Tax Incidence and Tax Avoidance

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ABSTRACT

We examine the implications of tax incidence—the share of the corporate tax actually borne by firm owners—on firms' tax avoidance decisions. We show in a model of a profit-maximizing firm that, if less of the corporate tax incidence falls on firm owners because of the firm's market power, firms have fewer incentives to avoid taxes and report higher effective tax rates. Using several empirical approaches, we provide evidence consistent with this prediction. Our findings imply that firms with high effective tax rates do not necessarily "undershelter." Instead, such firms may have market power allowing them to partly pass on the corporate tax to their stakeholders to maximize after-tax profits.

Keywords: Tax avoidance, tax burden, tax incidence, tax undersheltering puzzle

JEL classification: H20, H25

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1. Introduction

It is still a puzzle why some firms seemingly do not avoid taxes, as reflected in high effective tax rates (e.g., Weisbach 2002, Graham et al. 2014). Despite extensive research on tax avoidance across firms (e.g., Dyreng, Hanlon, and Maydew 2008, 2010) and time (Dyreng et al. 2016), variation in tax avoidance across firms is not well understood. This issue is also of concern to policymakers and international bodies such as the OECD, who fear that tax-avoiding firms may have competitive advantages relative to firms that are not avoiding taxes (e.g., OECD 2013). Paradoxically, we show it is rather the other way around: Firms that do not avoid taxes may *have* competitive advantages that enable them to pass on some of the tax burden to stakeholders, for example, through lower wages or higher consumer prices, and reduce their incentive to avoid tax payments. Our paper therefore merges a central insight from the public finance literature on tax incidence with the literature on tax avoidance. The tax incidence literature emphasizes that firms do not necessarily *bear* a tax even though they *pay* a tax (e.g., Gruber 2010). The tax avoidance literature examines firms' tax planning behavior aimed at reducing tax payments (e.g., Dyreng, Hanlon, and Maydew 2008, Dyreng et al. 2016). We show that firms that bear less of a tax because of their market power have lower incentives to avoid paying a tax.

Using a model of a profit-maximizing firm, we show that firms employ a mix of both tax avoidance and passing on taxes to stakeholders to maximize profits and minimize the tax burden. This mix depends on the cost of tax avoidance relative to the cost of passing on the corporate tax burden to stakeholders. Passing taxes, for example, to workers through lower wages creates a cost because it distorts the firm's labor supply and optimal factor input. This cost decreases in a firm's market power toward its stakeholders. Since firms with market power in the labor or product market face relatively price-inelastic workers or consumers, passing on the corporate tax burden to these stakeholders has little effect on optimal factor inputs and after-tax profits. Therefore, firms with market power pass on a larger portion of the tax burden to stakeholders and complement it with less avoidance of tax payments because the cost of passing on taxes to stakeholders is lower than the cost of tax avoidance. Since these firms pass on taxes to stakeholders rather than avoiding their payment, they report higher effective tax rates (ETRs) but, in fact, do not face a high tax burden. Since such firms already face a low tax burden, the benefit from further avoiding tax payments is not justified by the cost of tax avoidance. In contrast, if passing on the tax to stakeholders is more costly than tax avoidance, firms engage in more tax avoidance. Such firms are reluctant to pass on more taxes because of the strong distortions of their factor inputs that reduce after-tax profits. Overall, our model illustrates that firms optimally trade off avoiding tax payments and passing on taxes to stakeholders.

Taken together, we argue that tax incidence—reflected in the ability to pass on taxes to stakeholders—is a key determinant in a firm's tax avoidance decision. If less of the corporate tax incidence falls on firm owners, firms have fewer incentives to avoid tax payments and ETRs that are higher than their effective tax burden.[1] Our explanation for high ETRs is unrelated to agency problems (e.g., Desai and Dharmapala 2006) or reputational costs (e.g., Hanlon and Slemrod 2009, Gallemore, Maydew, and Thornock 2014, Graham et al. 2014). Instead, we borrow insights from the public finance literature on tax incidence.

Starting with Harberger (1962), there is a longstanding debate in public finance about who actually bears the corporate tax burden (see, e.g., the review by Fullerton and Metcalf 2002). A general conclusion about tax incidence is that corporate "*taxes are borne by those who can not easily adjust*" (Kotlikoff and Summers 1987, p. 1047) and that, under reasonable assumptions such as international capital mobility or endogenous savings, the corporate tax incidence is not fully borne by shareholders. Several empirical studies provide evidence that the corporate tax burden is passed on, for example, to employees through lower wages (e.g., Arulampalam, Devereux, and Maffini 2012, Liu and Altshuler 2013, Fuest, Peichl, and Siegloch 2016, Suárez Serrato and Zidar 2016) or to consumers through higher prices (e.g., Krzyzaniak and Musgrave 1963, Vasquez-Ruiz 2011).

We provide empirical evidence for our prediction that firms with greater ability to pass on the corporate tax burden to their stakeholders have higher ETRs and are less inclined to exploit tax avoidance opportunities. The key empirical challenge is that tax incidence is unobservable at the firm level. We can only rely on indirect proxies for firm-specific variation in the degree of corporate tax incidence falling on shareholders. Our first empirical proxy is a summary measure of firms' market power toward their stakeholders: the gross margin (i.e., the percentage of revenue retained after subtracting the cost of goods sold). The gross margin reconciles with the conceptual notion of tax incidence as a function of relative elasticities. Firms generating high margins exploit either relatively inelastic demand on the revenue side (e.g., from consumers) and/or relatively inelastic supply on the cost side (e.g., from employees and other suppliers). For example, Fuest, Peichl, and Siegloch (2016) model and empirically show that employees in firms with higher margins bear a larger share of the corporate tax. Further, high margins reflect product market power and less elastic consumer demand

[1] To see why firms that have already optimally passed on a large fraction of the tax burden to stakeholders are not further avoiding the 'remaining' tax payments to reduce their high ETRs, consider a firm that faces a fully inelastic labor supply: Such a firm can fully pass on tax payments to workers through decreasing wages without changing the labor supply or, therefore, the optimal labor input. This implies that the costs of passing on taxes is zero because this firm earns the same after-tax profit as in a world without taxes. Reducing tax payments through tax avoidance effectively undoes the passing on of taxes to workers and results in a decrease of pre-tax profits through higher wages. The reduction in tax payments cannot fully compensate for the lower pre-tax profit because tax avoidance is costly whereas passing on taxes is costless.

(Lerner 1934). High-margin firms have greater ability to shift corporate taxes to consumers. While margins proxy reasonably well for market power, they are only weakly related to industry concentration (Domowitz, Hubbard, and Petersen 1988, Ali, Klasa, and Yeung 2009). That is, having few firms dominating sales in an industry does not imply that they have pricing power (Demsetz 1968). Altogether, we expect high-margin firms to be less inclined to avoid statutory tax payments because their owners bear less of the corporate tax burden.

Using Compustat data for the years 1989–2015 and controlling for other determinants of tax avoidance, such as firm size, internationalization, or R&D intensity as well as a battery of fixed effects, we document that gross margins are positively associated with long-term cash ETRs. Consistent with our prediction, firms with higher margins and thus greater ability to pass on the corporate tax burden to employees and consumers have higher ETRs.

This cross-sectional result needs to be interpreted with caution because the variation in gross margins clearly is not exogenous. Therefore, we exploit exogenous variation in tax avoidance opportunities. The introduction of the Check-the-Box Regulation in 1997 increased tax avoidance opportunities (e.g., Altshuler and Grubert 2006, Gravelle 2009) and prior literature concludes this regulation led to decreased cash ETRs (Dyreng et al. 2016). We exploit this regulation as an exogenous shock to the cost of tax avoidance in a difference-in-differences setting.[2] We compare tax avoidance before and after 1997 (*first difference*) for firms with high or low gross margins (*second difference*). We define high versus low margins based on the industry-adjusted three-year average gross margin in 1996. Consistent with our model predictions, we expect that firms with limited ability to shift the corporate tax incidence to employees or consumers, that is, low-margin firms, are more likely to exploit increased tax avoidance opportunities to avoid taxes. Relative to firms with high gross margins, we find that low-gross margin firms decrease their three-year (five-year) cash ETRs around 1997 by 1.1 (1.8) percentage points, or by 4.2% (7.0%) of the sample average tax rate. These results are robust to several research design choices, where we, for example, additionally control for loss firms, truncate (instead of winsorize) ETRs, or include industry-year fixed effects. The latter ensures that our identification and the estimated responses stem from variation within industries and that we control for industry-level characteristics such as concentration.

We next examine two potential channels through which the incidence of the corporate tax can be shifted away from firm owners. The incidence of the corporate tax falls less on shareholders if the

[2] Other studies also use this regulation as an exogenous event. For example, Desai and Dharmapala (2009) use the Check-the-Box Regulation as an instrument in their test of the firm value implications of tax avoidance.

corporate tax results in higher prices for consumers or in lower wages for workers (e.g., Gruber 2010). While we are unable to test these channels directly, we exploit two distinct settings where one channel is affected while the other is held constant. First, we exploit shocks to import tariffs in the United States (Frésard 2010) and examine their effect on tax avoidance of U.S. firms (see also Brown et al. 2014). When import tariffs are cut, foreign competition enters the market and we expect product demand to become more elastic because consumer gain access to substitute products at more competitive prices. This makes it harder for firms to pass on the corporate tax to consumers through higher prices. Consistent with Brown et al. (2014) but based on a different theoretical explanation, we find that large import tariff cuts are associated with lower cash ETRs. Put differently, following increases in demand elasticity, firms increase their tax avoidance activities. This result is consistent with our tax incidence explanation: More elastic demand implies that less of the corporate tax incidence can be passed on to consumers and, thus, firms are more likely to engage in tax avoidance.

Second, we examine the wage channel around the 1997 Check-the-Box regulation introduction and exploit cross-sectional differences in the ability to shift the corporate tax burden to employees. Since blue-collar workers are relatively less mobile (elastic) than white-collar workers, blue-collar workers bear more of the corporate tax incidence (Fuest, Peichl, and Siegloch 2016). Hence, firms employing predominantly blue-collar workers have fewer incentives to avoid taxes because they can shift tax payments to workers. In our empirical test, we compare firms with a high ratio of wages over sales to firms with a low ratio of wages over sales around the 1997 Check-the-Box regulation introduction in a difference-in-differences setting. We find that firms with limited ability to shift the corporate tax incidence to employees, that is, firms with high wages to sales, reduce their cash ETRs by about 3.3 percentage points, or by about 14% of the sample average. These results are similar when we control for low-margin firms, our initial split variable in the difference-in-differences approach. Taken together, these results suggest that both channels of shifting the corporate tax incidence away from shareholders are likely at work.

We subject our results to three distinct robustness tests with unchanged inferences. First, we rerun all regressions using GAAP ETRs instead of cash ETRs. Second, we replace the gross margin with the profit margin as our proxy for corporate tax incidence. Third, we address concerns that our results are driven by firms that avoided taxes but were simply not successful in doing so. When excluding unsuccessful tax avoidance firms (Saavedra 2017), we obtain very similar results as in our main tests. We acknowledge that our approaches are imperfect because we are bound to rely on indirect proxies for corporate tax incidence. However, the consistency of results with our theoretical predictions across specifications, different proxies, and empirical settings increases confidence that the results we

document uncover the negative effect of corporate tax incidence on tax avoidance. Importantly, as emphasized earlier, this negative relation results from firms maximizing after-tax profits.

Our paper contributes to the literature in several ways. First, we provide an alternative explanation for a lack of tax avoidance activities that is unrelated to agency conflicts (e.g., Desai and Dharmapala 2006) but grounded in the theory of tax incidence. Even in the absence of agency problems or reputational concerns, we show that, if less of the corporate tax incidence falls on firm owners, firms have weaker incentives to engage in tax avoidance activities to maximize after-tax profits. Our results can thus help to explain the "tax undersheltering puzzle" (Weisbach 2002) and to understand the disperse distribution of ETRs (e.g., Dyreng, Hanlon, and Maydew 2008). Firms can maximize their after-tax profit and minimize their tax burden by passing on the tax to other stakeholders instead of reducing statutory tax payments tax through tax avoidance. Allowing for the possibility that the incidence of corporate tax does not fully fall on firm owners, therefore, directly addresses the open question "*why […] some corporations avoid more tax than others*" (Hanlon and Heitzman 2010, p. 146) and provides future research on tax avoidance with a theoretical framework.

Importantly, our paper does not invalidate the interpretation of the cash ETR as a proxy for tax avoidance activities. Low (high) cash ETRs indicate high (low) tax avoidance efforts. However, neither a high nor a low ETR imply that firm owners actually bear a high or low economic tax burden. While cash or GAAP ETRs can inform us about tax avoidance activities, tax avoidance proxies may be insufficient to measure the economic tax burden faced by firm owners. Our study, therefore, suggests controlling for a firm's market power when examining firms' tax avoidance decisions.

Our findings also have broader implications beyond the tax avoidance literature. The effect of taxes on investment decisions (e.g., Summers 1981, Auerbach 1983, Djankov et al. 2010), employment (e.g., Ljungqvist and Smolyansky 2015), or capital structure (e.g., Graham 1996, Heider and Ljungqvist 2015) could be a function of the corporate tax incidence falling on firms' owners vis-à-vis other stakeholders. In particular, the responsiveness of investments and capital structure decisions to corporate tax rate changes could be lower when firm owners bear only a small fraction of the corporate tax relative to firms that cannot easily pass on the corporate tax burden to other stakeholders.

Our paper also contributes to the literature examining the effect of competition and product market power on tax avoidance. While Kubick et al. (2015) find that product market power is positively related to tax avoidance, Brown et al. (2014) and our study find the opposite. Kubick et al. argue that firms with product market power are insulated from competitive threats because they "*are able to influence the price, quality, and nature of the product […] to a greater extent than […] competitors*," which hedges them against risks associated with avoiding taxes. We argue that firms trade off passing on the

tax burden to stakeholders versus engaging in costly tax avoidance. Conceptually, we follow Kubick et al. in their argument that firms with product market power face less elastic demand. However, we argue that product market power translates into greater ability to pass on the corporate tax burden to stakeholders. Therefore, there is less need to reduce statutory tax payments through tax avoidance to maximize after-tax profits.[3]

Our paper also complements a related stream of literature that examines how competition eliminates firms' ability to sustain tax advantages because of implicit taxes (e.g., Berger 1993, Erickson and Maydew 1998, Jennings, Weaver, and Mayew 2012, Chyz, Luna, and Smith 2016). This literature argues that competition will equalize any tax advantages by lowering the pre-tax return of activities with a low tax burden because capital is attracted to such activities. This increases (decreases) the input (output) prices of tax-advantaged activities. Under this view, any differences in the effective tax burden across firm owners would be quickly competed away. However, consistent with our results, Callihan and White (1999) and Salbador and Vendrzyk (2006) find that market power is positively related to a firm's ability to retain tax advantages. Consistent with this result, we find that firms with weaker ability to shift the tax burden to stakeholders engage more in tax avoidance. Taken together, our results imply that the very forces that give rise to firms' ability to pass on corporate taxes to stakeholders preclude implicit taxes from instantly competing away that ability.

Finally, our results also have policy implications. International organizations such as the European Commission or the OECD, the academic literature, and the media increasingly raise concerns about tax avoidance and, in particular, about low ETRs. The Base Erosion and Profit Shifting (BEPS) initiative is one example of specific actions (OECD 2013). However, combating tax avoidance can have heterogeneous effects on firms, depending on the corporate tax incidence falling on firm owners. Firms that are perceived as "good citizens" because they do not avoid taxes in terms of nominally paying taxes could actually pass on the corporate tax burden to consumers, suppliers, and/or workers. Hence, policymakers need to consider a set of regulations such as tax policy, consumer laws, and employment rights when trying to combat tax avoidance.

2. Relation of Tax Incidence and Tax Avoidance

2.1 Corporate Tax Incidence

There is a longstanding debate in the public finance literature about the economic incidence of the corporate tax, that is, the amount of taxes that effectively fall on shareholders. One view is that the

[3] Empirically, we note that the positive association between product market power and tax avoidance documented by Kubick et al. (2015) becomes negative when controlling for invariant unobservable firm characteristics.

corporate tax fully falls on firm owners, starting with the seminal contribution by Harberger (1962). Several studies and theoretical approaches support this view (e.g., Shoven 1976). Hence, it is common that studies about the effect of corporate taxes on firm outcomes such as investment (e.g., Summers 1981, Auerbach 1983, Djankov et al. 2010), capital structure (e.g., Graham 1996, Heider and Ljungqvist 2015), or tax avoidance (e.g., the review by Hanlon and Heitzman 2010) implicitly assume that the economic incidence of the corporate tax falls on shareholders.

However, there are several theoretical arguments why the corporate tax incidence might not fully fall on firm owners, since the main underlying assumptions in Harberger's (1962) seminal paper (closed economy, competitive labor markets, and fixed supply of capital) do not necessarily hold. When the assumption of a closed economy (Mutti and Grubert 1984), the assumption of competitive labor markets and perfect labor mobility (Arulampalam, Devereux, and Maffini 2012, Fuest, Peichl, and Siegloch 2016), or the assumption of fixed capital stock (Feldstein 1974) is relaxed, the corporate tax incidence is not fully borne by shareholders. While there are still many open questions in general equilibrium models (e.g., Gravelle 2013),[4] under reasonable parameter constellations and assumptions, this literature concludes that the corporate tax does not fully fall on firm owners (see also the conclusions of Clausing 2012, 2013).

Consistent with this conclusion, the survey by Fuchs, Kruger, and Poterba (1998) among economists at top 40 U.S. institutions shows that the median respondent thinks that only about 40% of the corporate tax incidence is borne by shareholders. Several empirical studies support this view. Several studies find that the incidence of the corporate tax could partly fall on employees in the form of lower wages (e.g., Felix 2007, Arulampalam, Devereux, and Maffini 2012, Liu and Altshuler 2013, Fuest, Peichl, and Siegloch 2016). Liu and Altshuler (2013), for example, show that the elasticity of wages to corporate tax rates is significant and increases as an industry becomes more concentrated and, thus, the industry-specific labor market becomes less competitive. Further, Fuest, Peichl, and Siegloch (2016) show that employees bear about 47% of the corporate tax incidence. Suárez Serrato and Zidar (2016) show that about 30–35% of state-level corporate taxes in the United States are actually borne by workers. There is also empirical evidence that firms pass on the corporate tax to consumers in the form of higher prices (e.g., Krzyzaniak and Musgrave 1963, Vasquez-Ruiz 2011).

Taken together, based on theory and empirical findings, it is reasonable to assume that the economic incidence of the corporate tax does not fully fall on shareholders and that the variation in the

[4] Among others, Auerbach (2005), Harberger (2008), Clausing (2012, 2013), and Gravelle (2013) discuss several other issues in general equilibrium models that can affect the model's implications about the corporate tax incidence.

extent to which shareholders bear the corporate tax is largely driven by a firm's market power vis-à-vis its stakeholders. This assumption is consistent with the concern raised by Fullerton and Metcalf (2002, p. 1842), who conclude that "*[t]he standard assumption about the corporate income tax that the burden falls 100% on capital remains the standard assumption even though it is commonly believed to be false*." Relatedly, Gruber (2010, p. 713) states that "*what seems clear […] is that assuming that all the burden of the corporate tax is on investors […] is likely to be incorrect*." A certain (unobservable) fraction of the corporate tax incidence is borne by employees, customers, suppliers, or even land owners. This fraction varies across firms based on the relative elasticities of supply and demand in the respective factor or product market. Hence, for a certain level of *statutory* tax burden, the actual *economic* tax burden could be lower. The objective of the remainder of this section is to derive predictions about tax avoidance decisions when firms can pass on tax payments to stakeholders.

2.2 Measuring Tax Avoidance with ETRs versus Measuring the Economic Tax Burden

There is a vast literature on measuring tax avoidance (e.g., the overview by Hanlon and Heitzman 2010). Our objective is not to compare and evaluate these proxies but, rather, to show how the decision to avoid taxes is affected by the tax incidence falling on firm owners. One common, readily understandable measure of tax avoidance is the ETR. The ETR is computed as the ratio of a proxy for the tax liability to a proxy of pre-tax income or cash flow. The literature on tax avoidance often uses GAAP ETRs, defined as tax expenses over pre-tax income, or cash ETRs, defined as cash taxes paid over pre-tax income, to measure the tax burden of firms. To illustrate the implications of tax incidence for tax avoidance in a simple way, we use one common proxy for tax avoidance, the cash ETR:

$$CashETR = \frac{Cash\ Tax}{Profit^{pre-tax}} \tag{1}$$

Equation (1) can be rearranged and expressed as the difference between pre-tax profits ($Profit^{pre-tax}$) and after-tax return to equity ($Profit^{after-tax}$) over pre-tax return to equity, where $Profit^{pre-tax} = (1-\tau) \times Profit^{after-tax}$:

$$CashETR = \frac{Profit^{pre-tax} - Profit^{after-tax}}{Profit^{pre-tax}} \tag{2}$$

Put differently, the cash ETR captures the percentage change in the pre-tax profit resulting from tax payments. In case the cash ETR is not managed and there are no book-tax differences, the pre-tax profit ($Profit^{pre-tax}$) is subject to the statutory tax rate. A reduction in the cash ETR thus implies that, for a given pre-tax profit, the after-tax profit increases. The interpretation of the cash ETR and also the GAAP ETR is that a firm with lower (higher) ETRs avoids more (less) tax payments.

Cash ETRs—managed or unmanaged—measure how much taxes are nominally paid, that is, the amount of tax paid by the firm to the government relative to pre-tax profits. We denote this the *statutory* tax burden. We now extend this view and link the concepts of statutory tax burden as measured by the ETR and the economic incidence of the corporate tax. To formalize the *economic* tax burden falling on firm owners, we build on the studies in public finance of King (1974) and King and Fullerton (1984). There are several approaches to model the effective tax rates (for an overview see, e.g., Devereux 2004, Sørensen 2004). For example, the forward-looking average effective tax rate of a single investment project is defined as the ratio of the net present value after tax over the net present value before tax (Devereux 2004). Relatedly, our measure of firm owners' economic tax burden, that is, the actual corporate tax burden that falls on the firms' shareholders, compares the firm's profit in a world without taxes ($Profit^{Tax=0\%}$) to the firm's after-tax profit ($Profit^{after-tax}$). Since we abstract away from personal taxes, the difference between $Profit^{Tax=0\%}$ and $Profit^{after-tax}$ stems only from corporate taxes. This difference is scaled by the profit in a world without taxes so that we can write the economic tax burden as

$$ETB = \frac{Profit^{Tax=0\%} - Profit^{after-tax}}{Profit^{Tax=0\%}} \tag{3}$$

The economic tax burden *ETB* measures the change in profit due to the part of corporate taxes actually borne by firm owners. Recall that the cash ETR compares after-tax profit to the profit realized in a world *with* taxes but before tax payments ($Profit^{pre-tax}$), that is, the statutory tax burden. The variable *ETB* measures how much of the statutory tax burden actually falls on firm owners by comparing the after-tax profit to the profit realized in a world *without* taxes ($Profit^{Tax=0\%}$). The profit realized in a world *with* taxes before tax payments ($Profit^{pre-tax}$) and the profit realized in a world *without* taxes ($Profit^{Tax=0\%}$) can differ because taxes change investment decisions and thus the realized pre-tax profit. In the following, we discuss how the economic tax burden and the cash ETR relate to each other for a profit-maximizing firm.

2.3 Tax Avoidance Implications of Tax Incidence

To illustrate the implications of corporate tax incidence on tax avoidance, we model the tax avoidance decision of a single firm. We use a firm that maximizes its after-tax profits by optimizing capital input *K*, labor input *L*, and the level of tax avoidance *A*. The firm's output is modeled with a Cobb–Douglas production function. The output is sold at output price *p*. We further assume that capital leads to non-tax costs of *r* per unit of capital. Similarly, a unit of labor input *L* incurs wage costs in the

world with taxes of w^{tax}. Wages are fully tax deductible, whereas the costs of capital are not tax-deductible.[5] The firm's profit before tax is subject to the statutory tax rate τ, which can be reduced by tax avoidance A, measured in percentage points. Thus, the ETR becomes $\tau - A$.[6] Tax avoidance is a costly activity leading, for example, to direct costs for tax advisors or indirect costs from reputational damage (e.g., Gallemore, Maydew, and Thornock 2014, Graham et al. 2014). Further, we follow the standard approach to model the cost of tax avoidance with a convex cost function $C(A)$, with $C'(A) > 0$ and $C(A) = 0$ for $A = 0$ (see also Bartelsmann and Beetsma 2003). This results in the following after-tax profit:

$$\Pi(K, L, A) = p \cdot K^{\alpha} \cdot L^{\beta} \cdot (1-(\tau - A)) - w^{tax} \cdot L \cdot (1-(\tau - A)) - r \cdot K \cdot (1-\gamma(\tau - A)) - C(A) \qquad (4)$$

For the sake of illustrating the effect of tax incidence on tax avoidance, we focus on firms' ability to pass on some of the corporate tax burden to employees through wages. We introduce the exogenous parameter ε, which, conceptually, captures the (relative) elasticity of the labor supply, that is, a firm's market power in the labor market.[7] In the extreme case of $\varepsilon = 1$, the firm faces wage-inelastic workers. Hence, the firm can pass on the tax to employees through a reduction in wages without distorting workers' supply of labor. Accordingly, the firm chooses the same optimal labor and capital quantities as factor inputs in a world with taxes as in a world without taxes. Therefore, the cost of passing on the tax to employees is zero, because the firms' optimal factor inputs will not be distorted by taxes. Undistorted factor inputs imply that firms earn the same after-tax profits as they would in a world without taxes.

If $\varepsilon < 1$, workers are elastic in their supply of labor with respect to wages. Smaller values of ε indicate that the workers' labor supply becomes more elastic. Hence, if $\varepsilon < 1$, passing on the tax to employees through a reduction in wages will distort the labor supply and, thus, the optimal factor inputs of labor and capital chosen by the firm. If $\varepsilon < 1$, the optimal labor and capital quantities as factor inputs in a world with taxes will be lower than in a world without taxes. This difference in factor inputs gives

[5] This assumption does not change our inferences. We obtain similar results if we assume the full or partial deductibility of the cost of capital (see Figure A.1 of the Online Appendix).

[6] We simplify the model and assume that profits and cash flows are the same and that there are no deferred taxes. Hence, the cash ETR and GAAP ETR are the same in our simple model.

[7] This is a simplification. Alternatively, one could use a general equilibrium framework with competitive labor markets (e.g., Result 1 of Fuest, Peichl, and Siegloch 2016) and endogenize tax incidence when modeling a firm's decision to avoid taxes. In such a model framework, the intuition that firms trade off the cost of passing on taxes to stakeholders, which is a function of the firm's relative elasticity towards stakeholders, and the cost of tax avoidance should hold as well. Further, we deliberately exclude other factors such as corporate governance to keep the model simple. While these factors may be related to a firm's market power and tax avoidance, they are unlikely to fully substitute for a firm's market power. We view the interaction of these other factors with market power and tax avoidance as beyond the scope of our paper and, hence, a fruitful avenue for future research.

rise to a non-zero cost of passing on the corporate tax to employees. The cost of passing on the tax to employees therefore increases as ε decreases from unity to zero. Intuitively, if the supply of labor is fully elastic, that is, if $\varepsilon = 0$, the distortion and cost caused by passing on the tax to employees through a reduction of the wage becomes prohibitively high and firms do not pass on any taxes to employees.

To formalize this discussion, we define the wage w^{tax} in a world with taxes as a function of ε and the firm's statutory tax burden, factor inputs K and L, tax avoidance A, and the wage $w^{Tax=0\%}$ from a world before taxes. Specifically, we set the wage w^{tax} in the world with taxes equal to $\left(w^{Tax=0\%} \cdot L \cdot (1-(1-\varepsilon)\cdot\tau) - p \cdot K^{\alpha} \cdot L^{\beta} \cdot (\tau-(1-\varepsilon)\cdot\tau)\right) \Big/ \left(L \cdot (1-\tau)\right)$ for two reasons. First, this definition ensures that the fraction of corporate tax payment borne by employees is exactly ε. Second, this ensures that the part of the corporate tax payment borne by firm owners is exactly $1-\varepsilon$. Inserting this expression for w^{tax} into equation (4) results in an after-tax profit of

$$\Pi(K,L,A) = p \cdot K^{\alpha} \cdot L^{\beta} \cdot (1-(1-\varepsilon)\cdot(\tau-A)) - w^{Tax=0\%} \cdot L \cdot (1-(1-\varepsilon)\cdot(\tau-A)) - r \cdot K - C(A) \qquad (5)$$

that includes the exogenously given level of corporate tax incidence falling on shareholders ε, the firm's decision to avoid taxes A, and the input factors labor L and capital K.

Note that equation (5) is equal to equation (4) if the corporate tax incidence fully falls on firm owners ($\varepsilon = 0$) as the wage in the world without taxes equals the wage in the world with taxes ($w^{tax} = w^{Tax=0\%}$) in this case, because no taxes are passed on to stakeholders. In contrast, if firms can fully pass on the corporate tax to employees ($\varepsilon = 1$), equation (5) is equal to $\Pi(K,L,A) = p \cdot K^{\alpha} \cdot L^{\beta} - w \cdot L - r \cdot K - C(A)$, that is, the profit from a world without taxes minus the cost of tax avoidance. In all other cases, the after-tax profit depends on ε, as described in equation (5).

Profit maximization is achieved if $\frac{\partial \Pi}{\partial K} = 0$, $\frac{\partial \Pi}{\partial L} = 0$, and $\frac{\partial \Pi}{\partial A} = 0$ under the additional condition that after-tax profits are non-negative ($\Pi \geq 0$). In Appendix A, we derive the expressions for the profit-maximizing capital input K^* and the profit-maximizing labor input L^*. Since we are interested in the tax avoidance decision and how this decision is affected by the level of tax incidence falling on stakeholders, we focus on the profit-maximizing level of tax avoidance A^* in this section. Generally, the profit-maximizing level of tax avoidance is reached when the marginal cost of tax avoidance equals the marginal benefit of tax avoidance:[8]

[8] While we do not explicitly disentangle the level of tax avoidance and the riskiness per unit of tax avoidance, we note that we model tax avoidance using a convex cost function, which implies that higher levels of tax avoidance become increasingly costly. Economically, this could be interpreted as if higher levels of tax avoidance are 'more aggressive' and associated with higher risk leading to increased cost of tax avoidance.

$$\underbrace{C'(A)}_{\text{Marginal Cost of Tax Avoidance}} = \underbrace{(1-\varepsilon)\cdot\left[\, p\cdot K^{*}\cdot L^{*} - w\cdot L^{*} - r\cdot K^{*}\,\right]}_{\text{Marginal Benefit of Tax Avoidance}} \tag{6}$$

If $\varepsilon = 0$, that is, if no taxes can be passed on to employees, the tax avoidance decision boils down to a comparison of marginal cost (equal to $C'(A)$) and benefit (equal to the marginal profit)), as is standard in prior literature. For $\varepsilon > 0$, the right-hand side of equation (6) illustrates that the ability to pass on taxes to employees reduces the marginal benefit from tax avoidance because firm owners bear only a part of the tax. When firms can fully pass on the tax to employees ($\varepsilon = 1$), any additional tax avoidance would provide the firm with no benefits, since the right-hand side of equation (6) becomes zero for any level of tax avoidance. The profit-maximizing level of tax avoidance in case of ($\varepsilon = 1$ is thus achieved if the cost of tax avoidance is zero ($C'(A) = 0$). In this case, only not engaging in the avoidance of tax payments, for example, $A^{*}= 0$, fulfills the condition that the marginal benefit equals the marginal cost of tax avoidance. We summarize this insight as follows.

Result 1: *If corporate tax incidence fully falls on stakeholders, firms have no incentive to avoid taxes and their ETR equals the statutory tax rate.*

For all other cases, that is, if workers are neither fully inelastic ($\varepsilon = 1$) nor fully elastic ($\varepsilon = 0$), firms employ a combination of both tax avoidance and passing on the tax to employees through lower wages. The optimal level of tax avoidance is a decreasing function of a firm's ability to pass on the tax to employees. Firms trade off the cost resulting from distortions of the labor supply caused by passing on the tax to employees versus the cost of tax avoidance through tax planning. Because greater ability to pass on the tax to employees means lower cost from labor supply distortions, a higher ε reduces the marginal benefit from tax avoidance (the right-hand side of equation (6)). Put differently, the opportunity cost of tax avoidance increases with a greater ability to pass on taxes to employees. Hence, on average, firms with a higher ε will choose lower levels of tax avoidance than firms with lower ε will. If more of the corporate tax incidence falls on firm owners (lower ε), the profit-maximizing level of tax avoidance A^{*} rises as the marginal benefit from tax avoidance increases, which justifies more costly tax avoidance and, therefore, higher levels of tax avoidance.

To illustrate how the profit-maximizing level of tax avoidance relates to corporate tax incidence, we graphically depict a numerical example to discuss equation (6) and the profit-maximizing level of tax avoidance. We assume that the statutory tax rate is 35%. The cost of tax avoidance is described by the convex cost function $0.75\cdot A^{2}$. To illustrate the optimal level of tax avoidance A^{*}, we set α to 0.2, β to 0.4, p to 0.8, and r to 0.2 to ensure that the after-tax profit is positive in all cases.

Figure 1 plots the profit-maximizing level of tax avoidance A^* (the *y*-axis) as a function of the corporate tax incidence falling on stakeholders, ε (the *x*-axis). We define the level of tax avoidance A^* in a way that, for example, a level of tax avoidance A^* of 25% implies that the ETR decreases from 35% to 10%. We also plot the resulting wage *w(A)* after shifting the tax to employees to illustrate how the tax burden is passed on to employees in the form of lower wages. If only a small part of the corporate tax incidence falls on stakeholders (low ε), the profit-maximizing firm avoids taxes at a level A^* that is close to that for the case in which firm owners fully bear the corporate tax burden. The resulting wage is then close to the wage rate in the setting where firm owners fully bear the corporate tax burden. As more of the corporate tax incidence falls on stakeholders, that is, as ε increases, the profit-maximizing level of tax avoidance A^* decreases and the resulting wage of employees decreases. If a very large part of the corporate tax incidence falls on stakeholders (high ε), the profit-maximizing level of tax avoidance A^* of the profit-maximizing firm becomes very small and is zero if $\varepsilon = 1$. In this case, firms rather pass on the corporate tax burden to employees instead of avoiding tax payments.

[Insert Figure 1 about here]

In Panel A, Figure 2, we plot the resulting cash ETR (solid black line) and the economic tax burden (dashed black line) for the profit-maximizing levels of capital K^*, labor L^*, and tax avoidance A^*. Consistent with the observation in Figure 1 that tax avoidance is decreasing as more of the corporate tax incidence falls on stakeholders (higher ε), the firm's profit-maximizing cash ETR increases if ε increases. That is, if a high (low) share of the corporate tax incidence is borne by employees, the profit-maximizing firm will report a low (high) ETR. However, reporting a low ETR does not mean that firm owners economically bear a small tax burden. Instead, as indicated by the dashed black line, the economic tax burden is highest for low ε and the highest level of tax avoidance. The economic tax burden decreases as more of the corporate tax incidence falls on stakeholders (higher ε), even though tax avoidance decreases. This finding is due to the tax-induced distortions of the optimal input factors K^* and L^* that result in a lower after-tax profit relative to the profit from a world without tax. This reduction in after-tax profits increases the economic tax burden. The reduction in after-tax profits is not reflected in the cash ETR. In other words, the high costs of passing on the tax burden to employees (low ε) cannot be fully compensated for by costly tax avoidance and, thus, firms face a high economic tax burden despite low ETRs. Hence, the ETR only captures how much firms avoid in nominal terms but not the economic tax burden firms actually face (unless at a point where the ETR and economic tax burden intersect).

In Panel B of Figure 2, we plot the resulting the after-tax profit (solid black line) to demonstrate that the after-tax profit increases as more of the corporate tax incidence falls on stakeholders. The pre-

tax profit (dashed line) is realized only when the corporate tax can be fully shifted to employees at zero cost ($\varepsilon = 1$) and when there is no tax avoidance. The decline in after-tax profits as ε decreases mirrors the increase in the economic tax burden despite increased tax avoidance activity. The lowest (maximized) after-tax profit is realized if the corporate tax incidence falls fully on firm owners.

[Insert Figure 2 about here]

Taken together, firm owners have incentives to avoid taxes *and* to pass on the tax burden to other stakeholders. There is a trade-off between these two means of reducing the tax burden, depending on their costs. The cost of passing on taxes to stakeholders stems from market responses that change firms' optimal capital and labor inputs before and after tax. The costs of avoidance, $C(A)$, stem from direct tax planning costs (e.g., tax advisor fees) and indirect tax planning costs (e.g., reputational and political costs). If the costs of reducing tax payments ($C(A)$) are independent of labor supply elasticity (expressed in ε), the relative cost of shifting taxes to stakeholders is lower for firms facing a less elastic labor supply. Reducing tax payments through tax avoidance is less attractive than passing on taxes to employees for firms facing a less elastic labor supply. This translates into greater shifting of the tax burden to employees relative to tax avoidance. It also translates into a decline in the level of tax avoidance as firms face a more elastic labor supply, as long as the costs of tax avoidance cannot be passed on to stakeholders to the same extent as tax payments.[9] Because the cost of passing on taxes to stakeholders, that is the labor supply elasticity is exogenous (at least in the short run), it plausibly determines the level of tax avoidance required to maximize after-tax profits. We summarize these insights as follows.

Result 2: *The incentive to avoid taxes increases in the corporate tax incidence falling on firm owners*.

Next, we show that it is suboptimal to further increase tax avoidance beyond A^*. Any deviation from the profit-maximizing level of tax avoidance A^* results in lower after-tax profits. If tax avoidance increases (and thus the ETR decreases), the resulting wage after passing on the corporate tax would adjust and increase again (e.g., Fuest, Peichl, and Siegloch 2016). This effectively changes the firm's factor inputs and ultimately decreases the after-tax profit more than the marginal savings from tax avoidance would increase after-tax profits. To illustrate this, we plot the after-tax profit for different

[9] If firms can also pass on the costs of tax avoidance to employees, the cost of tax avoidance decreases and, thus, the profit-maximizing level of tax avoidance (ETR) would also increase (decrease), but to a lower extent than passing on taxes would. We assume that firms are not able to pass on costs of tax avoidance to the same extent as tax payments because some of costs of tax avoidance, for example, back taxes, expected penalties, reputational costs, or political costs, bear uncertainty. Hence, only an expected value can be possibly passed on to employees, which is likely below the actual costs. We note that, if this assumption is invalid, empirically, this fully works against our prediction and our findings of higher ETRs for firms with more market power.

levels of A centered around the profit-maximizing level of tax avoidance A^* for $\varepsilon = 0.5$ in Figure 3. The after-tax profit decreases if the firm either avoids more taxes than A^* (positive values on the x-axis) or avoids less taxes than A^* (negative values on the x-axis). Taken together, any deviation from A^* reduces after-tax profits.

[Insert Figure 3 about here]

In the final step, we discuss the implications of changing the cost of tax avoidance. This enables us to derive empirical predictions about which firms' tax avoidance decisions are most responsive to changes in the costs of tax avoidance. To illustrate this effect, we assume a tax avoidance cost function $C(A) = A^2$ (higher costs) instead of $C(A) = 0.75 \cdot A^2$ (lower costs). Figure 4 plots the resulting profit-maximizing levels of tax avoidance (Panel A), the resulting ETRs (Panel B), the economic tax burdens (Panel C), and the after-tax profits (Panel D) of both cases. Relative to the case with a lower cost of tax avoidance, the profit-maximizing firm with a higher cost of tax avoidance has lower levels of tax avoidance, reports a higher ETR, has a higher economic tax burden, and lower pre-tax profits. The differences between the higher and lower tax avoidance cost cases decreases as more of the corporate tax is passed on to stakeholders. Put differently, as ε increases, firms are less responsive to changes in the cost of tax avoidance. From this observation, we can derive a testable prediction. If the costs of tax avoidance decrease, firms that can pass on less of the corporate tax to employees increase tax avoidance activities more than firms that can pass on more of the corporate tax to employees. This is illustrated in the declining difference in the profit-maximizing level of tax avoidance A^* between the higher and lower tax avoidance cost cases in Panel A of Figure 4.

[Insert Figure 4 about here]

Taken together, our conceptual framework illustrates that corporate tax incidence has a direct effect on firms' decision to avoid taxes. With this model, we can explain the tax undersheltering puzzle (e.g., Weisbach 2002) to the extent that there are cross-firm differences in the tax incidence falling on firm owners. Firms do not have incentives to avoid taxes and have higher ETRs when the corporate tax burden can be passed on to stakeholders. This does not invalidate the interpretation of cash ETRs as a proxy for tax avoidance activities. Low (high) cash ETRs indicate high (low) tax avoidance efforts. However, a high (low) cash ETR does not imply that firm owners actually face a high (low) economic tax burden. In fact, owners of firms with a high ETR could actually face a low economic tax burden while owners of firms with a low ETR can face a high economic tax burden.

3. Empirical Specifications and Data

3.1 Data

To provide empirical support for our theoretical framework, we start with all available Compustat observations for 1974–2015. Our sample restrictions follow prior literature on tax avoidance imposing minimal requirements (e.g., Dyreng, Hanlon, and Maydew 2008, 2010). Specifically, we include firms incorporated and headquartered in the United States with at least three consecutive years of non-missing cash taxes paid. We further eliminate real estate investment trusts, that is, firms with SIC code of 6798). We also require non-missing observations for our control variables. Due to missing information on cash taxes paid, we use observations for the years 1989–2015. After imposing these sample requirements, we obtain a sample of 8,871 firms and 82,966 observations.

3.2 Baseline Regression

The main limitation of testing the insights from our theoretical framework is that the economic tax burden is not observable. We would need to observe the pre-tax income before passing on corporate taxes to stakeholders, that is, the profit in a world without taxes. We can only provide indirect evidence consistent with Result 2. Prior literature suggests certain circumstances when the corporate tax incidence falls more or less on firm owners. We exploit the fact that "*taxes are borne by those who can not easily adjust*" (Kotlikoff and Summers 1987, p. 1047). For example, if demand is largely inelastic, firms can pass on corporate taxes to consumers in the form of higher prices. While consumers' demand could be more elastic in the long run, demand is not likely to be fully elastic, at least in the short and medium run. Hence, some of the corporate tax could be reflected in higher consumer prices (e.g., Gruber 2010, Chapter 24.3). Similarly, when the labor supply is less elastic, firms can more easily pass on the corporate tax to workers in the form of lower wages. For example, blue-collar workers are less mobile than white-collar workers and, thus, firms can more easily pass on the corporate tax burden to blue-collar workers (e.g., Fuest, Peichl, and Siegloch 2016).

For our first specification, we use the gross margin as our proxy for higher versus lower tax incidence falling on shareholders for two reasons. First, Fuest, Peichl, and Siegloch (2016) show that firms with higher margins have a greater ability to shift corporate taxes to employees. They use a fair wage model and provide empirical evidence of this result. Second, we argue that firms with more product market power face less elastic demand (Lerner 1934). We use an outcome of market power, the gross margin, and argue that higher gross margins are consistent with less elastic demand and, thus, greater ability to shift the incidence of the corporate tax to consumers (see, also, Jacob, Müller, and Michaely (2016). To this end, our empirical approach is related to that of Kubick et al. (2015), who use

the very closely related price-cost margin according to Peress (2010). Kubick et al. also argue that increased product market power increases the ability to change consumer prices when facing negative shocks. However, our model suggests that the consequences for tax avoidance are different. We predict that higher gross margins are associated with higher ETRs. Kubick et al. propose the opposite and argue that smoother profits from exploiting product market power increase tax avoidance. Which of the two effects dominates is an empirical question.

We use a firm-level measure of product market power instead of an industry-level measure of concentration such as the Herfindahl–Hirschman Index (HHI) for several reasons. First, our theoretical approach models a firm's decision to avoid taxes and our proxy for firm specific market power should reflect this. Using an industry-level measure would potentially misclassify individual firms that have low market power but that act in a concentrated industry. Second, margins are only weakly related to industry concentration (e.g., Ali, Klasa, and Yeung 2009), but proxy reasonably well for market power (Domowitz, Hubbard, and Petersen 1988). Put differently, having few firms dominating sales in an industry does not imply that they have pricing power (Demsetz 1968). Finally, industry-level concentration measures might correlated with industry-specific tax provisions (see, also, Kubick et al. 2015), CEO turnover (Defond and Park 1999), or disclosure (Harris 1998). We account for all time-varying and time-invariant industry characteristics, particularly, industry-level concentration, in our analysis by including industry-year fixed effects.

Following prior literature on the determinants of tax avoidance (e.g., Mills 1998, Rego 2003, Graham and Tucker 2006, Richardson and Lanis 2007; Dyreng, Hanlon, and Maydew 2008, 2010, Chen et al. 2010) and using the gross margin as our firm-specific proxy for market power, we thus estimate the following estimation equation:

$$\begin{aligned} Cash\ ETR_{i,t} = {} & \alpha_0 + \beta_1 GrossMargin_{i,t} + \beta_2 Investment_{i,t} + \beta_3 Cash_{i,t} + \beta_4 Income_{i,t} + \beta_5 Sales\ Growth_{i,t} \\ & + \beta_6 Leverage_{i,t} + \beta_7 Size_{i,t} + \beta_8 Foreign_{i,t} + \beta_9 LCF_{i,t} + \beta_{10} Intangibles_{i,t} + \beta_{11} PPE_{i,t} \\ & + \beta_{12} R\&D_{i,t} + \beta_{13} Advertising_{i,t} + \beta_{14} SG\&A_{i,t} + \beta_{15} Special\ Items_{i,t} + FE + \mu_{i,t} \end{aligned} \quad (7)$$

where *Cash ETR* is the dependent variable. We use a three-year and a five-year *Cash ETR* as an alternative dependent variable as a proxy for long-run tax avoidance (Dyreng, Hanlon, and Maydew 2008). We document the robustness to using a long-run GAAP ETR in Section 4.5. We define *Cash ETR* as the sum of taxes paid during $t-2$ and t ($t-4$ and t) divided by the sum of pre-tax income during t - 2 and t (t - 4 and t) to compute the three-year (five-year) *Cash ETR*. As in prior literature, we winsorize the cash ETR at zero and one but assess the robustness of our results to truncating the winsorized observations below.

For independent variables, we include *Gross Margin*, defined as sales minus the costs of goods sold over total sales. We view *Gross Margin* as a summary measure of a firm's market power (e.g., towards customers, employees, and other suppliers of factor inputs). This variable closely captures the key variable in our model, ε, the firm's ability to pass on taxes to their stakeholders, which is a function of the firm's relative elasticity towards its stakeholders. For example, high margins reflect product and labor market power, that is, relatively less elastic consumer demand (Lerner 1934) and labor supply. Consistent with higher margins indicating a higher ability to pass on taxes through prices or wages to consumers or employees, we expect firms with higher gross margins to have higher ETRs ($\beta_1 > 0$). In addition, we include several standard control variables following prior literature related to tax avoidance decisions (e.g., Dyreng, Hanlon, and Maydew 2010, Dyreng et al. 2016). For example, we include *Investment*, defined as capital expenditures scaled by lagged total assets; *Cash*, defined as cash holdings and short-term investments scaled by lagged total assets; *Income*, defined as earnings before interest, taxes, depreciation, and amortization (EBITDA) scaled by lagged total assets; *Sales Growth*, the natural logarithm of the growth rate of sales from $t - 1$ to t; *Leverage*, defined as total debt scaled by total assets; and *Size*, the natural logarithm of total assets. We also include dummy variables for being a multinational company (*Foreign*) and whether the firm has a tax loss carryforward (*LCF*). Finally, we include the ratio of intangible assets to total assets (*Intangibles*), the ratio of gross property, plant, and equipment to total assets (*PPE*), ratio of research and development expenses to sales (*R&D*), the ratio of advertising expenses to sales (*Advertising*), the ratio of selling, general, and administrative expense to sales (*SG&A*) and is the ratio of special items to total assets (*Special Items*).[10]

Further, we include several fixed effects. While the variation we model is primarily of cross-sectional nature, there are important reasons to isolate cross-sectional differences that are constant over time. That is, we include firm fixed effects as Dyreng, Hanlon, Maydew (2010), Chyz (2013), or Brown et al. (2014) to absorb time-invariant firm-level characteristics that are correlated with market power and tax avoidance. For example, a variable such as political or agency costs that is positively correlated with market power (e.g., Hart 1983) and negatively correlated with tax avoidance (e.g., Zimmerman 1983 for political costs and Rego 2003 or Desai and Dharmapala 2006 for agency costs) could plausibly bias the *Gross Margin* coefficient downwards and even lead to finding a negative relationship between a firm's market power and its effective tax rate. To the extent characteristics such as political or agency costs are constant over time, fixed effects absorb their effect. The inclusion of firm fixed effects

[10] Our results are robust to including dummy variables for missing R&D, Advertising, or SG&A (not reported).

therefore implies that we examine how changes in market power relative to the firm's average market power are related to changes in ETRs relative to a firm's average ETR.

We further benchmark this difference in market power also relative to ETR changes of firms with unchanged market power in the same year as well as industry in some specifications. This controls for contemporaneous changes in industry-level competition and concentration (e.g., Hou and Robinson 2006; Ali, Klasa, and Yeung 2009) and any other industry-specific characteristics in a given year. Further, since low- and high-margin firms can differ in many aspects even within an industry (for example, a vertically integrated firm has higher margins than a firm relying on outsourcing), we additionally sort firms in each year into deciles of gross margin. We then subsequently include decile–year fixed effects to identify the β_1 coefficient from variation within deciles of gross margin. Taken together, we compare how changes in market power relative to the firms' average market power affect observed effective tax rates relative to changes in tax avoidance, that is, effective tax rates, observed at the industry-year level and for firms with market power in a comparable range. In other words, in the specification with all fixed effects, the identification of the *Gross Margin* coefficient stems from within-industry and within-margin-decile variation in product market power at the firm level.[11] Standard errors are clustered at the firm level.

3.3 Exploiting the Introduction of the 1997 Check-the-Box Regulation

The key concern about the above baseline regression is that the variation in gross margins is not exogenous. That is, there may be unobservables driving both a change in the gross margin and tax avoidance. Hence, we complement the above analyses with alternative identification approaches where we exploit an exogenous shock to tax avoidance opportunities. While this approach partly deals with issues of cross-sectional regression, we need to ensure that a differential time trend of low- versus high-margin firms over this specific time window cannot explain the result. Below, in Section 4.2, we provide evidence that supports the parallel trend assumption.

Our main prediction is that, when firm owners bear a larger share of the corporate tax incidence, their firms are more likely to avoid taxes. This suggests that, once new tax avoidance opportunities appear, these firms should be more likely to exploit them. We use the 1997 introduction of the Check-the-Box regulation as an exogenous shock to tax avoidance opportunities (see also Desai and Dharmapala 2009). This regulation reduced the costs of tax avoidance for firms and, thus, increased firms' ability to engage in tax avoidance (e.g., Altshuler and Grubert 2006, Gravelle 2009). Consistent

[11] The results are not sensitive to this choice. We document in Table A.1 of the Online Appendix that our results are similar with bin–year fixed effects based on 20, 30, or 40 bins.

with this argument, Dyreng et al. (2016) document that cash ETRs substantially decreased from before the Check-the-Box introduction to after.

We exploit this shock and predict that firms with low gross margins are more likely to reduce their cash ETRs relative to firms with high gross margins. Put differently, we expect that the reduction in cash ETRs around 1997 is higher for firms that can pass on less of the corporate tax to stakeholders. Our approach is a difference-in-differences design where we compare low-gross margin to high-gross margin firms (*first difference*) around the 1997 introduction of the Check-the-Box regulation (*second difference*). A potential limitation is that there might be confounding events and policy changes. However, such concurrent changes would have to affect the tax avoidance decisions of low-gross margin versus high-gross margin firms in the same way as the Check-the-Box regulation. We are not aware of such events. To the extent that both groups are similarly affected by concurrent changes, for example, by the reduction in the long-term capital gains tax rate from 28% to 20%, the difference-in-differences estimate is not biased. Using data from 1992–2001, we thus estimate the following regression:

$$Cash\ ETR_{i,t} = \alpha_0 + \beta_1 LowMargin_i + \beta_2 LowMargin_i \times Post_t + CONTROLS_{i,t} + \alpha_i + \alpha_{j,t} + \mu_{i,t} \qquad (8)$$

where the cash ETR (*Cash ETR*) is the dependent variable. We use the three-year and a five-year *Cash ETR* as alternative dependent variables. The variable *Low Margin* is a dummy variable equal to one if the firm's average gross margin over 1994–1996 is below the median of the three-year industry-adjusted average gross margin over the same period. Hence, we define treatment and control groups based on observable firm characteristics before the shock to tax avoidance opportunities to prevent increased tax avoidance opportunities from affecting gross margins. The variable of interest is the difference-in-differences coefficient β_2. We expect β_2 to be negative because firms where stakeholders bear less of the corporate incidence have the strongest incentives to avoid taxes. When estimating the difference-in-differences model, we again include control variables, firm-fixed effects (α_i), and industry–year fixed effects ($\alpha_{j,t}$).

3.4 Assessing the Channels: Shifting to Consumers and/or to Employees

In the final step, we use two distinct settings to assess whether both channels of passing on the corporate tax incidence, increasing consumer prices and decreasing employees' wages, are at work. Theory predicts that more of the corporate tax incidence falls on firm owners if demand becomes more elastic. To isolate the consumer channel, we use shocks to consumer demand elasticity. The latter can arise if, for example, more international competitors enter the market. We thus use changes in import

tariffs from Frésard (2010) and examine their effect on tax avoidance using the following regression (see also Brown et al. 2014):[12]

$$Cash\ ETR_{i,t} = \alpha_0 + \beta_1 Tariff\ \ Cut_{j,t} + CONTROLS_{i,t} + \alpha_i + \alpha_t + \mu_{i,t} \quad (9)$$

where *Cash ETR* is the dependent variable. We use the one-year and a three-year *Cash ETR* as alternative dependent variables. The variable *Tariff Cut* is a dummy variable equal to one if the firm's industry experienced a significant tariff cut in the prior year or in the current year. We use the import tariffs at the four-digit SIC code level of Frésard (2010) and define a significant tariff cut if an industry's tariff cut is at least three times larger than the industry's average annual tariff cut over the sample period (see also Brown et al. 2014). We expect β_1 to be negative, since an increase in demand elasticity incentivizes firms to avoid taxes because more of the incidence now falls on firm owners. We limit the sample to observations for which we have data on cash ETRs, the control variables, and tariff cuts. Since we exploit 51 tariff cuts staggered in time and across industries, this approach is similar to a generalized difference-in-differences design. Since the treatment is defined at the four-digit SIC code industry level, we also cluster standard errors at the four-digit SIC code level. Again, we include the control variables, firm fixed effects, and (industry–year) year fixed effects. When including industry–year fixed effects, we define industries as the 48 Fama–French industries. This approach narrows down the counterfactual to industries from the Fama–French industry codes.

To estimate whether passing on the corporate tax incidence to employees can partly explain tax avoidance, we rerun our approach from equation (8) around the 1997 Check-the-Box introduction exploiting heterogeneous worker effects. Fuest, Peichl, and Siegloch (2016) show that the shift of the corporate tax incidence to employees is more pronounced for blue-collar workers because they are less mobile than white-collar workers. Therefore, firms with mostly white-collar workers are more likely respond to the increased tax avoidance opportunities created by the 1997 Check-the-Box introduction. Since data on the exact skills and wages of employees are not available, we use the ratio of the firm's wage expenses over sales as a proxy for heterogeneous worker effects. We thus run the following difference-in-differences model:

$$\begin{aligned} Cash\ ETR = {} & \alpha_0 + \beta_1 High-Wages-Sales_i + \beta_2 High-Wages-Sales_i \times Post_t \\ & + CONTROLS + \alpha_i + \alpha_t + \mu_{i,t} \end{aligned} \quad (10)$$

[12] Brown et al. (2014) offer two explanations why firms would increase tax avoidance in response to tariff cuts: eroding profit margins and more effective monitoring. Our framework also predicts eroding profits margins, because the increased competition from import tariff shocks reduces demand elasticity. Thus, less of the corporate tax can be passed on to consumers, resulting in lower profit margins.

where cash ETR (*Cash ETR*) is the dependent variable. We use a three-year and a five-year *Cash ETR* as alternative dependent variables. We define the treatment group (*High–Wages–Sales* = 1) as firms that have a wages-to-sales ratio above the two-year industry-adjusted median wages-to-sales ratio for 1995–1996. The coefficient of interest is β_2, the difference-in-differences estimate. We expect β_2 to be negative because firms with less ability to shift the corporate tax incidence to employees are expected to be more responsive to new tax avoidance opportunities. We include all the control variables above, firm fixed-effects, and (industry–year) year fixed effects. When including industry–year fixed effects, our identification is based on within-industry variation. Further, to the extent our control variables for size, being a multinational, tangibility, or R&D activities capture firms' ability to shift profits, the *High–Wages–Sales* indicator captures differences in the relative elasticity of supply and demand.

3.5 Summary Statistics

Table 1 presents summary statistics for our main variables. On average, our sample firms have a three-year cash ETR of 23.29%. For a more long-term measure of five years, the cash ETR amounts to 25.22%. The GAAP ETRs in the robustness tests in Section 4.5 are slightly higher in our sample, averaging 25.53% (27.79%) for the three-year (five-year) GAAP ETR. Further, our sample firm's average gross margin is 32.2%. The average firms holds 17% in cash or short-term equivalents, has capital expenditures of 6.4% of total assets, spends about 4% of sales in R&D, has a total debt-to-assets ratio of 53.46%, and has an EBITDA-to-assets ratio of 4%. Further, about 33% of firms are foreign and about 34% of firms have a non-missing and non-zero tax loss carryback. Further, about 12.76% (55.05%) of assets are intangibles (property, plant, and equipment). Finally, we note that the correlation analysis (not reported here) shows no highly correlated control variables. In particular, one could be concerned about the correlation of the gross margin and EBITDA. However, the correlation of 0.27 indicates that both variables capture different concepts (see also Peress 2010, Kubick et al. 2015).

[Insert Table 1 about here]

4. Empirical Results

4.1 Baseline Results

Table 2 presents the regression results from estimating equation (7). In Columns (1) and (2), we present the results using the three-year cash ETR. In Columns (3) and (4), we use the five-year cash ETR. Columns (1) and (3) include firm and year fixed effects. In Columns (2) and (4), we include firm as well as industry–year fixed effects. In Panel B, we replicate these results and additionally include margin-decile year fixed effects. Consistent with our main prediction, we find positive and significant

correlations of *Gross Margin* and *Cash ETR* in all specifications. Cash ETRs are higher for firms for which less of the corporate tax incidence falls on shareholders. The results are also economically significant. Using the coefficient estimates from Panel B, Column (2), we find that going from the 25th to the 75th percentile of *Gross Margin*, which is equivalent to an increase of 0.3049, increases the three-year cash ETR by 1.9 percentage points (= 0.0631 × 0.3049). This is equivalent to 9.3% of the sample average.

[Insert Table 2 about here]

While the coefficients of the control variables mostly show signs consistent with our expectations and prior literature,[13] our main result differs from that reported by Kubick et al. (2015). As noted earlier, political or agency costs represent variables that could bias the *Gross Margin* coefficient downwards if omitted because they are plausibly correlated positively with gross margins and negatively with tax avoidance (e.g., Zimmerman 1983, Rego 2003, Desai and Dharmapala 2006). This is a concern that works against us finding results consistent with our prediction and in favor of finding a negative *Gross Margin* coefficient as Kubick et al. (2015). To control for time-invariant differences in political and agency costs or other unobservable characteristics across firms attenuating our estimate, our specifications include firm fixed effects while the specifications in Kubick et al. (2015) do not. Kubick et al. find that firms with high market power have lower effective tax rates. They argue that firms with high market power have lower operating volatility allowing these firms to better predict tax benefits and to hedge tax risk.

Similar to Kubick et al. (2015), we obtain a negative and significant coefficient for gross margin once firm fixed effects are not accounted for (see Columns (1), (2), (4), and (5) of Table A.2 of the Online Appendix). However, we also show that operating volatility—the channel through which market power affects tax avoidance according to Kubick et al. (2015)—is positively associated with tax avoidance in a regression excluding firm fixed effects. This finding is inconsistent with their explanation and with McGuire, Omer, and Wilde (2013). Only if firm fixed effects are controlled for (see Columns (3) and (6) of Table A.2), operating volatility is negatively associated with tax avoidance. Hence, we find empirical support for the channel through which market power affects tax avoidance according to Kubick et al. (2015) and the findings in McGuire, Omer, and Wilde (2013) only if firm fixed effects are included. Importantly, in this specification, we obtain a positive and significant *Gross*

[13] Consistent with Dyreng et al. (2016), we find a positive sign for *Foreign*, suggesting that multinationals exhibited higher cash ETRs during our sample period. The coefficients of *Sales Growth*, *Leverage*, *PPE*, and *SG&A* are negative and mostly significant (e.g., Chen et al. 2010, Dyreng et al. 2016). Further, firms with tax loss carryforwards have lower ETRs. We also find that larger firms have higher cash ETRs, in line with the political cost argument (Zimmerman 1983).

Margin coefficient consistent with our prediction that market power, that is, the ability to pass on taxes to stakeholders, is negatively related to tax avoidance.[14] While using firm fixed effects may improve upon approaches not controlling for time-invariant unobservable firm characteristics, it is important to note that our approach does not control for time-variant unobservable firm characteristics that may be driving changes in the gross margin as well as tax avoidance. Therefore, we confirm the positive relation between gross margin and tax avoidance in later tests by exploiting exogenous variation in tax avoidance opportunities or in product market demand elasticity.

One potential concern about the approach is that the existence of negative pre-tax income is correlated with gross margins as well as with cash ETRs. While we partly try to address this issue in Table 2 by including gross margin decile–year fixed effects, this issue is intensified by winsorizing the cash ETR at zero and one, as in prior literature. Since negative pre-tax income is associated with winsorizing the ETR at zero and with low margins, we could misinterpret our results. We address this concern in two ways. First, instead of winsorizing at zero and one, we drop all observations with cash ETRs below zero and above one. Second, we include indicator variables for losses, negative cash taxes paid, and losses as well as negative cash taxes paid. We include indicators for the current year, as well as the two previous years, resulting in nine additionally included indicator variables. These dummy variables deal with all the possible cases that can lead to negative cash ETRs. The results (presented in Table A.3 of the Online Appendix) are robust to both approaches. We continue to find a positive correlation between gross margins and cash ETRs.

Another related caveat about the baseline analysis is that the variation in gross margins differs across bins. In fact, the largest variation is in the bottom decile of the gross margin decile, which includes a sizable proportion of firms with negative gross margins. While controlling for having a negative gross margin reduces the coefficient estimate in the case of the three-year cash ETR, our inferences remain unchanged. The coefficient estimates of the gross margin remain positive and significant in all cases (see Table A.4 of the Online Appendix). Still, these tests must be interpreted with caution. Therefore, we run difference-in-differences analyses in the subsequent sections to alleviate some of these concerns.

4.2 Check-the-Box Regulation: Graphical and Non-Parametric Results

We now turn to the analysis around the 1997 introduction of the Check-the-Box regulation. The regulation increased the opportunities for firms to avoid taxes (Dyreng et al. 2016). We exploit this

[14] As we show below in the robustness tests section, our results are not driven by the second explanation by Kubick et al. (2015). Unsuccessful tax avoiders do not explain our findings.

setting in a difference-in-differences approach. Before turning to the regression analysis including control variables and fixed effects, we first provide graphical evidence and simple regression results to support the parallel trends assumption. To this end, we track the difference in the cash ETR between firms with low gross margins and firms with high gross margins over time. We use pre-shock gross margins to sort firms into groups to prevent the reform from affecting the assignment to treatment and control groups.

Figure 5 presents the development of the difference in the five-year cash ETR over 1992–2001. Before the shock, there appears to be a parallel trend in ETRs. In 1997, the year of the Check-the-Box regulation introduction, the difference in cash ETRs dropped and remained at this lower level. This finding is consistent with our expectation that, relative to high-gross margin firms, low-gross margin firms exploit new tax avoidance opportunities and reduce their cash ETR when the costs of tax avoidance decrease.

[Insert Figure 5 about here]

Table 3 presents summary statistics for this analysis and tests of statistical differences across groups and over time. As in Figure 2, we split the sample into firms with low gross margins and firms with high gross margins and into years before and after 1997. The results in the first line indicate that low-gross margin firms decreased their cash ETR by 2.4 percentage points around 1997. At the same time, high-gross margin firms decreased their cash ETR by only 0.7 percentage points, but this decrease is insignificant. Further, Column (1) of Table 3 indicates that, prior to 1997, low-gross margin firms, on average, had a cash ETR of 30.58% while high-gross margin firms had a cash ETR of 29.30%. The 1.28% difference in cash ETR is statistically significant. While this result somewhat contradicts our findings from Table 2, note that we do not account for any other observable or unobservable firm characteristics and therefore, this difference might be due to omitted correlated variables as described above. What matters is the difference in differences (highlighted in bold), which suggest that, around the reform, low-gross margin firms decreased their five-year cash ETR by 1.7 percentage points relative to high-gross margin firms. This unconditional difference-in-differences estimate is statistically significant at the 1% level and consistent with our prediction illustrated in Panel A of Figure 4.

Taken together, there are two takeaways from the analyses in Figure 5 and Table 3. First, there is a parallel trend in cash ETRs between treatment and control groups, supporting the identifying assumptions of the difference-in-differences approach. Second, consistent with the tax incidence explanation, low-gross margin firms reduce their cash ETRs while high-gross margin firms' cash ETRs remain constant when new tax avoidance opportunities arise.

[Insert Table 3 about here]

4.3 Check-the-Box Regulation: Regression Results

We next examine the effect of the Check-the-Box Regulation on tax avoidance across firms while accounting for control variables and fixed effects. Table 4 presents regression results from estimating equation (8). In Columns (1) and (3), we include only fixed effects to demonstrate how accounting for observable firm characteristics affects our results. In line with our expectations, we find negative and significant coefficients for *Low Margin* × *Post* in all specifications.

These results indicate that, relative to firms that can more easily pass on taxes to stakeholders, firms with less ability to pass on the corporate tax incidence to stakeholders are more responsive to new tax avoidance opportunities, that is, to a reduction in the marginal costs of tax avoidance. These firms increase tax avoidance activities and reduce their cash ETRs. The estimated effects are not only statistically significant but also economically large. For example, the coefficient estimate in Column (2) suggests that, relative to firms with high gross margins, the three-year cash ETR of low-gross margin firms decreases by 1.1 percentage points, or by 4.7% of the sample average cash ETR of 23.29%. For the five-year cash ETR, the decrease in the cash ETR amounts to 1.77 percentage points, or about 7% of the sample average cash ETR.

[Insert Table 4 about here]

Again, we can relate these findings to prior literature, particularly Kubick et al. (2015). The consistency of the results across all specifications with or without control variables (Columns (1) and (3) versus Column (2) and (4) of Table 4) as well as across specifications with and without fixed effects and controls (Table 3 versus Table 4) supports our explanation. Once we exploit an exogenous event (Tables 3 and 4) or once we account for unobserved time-invariant variation at the firm level, we find support for the tax incidence explanation of tax avoidance. Firms with market power have fewer incentives to engage in tax avoidance and report higher ETRs.

In the next step, we break down the treatment effect into quartiles. If the mechanism behind reduced cash ETRs is indeed related to incidence, we should see strongest responses for firms in the bottom quartile of the gross margin distribution. We split firms into quartiles of the industry-adjusted three-year average gross margin during 1994–1996. We use the top quartile as the reference group and allow the effect of the 1997 reform to vary across quartiles. We would expect the strongest responses for the bottom quartile and moderate responses for the second and third quartiles relative to the top quartile of gross margins.

Table 5 presents the coefficient estimates for our main variables. The control variables are included in Columns (2) and (4) but are not reported. As expected, we find the strongest responses for firms with

the lowest gross margins (*Bottom Quartile*). The estimate in Column (4) implies that, relative to firms with high gross margins, firms in the bottom quartile of the industry-adjusted three-year average gross margin distribution reduce the five-year cash ETR by 3.4 percentage points. The response decreases as the gross margin increases. The signs of the coefficient estimates are negative for the second and third quartiles and are statistically significant in most cases. We find (in most cases) that the effect in the bottom quartile is also statistically significant from the effect in the second or third quartile.

[Insert Table 5 about here]

We test the robustness of these results to truncating the cash ETRs at zero and one, as well as to the inclusion of indicator variables for losses and/or negative cash taxes in t, t - 1, and t - 2, respectively. The results (see Table A.5 of the Online Appendix) are robust and support our main finding that, around the introduction of the 1997 Check-the-Box regulation, low-gross margin firms increased their tax avoidance activities relative to firms with higher gross margins.

4.4 Additional Analysis: The Role of the Consumer Channel versus the Role of the Wage Channel

The previous tests are silent about the potential channels through which the incidence of the corporate tax can be passed on to stakeholders. For example, the incidence of the corporate tax falls less on firm owners if the corporate tax results in higher prices for consumers and/or lower wages for consumers. While we cannot directly test these channels, we exploit two distinct settings where either of the channels is affected while the other is held constant.

Table 6 presents the regression results from estimating equation (9) exploiting changes in import tariffs (see also Brown et al. 2014). These tariff cuts lead to more elastic demand in the respective industry because of greater international competition. This curbs the ability of firms to pass on the corporate tax to consumers in the form of higher prices. Consequently, since firm owners now bear more of the corporate tax incidence, our model predicts more tax avoidance when maximizing after-tax profits. We should thus observe lower ETRs around tariff cuts. This is exactly what we find in all specifications of Table 6. The estimates suggest that, after a significant reduction in import tariffs (*Tariff Cut* = 1), firms reduce their three-year cash ETR by about 3.2 percentage points. The result is larger when we use the immediate response as measured by the one-year cash ETR. Overall, the results in Table 6 support the idea that shocks to demand elasticity can affect the tax avoidance decisions of firms. Higher demand elasticity increases the corporate tax incidence falling on firm owners and increases their incentives to avoid taxes, or, as illustrated in the notation of our model, a lower ε leads to a higher profit-maximizing level of tax avoidance A^*.

[Insert Table 6 about here]

In the next step, we examine the wage channel. Building on the work of Fuest, Peichl, and Siegloch (2016), we use a difference-in-differences design and examine the responses of firms with a relatively elastic and a relatively inelastic labor supply, which we proxy for with high versus low wages-to-sales ratios.[15] Panel A of Table 7 presents the regression results from estimating equation (10). The difference-in-difference coefficient of *High Wages to Sales* × *Post* is negative in all specifications. However, the coefficient is insignificant in the case of the five-year cash ETR when we include industry–year fixed effects. One potential reason for this insignificance is that we are excluding important variation in labor supply elasticities across industries. If we account for only year fixed effects, the results are significant. The results for the three-year cash ETR indicate that firms with limited ability to pass on the corporate tax incidence to employees (*High Wages to Sales* = 1) reduce their cash ETR by about 3.3 percentage points, or by about 14% of the sample average. Consistent with our finding, De Vito (2017) shows that stronger employment protection laws decreases tax avoidance, which can be explained by a lower ability to pass on taxes to workers.

[Insert Table 7 about here]

In a supplemental test, we additionally include the interaction of *Low Margin* and *Post* to account for both channels at the same time. The coefficient of *High Wages to Sales* × *Post* should capture the wage channel, while the *Low Margin* × *Post* interaction should capture the consumer channel. In Panel B of Table 7, we find that the coefficients of *High Wages to Sales* × *Post* are very similar when we include the interaction of *Low Margin* and *Post*. The magnitude of the coefficient of *Low Margin* × *Post* declines because we now more directly account for the wage channel through the interaction of *High Wages to Sales* × *Post*. What is picked up by the *Low Margin* × *Post* coefficient is, rather, related to the consumer channel. Importantly, the coefficient of *Low Margin* × *Post* remains statistically significant. Taken together, the analyses in the section indicate that several channels of shifting the corporate tax incidence to stakeholders are at work.

4.5 Robustness Tests

We run three additional sets of robustness tests. The first robustness test addresses concerns about the use of the cash ETR as our proxy for tax avoidance. We use the GAAP ETR as an alternative measure that accounts for deferred taxes. In Tables A.6 to A.11, we replicate all our main tables from above using the GAAP ETR instead of the cash ETR. All the results are robust, indicating that our results are not driven by the choice of the cash ETR versus the GAAP ETR.

[15] We obtain similar results if we control for the number of employees, a variable with limited data coverage.

The second set of robustness tests addresses concerns about the gross margin as a proxy for tax incidence. While we acknowledge that there is no perfect proxy for tax incidence, we at least demonstrate the robustness of the findings in Tables 2, 4, and 5 to using the profit margin, defined as pre-tax income over sales, as an alternative measure. Table 8 presents the regression results for the replication of Tables 2, 4, and 5. Again, our results are robust. We continue to find a strong positive relation between margins and cash ETRs indicating that, if less corporate tax incidence falls on shareholders, firms are less likely to avoid taxes and have higher ETRs.

[Insert Table 8 about here]

Third, one potential concern about our results is that a high ETR could reflect unsuccessful tax avoidance and not a lack of tax avoidance (Saavedra 2017) and that firms with more market power can more easily absorb unsuccessful tax avoidance (Kubick et al. 2015). While unsuccessful tax avoidance would not be consistent with our model's predictions, we still want to rule out this measurement concern. Firms with large tax settlements have higher ETRs and we could misinterpret our results when these less successful tax avoiders drive our findings. To this end, we replicate all our main results but exclude less successful tax avoiders according to the definition of Saavedra (2017). Our results hold when excluding these less successful tax-avoiding firms (see Table A.12 of the Online Appendix). This finding suggests that our results are less likely to be explained by unsuccessful tax avoidance than by a lack of tax avoidance activities.

4.6 Limitations and Caveats

The main objective of the paper is to make a conceptual point about the influence of tax incidence on firms' tax avoidance decisions. Prior tax literature does not include tax incidence as one of the explanations for tax avoidance, presumably because of the standard assumption that the corporate tax incidence fully falls on shareholders (Fullerton and Metcalf 2002). If one applies this view, then there are other theoretical explanations for our findings. Alternative explanations could relate to increased pressure for more efficiency when there is more competition. For example, Brown et al. (2014) argue that competition affects managerial efficiency. Our argument does not assume that firms with product market power are employing inefficiently low levels of tax avoidance. Instead, we argue that shifting taxes to stakeholders becomes costlier as competition intensifies, for example, because demand becomes more elastic. However, given the vast empirical and theoretical evidence that the corporate tax incidence does not fully fall on shareholders, we believe that our results can at least be partly explained by differences in the ability to pass on the corporate tax incidence to stakeholders.

Our empirical approach to providing evidence for our conceptual framework is certainly imperfect. Measuring incidence (as well as tax avoidance)[16] is challenging and we do not have an empirical setting to examine directly the effect of tax incidence on tax avoidance behavior. We use indirect proxies of tax incidence, which one can argue are related to incidence, but we cannot fully rule out that these proxies are also correlated with other concepts. We try to address this issue as best as possible by including control variables, as well as by examining more exogenous variation. Future research could consider other shocks to corporate tax incidence. Such shocks could relate to consumer prices or to wages to employees. Moreover, any more direct measure of tax incidence would improve the power and precision of the empirical model.

The key takeaway from our paper is that one needs to consider the concept of tax incidence when trying to explain tax avoidance behavior. Our paper is not about perfectly establishing this relation empirically. We see the empirical analysis in this paper as a start to considering tax incidence as an explanation of tax avoidance in the literature. This seems warranted, given the disparity between decades of corporate tax incidence research in public economics and tax avoidance. Other variables that are typically included as standard controls are plausibly related to corporate tax incidence. For example, larger firms could have more market power and thus might be better able to pass on the tax to consumers. Our coefficient estimates on firm size in the cross-sectional analysis support this view. Other characteristics, for example, whether a firm is multinational, could also affect the ability to shift the tax burden to stakeholders. These are just two of many potential variables that could be related to the incidence of the corporate tax. Our paper serves as a start to reconsider empirical and theoretical models of tax avoidance by including tax incidence as one of the key fundamentals of tax avoidance.

5. Conclusion

This paper examines whether the incidence of the corporate tax can explain differences in tax avoidance across firms. Using the model of a profit-maximizing firm, we show that, as more of the corporate tax incidence falls on firm owners, firms have more incentives to avoid taxes. In contrast, if the corporate tax incidence predominantly falls on stakeholders, firms have little incentive to avoid taxes and, thus, have higher ETRs. To maximize after-tax profits, firms instead pass on the tax to stakeholders. Cross-firm differences in the corporate tax incidence can therefore be one explanation

[16] For example, there is a debate in the literature about how to measure tax avoidance, in particular, with respect to scaling cash taxes paid (e.g., Henry and Sansing 2014). We acknowledge this debate and address this concern by controlling for losses and negative cash taxes, as well as by truncating instead of winsorizing. Our findings are robust to accounting for the extreme ends of the cash ETR distribution. We largely follow the recent state of the art in the tax literature (e.g., Dyreng, Hanlon, and Maydew 2008, 2010) but cannot rule out that our results are driven by a systematic measurement error in the tax avoidance proxy employed by prior literature.

for the tax undersheltering puzzle. We additionally provide indirect empirical evidence consistent with this explanation using several distinct empirical research designs.

The role of tax incidence in tax avoidance has implications for future academic research. For example, if firms can pass on the corporate tax burden to other stakeholders, the responsiveness of other important firm decisions, such as investments, or capital structure to tax rate changes could be muted. Further, our study suggests controlling for a firm's market power when examining the effect of cross-sectional differences on firms' tax avoidance efforts. We also view modelling and testing for interactive effects of other factors that have been shown to affect the tax avoidance decision, for example, corporate governance, with a firms' ability to pass on taxes to stakeholders as a fruitful avenue for future research.

Our results also have important policy implications. Recent attempts to combat tax avoidance and international profit shifting will lead to heterogeneous effects across firms if initiatives such as BEPS are implemented in isolation. Such initiatives hit firms whose owners bear a large share of the corporate tax incidence much harder than they hit firms that can pass on the corporate tax to stakeholders. The latter firms do not need to shift profits across borders. They pass on the corporate tax burden to consumers or employees when maximizing profits. Hence, policymakers need to consider several other laws, such as employment rights or consumer protection, when trying to limit tax avoidance. Otherwise, fighting tax avoidance could lead to increasing competitive disadvantages instead of reducing them.

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Appendix A: Derivation of Profit-Maximizing Capital and Labor Input

We build on the assumptions outlined in Section 2.4. The after-tax profit $\Pi(K, L, A)$ is defined as

$$\Pi(K,L,A) = p \cdot K^{\alpha} \cdot L^{\beta} \cdot (1-(1-\varepsilon)\cdot(\tau - A)) - w \cdot L \cdot (1-(1-\varepsilon)\cdot(\tau - A)) - r \cdot K - C(A) \qquad \text{(A.1)}$$

The profit is maximized with respect to capital *K*, labor *L*, and tax avoidance *A*. The firm then maximizes its profit if the following three conditions are fulfilled:

$$\frac{\partial \Pi(K,L,A)}{\partial K} = \alpha \cdot p \cdot K^{\alpha-1} \cdot L^{\beta} \cdot (1-(1-\varepsilon)\cdot(\tau - A)) - r \cdot K = 0 \qquad \text{(A.2)}$$

$$\frac{\partial \Pi(K,L,A)}{\partial L} = \beta \cdot p \cdot K^{\alpha} \cdot L^{\beta-1} \cdot (1-(1-\varepsilon)\cdot(\tau - A)) - w \cdot L = 0 \qquad \text{(A.3)}$$

$$\frac{\partial \Pi(K,L,A)}{\partial A} = (1-\varepsilon) \cdot p \cdot K^{\alpha} \cdot L^{\beta} - (1-\varepsilon) \cdot w \cdot L - C'(A) = 0 \qquad \text{(A.4)}$$

Multiplying equation (A.2) with *K* and equation (A.3) with *L* yields the following two expressions:

$$r \cdot K = (1-(1-\varepsilon)\cdot(\tau - A)) \cdot \alpha \cdot p \cdot K^{\alpha} \cdot L^{\beta} \qquad \text{(A.5)}$$

$$w \cdot L = \beta \cdot p \cdot K^{\alpha} \cdot L^{\beta} \qquad \text{(A.6)}$$

One can then isolate $p \cdot K^{\alpha} \cdot L^{\beta}$ in both equations and arrive at the following condition:

$$L = \frac{\beta}{\alpha} \cdot (1-(1-\varepsilon)\cdot(\tau - A))^{-1} \cdot \frac{r}{w} \cdot K \qquad \text{(A.7)}$$

We then insert equation (A.7) into equation (A.3) to arrive at the profit-maximizing level of capital K^*:

$$K^* = (1-(1-\varepsilon)\cdot(\tau - A))^{\frac{1-\beta}{1-\alpha-\beta}} \cdot \alpha^{\frac{1-\beta}{1-\alpha-\beta}} \cdot p^{\frac{1}{1-\alpha-\beta}} \cdot r^{\frac{\beta-1}{1-\alpha-\beta}} \cdot w^{\frac{-\beta}{1-\alpha-\beta}} \cdot \beta^{\frac{\beta}{1-\alpha-\beta}} \qquad \text{(A.8)}$$

Inserting equation (A.8) into equation (A.7) then yields the profit-maximizing level of labor L^*:

$$L^* = (1-(1-\varepsilon)\cdot(\tau - A))^{\frac{\alpha}{1-\alpha-\beta}} \cdot \alpha^{\frac{\alpha}{1-\alpha-\beta}} \cdot p^{\frac{1}{1-\alpha-\beta}} \cdot r^{\frac{-\alpha}{1-\alpha-\beta}} \cdot w^{\frac{-(1-\alpha)}{1-\alpha-\beta}} \cdot \beta^{\frac{(1-\alpha)}{1-\alpha-\beta}} \qquad \text{(A.9)}$$

Appendix B: Variable Definitions

Firm-Level Variables	
Cash ETR 1	*Cash ETR 1* is cash taxes paid scaled by pre-tax income in the current year, winsorized at 0 and 1.
Cash ETR 3	*Cash ETR 3* is the sum of cash taxes paid during $t-2$ and t scaled by the sum of pre-tax income in the current year during $t-2$ and t, winsorized at 0 and 1.
Cash ETR 5	*Cash ETR 5* is the sum of cash taxes paid during $t-4$ and t scaled by the sum of pre-tax income in the current year during $t-4$ and t, winsorized at 0 and 1.
GAAP ETR 1	*GAAP ETR 1* is tax expenses paid scaled by pre-tax income in the current year, winsorized at 0 and 1.
GAAP ETR 3	*GAAP ETR 3* is the sum of tax expenses paid during $t-2$ and t scaled by the sum of pre-tax income in the current year during $t-2$ and t, winsorized at 0 and 1.
GAAP ETR 5	*GAAP ETR 5* is the sum of tax expenses paid during $t-4$ and t scaled by the sum of pre-tax income in the current year during $t-4$ and t, winsorized at 0 and 1.
Gross Margin	*Gross margin* is sales minus costs of goods sold scaled by sales.
Investment	*Investment* is capital expenditures scaled by lagged total assets.
Cash	*Cash* is cash scaled by lagged total assets.
Income	*Income* is EBITDA scaled by lagged total assets.
Sales Growth	*Sales Growth* is the natural logarithm of the growth rate of sales from $t-1$ to t.
Leverage	*Leverage* is total debt scaled by total assets.
Size	*Size* is the natural logarithm of total assets
Profit margin	*Profit margin* is pre-tax income scaled by sales
Foreign	*Foreign* is a dummy variable equal to one if the firm has non-missing, non-zero values for pre-tax income from foreign operations and zero otherwise.
LCF	*LCF* is a dummy variable equal to one if the firm has non-missing, non-zero values for tax loss carryforwards and zero otherwise.
Intangibles	*Intangibles* is the ratio of intangible assets to total assets.
PPE	*PPE* is the ratio of gross property, plant, and equipment to total assets.
R&D	*R&D* is the ratio of R&D expenses to sales. We replace missing values with 0 (Dyreng, Hanlon, and Maydew 2010).
Advertising	*Advertising* is the ratio of advertising expenses to Sales. We replace missing values with 0 (Dyreng, Hanlon, and Maydew 2010).
SG&A	*SG&A* is the ratio of selling, general, and administrative expense to sales. We replace missing values with 0 (Dyreng, Hanlon, and Maydew 2010).
Special Items	*Special Items* is the ratio of special items to total assets.
Low Margin	*Low Margin* is a dummy variable equal to one if the three-year gross margin ratio over 1994–1996 is below the median of the three-year industry-adjusted average gross margin ratio over 1994–1996.
Tariff Cut	*Tariff Cut* is a dummy variable equal to one if there is a substantial import tariff cut according to Frésard (2010) in t or t - 1. A substantial tariff cut is one that is above three times the median tariff cut in the industry.
High–Wages–Sales	*High–Wages–Sales* is a dummy variable equal to one if the three-year ratio of wages to sales over 1994–1996 is below the median of the three-year industry-adjusted wages to sales over 1994–1996.

Figure 1: Profit-Maximizing Level of Tax Avoidance as a Function of Tax Incidence

This figure plots the profit-maximizing level of tax avoidance from equation (6) as a function of the share of corporate tax incidence falling on employees (ε). The dashed line represents the results wage after shifting. We assume that the statutory tax rate is 35%. The cost of tax avoidance is described by the convex cost function $C(A) = 0.75 \cdot A^2$. We further set α to 0.2, β to 0.4, p to 0.8, r to 0.2, and γ to 0.

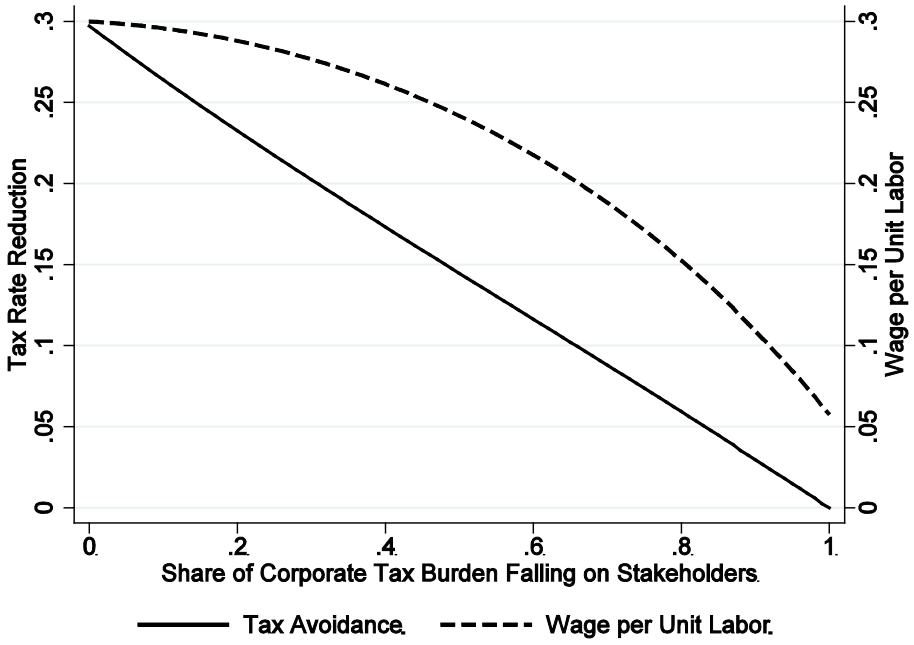
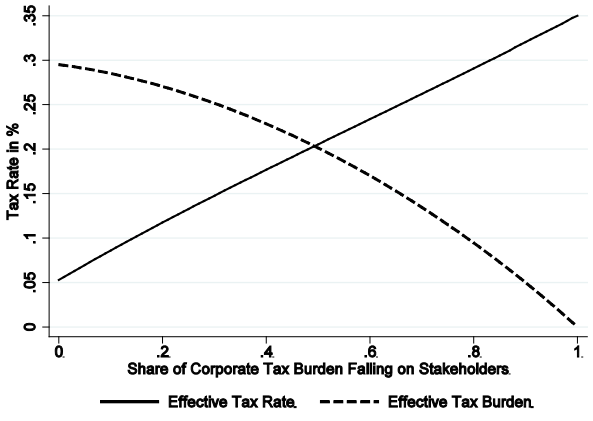


Figure 2: ETR, Tax Burden, and Profits for a Profit-Maximizing Firm

Panel A of this figure plots the ETR (solid black line) and the effective tax burden (dashed black line) as a function of the share of corporate tax incidence falling on stakeholders (ε) for a profit-maximizing firm. Panel B plots the after-tax profit (black line) and the pre-tax profit (dashed black line). We assume that the statutory tax rate is 35%. The cost of tax avoidance is $C(A) = 0.75 \cdot A^2$. We further set α to 0.2, β to 0.4, p to 0.8, and r to 0.2.

Panel A: ETR and ETB



Panel B: Profits

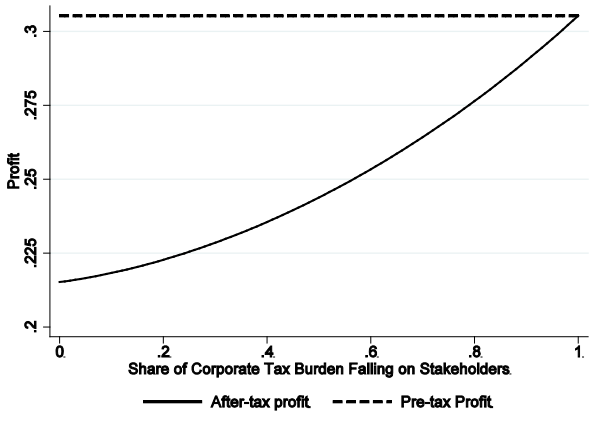


Figure 3: After-Tax Profit and Deviation from the Profit-Maximizing Level of Tax Avoidance

This figure plots the after-tax profit for different levels of tax avoidance around the optimal level of tax avoidance. The solid (dashed) black line assumes that ε equals 0.2 (0.5). The cost of tax avoidance is described by the convex cost function $C(A) = 0.75 \cdot A^2$. We further set τ to 0.35, α to 0.2, β to 0.4, p to 0.8, and r to 0.2.

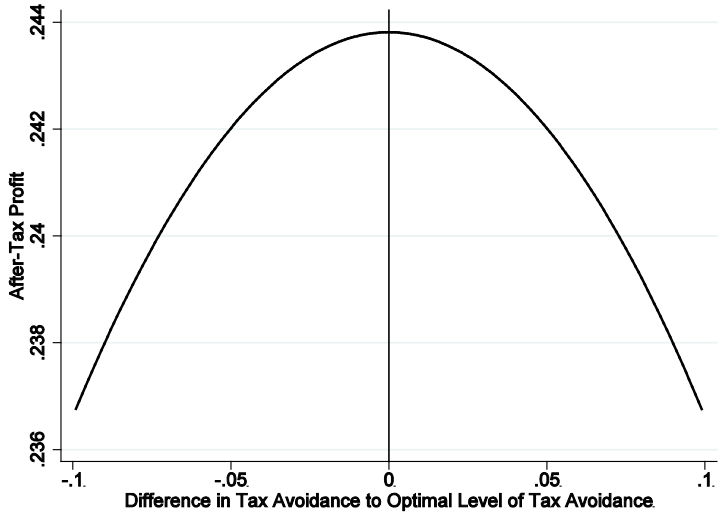
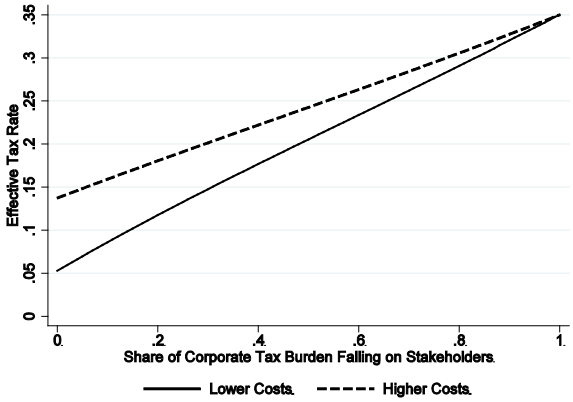


Figure 4: Costs of Tax Avoidance and the Profit-Maximizing Level of Tax Avoidance

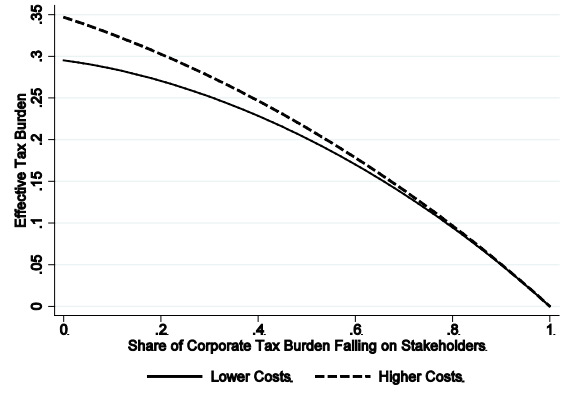
This figure plots the profit-maximizing level of tax avoidance (Panel A), the resulting ETR (Panel B), the economic tax burden (Panel C), and before- and after-tax profits (Panel D) for higher costs ($C(A) = A^2$) and lower costs of tax avoidance ($C(A) = 0.75 \cdot A^2$). We further set τ to 0.35, α to 0.2, β to 0.4, p to 0.8, and r to 0.2.

Panel A: Tax Avoidance

Panel B: ETR



Panel C: ETB



Panel D: Profits

Figure 5: Gross Margins and Cash ETRs

This figure plots the difference in five-year cash ETRs (*Cash ETR 5*) between firms with low gross margins and high gross margins. We define low-gross margin firms as firms below the gross margin industry median over 1994–1996.

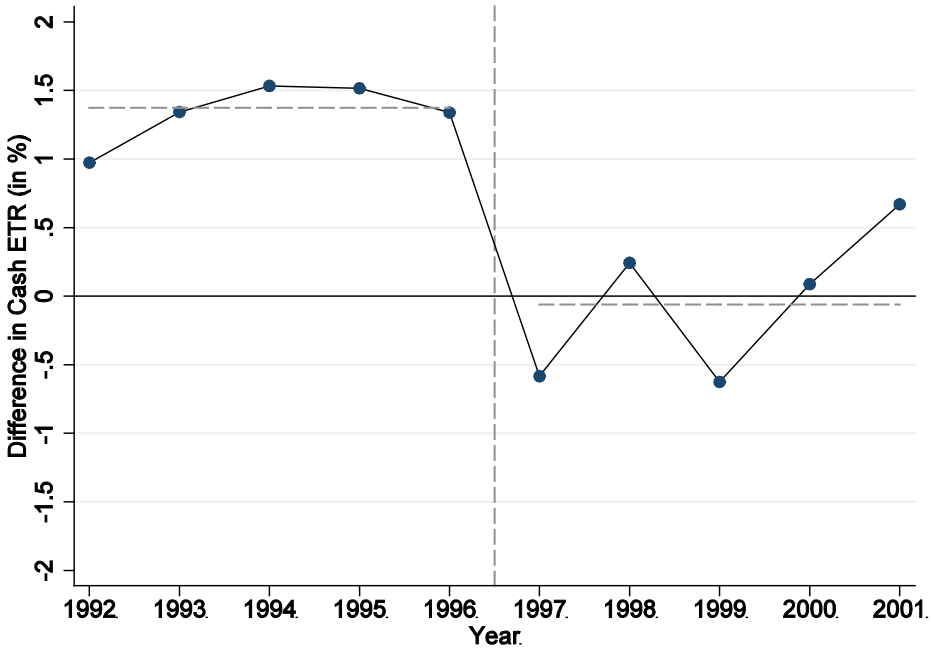


Table 1: Summary Statistics

This table presents descriptive statistics of our main variables for 8,871 firms and 82,966 observations over 1989–2015. The variables are defined in Appendix B. For *Cash ETR 5*, we use 65,339 observations.

Variable	Mean	Standard Deviation	25th Percentile	Median	75th Percentile
Cash ETR 1	0.2130	0.2370	0.0000	0.1645	0.3370
Cash ETR 3	0.2329	0.2344	0.0014	0.2115	0.3517
Cash ETR 5	0.2522	0.2360	0.0233	0.2421	0.3626
GAAP ETR 1	0.2388	0.2281	0.0003	0.2351	0.3721
GAAP ETR 3	0.2553	0.2268	0.0196	0.2646	0.3804
GAAP ETR 5	0.2779	0.2263	0.0712	0.2931	0.3886
Gross Margin	0.3218	0.7160	0.2141	0.3431	0.5190
Cash	0.1701	0.2501	0.0215	0.0751	0.2198
Income	0.0400	0.1790	-0.0016	0.0491	0.1154
Sales Growth	0.1805	0.4817	-0.0278	0.1387	0.3554
Leverage	0.5346	0.2386	0.3479	0.5466	0.7159
Size	5.9559	2.3666	4.2822	5.9164	7.5400
Investment	0.0638	0.0891	0.0142	0.0375	0.0777
Foreign	0.3331	0.4713	0.0000	0.0000	1.0000
LCF	0.3429	0.4747	0.0000	0.0000	1.0000
Intangibles	0.1276	0.1745	0.0000	0.0447	0.1939
PPE	0.5505	0.4253	0.2040	0.4436	0.8252
R&D	0.0396	0.0998	0.0000	0.0000	0.0262
Advertising	0.0092	0.0237	0.0000	0.0000	0.0053
SG&A	0.2417	0.2545	0.0671	0.1893	0.3327
Special Items	-0.0146	0.0493	-0.0088	0.0000	0.0000
Profit Margin	-0.1011	1.4907	-0.0020	0.0605	0.1363

Table 2: Baseline Panel Regression Results

This table presents the regression results on tax avoidance behavior over 1989–2015. The dependent variable is the three-year cash ETR (*Cash ETR 3*) in Columns (1) and (2). In Columns (3) and (4), we use the five-year cash ETR (*Cash ETR 5*) as the dependent variable. The independent variables are defined in Appendix B. We include year fixed effects in Columns (1) and (3). Columns (2) and (4) include industry–year fixed effects. In Panel B, we additionally include margin-decile-year fixed effects. We report robust standard errors clustered at the firm level in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Baseline Model

	Cash ETR 3		**Cash ETR 5**	
	(1)	(2)	(3)	(4)
Gross Margin	**0.0282*** **	**0.0356*** **	**0.0197***	**0.0286** **
	(0.0081)	**(0.0084)**	**(0.0119)**	**(0.0120)**
Cash	-0.0137	-0.0225*	-0.0013	-0.0103
	(0.0116)	(0.0118)	(0.0147)	(0.0151)
Pre-Tax Income	0.0343***	0.0283**	-0.0244	-0.0370**
	(0.0114)	(0.0116)	(0.0152)	(0.0154)
Sales Growth	-0.0177***	-0.0159***	-0.0223***	-0.0212***
	(0.0025)	(0.0026)	(0.0034)	(0.0035)
Leverage	-0.0850***	-0.0916***	-0.0780***	-0.0869***
	(0.0100)	(0.0099)	(0.0133)	(0.0133)
Size	0.0345***	0.0338***	0.0391***	0.0387***
	(0.0023)	(0.0024)	(0.0031)	(0.0033)
Capital Expenditures	0.0611***	0.0716***	0.0139	0.0263*
	(0.0109)	(0.0110)	(0.0135)	(0.0137)
Foreign	0.0189***	0.0151***	0.0186***	0.0165***
	(0.0045)	(0.0046)	(0.0057)	(0.0058)
LCF	-0.0424***	-0.0452***	-0.0276***	-0.0316***
	(0.0033)	(0.0033)	(0.0040)	(0.0040)
Intangibles	0.0396***	0.0326**	0.0056	0.0008
	(0.0145)	(0.0151)	(0.0179)	(0.0185)
PPE	-0.0065	-0.0142*	-0.0174*	-0.0261**
	(0.0084)	(0.0086)	(0.0105)	(0.0107)
R&D	-0.0124	-0.0143	-0.0485	-0.0506
	(0.0224)	(0.0228)	(0.0367)	(0.0364)
Advertising	0.0849	0.0926	-0.0114	-0.0172
	(0.0836)	(0.0837)	(0.1072)	(0.1086)
SG&A	-0.0381***	-0.0421***	-0.0231*	-0.0283**
	(0.0088)	(0.0088)	(0.0133)	(0.0133)
Special Items	0.1063***	0.1018***	-0.0746***	-0.0847***
	(0.0195)	(0.0195)	(0.0270)	(0.0269)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No
Industry–Year FE	No	Yes	No	Yes
Margin–Decile–Year FE	No	No	No	No
Observations	82,966	82,966	65,339	65,339
Adjusted R^2	0.308	0.318	0.342	0.351

Panel B: Model with Extended Fixed Effects				
	Cash ETR 3		Cash ETR 5	
	(1)	(2)	(3)	(4)
Gross Margin	**0.0593*** **	**0.0631*** **	**0.0766*** **	**0.0774*** **
	(0.0121)	**(0.0124)**	**(0.0180)**	**(0.0179)**
Cash	-0.0124	-0.0211*	-0.0004	-0.0094
	(0.0115)	(0.0118)	(0.0147)	(0.0151)
Pre-Tax Income	0.0427***	0.0373***	-0.0097	-0.0218
	(0.0116)	(0.0118)	(0.0155)	(0.0158)
Sales Growth	-0.0178***	-0.0164***	-0.0233***	-0.0224***
	(0.0025)	(0.0026)	(0.0035)	(0.0035)
Leverage	-0.0876***	-0.0926***	-0.0818***	-0.0891***
	(0.0100)	(0.0099)	(0.0134)	(0.0133)
Size	0.0336***	0.0332***	0.0384***	0.0380***
	(0.0023)	(0.0024)	(0.0031)	(0.0033)
Capital Expenditures	0.0644***	0.0732***	0.0155	0.0263*
	(0.0109)	(0.0110)	(0.0136)	(0.0137)
Foreign	0.0182***	0.0144**	0.0177***	0.0156***
	(0.0045)	(0.0072)	(0.0057)	(0.0058)
LCF	-0.0427***	-0.0454***	-0.0282***	-0.0318***
	(0.0033)	(0.0033)	(0.0040)	(0.0040)
Intangibles	0.0378***	0.0319**	0.0037	-0.0004
	(0.0146)	(0.0150)	(0.0180)	(0.0186)
PPE	-0.0069	-0.0144*	-0.0185*	-0.0275***
	(0.0083)	(0.0086)	(0.0104)	(0.0106)
R&D	-0.0059	-0.0090	-0.0422	-0.0458
	(0.0224)	(0.0229)	(0.0368)	(0.0364)
Advertising	0.1010	0.1030	0.0076	-0.0074
	(0.0833)	(0.0835)	(0.1069)	(0.1085)
SG&A	-0.0353***	-0.0386***	-0.0161	-0.0206
	(0.0087)	(0.0088)	(0.0131)	(0.0132)
Special Items	0.1076***	0.1044***	-0.0725***	-0.0819***
	(0.0195)	(0.0195)	(0.0270)	(0.0268)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No
Industry–Year FE	No	Yes	No	Yes
Margin–Decile–Year FE	Yes	Yes	Yes	Yes
Observations	82,966	82,966	65,339	65,339
Adjusted R^2	0.308	0.318	0.342	0.351

Table 3: Gross Margins and Cash ETRs around 1997 Check-the-Box Regulation

This table presents the cash ETRs around the 1997 Check-the-Box Regulation for a sample of U.S. firms over 1992–2001. We use the five-year cash ETR. We compare low-gross margin firms and high-gross margin firms. We use the median of the three-year industry-adjusted average gross margin ratio over 1994–1996 to sort firms into low- and high-gross margin firms. We report robust standard errors clustered at the firm level in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	Pre-Reform 1992–1996 (1)	Post-Reform 1997–2001 (2)	Time Difference for Group (3)
Low-Gross Margin Firms	0.3058	0.2818	-0.0240***
			(0.0049)
High-Gross Margin Firms	0.2930	0.2862	-0.0067
			(0.0043)
Difference Low- versus High-Gross Margin Firms in *t*	0.0128**	-0.0044	**-0.0173*** **
	(0.0057)	(0.0056)	**(0.0065)**

Table 4: Gross Margins and Cash ETRs around the 1997 Check-the-Box Regulation: Difference-in-Differences Analysis

This table presents the regression results on tax avoidance behavior over 1992–2001. The dependent variable is the three-year cash ETR (*Cash ETR 3*) in Columns (1) and (2). In Columns (3) and (4), we use the five-year cash ETR (*Cash ETR 5*) as the dependent variable. We compare low-gross margin firms and high-gross margin firms. We use the median of the three-year industry-adjusted average gross margin ratio over 1994–1996 to sort firms into low- and high-gross margin firms. Firms below the median are denoted *Low Margin* firms. The variable *Post* is a dummy variable equal to one for years after 1996. The independent variables are defined in Appendix B. We include year fixed effects in Columns (1) and (3). Columns (2) and (4) include industry–year fixed effects. We report robust standard errors clustered at the firm level in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Cash ETR 3		**Cash ETR 5**	
	(1)	(2)	(3)	(4)
Low Margin × Post	**-0.0133****	**-0.0109***	**-0.0199*****	**-0.0177****
	(0.0062)	**(0.0061)**	**(0.0071)**	**(0.0070)**
Cash		-0.0801***		-0.0830***
		(0.0207)		(0.0239)
Income		-0.0227		-0.0736***
		(0.0182)		(0.0217)
Sales Growth		-0.0121**		-0.0112**
		(0.0048)		(0.0056)
Leverage		-0.1031***		-0.0815***
		(0.0179)		(0.0225)
Size		0.0384***		0.0348***
		(0.0051)		(0.0062)
Investment		0.0866***		0.0322
		(0.0182)		(0.0210)
Foreign		0.0274***		0.0157
		(0.0090)		(0.0096)
LCF		-0.0505***		-0.0324***
		(0.0064)		(0.0069)
Intangibles		-0.0248		-0.0516
		(0.0304)		(0.0343)
PPE		-0.0198		-0.0463**
		(0.0163)		(0.0183)
R&D		-0.0031		-0.0630
		(0.0456)		(0.0621)
Advertising		0.0756		0.0922
		(0.1405)		(0.1710)
SG&A		0.0916**		-0.1363***
		(0.0367)		(0.0446)
Special Items		-0.0389**		-0.0226
		(0.0167)		(0.0233)
Firm FE	Yes	Yes	Yes	Yes
Industry–Year FE	Yes	Yes	Yes	Yes
Observations	29,826	29,829	25,956	25,956
Adjusted R^2	0.340	0.351	0.391	0.397

Table 5: Gross Margins and Cash ETRs: Breakdown of Margin Quartiles

This table presents the regression results on tax avoidance behavior over 1992–2001. The dependent variable is the three-year cash ETR (*Cash ETR 3*) in Columns (1) and (2). In Columns (3) and (4), we use the five-year cash ETR (*Cash ETR 5*) as the dependent variable. We compare the quartiles of the three-year industry-adjusted average gross margin ratios over 1994–1996. The top quartile serves as the baseline group. The variable *Post* is a dummy variable equal to one for years after 1996. The independent variables are defined in Appendix B. We include year fixed effects in Columns (1) and (3). Columns (2) and (4) include industry–year fixed effects. We report robust standard errors clustered at the firm level in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Cash ETR 3		**Cash ETR 5**	
	(1)	(2)	(3)	(4)
Bottom Quartile × Post	-0.0315***	-0.0276***	-0.0385***	-0.0340***
	(0.0089)	(0.0088)	(0.0100)	(0.0099)
2nd Quartile × Post	-0.0124	-0.0096	-0.0193**	-0.0168*
	(0.0088)	(0.0086)	(0.0097)	(0.0095)
3rd Quartile × Post	-0.0165**	-0.0146*	-0.0170*	-0.0144
	(0.0080)	(0.0079)	(0.0092)	(0.0090)
Difference Bottom versus 2nd Quartile	-0.0191**	-0.0180*	-0.0193*	-0.0172
[*t*-Stat]	[1.98]	[1.90]	[1.80]	[1.63]
Difference Bottom versus 3rd Quartile	-0.0150*	-0.0130	-0.0216**	-0.0196*
[*t*-Stat]	[1.68]	[1.48]	[2.10]	[1.91]
Controls	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes
Industry–Year FE	Yes	Yes	Yes	Yes
Observations	29,826	29,826	25,956	25,956
Adjusted R^2	0.340	0.351	0.391	0.397

Table 6: Tariff Cuts and Cash ETRs

This table presents the regression results on tax avoidance behavior over 1974–2005. The dependent variable is the one-year cash ETR (*Cash ETR 1*) in Columns (1) and (2). In Columns (3) and (4), we use the three-year cash ETR (*Cash ETR 3*) as the dependent variable. The variable *Tariff Cut* is a dummy variable equal to one if there is a substantial tariff cut according to Frésard (2010) in t or t - 1. The independent variables are defined in Appendix B. We include year fixed effects in Columns (1) and (3). Columns (2) and (4) include industry–year fixed effects. We report robust standard errors clustered at the industry level in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Cash ETR 1		**Cash ETR 3**	
	(1)	(2)	(3)	(4)
Tariff Cut	**-0.0416****	**-0.0420****	**-0.0313***	**-0.0318****
	(0.0186)	**(0.0180)**	**(0.0178)**	**(0.0139)**
Cash		0.0214		-0.0464
		(0.0331)		(0.0390)
Income		0.0629**		0.0010
		(0.0288)		(0.0367)
Sales Growth		-0.0220*		-0.0443***
		(0.0132)		(0.0132)
Leverage		-0.1286***		-0.0877*
		(0.0375)		(0.0521)
Size		0.0394**		0.0309*
		(0.0151)		(0.0184)
Investment		0.2326***		0.1555***
		(0.0474)		(0.0371)
Foreign		0.0089		0.0365
		(0.0199)		(0.0265)
LCF		-0.0389***		-0.0457***
		(0.0115)		(0.0112)
Intangibles		-0.0172		0.0549
		(0.0700)		(0.0498)
PPE		-0.0387		-0.0507
		(0.0407)		(0.0400)
R&D		-0.0201		-0.0239
		(0.0220)		(0.0377)
Advertising		-0.4845**		0.1091
		(0.2397)		(0.3599)
SG&A		0.4348***		0.0310
		(0.0820)		(0.0952)
Special Items		-0.0239		-0.0373
		(0.0190)		(0.0398)
Firm FE	Yes	Yes	Yes	Yes
Industry–Year FE	Yes	Yes	Yes	Yes
Observations	6,515	6,515	5,504	5,504
Adjusted R^2	0.208	0.233	0.294	0.306

Table 7: Wages and Cash ETRs around the 1997 Check-the-Box Regulation: Difference-in-Differences Analysis

This table presents the regression results on tax avoidance behavior over 1992–2001. The dependent variable is the three-year cash ETR (*Cash ETR 3*) in Columns (1) and (2). In Columns (3) and (4), we use the five-year cash ETR (*Cash ETR 5*) as the dependent variable. We compare firms with a high wages-to-sales ratio to firms with a low wages-to-sales ratio. We use the median of the two-year industry-adjusted average wages-to-sales ratio over 1994–1996 to sort firms into low– and high–wages-to-sales firms. Firms above the median are denoted *High Wages to Sales* firms. The variable *Post* is a dummy variable equal to one for years after 1996. The independent variables are defined in Appendix B. In Panel B, we additionally control for the interaction of *Low Margin* (as defined in Table 3) and *Post*. We include year fixed effects in Columns (1) and (3). Columns (2) and (4) include industry–year fixed effects. We report robust standard errors clustered at the firm level in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Main Results

	Cash ETR 3		Cash ETR 5			
	(1)	(2)	(3)	(4)	(5)	(6)
High Wages to Sales × Post	-0.0297***	-0.0334***	-0.0153	-0.0171	-0.0211**	-0.0229**
	(0.0097)	(0.0112)	(0.0110)	(0.0111)	(0.0106)	(0.0107)
Controls	No	Yes	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry–Year FE	Yes	Yes	Yes	Yes	No	No
Year FE	Yes	Yes	No	No	Yes	Yes
Observations	29,166	29,166	25,464	25,464	25,471	25,471
Adjusted R^2	0.340	0.344	0.392	0.397	0.388	0.394

Panel B: Controlling for Low Margin

	Cash ETR 3		Cash ETR 5			
	(1)	(2)	(3)	(4)	(5)	(6)
High Wages to Sales × Post	-0.0301***	-0.0338***	-0.0160	-0.0177	-0.0214**	-0.0230**
	(0.0097)	(0.0112)	(0.0109)	(0.0111)	(0.0105)	(0.0106)
Low Margin × Post	-0.0138**	-0.0117*	-0.0201***	-0.0178**	-0.0209***	-0.0193***
	(0.0063)	(0.0061)	(0.0071)	(0.0070)	(0.0072)	(0.0071)
Controls	No	Yes	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry–Year FE	Yes	Yes	Yes	Yes	No	No
Year FE	Yes	Yes	No	No	Yes	Yes
Observations	29,152	29,150	25,453	25,453	25,460	25,460
Adjusted R^2	0.332	0.346	0.390	0.397	0.388	0.394

Table 8: Gross Margins and Cash ETRs: Robustness to Using the Profit Margin

This table replicates our main tables but uses the profit margin instead of the gross margin. Panel A presents the results from replicating Table 2. Panel B (C) reports the results replicating Table 4 (5). We report robust standard errors clustered at the firm level in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Replicating Table 2				
	Cash ETR 3		**Cash ETR 5**	
	(1)	(2)	(3)	(4)
Profit Margin	0.0205***	0.0098***	0.0270***	0.0181***
	(0.0036)	(0.0035)	(0.0053)	(0.0053)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No
Industry–Year FE	No	Yes	No	Yes
Margin–Decile–Year FE	Yes	Yes	Yes	Yes
Observations	82,966	82,961	65,339	65,325
Adjusted R^2	0.310	0.335	0.343	0.360
Panel B: Replicating Table 4				
	(1)	(2)	(3)	(4)
Low Profit Margin × Post	-0.0255***	-0.0198***	-0.0280***	-0.0211***
	(0.0062)	(0.0061)	(0.0065)	(0.0065)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Industry–Year FE	Yes	Yes	Yes	Yes
Observations	31,868	31,868	26,930	26,930
Adjusted R^2	0.346	0.356	0.396	0.402
Panel C: Replicating Table 5				
	(1)	(2)	(3)	(4)
Bottom Quartile × Post	-0.0355***	-0.0425***	-0.0571***	-0.0462***
	(0.0074)	(0.0076)	(0.0106)	(0.0106)
2nd Quartile × Post	0.0352*	0.0390*	0.0656	0.0615
	(0.0205)	(0.0227)	(0.0733)	(0.0674)
3rd Quartile × Post	0.0286*	0.0207	0.1453*	0.0928
	(0.0157)	(0.0191)	(0.0811)	(0.0837)
Difference Bottom versus 2nd Quartile	-0.0881***	-0.0706***	-0.1227*	-0.1077
[*t*-Stat]	[3.56]	[2.89]	[1.66]	[1.58]
Difference Bottom versus 3rd Quartile	-0.0734***	-0.0611***	-0.2024**	-.1390*
[*t*-Stat]	[3.57]	[3.08]	[2.48]	[1.65]
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Industry–Year FE	Yes	Yes	Yes	Yes
Observations	41,174	31,871	26,930	26,930
Adjusted R^2	0.342	0.350	0.398	0.403

Online Appendix

Tax Incidence and Tax Avoidance

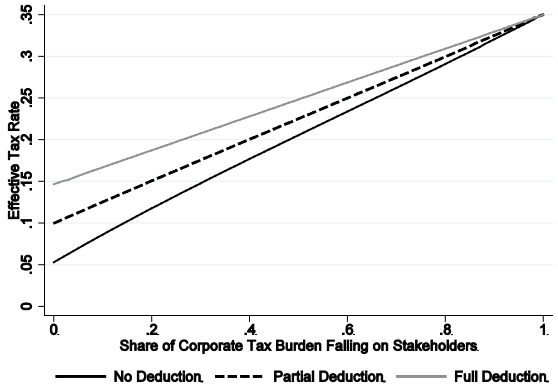
Martin Jacob and Maximilian A. Müller

Figure A.1: Deductibility of the Cost of Capital and the Profit-Maximizing Level of Tax Avoidance

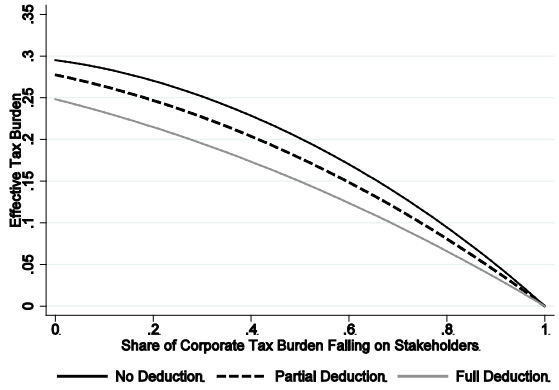
This figure plots the profit-maximizing level of tax avoidance (Panel A), the resulting ETR (Panel B, the economic tax burden (Panel C), and the before- and after-tax profits (Panel D) for no deductibility of the cost of capital ($\gamma = 0$), partial deductibility ($\gamma = 0.5$), and full deductibility ($\gamma = 1$). The parameter γ describes the extent to which the costs of capital are deductible. The costs of tax avoidance are described by the function $0.75 \cdot A^2$. We further set τ to 0.35, α to 0.2, β to 0.4, p to 0.8, and r to 0.2.

Panel A: Tax Avoidance

Panel B: ETR



Panel C: ETB



Panel D: Profits

Table A.1: Baseline Panel Regression Results: Robustness to Bin Choices

This table presents the regression results on tax avoidance behavior over 1989–2015. The dependent variable is the three-year cash ETR (*Cash ETR 3*) and the five-year cash ETR (*Cash ETR 5*), respectively. We replicate the results from Table 2 but use different numbers of bins. The independent variables are defined in Appendix B. We include year fixed effects in Columns (1) and (3). Columns (2) and (4) include industry–year fixed effects. We report robust standard errors clustered at the firm level in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	No Bins		**20 Bins**	
	Cash ETR 3	**Cash ETR 5**	**Cash ETR 3**	**Cash ETR 5**
Gross Margin	0.0356***	0.0286**	0.0635***	0.0938***
	(0.0084)	(0.0120)	(0.0146)	(0.0209)
Controls	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Industry–Year FE	Yes	Yes	Yes	Yes
Bin–Margin–Year FE	No	No	Yes	Yes
Observations	82,961	65,325	82,961	65,325
Adjusted R^2	0.318	0.351	0.318	0.351
	30 Bins		**40 Bins**	
	Cash ETR 3	**Cash ETR 5**	**Cash ETR 3**	**Cash ETR 5**
Gross Margin	0.0438***	0.0937***	0.0363**	0.0904***
	(0.0164)	(0.0243)	(0.0181)	(0.0273)
Controls	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Industry–Year FE	Yes	Yes	Yes	Yes
Bin–Margin–Year FE	Yes	Yes	Yes	Yes
Observations	82,961	65,325	82,961	65,325
Adjusted R^2	0.318	0.351	0.318	0.351

Table A.2: Baseline Panel Regression Results: Sensitivity to Controlling for Cash Flow Volatility and Firm Fixed Effects

This table presents the regression results on tax avoidance behavior over 1989–2015. The dependent variable is the three-year cash ETR (*Cash ETR 3*) and the five-year cash ETR (*Cash ETR 5*), respectively. We replicate the results from Table 2 but use different fixed effects. The independent variables are defined in Appendix B. The variable *CF Vol* is the three-year rolling window volatility of operating cash flow. We include industry–year fixed effects and margin-decile fixed effects in all columns. In Column (3) and (6) we include firm fixed effects. We report robust standard errors clustered at the firm level in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Cash ETR 3			**Cash ETR 5**		
	(1)	(2)	(3)	(4)	(5)	(6)
Gross Margin	-0.0286***	-0.0298***	0.0385***	-0.0343***	-0.0354***	0.0298**
	(0.0081)	(0.0081)	(0.0108)	(0.0088)	(0.0088)	(0.0120)
CF Vol		-0.0573**	0.1265***		-0.0529*	0.0880***
		(0.0285)	(0.0305)		(0.0305)	(0.0315)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	No	No	Yes	No	No	Yes
Industry–Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Bin–Margin–Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	66,321	65,322	65,322	66,320	66,320	65,321
Adjusted R^2	0.130	0.130	0.313	0.115	0.115	0.351

Table A.3: Baseline Panel Regression Results: Truncating and Controlling for Losses

This table presents the regression results on tax avoidance behavior over 1989–2015. The dependent variable is the three-year cash ETR (*Cash ETR 3*) in Columns (1) and (2). In Columns (3) and (4), we use the five-year cash ETR (*Cash ETR 5*) as the dependent variable. The independent variables are defined in Appendix B. We include year fixed effects in Columns (1) and (3). Columns (2) and (4) include industry–year fixed effects. In Panel A, we truncate the cash ETR at zero and one. In Panel B, we additionally control for indicator variables for losses (in *t*, *t* - 1, and *t* - 2, respectively), negative cash taxes paid (in *t*, *t* - 1, and *t* - 2, respectively), as well as the interactions of the respective dummy variables. We report robust standard errors clustered at the firm level in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Truncating at 0 and 1

	Cash ETR 3		Cash ETR 5	
	(1)	(2)	(3)	(4)
Gross Margin	0.0460**	0.0466**	0.0065	0.0036
	(0.0226)	(0.0227)	(0.0258)	(0.0237)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No
Industry–Year FE	No	Yes	No	Yes
Observations	59,545	59,528	49,155	49,128
Adjusted R^2	0.383	0.394	0.454	0.469

Panel B: Controlling for Losses and Refunds

	Cash ETR 3		Cash ETR 5	
	(1)	(2)	(3)	(4)
Gross Margin	0.0697***	0.0722***	0.0797***	0.0786***
	(0.0151)	(0.0154)	(0.0178)	(0.0177)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No
Industry–Year FE	No	Yes	No	Yes
Observations	65,336	65,322	65,335	65,321
Adjusted R^2	0.337	0.343	0.355	0.362

Table A.4: Baseline Panel Regression Results: Controlling for Negative Margins

This table presents the regression results on tax avoidance behavior over 1989–2015. The dependent variable is the three-year cash ETR (*Cash ETR 3*) in Columns (1) and (2). In Columns (3) and (4), we use the five-year cash ETR (*Cash ETR 5*) as the dependent variable. The independent variables are defined in Appendix B. We include year fixed effects in Columns (1) and (3). Columns (2) and (4) include industry–year fixed effects. In all specifications, we include a dummy variable for negative gross margins. We report robust standard errors clustered at the firm level in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Truncating at 0 and 1

	Cash ETR 3		Cash ETR 5	
	(1)	(2)	(3)	(4)
Gross Margin	0.0283*	0.0325*	0.0828***	0.0829***
	(0.0170)	(0.0173)	(0.0250)	(0.0245)
Controls and Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No
Industry–Year FE	No	Yes	No	Yes
Observations	82,966	82,961	65,339	65,325
Adjusted R^2	0.310	0.318	0.343	0.351

Table A.5: Difference-in-Differences Regression Results: Dealing with Outliers

This table presents the regression results on tax avoidance behavior over 1992–2001. Panel A replicates Table 4. Panel B replicates Table 5. The dependent variable is the three-year cash ETR (*Cash ETR 3*) and the five-year cash ETR (*Cash ETR 5*) is the dependent variable. We compare low-gross margin firms and high-gross margin firms. We use the median of the three-year industry-adjusted average gross margin ratio over 1994–1996 to sort firms into low- and high-gross margin firms. Firms below the median are denoted *Low Margin* firms. The variable *Post* is a dummy variable equal to one for years after 1996. The independent variables are defined in Appendix B. In Columns (1) and (2), we truncate the cash ETR at zero and one. In Columns (3) and (4), we additionally control for indicator variables for losses (in *t*, *t* - 1, and *t* - 2, respectively), negative cash taxes paid (in *t*, *t* - 1, and *t* - 2, respectively), as well as the interactions of the respective dummy variables. We report robust standard errors clustered at the firm level in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Robustness of Table 4

	Truncating		**Controlling for Losses**	
	Cash ETR 3	Cash ETR 5	Cash ETR 3	Cash ETR 5
	(1)	(2)	(3)	(4)
Low Margin × Post	-0.0136**	-0.0111*	-0.0108	-0.0166**
	(0.0053)	(0.0059)	(0.0066)	(0.0069)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Industry–Year FE	Yes	Yes	Yes	Yes
Observations	22,476	20,143	25,957	25,956
Adjusted R^2	0.448	0.538	0.379	0.407

Panel B: Robustness of Table 5

	Truncating		**Controlling for Losses**	
	Cash ETR 3	Cash ETR 5	Cash ETR 3	Cash ETR 5
	(1)	(2)	(3)	(4)
Bottom Quartile × Post	-0.0262***	-0.0290***	-0.0272***	-0.0330***
	(0.0089)	(0.0086)	(0.0094)	(0.0097)
2nd Quartile × Post	-0.0037	-0.0011	-0.0091	-0.0154
	(0.0082)	(0.0081)	(0.0093)	(0.0093)
3rd Quartile × Post	-0.0069	-0.0057	-0.0138	-0.0141
	(0.0073)	(0.0071)	(0.0085)	(0.0089)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Industry–Year FE	Yes	Yes	Yes	Yes
Observations	19,759	20,143	25,957	25,956
Adjusted R^2	0.475	0.539	0.379	0.407

Table A.6: Baseline Panel Regression Results with the GAAP ETR

This table presents the regression results on tax avoidance behavior over 1989–2015. The dependent variable is the three-year GAAP ETR (*GAAP ETR 3*) in Columns (1) and (2). In Columns (3) and (4), we use the five-year GAAP ETR (*GAAP ETR 5*) as the dependent variable. The independent variables are defined in Appendix B. We include year fixed effects in Columns (1) and (3). Columns (2) and (4) include industry–year fixed effects. We report robust standard errors clustered at the firm level in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	GAAP ETR 3		**GAAP ETR 5**	
	(1)	(2)	(3)	(4)
Gross Margin	0.0254*	0.0273*	0.0447**	0.0432**
	(0.0135)	(0.0140)	(0.0199)	(0.0204)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No
Industry–Year FE	No	Yes	No	Yes
Margin–Decile–Year FE	Yes	Yes	Yes	Yes
Observations	69,328	69,319	58,229	58,215
Adjusted R^2	0.357	0.367	0.376	0.385

Table A.7: Gross Margins and GAAP ETRs around 1997

This table presents cash ETRs around the 1997 Check-the-Box Regulation using the sample of U.S. firms over 1992–2001. We use the five-year GAAP ETR. We compare low-gross margin firms and high-profit margin firms. We use the median of the three-year industry-adjusted average gross margin ratio over 1994–1996 to sort firms into low- and high-gross margin firms. We report robust standard errors clustered at the firm level in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	Pre-Reform 1992–1996 (1)	Post-Reform 1997–2001 (2)	Time Difference for Group (3)
Low Gross Margin Firms	0.3127	0.3006	-0.0121**
			(0.0053)
High Gross Margin Firms	0.3159	0.3165	0.0006
			(0.0046)
Difference Low versus High	-0.0032	-0.0159***	**-0.0127***
Gross Margin Firms in *t*	(0.0061)	(0.0060)	**(0.0070)**

Table A.8: Gross Margins and GAAP ETRs around 1997: Difference-in-Differences Analysis

This table presents the regression results on tax avoidance behavior over 1992–2001. The dependent variable is the three-year GAAP ETR (*GAAP ETR 3*) in Columns (1) and (2). In Columns (3) and (4), we use the five-year GAAP ETR (*GAAP ETR 5*) as the dependent variable. We compare low-gross margin firms and high-gross margin firms. We use the median of the three-year industry-adjusted average gross margin ratio over 1994–1996 to sort firms into low- and high-gross margin firms. Firms below the median are denoted *Low Margin* firms. The variable *Post* is a dummy variable equal to one for years after 1996. The independent variables are defined in Appendix B. We include year fixed effects in Columns (1) and (3). Columns (2) and (4) include industry–year fixed effects. We report robust standard errors clustered at the firm level in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	GAAP ETR 3		**GAAP ETR 5**	
	(1)	(2)	(3)	(4)
Low Margin × Post	-0.0144**	-0.0240***	-0.0228***	-0.0194***
	(0.0065)	(0.0054)	(0.0066)	(0.0074)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Industry–Year FE	Yes	Yes	Yes	Yes
Observations	24,611	24,615	26,742	20,916
Adjusted R^2	0.383	0.393	0.428	0.434

Table A.9: Gross Margins and GAAP ETRs: Breakdown of Margin Quartiles

This table presents the regression results on tax avoidance behavior over 1992–2001. The dependent variable is the three-year GAAP ETR (*GAAP ETR 3*) in Columns (1) and (2). In Columns (3) and (4), we use the five-year GAAP ETR (*GAAP ETR 5*) as the dependent variable. We compare the quartiles of the three-year industry-adjusted average gross margin ratio over 1994–1996. The top quartile serves as the baseline group. The variable *Post* is a dummy variable equal to one for years after 1996. The independent variables are defined in Appendix B. We include year fixed effects in Columns (1) and (3). Columns (2) and (4) include industry–year fixed effects. We report robust standard errors clustered at the firm level in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	GAAP ETR 3		**GAAP ETR 5**	
	(1)	(2)	(3)	(4)
Bottom Quartile × Post	-0.0232**	-0.0247***	-0.0303***	-0.0308***
	(0.0093)	(0.0090)	(0.0106)	(0.0104)
2nd Quartile × Post	-0.0194**	-0.0180**	-0.0234**	-0.0232**
	(0.0094)	(0.0090)	(0.0101)	(0.0099)
3rd Quartile × Post	-0.0135*	-0.0145*	-0.0151	-0.0144
	(0.0082)	(0.0079)	(0.0096)	(0.0094)
Difference Bottom versus 2nd Quartile	-0.0038	-0.0067	-0.0069	-0.0076
[*t*-Stat]	0.37	0.68	0.61	0.68
Difference Bottom versus 3rd Quartile	-0.0097	-0.0102	-0.0152	-0.0164
[*t*-Stat]	1.07	1.16	1.39	1.52
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Industry–Year FE	Yes	Yes	Yes	Yes
Observations	24,611	24,611	20,916	20,916
Adjusted R^2	0.383	0.400	0.426	0.434

Table A.10: Tariff Cuts and GAAP ETRs

This table presents the regression results on tax avoidance behavior over 1974–2005. The dependent variable is the one-year GAAP ETR (G*AAP ETR 1*) in Columns (1) and (2). In Columns (3) and (4), we use the three-year GAAP ETR (*GAAP ETR 3*) as the dependent variable. The variable *Tariff Cut* is a dummy variable equal to one if there is a substantial tariff cut according to Frésard (2010) in *t* or *t* - 1. The independent variables are defined in Appendix B. We include year fixed effects in Columns (1) and (3). Columns (2) and (4) include industry–year fixed effects. We report robust standard errors clustered at the industry-level in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	GAAP ETR 1		**GAAP ETR 3**	
	(1)	(2)	(3)	(4)
Tariff Cut	-0.0347*	-0.0323**	-0.0351**	-0.0292***
	(0.0195)	(0.0155)	(0.0152)	(0.0110)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Industry–Year FE	Yes	Yes	Yes	Yes
Observations	6,515	6,515	5,504	5,504
Adjusted R^2	0.280	0.320	0.344	0.370

Table A.11: Wages and GAAP ETRs around the 1997 Check-the-Box Regulation: Difference-in-Differences Analysis

This table presents the regression results on tax avoidance behavior over 1992–2001. The dependent variable is the three-year GAAP ETR (*GAAP ETR 3*) in Columns (1) and (2). In Columns (3) and (4), we use the five-year GAAP ETR (*GAAP ETR 5*) as the dependent variable. We compare low profit margin firms and high-profit margin firms. We compare firms with a high wages-to-sales ratio to firms with a low wages-to-sales ratio. We use the median of the two-year industry-adjusted average wages-to-sales ratio over 1994–1996 to sort firms into low– and high–wages-to-sales firms. Firms above the median are denoted *High Wages to Sales* firms. The variable *Post* is a dummy variable equal to one for years after 1996. The independent variables are defined in Appendix B. We include year fixed effects in Columns (1) and (3). Columns (2) and (4) include industry–year fixed effects. We report robust standard errors clustered at the firm level in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Cash ETR 3		**Cash ETR 5**			
	(1)	(2)	(3)	(4)	(5)	(6)
High Wages to	-0.0321***	-0.0270**	-0.0138	-0.0166	-0.0251**	-0.0281***
Sales × Post	(0.0099)	(0.0111)	(0.0113)	(0.0116)	(0.0106)	(0.0108)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry–Year FE	Yes	Yes	Yes	Yes	No	No
Year FE	Yes	Yes	No	No	Yes	Yes
Observations	24,113	24,110	20,531	20,531	20,540	20,540
Adjusted R^2	0.375	0.395	0.425	0.435	0.424	0.432

Table A.12: Main Results, Controlling for Unsuccessful Tax Avoiders

This table replicates our main results from Tables 3, 4, 6, and 7 on tax avoidance behavior over 1992–2001. The dependent variable is the three-year cash ETR (*Cash ETR 3*) in Columns (1) and (3). In Columns 2) and (4), we use the five-year cash ETR (*Cash ETR 5*) as the dependent variable. In this test, we exclude unsuccessful tax avoiders over the past five years according to the definition of Saavedra (2017). The independent variables are defined in Appendix B. We include firm fixed effects and industry–year fixed effects in all regressions. We report robust standard errors clustered at the firm level in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Baseline Test		**Tariff Cut Test**	
	Cash ETR 3	Cash ETR 5	Cash ETR 3	Cash ETR 5
	(1)	(2)	(3)	(4)
Gross Margin	0.0493***	0.0353**		
	(0.0172)	(0.0154)		
Tariff Cut			-0.0299*	-0.0246*
			(0.0152)	(0.0130)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Industry–Year FE	Yes	Yes	Yes	Yes
Observations	60,744	60,744	5,738	5,739
Adjusted R^2	0.338	0.419	0.264	0.339
	Difference-in-Differences Regression around Check-the-Box			
	Cash ETR 3	Cash ETR 5	Cash ETR 3	Cash ETR 5
	(1)	(2)	(3)	(4)
Low Margin × Post	-0.0144**	-0.0126**		
	(0.0060)	(0.0056)		
High Wages to Sales × Post			-0.0240**	-0.0106
			(0.0100)	(0.0084)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Industry–Year FE	Yes	Yes	Yes	Yes
Observations	23,703	23,703	23,295	23,295
Adjusted R^2	0.390	0.494	0.388	0.490