

Annual Review of Financial Economics

Corporate Debt and Taxes

Michelle Hanlon¹ and Shane Heitzman²

¹Sloan School of Management, Massachusetts Institute of Technology, Cambridge, Massachusetts, USA; email: mhanlon@mit.edu

²Marshall School of Business, University of Southern California, Los Angeles, California, USA

ANNUAL
REVIEWS **CONNECT**

www.annualreviews.org

- Download figures
- Navigate cited references
- Keyword search
- Explore related articles
- Share via email or social media

Annu. Rev. Financ. Econ. 2022. 14:509–34

First published as a Review in Advance on
August 12, 2022

The *Annual Review of Financial Economics* is online at
financial.annualreviews.org

<https://doi.org/10.1146/annurev-financial-101221-103806>

Copyright © 2022 by Annual Reviews.
All rights reserved

JEL codes: G32, G38, H25, H32

Keywords

financial policy, capital structure, leverage, corporate tax, tax policy

Abstract

We provide updates to and perspectives on the enduring topic of debt and taxes. The recent decade brought us new empirical strategies, accounting rules, and tax laws. We discuss how these and other developments change our understanding of leverage and taxes. Overall, tax incentives still do not seem to have a consistent, first-order effect on corporate capital structure. This presents a puzzle as governments increasingly limit interest deductibility, citing its contribution to overleverage and distress. We discuss critical empirical challenges such as measurement, highlight issues surrounding assumptions about tax rates and real-world financing decisions, and offer insights and direction for future research. We conclude that rather than asking if taxes are a first-order driver of corporate capital structure, a more productive goal is a greater understanding of when tax incentives yield material effects on corporate capital structure.

The tax bias against corporate equity encourages firms to rely on debt more than they would if the tax system imposed no such bias. The use of higher debt levels by corporations, known as “leveraging,” may increase the risk of bankruptcy and financial distress during temporary industry or economy-wide downturns. This heightened bankruptcy risk can make the entire economy more volatile.

—Pres. Advis. Panel Federal Tax Reform (2005)

Companies are taxed heavily for making investments with equity, yet the tax code actually pays companies to invest using leverage. As a result, you’ve got too many companies ending up making decisions based on what their tax director says.

—President Obama (2011)

1. INTRODUCTION

This article takes stock of the recent empirical research on corporate debt and taxes. Auerbach (2002) and Graham (2013) provide comprehensive guides to the large body of theory and evidence in this area. We do not repeat those efforts.¹ Instead, we focus primarily on the recent decade of research characterized by new data, settings, and identification strategies. In addition, we offer our perspective on significant changes to accounting rules that affect the measurement of debt and taxes and tax laws that directly affect tax incentives to use debt. Because academic interest in the debt and taxes question spans finance, accounting, and economics, we survey the evidence from these areas. We summarize the unanswered questions, discuss policy implications, and provide directions for future research.

Asymmetric taxation of debt and equity financing is a nearly universal feature of tax codes. If this feature has a material effect on firm value, then financing decisions should respond to changes in tax incentives in predictable ways. Despite a tax hypothesis that has been around at least six decades, the evidence fails to paint a consistent picture of the importance of taxes to the capital structure decision. This is particularly troublesome given strong assumptions of tax effects in theory, pedagogy, and fiscal policy. Ten years ago in this journal, Fama (2011, p. 8) argued that “the big open challenge in corporate finance is to produce evidence on how taxes affect market values and thus optimal financing decisions.”² This challenge remains open.

We summarize our main findings as follows. First, the literature continues to struggle to document a consistent relation between corporate debt policies and taxes, despite new identification strategies and proxies for the tax benefits of debt. Coefficient estimates are statistically significant in some settings, but if the models are correct and the coefficients are reliable, they imply economic gains to leverage adjustments that appear too small to overcome even reasonable estimates of transactions costs.

¹For reviews of capital structure in general, see Graham & Leary (2011) and Graham, Leary & Roberts (2015). For reviews of taxes and general business decisions, see Shackelford & Shevlin (2001), Hanlon & Heitzman (2010), and Graham (2006, 2013). We do not focus on econometric issues, as those issues are covered in many other reviews.

²In addition, Myers famously stated, “I know of no study clearly demonstrating that a firm’s tax status has predictable, material effects on its debt policy. I think the wait for such a study will be protracted” (1984, p. 588). The evidence accumulated over the 1990s, and by 1998 Myers argued, “When you do get to the issue of the percentages on the balance sheet, taxes are only one of four or five things we know are potentially important. For this reason, I think it’s sort of back-asswards to start off with taxes and say that’s the primary concern, even though we can agree that it is one important element” (Vanderbilt Univ. Roundtable 1998, p. 18). Similarly, Parrino & Weisbach conclude “There is general agreement that debt has a tax advantage over equity, but disagreement exists over the magnitude of this tax advantage and the relative importance of the costs of debt that offset this tax advantage at the margin” (1999, p. 39).

Second, inconsistent empirical evidence coupled with potentially small economic effects presents a policy puzzle. Governments are increasingly adopting tax policies that explicitly limit interest deductibility. Some of this is driven by concerns that firms use intrafirm lending to shift tax deductions to high-tax entities. But statements from policy makers cited above and discussed below in Section 5 reveal a maintained assumption that tax laws that favor debt financing propel firms down a path of overleverage and distress. No evidence to support this policy motivation has been documented in the extant literature.³

Third, measurement issues continue to be relevant. The difficulties of measuring the tax status of a corporation and its investors are well known, and we still know very little about the tax rates that matter in practice. Moreover, accurately measuring relevant interest-bearing debt from the financial statements is a bigger challenge than is usually acknowledged. Intrafirm debt is often ignored (because it is eliminated for financial accounting purposes), the geographic home of debt matters for taxes but not for financial reporting, and accounting rules change over time, affecting standard measures of financing decisions.

Finally, recent reforms to corporate tax laws under the Tax Cuts and Jobs Act (TCJA) introduced a seemingly large shock to the tax incentives to finance with debt via the following: (a) a significantly lower corporate income tax rate; (b) the elimination of US taxes on most repatriations of foreign profits, theoretically leading to less borrowing in the United States⁴; and (c) explicit limitations on the deductibility of interest. Despite several tax changes that reduced the tax incentive to finance with debt, the jury is still out on whether and how the TCJA influenced firms' capital structure decisions.

Our primary calls for future research center on four broad goals. First, rather than focus on documenting whether taxes have significant average effects on debt financing, a more productive goal is a better understanding of the conditions under which taxes do matter. Macroeconomic conditions, fiscal policy and uncertainty, investment incentives, firm and industry characteristics, and managerial incentives and information are all candidates for explaining tax sensitivity. Second, the field still needs a deeper understanding of investor-level taxes and their influence on debt and equity prices. This research involves challenging maintained assumptions about the identity and tax sensitivity of the relevant price-setting investor and their importance to corporate financial policies. Third, given that the Organization for Economic Cooperation and Development (OECD) promotes explicit limits on interest deductibility, we need evidence on whether and how firms respond to those initiatives, if at all. Finally, given the anecdotal evidence, as well as some evidence in the literature that multinationals borrowed domestically to avoid the tax on repatriating foreign cash (e.g., Albring 2006; Graham, Hanlon & Shelvin 2010; De Simone & Lester 2018), one path for future research is to examine whether US multinationals use newly freed up foreign cash to pay down this debt following the TCJA and, if not, why not.⁵

³Another policy motivation is found in the notion that when full expensing (bonus depreciation) is allowed, interest deductibility should be curtailed so that the effective tax rate on debt-financed investment is not (too) negative.

⁴We recognize that after the TCJA more foreign earnings are subject to US taxation [e.g., by the Global Intangible Low-Taxed Income (GILTI) tax], but whether this tax is assessed is not dependent upon repatriation. Thus, the need to borrow in the United States to fund US operations because the foreign earnings were locked out due to a repatriation tax (Graham, Hanlon & Shelvin 2010) has in theory been eliminated.

⁵Care needs to be taken in this evaluation in terms of how debt is measured. For example, if debt is measured as worldwide net debt (debt less cash), then the use of previously foreign cash to pay down domestic debt would likely not be observable.

2. BASIC THEORY

Following Miller (1977), Graham (2003, 2013), Gordon (2010), and others, we (briefly) summarize the basic tax trade-offs between debt and equity financing and the implications for firm value. We then highlight two important considerations in using this framework to understand the tax sensitivity of debt. We start with the familiar expression that compares the after-tax value of \$1 of corporate cash paid to debtholders versus stockholders:

$$(1 - \tau_B) - (1 - \tau_C)(1 - \tau_E), \quad 1.$$

where τ_C is the marginal corporate tax rate and τ_B and τ_E are the taxes on interest and equity income, respectively, for the price-setting investors. When Equation 1 is positive, the manager can increase value by financing with debt, relative to financing with equity. The contribution to value from financing with debt D at interest rate r_D is

$$[(1 - \tau_B) - (1 - \tau_C)(1 - \tau_E)]r_D D. \quad 2.$$

Assuming debt is perpetual and discounting the stream of future tax savings at the after-tax discount rate $r_D(1 - \tau_B)$, we get the familiar expression from Miller (1977):

$$V_{\text{Levered}} = V_{\text{Unlevered}} + \left[1 - \frac{(1 - \tau_C)(1 - \tau_E)}{(1 - \tau_B)} \right] D. \quad 3.$$

In effect, the manager can increase the value of the firm with leverage if the after-investor tax value of interest $(1 - \tau_B)$ exceeds the after-tax value of residual profits $[(1 - \tau_C)(1 - \tau_E)]$. This equation yields two testable empirical predictions, holding the value of the unlevered firm and investor-level taxes constant:⁶

Prediction 1: The sensitivity of firm value to leverage is increasing in the corporate income tax rate.

Prediction 2: The incentive to finance with debt is increasing in the corporate income tax rate.

For investor taxes to matter, the price-setting investor needs to face differential taxation on those returns, that is, $\tau_E \neq \tau_B$. If $\tau_E = \tau_B$, only corporate taxes matter. The difference between τ_B and τ_E reflects the investor's tax penalty on interest income. This motivates two additional predictions (all else constant):

Prediction 3: The sensitivity of firm value to leverage is decreasing in the tax rate on interest income relative to the tax rate on equity income.

Prediction 4: The incentive for corporations to finance with debt is decreasing in the tax rate on interest income relative to the tax rate on equity income.

This framework provides a basis for estimating the value of tax benefits of debt directly (Graham 2000; Blouin, Core & Guay 2010), interpreting the results of market-based studies (Doidge & Dyck 2015; Faccio & Xu 2018), and providing a benchmark for theoretical and empirical evidence on the costs associated with using debt. That said, there are some important considerations to keep in mind.

⁶Miller (1977) used the model to describe a market equilibrium in which the investor-level tax implicit in security prices is endogenous to the corporate tax rate and an optimal debt ratio for an individual firm does not exist. The model can be generalized to incorporate features of the tax code and borrowing costs that yield firm-specific optimal debt ratios. For a discussion, see Graham (2013, section 2.1); for an example, see DeAngelo & Masulis (1980).

First, Equation 3 assumes the firm generates perpetual tax benefits from interest deductions. Theory, survey evidence, and empirical patterns of observed leverage are consistent with firms placing a high value on financial flexibility, retaining the option to borrow to fund future investment (Graham & Harvey 2001; DeAngelo, DeAngelo & Whited 2011; Denis & McKeon 2012; DeAngelo, Gonçalves & Stulz 2018; Graham 2022). Firms also display considerable time-series variation in their capital structures, suggesting that debt policy today may not reliably predict debt policy beyond a few years (DeAngelo & Roll 2015). This variation becomes important for interpreting the magnitudes (but not the sign) of estimated tax effects.

Second, it requires knowledge of the relevant tax rates. The standard assumption is that the price-setting investor is a taxable individual who faces tax rates $\tau_E < \tau_B$. However, because heterogeneity exists in the taxation of capital providers (e.g., banks subject to the corporate rate lend), we still do not know whose taxes matter for pricing the firm's debt and equity or how.⁷ In addition, the corporate rate (τ_C) that measures the expected tax benefit of interest deductions ($r_D D$) is difficult to estimate. A multinational (and even a multistate) firm can have several τ_C values, τ_C is endogenous to the financing decision, and the manager's own proxy for τ_C is potentially influenced by the quality of their information, variation in the horizon of the debt, and expectations of future tax rate changes, among other things.

3. RECENT EVIDENCE ON DEBT AND TAXES

3.1. Cross-Sectional Variation in Tax Rates

The classic simulated marginal tax rate (MTR) developed for wide use by Shevlin (1990) and Graham (1996a)—the prevalent firm-level estimates of τ_C —assumes that the firm faces a single tax system based on the location of the parent company and disregards the location of the operations and subsidiaries.⁸ However, most large firms are multinational and face tax differences across the jurisdictions in which they operate.

Recognizing this limitation in simulated MTRs and its impact on tests of Prediction 2, Faulkender & Smith (2016) estimate the firm's tax rate using an EBIT (earnings before interest and tax)-weighted average of statutory tax rates across the countries in which the firm operates. Unlike the simulated MTR, this approach does not rely on long-run income forecasts or net operating loss carryforward (NOL) estimates, implying that managers make debt decisions based more on short-term forecasts and statutory rates.

Their proxy explains leverage as expected: Firms with higher global average statutory tax rates utilize more debt financing. Interestingly, the authors show that the coefficient on the tax status proxy switches sign using both the simulated MTRs from Graham (1996a) and the nonparametric income forecasting alternative from Blouin, Core & Guay (2010). The authors attribute this to measurement error in simulated MTRs from ignoring cross-country variation in corporate tax rates. Faulkender & Smith's (2016) approach reflects an important contribution to measuring the relevant tax benefit for multinationals relative to domestic-only corporations,

⁷This heterogeneity is less important for the market as long as investor taxes are reflected in prices, and more important for managers and researchers whose models rely on assumptions about investor taxes.

⁸For more detail on MTRs, visit John Graham's website at <https://faculty.fuqua.duke.edu/~jgraham/taxform.html>. Note that Auerbach (1983) estimated MTRs on the earnings of corporate investments in plant and equipment. In addition, Altshuler & Auerbach (1990) examine and clearly describe the restrictions on the ability of firms to utilize tax losses and credits. Shevlin (1987, 1990) and Graham (1996a) incorporate the insights and details about loss carryforwards and credit utilization from Auerbach (1983) and Altshuler & Auerbach (1990) in developing the firm-specific MTRs.

because multinationals are more profitable on average and variation in rates across the countries in which they operate is a well-known determinant of their tax planning.

A recent survey of tax directors by Graham et al. (2017) also provides support for a statutory tax rate–based proxy. Using survey responses from nearly 500 firms, the authors find that (a) managers infrequently use sophisticated MTR estimates when making capital structure decisions (approximately 12% of the time) and (b) publicly traded firms that rely on statutory tax rate estimates have significantly more foreign assets. This finding highlights the need to understand the proxies that managers actually use and is consistent with managers of multinational firms using statutory rates as a simple heuristic. In that spirit, future research that generates estimates of Faulkender & Smith’s (2016) measure with publicly available data could provide valuable opportunities to understand capital structure and other corporate decisions.

3.2. Time-Series Variation in Tax Rates

Although tax policy shocks vary significantly in scope and political motive (Romer & Romer 2010), they do offer a potentially powerful test of sensitivity to taxes implied by Prediction 2. For example, studies focused on specific tax reforms, such as the 1986 Tax Reform Act, appear to provide compelling evidence that taxes affect debt use in the predicted way (Gordon & MacKie-Mason 1991; van Binsbergen, Graham & Yang 2010). That said, evidence from several recent studies appears mixed.

Using aggregate Internal Revenue Service (IRS) statistics spanning almost a century and at least two dozen corporate tax regimes, Fleckenstein, Longstaff & Strebulaev (2020) show that changes in the US corporate tax rate predict changes in aggregate corporate leverage. Over a similar period, however, Graham, Leary & Roberts (2015) find little evidence of a link between corporate tax regimes and aggregate leverage of public firms, controlling for time trends and macroeconomic factors. The characteristics of firms and their debt that comprise the aggregate data used in these two studies are likely to be systematically different. For example, IRS statistics capture every corporation filing a tax return and thus include small, private companies, whereas Graham, Leary & Roberts (2015) use only publicly traded companies. Moreover, IRS data focus on domestic balance sheets, whereas financial reporting data reflect worldwide balance sheets. Whether these factors explain the difference is unclear.

Bargeron, Denis & Lehn (2018) explore an early shock to the US tax regime during World War I: the corporate excess-profits tax. Between 1915 and 1922, statutory corporate tax rates increased from 1% to 12.5%. In addition, between 1917 and 1921, the excess-profits tax levied an additional tax of 40% to 80% on excess income. The key detail is that firms received a credit against the tax that increased with the use of equity financing, not debt.⁹ In this case, Prediction 2 suggests that marginal investment by firms subject to the excess-profits tax would be financed with equity. Inconsistent with Prediction 2, investing firms overwhelmingly financed with debt and appeared to delever after Congress rescinded the tax. Both the horizon of the tax and the debt can possibly explain these results. If financing needs are primary and the debt is transitory, tax considerations are unlikely to matter. This pattern of leveraging up to fund investment, followed by periods of

⁹For a review of the literature regarding equity deduction settings that in theory integrate corporate taxation and reduce debt bias, see Klemm (2006). A recent example includes the work by Schepens (2016), who finds that the average Belgian bank significantly reduced debt financing (while leaving investment unchanged) after Belgium allowed a deduction for the cost of equity. Colombo & Caldeira (2018) find that firms reduced leverage after Brazil permitted tax deductions for so-called interest on equity distributions. The US Senate held hearings in 2016 to consider the arguments for allowing a tax deduction for dividends (US Senate Comm. Finance 2016).

deleveraging, appears to be a regularity of capital structure dynamics (Denis & McKeon 2012). Even if the debt is permanent, managers should be less responsive to short-term tax costs.

Other settings appear consistent with Prediction 2. Doidge & Dyck (2015) examine Canadian income trusts. These firms experienced a sharp and unexpected increase in their applicable tax rate—from 0% to 31.5%—and increased leverage by 6 percentage points over the 4-year period following the Canadian reform. Thus, across studies of specific events, the evidence is mixed.

Researchers also rely on panel data that capture time-series and cross-sectional variation in statutory tax rates. Based on an international sample of firms from 29 OECD countries, Faccio & Xu (2015) identify changes in country-level tax rates between 1981 and 2009 and find that leverage responses to tax reforms are strongest and most immediate for decreases in tax rates. When tax rates increase, firms delay the leverage response by several years.¹⁰ Heckemeyer & de Mooij (2017) also find that consolidated debt use is sensitive to corporate taxes.

Subnational variation in tax rates can also be exploited. For example, interest is usually deductible at the state level in states with a corporate income tax. State corporate tax rates vary in the cross section (from 0% to more than 10%) and often change over time. Heider & Ljungqvist (2015) cleverly exploit this variation and identify a panel of 121 state corporate tax rate changes over a 13-year period. If firms originate debt in the state where they are headquartered, and leverage responds to the effective dates of state tax reforms, then their evidence suggests that firms respond to tax rate increases with more borrowing, consistent with Prediction 2. Contrary to Faccio & Xu (2015), who find that leverage reacts more to country tax rate cuts than increases, Heider & Ljungqvist (2015) find that leverage reacts more to state tax increases than state tax cuts. The latter authors attribute the asymmetry to an agency explanation in which the gain from reducing debt would accrue primarily to debtholders (Admati et al. 2018). It is not clear why these authors obtain such different results.¹¹

Taken together, the evidence from time-series changes in corporate taxes raises questions that should be addressed in future research. For example, what factors explain the divergent evidence for Prediction 2 and what do they imply about our understanding of corporate leverage? In addition, how durable are leverage reactions and how much does that matter?

3.3. Intrafirm Lending and Debt Allocation

When the boundaries of the firm span jurisdictions with different tax regimes, at least three predictions arise: External (third-party) debt capacity is increasing in the average statutory corporate income tax rate across countries (e.g., Faulkender & Smith 2016); external debt will be allocated to subsidiaries with the highest tax rates (e.g., Huizinga, Laeven & Nicodème 2008; Arena & Roper 2010); and internal lending will be used to shift profits from high-tax to low-tax subsidiaries (e.g., Altshuler & Grubert 2003). Graham (2013) provides an extensive review of the rules and literature. We concentrate on a recent area of the literature focused on internal capital markets.

¹⁰Consistent with the tax hypothesis, Faccio & Xu (2015) estimate a coefficient of 0.40 on the statutory corporate income tax rate, suggesting that an increase in the tax rate of 10 percentage points is associated with a 4-percentage-point increase in the debt ratio. Because investor-level taxes are expected to influence the net tax benefits of debt through their influence on expected rates of return, the authors also include changes in individual tax rates on dividend and interest income. The effects of changes in top individual dividend and ordinary income tax rates are smaller.

¹¹A working paper by Ivanov, Pettit & Whited (2021) uses state variation on private firms and finds an increase in debt in response to tax rate decreases. They attribute the result to a default risk story: The increase in after-tax cash flows increases the distance to default and thus raises borrowing capacity.

What makes the internal capital market setting unique is that information and distress costs are relatively minimal (i.e., the company is lending to itself). This allows managers to focus on the potential tax gains where inputs (r_D , τ_C , τ_B , τ_E) are also easier to control and estimate. As a tactical financing decision (Myers 2001), intrafirm debt should be more sensitive to variation in marginal benefits (MBs) as captured by tax rates. However, intrafirm debt and interest payments do not appear on the consolidated firm's balance sheet or income statement because intracompany transactions are eliminated in the accounting consolidation process and rarely disclosed. As a result, less research is done on intrafirm debt and internal capital market activity generally.

Early work by Collins & Shackelford (1998), Altshuler & Grubert (2003), and Desai, Foley & Hines (2004) uses proprietary government data to show that intrafirm lending at US multinationals is sensitive to tax incentives. More recent work explores similar questions using multinational data provided by the Deutsche Bundesbank. Fuest, Hebous & Riedel (2011) show that foreign subsidiaries borrow more from their German parent company when subsidiaries' statutory tax rates are higher, while Buettner & Wamser (2013) find that related-party borrowing between affiliates is also a function of their relative tax rates.

If firms adopt internal lending policies that exploit opportunities to shift taxable profits to low-tax subsidiaries, it is not surprising that governments take actions to limit the tax benefits.¹² Some tax laws incorporate thin-capitalization (thin-cap) rules that disallow tax deductions for interest expense on related-party debt above a bright-line threshold ratio of debt-to-equity. Staggered national adoptions of thin-cap rules provide a convenient empirical setting to test Prediction 2: If internal borrowing is sensitive to taxes, and internal leverage is beyond the threshold allowed by the tax authority, then adoption of a thin-cap rule by a high-tax affiliate's country ought to lead to a reduction in that affiliate's related-party debt. Overesch & Wamser (2010) show this using German subsidiaries of foreign parents. Buettner et al. (2012) find similar effects between German parents and their foreign subsidiaries. Blouin et al. (2014) produce similar findings using related-party debt within US multinationals.

At least three developments make the intrafirm lending setting an interesting area for future research. First, profit shifting continues to be a prime target of tax authorities worldwide, evidenced by the recent agreement among approximately 140 countries to implement a global minimum tax (OECD 2021). Although several studies exploit confidential data on US subsidiaries or public data on European subsidiaries, we have surprisingly little insight into intercompany lending agreements.

Second, thin-cap rules based on threshold debt-to-equity ratios are slowly being replaced by earnings-stripping rules that limit interest deductions to a percentage of tax-based earnings. Theoretical work by Gresik, Schindler & Schjelderup (2017) supports the earnings-based approach, and it is explicitly recommended by the OECD.¹³ If a limitation based on earnings is more difficult to avoid than a limitation based on a debt-to-equity ratio, then internal debt ought to be even more sensitive to these limitations.

Finally, interest limitation rules often apply to external debt as well. Some interesting questions are whether firms are indeed sensitive to these limitations in their external financing decisions, and whether the tax sensitivity of external debt depends on the firm's ability to achieve tax benefits from internal debt. In other words, do the tax benefits of internal debt affect the use and tax benefits of external debt?

¹²Since at least 1979, Section 385 of the Internal Revenue Code provides the IRS with the discretion to recharacterize interest payments as dividends under the theory that a firm's owners have incentives to structure their investment as debt for tax purposes.

¹³Readers are referred to the OECD base erosion and profit shifting (BEPS) project website, <https://www.oecd.org/tax/beps/>.

3.4. Are Investor-Level Taxes Relevant?

Investor-level taxes are foundational to both theory and empirical strategy. Whether one needs to incorporate their effects depends on the question. A research design focused on corporate tax changes with no correlated investor-level tax changes is generally sufficient to focus on corporate tax effects. However, these settings are difficult to find, as tax changes are generally broad-based. Furthermore, because we cannot observe the tax status of the price-setting investor, we cannot generally identify whether their tax rate has changed. Studies such as those by Lin & Flannery (2013) and Cohn, Titman & Twite (2021) focus on leverage reactions to investor-level tax changes specifically. These studies can be useful in gauging the general direction of tax effects but are inherently joint tests of Prediction 4 and the hypothesis that the relevant investor is a taxable individual.

To illustrate the difficulty in isolating the effects of investor-level taxes and reconciling with theory, consider the firm's borrowing activities. To proxy for investor-level tax effects in debt, one might tap into the implicit tax rate implied by the spreads between publicly traded investment-grade municipal and corporate bonds as in the work by Graham (2000) or Blouin, Core & Guay (2010). However, various market frictions prevent a clear interpretation of observed spreads (Cestau et al. 2019). Moreover, Colla, Ippolito & Li (2020) show that the sources of corporate debt are diverse. Approximately 60% of US firms borrow using senior bonds or notes; tax-exempt institutions are a natural clientele for corporate bonds but face no investor-level tax on the investment. Approximately half of the firms in their sample have credit lines or term loans outstanding; these are typically funded by banks subject to the corporate tax (or the individual tax if the bank is an S corporation, and no tax if a credit union). Finally, leasing is a key vehicle for financing corporate investment, but the corporate taxation of the lessors providing capital ranges from the effectively untaxed real estate investment trust (REIT) to a fully taxable C corporation. Taken together, the municipal–corporate bond spread is unlikely to identify the impact of investor-level taxes in firms' cost of debt.

While not a direct test of Predictions 3 or 4, examining the relation between the loan spread charged by the bank and the tax rate the bank faces on interest income potentially sheds new light on the pricing of investor taxes implied by Equation 3. For example, Kang, Li & Lin (2021) ask whether banks' exposure to state-level corporate tax rates affects the spreads charged by those banks. The idea is that a lending bank corporation that faces a tax rate on interest income tied to the location of the borrower will adjust the interest rate charged to hold the after-tax return to the bank constant (i.e., the bank will charge more to cover the bank's taxes). Using staggered state tax changes, the results are consistent with this prediction: Banks charge higher spreads to borrowers in higher-tax states.¹⁴ These findings are also consistent with international bank-level evidence in the work by Demirgüç-Kunt & Huizinga (1999) and Huizinga, Voget & Wagner (2014), who show that the interest margins charged to bank customers are increasing in the bank's exposure to corporate and cross-border taxation.

An interesting implication of these studies is that the price-setting investor could easily be another taxable corporation exposed to the same tax on interest income that the borrower escapes from its interest expense, that is, $\tau_B = \tau_C$. Under this condition, an increase in the tax benefit of interest is offset by an increase in the tax cost implicit in the interest rate. We look forward to future research that explores whether debt specialization by borrowers and variation in lenders' tax statuses provide a path to better understanding the pricing of investor-level taxes and its impact on leverage decisions.

¹⁴Kang, Li & Lin (2021) do not test the amount that is lent.

3.5. Has the Economic Impact of Tax-Motivated Debt Financing Been Exaggerated?

Using different approaches, van Binsbergen, Graham & Yang (2010) and Korteweg (2010) estimate the firm's net tax benefits of debt (net of costs such as financial distress) to be approximately 4–6% of value.¹⁵ However, they also find that firm value is largely insensitive to modest deviations from optimal leverage ($\pm 20\%$ of observed debt-to-assets).

The insensitivity of value to modest leverage deviations appears consistent with dynamic inaction models that predict infrequent rebalancing (for a review, see Strebulaev & Whited 2012). If firms do not frequently rebalance their capital structures, then only firms for which the tax change pushed them outside a region of optimal inaction should immediately respond (DeAngelo, DeAngelo & Whited 2011; Morellec, Nikolov & Schürhoff 2012; Danis, Retzl & Whited 2014; Li, Whited & Wu 2016). Tax-induced deviations, and thus the need to respond, are tempered when managers do not expect tax changes to last (Hennessey, Kasahara & Strebulaev 2020).

Where does this leave us? Assume that the reported coefficients from the studies represent a meaningful estimate of the magnitude of the average firm's debt sensitivity to taxes. In this case, the empirical estimates from the extant research on debt-tax sensitivities appear too small to matter. In a meta-study covering research published between 1995 and 2012, Feld, Heckemeyer & Overesch (2013) catalog more than 1,000 coefficient estimates and conclude that the sensitivity of leverage ratios to taxes $[\partial(D/A)/\partial\tau_c]$ is approximately 0.27. That is, a 1 percentage point decrease in the tax benefits of debt is associated with a 0.27 percentage point lower leverage ratio.¹⁶ Heider & Ljungqvist (2015) document large sensitivities at 0.4. But how does this compute in value terms?

Suppose a firm's assets are worth \$4 billion, it has \$1 billion in debt outstanding, and it is at optimal leverage. Using the 0.4 estimate from Heider & Ljungqvist (2015), a tax rate hike of 1 percentage point implies an increase in the leverage ratio from 0.25 to 0.254.¹⁷ Holding asset value constant, optimal debt increases to \$1,016 million ($\$4 \text{ billion} \times 0.254$). As shown in **Figure 1**, increasing debt raises the value of the firm by the area under the MB curve ($\tau'_c \Delta D$) and reduces the value of the firm by the area below the marginal cost (MC) curve. The net gain to increasing debt in response to the tax incentive is only the small, outlined triangle above the MC curve.¹⁸ Assuming constant marginal benefits, linear marginal costs, and a permanent debt adjustment, a firm that adjusts leverage up by \$16 million expects to gain on the margin approximately \$80,000 in present value terms $[0.5 \times (0.01 \times \$16\text{m})]$. This is before subtracting transaction costs not reflected in the MC curve (and the result will be smaller if the new debt is transitory). Consistent with the dynamic inaction literature, a rational manager should ignore such small perturbations.

¹⁵Identification of the cost curve in van Binsbergen, Graham & Yang (2010) assumes that the tax benefit function varies exogenously with respect to the cost curve. As the authors note, this variation can come from either time-series shifts in tax rates or cross-sectional variation in the MB curve. In Korteweg (2010), the pricing approach is forward-looking. Investors are assumed to price in the firm's optimal leverage, but being at optimal is not required to estimate the net benefits model. The underlying economics in both studies is the same, and the similarity of their results suggests that the approaches are reinforcing.

¹⁶Across four dozen papers analyzed by Feld, Heckemeyer & Overesch (2013), 12% of the reported empirical estimates of tax sensitivity are derived using simulated MTRs.

¹⁷Most of the changes in state tax rates examined by Heider & Ljungqvist (2015) are below 1% (and the firm is only affected to the degree of taxable income apportioned to that state). These same, negligible changes in tax rates are used to identify tax effects in numerous studies, including those by Ivanov, Pettit & Whited (2021) and Kang, Li & Lin (2021).

¹⁸We thank John Graham for pointing this out.

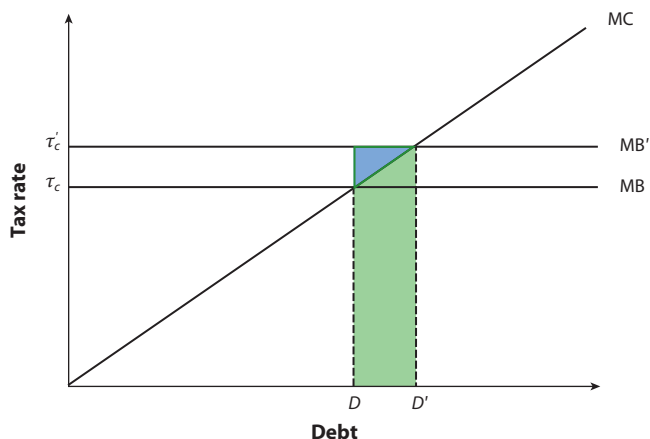


Figure 1

This figure illustrates the gain from refinancing after a tax rate increase. For a tax rate increase from τ_c to τ'_c , optimal leverage increases from D to D' . If the firm refinances, the benefits are picked up by the area below the marginal benefit (MB') curve (blue) and the costs are picked up by the area below the marginal cost (MC) curve (green). The net gain from refinancing is the small blue triangle that appears above the MC curve.

Even if the tax change is sufficiently large to overcome transactions costs, the net gain to the firm appears relatively small, and firms should be slow to respond.¹⁹

Overall, the evidence suggests that estimated debt–tax sensitivities are often small and not necessarily in the same direction. On the margin, taxes appear dominated by considerations such as funding demands. Managers appear conservative, failing to lever up to capture maximum tax benefits (Graham 2000). Survey evidence from Graham & Harvey (2001) suggests that financial flexibility is a likely reason. Using updated survey data, Graham (2022, figure 16) reports that financial flexibility appears even more important to managers' debt decisions, while tax incentives appear less important after the TCJA. The latter result is of course consistent with the reduction in the tax benefits of debt under the TCJA.

4. MEASUREMENT AND THE RELEVANCE OF FINANCIAL ACCOUNTING

4.1. Introduction

Empirical tests of capital structure theories lean heavily on financial accounting–based proxies for leverage, tax status, and other determinants of financing choice. However, the wedge between the economic construct and the accounting-based proxy can be large. For example, accounting rules systematically understate asset values, information in audited financial statements may not correspond to information reported internally to the manager or to the tax authorities, entities within the reporting group are often different between financial accounting and tax, and some fixed claims that have associated tax-deductible costs are not recorded as debt (or interest expense)

¹⁹Small estimated debt–tax sensitivities do not necessarily imply small total net benefits of debt. For example, with a steep MC curve, debt should be largely unresponsive to changes in tax rates, yet the net tax benefits reflected in the area between the MC and MB curves can be large. Gordon (2010), Hennessy, Kasahara & Strebulaev (2020), and others discuss the interpretation of empirical debt–tax sensitivities and their significance for understanding welfare implications of tax preferences for debt financing.

on financial statements. In the remainder of this section, we discuss two pertinent accounting measurements faced in corporate finance research: tax status and financing.

4.2. Measuring Corporate Tax Status

Researchers have introduced numerous proxies for corporate tax status. Graham (1996b) discusses several, including NOLs, statutory tax rates, cash or Generally Accepted Accounting Principles (GAAP) effective tax rates, profitability, nondebt tax shields, sophisticated approaches using simulations, or some combination. Organizational form variation has also been used (Barclay, Heitzman & Smith 2013; Doidge & Dyck 2015). In all cases, endogeneity of the tax status proxy is an important consideration (Graham, Lemmon & Schallheim 1998).

The empirical debt and taxes literature, at least with US samples, relies heavily on the seminal Shevlin-Graham simulated MTRs that use financial accounting information to estimate and forecast taxable income. The Shevlin-Graham method, which captures the features and dynamics of the tax code, estimates a theoretically correct MTR. However, it also has enough limitations to open the door for other measures. Basic but difficult measurement concerns that are inherent to estimated MTRs—and potential fixes—have been discussed at length in the prior literature (Graham & Mills 2008; Blouin, Core & Guay 2010; Hanlon & Heitzman 2010).²⁰ Adding to these concerns, as we discuss in Section 3.1, is whether managers even use sophisticated tax proxies. Based on survey evidence from Graham et al. (2017), the answer is probably no. The more we know about managers and how they think about tax status and corporate financing as discussed by Bertrand & Schoar (2003), Faulkender & Smith (2016), Graham et al. (2017), and others, the more informed our empirical strategies will become.

4.3. Measuring Debt and Other Fixed Claims with Financial Statements

Traditional debt issues are the backbone of capital structure research. However, Welch (2011) shows that for a sample from the early 2000s, nondebt liabilities account for approximately half of book liabilities. These are relevant if they influence the debt-versus-equity decision. Leasing (Rauh & Sufi 2012), pension (Bulow 1982; Shivdasani & Stefanescu 2010), and deferred compensation (Cassell et al. 2012) obligations all appear to influence debt usage. Research also suggests that trade credit is a direct, alternative source of external financing (Petersen & Rajan 1997; Desai, Foley & Hines 2016).²¹ Even tax liabilities are fair game, with firms delaying tax payments or engaging in aggressive tax avoidance to conserve cash (Law & Mills 2015; Edwards, Schwab & Shevlin 2016).

²⁰These concerns include (a) requiring assumptions in the process of the researcher-estimated future taxable income for the firm, (b) not considering the effect of permanent differences, (c) not taking into account tax rates in foreign jurisdictions where the firm operates, and (d) using financial accounting data to proxy for taxable income, among others (see Graham 1996a; Graham & Mills 2008; Hanlon & Heitzman 2010). Confidential tax return data do not necessarily improve the situation (Graham & Mills 2008). Another concern less frequently discussed is the measurement of NOLs. NOL status is a key determinant of variation in the simulated MTRs. Graham's rates use the amount reported by Compustat (variable *tlcf*) as the starting value. Issues with Compustat NOLs are well-known and include understatement of the frequency and misstatement of the amount. Improved proxies for the firm's NOL benefits have been identified using financial statement disclosures (Mills, Newberry & Novack 2003; Heitzman & Lester 2022).

²¹Desai, Foley & Hines (2016) argue that trade credit policies are driven by corporate tax considerations similar to the prediction on debt (Prediction 2). However, an examination of 29,910 trade credit contracts provided by 24,140 unique suppliers finds that only 13% included a discount that would create an interest-like component for either buyer or seller (Klapper, Laeven & Rajan 2012).

How is this relevant for the debt and taxes literature? Empirical tests of Predictions 2 and 4 should isolate the financing decisions relative to an all-equity firm. The all-equity firm can choose its lease, pension, trade credit, and deferred compensation policies in response to tax incentives. If the goal is to explain the effect of taxes on external debt financing, the empirical model must be careful to hold the effects of those decisions (for example, on the tax benefits of debt or the need for debt) constant. If it cannot, it strains the ability to draw conclusions about tax effects in capital structure choice.

These issues compound when the liabilities in question (and the assets they support) are not even on the balance sheet. Under prior accounting rules, this would include pensions (even more so than under current rules), operating leases, and debt held in special-purpose entities (Mills & Newberry 2005). The existence of off-balance-sheet financing understates true leverage. If the off-balance-sheet debt results in tax-deductible interest, this will affect tests of the tax incentives for debt. Examples include intracompany debt (discussed above) and debt–equity hybrid securities (Engel, Erickson & Maydew 1999). We do not have space to cover the details or evidence on these topics but focus on leases in the next section to illustrate the point that measurement using financial statements does not always represent measurement used for tax purposes.

Welch (2011) reviews the literature's use of debt-to-assets as the variable of interest and suggests several alternatives. But how do managers think about debt policy? Data obtained by surveyed CFOs suggest that managers are far more likely to think about debt policy in terms of debt-to-EBITDA (earnings before interest, tax, depreciation, and amortization) or an interest coverage ratio and not very often in terms of the research mainstays of debt-to-assets or debt-to-equity (Graham 2022).²² We look forward to research understanding whether managers' capital structure decisions are consistent with their survey responses and under what conditions.

4.4. Leasing

The literature has long acknowledged leasing as a critical source of financing and has sought to understand the tax and nontax factors that affect its use in corporate finance (Smith & Wakeman 1985; Graham, Lemmon & Schallheim 1998; Eisfeldt & Rampini 2009; Rauh & Sufi 2012; Rampini & Viswanathan 2013; Chu 2020). This section focuses on new accounting rules for operating lease financing. First, we briefly discuss the tax incentives for leasing.

The substitution hypothesis of leasing is framed in terms of arranging financing so that tax benefits accrue to the party who benefits from them the most. High-tax-rate firms (lessors) should purchase assets and lease them out to low-tax-rate firms (lessees) because the lessor typically retains the right to interest and depreciation deductions on the asset. Rental payments can be negotiated such that the low-tax-rate firm shares the tax benefits via reduced rent.

Measuring capital financed through leasing has long been problematic because determining whether a lease is economically equivalent to a purchase is not straightforward. Historically, only the small fraction of leases treated as capital leases (now called finance leases) were treated as purchases. Prior to 2019, assets acquired through operating lease agreements—and the associated liabilities—were not included on the lessee's balance sheet. Instead, the lessee disclosed a schedule of required minimum lease payments in the notes to the financial statements. This information allows a financial statement user to estimate the present value of the lease liability and make pro forma balance sheet and income statement adjustments. A researcher, analyst, or investor focused

²²Note that these are the same metrics often used in debt covenants.

only on debt reported on the balance sheet would miss the investment and financing through operating leases and potentially misvalue the firm because of unrecorded assets and liabilities.²³

The accounting rules changed for operating leases in 2019 [under both US GAAP and International Financial Reporting Standards (IFRS)]. Lessees now record most operating leases—both the asset and the liability—on the balance sheet at approximately the present value of the minimum lease obligations.²⁴ Under the new US accounting rules, the balance sheet now recognizes operating lease obligations as a source of financing, but the income and cash flow statements do not. Rent expense is still treated as a pure operating cost on both statements. This inconsistency between the income statement and balance sheet is an important factor for researchers when attempting to identify financing activity and its costs. In contrast, international accounting standards require firms to estimate and record the interest and depreciation expense components of operating lease payments on the income statement.²⁵

The tax treatment of leases was unaffected. Operating leases are still true leases for tax purposes, meaning the lessee deducts the rent payment, not explicit interest or depreciation. Thus, the prediction that low-tax-rate firms will have more operating leases than high-tax-rate firms should still hold. Moreover, the interest implicit in lease payments is not subject to limitations on interest deductibility (we discuss those limitations in the next section). Finally, although the financial statements now report operating lease debt on the balance sheet, this is still not treated as debt for tax purposes. Thus, book measurement of the relevant debt does not align with the tax measurement.

What is the impact on empirical research? S&P Global, the provider of Compustat and Capital IQ databases, decided to include the new operating lease liability in its usual measure of debt financing [long-term debt total (*dltt*) plus debt in current liabilities (*dlc*)] for both domestic and international firms. As of this writing, Compustat does not separately report the operating lease component in its standard data sets (although firms explicitly disclose it on the face of the balance sheet and in the notes).²⁶ Firms continue to disclose (and Compustat reports) minimum lease payments for the next 5 years (*mrc1* through *mrc5*), plus the amount thereafter as a lump sum (*mrcta*). This provides future cash flow inputs relevant to estimating the liability that firms report (the firm also reports the weighted-average discount rate used to value leases, but this will need to be hand collected or estimated by the researcher until it is available in Compustat). Whether one is interested in measuring financing with or without operating leases, consistency will be important.

²³See also Graham (2013), who highlights the question of substitution between debt and leases as well as the endogeneity of tax status to leasing.

²⁴In the United States, these rules are reflected in the Accounting Standards Codification (ASC) Topic 842. The new rules are effective for annual periods starting after December 15, 2018, and must be reported on the first interim period. Firms had the option to adopt the standard as early as 2016. Internationally, IFRS 16 covers lease accounting and generally requires capitalization of operating leases for fiscal periods starting after December 21, 2018. Very-short-term leases (initial lease term less than 12 months) are excluded, as are variable leases.

²⁵In the United States, operating lease costs will generally reduce earnings and reduce EBITDA by the payment made. For a similar lease using international accounting rules, operating lease costs will be frontloaded, and interest and depreciation reduce earnings but not EBITDA.

²⁶To identify the actual operating lease liability reported by the firm, one needs to either hand collect the data or use supplemental products such as Compustat Snapshot. For a useful write-up on alternatives, readers are referred to the paper by Ma (2020). Compustat does provide a separate variable for the capitalized lease obligations reported in debt (*dcl*), but as of this writing, *dcl* includes only finance leases. See also S&P Global Market Intelligence “CIQ Fundamentals Update—Operating Leases,” available to subscribers at <https://www.capitaliq.com>.

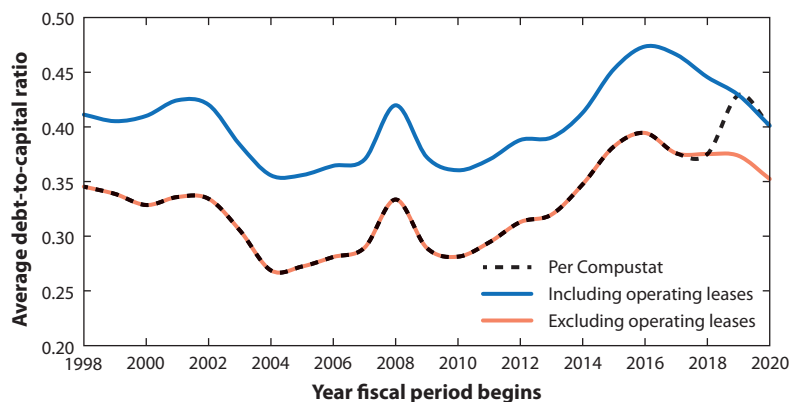


Figure 2

Average debt-to-capital ratios, per Compustat and adjusting for operating leases. Debt-to-capital is defined from Compustat data items as $(dltt + dlc + \text{operating lease adjustment}) / (dltt + dlc + seq)$. Operating lease adjustment values are based on the work by Li, Whited & Wu (2016), calculated as the present value of future minimum lease payments discounted at the Baa yield. The sample consists of US Compustat firms with positive capital and fiscal years ending between December 1998 and November 2021. Years are based on the date the fiscal year begins.

The researcher should subtract the estimated lease liability beginning with fiscal years starting in 2019 if the focus is on traditional debt defined by tax rules. If the focus is a broader measure of capital financing inclusive of leasing, the researcher should add back the estimated liability before this period.²⁷

Figure 2 shows the time series of capital structure for US firms and the impact of leases and lease accounting on measured debt ratios since 1998. The mean debt ratio without adjustment shows a sharp increase in 2019, reflecting the inclusion of leases on the balance sheet and in Compustat's measure of debt. For comparison, we also show our adjusted measures. First, we show the trend in the measurement including leases, in which we added an estimate of operating lease value to debt and capital before 2019. Second, we show the measurement without leases, in which we subtracted the estimated lease value from Compustat debt starting in 2019. Operating lease leverage adds approximately 6–8 percentage points to the debt ratio. Unadjusted debt ratios for data after 2018 will conflate debt and lease activity for those years.²⁸

What are the takeaways for corporate finance research? First, tests that span the adoption of new lease accounting rules (such as debt responses to the TCJA) must consider the impact of lease accounting. Second, balance sheet measures of debt issuance will include changes in both debt and leasing policies, whereas cash flow statement measures will continue to isolate true debt.

²⁷Interest expense reflects the interest on traditional balance sheet debt and capital/finance lease obligations. Although an interest component is implicit in operating lease payments, it is included under the umbrella of rent expense. For a researcher focused on a broad-based measure of financing activity that includes leases, one can estimate the implied interest component as the product of the present value of the lease and the assumed discount rate. Alternatively, one can follow Graham, Lemmon & Schallheim (1998) and use one-third of rent expense as the implied interest component. Graham's before-financing simulated MTRs include the implied interest component of rent expense in his estimate of interest expense (see <https://faculty.fuqua.duke.edu/~jgraham/taxform.html>).

²⁸If one graphs debt issuances, a large spike occurs in the average balance sheet change in debt due to the leases being added to the balance sheet. If one graphs cash flow metrics, no spike occurs.

Third, disclosed and reported lease obligations typically understate managers' expected lease obligations. This understatement occurs because they exclude future, not-yet-contracted periods likely covered by lease renewal options (i.e., they do not take into account lease terms starting in a future year). In an untabulated analysis of Compustat data, we find that disclosed future minimum lease payments for the next 5 years capture less than half of the realized lease payments over the same period. Finally, lease accounting rules could influence real capital structure decisions if managers respond to financial reporting (not tax) incentives. For example, industry observers predicted the new lease rules would induce firms to stop utilizing operating leases and just purchase the assets (because they have to show them as liabilities anyway), yielding an increase in traditional debt issues.²⁹

5. TAX POLICY DEVELOPMENTS

In this section, we focus on recent tax law changes that affect the tax benefits of debt financing. We focus on the relevant provisions of the TCJA and also extend the discussion of interest deductibility limitations to include some of the rules in other countries.³⁰

5.1. The 21% Corporate Tax Rate

The most salient change to the tax benefits of debt is the corporate tax rate reduction from 35% to 21%. Consistent with Prediction 2, this change alone should drive firms to reduce leverage. Graham, Hanlon & Shroff (2022) find that the rate change is by far the most important provision of the TCJA for their 182 survey respondents, with 84% indicating that rate change was important or very important. When asked which provisions of the TCJA led their companies to change their debt levels, respondents said it was the lower corporate statutory tax rate (16% of respondents), the tax-free repatriations of foreign earnings (10%), and bonus depreciation provisions (9%). Interestingly, only 4% of respondents indicated that interest deductibility limits led to a decrease in debt. Moreover, although the massive statutory rate change appears to be the largest determinant of potential TCJA-induced debt reductions in this group, barely one out of six responded it would have an effect. If a 14-percentage-point drop in the federal tax rate does not trigger a strong financing response, it is hard to conclude taxes are a first-order determinant. The respondent sample is more profitable and less financially constrained than the average Compustat firm—factors that should make them more sensitive to tax changes. Thus, their responses likely capture upper-bound estimates of the broader population.³¹

²⁹Several recent studies examine the consequences of capitalizing operating lease liabilities, including the work by Cornaggia, Franzen & Simin (2013), who suggest that old lease accounting rules distorted measures of performance and distress; Milian & Lee (2020), who argue that the market reacted negatively to introduction of balance sheet treatment of operating leases in early 2019; Yoon (2021), who argues that firms decreased their operating lease activity after the adoption of ASC Topic 842; and Caskey & Ozel (2019), who provide evidence that accounting treatment played a minimal role in firms' leasing decisions. Ferreira, Landsman & Rountree (2020) provide evidence that firms reduced debt levels by 10–12% after the new lease standard, a result they claim is due to firms' concern over violating loan covenants.

³⁰The TCJA also changed other tax rules. In addition, after the onset of the global coronavirus pandemic, the United States enacted the Coronavirus Aid, Relief, and Economic Security (CARES) Act. Parts of the CARES Act temporarily amended some of the TCJA provisions. The effects of the pandemic and the CARES Act will have to be considered in any research regarding the TCJA.

³¹Potentially related to this result are those from Graham (2022, figure 16). When CFOs are asked about factors that drive debt decisions, the factor "Interest Tax Savings" receives responses of "moderately important

5.2. Bonus Depreciation

A deduction for depreciation on capital investment has long been a part of the debt and taxes landscape. As a nondebt tax shield, it potentially reduces the value of interest deductions if the deductions together are larger than taxable income before the deductions (DeAngelo & Masulis 1980). Under the TCJA, firms can deduct 100% of the cost of qualified property placed into service between September 28, 2017, and the end of 2022. If investment responds to tax incentives—an important question outside the scope of this article—the additional depreciation expense could crowd out tax incentives to finance the investment with debt. However, if funding the investment is the primary consideration, and firms prefer to raise those funds by issuing debt, the lost tax benefits are not a constraint (especially if the debt is transitory). Because of this, the predicted impact of bonus depreciation on debt usage depends on the hypothesis.

5.3. International Tax

Prior to 2018, the US international tax regime was a worldwide system with deferral (Foley et al. 2007; Graham, Hanlon & Shevlin 2011; and others). Several studies, including those by Foley et al. (2007), Faulkender, Hankins & Petersen (2019), and Graham & Leary (2018), find that US multinationals' cash holdings increase in the US taxation on repatriation of foreign profits (the spread between the US and foreign tax rates, less foreign tax credits). Anecdotal and archival evidence suggests that this tax regime led to higher leverage in the United States because foreign subsidiaries' funds were trapped and, thus, domestic cash demands for operations and payouts were financed with debt (Graham, Hanlon & Shevlin 2010; De Simone & Lester 2018). In other words, tax-induced frictions in their internal capital market pushed firms to increase borrowing in the United States from third parties.

As a result, many predicted that leverage would fall after the TCJA, as the cash was set free. The new modified territorial system does not tax based on repatriation.³² Furthermore, because all accumulated and previously untaxed (in the United States) foreign earnings were taxed at the transition regardless of how firms responded, internal capital markets should have freed up, inducing repatriations to fund debt repayments. The evidence on this prediction is not particularly strong. **Figure 3** plots the average debt-to-capital ratio for domestic and multinational firms. Multinational firm debt ratios appear to hold steady beginning in 2016 but fall for domestic firms.³³ If multinationals had issued debt to fund operations when their foreign cash was trapped, why those same firms do not pay down the debt after the TCJA is an open question.

5.4. Interest Deductibility Limitations

In this section, we provide a brief overview of the landscape affecting the deductibility of corporate interest. We discuss global policy trends, the recent US response, the empirical evidence to date, and the challenge of identifying tax-based responses to interest-to-profit ratios.

5.4.1. Background—global trends in limiting interest deductibility. The OECD's BEPS (base erosion and profit shifting) project identifies several key strategies that multinational

and very important" from 60% of CFOs in 2001 but from only approximately 25% of CFOs in 2022. The lower response by the CFOs in 2022 is potentially caused by the lower tax rate after the TCJA, low interest rates, and/or the interest limitation.

³² However, foreign dividend tax withholding upon repatriation provides a possible reason to not repatriate.

³³ The decrease in domestic firm debt could coincide with a tax explanation: Domestic firms should be more exposed to the tax rate reduction in the TCJA given that their operations are exclusively in the United States.

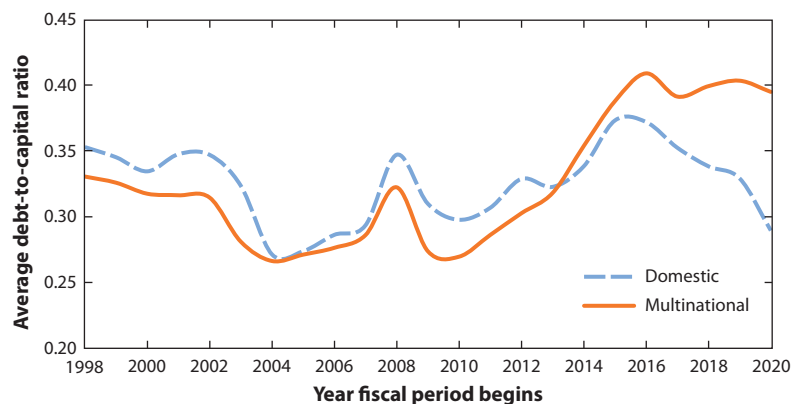


Figure 3

Average debt-to-capital ratios, excluding leases, per Compustat calculated as in **Figure 2**. The average debt-to-capital ratio is shown for domestic (*dashed blue line*) and multinational (*solid orange line*) firms. Multinational firms are identified by existence of nonzero foreign tax (*txfo*) or foreign pretax income (*pifo*).

corporations use to reduce their global tax liabilities and recommends several actions governments can take to counteract them. Action 4 recommends countries impose limitations on interest deductions to combat the strategic placement of third-party debt in high-tax countries and intrafirm loans that appear to shift income. In response, several countries have adopted some form of limitation on the deductibility of interest. European Union Anti-Tax Avoidance Directive 2016/1164 further states, “The interest limitation rule is necessary to discourage [profit shifting] by limiting the deductibility of taxpayers’ . . . borrowing costs” and that “It is therefore necessary to fix a ratio for deductibility which refers to a taxpayer’s taxable earnings before interest, tax, depreciation and amortization (EBITDA)” (Eur. Union Counc. 2016). At the time of this writing, all OECD countries except Israel limit interest deductibility. All interest limitation rules target related-party debt, consistent with our discussion in Section 3 and the OECD’s concern that multinational entities exploit cross-border tax differences to shift income. In addition, 80% of the OECD countries limit interest deductions on third-party debt. A recent working paper by Bilicka, Qi & Xing (2021) finds that UK multinationals subject to the United Kingdom’s recent limit on interest deductibility end up shifting both debt and real operations out of the United Kingdom.^{34,35}

5.4.2. The Tax Cuts and Jobs Act limits on interest deductibility. In limiting interest deductibility with Section 163(j) [from the Internal Revenue Code (IRC)]; all subsequent references

³⁴Alberternst & Sureth-Sloane (2015) find evidence consistent with this finding: German firms subject to interest deductibility limits reduced leverage by 3 percentage points more than companies not subject to the limitations.

³⁵It is also instructive to examine other settings from prior history and literature. For example, Froot & Hines (1995), Altshuler & Mintz ([1995] 1996), and Collins & Shackelford (1992) all examine consequences of newly enacted interest allocation rules in the Tax Reform Act of 1986 that served to limit foreign tax credits available to some US firms. In a sense, this rule is analogous to limiting interest deductions, because too much interest reduces the foreign tax credit that can be used, raising US taxation. The authors of each of these papers find significant economic consequences, including (a) greater issuance of preferred stock as a substitute form of financing after reducing the tax-favored status of debt (Collins & Shackelford 1992), (b) affected firms issued less debt and invested less in property, plant, and equipment (Froot & Hines 1995), and (c) the marginal cost of debt increased significantly for firms with excess foreign tax credits and firms altered the location of their debt in response to the new rule (Altshuler & Mintz [1995] 1996). For more discussion, see Graham (2013).

to sections are from the IRC as well], Congress articulated an explicit assumption that the corporate tax preference for debt pushed US corporations to take on too much leverage:

The Committee believes that the general deductibility of interest payments on debt may result in companies undertaking more leverage than they would in the absence of the tax system. . . Limiting the deductibility of interest along with reducing the corporate tax rate narrows the disparity in the effective marginal tax rates based on different sources of financing. This leads to a more efficient capital structure for firms. . . The Committee believes that limitations on the deductibility of interest should be applied to those businesses with the greatest levels of leverage. Such firms may pose the greatest societal costs in times of financial distress (US House Ways Means Comm. 2017).

The Section 163(j) limitation disallows a tax deduction for interest expense that exceeds business interest income plus the maximum of 30% of EBITDA or zero, computed using tax accounting rules. Disallowed interest deductions are carried forward similar to NOLs. Starting in 2022, the interest limitation is based on tax-based EBIT (inconsistent with international norms and subject to change).

5.4.3. Empirical evidence from the Tax Cuts and Jobs Act. Under Prediction 2, firms that face interest limitations should reduce debt. As of this writing, several papers tackle this question. Carrizosa, Gaertner & Lynch (2022) deploy a book-based proxy using profitable (positive EBITDA) firms and find that firms exposed to Section 163(j) (interest expense > 30% of EBITDA) reduced debt following the TCJA. Their estimates suggest that affected firms reduce debt by approximately 7% of assets. To address potential identification problems, Sanati (2021) employs a regression discontinuity design that exploits the \$25 million sales threshold for application of the limitation. He finds that small firms just above the cutoff (affected firms) reduced debt more than those just below it, and the reduction is accompanied by a decrease in investment. His estimates suggest that the average affected firm in the sample reduced debt by 37% of capital. Both studies focus on leverage responses over a short period surrounding TCJA.³⁶

One consideration in addressing interest limitation effects is the overlap between a tax cost tied to the government's definition of excess interest and firms' incentives to reduce debt absent that cost. The interest limitation rule in Section 163(j) is likely to identify firms with already low marginal benefits of debt arising from both low-taxable profits and high-deductible interest costs. The rule is also likely to identify firms with high marginal costs of debt. To illustrate this, consider that the formula used to calculate disallowed interest is essentially a fixed-charge or interest coverage ratio requiring a minimum of 3.33 for full deductibility $[(\text{Net Income} + \text{Tax} + \text{Interest} + \text{Depreciation and Amortization}) > 1/.3]$. These EBITDA-based interest coverage ratios are routine features of bank loan covenants (Li 2016). With average covenant thresholds of approximately 2.9 (Li, Vasvari & Wittenberg-Moerman 2016), the excess debt the government is trying to control with tax incentives aligns with the excess debt that lenders already try to constrain. Further, Graham (2022) finds that CFOs think about leverage adjustments in similar terms, focusing on metrics such as debt-to-EBITDA ratios and interest coverage similar to the metrics found in covenants (documented by Li 2016).

Hanlon & Heitzman (2022) find that firms that disclosed exposure to Section 163(j) in tax year 2018 are less profitable, have lower marginal tax benefits, are more financially constrained, and

³⁶In both cases, the estimated tax sensitivity of debt is implausibly large. Using the estimated sensitivity of 0.40 from Heider & Ljungqvist (2015), these authors conclude that Section 163(j) is equivalent to a change of 17.5 (7%/0.40) to 92.5 (37%/0.40) percentage points in the corporate tax rate. This is in addition to the 14-percentage-point change in the statutory tax rate at the same time.

are more likely to delist for distress. Over a 30-year period, firms with high interest-to-EBITDA ratios have similar characteristics. Over one-quarter of such firm-year observations delist due to distress within 5 years, and those that survive significantly reduce leverage. Controlling for other determinants of financing choice, excess-interest firms reduce leverage (net new debt minus net new equity) by an average of 0.7–1.0% of book assets in the following year. Focusing on debt specifically, these excess-interest firms reduce debt in each of the 31 years of the sample, suggesting firms respond strongly to the information about marginal costs and benefits implied by a high interest-to-EBITDA ratio. The sensitivity of leverage adjustments to excess interest increases after TCJA for the average firm, but only slightly so. However, this post-TCJA increase in sensitivity becomes stronger and significant among profitable, nondistressed, and financially unconstrained firms.³⁷ In other words, firms that have the ability to adjust to the limitation (i.e., are financially unconstrained) adjust debt levels down in response to Section 163(j). In contrast, high-leverage firms that ex ante contribute most to financial risk appear the least responsive to the new interest limitation rules. This finding appears inconsistent with the policy's stated goal of targeting high-financial-risk firms.

Taken together, incentives to delever from high interest-to-EBITDA states exist because of the benefits of reducing distress costs, regaining financial flexibility, and increasing the marginal benefit from interest deductions. The effect of a specific tax penalty tied to interest-to-EBITDA ratios must be gauged incremental to these underlying incentives. If firms already respond to this metric being too high, adding a tax penalty may have only negligible effects on the typical firm. That said, it is still possible to have meaningful cross-sectional variation in responses, and understanding which factors are associated with stronger tax-driven responses is a constructive research objective. In addition, the limitation will apply to more firms going forward given the move to an EBIT base in 2022 (because $EBIT \leq EBITDA$). Indeed, if the EBIT limitation remains in the law, the interest limitation will impact firms making large capital investments because depreciation will lower EBIT. This will be true even if the new investment is entirely financed by equity. We look forward to research on the effects of this new, stricter interest limitation rule.

6. CONCLUSIONS AND DIRECTIONS FOR FUTURE RESEARCH

Over the last decade, a steady stream of new empirical findings on the relationship between debt and taxes has emerged. We are encouraged by the work on responses to tax rate shocks across multiple jurisdictions, creative approaches to estimating the tax benefits of debt (and nontax costs), a focus on internal capital markets, policy initiatives to limit debt bias in tax systems, and evolving structural models of capital structure that incorporate tax dynamics.

Our review of this recent evidence, in the context of decades of research on the question, leads us to conclude that taxes are not a first-order consideration for corporate capital structure. Firm value appears largely insensitive to modest deviations from optimal leverage, and managers do not adjust leverage quickly to changes in the marginal costs or benefits. Even the largest empirical estimates of tax sensitivity suggest small incentives (in terms of economic magnitudes) to

³⁷The sample-wide finding of no effect appears consistent with that of Wagner, Zeckhauser & Ziegler (2020), who find that market reactions to the TCJA are unrelated to the firm's exposure to interest deductibility limitations. While this appears to reject the tax hypothesis, it is consistent with a number of alternative explanations, including the following: (a) the TCJA is broad and complex, and the market does not have full information on the final version of the law or the firm's exposure to it; (b) exposed firms reduce leverage, and the benefits exceed the lost tax costs; (c) the effect is too small to matter; or (d) measurement error occurs in the limitation proxy driven by, for example, using accounting data to proxy for tax data and unobservable tax variables.

adjust leverage. This conclusion is consistent with critiques by Graham & Leary (2011), DeAngelo (2022), and others who highlight the ongoing struggle to explain a significant portion of variation in capital structure.

In his review, Graham (2013, p. 150) states, “It would be helpful for future research to investigate whether the tax effects on the debt versus equity choice are economically important, and if they are not, to determine why not?” Does the body of evidence rule out the possibility of large tax effects? We think the answer is likely no.³⁸ However, in our opinion, future research on debt and taxes will contribute most to this call by generating insights into the conditions (economic, industry, firm, manager) under which taxes do matter and how. There has been progress in understanding how managers think about τ_C and how to proxy for it, but measurement issues driven by accounting rules and tax laws will play a central role in unpacking tax effects in real-world decisions.

Despite calls for more work (e.g., Graham 2013), we still know surprisingly little about the role investor-level taxes play. Fama (2011) argues, “the challenge is empirical measurement of tax effects. . . in the pricing of dividends and interest. So far, the challenge goes unmet” (p. 8). This is relevant because of long-standing theoretical predictions and because fiscal policies that affect corporations must also account for investors. A recent meta-study finds that authors account for investor-level taxes less than 20% of the time. When they do, it is typically assumed that a taxable individual is the price-setting investor. However, we note that the bulk of new external financing is debt provided by a heterogeneous group, often including other corporations.

Intrafirm debt has been a long-standing target of tax rules because of income shifting concerns, but third-party debt is also in the spotlight, with some lawmakers arguing these limitations improve social welfare by reducing corporate debt and thus distress. The extant evidence, as discussed above, does not support policy motivations for limiting third-party debt. Policy makers sometimes cite corporate finance research (Jt. Comm. Tax. 2016), and researchers are beginning to articulate the policy implications of their findings (e.g., He & Matvos 2016; Hennessy, Kasahara & Strebulaev 2020). We look forward to more work in the area and more informed public policy.

DISCLOSURE STATEMENT

The authors are not aware of any affiliations, memberships, funding, or financial holdings that might be perceived as affecting the objectivity of this review.

ACKNOWLEDGMENTS

We appreciate comments from Novia Chen (discussant), participants at the eleventh EIASM Conference on Current Research in Taxation, and workshop participants at the University of Texas–Dallas. We also appreciate comments from and discussions with Harry DeAngelo, Lisa De Simone, John Graham, Jim Hines, Jeff Hoopes, Arthur Korteweg, Rebecca Lester, Ed Maydew, Marcel Olbert, S.P. Kothari, Daniel Saavedra, Nemit Shroff, Joe Weber, and Toni Whited.

LITERATURE CITED

- Admati A, DeMarzo P, Hellwig M, Pfleiderer P. 2018. The leverage ratchet effect. *J. Finance* 78(1):145–98
- Alberternst S, Sureth-Sloane C. 2015. *The effect of taxes on corporate financing decisions: evidence from the German Interest Barrier*. Work. Pap. 8, Univ. Paderborn, Paderborn, Ger.

³⁸For a discussion of the magnitudes of estimated tax effects, their implication for welfare loss inferences, and insight on research design choices that could contribute to the small empirical estimates, see Hennessy, Kasahara & Strebulaev (2020).

- Albring S. 2006. The effects of the cost of foreign internal funds on the probability that a firm issues domestic debt. *J. Am. Tax. Assoc.* 28:25–41
- Altshuler R, Auerbach A. 1990. The significance of tax law asymmetries: an empirical investigation. *Q. J. Econ.* 105(1):61–86
- Altshuler R, Grubert H. 2003. Repatriation taxes, repatriation strategies and multinational financial policy. *J. Public Econ.* 87(1):73–107
- Altshuler R, Mintz J. (1995) 1996. U.S. interest allocation rules: effects and policy. *Int. Tax. Public Finance* 2:7–35. Reprinted in *The Taxation of Multinational Corporations*, pp. 3–31, New York: Kluwer Acad. Pub.
- Arena MP, Roper AH. 2010. The effect of taxes on multinational debt location. *J. Corp. Finance* 16(5):634–54
- Auerbach AJ. 1983. Corporate taxation in the United States. In *Brookings Papers on Economic Activity*, Vol. 2, pp. 451–513. Washington, DC: Brookings Inst.
- Auerbach AJ. 2002. Taxation and corporate financial policy. In *Handbook of Public Economics*, Vol. 3, ed. AJ Auerbach, M Feldstein, pp. 1251–92. Amsterdam: Elsevier
- Barclay MJ, Heitzman SM, Smith CW. 2013. Debt and taxes: evidence from the real estate industry. *J. Corp. Finance* 20:74–93
- Bargeron L, Denis D, Lehn K. 2018. Financing investment spikes in the years surrounding World War I. *J. Financ. Econ.* 130:215–36
- Bertrand M, Schoar A. 2003. Managing with style: the effect of managers on firm policies. *Q. J. Econ.* 118(4):1169–208
- Bilicka KA, Qi Y, Xing J. 2021. *Real responses to anti-tax avoidance: evidence from the UK worldwide debt cap*. Work. Pap. 9044, CESifo, Munich
- Blouin JL, Core JE, Guay WR. 2010. Have the tax benefits of debt been overestimated? *J. Financ. Econ.* 98(2):195–213
- Blouin JL, Huizinga H, Laeven L, Nicodème G. 2014. *Thin capitalization rules and multinational firm capital structure*. Work. Pap. 14/12, Int. Monet. Fund, Washington, DC
- Buettner T, Overesch M, Schreiber U, Wamser G. 2012. The impact of thin-capitalization rules on the capital structure of multinational firms. *J. Public Econ.* 96:930–38
- Buettner T, Wamser G. 2013. Internal debt and multinational profit shifting: empirical evidence from firm-level panel data. *Natl. Tax J.* 66(1):63–95
- Bulow JI. 1982. What are corporate pension liabilities? *Q. J. Econ.* 97(3):435–52
- Carrizosa R, Gaertner F, Lynch D. 2022. Debt and taxes? The effect of TCJA interest limitations on capital structure. *J. Am. Tax. Assoc.* Forthcoming. <https://doi.org/10.2308/JATA-2021-010>
- Caskey J, Ozel NB. 2019. Reporting and non-reporting incentives in leasing. *Account. Rev.* 94(6):137–64
- Cassell CA, Huang SX, Sanchez JM, Stuart MD. 2012. Seeking safety: the relation between CEO inside debt holdings and the riskiness of firm investment and financial policies. *J. Financ. Econ.* 103(3):588–610
- Cestau D, Hollifield B, Li D, Schürhoff N. 2019. Municipal bond markets. *Annu. Rev. Financ. Econ.* 11:65–84
- Chu Y. 2020. Collateral, ease of repossession, and leases: evidence from antirecharacterization laws. *Manag. Sci.* 66(7):2951–74
- Cohn J, Titman S, Twite G. 2021. *Capital structure, corporate investment, and investor-level taxes: evidence from a natural experiment in Europe*. Work. Pap., Univ. Texas, Austin
- Colla P, Ippolito F, Li K. 2020. Debt structure. *Annu. Rev. Financ. Econ.* 12:193–215
- Collins JH, Shackelford DA. 1992. Foreign tax credit limitations and preferred stock issuances. *J. Account. Res.* 30:103–24
- Collins JH, Shackelford DA. 1998. Global organizations and taxes: an analysis of the dividend, interest, royalty, and management fee payments between U.S. multinationals' foreign affiliates. *J. Account. Econ.* 24:151–73
- Colombo J, Caldeira J. 2018. The role of taxes and the interdependence among corporate financial policies: evidence from a natural experiment. *J. Corp. Finance* 50:402–23
- Cornaggia KJ, Franzen LA, Simin TT. 2013. Bringing leased assets onto the balance sheet. *J. Corp. Finance* 22:345–60
- Danis A, Rettl DA, Whited TM. 2014. Refinancing, profitability, and capital structure. *J. Financ. Econ.* 114:424–43
- DeAngelo H. 2022. The capital structure puzzle: What are we missing? *J. Financ. Quant. Anal.* 57(2):413–54

- DeAngelo H, DeAngelo L, Whited TM. 2011. Capital structure dynamics and transitory debt. *J. Financ. Econ.* 99:235–61
- DeAngelo H, Gonçalves A, Stulz R. 2018. Corporate deleveraging and financial flexibility. *Rev. Financ. Stud.* 31(8):3122–74
- DeAngelo H, Masulis R. 1980. Optimal capital structure under corporate and personal taxation. *J. Financ. Econ.* 8(1):3–29
- DeAngelo H, Roll R. 2015. How stable are corporate capital structures? *J. Finance* 70(1):373–418
- Demirgüç-Kunt A, Huizinga H. 1999. Determinants of commercial bank interest margins and profitability: some international evidence. *World Bank Econ. Rev.* 13(2):379–408
- Denis D, McKeon S. 2012. Debt financing and financial flexibility: evidence from proactive leverage increases. *Rev. Financ. Stud.* 25(6):1897–929
- Desai MA, Foley CF, Hines JR. 2004. A multinational perspective on capital structure choice and internal capital markets. *J. Finance* 59(5):2451–87
- Desai MA, Foley CF, Hines JR. 2016. Trade credit and taxes. *Rev. Econ. Stat.* 98(1):132–39
- De Simone L, Lester R. 2018. *The effect of foreign cash holdings on internal capital markets and firm financing*. SSRN Work. Pap. 3199295
- Doidge C, Dyck A. 2015. Taxes and corporate policies: evidence from a quasi natural experiment. *J. Finance* 70(1):45–89
- Edwards A, Schwab C, Shevlin T. 2016. Financial constraints and cash tax savings. *Account. Rev.* 91(3):859–81
- Eisfeldt AL, Rampini AA. 2009. Leasing, ability to repossess, and debt capacity. *Rev. Financ. Stud.* 22(4):1621–57
- Engel E, Erickson M, Maydew E. 1999. Debt-equity hybrid securities. *J. Account. Res.* 37(2):249–74
- Eur. Union Counc. 2016. European Union Anti-Tax Avoidance Directive 2016/1164. *Off. J. Eur. Union* July 19. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32016L1164&from=en>
- Faccio M, Xu J. 2015. Taxes and capital structure. *J. Financ. Qual. Anal.* 50(3):277–300
- Faccio M, Xu J. 2018. Taxes, capital structure choices, and equity value. *J. Financ. Qual. Anal.* 53(3):967–95
- Fama EF. 2011. My life in finance. *Annu. Rev. Financ. Econ.* 3:1–15
- Faulkender M, Hankins K, Petersen M. 2019. Understanding the rise in corporate cash: precautionary savings or foreign taxes. *Rev. Financ. Stud.* 32(9):3299–334
- Faulkender M, Smith JM. 2016. Taxes and leverage at multinational corporations. *J. Financ. Econ.* 122(1):1–20
- Feld LP, Heckemeyer JH, Overesch M. 2013. Capital structure choice and company taxation: a meta-study. *J. Bank. Finance* 37:2850–66
- Ferreira P, Landsman WR, Rountree B. 2020. *Real effects of changes in accounting rules: the case of lease accounting*. Work. Pap., Rice Univ., Houston, Tex.
- Fleckenstein M, Longstaff F, Strebulaev I. 2020. Corporate taxes and capital structure: a long-term historical perspective. *Crit. Finance Rev.* 9(1–2):1–28
- Foley CF, Hartzell JC, Titman S, Twite G. 2007. Why do firms hold so much cash? A tax-based explanation. *J. Financ. Econ.* 86(3):579–607
- Froot KA, Hines JR Jr. 1995. Interest allocation rules, financing patterns and the operations of U.S. multinationals. In *The Effects of Taxation on Multinational Corporations*, ed. M Feldstein, JR Hines Jr., RG Hubbard, pp. 277–312. Chicago: Univ. Chicago Press
- Fuest C, Hebous S, Riedel N. 2011. International debt shifting and multinational firms in developing countries. *Econ. Lett.* 113(2):135–38
- Gordon RH. 2010. Taxation and corporate use of debt: implications for tax policy. *Natl. Tax J.* 63(1):151–74
- Gordon RH, MacKie-Mason JK. 1991. How much do taxes discourage incorporation? *J. Finance* 52(2):477–506
- Graham JR. 1996a. Debt and the marginal tax rate. *J. Financ. Econ.* 41:41–73
- Graham JR. 1996b. Proxies for the marginal tax rate. *J. Financ. Econ.* 42:187–221
- Graham JR. 2000. How big are the tax benefits of debt? *J. Finance* 55(5):1901–41
- Graham JR. 2003. Taxes and corporate finance: a review. *Rev. Financ. Stud.* 16(4):1075–1129
- Graham JR. 2006. A review of taxes and corporate finance. *Found. Trends Finance* 1(7):573–691
- Graham JR. 2013. Do taxes affect corporate decisions? A review. In *Handbook of Economics and Finance*, Vol. 2A, ed. G Constantinides, M Harris, R Stulz. Amsterdam: North Holland

- Graham JR. 2022. *Presidential address: corporate finance and reality*. NBER Work. Pap. 29841
- Graham JR, Hanlon M, Shevlin T. 2010. Barriers to mobility: the lockout effect of U.S. taxation of worldwide corporate profits. *Natl. Tax J.* 63:1111–44
- Graham JR, Hanlon M, Shevlin T. 2011. Real effects of accounting rules: evidence from multinational firms' investment location and profit repatriation decisions. *J. Account. Res.* 49(1):137–85
- Graham JR, Hanlon M, Shevlin T, Shroff N. 2017. Tax rates and corporate decision-making. *Rev. Financ. Stud.* 30(9):3128–75
- Graham JR, Hanlon M, Shroff N. 2022. *TCJA and CARES Act effects on decision-making: a survey*. Work. Pap., Duke Univ., Durham, N.C.
- Graham JR, Harvey CR. 2001. The theory and practice of corporate finance: evidence from the field. *J. Financ. Econ.* 60:187–243
- Graham JR, Leary MT. 2011. A review of empirical capital structure research and directions for the future. *Annu. Rev. Financ. Econ.* 3:309–45
- Graham JR, Leary MT. 2018. The evolution of corporate cash. *Rev. Financ. Stud.* 31(11):4288–344
- Graham JR, Leary MT, Roberts MR. 2015. A century of capital structure: the leveraging of corporate America. *J. Financ. Econ.* 118(3):658–83
- Graham JR, Lemmon ML, Schallheim JS. 1998. Debt, leases, taxes, and the endogeneity of corporate tax status. *J. Finance* 53(1):131–62
- Graham JR, Mills LF. 2008. Using tax return data to simulate corporate marginal tax rates. *J. Account. Econ.* 46:366–88
- Gresik TA, Schindler D, Schjelderup G. 2017. Immobilizing corporate income shifting: Should it be safe to strip in the harbor? *J. Public Econ.* 152:68–78
- Hanlon M, Heitzman S. 2010. A review of tax research. *J. Account. Econ.* 50:127–78
- Hanlon M, Heitzman S. 2022. *Interest limitations and corporate financial policy*. Work. Pap., Mass. Inst. Technol., Cambridge, Mass.
- He Z, Matvos G. 2016. Debt and creative destruction: Why could subsidizing corporate debt be optimal? *Manag. Sci.* 62(2):303–25
- Heckemeyer JH, de Mooij RA. 2017. Taxation and corporate debt: Are banks any different? *Natl. Tax J.* 70(1):53–76
- Heider F, Ljungqvist A. 2015. As certain as debt and taxes: estimating the tax sensitivity of leverage from state tax changes. *J. Financ. Econ.* 118(3):684–712
- Heitzman S, Lester R. 2022. Net operating loss carryforwards and corporate savings policies. *Account. Rev.* 97(2):267–89
- Hennessy CA, Kasahara A, Strebulaev IA. 2020. Empirical analysis of corporate tax reforms: What is the null and where did it come from? *J. Financ. Econ.* 135:555–76
- Huizinga H, Laeven L, Nicodème G. 2008. Capital structure and international debt shifting. *J. Financ. Econ.* 88(1):80–118
- Huizinga H, Voget J, Wagner W. 2014. International taxation and cross-border banking. *Am. Econ. J. Econ. Policy* 6(2):94–125
- Ivanov IT, Pettit L, Whited T. 2021. *Taxes depress corporate borrowing: evidence from private firms*. Work. Pap. 32, Inst. Höhere Stud., Vienna
- Jt. Comm. Tax. 2016. *Overview of approaches to corporate integration*. Rep. JCX-44-16, prepared by the Staff of the Jt. Comm. Tax., Washington, DC, May 13. <https://perma.fdlp.gov/gpo175294/x-44-16-4913.pdf>
- Kang Y, Li OZ, Lin Y. 2021. Tax incidence in loan pricing. *J. Account. Econ.* 72(1):101418
- Klapper L, Laeven L, Rajan R. 2012. Trade credit contracts. *Rev. Financ. Stud.* 25(3):838–67
- Klemm A. 2006. *Allowances for corporate equity in practice*. Work. Pap. 06/259, Int. Monet. Fund, Washington, DC
- Korteweg A. 2010. The net benefits to leverage. *J. Finance* 65(6):2137–70
- Law K, Mills L. 2015. Taxes and financial constraints: evidence from linguistic cues. *J. Account. Res.* 53(4):777–819
- Li N. 2016. Performance measures in earnings-based financial covenants in debt contracts. *J. Account. Res.* 54(4):1149–86

- Li N, Vasvari F, Wittenberg-Moerman R. 2016. Dynamic threshold values in earnings-based covenants. *J. Account. Econ.* 61:605–29
- Li S, Whited T, Wu Y. 2016. Collateral, taxes, and leverage. *Rev. Financ. Stud.* 29(6):1453–1500
- Lin L, Flannery M. 2013. Do personal taxes affect capital structure? Evidence from the 2003 tax cut. *J. Financ. Econ.* 109:549–65
- Ma Y. 2020. *Note on operating lease accounting post 2019*. Work. Pap., Booth Sch. Bus., Univ. Chicago. <https://cpb-us-w2.wpmucdn.com/voices.uchicago.edu/dist/7/1291/files/2017/01/lease.pdf>
- Milian JA, Lee EJ. 2020. *Did the recognition of operating leases cause a decline in equity valuations?* SSRN Work. Pap. 3509373
- Miller M. 1977. Debt and taxes. *J. Finance* 32(2):261–75
- Mills L, Newberry K. 2005. Firms’ off-balance sheet and hybrid debt financing: evidence from their book-tax reporting differences. *J. Account. Res.* 43(2):251–82
- Mills L, Newberry K, Novack G. 2003. How well do Compustat NOL data identify firms with U.S. tax return loss carryovers? *J. Am. Tax. Assoc.* 25(2):1–17
- Morellec E, Nikolov B, Schürhoff N. 2012. Corporate governance and capital structure dynamics. *J. Finance* 67:803–48
- Myers S. 1984. The capital structure puzzle. *J. Finance* 39(3):574–92
- Myers S. 2001. Capital structure. *J. Econ. Perspect.* 15(2):81–102
- Obama B. 2011. “Remarks by the President to the Chamber of Commerce.” Feb. 7, US Chamber of Commerce Headquarters, Washington, DC. Transcript. <https://obamawhitehouse.archives.gov/realitycheck/the-press-office/2011/02/07/remarks-president-chamber-commerce>
- OECD (Org. Econ. Coop. Dev.). 2021. *International community strikes a ground-breaking tax deal for the digital age*. News release, Aug. 10. <https://www.oecd.org/tax/beps/international-community-strikes-a-ground-breaking-tax-deal-for-the-digital-age.htm>
- Overesch M, Wamser G. 2010. Corporate tax planning and thin-capitalization rules: evidence from a quasi-experiment. *Appl. Econ.* 42(5):563–73
- Parrino R, Weisbach MS. 1999. Measuring investment distortions arising from stockholder-bondholder conflicts. *J. Financ. Econ.* 53:3–42
- Petersen MA, Rajan RG. 1997. Trade credit: theories and evidence. *Rev. Financ. Stud.* 10(3):661–97
- Pres. Advis. Panel Federal Tax Reform. 2005. *Simple, fair, and pro-growth: proposals to fix America’s tax system*. Rep., Pres. Advis. Panel Federal Tax Reform, Washington, DC. <https://govinfo.library.unt.edu/taxreformpanel/final-report/index.html>
- Rampini AA, Viswanathan S. 2013. Collateral and capital structure. *J. Financ. Econ.* 109:406–92
- Rauh JD, Sufi A. 2012. Explaining corporate capital structure: product markets, leases, and asset similarity. *Rev. Finance* 16:115–55
- Romer CD, Romer DH. 2010. The macroeconomic effect of tax changes: estimates based on a new measure of fiscal shocks. *Am. Econ. Rev.* 100(3):763–801
- Sanati A. 2021. *How does removing the tax benefits of debt affect firms? Evidence from the 2017 US tax reform*. SSRN Work. Pap. 3878363
- Schepens G. 2016. Taxes and bank capital structure. *J. Financ. Econ.* 120(3):585–600
- Shackelford D, Shevlin T. 2001. Empirical research in accounting. *J. Account. Econ.* 31:321–87
- Shevlin T. 1987. Taxes and off-balance-sheet financing: research and development limited partnerships. *Account. Rev.* 62(3):480–509
- Shevlin T. 1990. Estimating corporate marginal tax rates with asymmetric tax treatment of gains and losses. *J. Am. Tax. Assoc.* 11(2):51–67
- Shivdasani A, Stefanescu I. 2010. How do pensions affect corporate capital structure decisions? *Rev. Financ. Stud.* 23(3):1287–323
- Smith CW, Wakeman LM. 1985. Determinants of corporate leasing policy. *J. Finance* 40(3):895–905
- Strebulaev IA, Whited TM. 2012. Dynamic models and structural estimation in corporate finance. *Found. Trends Finance* 6:1–163
- US House Ways Means Comm. 2017. *Tax Cuts and Jobs Act*. Rep. 115-409, 115th Congr., 1st sess., Nov. 13

- US Senate Comm. Finance. 2016. *Integrating the corporate and individual tax systems: the dividends paid deduction considered*. Hearing 114-654, 114th Congr., 2nd sess., May 17. <https://www.finance.senate.gov/imo/media/doc/25795.pdf>
- van Binsbergen JH, Graham JR, Yang J. 2010. The cost of debt. *J. Finance* 65(6):2089–136
- Vanderbilt Univ. Roundtable. 1998. Vanderbilt University Roundtable on the capital structure puzzle. *J. Appl. Corp. Finance* 11(1):8–24
- Wagner A, Zeckhauser R, Ziegler A. 2020. *The Tax Cut and Jobs Act: Which firms won? Which lost?* NBER Work. Pap. 27470
- Welch I. 2011. Two common problems in capital structure research: the financial debt-to-asset ratio and issuing activity versus leverage changes. *Int. Rev. Finance* 11(1):1–17
- Yoon YS. 2021. *Recognition versus disclosure: operating lease capitalization and managerial leasing decisions*. SSRN Work. Pap. 3689446



Contents

The Village Money Market Revealed: Financial Access and Credit Chain Links Between Formal and Informal Sectors <i>Parit Sripakdeevong and Robert M. Townsend</i>	1
Zombie Lending: Theoretical, International, and Historical Perspectives <i>Viral V. Acharya, Matteo Crosignani, Tim Eisert, and Sascha Steffen</i>	21
Bank Supervision <i>Beverly Hirtle and Anna Kovner</i>	39
The Economics of Liquidity Lines Between Central Banks <i>Saleem Bahaj and Ricardo Reis</i>	57
Sovereign Debt Sustainability and Central Bank Credibility <i>Tim Willems and Jeromin Zettelmeyer</i>	75
Bitcoin and Beyond <i>Kose John, Maureen O'Hara, and Fahad Saleh</i>	95
Some Simple Economics of Stablecoins <i>Christian Catalini, Alonso de Gortari, and Nibar Shab</i>	117
Nonbanks and Mortgage Securitization <i>You Suk Kim, Karen Pence, Richard Stanton, Johan Walden, and Nancy Wallace</i>	137
Student Loans and Borrower Outcomes <i>Constantine Yannelis and Greg Tracey</i>	167
FinTech Lending <i>Tobias Berg, Andreas Fuster, and Manju Puri</i>	187
Financing Health Care Delivery <i>Jonathan Gruber</i>	209
Financing Biomedical Innovation <i>Andrew W. Lo and Richard T. Thakor</i>	231

Private or Public Equity? The Evolving Entrepreneurial Finance Landscape <i>Michael Ewens and Joan Farre-Mensa</i>	271
The Effects of Public and Private Equity Markets on Firm Behavior <i>Shai Bernstein</i>	295
Private Finance of Public Infrastructure <i>Eduardo Engel, Ronald Fischer, and Alexander Galetovic</i>	319
Factor Models, Machine Learning, and Asset Pricing <i>Stefano Giglio, Bryan Kelly, and Dacheng Xiu</i>	337
Empirical Option Pricing Models <i>David S. Bates</i>	369
Decoding Default Risk: A Review of Modeling Approaches, Findings, and Estimation Methods <i>Gurdip Bakshi, Xiaobui Gao, and Zhaodong Zhong</i>	391
The Pricing and Ownership of US Green Bonds <i>Malcolm Baker, Daniel Bergstresser, George Serafeim, and Jeffrey Wurgler</i>	415
A Survey of Alternative Measures of Macroeconomic Uncertainty: Which Measures Forecast Real Variables and Explain Fluctuations in Asset Volatilities Better? <i>Alexander David and Pietro Veronesi</i>	439
A Review of China's Financial Markets <i>Grace Xing Hu and Jiang Wang</i>	465
Corporate Debt and Taxes <i>Michelle Hanlon and Shane Heitzman</i>	509
Corporate Culture <i>Gary B. Gorton, Jillian Grennan, and Alexander K. Zentefis</i>	535
Kindleberger Cycles: Method in the Madness of Crowds? <i>Randall Morck</i>	563

Indexes

Cumulative Index of Contributing Authors, Volumes 7–14	587
Cumulative Index of Article Titles, Volumes 7–14	590

Errata

An online log of corrections to *Annual Review of Financial Economics* articles may be found at <http://www.annualreviews.org/errata/financial>