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Abstract

Effective policymakers must balance the demands of formulating a corporate tax system that raises revenue and spurs economic activity (e.g., investment) while promoting a "level playing field" across firms. Balancing these tradeoffs has likely caused tax systems to become more complex over time, increasing firms' difficulty in understanding and complying with tax regulations. We investigate the impact of tax system complexity on the responsiveness of firm-level investment to tax policy changes. Exploiting staggered tax rate changes and variation in tax system complexity across countries, we document two key findings. First, firm-level investment is less sensitive to changes in the corporate tax rate when tax system complexity is higher, suggesting that such complexity can undermine the ability of tax policy to affect economic growth. Second, the impact of tax complexity on the sensitivity of investment to tax rate changes varies significantly across firms, with domestic-owned, smaller, and private firms being more affected. These cross-sectional disparities are consistent with tax system complexity potentially reducing tax system parity. Collectively, our findings suggest that corporate tax system complexity can negatively impact the ability of fiscal policy to affect investment and lead to heterogeneous tax policy responses across firms.

Keywords: tax complexity, tax rates, investment, employment

JEL Codes: D25, F23, H23, H25, G31

1. Introduction

Governments worldwide face the inherent challenge of developing effective tax policy in the increasingly complicated global economy. The primary purpose of a tax system is to raise revenue to fund government operations. But in this effort, policymakers must not only grapple with the challenge of formulating a tax system that effectively collects revenue, but also one that simultaneously fosters economic activity, ensures parity (i.e., a "level playing field"), and accommodates the complexity underlying global organizations and economic institutions. Balancing these tradeoffs almost certainly magnifies tax system complexity, or the difficulty of understanding and complying with tax regulations.

Although an expansive literature considers how tax burdens influence investment, we have limited evidence on the role tax system complexity plays in shaping investment and how this effect varies across firms.[1] Prior studies on tax system complexity focus on non-investment firm-level outcomes (Zwick 2021) or country-level outcomes (i.e., foreign direct investment) (Lawless 2013; Esteller-More, Rizzo, and Secomandi 2021). In contrast, our interest is in understanding how the interaction between tax complexity and changes in tax policy—not just tax complexity by itself—shapes firm-level investment. Specifically, we examine how tax system complexity affects the responsiveness of firm investment to tax rate changes, and critically, how such complexity differentially affects distinct groups of firms. Our firm-level approach allows us to explore the mechanisms through which tax system complexity affects investment and to assess whether a consequence of complexity is a tax system that creates "winners" and "losers".

Documenting the firm-level investment effects of tax system complexity, conditional on a

[1] Examples of prior research on the effects of tax policy on investment include Auerbach and Hassett (1992), Djankov, Ganser, McLiesh, Ramalho, and Shleifer (2010), Edgerton (2010), Dharmapala, Foley, and Forbes (2011), Ljungqvist, Zhang, and Zuo (2017), Zwick and Mahon (2017), Giroud and Rauh (2019), Jacob, Michaely, and Müller (2019), and Lester (2019).

given tax incentive (e.g., tax rate change), is important given recent policymaker interest in the consequences of the complexity of tax policy.[2] Understanding the effects of tax system complexity is also important in light of observations that this complexity has increased over time (Asen 2021) and is associated with significant compliance costs (Marcuss et al. 2013). Thus, by studying the consequences of tax system complexity, our study seeks to inform tax policy decisions, which not only have implications for the level of economic activity but also the distributional effects of the policies (i.e., their effects on fairness and competition).

Tax system complexity can arise from multiple sources, including the length of the tax code and related provisions, uncertainty in the applicability of tax code provisions to the firm and its transactions, the number of forms and documentation that firms need to complete to comply with the law, the ease and frequency with which firms submit payments, and the effort and resources spent on preparing for and complying with tax audits. A key characteristic of our definition of tax system complexity is the time spent complying with the tax system. In a high (low) complexity tax system, the average firm will spend more (less) time understanding which provisions apply to the firm, completing the necessary forms and documentation, remitting payments, and interacting with the tax authority (i.e., in tax audits). Tax system complexity is thus distinct from other tax system characteristics, such as the tax rate and other specific tax provisions (e.g., Giroud and Rauh 2019), tax enforcement (e.g., Hoopes, Mescall, and Pittman 2012; Gallemore and Jacob 2023), and uncertainty about future tax policy or enforcement (e.g., Gallemore, Hollander, Jacob, and Zheng 2022; Fox, Jacob, Wilde, and Wilson 2022).

Our study explores how tax system complexity affects the responsiveness of firm

[2] In 2020, the EU released an Action Plan for Fair and Simple Taxation, with one goal of the proposal being to achieve "simple EU tax policies for a competitive single market." See: https://taxation-customs.ec.europa.eu/package-fair-and-simple-taxation_en and https://taxation-customs.ec.europa.eu/system/files/2020-07/2020_tax_package_tax_action_plan_en.pdf (last accessed February 2023).

investment to tax policy through the lens of corporate tax rate changes. We use the statutory tax rate as a starting point in our analyses because (i) tax rate changes are prominent tax policy changes that are easily comparable across a broad set of countries, (ii) prior research links tax rate changes to investment (Jacob 2022), and (iii) evidence suggests that managers frequently use the statutory tax rate when making investment decisions (Graham, Hanlon, Shevlin, and Shroff 2017). Our conceptual framework draws on the intuition from Hall and Jorgenson (1967), which model firms' marginal capital investment as a function of the tax deductibility of investment costs at the prevailing statutory corporate tax rate. The underlying intuition follows a net present value (NPV) framework that considers the discount rate and timing of cash flows and expenses. If the cost of the initial investment is not fully tax deductible in present value terms (due to tax depreciation), capital investment will be decreasing in the corporate income tax rate. Thus, decreases (increases) in the corporate income tax rate will encourage (discourage) marginal investment.

The objective of our study is to understand whether this investment response to a change in the tax rate depends on the country's corporate tax system complexity. Put differently, our ideal experiment is to compare similar firms in two countries that consider implementing the same statutory tax rate change (e.g., a 5-percentage point cut), but where the countries vary in the extent of their tax system complexity. This comparison allows us to speak to how tax system complexity impacts policymakers' ability to use tax policy (e.g., tax rate changes) to affect economic activity.

We propose three mechanisms through which tax system complexity could attenuate the sensitivity of investment to tax rate changes: tax compliance costs, uncertainty, and tax planning. First, tax system complexity increases the costs firms incur to comply with the tax code, reducing the net benefits of additional investment. In particular, tax-complexity induced compliance costs likely have a variable component, arising from investment that (i) expands the breadth of business

activities (e.g., innovation), which require the firm to comply with different parts of the tax code, or (ii) increases the scope of transactions which in turn amplifies the costs of keeping tax records or prepare for tax audits. Second, tax system complexity increases the difficulty in interpreting the tax code as written and complying with all pertinent tax regulations, which in turn can increase the uncertainty over the firm's tax burden, leading to a higher discount rate associated with the potential investment. Third, complex tax systems likely provide greater tax planning opportunities such that firms in high complexity tax systems face an effective tax burden that is lower than the applicable statutory tax rate.

Consistent with the intuition underlying economic theory of taxes and investment (Hall and Jorgenson 1967), the key point with each of these mechanisms is that they introduce a friction that reduces the extent to which a tax rate cut increases the NPV of an investment project (and vice-versa for a tax rate increase). For example, when considering tax-complexity induced compliance costs, a tax rate cut increases the after-tax value of such costs and this effect increases in tax complexity. For the uncertainty mechanism, the extent to which a tax rate cut increases the NPV is decreasing in the discount rate. In the case of tax planning, a tax rate cut reduces the firm's actual tax payments and thus increases the project's NPV; this effect is decreasing in the amount of tax planning. More generally, greater tax system complexity under each mechanism will shift project NPVs away from investment thresholds, reducing the likelihood that a tax rate change will cause NPVs to cross that threshold. In short, tax system complexity can attenuate the sensitivity of investment to tax rate changes.[3]

To empirically examine how tax system complexity affects the sensitivity of investment to tax rate changes, we employ a sample of firms in 28 EU and OECD countries from 2013 to 2019,

[3] We provide stylized numerical examples in section 2.3 to illustrate the intuition in our setting.

covering 19 staggered tax rate changes (15 decreases and 4 increases). The benefit of our international approach is that we capture meaningful variation in aggregate tax system complexity across countries, as opposed to focusing on the complexity associated with a specific tax policy in a particular country. Furthermore, our approach exploits the fact that tax rate changes vary in both their timing and magnitude across countries, which allows us to hold constant time-invariant country- and firm-level factors. To measure tax system complexity, we employ the time spent to prepare, file, and pay taxes for the average medium-sized firm, as measured by the World Bank's Doing Business survey. This measure is conceptually well-aligned with our tax system complexity construct and has been used in prior research (Djankov et al. 2010).

Consistent with our expectation, we find that while investment is negatively associated with the tax rate on average, tax system complexity attenuates this relation. In economic terms, a one standard deviation increase (measured within firm fixed effects) in tax system complexity reduces the sensitivity of investment to the tax rate by approximately 8 percent. These results suggest that when tax system complexity is higher, firm-level investment responds less strongly to tax rate changes. Our findings are robust to employing a stacked difference-in-differences approach, addressing concerns associated with staggered treatments (Barrios 2021; Baker, Larcker, and Wang 2022). Our results also hold across a battery of robustness tests, including using alternative measures of tax system complexity and controlling for other country-level factors, such as the strength of tax enforcement and uncertainty over future tax policy (Gallemore et al. 2022). This evidence corroborates our primary results and mitigates concerns that our results are driven by the specific way we measure tax system complexity in our primary tests or country-level characteristics other than tax system complexity.

We conduct additional analyses that examine the mechanisms through which tax system

complexity dampens the sensitivity of investment to the tax rate. Specifically, we examine whether our main result varies with proxies for a firm's access to resources and experience navigating various tax systems. If compliance costs and uncertainty drive our main findings, we expect that the attenuating effect of tax system complexity on the sensitivity of investment to tax rate changes should be *less* pronounced for firms with greater resources and experience dealing with different tax systems. Resources and experience should facilitate a firm's ability to efficiently and effectively identify and comply with pertinent tax regulations, reducing compliance costs and uncertainty over the ultimate tax burden. On the other hand, if tax planning opportunities drive our main findings, we expect that the attenuating effect of tax system complexity on the investment response to tax rate changes should be *more* pronounced for firms with greater resources and experience. The intuition here is that such firms should be more effective at exploiting complex tax systems via tax planning, leading to effective tax rates that diverge substantially from statutory tax rates and thus reducing the impact of tax rate changes on firm investment.

We employ three different measures to proxy for the firm's resources for and experience in navigating tax systems: (i) whether the firm is multinational (MNC)-owned, (ii) whether the firm is publicly traded, and (iii) firm size. We expect that MNC-owned, publicly traded, and large firms have relatively more resources for and experience in navigating complex tax systems. Our results suggest that the attenuating effect of tax system complexity on the sensitivity of investment to the tax rate is *less* pronounced for MNC-owned, publicly traded, and large firms, relative to domestically owned, private, and small firms, respectively. These results are largely consistent with uncertainty and compliance costs being the mechanisms responsible for our main findings. Additionally, these results suggest that tax system complexity can drive, in part, heterogeneity in firm-level responses to tax policy, and have consequences for policymakers' aim for a "level

playing field."

We conduct two additional analyses. First, we replace the statutory tax rate with measures for the country's aggregate effective tax rate (ETR). A benefit of this approach is that changes in the ETR capture the amalgamation of changes in the tax rate, tax base, and average country-level tax planning. We find that tax system complexity attenuates the sensitivity of investment to the ETR, similar to our results when using the statutory tax rate. These results have two implications. First, they suggest that tax system complexity can affect the sensitivity of investment to a broader set of tax policies. Second, they further indicate that tax planning is unlikely to be the mechanism underlying our main results. Second, we also examine how tax complexity moderates the responsiveness of firms' labor investment to tax rate changes, consistent with the idea that capital and labor investment can be complements (Curtis, Garrett, Ohrn, Roberts, and Serrato 2021). We find that the attenuating effect of tax complexity on firms' investment responsiveness to tax rates extends to labor investment.

Our study contributes to the literature in economics, finance, and accounting that examines how tax policy shapes investment (see Hassett and Hubbard (2002) and Jacob (2022) for reviews of this literature). This literature broadly documents that firm-level investment is sensitive on average to corporate tax rates (e.g., Djankov et al. 2010; Ohrn 2018; Jacob and Zerwer 2023) and specific tax provisions (e.g., Langenmayr and Lester 2018; Lester 2019). We extend this research in two ways. First, we provide evidence on how tax system complexity, a central but relatively understudied component of the tax system, affects firm investment. In particular, unlike prior research that focuses on the direct effect of tax system attributes (e.g., tax rates or specific tax provisions) on investment, we examine how tax system complexity moderates firms' *responsiveness* to tax policy. An important implication of our findings is that an estimated

elasticity of investment to a tax policy change (e.g., tax rate change) in one jurisdiction or period may not generalize to settings with different levels of tax system complexity. Second, we document that tax system complexity is associated with *heterogeneous* tax policy responses, adding to prior literature that generally focuses on how tax system attributes affect *average* firm-level investment. In this way, we contribute to the recent research that explores how responses to tax policy changes vary across firms (Zwick and Mahon 2017; Gallemore et al. 2022).

Our study also contributes to the emerging literature on the consequences of tax system complexity. Prior research has studied the impact of tax system complexity on credit refund uptake (Zwick 2021) and bilateral foreign direct investment (FDI) flows (Lawless 2013; Esteller-More et al. 2021; Euler, Harst, Schanz, Sureth-Sloane, and Voget 2024). Our study is distinct from, and thus contributes to, this research in several ways. First, our firm-level approach allows us to speak to the mechanisms underlying the impact of tax system complexity on investment and to examine firm-level heterogeneity in the consequences of such complexity. Second, in contrast to prior work that focuses on the direct impact of tax system complexity, we examine how complexity affects the sensitivity of investment to tax rate changes. This approach allows us to assess how tax system complexity impacts the role of fiscal policy in shaping investment. Third, we examine the impact of tax system complexity on domestic firms, which are omitted from bilateral FDI flows, thereby providing evidence on potentially unintended effects that tax complexity can have on domestic firms vis-à-vis multinationals.

Finally, our study has several implications for policymaking. First, our findings suggest that there are trade-offs to policies that add complexity to the tax system. Although these policies may enable policymakers to accomplish certain goals (e.g., raising revenues or redistributing wealth), they incur a cost in that they can reduce the responsiveness of investment to tax rate

changes. Second, finding that the impact of tax system complexity is heterogeneous suggests that tax policy can disadvantage certain firms (e.g., domestic firms) vis-a-vis others (e.g., MNCs), leading to "winners" and "losers" and reducing tax policy neutrality (e.g., Furman 2008). Third, our findings also inform ongoing policy efforts that may inadvertently increase tax system complexity (e.g., the OECD Two Pillar proposal), and other efforts to understand the impact of complexity on taxpayer compliance burdens (Internal Revenue Service 2023). Overall, while some level of tax system complexity is likely necessary, our findings suggest that policymakers should carefully weigh the benefits of creating a complex tax system with the potential cost of impacting whether and how fiscal policy can affect investment.[4]

2. Conceptual framework

2.1. Prior literature

Researchers have long been interested in the link between taxes and investment. An extensive literature explores the effect of tax rates (Hassett and Hubbard 2002; Jacob 2022), generally finding that corporate tax rates are negatively associated with investment. Related research examines the role of specific tax system features, such as the tax treatment of operating losses or tax credits and tax deductions, on firm investment (Langenmayr and Lester 2018; Devereux 2016; Blouin, Krull, and Robinson 2017; Ljungqvist et al. 2017; Williams 2018; Lester 2019). In contrast, research on tax system complexity is relatively scarce. On the determinants side, Slemrod (2005) finds that professional legislatures and the activity of the voting population shape variation in tax complexity among U.S. states. More recent research approaches tax complexity from a multinational firm perspective and introduces a survey-based tax complexity index, suggesting that tax complexity can be characterized by tax code and tax framework

[4] We note that we do not study, and our results do not speak to, the net societal costs and benefits of tax system complexity. Rather, our study documents one set of consequences that can inform tax policy deliberations.

complexity (Hoppe, Schanz, Sturm, and Sureth-Sloane 2023).

More closely related to our study is research examining the consequences of tax system complexity. Zwick (2021) examines the role of corporate tax complexity in claiming refunds, finding that tax complexity can affect firms' take-up of available tax benefits. Marcuss et al. (2013) discuss the increasing tax complexity in the U.S. and the effect of such complexity on taxpayer compliance burdens. They estimate that aggregate annual income tax-related compliance costs exceed $150 billion. Other research examines the role of tax complexity in FDI flows (Lawless 2013; Esteller-More et al. 2021; Euler et al. 2024) and how the opening of taxpayer filing assistance centers, which can alleviate compliance burdens, is associated with new business registrations (Armstrong and Glaeser 2023). However, to date, there is little research on whether and how tax system complexity shapes firm-level investment responses to corporate tax rate changes and whether this effect varies across firms. Our study considers that possibility.

2.2. Theoretical development

Our interest is in understanding whether tax system complexity impacts the sensitivity of firm-level investment to changes in the corporate tax rate.[5] In line with that question, our conceptual framework centers on intuition from economic theory of taxes and investment, which suggests that tax policy can shape firms-level capital investment (Hall and Jorgenson 1967). In this framework, an investment opportunity's after-tax NPV is a function of the discount rate and the timing of cash flows and expenses. As long as the cost of the initial investment is not fully tax deductible in present value terms, investment will be decreasing in the corporate tax rate. Thus, decreases (increases) in the tax rate will lead to greater (less) marginal investment.

[5] Our focus on tax rates changes, rather than other tax code provisions, is consistent with the key role tax rates arguably play in various firm decisions. Tax rate changes also provide for a straightforward approach to measuring changes to a core tax incentive that one can apply for multiple years across multiple countries in a consistent way.

With this framework as our starting point, we argue that there are at least three mechanisms through which tax system complexity can attenuate the responsiveness of investment to changes in the tax rate: tax compliance costs, uncertainty, and tax planning opportunities. We elaborate on these mechanisms below and illustrate them with a stylized numerical example in section 2.3.

The first mechanism relates to the impact of tax system complexity on compliance costs. When the tax system is more complex, we expect that firms will spend more time and resources on complying with the tax code (Marcuss et al. 2013). Importantly, a portion of these tax-complexity induced costs are likely variable in nature, for several reasons. First, marginal investment could involve the expansion of the scope of business activities, such as engaging in innovative activities or manufacturing new products, which in turn require the firm to deal with additional parts of the tax system. Second, investment may involve the firm expanding the number of sales made, customers targeted, or suppliers purchased from, and tracking these transactions for tax purposes will likely require more compliance personnel and better internal information systems (e.g., Gallemore and Labro 2015). Third, tax system complexity can affect the costs associated with tax audits, including both direct costs (e.g., paperwork, services from consulting, accounting, and law firms, etc.) and indirect costs (e.g., opportunity costs of employee time). As the scale and scope of operations, assets, and transactions grows, the complexity of potential tax audits—and the costs of preparing and complying with them—will increase. Since these compliance costs are likely tax deductible, their after-tax value reduces the NPV of an investment project. A tax rate cut (increase) raises (lowers) the after-tax value of these costs, and this effect increases in tax complexity. Furthermore, greater compliance costs shift project NPVs away from investment thresholds, diminishing the extent to which a tax rate change is likely to induce a project to cross the firm's threshold for investment. Thus, tax-complexity induced compliance costs will reduce

the responsiveness of investment to tax rate changes.

The second mechanism relates to the effect of tax system complexity on uncertainty. We expect tax system complexity to increase the difficulty of interpreting the tax code and complying with all relevant tax provisions. These challenges may lead the firm to become more concerned about exposure to, and the outcomes of, potential tax audits, inducing uncertainty regarding the firm's (ultimate) tax obligations.[6] By increasing uncertainty over the tax burden, tax system complexity should increase the discount rate associated with marginal investment. A higher discount rate will reduce the extent to which a project's NPV changes with a tax rate change. Additionally, this tax-complexity induced uncertainty will shift project NPVs away from investment threshold, reducing the likelihood that a tax rate change will cause NPVs to cross the threshold. This idea is consistent with prior research that finds that uncertainty can reduce firms' sensitivity to first moment fiscal policies (Bloom, Floetotto, Jaimovich, Saporta-Eksten, and Terry 2018; Gallemore et al. 2022), like a tax rate change.[7] Both of these forces will reduce the extent to which firm investment changes in response to a tax rate change.

The third mechanism relates to how tax system complexity can facilitate tax planning. We argue that tax system complexity can affect a firm's tax base by providing opportunities to change the base via tax planning such that a firm's effective tax rate (ETR) is lower than the statutory tax rate (Krause 2000). If so, then tax system complexity will lead to a weaker alignment between

[6] This source of uncertainty is also related to, but distinct from, the tax enforcement-related uncertainty studied in Fox et al. (2022), which involves the uncertainty of tax enforcement from supranational entities (i.e., the European Commission) aimed at multinationals. In contrast, we consider a specific source of tax-induced uncertainty emanating from tax system complexity of a specific country, and how it impacts investment of all firm types.

[7] The uncertainty we consider here relates to the enacted tax code, and thus is distinct from uncertainty related to potential tax policy changes (Gallemore et al. 2022). We do not argue that tax complexity and tax policy uncertainty are entirely different constructs. Rather, tax complexity can create uncertainty over tax outcomes even in the absence of uncertainty over future tax policy. In a robustness test, we show that our findings are robust to controlling for tax policy uncertainty (see section 4.3.2). Moreover, our focus relates to how tax-complexity induced uncertainty affects investment responses to tax rate changes, which is different from the direct effect of policy uncertainty on investment studied by prior research (Julio and Yook 2012; Jens 2017; Baker, Bloom, and Davis 2016; Hassan, Hollander, van Lent, and Tahoun 2019; Gallemore et al. 2022; Handley and Limão 2022).

changes in the statutory tax rate and changes in firms' effective tax burdens. Moreover, greater tax planning will reduce the extent to which a tax rate change will induce a project to cross the firm's NPV threshold for investment. As a result, the tax planning mechanism implies that changes to the statutory tax rate will have a smaller impact on the after-tax NPVs of an investment project—and thus be less likely to lead to a change in investment—when tax system complexity is higher.

In summary, firm-level capital investment should respond to changes in the tax rate because increased (reduced) tax rates lead to a lower (higher) after-tax NPV of an investment project. However, we expect that tax system complexity introduces frictions—in the form of compliance costs, uncertainty, and tax planning opportunities—that attenuate the sensitivity of such investment to changes in the corporate tax rate. Notably, our theory focuses on how tax system complexity moderates the responsiveness of investment to tax rate changes. In Appendix A, we explore the extent to which this conceptual framework translates to tax base policy changes such as tax credits, bonus depreciation, and super deductions.

2.3. Stylized examples

To illustrate the conceptual framework outlined above, and specifically how each mechanism can introduce a friction that reduces the sensitivity of investment to tax rate changes, we develop several stylized examples. In these examples, we examine how tax rate changes can impact firm-level investment, and how the extent of tax system complexity can shape the impact of the tax rate change on these decisions. We highlight the key features and takeaways of these examples here, leaving a more detailed explanation (including calculations) to Appendix A.

We assume two firms that can invest in three projects. The projects differ in terms of their revenues, capturing diminishing marginal returns to investment, but are otherwise identical (e.g., require the same initial and ongoing costs). One firm is in a high tax complexity country and the

other one is in a low tax complexity country. The two firms are identical in terms of investment opportunities and other firm characteristics (e.g., the discount rate). The firms invest in any project for which the discounted sum of total after-tax cash flows (i.e., the NPV) is positive. Both countries have the same statutory corporate tax rate (20%) and are considering a tax rate cut of 5%. One can similarly consider the example in terms of a rate increase (e.g., from 15% to 20%).

Tax system complexity has several effects that are relevant for the investment decision. First, related to the compliance cost mechanism, we assume that marginal investment incurs additional compliance costs that are higher in the high tax complexity country. Second, we model a discount rate effect related to the tax uncertainty mechanism, which captures the idea that tax complexity is likely to increase uncertainty over the firm's ultimate tax outcomes. Again, we assume that the firm in the high tax complexity country faces a greater increase in the discount rate. Third, related to the tax planning mechanism, we assume that tax system complexity allows firms to engage in tax planning that reduces the ETR (relative to the statutory tax rate); the extent of tax planning is again greater in the high tax system complexity country.

In Appendix A, we show how investment of both firms responds to the tax rate cut. For the firm in the low tax complexity country, the tax rate change does not affect decisions regarding the high revenue and low revenue projects. However, the tax rate cut leads the medium revenue project to go from having a negative NPV to a positive NPV, inducing the firm to invest in it. This pattern is consistent with the idea that lower tax rates tend to induce greater investment, all else equal. In contrast, the tax rate cut does not change *any* of the investment decisions for the firm in the high tax system complexity country. That is, the decrease in the statutory tax rate does not lead any of the three projects to go from being negative to positive NPV. In addition, the increase in the after-tax NPV following the tax rate cut is consistently greater in the low tax complexity country than

in the high tax complexity country for all three projects.

We attribute these results to the frictions induced by the three mechanisms outlined in section 2.2. Tax rate cuts increase the after-tax value of compliance costs and this effect increases in tax complexity, reducing the extent to which a tax rate change alters the projects after-tax NPV. Furthermore, tax-complexity induced uncertainty reduces the positive impact of a tax rate cut on the NPV. Tax-complexity induced tax planning opportunities reduce the extent to which the statutory tax rate change alters firms' effective tax burdens, diminishing the impact of such changes on the after-tax NPVs of investment opportunities. Furthermore, each of these three mechanisms can shift the NPV of investment opportunities away from the investment threshold, such that tax rate changes no longer lead to these NPVs crossing the threshold. Thus, the numerical examples in Appendix A demonstrate how tax system complexity can attenuate the responsiveness of investment to tax rate changes.[8]

3. Research design and data

3.1. Measuring tax system complexity

Conceptually, tax system complexity is the burden that firms face in complying with the tax code in all its facets. A low complexity system is one in which the provisions are clearly spelled out, firms do not need to fill out much paperwork, and disputes with the relevant tax authorities are handled in a straightforward and timely manner. In contrast, a high complexity tax system will require that firms spend more time and resources to understand and comply with the relevant tax provisions. Firms will also have residual uncertainty about whether they have adequately complied with the regulations and incur more direct and opportunity costs in preparing for or complying with potential or actual tax audits. A high complexity system may also contain more loopholes,

[8] Section A.2 of Appendix A discusses how this intuition would extend to tax base changes (e.g., tax credits).

indirectly encouraging firms to engage in greater tax planning to lower their effective tax burden. One common thread behind each of these aspects of tax system complexity is the time spent complying with the tax code. Indeed, a characteristic of a high (low) complexity tax system is the average firm will spend less (more) time understanding which provisions apply to the firm, completing the necessary documentation, and dealing with the tax authority.

Our primary measure of tax system complexity is the time to comply with the tax code for a standard medium-sized company, as measured by the World Bank's Doing Business survey. This measure is based on a survey of World Bank in cooperation with PwC, conducted annually from 2004 to 2021. It captures the time (in hours) spent to comply with corporate income taxes, sales taxes, and value-added taxes.[9] This measure is relatively stable within a country over time, with a few exceptions, consistent with the tax system generally not changing substantially from year-to-year.[10] However, this measure exhibits substantial variation *across* countries, reflecting the fact that countries have implemented tax systems with differing levels of complexity. Our empirical approach relies on this cross-sectional variation to explore whether the effect of tax rate changes on investment varies depending on tax system complexity. To highlight this variation, we plot the average value of this measure for our sample countries in Figure OA-1 in the Online Appendix.

[9] For additional background on the measure, see https://archive.doingbusiness.org/en/ methodology/paying-taxes. Other potential measures of tax code complexity, such as the length of the tax code, are more challenging to measure (e.g., due to differences in language) and admittedly need not capture tax complexity per se (e.g., a longer tax code could actually be less complex if it spells out clearly how each possible transaction is taxed).

[10] At the country-level, there are three large changes (i.e., an increase/decrease of 40 or more hours over a single year) in our measure during our sample period: Poland 2019 (increase), Lithuania 2018 (decrease), and Romania 2016 (decrease). We researched these three events to confirm that these three countries experienced substantial changes in tax system complexity. Poland enacted legislation requiring firms to provide more documentation for withholding taxes and cross-border tax arrangements and monthly reporting for value added taxes, among other changes (https://globaltaxnews.ey.com/news/2018-6273-poland-passes-2019-tax-reform-including-mandatory-disclosure -rules). Lithuania implemented an electronic filing system for several taxes, including corporate income taxes and value added taxes (see https://www.roedl.com/en-gb/de/media/ publications/newsletters/lithuania/documents/news%20flash%20lithuania_01-2018.pdf). Romania engaged in a substantial effort to simplify their tax system, organized around the principle to promote clear and predictable taxation (see https://www.taxand.com/wp-content /uploads/2017/09/taxhottopics_september-1.pdf).

This measure of tax system complexity has several benefits. First, it is conceptually well-aligned with our tax system complexity construct: as discussed above, more complex tax systems should, all else equal, require more time for the average firm to comply with the relevant tax provisions. Second, it is available for a large sample of countries and years, allowing us to incorporate a broad range of tax jurisdictions. More importantly, the measure is comparable across countries. Third, it has been used by prior research (Djankov et al. 2010).

That said, this measure has some limitations. First, the fact that it is relatively stable within countries over time introduces the possibility that it may be correlated with other country level institutions, and that those, rather than tax complexity, drive our findings. To address this issue, our primary design (explained in section 3.2) exploits the staggered announcement of tax rate changes to understand the impact of tax complexity on investment. Further, we account for how other country-level institutional factors affect the sensitivity of investment to tax rates via several robustness tests (see section 4.3.2). Second, this measure only captures the time spent for a standard medium-sized firm and thus does not capture heterogeneity in tax-related compliance time across firms within a country. An underlying assumption of our design is that the time spent by a standard medium-sized firm to comply with taxes captures the general level of tax system complexity faced by all firms in that country. The extent to which this assumption does not hold, our approach will introduce error into the measurement of tax system complexity for some firms (e.g., MNCs).[11] Third, this measure does not capture other consequences of tax system complexity, such as compliance expenditures associated with internal resources or external services (e.g.,

[11] To address this issue, we examine the sensitivity of our inferences to the Tax Complexity Index developed by Hoppe et al. (2023), which is based on multinational firms (see section 4.3.1). We note that our primary measure exhibits a strong positive correlation with the Hoppe et al. (2023) measure in the two years that overlap with our sample (0.45 in 2016 and 0.36 in 2018), providing some comfort that our primary measure allows us to capture tax complexity in a country more generally. We do not use the Hoppe et al. (2023) as our primary measure because it covers only a few specific years (2016, 2018, and 2020), whereas we examine a longer sample period.

accounting expertise); it also does not allow us to disentangle the drivers of tax system complexity (e.g., equity, politics, etc.). In supplemental tests, we examine the robustness of our findings to using two alternative tax system complexity measures, mitigating concerns that the drawbacks of a particular measure unduly influence our conclusions.

3.2. Research design

To examine the effect of tax system complexity on the sensitivity of investment to the tax rate, we estimate the following regression at the firm-year-level:

$$Capital\ Investment_{i,t} = \alpha_i + \alpha_{j,t} + \beta_1 Tax\ Rate_{c,t} + \beta_2 Tax\ Complexity_{c,t} + \beta_3 Tax\ Rate_{c,t} \times TaxComplexity_{c,t} + \varepsilon_{i,t} \quad (1)$$

Our dependent variable is *Capital Investment*, defined as the year-over-year change in tangible fixed assets, scaled by lagged total assets (De Simone and Olbert 2022). This measure is well-suited to address our research question because the annual change in tangible fixed assets reported on the balance sheet reflects a firm's capital investment (net of depreciation). In additional tests, we examine a labor-based measure of investment, as well as the robustness of our inferences to alternative measures of capital investment.

Tax Rate is the announced top statutory corporate tax rate for country *c* in year *t*. This variable can capture instances in which a change to the statutory tax rate has been announced, but is not yet effective.[12] The reasoning behind this approach is that firms likely consider the future tax rate when making investment decisions (Ivanov, Pettit, and Whited 2024; Gallemore et al. 2022). Here, the argument is that the returns to investment, particularly capital investment, are likely to be long-lived. Thus, when managers evaluate the NPV of an investment project, they are likely to incorporate the statutory tax rate that will be in place for most of the life of the investment.

[12] If a country announces a staggered tax rate change phased in over several years, we focus on the terminal rate to be achieved through the reform.

Along these lines, we expect that the relevant tax rate when deciding on marginal investment will be the future tax rate, which need not be the statutory tax rate that is effective today. For example, if a country has a 25% tax rate today, and announces a series of tax rate decreases that will result in the statutory tax rate being 20% in three years, we expect that firms will use the 20% tax rate when evaluating the NPV of investment opportunities. Consistent with other research, we also expect that firms' investment behavior can respond quickly to tax rate changes—even those that have been announced, but that are not yet effective (Ivanov et al. 2024; Link, Menkhoff, Peichl, and Schüle 2024). In robustness tests, we examine the sensitivity of our findings to using the statutory corporate tax rate that is currently effective.

Furthermore, we use the top statutory tax rate, as opposed to an average or size-matched statutory tax rate.[13] We believe this approach is reasonable given evidence suggesting that firms frequently use the top statutory tax rate when making marginal investment decisions (Graham, Hanlon, Shevlin, and Shroff 2014).[14] We expect that the coefficient on *Tax Rate* will be negative, consistent with tax rate cuts (increases) encouraging (discouraging) investment.

To measure tax system complexity, we use the time to comply with taxes measure from the World Bank's Doing Business survey, as described in section 3.1. We standardize this variable (i.e., so that its mean is zero and standard deviation is one), and label it *Tax Complexity*.[15] Our

[13] Variation in our tax rate measures is also entirely attributable to changes in federal tax burdens. We do not exploit variation in local or regional income taxes because our tax system complexity measure captures complexity in federal taxation. For jurisdictions with subnational taxes levied throughout the entire country (e.g., Germany or Italy), the tax rates in Table 3 include a representative estimate for local or regional taxes.

[14] That said, this design choice still potentially introduces measurement mismatch to the extent that mid-sized firms (the focal group for our tax system complexity measure) are not subject to the top statutory tax rate. To examine the extent of this potential measurement error, we calculate the percentage of country-years in which the mid-sized firm likely faces the top statutory tax rate. We describe this calculation in section C.2 of the Online Appendix. We estimate that the top statutory corporate tax rate is likely to apply to the average mid-sized firm in 184 of the 196 country-years in our sample (= 94%). Thus, we believe that this source of measurement error is unlikely to materially affect our findings.

[15] To facilitate interpretation, we additionally demean *Tax Rate* before conducting the regression analysis. As a result, the coefficient on *Tax Rate* (*Tax Complexity*) reflects its association with investment holding tax complexity (the tax rate) at the sample mean. In Table OA-8, we show that our primary results are robust to using

variable of interest is the interaction of *Tax Rate* and *Tax Complexity*. If tax system complexity attenuates the sensitivity of investment to tax rate changes, we expect the coefficient on this variable to be positive.[16] As noted above, a key part of our research design is that it exploits the staggered announcement of tax rate changes, and cross-sectional variation in tax system complexity across countries, to identify the effect of tax system complexity on the sensitivity of investment to the tax rate. Our identifying assumption is that the timing of tax rate changes is unlikely to be consistently correlated with changes to specific country-level institutions, and that the mapping of tax rate changes into investment should be primarily driven by tax system-related characteristics, such as tax system complexity, as opposed to other country-level institutions.[17]

However, a potential concern in our setting is that our tax rate measure and the proxy for tax system complexity are correlated with local economic conditions and other country-level institutions that could also affect firm-level investment. We take several steps in our baseline design to mitigate this concern. First, we include firm fixed effects in each specification. Since our firms do not change country location, these fixed effects account for time-invariant country-level factors.[18] Moreover, with firm fixed effects, our research design leverages variation in tax rates within countries over time (i.e., tax rate changes), consistent with the conceptual framework outlined in section 2. Second, we include several country-level time-varying variables to account for local economic conditions: the natural logarithm of GDP per capita (*GDP per Capita*), GDP growth (*GDP Growth*), inflation rate (*Inflation*), and unemployment rate (*Unemployment*). We

(i) decile-ranked values, (ii) demeaned values, and (iii) raw values of *Tax Complexity*.

16 Although we include *Tax Complexity* as a standalone variable in our regressions, we do not focus on its coefficient because (i) our tax system complexity measure does not exhibit substantial variation within countries over time and (ii) we include firm fixed effects in our models. Thus, the coefficient on *Tax Complexity* may be identified from only a few changes in the tax complexity measure during our sample period.

17 That said, we examine the robustness of our findings to accounting for other country-level institutions, including other tax system characteristics, and how they affect the mapping of the tax rate into investment, in section 4.3.2.

18 These fixed effects also account for time-invariant factors at the consolidated group level, for firms that are part of larger corporate groups. Our results are unchanged when replacing firm with group fixed effects.

measure these control variables in year *t* (Jacob and Zerwer 2023).

We also include several firm-level time-varying controls that can explain investment outcomes (Badertscher, Shroff, and White 2013; Shroff, Verdi, and Yu 2014; Shroff 2017; Fox et al. 2022). Specifically, we control for debt financing (*Leverage*), profitability (*RoA*), firm size (*Size*), cash holdings (*Cash*), and capital intensity (*Capital Intensity*).[19] We measure these control variables in year *t-1*. Additionally, we include industry × year fixed effects, where industry is defined at the two-digit NACE level, to account for global sector-level supply or demand shocks that could impact firm-level investment. We winsorize continuous variables at the 1st and 99th percentiles. We cluster standard errors at the country-industry level.[20]

3.3. Data sources and sample

We obtain firm-level ownership and financial statement data from Bureau van Dijk's Orbis database (sample period: 2012-2019). As noted in section 3.1, we obtain data for our measure of tax system complexity from the World Bank's Doing Business Survey. Data for country level control variables come from World Bank's World Development Indicators.

Table 1 describes our sample selection process. We begin with all active corporations located in an OECD, EU, or EFTA country and that file unconsolidated (i.e., entity-level) financial statements. We require non-missing data on sales, profit before tax, and tangible fixed assets as well as non-missing ownership information.[21] Consistent with prior research (e.g., Badertscher et al. 2013), we exclude financial firms and utilities due to distinct investment patterns in these

[19] In untabulated tests, we find that our results are robust to including annual sales growth as an additional control for firm-level growth opportunities. We do not include this control in our main analyses because doing so results in losing an additional sample year.

[20] Industry is defined at NACE Level 1 (i.e., the primary sector level). We do not cluster at the country level as there are only 28 countries in our main analyses, and fewer in certain robustness tests, which raises the concern that standard errors may be biased due to too few clusters (Petersen 2009).

[21] One limitation of the version of Orbis we use is that we have static ownership information, reflecting ownership status at the end of our sample period.

industries. To avoid denominator effects, we require firms to have total assets of at least €50,000 and fixed assets of at least €5,000 (Jacob and Zerwer 2023). Moreover, we drop firms with negative sales, negative cash holdings, and data insufficient to compute our regression variables. Finally, we require firms to have an uninterrupted time series of data. These steps yield a sample of 2,920,127 firm-year observations, representing 417,161 unique firms. Because we lag firm-level controls in equation 1 by one year, our final sample effectively covers the years 2013 to 2019.

Table 2 provides descriptive statistics. The mean of *Capital Investment* is 0.988, consistent with prior studies using Orbis data (De Simone and Olbert 2022). The average value for *Tax Complexity*, which captures the time (in hours) per year that the standard medium-sized firm would take to comply with its taxes according to the World Bank's Doing Business survey, is 211 in our sample. In Table 3, we provide several country-level statistics: the *Tax Rate* per country and year, the number of firm-year observations for each country, and mean *Tax Complexity* across our sample period. In terms of coverage, our final sample includes observations from 28 countries.[22] We observe the largest number of firm-year observations for Italy, France, and Spain.[23]

4. Main results

4.1. Tax system complexity and the sensitivity of investment to the tax rate

We present the results from estimating equation 1 in Table 4. We first estimate a version

[22] Since we require firms to file unconsolidated financial statements, our sample does not include countries without such a reporting requirement (e.g., the U.S.). Furthermore, firms from the UK lack data on sales (our proxy for *Size*, following Jacob and Zerwer (2023)) and thus we do not include them in our sample.

[23] Variation in the number of observations across countries comes, in part, from variation across EU countries in the size thresholds for when firms have to report both a balance sheet and a profit and loss statement as well as the extent of required disclosures (Bernard, Burgstahler, and Kaya 2018; Beuselinck, Elfers, Gassen, and Pierk 2023). Regarding the three countries with the largest sample representation (Italy, France, and Spain), we note that each of them announced changes in tax rates and experienced changes in tax system complexity during our sample period. Italy announced a tax rate cut in 2015 and experienced changes in tax system complexity in 2017 and 2018; France announced a tax rate cut in 2017 and experienced changes in tax system complexity in 2014 and 2017; and Spain announced a tax rate cut in 2015 and experienced changes in tax system complexity in 2016, 2017, and 2019. In Table OA-7 in the Online Appendix, we find that our inferences are robust to excluding these three countries from our sample.

of equation 1 that includes *Tax Rate* as the only country-level tax system measure, which we report in column 1. We find a negative and statistically significant coefficient on *Tax Rate*, consistent with prior research that shows that firm-level investment is decreasing in the statutory corporate tax rate. In terms of economic magnitudes, the coefficient in column 1 implies a partial elasticity of capital investment to the tax rate of -5.3.[24] This semi-elasticity is in upper end of the range of estimates discussed in Egger, Erhardt, and Keuschnigg (2020).[25] In monetary terms, a one percentage point increase in the statutory tax rate is associated with €10,019 less in investment (mean total assets of €19,266,620 × 0.00052—the coefficient times the percentage point change).

One possible concern with these findings is that other factors, such as local economic conditions, could be driving both current firm-level investment and changes to the tax system. Our main specification includes a vector of country-level time-varying control variables and firm fixed effects to address this concern. To further mitigate this possibility, we conduct a falsification test in which we include as additional independent variables the announced corporate tax rates in years *t+1* and *t+2*. The idea behind this test is that if omitted variables are driving both contemporaneous investment and future announced tax rate changes, these future tax rates will exhibit statistically significant coefficients (Jacob, Müller, and Wulff 2022). We report the coefficients (along with their confidence intervals) in Figure 1. We continue to find that investment responds to the announced tax rate as of year *t*, and we do not find that investment is sensitive to the announced tax rate in years *t+1* or *t+2*. Overall, we interpret these results as further mitigating alternative

[24] The coefficient of -0.052 on *Tax Rate* in column 1 suggests that for a one percentage point increase in the tax rate, investment decreases by 0.052 percentage points. Mean investment equals 0.988 percent of total assets; thus, when evaluated at the mean, we arrive at an investment response of -0.052/0.988 = -5.3.

[25] One reason for the relatively high semi-elasticity is the small mean of *Capital Investment*, which is common for studies using Orbis data and calculating investment based on the annual changed in tangible fixed assets (De Simone and Olbert 2022). When adjusting investment for the annual depreciation expense (*Capital Investment Gross*), we obtain a semi-elasticity of capital investment to the tax rate of -1.1, which is similar to prior estimates for investment responses at the intensive margin (Mooij and Ederveen 2008; Jungmann and Loretz 2019).

explanations for our findings and providing credibility for our baseline design.

In column 2, we re-estimate this regression including *Tax Complexity* and its interaction with *Tax Rate*. The coefficient on *Tax Rate* × *Tax Complexity* is positive and significant ($p < 0.05$), indicating that tax complexity attenuates the sensitivity of investment to the tax rate.[26] In economic terms, the estimate on *Tax Rate* × *Tax Complexity* in column 2 suggests that a one standard deviation increase in tax system complexity (measured within firm fixed effects, following Breuer and deHaan (2024)) reduces the sensitivity of investment to the tax rate by 7.97 percent.[27] Put differently, our results suggest that tax system complexity can undermine the ability of tax rate changes to affect investment.

4.2. Stacked difference-in-differences design

The specification in Table 4 is effectively a staggered difference-in-differences design. Recent research suggests that this methodology can lead to erroneous inferences (Barrios 2021; Baker et al. 2022). To address this issue, and to provide further confidence in our findings, we implement a stacked cohort design in which we compare the change in investment in countries that implement a tax rate change to a sample of control countries that do not change their tax rate, and in particular whether this investment change varies with the extent of the country's tax system complexity. An additional benefit of this approach is that it closely mirrors the conceptual framework in section 2, which is based on changes in the tax rate.

To implement this approach, we begin by identifying instances in which sample countries

[26] We also document a negative and statistically significant coefficient on *Tax Complexity*, consistent with tax system complexity being associated with lower investment. However, we encourage a cautious interpretation of this finding because, as discussed in section 3.1 and in footnote 16, *Tax Complexity* does not exhibit much variation within a country over time. Since our regressions include firm fixed effects, and firms do not change country location, this coefficient is effectively identified from only a few large changes during our sample period.

[27] 0.033 (coefficient on *Tax Rate* × *Tax Complexity* from Table 4, column 2) / -0.058 (coefficient on *Tax Rate* from Table 4, column 2) * 13.98 percent (within firm fixed effect standard deviation as a percentage of the pooled sample standard deviation from Table 2).

announce a corporate tax rate change (i.e., increase or decrease), and there is no other announced tax rate change within the three years prior to and after. In our main sample, we identify nine such instances and where we have data for three years pre- and post-reform: Hungary in 2016, Slovakia in 2016, Slovenia in 2016, Belgium in 2016, Greece in 2016, Croatia in 2016, France in 2016, Latvia in 2017, and South Korea in 2017.[28] These countries represent our treated sample. For our control sample, we employ countries without a change in the corporate tax rate during our sample period (2013-2019) and the two years prior to the start of our sample (2011 and 2012).[29]

For each tax rate change event, we define a cohort with treatment observations and control observations for the three years before and the three years after the announcement. *Treat* is an indicator variable equal to one for the tax rate change countries and zero otherwise, and *Post* is an indicator variable for whether year *t* is after the announcement for both the treated and control observations, and zero otherwise. The dependent variable is *Capital Investment*, as above. Since we use both tax rate increases and decreases, we multiply the dependent variable by negative one in instances of a tax rate increase so that *Treat* can be interpreted as a tax rate decrease. We then re-estimate a modified version of equation 1 where we include *Treat*, *Post*, and their interaction, as well as the full set of control variables. We include cohort-specific firm and cohort-specific industry × year fixed effects. We entropy balance treatment and control observations for each

[28] As a result of the Government Debt Crisis, Greece enacted several tax-related changes during our sample period. For instance, the Greek government announced and enacted a uniform corporate tax rate of 29% in June 2016 (Laws 4387/2016 and 4389/2016; see Ecovis (2016)), which we use as a treatment event. Yet, an emergency package announced and enacted in July 2015 had increased the tax rate for some firms (Law 4334/2015) without specifying the affected accounting periods (PWC 2015). To maximize the number of treatment events, we include Greece as a treatment event in our primary sample but find that our inferences are robust to excluding it in Figures OA-4 and OA-5 and Table OA-2 in the Online Appendix.

[29] One exception is that we omit Poland from our control sample for our main tests. While Poland did not experience a tax rate change during our sample period, it underwent a substantial restructuring of the role of government in its economy, in a way that likely affected private sector investment. For example, the 2015 governmental elections brought a change in government with the new government putting a stronger emphasize on the renationalization of business (Sieradzki 2016; Wysocki, Wojcik, and Freytag 2024), negatively affecting corporate investment (Gadomski 2018). Thus, Poland is not an ideal control country. That said, we find that our inferences are robust to including Poland as a control group in Figures OA-6 and OA-7 and Table OA-3 in the Online Appendix.

treatment event using the three-year pre-treatment averages of the firm-level control variables.[30]

We report the results in column 1 of Table 5. Consistent with our findings in Table 4, we find that firm-level investment increases after a tax rate reduction (or declines, in the case of a tax rate increase). In column 2, we further refine this analysis by excluding instances in which the enacted tax rate change was small (i.e., one percentage point or less; this excludes Slovakia) and continue to find similar results.[31]

The ability to interpret these findings as a treatment effect depends on the assumption of treatment and control observations exhibiting similar trends in the absence of treatment. Since this assumption is inherently untestable, we follow prior research by examining the treatment dynamics around the tax rate change event. We re-estimate the regression after replacing *Post* with indicator variables for each year within our sample window and interacting these variables with *Treatment*. We plot the coefficients along with their confidence intervals in Figure 2. We find that the trend in capital investment is stable in years *t-3* through *t-1*, supporting the parallel trends assumption. We find a sharp increase in investment in year *t*, consistent with firm investment responding to announced tax rate changes. We interpret these findings as being broadly consistent with tax rate changes affecting investment.

Next, we test whether the treatment effect varies with country-level tax system complexity. Specifically, we define *LowTaxComplexity* (*HighTaxComplexity*) as an indicator variable equal to one for treatment countries with tax complexity below the median (above the median) in the year prior to the treatment event, and zero otherwise, and re-estimate the models after interacting these

[30] The purpose of the entropy balancing is to reduce pre-treatment differences between treatment and control firms that could impact post-treatment differences in investment. We find similar inferences even if we do not employ entropy balancing (see Figures OA-2 and OA-3 and Table OA-1 in the Online Appendix).

[31] In untabulated tests, we find similar results when using gross investment the dependent variable, mitigating concerns that intertemporal earnings management by accelerating depreciation around tax rate cuts drives our findings (Eichfelder, Jacob, Kalbitz, and Wentland 2023).

variables with *Post*. We report the findings in columns 3 and 4 of Table 5. The coefficient on *Treat (LowTaxComplexity)* × *Post* is positive and statistically significant in both columns, suggesting that tax rate changes are associated with increased investment when treatment country tax system complexity is below the median. In contrast, while the coefficient on *Treat (HighTaxComplexity)* × *Post* is positive, it is not statistically significant at conventional levels. Furthermore, the two coefficients are statistically different from one another, suggesting that investment is less sensitive to tax rate changes when the treatment country has greater tax system complexity. In Figure 3, we show that the pre-treatment trends in investment are similar between treatment and control firms in both low and high tax system complexity groups. However, the increase in investment after the tax rate change is only observable for treatment countries with low tax complexity. Overall, the findings from Table 5 and Figures 2 and 3 suggest that tax system complexity attenuates the responsiveness of investment to tax rate changes, corroborating our primary tests.

4.3. Robustness tests

4.3.1. Alternative tax system complexity measures

An advantage of our primary tax complexity measure is that it reflects an intuitive approach to the tax complexity construct by using the time to pay tax in hours per year, which is available for, and comparable across, a large sample of countries. That said, as noted in section 3.1, there are some limitations to this measure. Therefore, we examine the robustness of our primary results (Table 4) to using two alternative measures of tax complexity: *Frequency of Paying Taxes* and *Tax Complexity Index*. *Frequency of Paying Taxes* is the total number of times that a firm must remit taxes and contributions per year as reported by World Bank. We expect that having to remit taxes more frequently makes complying with the tax system more complex. *Tax Complexity Index* is a survey-based measure of tax system complexity developed by Hoppe et al. (2023), aimed at

capturing tax system complexity from the perspective of multinational firms.[32] We report the results using these alternative tax system complexity measures in columns 1 and 2 of Table 6. The coefficients on *Tax Rate* × *Tax Complexity* remain positive and significant, suggesting that our primary findings are not solely attributable to our main measure of tax system complexity.

4.3.2. Controlling for country-level institutions

As noted in sections 3.1 and 3.2, a potential concern with our baseline design is that corporate tax system complexity may be correlated with other country institutions such that those factors, rather than tax system complexity, drive our results. We take several steps to mitigate this concern in our baseline design, such as exploiting the staggered implementation of tax rate changes across countries and the inclusion of firm fixed effects (which absorb time-invariant country-level factors) and time-varying country-level control variables. In our next set of analyses, we directly control for the possibility that other country-level institutional factors could affect the sensitivity of investment to tax rate changes.

First, we obtain data on two key country-level institutional factors from World Bank's Worldwide Governance Indicators (WGI): *Government Effectiveness* and *Political Stability*. *Government Effectiveness* (*Political Stability*) reflects estimated government effectiveness (political stability) for country *c* in year *t*. Both country attributes are likely negatively correlated with tax system complexity and associated with firm investment in a given country. We re-estimate equation 1 after including deciles ranks of these variables, one at a time, along with their interaction with *Tax Rate*.[33] We report the results in columns 3 and 4 of Table 6. In each specification, we

[32] The Hoppe et al. (2023) tax complexity index covers only a few specific years (2016, 2018, and 2020). For our robustness test, we backfill missing values to retain our initial sample period. This approach assumes that tax system complexity is relatively stable within a country over our sample period.

[33] We include the variables one at a time, rather than together, because they are highly correlated (Pearson correlation coefficient of 0.46). Moreover, using decile ranks allows us to rank-order countries on these characteristics and is less sensitive to outliers. In untabulated tests, we find similar inferences if we instead (i) use non-decile ranked but standardized versions of these country-level institutional factors or (ii) control for high and

continue to find a positive coefficient on *Tax Rate* × *Tax Complexity*, suggesting our main findings are robust to allowing the sensitivity of investment to the tax rate to also vary with these factors.

Next, we examine whether our tax complexity findings are driven by uncertainty over tax policy. Prior research finds that tax policy uncertainty is associated with lower investment, and in particular a lower investment response to first-moment policies such as tax rate changes (Gallemore et al. 2022). If a more complex tax system is associated with more frequent tax policy changes, and thus greater tax policy uncertainty, then our primary findings could reflect the dampening effect of tax policy uncertainty on the investment response to tax rate changes. To address this alternative explanation, we conduct a robustness test in which we account for country-level tax policy uncertainty using data from Hassan et al. (2019). Because the data are only available for publicly listed firms, we transform their firm-level tax policy uncertainty measure to a country-level measure by calculating the average of the firm-level tax policy risk for each country-year. We then re-estimate equation 1 after including this measure (again decile ranked) and its interaction with *Tax Rate*. We report the results in column 5 of Table 6; we continue to find a positive and significant coefficient on *Tax Rate* × *Tax Complexity*. These results corroborate the robustness of our main findings and suggest that the impact of tax complexity on the sensitivity of investment to tax rate changes is distinct from uncertainty over future tax policy.

Finally, we test whether our findings are confounded by the impact of tax enforcement. Weaker tax enforcement likely means that the statutory tax rate is not the relevant tax rate that firms use when making investment decisions. Thus, in the presence of weaker tax enforcement, the sensitivity of investment to tax rate changes could be lower. If greater tax complexity is associated with weaker tax enforcement, it could be tax enforcement, not tax system complexity,

low government effectiveness and political stability, respectively, following our approach to controlling for tax enforcement in columns 6 and 7 of Table 6.

that drives our main findings.[34] To examine the robustness of our inferences to accounting for country-level tax enforcement, we collect data from the 2015 OECD Tax Administration Survey, which provides information until 2013. Specifically, we collect the value of completed verification actions for all taxpayers in 2013, which is the first year of our sample, and divide it by net revenue collections for all taxes administered by revenue bodies. We use this variable to approximate the total tax base audited in country *c*.[35] Using this measure, we construct two variables: *Weak* (*Strong*) *Tax Enforcement* is an indicator variable equal to one for *Tax Enforcement* in the bottom (top) sample quartile, and zero otherwise. We then re-estimate equation 1, additionally including these two control variables (one at a time) and their interaction with *Tax Rate*. We report these findings in columns 6 and 7 of Table 6. In both specifications, we continue to find a positive and significant coefficient on *Tax Rate* × *Tax Complexity*, mitigating concerns that differential levels of tax enforcement are fully responsible for our results.

4.3.3. Other robustness tests

In section C.3 in the Online Appendix, we present several additional robustness tests. First, we estimate a first differenced version of equation 1 (with the exception of *Tax Complexity*, which we still include in its levels form). Second, we use alternative measures for capital investment as the dependent variable. Third, we use the corporate tax rate effective in year *t* instead of the announced tax rate. Fourth, we apply alternative sample criteria and drop observations (i) from Italy, Spain, and France, which are the three largest contributors to our sample, (ii) from Bulgaria, which is somewhat of an outlier in tax system complexity (see Figure OA-1), (iii) from countries

[34] Using data for 2013 (the year for which we have tax enforcement data), we find a pairwise Pearson (Spearman) correlation of 0.11 (0.17) for *Tax Enforcement* and *Tax Complexity*, suggesting that tax complexity and tax enforcement are likely related, but distinct, tax system features.

[35] Ideally, we would develop a country-year-level measure of tax enforcement. Unfortunately, these data are only available as of 2013. Since our primary tax complexity measure is also relatively stable within a country over our sample period, using a time-invariant measure should still help mitigate this alternative explanation.

that have either a progressive corporate tax system or offer reduced corporate tax rates for certain types of firms, as these observations may not be subject to the top statutory tax rate, and (iv) in the bottom and top size quartile within each country-year, as these observations may experience tax system complexity differently than the average mid-sized firm. Fifth, we employ alternative standard error clustering strategies. In each of these tests, we generally find that tax system complexity attenuates the sensitivity of investment to tax rate changes.

5. Additional Analyses

5.1. Cross-sectional tests

We next conduct several cross-sectional tests to examine the mechanisms through which tax system complexity affects the sensitivity of investment to tax rate changes. Specifically, we focus on the role of firm-level resources for and experience with navigating tax systems. On the one hand, we expect that greater resources (e.g., internal information systems, consultants, and accounting firms) and experience dealing with different tax systems should improve the firm's ability to effectively identify and fulfill applicable tax requirements, prepare for potential tax audits, and comply with actual tax audits, reducing uncertainty related to the ultimate tax burden (e.g., Gallemore and Labro 2015). Furthermore, firms with greater resources and experience likely have the systems and personnel already in place that allow them to document transactions more efficiently for tax purposes, lowering tax compliance costs associated with additional investment (e.g., Zwick 2021). As discussed above, we expect that tax-complexity induced uncertainty and compliance costs should attenuate the responsiveness of investment to tax rate changes. To the degree tax system complexity shapes investment responses through uncertainty and compliance costs, we should find that the dampening effect of tax system complexity on the sensitivity of investment to tax rate changes is less pronounced for firms with greater resources and experience

dealing with different tax systems.

On the other hand, such firms are likely more effective at identifying and exploiting loopholes to lower the effective tax burden. Along these lines, prior research finds that firms with greater internal resources (e.g., internal tax-related human capital, information systems) or access to external resources (e.g., accounting firms, financial institutions, lawyers) are associated with more tax planning (Mills, Erickson, and Maydew 1998; Rego 2003; McGuire, Omer, and Wang 2012; Gallemore and Labro 2015; Gallemore, Gipper, and Maydew 2019; Acito and Nessa 2022; Barrios and Gallemore 2023). To the extent that tax system complexity enables firms to engage in greater tax planning, it should lead to a greater deviation between the statutory tax rate and the effective tax rate, meaning that tax rate changes will have less of an effect on investment decisions. Thus, if greater tax planning opportunities are the primary mechanism through which tax system complexity affects how tax rates shape investment, we should find that the attenuating effect of tax system complexity on the responsiveness of investment to tax rate changes is more pronounced for firms with greater resources and experience dealing with different tax systems.[36]

We employ three different approaches to identify firms with greater resources for and experience dealing with different tax systems. First, we differentiate between multinational (MNC)-owned firms and domestically owned firms. MNCs, by definition, operate in more than one tax jurisdiction, and thus should have more experience and resources. For example, they may have greater capabilities in dealing with tax audits, reducing the uncertainty associated with tax system complexity, or better information systems, mitigating tax-complexity induced compliance costs. Further, their presence in and experience with different tax jurisdictions could allow them to exploit complex tax systems via tax planning. In contrast, domestic firms are less likely to have

[36] In Section B of the Online Appendix, we illustrate these predictions using the stylized numerical example framework developed in section 2.3 and in Appendix A.

the scale and prior investments in tax compliance and tax planning. We also examine (i) public versus private firms and (ii) large versus small firms. Prior research suggests that large firms are more likely to have internal tax resources, such as tax departments (Barrios and Gallemore 2022; Belnap, Hoopes, and Wilde 2023). Further, public firms and large firms are likely to be better able to access external tax resources, such as financial institutions, consultants, and accounting firms, which can impact tax planning (McGuire et al. 2012; Klassen, Lisowsky, and Mescall 2016; Gallemore et al. 2019; Acito and Nessa 2022). These resources likely facilitate the ability to exploit tax planning opportunities and mitigate uncertainty and compliance costs associated with tax system complexity. If uncertainty and compliance costs (tax planning opportunities) primarily drive the dampening effect of tax system complexity on firms' investment responses to tax rate changes, we expect the effect to be less (more) pronounced for MNC owned, public, or larger firms relative to domestically owned, privately owned, or smaller firms, respectively.

To conduct these tests, we create three indicator variables: *MNC*, *Public*, and *Large*. First, *MNC* equals one if the firm is multinational-owned and zero otherwise. We define a firm as being MNC owned if its shareholder is located in a different country. If a firm is not clearly owned by a foreign shareholder, we assume that is domestically owned. Moreover, we limit domestically owned firms to those that have no subsidiaries to rule out that the firm itself can be the parent of a multinational group. Second, we define *Public* as equal to one if firm *i* has a publicly traded owner, and zero otherwise.[37] Finally, *Large* is equal to one if the firm is in the top sample quartile for sales, and zero otherwise. For each of these partitioning variables (*MNC*, *Public*, and *Large*), we

[37] A limitation of our Orbis data is that we have static ownership information, reflecting ownership status at the end of our sample period. As a result, *MNC* and *Public* do not vary over time at the firm level. Furthermore, we note that *MNC* (*Public*) could be measured with error to the degree we incorrectly classify a firm as having a foreign (publicly traded) owner even if this were only the case towards the end of our sample period (i.e., the firm was acquired by a MNC or a publicly traded firm at the end of the sample period). If so, we expect this measurement error to bias against finding differences in the impact of tax system complexity on firms' investment responses to tax rate changes across these firm types.

re-estimate equation 1 and include the interactions of the partitioning variable with *Tax Rate*, *Tax Complexity*, and *Tax Rate* × *Tax Complexity*. We report these findings in Table 7. Column 1 (2) examines the cross-sectional tests related to MNC (public firms). We employ two tests regarding large firms: column 3 employs the full sample; column 4 employs a sample of only domestic firms. The approach in column 4 aims to isolate the impact of size distinct from multinational ownership, since the large firms in column 3 may be more likely to be multinational owned.

Across each of these tests, we find that the coefficients on *Tax Rate* are negative and significant, and that the coefficients on *Tax Rate* × *Tax Complexity* are positive and significant, consistent with our main findings. More importantly, we find that the coefficients on the interaction of the partitioning variable and *Tax Rate* × *Tax Complexity* are negative and significant for each test. Additionally, in columns 2 and 3, a joint test of the coefficients on *Tax Rate* × *Tax Complexity* and its interaction with the partitioning variable indicates that their sum is statistically indistinguishable from zero. Collectively, these results suggest that tax system complexity has a less pronounced effect on the sensitivity of investment to tax rate changes for MNC owned firms, public firms, and large firms, relative to domestic owned firms, private firms, and small firms, respectively.[38] These findings are broadly consistent with uncertainty and compliance costs, not tax planning opportunities, being the primary mechanisms responsible for the attenuating effect of tax system complexity on the sensitivity of investment to tax rate changes.[39] These findings also suggest that a consequence of tax system complexity is heterogeneous tax policy responses,

[38] The similarity between the results in columns 1-4 of Table 7 is unlikely to be driven by substantial overlap between the three cross-sectional sorting variables. For example, in our sample, we document that the Pearson correlation between *MNC* and *Public* is 0.25, between *MNC* and *Large* is 0.26, and between *Public* and *Large* is 0.26. Thus, these three variables appear to capture different types of firms.

[39] That said, we document a negative and statistically significant coefficient on *Tax Complexity* × *MNC*, suggesting that MNC owned firms tend to invest less on average in countries with higher tax complexity. However, as noted in section 3.1 and footnote 16, we suggest a cautious interpretation of this finding, given that we include firm fixed effects and *Tax Complexity* does not exhibit much variation within a country over time.

meaning that fiscal policy changes applied to all firms can lead to "winners" and "losers" in the cross-section, potentially undermining tax system parity.

5.2. Country-level ETRs

Next, we examine the sensitivity of our primary results to using measures for the country-level effective tax rate (ETR) instead of the statutory tax rate. In contrast to changes to the statutory tax rate, changes in the ETR can jointly capture the impact of multiple changes in tax policy—including changes in the tax rate, changes to the tax base, and changes to tax policies that affect the average amount of tax planning in the country—on the firm's tax burden. Thus, ETRs can more holistically capture changes to these different aspects of tax policy, consistent with prior research suggesting that countries jointly determine tax rates and tax preferences, i.e., adjustments to the tax base (Kawano and Slemrod 2016). We use two measures for the country-level ETR. First, we use the effective average tax rate for country *c* in year *t* (*EATR*) based on the methodology by Devereux and Griffith (1998) and Devereux and Griffith (2003). Second, we employ the country's aggregated cash effective tax rate (*ACETR*) based on the methodology by Shevlin, Shivakumar, and Urcan (2019).

We report these findings in Table 8. Similar to our main findings, we find that the country-level ETR is negatively associated with investment, consistent with higher tax burdens (whether they come from tax rates, tax base changes, or policies that impact tax planning) reducing the after-tax NPV of investment projects. More importantly, we continue to find that tax system complexity attenuates the sensitivity of investment to the ETR, consistent with the findings in Tables 4 and 5. These results have two implications. First, they suggest that tax system complexity can affect the sensitivity of investment to the broader set of tax policies. Second, they further indicate that tax planning is unlikely to be the mechanism underlying our main results because the country-level

ETR captures policies that shape average tax planning within a country-year. Put differently, in our setting, tax planning (within a country) does not appear to overcome tax-complexity induced investment frictions stemming from tax compliance costs and uncertainty.

5.3. Labor investment

Our primary analyses employ measures of capital (i.e., physical) investment, consistent with the applicability of our theory to capital investment decisions. A priori, it is unclear that our theory extends to labor investment. As noted by Lester and Olbert (2024), employment expenses are usually fully tax deductible when incurred and thus labor investment should not be sensitive to the tax rate. However, capital and labor can be complementary production factors (e.g., if a firm needs additional workers to run a newly-acquired machine) and may therefore be similarly affected by tax policy and tax system complexity (Curtis et al. 2021). Moreover, the shift in some countries to a greater service economy is likely to increase the relevance of labor as a production factor. In Table 9, we replace *Capital Investment* with *Labor Investment*, which is the year-over-year change in total wages, scaled by lagged total wages (De Simone and Olbert 2022) and captures investment in human capital. We document that (i) tax rates are negatively associated with labor investment and (ii) tax system complexity attenuates this association, consistent with our primary findings using capital investment. Thus, our inferences appear to extend to labor investment.[40]

6. Conclusion

We examine the consequences of tax system complexity on firm investment. Using an international sample of firms and measuring tax system complexity using the time the average firm spends to comply with and pay their taxes, we document two main results. First, we show that tax

[40] One potential issue with these tests is that total wages may not capture the total labor costs if some of these costs are instead included in cost-of-goods sold. In Section C.3.6 in the Online Appendix, we present two additional robustness tests, which suggest that this source of measurement error is unlikely to affect these inferences.

system complexity dampens the negative association between corporate tax rates and investment. Second, we find that the effect of tax system complexity on the sensitivity of investment to tax rate changes exhibits firm-level heterogeneity, with domestically owned, private, and smaller firms (multinational-owned, public, and larger firms) being more (less) affected by such complexity. These results are consistent with uncertainty and compliance costs being the mechanisms responsible for the attenuating effect of tax system complexity on the investment responsiveness to tax rate changes.

Our findings collectively indicate that tax system complexity reduces the sensitivity of investment to tax rate changes, suggesting that such complexity can compromise the ability of policymakers to use fiscal policy to affect investment. Furthermore, finding that certain firms are better able to mitigate the impacts of tax system complexity suggests such complexity potentially leads to heterogenous tax policy responses and creates "winners" and "losers" in the cross-section of firms. While some level of tax system complexity is likely desirable to achieve balance among various policy objectives, our findings point to a clear trade-off for policymakers to consider.

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Appendix A: Stylized examples

In this appendix, we provide several stylized numerical examples, each of which highlights one of the three theoretical mechanisms through which tax system complexity can affect the sensitivity of investment to tax rate changes. These mechanisms are discussed in section 2.1. We also discuss whether our inferences concerning tax rate changes extend to tax base policies (e.g., tax credits).

A.1. Changes to the corporate tax rate

Investment option assumptions

We make the following assumptions regarding the investment options each firm faces:

- There are three investment options, and the firm can implement any combination of them (i.e., all three or none)
- The three investment options (i.e., projects) vary in terms of their expected revenues (capturing the idea that there are diminishing marginal returns on investment) but have the same recurring annual non-tax costs. (See the table below for the specific assumptions we make about revenues and costs.)
- Each investment costs $50 in upfront costs and has an investment horizon of 5 years. Thus, for tax purposes, the asset is depreciated over 5 years.
- The discount rate is 15%
- The firm's objective is to maximize the present value of net cash flows (NPV). Thus, the firm will implement any investment for which the NPV (after considering all operating, financing, and tax costs) is positive.

Project assumptions	**Project 1**	**Project 2**	**Project 3**
Revenues	65	60	62.5
Non-tax costs (annual)	45	45	45

Country-level assumptions

There are two countries. Both countries currently have a statutory tax rate of 20% and are considering a cut in the statutory tax rate of 5%. That is, these two countries do not vary in the extent of the tax rate change they are considering.

Where the countries do vary is in their tax system complexity—we label one country as having low tax system complexity and the other as having high tax system complexity. Furthermore, we assume that tax system complexity affects investments through three theoretical mechanisms—tax compliance costs, tax uncertainty, and tax planning—described in section 2.2.

We make the following assumptions regarding how each mechanism can affect the returns to investment and thus the firm's decision to invest in each project:

- **Tax compliance costs**: The firm incurs additional tax compliance costs if it goes forward with the investment. Here, we assume that tax compliance costs are 20% lower for the low complexity country vis-à-vis the high complexity country (i.e., 3.2% of investment instead of 4% of investment) such that tax compliance costs equal $1.6 ($2) per year for the low (high) tax complexity country. Our example assumes that as investment increases, the tax compliance costs increase (i.e., compliance costs are variable in the amount of investment)

because the firm only incurs the costs if it makes the investment, for the reasons discussed in section 2.2.

- **Tax uncertainty**: Tax uncertainty induced by tax system complexity leads to an increase in the firm's discount rate because there is more uncertainty over the firm's ultimate tax burden. We assume that in the high (low) tax system complexity country, tax uncertainty leads to an increase in the discount rate of 1.5 (0) percentage points.[41]
- **Tax planning**: Tax system complexity enables the firm to engage in tax planning, reducing its ETR to be below the statutory tax rate. We model tax-complexity induced tax planning opportunities as a function of the statutory tax rate, which reflects that the benefit from tax planning is likely to be lower (higher) when the statutory tax rate is lower (higher). Specifically, we assume that the firm in the high (low) tax complexity country can obtain an ETR that is 25% (12.5%) lower than the statutory tax rate.

These assumptions are summarized in the following table:

	Low tax complexity	High tax complexity
Tax compliance: annual costs	$1.6 (3.2% of investment)	$2 (4.0% of investment)
Tax uncertainty: increase in discount rate	0	0.015
Tax planning: reduction in STR in %	12.5%	25%

Next, we walk through how the statutory tax rate cut affects the firm's investment decisions in the low tax complexity country. We then conduct the same analysis for the high tax complexity country, examining each theoretical mechanism—tax compliance costs, tax uncertainty, and tax planning—in isolation to better highlight its role.

Investment decisions in the low tax complexity country

In the low tax country, the firm faces lower additional tax compliance costs associated with the marginal investment. Furthermore, there is no tax uncertainty effect in this country. Finally, the firm can only engage in a limited amount of tax planning and reduce its ETR by 12.5% of the statutory tax rate.

	Project 1		Project 2		Project 3	
Tax Rate:	**20%**	**15%**	**20%**	**15%**	**20%**	**15%**
Revenues	$65.00	$65.00	$60.00	$60.00	$62.50	$62.50
Non-tax costs	($45.00)	($45.00)	($45.00)	($45.00)	($45.00)	($45.00)
Tax depreciation	($10.00)	($10.00)	($10.00)	($10.00)	($10.00)	($10.00)
Tax compliance costs	($1.60)	($1.60)	($1.60)	($1.60)	($1.60)	($1.60)
Tax base	$8.40	$8.40	$3.40	$3.40	$5.90	$5.90
Tax payments	($1.47)	($1.10)	($0.60)	($0.45)	($1.03)	($0.77)

[41] One could also consider the possibility that uncertainty increases expected tax payments through penalties. However, this effect would only apply if the firm's tax strategy violates the tax law, which we do not expect applies to most firms. On the other hand, interest on additional tax payments (refunds) related to tax authority disputes would have an expected value of zero, assuming the country charges (refunds) interest on additional (decreased) final tax liabilities.

After-tax cash flows	$16.93	$17.30	$12.81	$12.95	$14.87	$15.13
NPV	$6.75	$7.98	($7.08)	($6.58)	($0.16)	$0.70
Change in decision?	**NO**		**NO**		**YES**	
Difference in NPV	**$1.23**		**$0.50**		**$0.87**	

For the low tax complexity country, we find that when the tax rate is 20%, project 1 (the high revenue project) has a positive NPV, whereas project 2 (the low revenue project) and project 3 (the medium revenue project) do not. Thus, under the 20% tax rate, the firm will invest in project 1, but not projects 2 or 3. However, when the tax rate is cut to 15%, project 3 goes from having a negative NPV to a positive NPV, thereby crossing the investment threshold. Thus, we conclude that the tax rate cut encourages the firm to invest in project 3, while leaving the decisions regarding projects 1 and 2 unchanged. Thus, the tax rate cut leads to an increase in marginal investment.

Investment decisions in the high tax complexity country: the role of tax compliance costs

In this next scenario, everything will be the same as in the low tax complexity country, except for a *compliance costs*-related effect. Specifically, we assume that higher tax complexity forces the firm to incur additional tax compliance costs, which we model as 4% of investment ($2) (the low complexity country has compliance costs that are 20% lower than the high complexity country). With these changes, we can recalculate the project NPVs, which we present in the table below.

	Project 1		Project 2		Project 3	
Tax Rate:	**20%**	**15%**	**20%**	**15%**	**20%**	**15%**
Revenues	$65.00	$65.00	$60.00	$60.00	$62.50	$62.50
Non-tax costs	($45.00)	($45.00)	($45.00)	($45.00)	($45.00)	($45.00)
Tax depreciation	($10.00)	($10.00)	($10.00)	($10.00)	($10.00)	($10.00)
Tax compliance costs	($2.00)	($2.00)	($2.00)	($2.00)	($2.00)	($2.00)
Tax base	$8.00	$8.00	$3.00	$3.00	$5.50	$5.50
Tax payments	($1.40)	($1.05)	($0.53)	($0.39)	($0.96)	($0.72)
After-tax cash flows	$16.60	$16.95	$12.48	$12.61	$14.54	$14.78
NPV	$5.65	$6.82	($8.18)	($7.74)	($1.27)	($0.46)
Change in decision?	**NO**		**NO**		**NO**	
Difference in NPV	**$1.17**		**$0.44**		**$0.81**	

For the high tax complexity country, when the tax rate is 20%, we again find that only project 1 has a positive NPV, whereas projects 2 and 3 do not. So, again, under the 20% tax rate, the firm will invest in project 1, but not in projects 2 or 3.

However, we find that when the high tax complexity country cuts its tax rate to 15%, none of the three projects change in terms of going from negative to positive NPV. For project 3 (the project that goes from negative to positive NPV in the low complexity country), the reason it no longer changes is because the tax rate cut *increases the annual after-tax value of the tax compliance costs*,

and this effect is stronger in the high complexity country where the pre-tax compliance costs are greater. Moreover, greater tax compliance costs shift project NPVs away from investment thresholds, diminishing the extent to which a tax rate change is likely to induce a project to cross the firm's threshold for investment. Thus, in the high complexity country, the cut in the tax rate will not lead to additional marginal investment; the firm will still only invest in project 1, but not projects in 2 and 3.

This example can also illustrate that the change in project NPV associated with the tax rate *change* is *consistently greater in the low tax complexity country*, as is shown in the table below. This pattern suggests that a tax rate change has a stronger impact on the after-tax NPV in a low tax complexity environment. These findings align with the idea that tax complexity induces a friction that can mute the ability of a tax rate change to spur investment in a high tax complexity setting.

	ΔNPV - Low Tax Complexity Country	**ΔNPV - High Tax Complexity Country**	**Diff**	**Diff as % of Low**
Project 1	$1.23	$1.17	($0.06)	-4.76%
Project 2	$0.50	$0.44	($0.06)	-11.76%
Project 3	$0.87	$0.81	($0.06)	-6.78%

Investment decisions in the high tax complexity country: the role of tax uncertainty

In this next scenario, everything will be the same as in the low tax complexity country, except for an *uncertainty*-related effect. Specifically, the discount rate associated with each project will be higher (by 1.5 percentage points), as there is greater uncertainty about the firm's ultimate tax burden. With these changes, we can recalculate the project NPVs, which we present in the table below.

	Project 1		Project 2		Project 3	
Tax Rate:	**20%**	**15%**	**20%**	**15%**	**20%**	**15%**
Revenues	$65.00	$65.00	$60.00	$60.00	$62.50	$62.50
Non-tax costs	($45.00)	($45.00)	($45.00)	($45.00)	($45.00)	($45.00)
Tax depreciation	($10.00)	($10.00)	($10.00)	($10.00)	($10.00)	($10.00)
Tax compliance costs	($1.60)	($1.60)	($1.60)	($1.60)	($1.60)	($1.60)
Tax base	$8.40	$8.40	$3.40	$3.40	$5.90	$5.90
Tax payments	($1.47)	($1.10)	($0.60)	($0.45)	($1.03)	($0.77)
After-tax cash flows	$16.93	$17.30	$12.81	$12.95	$14.87	$15.13
NPV	$4.79	$5.98	($8.56)	($8.08)	($1.88)	($1.05)
Change in decision?	**NO**		**NO**		**NO**	
Difference in NPV	**$1.19**		**$0.48**		**$0.84**	

For the high tax complexity country, when the tax rate is 20%, we again find that only project 1 has a positive NPV, whereas projects 2 and 3 do not. So, again, under the 20% tax rate, the firm will invest in project 1, but not in projects 2 or 3.

In contrast, when the high tax complexity country cuts its tax rate to 15%, none of the three projects change in terms of going from negative to positive NPV. In the specific context of project 3 (the project that goes from negative to positive NPV in the low complexity country), the reason it no longer changes is *because uncertainty increases the discount rate such that the tax rate cut has a weaker positive impact on the NPV in the high complexity country*. Moreover, greater uncertainty shifts project NPVs away from investment thresholds, diminishing the extent to which a tax rate change is likely to induce a project to cross the firm's threshold for investment. Thus, in that country, the cut in the tax rate will not lead to additional marginal investment; the firm will still only invest in project 1, but not in projects 2 and 3.

This example can also illustrate that the *change* in project NPV associated with the tax rate change is *consistently greater in the low tax complexity country*, as is shown in the table below. This pattern suggests that a tax rate change has a stronger impact on the after-tax NPV in a low tax complexity environment. These findings align with the idea that tax complexity induces a friction that can mute the ability of a tax rate change to spur investment in a high tax complexity setting.

	ΔNPV - Low Tax Complexity Country	**ΔNPV - High Tax Complexity Country**	**Diff**	**Diff as % of Low**
Project 1	$1.23	$1.19	($0.04)	-3.45%
Project 2	$0.50	$0.48	($0.02)	-3.45%
Project 3	$0.87	$0.84	($0.03)	-3.45%

Investment decisions in the high tax complexity country: the role of tax planning

In this next scenario, everything will be the same as in the low tax complexity country, except for a *tax planning*-related effect. Specifically, we assume that the firm can engage in additional tax planning in the high tax complexity country, allowing it to lower its ETR by 25 percent relative to the statutory tax rate. With these changes, we can recalculate the project NPVs, which we present in the table below.

	Project 1		Project 2		Project 3	
Tax Rate:	**20%**	**15%**	**20%**	**15%**	**20%**	**15%**
Revenues	$65.00	$65.00	$60.00	$60.00	$62.50	$62.50
Non-tax costs	($45.00)	($45.00)	($45.00)	($45.00)	($45.00)	($45.00)
Tax depreciation	($10.00)	($10.00)	($10.00)	($10.00)	($10.00)	($10.00)
Tax compliance costs	($1.60)	($1.60)	($1.60)	($1.60)	($1.60)	($1.60)
Tax base	$8.40	$8.40	$3.40	$3.40	$5.90	$5.90
Tax payments	($1.26)	($0.95)	($0.51)	($0.38)	($0.89)	($0.66)
After-tax cash flows	$17.14	$17.46	$12.89	$13.02	$15.02	$15.24
NPV	$7.46	$8.51	($6.79)	($6.36)	$0.33	$1.07
Change in decision?	**NO**		**NO**		**NO**	
Difference in NPV	**$1.06**		**$0.43**		**$0.74**	

For the high tax complexity country, when the tax rate is 20%, we find that projects 1 and 3 have a positive NPV, whereas project 2 does not. So, under the 20% tax rate, the firm will invest in projects 1 and 3 but not in project 2.

When the high tax complexity country cuts its statutory tax rate to 15%, none of the three projects change in terms of going from negative to positive NPV. In the specific context of project 3 (the project that does go from negative to positive NPV in the low complexity country), the reason it no longer changes is because in the high tax complexity country, the firm was able to exploit the complexity to lower its effective tax rate such that the project's after-tax NPV was positive even under the 20% tax rate scenario. Thus, *the tax rate cut has a weaker positive impact on the NPV in the high tax complexity country* and does not spur additional marginal investment relative to the low complexity country. Moreover, as evident from the table above, tax planning shifts project NPVs away from investment thresholds (e.g., project 3 in the high tax complexity country has a positive NPV even before the tax rate cut), diminishing the extent to which a tax rate change is likely to induce a project to cross the firm's threshold for investment.

As with the other mechanisms we consider, this example illustrates that the *change* in project NPV associated with the tax rate change is *consistently greater in the low tax complexity country*, as is shown in the table below. This pattern suggests that a tax rate change has a stronger impact on the after-tax NPV in a low tax complexity environment. These findings align with the idea that tax complexity induces a friction that can mute the ability of a tax rate change to spur investment in a high tax complexity setting.

	ΔNPV - Low Tax Complexity Country	**ΔNPV - High Tax Complexity Country**	**Diff**	**Diff as % of Low**
Project 1	$1.23	$1.06	($0.18)	-14.29%
Project 2	$0.50	$0.43	($0.07)	-14.29%
Project 3	$0.87	$0.74	($0.12)	-14.29%

Generalizing the stylized examples

It is obviously true that one could change these assumptions in a way that results in tax system complexity (or even the tax rate change itself) to have no impact on the firm's investment decisions. For example, if revenues were sufficiently high (say $100) for each project, then all projects would have a positive NPV regardless of (i) the tax rate change or (ii) the country's level of tax system complexity. The point of the numerical examples is not to claim that complexity will *always* impact the sensitivity of investment to tax rate changes. Rather, it is to show that, in certain circumstances, tax system complexity can moderate the impact of tax rate changes on investment *at the margin*.

A.2. Changes in tax base policies

To consider whether our inferences apply to other tax policy changes, we extend our stylized examples to illustrate how tax system complexity could influence the responsiveness of investment to three distinct tax base policies: (i) bonus depreciation, (ii) tax credits, and (iii) super deductions. We briefly discuss these three tax base policies here and include a more in-depth discussion, including the stylized numerical examples, in section A of the Online Appendix.

A brief explanation of the three tax policies:

- Bonus depreciation allows a firm to depreciate the asset faster for tax purposes (i.e., to record greater amounts of tax depreciation in earlier years), accelerating the tax deduction of investment costs and reducing the firm's taxable income in earlier years to a greater extent than it would otherwise.
    - Several European countries implemented bonus depreciation schemes during the Covid-19 pandemic, including Germany, the Czech Republic, Finland, and the UK.
- Tax credits reduce, dollar for dollar, the firm's tax liability/payments.
    - Tax credits for capital investment exist in several European countries. For example, Luxembourg offers a 12% tax credit for investment in depreciable tangible. Similarly, during the Covid-19 pandemic, firms in Austria could claim a tax credit of 7% or 14%, depending on the type of asset acquired, for their qualified capital investments.
- Super deductions allow the firm to deduct more than 100 percent of an asset's value through tax depreciation, again allowing the firm to reduce its taxable income, and thus its tax burden.
    - Super deductions are common in Europe. For example, the UK has implemented a temporary super deduction after Covid-19 where firms could deduct a total of 130% of the investment costs for tax purposes. Similarly, in Austria, firms can deduct between 110% and 115% of the investment costs, depending on the type of asset acquired.

Our primary stylized examples illustrate that the low tax complexity setting is associated with a stronger investment response to the change in the tax rate (via tax compliance costs, uncertainty, and tax planning). However, the stylized examples for the three tax base changes show that for a tax base change to have a similar effect, *the benefit of the tax base change must depend on the tax rate*. As we highlight below, this is true for some tax base policies, but not others. Furthermore, our examples highlight that only two mechanisms—uncertainty and tax planning—affect the sensitivity of investment to the tax *base* policies. The compliance cost mechanism does not appear to play a direct role in the tax base policy settings we consider because, unlike tax rate changes, tax base changes do not differentially affect the after-tax value of the compliance costs in the low or the high tax complexity country. That said, tax system complexity under all three mechanisms shifts project NPVs away from investment thresholds, which can diminish the extent to which a tax base change is likely to induce a project to cross the firm's threshold for investment.

One can observe the outlined effects in the case of super deductions. If tax system complexity introduces more uncertainty or an expanded scope for tax planning, then we find that tax system complexity moderates the responsiveness of investment to super deductions. The reason is that additional tax deductions are more valuable the lower the discount rate (i.e., the lower tax-complexity induced uncertainty) and the higher the firm's effective tax rate (i.e., the fewer tax planning opportunities tax complexity provides). However, if tax system complexity introduces greater tax compliance costs, it does not affect the sensitivity of investment to super deductions. The reason is that additional tax deductions as a result of the super deductions do not differentially affect the after-tax compliance costs in the low or the high tax complexity country.

In contrast, for the other tax policies we model—tax credits and bonus depreciation—the impact of tax system complexity is more nuanced. In the case of tax credits, we find that only the uncertainty mechanism moderates the association between investment and tax credits (because the

value of the tax credit decreases in the discount rate); the other two mechanisms (tax compliance costs and tax planning) have no effect because the value of the tax credit does not depend on the effective tax rate. Thus, while the "sign" of the impact of tax system complexity on the investment-tax credit association is clear (in that it is negative), it can only occur via the uncertainty mechanism.

Finally, in the case of bonus depreciation, we find that the impact of tax system complexity on the responsiveness of investment to bonus depreciation depends critically on the way in which the complexity manifests. If tax system complexity manifests in the form of a greater scope for tax planning, then it indeed moderates the sensitivity of investment to bonus depreciation (faster tax depreciation is more valuable the higher the effective tax rate, i.e., the lower tax system complexity). However, if the mechanism is uncertainty, we find the opposite result—i.e., an increase in tax system complexity can actually enhance the responsiveness of investment to bonus depreciation. The reason is that bonus depreciation alters the timing of tax deductions without providing additional tax savings/deductions; the benefit of accelerated tax deductions (i.e., moving tax savings/deductions forward in time) is increasing in the discount rate (i.e., increasing in tax system complexity).

In summary, the extent to which our insights from tax rate changes extend to other tax policies depends on the form of those tax policies—the insights extend to the case of super deductions, and, to a lesser extent, tax credits. However, for bonus depreciation, the impact of tax system complexity is ex ante unclear, and it depends on the form(s) in which the complexity manifests.

Appendix B: Variable definitions

Variable	Description	Data Source
Investment Variables		
Capital Investment	Tangible fixed assets in year *t* less tangible fixed assets in year *t-1*, scaled by lagged total assets and multiplied by 100.	Orbis
Capital Investment Gross	Tangible fixed assets in year *t* less tangible fixed assets in year *t-1* adjusted for depreciation expense in year *t*, scaled by lagged total assets and multiplied by 100.	Orbis
Total Capital Investment	Fixed assets in year *t* less fixed assets in year *t-1*, scaled by lagged total assets and multiplied by 100.	Orbis
Total Capital Investment Gross	Fixed assets in year *t* less fixed assets in year *t-1* adjusted for depreciation expense in year *t*, scaled by lagged total assets and multiplied by 100.	Orbis
Δ *Tangible Fixed Assets*	Natural logarithm of tangible fixed assets in year *t* less the natural logarithm of tangible fixed assets in year *t-1*.	Orbis
Labor Investment	Costs of employees in year *t* less costs of employees in year *t-1*, scaled by lagged costs of employees and multiplied by 100.	Orbis
Tax Rate Variables		
Tax Rate	The corporate tax rate (in %) that was announced or enacted in country *c* in year *t*.	KPMG, News Articles, Government Announcements, Domestic Law,
Tax Rate Effective	The corporate tax rate (in %) that was effective in country *c* in year *t*.	KPMG, News Articles, Government Announcements, Domestic Law
EATR	The effective average tax rate (EATR, in %) calculated for country *c* in year *t* based on the methodology by Devereux and Griffith (1999, 2003).	Spengel et al. (2020)
ACETR	The aggregated cash effective tax rate (ACETR, in %) calculated for country *c* in year *t* based on the methodology by Shevlin et al. (2019)	Shevlin et al. (2019)
Tax Complexity Variables		
Tax Complexity	Time to pay tax (in hours per year) for country *c* in year *t*.	World Bank
Frequency of Paying Taxes	Total number of taxes and contributions paid per year for country *c* in year *t*.	World Bank
Tax Complexity Index	Tax Complexity Index for country *c* in year *t* based on the methodology by Hoppe et al.	Hoppe et al. (2023)

	(2023). We backfill country-years with missing data.	
Partitioning Variables		
Treat	Indicator variable equal to one for countries with an announced change in the corporate tax rate (treatment countries), and zero for countries with no announced change in the corporate tax rate (control countries).	KPMG, News Articles, Government Announcements, Domestic Law
Post	Indicator variable equal to one for the years after the announced change in the corporate tax rate, and zero for the years prior the announced change in the corporate tax rate.	KPMG, News Articles, Government Announcements, Domestic Law
LowTaxComplexity	Indicator variable equal to one for treatment countries with tax complexity below the median prior to the treatment event, and zero otherwise	World Bank
HighTaxComplexity	Indicator variable equal to one for treatment countries with tax complexity above the median prior to the treatment event, and zero otherwise	World Bank
MNC	Indicator variable equal to one if firm *i* has a foreign owner, and zero if firm *i* has a domestic owner and no own subsidiaries.	Orbis
Public	Indicator variable equal to one if firm *i* has an owner that is publicly listed (i.e., public owner), and zero if firm *i* has an unlisted owner (i.e., private owner).	Orbis
Large	First, indicator variable equal to one if firm *i*'s sales are in the top sample quartile, and zero otherwise. Second, indicator variable equal to one if firm *i*'s sales are in the top quartile in the subsample of domestic firms, and zero otherwise.	Orbis
Firm-level Control Variables		
Leverage	Long-term debt in year *t* divided by total assets in year *t* and multiplied by 100.	Orbis
RoA	Net income in year *t* divided by total assets in year *t* and multiplied by 100.	Orbis
Size	Natural logarithm of sales in year *t*.	Orbis
Cash	Cash and cash equivalents in year *t* divided by total assets in year *t* and multiplied by 100.	Orbis
Capital Intensity	Fixed assets in year *t* divided by total assets in year *t* and multiplied by 100.	Orbis
Country-level Control Variables		
GDP Growth	GDP growth (in %) for country *c* in year *t*.	World Bank's World Development Indicators
Inflation	Inflation rate (consumer prices, in %) for country *c* in year *t*.	

Unemployment	Unemployment rate (in % of total labor force) for country *c* in year *t*.	
GDP per Capita	Natural logarithm of GDP per capita (in current US$) for country *c* in year *t*.	
Political Stability	Decile rank of estimated political stability and absence of violence/terrorism for country *c* in year *t*.	Worldwide Governance Indicators (WGI)
Government Effectiveness	Decile rank of estimated government effectiveness for country *c* in year *t*.	
Tax Policy Risk	Decile rank of tax policy risk for country *c* in year *t*, calculated as the country-year mean of firm-level tax policy risk according to Hassan et al. (2019)	www.firmlevelrisk.com
Weak (Strong) Tax Enforcement	*Weak* (*Strong*) *Tax Enforcement* is an indicator variable equal to one if our country-level measure of tax enforcement is in the bottom (top) sample quartile, and zero otherwise. Our country-level tax enforcement measure is the value of completed verification actions for all taxpayers in the year 2013 divided by net revenue collections for all taxes administered by revenue bodies in the year 2013 (both measured in millions in local currency).	OECD's Tax Administration 2015

Figure 1: Falsification test

This figure presents the results of a falsification test in which we re-estimate equation 1, after additionally including the announced corporate tax rates for years *t+1* and *t+2*. The dependent variable is *Capital Investment*, measured as the annual change in tangible fixed assets scaled by lagged total assets. Whisker bars represent 95 percent confidence intervals.

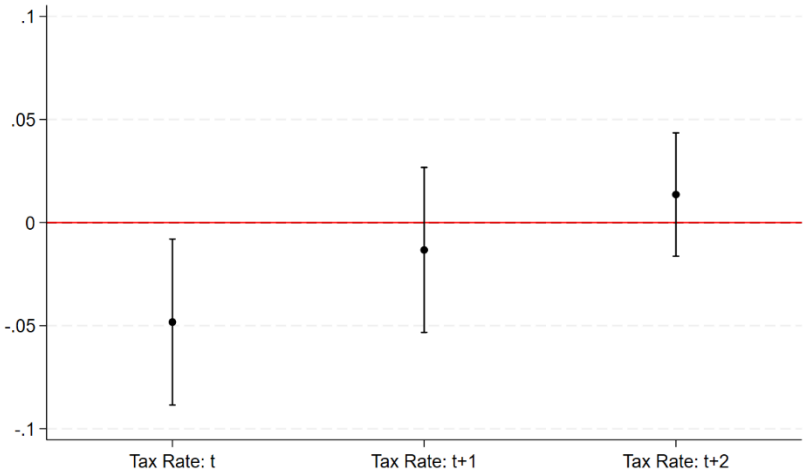


Figure 2: Stacked difference-in-differences design – treatment dynamics for average effect

This figure shows annual treatment effects for the stacked difference-in-differences design in column 1 of Table 5, using capital investment as the dependent variable. Treatment effects indicate the difference in capital investment between treated firms (i.e., firms located in a country with an announced tax rate change) and control firms (i.e., firms located in a country without a tax rate change). We measure annual treatment effects relative to the year prior to the announcement of the tax rate change (i.e., year t-1). Whisker bars represent 95 percent confidence intervals.

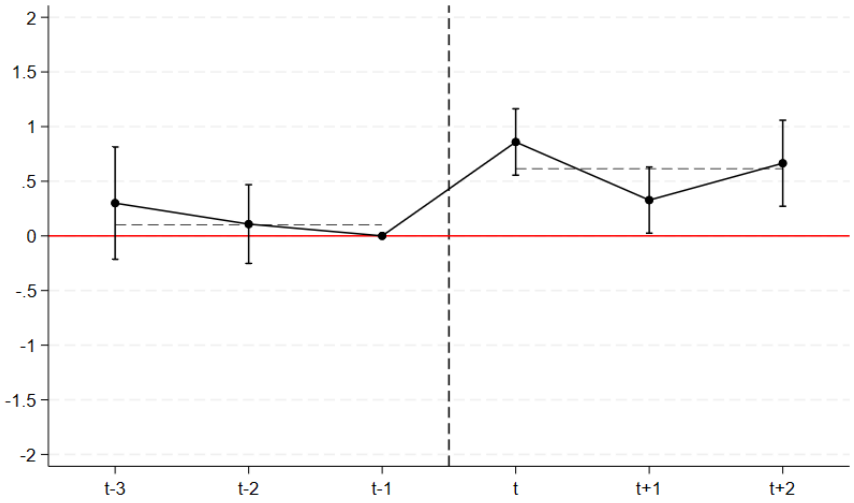
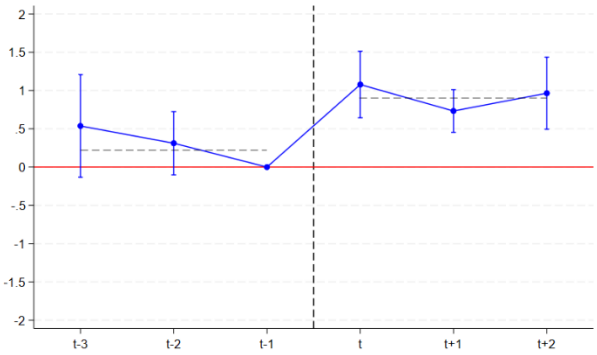


Figure 3: Stacked difference-in-differences design – treatment dynamics for treatment countries with low versus high tax complexity

This figure shows annual treatment effects for the stacked difference-in-differences design in column 1 of Table 5, using capital investment as the dependent variable. Treatment effects indicate the difference in capital investment between treated firms (i.e., firms located in a country with an announced tax rate change) and control firms (i.e., firms located in a country without a tax rate change). Panel a (b) plots the treatment effects for treatment countries with tax complexity below the median (above the median) in the year prior to the treatment event. We measure annual treatment effects relative to the year prior to the announcement of the tax rate change (i.e., year t-1). Whisker bars represent 95 percent confidence intervals.

(a) Low tax complexity



(b) High tax complexity

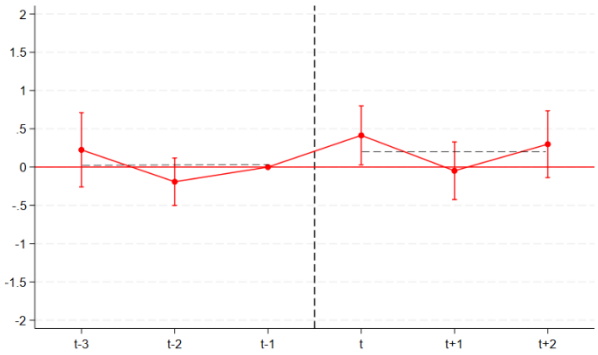


Table 1: Sample selection

This table presents the sample selection for our primary sample.

Sample Selection	**Firm-Years**
All active corporations in Bureau van Dijk's Orbis database with non-missing ultimate owner information that are located in an OECD, EU or EFTA country, file unconsolidated financial statements and report non-missing sales, profit before tax, and tangible fixed assets (sample period: 2012-2019)	12,290,856
Less: Financial firms (NACE codes: 6400-6899) and utility firms (NACE codes: 3500-3999).	(1,589,224)
Less: Observations with total assets < €50,000, fixed assets < €5,000, negative sales, and negative cash and cash equivalents	(3,166,489)
Less: Observations with insufficient data to compute regression variables and firms with an interrupted time series of data	(4,615,016)
Final sample (sample period: 2013-2019)	**2,920,127**

Table 2: Descriptive statistics

This table presents descriptive statistics for our primary sample. All variables are defined in the appendix.

Variable	N	Mean	SD	P25	Median	P75
Capital Investment	2,920,127	0.988	9.262	-2.162	-0.366	1.215
Capital Investment Gross	2,751,018	5.177	10.445	0.291	1.748	5.721
Labor Investment	2,638,151	8.056	34.599	-4.854	3.421	14.000
Tax Rate	2,920,127	25.108	5.654	22.000	25.000	27.900
Tax Complexity	2,920,127	211.185	82.092	139.000	224.000	269.000
Leverage	2,920,127	11.186	18.084	0.000	1.220	15.701
RoA	2,920,127	3.990	10.112	0.212	2.532	7.692
Size	2,920,127	14.241	1.921	12.931	14.122	15.478
Cash	2,920,127	13.129	16.241	1.488	6.379	18.815
Capital Intensity	2,920,127	36.702	27.486	12.531	30.881	57.231
GDP Growth	2,920,127	1.510	1.478	0.778	1.293	2.520
Inflation	2,920,127	0.889	0.933	0.149	0.897	1.409
Unemployment	2,920,127	10.359	4.810	7.360	10.330	12.150
GDP per Capita	2,920,127	10.314	0.493	10.171	10.386	10.509
MNC	2,321,067	0.336	0.472	0.000	0.000	1.000
Public	2,920,127	0.048	0.213	0.000	0.000	0.000
Large	2,916,478	0.250	0.433	0.000	0.000	0.000

Table 3: Country-level descriptive statistics and sample composition

This table presents country-level descriptive statistics and information on the sample composition. For each sample country, we present the number of firm-year observations in our primary sample, the announced corporate tax rate for each sample year, and average *Tax Complexity* across the sample period. All variables are defined in the appendix.

Country	**N**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	***Tax Complexity***
Austria	11,564	25	25	25	25	25	25	25	141.57
Belgium	48,076	33	33	33	33	25	25	25	135.00
Bulgaria	147,084	10	10	10	10	10	10	10	445.71
Croatia	57,799	20	20	20	18	18	18	18	203.43
Czech Republic	36,176	19	19	19	19	19	19	19	228.57
Estonia	30,499	21	21	20	20	20	20	20	68.57
Finland	52,276	20	20	20	20	20	20	20	92.57
France	369,740	33.33	33.33	33.33	33.33	25.00	25.00	25.00	137.14
Germany	32,193	29	29	29	29	29	29	29	216.43
Greece	28,301	26	26	26	29	29	29	24	194.29
Hungary	26,838	19	19	19	9	9	9	9	277.00
Iceland	1,337	20	20	20	20	20	20	20	140.00
Italy	1,016,771	31.40	31.40	27.90	27.90	27.90	27.90	27.90	256.00
Latvia	45,038	15	15	15	15	20	20	20	191.36
Lithuania	3,528	15	15	15	15	15	15	15	153.04
Luxembourg	665	27.75	27.75	27.75	27.75	25.75	25.75	23.75	55.57
Malta	1,239	35	35	35	35	35	35	35	139.00
Netherlands	651	25	25	25	25	25	25	25	120.14
New Zealand	616	28	28	28	28	28	28	28	148.57
Norway	191,310	27	27	25	23	23	22	22	83.00
Poland	62,356	19	19	19	19	19	19	19	284.00
Portugal	136,031	21	21	21	21	21	21	21	261.29
Romania	13,629	16	16	16	16	16	16	16	175.57
Slovakia	63,042	22	22	22	21	21	21	21	197.86
Slovenia	38,983	17	17	17	19	19	19	19	233.00
South Korea	143,367	22	22	22	22	25	25	25	190.43
Spain	300,013	30	25	25	25	25	25	25	158.64
Sweden	61,005	22	22	22	22	22	21	21	122.00

Table 4: Tax system complexity and the sensitivity of capital investment to the tax rate

This table presents results for the effect of tax system complexity on the sensitivity of capital investment to the tax rate. The samples in all columns include observations for the years 2013 to 2019. The dependent variable is *Capital Investment*, measured as the annual change in tangible fixed assets scaled by lagged total assets. The main independent variable of interest is *Tax Rate* × *Tax Complexity*. *Tax Rate* is a country's announced corporate tax rate. *Tax Complexity* is the country's time to pay tax (in hours per year) based on the World Bank Doing Business survey. We demean (standardize) *Tax Rate* (*Tax Complexity*) to have a mean of zero (a mean of zero and a standard deviation of one) in the regression sample. Firm-level control variables are lagged by one year. All regressions include firm and industry-year fixed effects. All variables are defined in the appendix. We report t-statistics in parenthesis, based on standard errors clustered by country-industry. *, **, and *** represent significance levels of 10%, 5%, and 1%, respectively (two-tailed).

	(1)	(2)
Dependent variable:	*Capital Investment*	*Capital Investment*
Tax Rate	-0.052**	-0.058**
	(-2.359)	(-2.001)
Tax Complexity		-1.115**
		(-2.287)
Tax Rate × *Tax Complexity*		0.033**
		(2.587)
Leverage	-0.047***	-0.047***
	(-12.462)	(-12.473)
RoA	0.066***	0.066***
	(14.080)	(14.291)
Size	-1.862***	-1.863***
	(-12.296)	(-12.248)
Cash	0.030***	0.029***
	(12.906)	(12.450)
Capital Intensity	-0.227***	-0.227***
	(-29.248)	(-29.176)
GDP Growth	0.134**	0.143***
	(2.557)	(2.853)
Inflation	0.246***	0.286***
	(3.610)	(3.809)
Unemployment	-0.101***	-0.096***
	(-4.559)	(-4.474)
GDP per Capita	-6.186***	-5.510***
	(-7.405)	(-6.470)
Observations	2,920,120	2,920,120
Adjusted R-squared	0.128	0.128
Firm FE	YES	YES
Industry × Year FE	YES	YES

Table 5: Stacked difference-in-differences design

This table presents regression results for the effect of tax complexity on the sensitivity of capital investment to the tax rate using a stacked difference-in-differences design. We identify nine events in which a country announced a corporate tax rate change (either increase or decrease) and did not announce a tax rate change in the three years before and three years after the event. The control group consists of countries without a change in the corporate tax rate during our sample period (2013-2019) and the two years prior to the start of our sample (2011-2012). We also exclude Poland from the control group due to significant political changes around our treatment events. For each event, we define a cohort with treatment observations and control observations for the three years before and after the announcement of the tax rate change. The dependent variable is *Capital Investment*, measured as the annual change in tangible fixed assets scaled by lagged total assets. In case of a tax rate increase, we multiply the dependent variable by negative one to accommodate tax rate increases and decreases in one regression. *Treat* is an indicator variable equal to one for countries with a tax rate change event, and zero otherwise. *LowTaxComplexity* (*HighTaxComplexity*) is an indicator variable equal to one for treatment countries with tax complexity below the median (above the median) in the year prior to the treatment event, and zero otherwise. In columns (1) and (3), we use all treatment events; in columns (2) and (4), we exclude treatment events with a small tax rate change (i.e., one percentage point or less). Firm-level control variables are lagged by one year. We entropy balance treatment and control observations for each treatment event using the three-year pre-treatment averages of the firm-level control variables. All regressions include firm and industry-year fixed effects for each treatment cohort. We report t-statistics in parenthesis, based on standard errors clustered by country-industry. *, **, and *** represent significance levels of 10%, 5%, and 1%, respectively (two-tailed).

	(1)	(2)	(3)	(4)
Dependent variable:	*Capital Investment*	*Capital Investment*	*Capital Investment*	*Capital Investment*
Sample:	*Full Sample*	*w/o small Tax Rate Change*	*Full Sample*	*w/o small Tax Rate Change*
Treat × *Post*	0.549***	0.619***		
	(4.436)	(4.897)		
Treat (LowTaxComplexity) × *Post*			0.742***	0.829***
			(4.433)	(5.227)
Treat (HighTaxComplexity) × *Post*			0.251	0.181
			(1.521)	(0.886)
Treat (LowTaxComplexity) × *Post* = *Treat (HighTaxComplexity)* × *Post*			$p = 0.04$	$p = 0.02$
Controls	YES	YES	YES	YES
Entropy Balancing	YES	YES	YES	YES
Observations	2,617,140	2,350,518	2,617,140	2,350,518
Adjusted R-squared	0.104	0.102	0.104	0.102
Firm × Cohort FE	YES	YES	YES	YES
Industry × Year × Cohort FE	YES	YES	YES	YES

Table 6: Robustness tests for primary analysis

This table presents results for robustness tests for our primary analysis using alternative measures for tax complexity (columns 1 and 2) and controlling for other country-level characteristics (columns 3-7). The samples in all columns include observations for the years 2013 to 2019. The dependent variable is *Capital Investment*, measured as the annual change in tangible fixed assets scaled by lagged total assets. In columns 1 and 2, we use alternatives measures of tax complexity: *Frequency of Paying Taxes* and *Tax Complexity Index*. In columns 3-7, we control for the effect of country-level characteristics on the sensitivity of investment to the tax rate: *Government Effectiveness*, *Political Stability*, *Tax Policy Risk*, *Weak Tax Enforcement*, and *Strong Tax Enforcement*. See section 4.3.2 and the appendix for more details. We demean (standardize) *Tax Rate* (*Tax Complexity*) to have a mean of zero (a mean of zero and a standard deviation of one) in the regression sample. All regressions include firm and industry-year fixed effects. We report t-statistics in parenthesis, based on standard errors clustered by country-industry. *, **, and *** represent significance levels of 10%, 5%, and 1%, respectively (two-tailed).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable:	*Capital Investment*	*Capital Investment*	*Capital Investment*	*Capital Investment*	*Capital Investment*	*Capital Investment*	*Capital Investment*
Tax complexity measure:	*Frequency of Paying Taxes*	*Tax Complexity Index*	Baseline	Baseline	Baseline	Baseline	Baseline
Country variable:			*Government Effectiveness*	*Political Stability*	*Tax Policy Risk*	*Weak Tax Enforce.*	*Strong Tax Enforce.*
Tax Rate	-0.033	-0.044**	-0.054*	-0.059**	-0.056*	0.006	-0.004
	(-1.427)	(-2.082)	(-1.885)	(-2.410)	(-1.919)	(0.362)	(-0.233)
Tax Complexity	0.316***	0.373***	-1.051**	-1.167***	-1.277***	-0.355	-0.264
	(4.056)	(3.592)	(-2.177)	(-2.600)	(-2.801)	(-1.560)	(-1.121)
Tax Rate × Tax Complexity	0.062***	0.046***	0.072***	0.042***	0.053***	0.031**	0.026**
	(5.481)	(3.632)	(3.569)	(2.923)	(4.675)	(2.589)	(2.066)
Country Variable			-0.038*	-0.010	-0.065***		
			(-1.793)	(-0.316)	(-3.019)		
Tax Rate × Country Variable			0.013**	-0.003	-0.004*	-0.153***	-0.040
			(2.558)	(-1.246)	(-1.732)	(-4.691)	(-1.035)
Controls	YES	YES	YES	YES	YES	YES	YES
Observations	2,920,120	2,905,712	2,920,120	2,920,120	2,530,735	2,633,491	2,633,491
Adjusted R-squared	0.128	0.130	0.128	0.128	0.124	0.126	0.126
Firm FE	YES	YES	YES	YES	YES	YES	YES
Industry × Year FE	YES	YES	YES	YES	YES	YES	YES

Table 7: Cross-sectional analyses: MNC ownership, listing status, and firm size

This table presents results for cross-sectional tests of the effect of tax complexity on the sensitivity of capital investment to the tax rate. In column 1, we examine MNC ownership, in column 2 the listing status of the firm's owner, and in column 3 and 4 firm size. The samples in all columns include observations for the years 2013 to 2019; we limit the sample to domestic firms in column 4. The dependent variable is *Capital Investment*, measured as the annual change in tangible fixed assets scaled by lagged total assets. The main independent variable of interest is *Tax Rate* × *Tax Complexity* × *Partition*. *Tax Rate* is a country's announced corporate tax rate. *Tax Complexity* is the country's time to pay tax (in hours per year) based on the World Bank Doing Business survey. We demean (standardize) *Tax Rate* (*Tax Complexity*) to have a mean of zero (a mean of zero and a standard deviation of one) in the regression sample. In column 1, *Partition* equals *MNC*, which is an indicator variable equal to one if firm *i* has a foreign owner, and zero if it has a domestic owner and no own subsidiaries. In column 2, *Partition* equals *Public*, which is an indicator variable equal to one if firm *i* has a public owner, and zero if it has a private owner. In column 3 (4), *Partition* equals *Large*, which is an indicator variable equal to one if the firm's sales are in the top sample quartile (in the top quartile in the subsample of domestic firms), and zero otherwise. All regressions include firm and industry-year fixed effects. All variables are defined in the appendix. We report t-statistics in parenthesis, based on standard errors clustered by country-industry. *, **, and *** represent significance levels of 10%, 5%, and 1%, respectively (two-tailed).

	(1)	(2)	(3)	(4)
Dependent variable:	*Capital Investment*	*Capital Investment*	*Capital Investment*	*Capital Investment*
Sample:	*Full Sample*	*Full Sample*	*Full Sample*	*Domestic Firms*
Partitioning variable:	*MNC*	*Public*	*Large*	*Large*
Tax Rate	-0.063**	-0.058**	-0.054*	-0.021
	(-2.356)	(-1.968)	(-1.921)	(-1.282)
Tax Rate × *Tax Complexity*	0.047***	0.037***	0.036***	0.049***
	(2.992)	(2.781)	(2.684)	(3.294)
Tax Rate × *Tax Complexity* × *Partition*	-0.086***	-0.066***	-0.020***	-0.018**
	(-4.274)	(-3.394)	(-2.874)	(-1.981)
Tax Complexity	-0.960**	-1.133**	-1.098**	-0.690**
	(-2.001)	(-2.311)	(-2.287)	(-2.292)
Partition			0.685***	0.670***
			(7.764)	(6.809)
Tax Rate × *Partition*	-0.046**	-0.027	-0.021**	-0.018**
	(-1.988)	(-1.278)	(-2.563)	(-2.027)
Tax Complexity × *Partition*	-0.567*	0.135	-0.121	-0.130
	(-1.654)	(0.549)	(-1.526)	(-1.615)
Tax Rate × *Tax Complexity* + *Tax Rate* × *Tax Complexity* × *Partition* = 0	-0.039	-0.029	0.016	0.031
	[3.92]	[2.36]	[1.46]	[4.64]
	p = 0.05	p = 0.13	p = 0.23	p = 0.03
Controls	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Industry × Year FE	YES	YES	YES	YES
Observations	2,321,060	2,920,120	2,916,471	2,138,786
Adjusted R-squared	0.133	0.128	0.129	0.124

Table 8: Country-level effective tax rate measures

This table presents results for our primary analysis using country-level effective tax rate measures. The samples in all columns include observations for the years 2013 to 2019. The dependent variable is *Capital Investment*, measured as the annual change in tangible fixed assets scaled by lagged total assets. In columns 1 and 3, we replace *Tax Rate* with the country's effective average tax rate (*EATR*) calculated based on the methodology by Devereux and Griffith (1998) and Devereux and Griffith (2003). In columns 2 and 4, we replace *Tax Rate* with the country's aggregated cash effective tax rate (*ACETR*) based on the methodology by Shevlin, Shivakumar, and Urcan (2019). *Tax Complexity* is the country's average time to pay tax (in hours per year) based on the World Bank Doing Business survey. We demean (standardize) *Tax Rate* (*Tax Complexity*) to have a mean of zero (a mean of zero and a standard deviation of one) in the regression sample. All regressions include firm and industry-year fixed effects. We report t-statistics in parenthesis, based on standard errors clustered by country-industry. *, **, and *** represent significance levels of 10%, 5%, and 1%, respectively (two-tailed).

	(1)	(2)	(3)	(4)
Dependent variable:	*Capital Investment*	*Capital Investment*	*Capital Investment*	*Capital Investment*
Tax rate measure:	*EATR*	*ACETR*	*EATR*	*ACETR*
Tax Rate	-0.031**	-0.022***	-0.031**	-0.022***
	(-2.460)	(-3.452)	(-2.451)	(-3.450)
Tax Complexity			-0.174	-0.809**
			(-0.913)	(-2.070)
Tax Rate × *Tax Complexity*			0.030**	0.011***
			(2.286)	(2.848)
Controls	YES	YES	YES	YES
Observations	2,774,800	2,920,120	2,774,800	2,920,120
Adjusted R-squared	0.125	0.128	0.125	0.129
Firm FE	YES	YES	YES	YES
Industry × Year FE	YES	YES	YES	YES

Table 9: Labor investment

This table presents results for tests of the effect of tax complexity on the sensitivity of labor investment to the tax rate. The samples in all columns include observations for the years 2013 to 2019. The dependent variable is *Labor Investment*, measured as the annual change in the costs of employees scaled by lagged costs of employees. The main independent variable of interest is *Tax Rate* × *Tax Complexity*. *Tax Rate* is a country's announced corporate tax rate. *Tax Complexity* is the country's time to pay tax (in hours per year) based on the World Bank Doing Business survey. We demean (standardize) *Tax Rate* (*Tax Complexity*) to have a mean of zero (a mean of zero and a standard deviation of one) in the regression sample. All regressions include firm and industry-year fixed effects. All variables are defined in the appendix. We report t-statistics in parenthesis, based on standard errors clustered by country-industry. *, **, and *** represent significance levels of 10%, 5%, and 1%, respectively (two-tailed).

	(1)	(2)
Dependent variable:	*Labor Investment*	*Labor Investment*
Tax Rate	-0.442***	-0.283***
	(-7.926)	(-3.957)
Tax Complexity		-2.959**
		(-2.262)
Tax Rate × *Tax Complexity*		0.358***
		(7.083)
Controls	YES	YES
Firm FE	YES	YES
Industry × Year FE	YES	YES
Observations	2,635,332	2,635,332
Adjusted R-squared	0.099	0.099

Online Appendix

For

"Corporate Tax System Complexity and Investment Sensitivity to Tax Policy Changes"

Harald Amberger
John Gallemore
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A. Stylized examples for tax base policies

In this section, we adapt the framework for the stylized numerical example introduced in section 2.3 to examine three alternative tax policies that, in contrast to tax rate changes, shape the tax base: (i) bonus depreciation, (ii) tax credits, and (iii) super deductions.

A.1. Bonus depreciation

We model bonus depreciation as a provision that allows the firm to depreciate the asset (i.e., the investment costs) for tax purposes over four instead of five years. Thus, bonus depreciation affects the tax base by accelerating tax deductions from later years in the life of the investment to earlier years, which is beneficial for the firm because of the time value of money.

Investment decisions in the low tax complexity country

Similar to the example in Appendix A, in the low tax complexity country, the firm faces lower additional tax compliance costs associated with the marginal investment. Furthermore, there is no tax uncertainty effect in this country. Finally, the firm can only engage in a limited amount of tax planning and reduce its ETR by 12.5% of the statutory tax rate.

	Project 1		Project 2		Project 3	
Tax Rate:	**20%**	**20%**	**20%**	**20%**	**20%**	**20%**
Revenues	$65.00	$65.00	$60.00	$60.00	$62.50	$62.50
Non-tax costs	($45.00)	($45.00)	($45.00)	($45.00)	($45.00)	($45.00)
Tax depreciation	($10.00)	($12.50)	($10.00)	($12.50)	($10.00)	($12.50)
Tax compliance costs	($1.60)	($1.60)	($1.60)	($1.60)	($1.60)	($1.60)
Tax base	$8.40	$5.90	$3.40	$0.90	$5.90	$3.40
Tax payments	($1.47)	($1.03)	($0.60)	($0.16)	($1.03)	($0.60)
After-tax cash flows t+1/t+4	$16.93	$17.37	$12.81	$13.24	$14.87	$15.31
After-tax cash flows t+5		$15.18		$11.06		$13.12
NPV	$6.75	$7.13	($7.08)	($6.70)	($0.16)	$0.22
Change in decision?	**NO**		**NO**		**YES**	
Difference in NPV	**$0.38**		**$0.38**		**$0.38**	

We find that bonus depreciation (i.e., allowing the firm to depreciate the asset for tax purposes over four instead of five years) increases the after-tax NPV of each investment project, consistent with the time value of money making earlier tax deductions more valuable. Furthermore, due to bonus depreciation, project 3 goes from a negative NPV to a positive NPV, leading the project to cross the investment threshold and thus induce the firm to invest in it.

Investment decisions in the high tax complexity country: the role of compliance costs

We next examine the firm's investment decisions in the presence of higher tax-complexity induced compliance costs.

	Project 1		Project 2		Project 3	
Tax Rate:	**20%**	**20%**	**20%**	**20%**	**20%**	**20%**
Revenues	$65.00	$65.00	$60.00	$60.00	$62.50	$62.50
Non-tax costs	($45.00)	($45.00)	($45.00)	($45.00)	($45.00)	($45.00)

Tax depreciation	($10.00)	($12.50)	($10.00)	($12.50)	($10.00)	($12.50)
Tax compliance costs	($2.00)	($2.00)	($2.00)	($2.00)	($2.00)	($2.00)
Tax base	$8.00	$5.50	$3.00	$0.50	$5.50	$3.00
Tax payments	($1.40)	($0.96)	($0.53)	($0.09)	($0.96)	($0.53)
After-tax cash flows t+1/t+4	$16.60	$17.04	$12.48	$12.91	$14.54	$14.98
After-tax cash flows t+5		$14.85		$10.73		$12.79
NPV	$5.65	$6.02	($8.18)	($7.80)	($1.27)	($0.89)
Change in decision?	**NO**		**NO**		**NO**	
Difference in NPV	**$0.38**		**$0.38**		**$0.38**	

For the high tax complexity country, we find that without bonus depreciation, only project 1 has a positive NPV, whereas projects 2 and 3 do not. So, without bonus depreciation, the firm will invest in project 1 but not in projects 2 and 3.

If the high tax complexity country introduces bonus depreciation, none of the three projects change in terms of going from negative to positive NPV. Thus, in that country, the introduction of bonus depreciation will not lead to additional marginal investment. This result is consistent with tax-complexity induced compliance costs shifting project NPVs away from investment thresholds in a high complexity environment, diminishing the extent to which a tax base change is likely to induce a project to cross the firm's threshold for investment

This example can also illustrate that the *change* in project NPV associated with bonus depreciation *does not differ with tax system complexity-induced compliance costs*, as shown in the table below. The reason is that faster tax deductions as a result of the bonus depreciation *do not differentially affect the after-tax value of tax compliance costs in the low or the high tax complexity country*. Overall, our example suggests that if tax system complexity manifests in higher tax compliance costs, it can only affect the sensitivity of investment to bonus depreciation by shifting project NPVs away from investment thresholds. Because bonus depreciation does not alter the after-tax value of tax compliance costs, it does not differentially affect project NPVs in both the low and high tax complexity country.

	ΔNPV - Low Tax Complexity Country	**ΔNPV - High Tax Complexity Country**	**Diff**	**Diff as % of Low**
Project 1	$0.38	$0.38	($0.00)	0.00%
Project 2	$0.38	$0.38	$0.00	0.00%
Project 3	$0.38	$0.38	($0.00)	0.00%

Investment decisions in the high tax complexity country: the role of uncertainty

We next examine the firm's investment decisions in the presence of higher tax complexity-induced uncertainty.

	Project 1		Project 2		Project 3	
Tax Rate:	**20%**	**15%**	**20%**	**15%**	**20%**	**15%**
Revenues	$65.00	$65.00	$60.00	$60.00	$62.50	$62.50
Non-tax costs	($45.00)	($45.00)	($45.00)	($45.00)	($45.00)	($45.00)

Tax depreciation	($10.00)	($12.50)	($10.00)	($12.50)	($10.00)	($12.50)
Tax compliance costs	($1.60)	($1.60)	($1.60)	($1.60)	($1.60)	($1.60)
Tax base	$8.40	$5.90	$3.40	$0.90	$5.90	$3.40
Tax payments	($1.47)	($1.03)	($0.60)	($0.16)	($1.03)	($0.60)
After-tax cash flows t+1/t+4	$16.93	$17.37	$12.81	$13.24	$14.87	$15.31
After-tax cash flows t+5		$15.18		$11.06		$13.12
NPV	$4.79	$5.19	($8.56)	($8.16)	($1.88)	($1.49)
Change in decision?	**NO**		**NO**		**NO**	
Difference in NPV	**$0.40**		**$0.40**		**$0.40**	

For the high tax complexity country, we again find that without bonus depreciation, only project 1 has a positive NPV, whereas projects 2 and 3 do not. So, without bonus depreciation, the firm will invest in project 1 but not in projects 2 and 3.

If the high tax complexity country introduces bonus depreciation, none of the three projects change in terms of going from negative to positive NPV. Thus, in that country, the introduction of bonus depreciation will not lead to additional marginal investment. This result is consistent with tax-complexity induced uncertainty shifting project NPVs away from investment thresholds in a high complexity environment, diminishing the extent to which a tax base change is likely to induce a project to cross the firm's threshold for investment

However, in contrast to the results for tax rate changes, we find that greater uncertainty *increases* the extent to which bonus depreciation *changes* each project's NPV, as shown in the table below. This effect occurs because when the discount rate is higher, waiting longer for the tax depreciation to materialize reduces the present value of the associated tax savings. Put differently, bonus depreciation results in an *earlier* tax recognition of depreciation, *and this is more valuable when the discount rate is higher*. Overall, our example suggests that if tax system complexity manifests in greater uncertainty, it can actually enhance the responsiveness of investment to bonus depreciation.

	ΔNPV - Low Tax Complexity Country	**ΔNPV - High Tax Complexity Country**	**Diff**	**Diff as % of Low**
Project 1	$0.38	$0.40	$0.02	4.65%
Project 2	$0.38	$0.40	$0.02	4.65%
Project 3	$0.38	$0.40	$0.02	4.65%

Investment decisions in the high tax complexity country: the role of tax planning

We next examine the firm's investment decisions when tax system complexity allows for greater tax planning.

	Project 1		Project 2		Project 3	
Tax Rate:	**20%**	**15%**	**20%**	**15%**	**20%**	**15%**
Revenues	$65.00	$65.00	$60.00	$60.00	$62.50	$62.50
Non-tax costs	($45.00)	($45.00)	($45.00)	($45.00)	($45.00)	($45.00)
Tax depreciation	($10.00)	($12.50)	($10.00)	($12.50)	($10.00)	($12.50)

Tax compliance costs	($1.60)	($1.60)	($1.60)	($1.60)	($1.60)	($1.60)
Tax base	$8.40	$5.90	$3.40	$0.90	$5.90	$3.40
Tax payments	($1.26)	($0.89)	($0.51)	($0.14)	($0.89)	($0.51)
After-tax cash flows t+1/t+4	$17.14	$17.52	$12.89	$13.27	$15.02	$15.39
After-tax cash flows t+5		$15.64		$11.39		$13.52
NPV	$7.46	$7.78	($6.79)	($6.47)	$0.33	$0.66
Change in decision?	**NO**		**NO**		**NO**	
Difference in NPV	**$0.32**		**$0.32**		**$0.32**	

For the high tax complexity country, we find that without bonus depreciation, projects 1 and 3 have a positive NPV, whereas project 2 does not. So, without bonus depreciation, the firm will invest in projects 1 and 3 but not in project 2.

If the high tax complexity country introduces bonus depreciation, none of the three projects change in terms of going from negative to positive NPV. Thus, in that country, the introduction of bonus depreciation will not lead to additional marginal investment. This result is consistent with tax-complexity induced tax planning opportunities shifting project NPVs away from investment thresholds in a high-complexity complexity environment, diminishing the extent to which a tax base change is likely to induce a project to cross the firm's threshold for investment

However, consistent with the results for tax rate changes, we find that the *change* in project NPV associated with bonus depreciation *is consistently greater in the low tax complexity country*. This effect occurs *because the value of bonus depreciation is increasing in the firm's effective tax rate*. Put differently, greater tax planning afforded by tax system complexity reduces the extent to which changes in bonus depreciation will positively affect project NPVs in the high tax complexity country. Overall, our example suggests that if tax system complexity manifests in greater tax planning opportunities, it indeed moderates the sensitivity of investment to bonuses depreciation.

	ΔNPV - Low Tax Complexity Country	**ΔNPV - High Tax Complexity Country**	**Diff**	**Diff as % of Low**
Project 1	$0.38	$0.32	($0.05)	-14.29%
Project 2	$0.38	$0.32	($0.05)	-14.29%
Project 3	$0.38	$0.32	($0.05)	-14.29%

A.2. Tax credits

We model tax credits as the firm receiving a tax refund of 2% of its investment costs (i.e., $1) at the end of the first year. Thus, tax credits reduce, dollar for dollar, the taxes that the firm owes.

Investment decisions in the low tax complexity country

Similar to the example in Appendix A, in the low tax complexity country, the firm faces lower additional tax compliance costs associated with the marginal investment. Furthermore, there is no tax uncertainty effect in this country. Finally, the firm can only engage in a limited amount of tax planning and reduce its ETR by 12.5% of the statutory tax rate.

	Project 1	Project 2	Project 3

Tax Rate:	**20%**	**20%**	**20%**	**20%**	**20%**	**20%**
Revenues	$65.00	$65.00	$60.00	$60.00	$62.50	$62.50
Non-tax costs	($45.00)	($45.00)	($45.00)	($45.00)	($45.00)	($45.00)
Tax depreciation	($10.00)	($10.00)	($10.00)	($10.00)	($10.00)	($10.00)
Tax compliance costs	($1.60)	($1.60)	($1.60)	($1.60)	($1.60)	($1.60)
Tax base	$8.40	$8.40	$3.40	$3.40	$5.90	$5.90
Tax payments	($1.47)	($1.47)	($0.60)	($0.60)	($1.03)	($1.03)
After-tax cash flows	$16.93	$16.93	$12.81	$12.81	$14.87	$14.87
NPV	$6.75	$7.62	($7.08)	($6.21)	($0.16)	$0.71
Change in decision?	**NO**		**NO**		**YES**	
Difference in NPV	**$0.87**		**$0.87**		**$0.87**	

For the low tax complexity country, we find that tax credits increase the NPV of each investment project. This effect is due to the firm benefiting from tax credits because they directly lower tax payments/liabilities at the end of the first year. As a result, tax credits shift the NPV of project 3 from being negative to positive, which all else equal should induce the firm to invest in it.

Investment decisions in the high tax complexity country: the role of compliance costs

We next examine the firm's investment decisions in the presence of higher tax complexity-induced compliance costs.

	Project 1		Project 2		Project 3	
Tax Rate:	**20%**	**20%**	**20%**	**20%**	**20%**	**20%**
Revenues	$65.00	$65.00	$60.00	$60.00	$62.50	$62.50
Non-tax costs	($45.00)	($45.00)	($45.00)	($45.00)	($45.00)	($45.00)
Tax depreciation	($10.00)	($10.00)	($10.00)	($10.00)	($10.00)	($10.00)
Tax compliance costs	($2.00)	($2.00)	($2.00)	($2.00)	($2.00)	($2.00)
Tax base	$8.00	$8.00	$3.00	$3.00	$5.50	$5.50
Tax payments	($1.40)	($1.40)	($0.53)	($0.53)	($0.96)	($0.96)
After-tax cash flows	$16.60	$16.60	$12.48	$12.48	$14.54	$14.54
NPV	$5.65	$6.52	($8.18)	($7.31)	($1.27)	($0.40)
Change in decision?	**NO**		**NO**		**NO**	
Difference in NPV	**$0.87**		**$0.87**		**$0.87**	

For the high tax complexity country, we find that without tax credits, only project 1 has a positive NPV, whereas projects 2 and 3 do not. So, without tax credits, the firm will invest in project 1 but not in projects 2 and 3.

If the high tax complexity country introduces tax credits, none of the three projects change in terms of going from negative to positive NPV. Thus, in that country, the introduction of tax credits will not lead to additional marginal investment. This result is consistent with tax-complexity induced compliance costs shifting project NPVs away from investment thresholds in a high complexity

environment, diminishing the extent to which a tax base change is likely to induce a project to cross the firm's threshold for investment

This example can also illustrate that the *change* in project NPV associated with tax credits *does not differ with tax system complexity-induced compliance costs*, as shown in the table below. The reason is that the tax refund as a result of the tax credit *does not differentially affect the after-tax value of tax compliance costs in the low or the high tax complexity country*. Overall, our example suggests that if tax system complexity manifests in greater tax compliance costs, it can only affect the sensitivity of investment to tax credits by shifting project NPVs away from investment thresholds. Because tax credits do not alter the after-tax value of tax compliance costs, they do not differentially affect project NPVs in both the low and high tax complexity country.

	ΔNPV - Low Complexity	**ΔNPV - High Complexity**	**Diff**	**% of Low**
Project 1	$0.87	$0.87	$0.00	0.00%
Project 2	$0.87	$0.87	$0.00	0.00%
Project 3	$0.87	$0.87	$0.00	0.00%

Investment decisions in the high tax complexity country: the role of uncertainty

We next examine the firm's investment decisions in the presence of higher tax complexity-induced uncertainty.

	Project 1		Project 2		Project 3	
Tax Rate:	**20%**	**20%**	**20%**	**20%**	**20%**	**20%**
Revenues	$65.00	$65.00	$60.00	$60.00	$62.50	$62.50
Non-tax costs	($45.00)	($45.00)	($45.00)	($45.00)	($45.00)	($45.00)
Tax depreciation	($10.00)	($10.00)	($10.00)	($10.00)	($10.00)	($10.00)
Tax compliance costs	($1.60)	($1.60)	($1.60)	($1.60)	($1.60)	($1.60)
Tax base	$8.40	$8.40	$3.40	$3.40	$5.90	$5.90
Tax payments	($1.47)	($1.47)	($0.60)	($0.60)	($1.03)	($1.03)
After-tax cash flows	$16.93	$16.93	$12.81	$12.81	$14.87	$14.87
NPV	$4.79	$5.65	($8.56)	($7.70)	($1.88)	($1.02)
Change in decision?	**NO**		**NO**		**NO**	
Difference in NPV	**$0.86**		**$0.86**		**$0.86**	

For the high tax complexity country, we again find that without tax credits, only project 1 has a positive NPV, whereas projects 2 and 3 do not. So, without tax credits, the firm will invest in project 1 but not in projects 2 and 3.

If the high tax complexity country introduces tax credits, none of the three projects change in terms of going from negative to positive NPV. Thus, in that country, the introduction of tax credits will not lead to additional marginal investment. This result is consistent with tax-complexity induced uncertainty shifting project NPVs away from investment thresholds in a high complexity environment, diminishing the extent to which a tax base change is likely to induce a project to cross the firm's threshold for investment

Furthermore, consistent with the results for tax rate changes, we find that the *change* in project NPV associated with tax credits *is consistently greater in the low tax complexity country*. This effect occurs *because the value of the tax credit is decreasing in the firm's discount rate (i.e., decreasing with tax complexity)*. This pattern suggests that tax credits have a stronger impact on the after-tax NPV in a low complexity environment. Overall, our example suggests that if tax system complexity manifests in greater uncertainty, it moderates the sensitivity of investment to tax credits.

	ΔNPV - Low Complexity	**ΔNPV - High Complexity**	**Diff**	**% of Low**
Project 1	$0.87	$0.86	($0.01)	-1.29%
Project 2	$0.87	$0.86	($0.01)	-1.29%
Project 3	$0.87	$0.86	($0.01)	-1.29%

Investment decisions in the high tax complexity country: the role of tax planning

We next examine the firm's investment decisions when tax system complexity allows for greater tax planning.

	Project 1		Project 2		Project 3	
Tax Rate:	**20%**	**20%**	**20%**	**20%**	**20%**	**20%**
Revenues	$65.00	$65.00	$60.00	$60.00	$62.50	$62.50
Non-tax costs	($45.00)	($45.00)	($45.00)	($45.00)	($45.00)	($45.00)
Tax depreciation	($10.00)	($10.00)	($10.00)	($10.00)	($10.00)	($10.00)
Tax compliance costs	($1.60)	($1.60)	($1.60)	($1.60)	($1.60)	($1.60)
Tax base	$8.40	$8.40	$3.40	$3.40	$5.90	$5.90
Tax payments	($1.26)	($1.26)	($0.51)	($0.51)	($0.89)	($0.89)
After-tax cash flows	$17.14	$17.14	$12.89	$12.89	$15.02	$15.02
NPV	$7.46	$8.33	($6.79)	($5.92)	$0.33	$1.20
Change in decision?	**NO**		**NO**		**NO**	
Difference in NPV	**$0.87**		**$0.87**		**$0.87**	

For the high tax complexity country, we find that without tax credits, projects 1 and 3 have a positive NPV, whereas project 2 does not. So, without tax credits, the firm will invest in projects 1 and 3 but not in project 2.

If the high tax complexity country introduces tax credits, none of the three projects change in terms of going from negative to positive NPV. Thus, in that country, the introduction of tax credits will not lead to additional marginal investment. This result is consistent with tax-complexity induced tax planning opportunities shifting project NPVs away from investment thresholds in a high complexity environment, diminishing the extent to which a tax base change is likely to induce a project to cross the firm's threshold for investment

This example can also illustrate that the *change* in project NPV associated with tax credits *does not differ with tax system complexity-induced tax planning opportunities*, as shown in the table below. The reason is that the value of the tax refund as a result of the tax credit *is independent of the firm's effective tax rate*. Overall, our example suggests that if tax system complexity manifests

in greater tax planning opportunities, it can only affect the sensitivity of investment to tax credits by shifting project NPVs away from investment thresholds. Because tax credits do not alter the firm's effective tax rate, they do not differentially affect project NPVs in both the low and high tax complexity country.

	ΔNPV - Low Complexity	ΔNPV - High Complexity	Diff	% of Low
Project 1	$0.87	$0.87	$0.00	0.00%
Project 2	$0.87	$0.87	$0.00	0.00%
Project 3	$0.87	$0.87	$0.00	0.00%

A.3. Super deductions

We model super deductions as a provision that allows the firm to depreciate 120% of its investment costs for tax purposes (i.e., $60 instead of $50) over five years. Thus, super deductions affect firms by allowing them to recognize additional deductions from their tax return, reducing the tax burden.

Investment decisions in the low tax system country

Similar to the example in Appendix A, in the low tax complexity country, the firm faces lower additional tax compliance costs associated with the marginal investment. Furthermore, there is no tax uncertainty effect in this country. Finally, the firm can only engage in a limited amount of tax planning and reduce its ETR by 12.5% of the statutory tax rate.

	Project 1		Project 2		Project 3	
Tax Rate:	**20%**	**20%**	**20%**	**20%**	**20%**	**20%**
Revenues	$65.00	$65.00	$60.00	$60.00	$62.50	$62.50
Non-tax costs	($45.00)	($45.00)	($45.00)	($45.00)	($45.00)	($45.00)
Tax depreciation	($10.00)	($12.00)	($10.00)	($12.00)	($10.00)	($12.00)
Tax compliance costs	($1.60)	($1.60)	($1.60)	($1.60)	($1.60)	($1.60)
Tax base	$8.40	$6.40	$3.40	$1.40	$5.90	$3.90
Tax payments	($1.47)	($1.12)	($0.60)	($0.25)	($1.03)	($0.68)
After-tax cash flows	$16.93	$17.28	$12.81	$13.16	$14.87	$15.22
NPV	$6.75	$7.93	($7.08)	($5.90)	($0.16)	$1.01
Change in decision?	**NO**		**NO**		**YES**	
Difference in NPV	**$1.17**		**$1.17**		**$1.17**	

For the low tax complexity country, we find that super deductions increase the NPV of each investment opportunity. The reason is that the firm benefits from super deductions because they increase the tax deductions in each year. As a result, super deductions shift the NPV of project 3 from being negative to positive, which all else equal should induce the firm to invest in it.

Investment decisions in the high tax complexity country: the role of compliance costs

We next examine the firm's investment decisions in the presence of higher tax complexity-induced compliance costs.

	Project 1		Project 2		Project 3	
Tax Rate:	**20%**	**20%**	**20%**	**20%**	**20%**	**20%**

Revenues	$65.00	$65.00	$60.00	$60.00	$62.50	$62.50
Non-tax costs	($45.00)	($45.00)	($45.00)	($45.00)	($45.00)	($45.00)
Tax depreciation	($10.00)	($12.00)	($10.00)	($12.00)	($10.00)	($12.00)
Tax compliance costs	($2.00)	($2.00)	($2.00)	($2.00)	($2.00)	($2.00)
Tax base	$8.00	$6.00	$3.00	$1.00	$5.50	$3.50
Tax payments	($1.40)	($1.05)	($0.53)	($0.18)	($0.96)	($0.61)
After-tax cash flows	$16.60	$16.95	$12.48	$12.83	$14.54	$14.89
NPV	$5.65	$6.82	($8.18)	($7.01)	($1.27)	($0.09)
Change in decision?	**NO**		**NO**		**NO**	
Difference in NPV	**$1.17**		**$1.17**		**$1.17**	

For the high tax complexity country, we find that without super deductions, only project 1 has a positive NPV, whereas projects 2 and 3 do not. So, without super deductions, the firm will invest in project 1 but not in projects 2 and 3.

If the high tax complexity country introduces super deductions, none of the three projects change in terms of going from negative to positive NPV. Thus, in that country, the introduction of super deductions will not lead to additional marginal investment. This result is consistent with tax-complexity induced compliance costs shifting project NPVs away from investment thresholds in a high complexity environment, diminishing the extent to which a tax base change is likely to induce a project to cross the firm's threshold for investment

This example can also illustrate that the *change* in project NPV associated with super deductions *does not differ with tax complexity-induced compliance costs*, as shown in the table below. The reason is that additional tax deductions as a result of super deductions *do not differentially affect the after-tax compliance costs in the low or the high tax complexity country*. Overall, our example suggests that if tax system complexity manifests in greater tax compliance costs, it can only affect the sensitivity of investment to super deductions by shifting project NPVs away from investment thresholds. Because super deductions do not alter the after-tax value of tax compliance costs, they do not differentially affect project NPVs in both the low and high tax complexity country.

	ΔNPV - Low Complexity	**ΔNPV - High Complexity**	**Diff**	**% of Low**
Project 1	$1.17	$1.17	($0.00)	0.00%
Project 2	$1.17	$1.17	$0.00	0.00%
Project 3	$1.17	$1.17	($0.00)	0.00%

Investment decisions in the high tax complexity country: the role of uncertainty

	Project 1		Project 2		Project 3	
Tax Rate:	**20%**	**20%**	**20%**	**20%**	**20%**	**20%**
Revenues	$65.00	$65.00	$60.00	$60.00	$62.50	$62.50
Non-tax costs	($45.00)	($45.00)	($45.00)	($45.00)	($45.00)	($45.00)
Tax depreciation	($10.00)	($12.00)	($10.00)	($12.00)	($10.00)	($12.00)
Tax compliance costs	($1.60)	($1.60)	($1.60)	($1.60)	($1.60)	($1.60)

Tax base	$8.40	$6.40	$3.40	$1.40	$5.90	$3.90
Tax payments	($1.47)	($1.12)	($0.60)	($0.25)	($1.03)	($0.68)
After-tax cash flows	$16.93	$17.28	$12.81	$13.16	$14.87	$15.22
NPV	$4.79	$6.10	($8.56)	($7.25)	($1.88)	($0.58)
Change in decision?	**NO**		**NO**		**NO**	
Difference in NPV	**$1.30**		**$1.30**		**$1.30**	

For the high tax complexity country, we again find that without super deductions, only project 1 has a positive NPV, whereas projects 2 and 3 do not. So, without super deductions, the firm will invest in project 1 but not in projects 2 and 3.

If the high tax complexity country introduces super deductions, none of the three projects change in terms of going from negative to positive NPV. Thus, in that country, the introduction of super deductions will not lead to additional marginal investment. This result is consistent with tax-complexity induced uncertainty shifting project NPVs away from investment thresholds in a high complexity environment, diminishing the extent to which a tax base change is likely to induce a project to cross the firm's threshold for investment

Furthermore, consistent with the results for tax rate changes, we find that the *change* in project NPV associated with super deductions *is consistently greater in the low tax complexity country*. This effect occurs *because the value of additional tax deductions is decreasing in the firm's discount rate (i.e., decreasing in tax complexity)*. This pattern suggests that super deductions have a stronger impact on the after-tax NPV in a low complexity environment. Overall, our example suggests that if tax system complexity manifests in greater uncertainty, it moderates the sensitivity of investment to super deductions.

	ΔNPV - Low Complexity	**ΔNPV - High Complexity**	**Diff**	**% of Low**
Project 1	$1.35	$1.30	($0.04)	-3.17%
Project 2	$1.35	$1.30	($0.04)	-3.17%
Project 3	$1.35	$1.30	($0.04)	-3.17%

Investment decisions in the high tax complexity country: the role of tax planning

We next examine the firm's investment decisions when tax system complexity allows for greater tax planning.

	Project 1		Project 2		Project 3	
Tax Rate:	**20%**	**20%**	**20%**	**20%**	**20%**	**20%**
Revenues	$65.00	$65.00	$60.00	$60.00	$62.50	$62.50
Non-tax costs	($45.00)	($45.00)	($45.00)	($45.00)	($45.00)	($45.00)
Tax depreciation	($10.00)	($12.00)	($10.00)	($12.00)	($10.00)	($12.00)
Tax compliance costs	($1.60)	($1.60)	($1.60)	($1.60)	($1.60)	($1.60)
Tax base	$8.40	$6.40	$3.40	$1.40	$5.90	$3.90
Tax payments	($1.26)	($0.96)	($0.51)	($0.21)	($0.89)	($0.59)
After-tax cash flows	$17.14	$17.44	$12.89	$13.19	$15.02	$15.32

NPV	$7.46	$8.64	($6.79)	($5.61)	$0.33	$1.51
Change in decision?	**NO**		**NO**		**NO**	
Difference in NPV	**$1.18**		**$1.18**		**$1.18**	

For the high tax complexity country, we find that without super deductions, projects 1 and 3 have a positive NPV, whereas project 2 does not. So, without super deductions, the firm will invest in projects 1 and 3 but not in project 2.

If the high tax complexity country introduces super deductions, none of the three projects change in terms of going from negative to positive NPV. Thus, in that country, the introduction of super deductions will not lead to additional marginal investment. This result is consistent with tax-complexity induced tax planning opportunities shifting project NPVs away from investment thresholds in a high complexity environment, diminishing the extent to which a tax base change is likely to induce a project to cross the firm's threshold for investment

Furthermore, consistent with the results for tax rate changes, we find that the *change* in project NPV associated with super deductions *is consistently greater in the low tax complexity country*. This effect occurs *because the value of additional tax deductions is increasing in the firm's effective tax rate*. This pattern suggests that super deductions have a stronger impact on the after-tax NPV in a low complexity environment. Overall, our example suggests that if tax system complexity manifests in greater tax planning opportunities, it moderates the sensitivity of investment to super deductions.

	ΔNPV - Low Complexity	**ΔNPV - High Complexity**	**Diff**	**% of Low**
Project 1	$1.35	$1.18	($0.17)	-12.44%
Project 2	$1.35	$1.18	($0.17)	-12.44%
Project 3	$1.35	$1.18	($0.17)	-12.44%

B. Stylized examples for cross-sectional predictions

In this section, we extend the framework for the stylized numerical example introduced in section 2.3 and in Appendix A to demonstrate how the impact of resources (and experience) can lead to heterogeneity in how tax system complexity affects the investment sensitivity to tax rate changes.

Building on the assumptions outlined in Appendix A of the paper, we introduce heterogeneity across firms in the extent to which they have resources and experience navigating the effects of tax system complexity. Effectively, we assume that some firms have additional resources that allow them to mitigate the impacts of greater tax system complexity (and thus experience weaker tax system complexity effects), while others do not (and thus experience stronger tax system complexity effects).

- **Compliance costs**: Previously we had assumed that firms in the high tax complexity country incurred $2 in additional tax compliance costs per year per project, compared to $1.60 in the low tax complexity country. Now, we assume that a firm in the high tax complexity country with high resources only incurs $1.80 in additional tax compliance costs per project, whereas a firm in this country with low resources incurs $2.40 in

additional tax compliance costs per year per project. We continue to assume that all firms in the low tax complexity country incur $1.60 in compliance costs per year per project.

- **Tax uncertainty**: Previously we had assumed that firms in the high tax complexity country incurred a 1.5 percentage point higher discount rate compared to firms in the low tax complexity country. Now, we assume that a firm in the high tax complexity country with high resources only experiences a 0.5 percentage point increase in the discount rate, whereas a firm in this country with low resources faces a 2.0 percentage point increase in the discount rate. We continue to assume that all firms in the low tax complexity country do not experience any increase in their discount rate (i.e., the discount rate is still 15%).
- **Tax planning**: Previously we had assumed that firms in the high tax complexity country were able to lower their effective tax rate by 25% of the statutory tax rate compared to 12.5% in the low tax complexity country. Now, we assume that a firm in the high tax complexity country with high resources is able to lower its effective tax rate by 30% of the statutory tax rate, whereas a firm in this country with low resources is able to lower its effective tax rate by 15% of the statutory tax rate. We continue to assume that a firm in the low tax system complexity country is able to lower its effective tax rate by 12.5% of the statutory tax rate.

We now re-evaluate how the assumed tax rate change (i.e., a 5-percentage point tax rate cut) impacts investment decisions under each of the three theoretical mechanisms (i.e., tax compliance costs, uncertainty, and tax planning) separately for the firm with high resources and the firm with low resources. For brevity, we only show the calculations for project 3; the inferences from this project extend to the other projects as well. Furthermore, we do not repeat the calculation for the low tax complexity firm but instead refer the reader to Appendix A in the paper.

Investment decisions in the high tax complexity country: the role of compliance costs

In the table below, we model the NPVs for project 3 in the high tax complexity country separately for the low resource firm and high resource firm, where additional resources allow the high resource firm to partially mitigate the additional tax compliance costs associated with tax system complexity.

	Low Resources		**High Resources**	
	Project 3		Project 3	
Tax Rate:	**20%**	**15%**	**20%**	**15%**
Revenues	$62.50	$62.50	$62.50	$62.50
Non-tax costs	($45.00)	($45.00)	($45.00)	($45.00)
Tax depreciation	($10.00)	($10.00)	($10.00)	($10.00)
Tax compliance costs	($2.40)	($2.40)	($1.80)	($1.80)
Tax base	$5.10	$5.10	$5.70	$5.70
Tax payments	($0.89)	($0.67)	($1.00)	($0.75)
After-tax cash flows	$14.21	$14.43	$14.70	$14.95
NPV	($2.37)	($1.63)	($0.71)	$0.12
Change in decision?	**NO**		**YES**	

Difference in NPV	**$0.75**	**$0.84**

For the low resource firm, we continue to find that the tax rate change does not lead project 3 to shift from being negative to positive NPV. For the high resource firm, in contrast, the tax rate change now leads project 3 to shift from being negative NPV to positive NPV. This differential effect is due to the high resource firms experiencing lower after-tax compliance costs in a high complexity environment, which increases the benefit of the tax rate cut. Furthermore, the *change* in project NPV as a result of the tax rate is *greater for the high resource firm.*

Overall, this example demonstrates that when, due to greater resources, firms incur lower additional tax compliance costs associated with tax system complexity, the tax rate cut increases project NPVs to a greater extent and thus is more likely to induce additional investment in the high tax complexity country. Put differently, under this mechanism, greater resources should offset the extent to which tax system complexity attenuates the sensitivity of investment to tax rate changes.

Investment decisions in the high tax complexity country: the role of uncertainty

In the table below, we model the NPVs for project 3 separately for the low resource firm and high resource firm, where additional resources allow the high resource firm to partially mitigate the additional uncertainty associated with tax system complexity.

	Low Resources		**High Resources**	
	Project 3		Project 3	
Tax Rate:	**20%**	**15%**	**20%**	**15%**
Revenues	$62.50	$62.50	$62.50	$62.50
Non-tax costs	($45.00)	($45.00)	($45.00)	($45.00)
Tax depreciation	($10.00)	($10.00)	($10.00)	($10.00)
Tax compliance costs	($1.60)	($1.60)	($1.60)	($1.60)
Tax base	$5.90	$5.90	$5.90	$5.90
Tax payments	($1.03)	($0.77)	($1.03)	($0.77)
After-tax cash flows	$14.87	$15.13	$14.87	$15.13
NPV	($2.43)	($1.61)	($0.75)	$0.11
Change in decision?	**NO**		**YES**	
Difference in NPV	**$0.83**		**$0.86**	

For the low resource firm, we continue to find that the tax rate change does not lead project 3 to shift from being negative to positive NPV. For the high resource firm, in contrast, the tax rate change now leads project 3 to shift from being negative NPV to positive NPV. This differential effect is due to the high resource firm experiencing a lower discount rate in a high complexity environment, which increases the benefit of the tax rate cut. Furthermore, the *change* in project NPV as a result of the tax rate is *greater for the high resource firm.*

Overall, this example demonstrates that when, due to greater resources, firms incur a smaller tax-complexity induced increase in the discount rate, the tax rate cut increases project NPVs to a

greater extent and thus is more likely to induce additional investment in the high tax complexity country. Put differently, under this mechanism, greater resources should offset the extent to which tax system complexity attenuates the sensitivity of investment to tax rate changes.

Investment decisions in the high tax complexity country: the role of tax planning

In the table below, we model the NPVs for project 3 separately for the low resource firm and high resource firm, where additional resources allow the high resource firm to further exploit tax planning opportunities associated with tax system complexity.

	Low Resources		**High Resources**	
	Project 3		Project 3	
Tax Rate:	**20%**	**15%**	**20%**	**15%**
Revenues	$62.50	$62.50	$62.50	$62.50
Non-tax costs	($45.00)	($45.00)	($45.00)	($45.00)
Tax depreciation	($10.00)	($10.00)	($10.00)	($10.00)
Tax compliance costs	($1.60)	($1.60)	($1.60)	($1.60)
Tax base	$5.90	$5.90	$5.90	$5.90
Tax payments	($1.00)	($0.75)	($0.83)	($0.62)
After-tax cash flows	$14.90	$15.15	$15.07	$15.28
NPV	($0.06)	$0.78	$0.53	$1.22
Change in decision?	**YES**		**NO**	
Difference in NPV	**$0.84**		**$0.69**	

For the low resource firm, we now find that the tax rate change leads project 3 to shift from being negative NPV to positive NPV. For the high resource firm, in contrast, the tax rate change no longer leads project 3 to shift from being negative to positive NPV—the project is always positive NPV. This differential effect is due to the high resource firm having a lower effective tax rate in a high complexity environment (due to greater tax planning), which decreases the benefit of the tax rate cut. Furthermore, the *change* in project NPV as a result of the tax rate is *greater for the low resource firm*.

Overall, this example demonstrates that when, due to greater resources, firms are better able to take advantage of tax planning opportunities associated with tax complexity, the tax rate cut increases project NPVs to a smaller extent and thus is less likely to induce additional investment in the high tax complexity country. Put differently, under this mechanism, greater resources strengthen the extent to which complexity attenuates the sensitivity of investment to tax rate changes.

C. Background on treatment events and additional analyses

C.1. Identifying treatments events for stacked differences-in-differences design

As discussed in section 4.2, we use instances in which a country announces a tax rate change during our sample period as a treatment event for our stacked differences-in-differences research

design. Consistent with our primary approach, we focus on the announcement of a tax-rate change, which often precedes the effectiveness of the new tax rate. In some cases, a country announces a tax-rate change without specifying the future tax rate. We treat such announcements as treatment events as long as the country specifies the direction of the tax-rate change (i.e., whether the tax rate will decrease or increase), assuming firms will react to such announced tax policy. In the following, we discuss four examples—two tax-rate increase events and two tax-rate decrease events—to illustrate how we determine the treatment timing for the tax rate events included in our analysis.

C.1.1. Tax-rate increase: Slovenia in 2016

In April 2016, the Slovenian government announced an increase in the corporate tax rate from 17% to 20%.[42] The parliament enacted the increase (from 17% to 19%) on October 19, 2016.[43] The law governing the tax rate increase was published in Slovenia's Official Gazette on November 4, 2016; the tax rate increase became effective on January 1, 2017.[44] Since the tax rate increase was announced in 2016, we use 2016 as the treatment event.

C.1.2. Tax-rate increase: South Korea in 2017

In August 2017, the South Korean president announced an increase in the top statutory corporate tax rate from 22% to 25%.[45] The South Korean government enacted the tax-rate increase on December 5, 2017; the new tax rate became effective on January 1, 2017.[46] Since the tax rate decrease was announced in 2016, we use 2016 as the treatment event.

C.1.3. Tax-rate decrease: Belgium in 2016

On April 9, 2016, the Belgian Federal Government announced a significant reduction in the statutory corporate tax rate with the terminal rate yet to be determined.[47] On July 26, 2017, the government reached an agreement and announced that the top statutory corporate tax rate would be reduced to 29% in 2018 and to 25% in 2020, respectively.[48] The Belgian parliament enacted the tax rate change on December 22, 2017;[49] the corresponding law was published in the Belgian Official Gazette on December 29, 2017.[50] The first part of the tax-rate decrease became effective on January 1, 2018. Since the government announced a significant reduction in the tax rate in 2016, we use 2016 as the treatment event.[51]

C.1.4. Tax-rate decrease: Hungary in 2016

In November 2016, the Hungarian Prime Minister announced a reduction in the corporate tax rate

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42 See https://regfollower.com/slovenia-publishes-proposal-for-amendments-to-the-corporate-income-tax-law/.

43 See https://regfollower.com/slovenia-amendments-to-the-corporate-and-individual-income-tax-rates/.

44 See https://www.uradni-list.si/glasilo-uradni-list-rs/vsebina/128124#!/Zakon-o-spremembah-in-dopolnitvah-Zakona-o-davku-od-dohodkov-pravnih-oseb-(ZDDPO-2N).

45 See https://www.fdiintelligence.com/content/611c5cf2-b326-584e-8f50-5f9b5646b3fa.

46 See https://www.straitstimes.com/business/south-korea-raises-top-corporate-tax-rate-as-2018-budget-passed.

47 See https://taxnews.ey.com/news/2016-0673-belgium-announces-corporate-tax-reform.

48 See https://news.pwc.be/belgian-tax-reform-reduces-corporate-rate-to-25-and-introduces-fiscal-consolidation/.

49 See https://vanhavermaet.be/artikels/cijfers/fiscaal-sociaal/belgian-corporate-tax-reform/.

50 See https://www.ejustice.just.fgov.be/cgi/article_body.pl?language=nl&pub_date=2017-12-29&numac=2017014414&caller=summary.

51 Since the terminal rate as a result of the tax-rate cut had not been determined by the end of 2016, we use the pre-reform tax rate of 33% for 2016 in our primary analysis. We apply the announced terminal rate of 25% starting in 2017 (see Table 3).

from 19% to 9%.[52] The draft legislation was submitted to parliament and enacted in December 2016.[53] The tax rate cut became effective on January 1, 2017. Since the tax rate decrease was announced in 2016, we use 2016 as the treatment event.[54]

C.2. Analysis of country-years to assess applicability of the top statutory corporate tax rate

As discussed in section 4.3.3, we re-estimate our analyses after dropping observations from countries that have either a progressive corporate tax system or offer a reduced corporate tax rate for certain types of firms. We conduct this robustness test because such observations might not be subject to the top statutory tax rate used in our primary analysis. To identify the respective observations, we draw on information in EY's annual Worldwide Corporate Tax Guides.[55] The results in columns 3 and 4 of Table OA-7 are consistent with our primary findings reported in Table 4 (see Section C.3.4 for additional details).

Additionally, we determine how often the average mid-sized firm in our sample is likely subject to the top statutory corporate tax rate. We examine this type of firm because (i) our primary measure for tax system complexity captures tax complexity from the perspective of the average mid-sized firm in a country-year and (ii) our primary analysis leverages changes in top statutory corporate tax rates for identification.

To conduct this analysis, we proceed in two steps:

- First, if there is no reduced corporate tax rate in a country-year (i.e., the country applies one proportional tax rate on total corporate income), we assume the average mid-sized firm is subject to the top statutory corporate tax rate.
- Second, if there is a reduced corporate tax rate in a country-year, we identify mid-sized firms by limiting the sample to firms in the middle two size quartiles (i.e., the second and third quartile in terms of total assets) for each country-year. For these firms, we calculate the mean for the metrics that qualifies them for the reduced tax rate (e.g., sales, pre-tax income, employees, etc.) and assess whether the top statutory corporate tax rate applies.[56]

When using this approach, we observe that the top statutory corporate tax rate is likely to apply to the average mid-sized firm in 184 of the 196 country-years included in our sample (= 94%). This analysis further supports our approach of focusing on changes in the top statutory corporate tax rate in our primary analysis.

C.3. Other robustness tests

C.3.1. First difference specification

In Table OA-4, we estimate a first differenced version of equation 1 (with the exception of *Tax*

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52 See https://www.ft.com/content/302fa4b4-acda-11e6-9cb3-bb8207902122.

53 See https://www.taxathand.com/article/10530/Hungary/2016/2017-tax-bill-passed-including-corporate-tax-rate-reduction/legal.

54 See https://regfollower.com/hungary-amendments-to-the-tax-law-submitted-to-the-parliament/.

55 See https://www.ey.com/en_gl/technical/tax-guides/worldwide-corporate-tax-guide.

56 The requirements to qualify for a reduced corporate income tax rate vary across countries. Some countries have size-based thresholds (e.g., Croatia or Poland), others provide a lower tax rate for initial levels of taxable income (e.g., Belgium, Hungary, Netherlands, Luxembourg, etc.) while a third group of countries combines both requirements (e.g., France or Lithuania (which focus on the number of employees).

Complexity, which is still included in levels). The benefit of this approach is that it more directly captures the impact of changes in tax rates. However, the drawback is that we lose an additional sample year. We continue to find that tax system complexity attenuates the association between capital investment and tax rate changes, consistent with our findings in Table 4.[57]

C.3.2. Alternative capital investment measures

In Table OA-5, we re-estimate our primary analysis (Table 4) but use different measures of capital investment as the dependent variable, including *Capital Investment Gross*, *Total Capital Investment*, *Total Capital Investment Gross*, and Δ *Tangible Fixed Assets*. We compute *Capital Investment Gross* as tangible fixed assets in year *t* less tangible fixed assets in year *t-1* adjusted for depreciation in year *t*, scaled by lagged total assets. Adjusting for annual depreciation in this way allows us to use a measure of gross capital investment. *Total Capital Investment* is a broader measure, capturing not only capital investment but also financial investment (e.g., via M&A) and capitalized investment in intangible assets (Amberger, Markle, and Samuel 2021). We calculate the measure as fixed assets in year *t* less fixed assets in year *t-1*, scaled by lagged total assets. We also adjust this measure for depreciation in year *t* (*Total Capital Investment Gross*). Lastly, we calculate Δ *Tangible Fixed Assets* as the natural logarithm of tangible fixed assets in year *t* less the natural logarithm of tangible fixed assets in year *t-1*. Such a measure addresses the concern that variation in the denominator (lagged total assets) could drive our results. Using each of these alternative investment measures, we find inferences similar to those in our main analyses.

C.3.3. Current statutory corporate tax rate

In our primary tests, we employ the announced statutory corporate tax rate, with the idea being that firms will likely evaluate the NPV of an investment project using the tax rate that is likely applicable for the majority of the investment's useful life. However, it is possible that firms instead use the current statutory corporate tax rate, ignoring the changes that have been announced until they become effective. In Table OA-6, we re-estimate our primary analyses using the top statutory corporate tax rate effective in year *t*. We find that the coefficients on *Tax Rate* (*Tax Rate* × *Tax Complexity*) remain significantly negative (positive), mitigating concerns that using announced, as opposed to currently effective, corporate tax rates drives our results.

C.3.4. Alternative samples

In Table OA-7, we examine the robustness of our primary results to several alternative sample criteria. In column 1, we drop observations from Italy, Spain, and France, which are the three largest contributors (in terms of number of observations) to our sample. In column 2, we drop observations from Bulgaria, which is somewhat of an outlier in tax system complexity. In column 3, we drop observations from countries that have either a progressive corporate tax system or offer reduced corporate tax rates for certain types of firms, as these observations may not be subject to the top statutory corporate tax rate. In column 4, we drop observations in the bottom and top size quartile (in terms of total assets) within each country-year, as these observations may experience tax system complexity differently than the average mid-sized firm. Across all columns, we continue to find that tax system complexity attenuates the sensitivity of investment to tax rate

[57] In untabulated analyses, we re-estimate equation 1 using changes in tax rates while including the remaining variables in levels. The coefficient on Δ*Tax Rate* × *Tax Complexity* remains positive but is statistically weaker ($p = 0.22$). The weakened significant is potentially attributable to the fact that this approach regresses investment in its level form on the change in the tax rate.

changes, consistent with our main findings.

C.3.5. Alternative clustering strategies

In untabulated tests, we employ alternative clustering strategies. We find that clustering standard errors at the firm-level leads to similar inferences as those in Table 4. When clustering at the country-level, we find slightly weaker results for the coefficient on *Tax Rate* × *Tax Complexity* (in a statistical sense, two-tailed *t*-stat of 1.314). This weaker result may relate to the relatively low number of clusters in our setting (i.e., there are only 28 countries in our main sample) (Petersen 2009).

C.3.6. Cost-of-goods sold and total labor costs

One potential issue with our labor investment tests in Table 9 is that total wages may not capture the total labor costs if some of these costs are instead included in cost-of-goods sold (COGS). Our understanding is that EU firms (which make up the vast majority of our sample) are likely reporting costs by "nature" in their profit and loss statements (and thus separately reporting total staff costs), as opposed to reporting by function (where wage costs would be included in COGS). Consistent with this assumption, only 13% of our sample reports COGS. In Table OA-9, we find similar inferences if we limit the sample for the labor investment tests to (i) firms that do not report COGS (and thus likely report by "nature") and (ii) EU firms, which do not report COGS (these firms should be reporting by "nature" according to EU Directive 2013/34/EU), suggesting that this source of measurement error is unlikely to affect these inferences.

D. Additional figures

Figure OA-1: Country-level average tax complexity (sample period: 2013-2019)

This figure shows the country-level average *Tax Complexity* for our primary sample. *Tax Complexity* is the country's time to pay tax (in hours per year) based on the World Bank Doing Business survey. We calculate average *Tax Complexity* for the period 2013 through 2019. We order country by tax complexity.

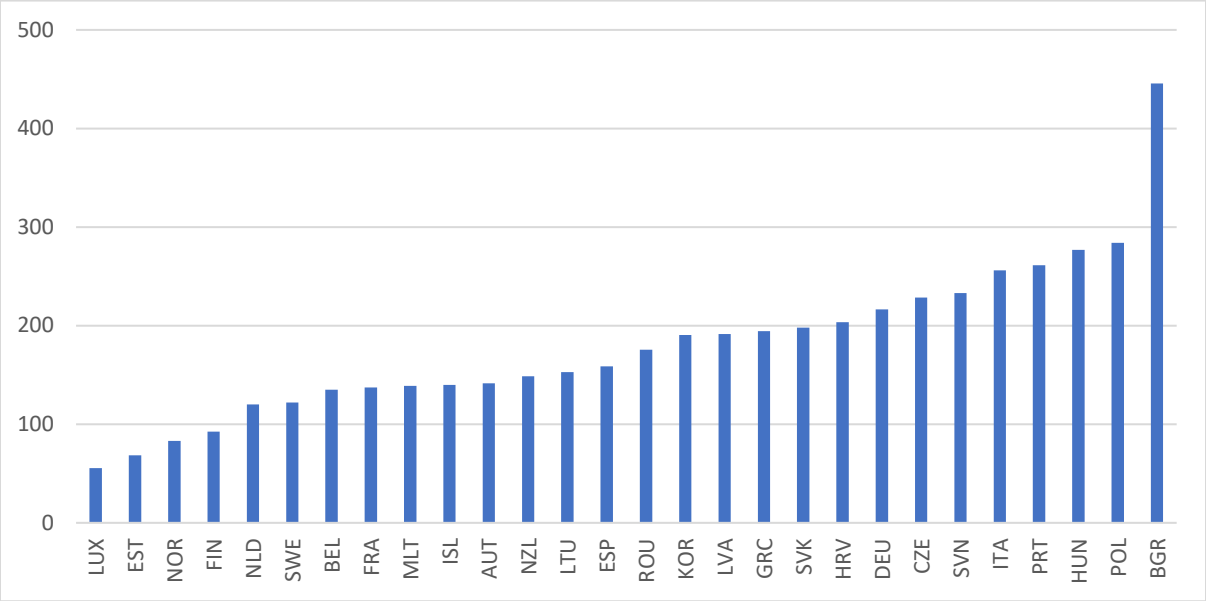


Figure OA-2: Stacked difference-in-differences design – treatment dynamics for average effect (non-entropy balanced sample)

This figure shows annual treatment effects after re-estimating Figure 2 using a non-entropy balanced sample. Treatment effects indicate the difference in capital investment between treated firms (i.e., firms located in a country with an announced tax rate change) and control firms (i.e., firms located in a country without a tax rate change). We measure annual treatment effects relative to the year prior to the announcement of the tax rate change (i.e., year t-1). Whisker bars represent 95 percent confidence intervals.

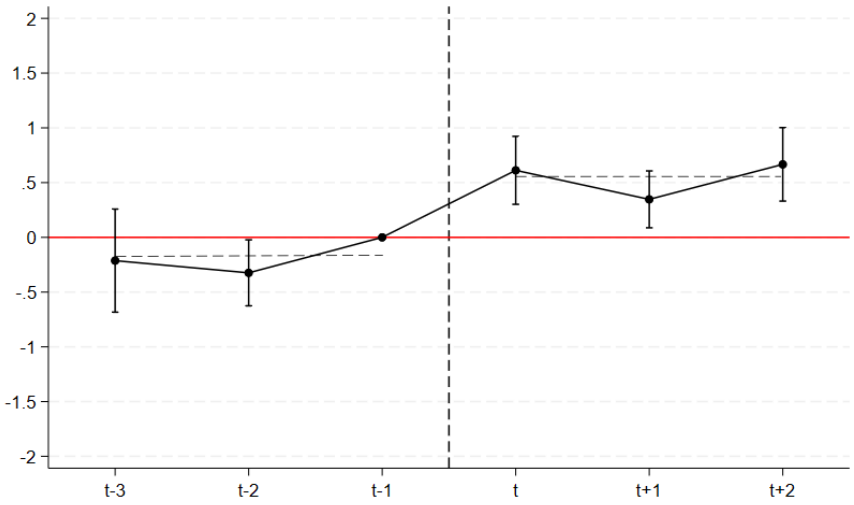
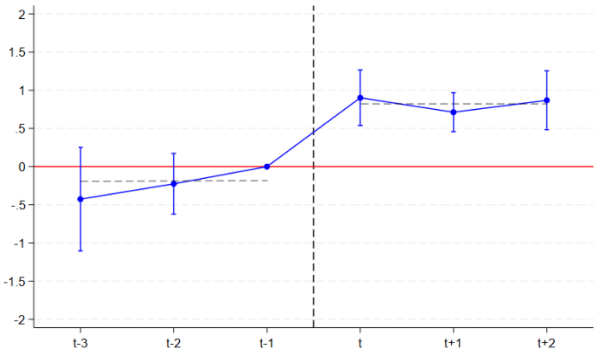


Figure OA-3: Stacked difference-in-differences design – treatment dynamics for treatment countries with low versus high tax complexity (non-entropy balanced sample)

This figure shows annual treatment effects after re-estimating Figure 3 using a non-entropy balanced sample. Treatment effects indicate the difference in capital investment between treated firms (i.e., firms located in a country with an announced tax rate change) and control firms (i.e., firms located in a country without a tax rate change). Panel a (b) plots the treatment effects for treatment countries with tax complexity below the median (above the median) in the year prior to the treatment event. We measure annual treatment effects relative to the year prior to the announcement of the tax rate change (i.e., year t-1). Whisker bars represent 95 percent confidence intervals.

(a) Low tax complexity



(b) High tax complexity

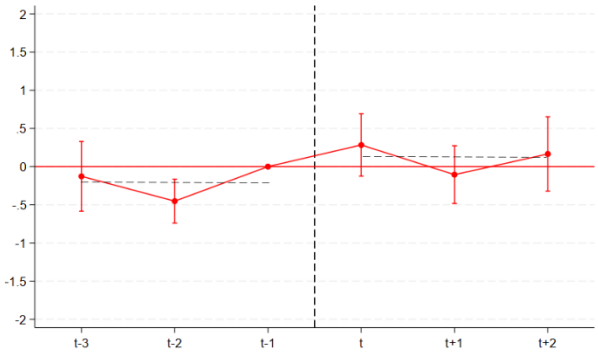


Figure OA-4: Stacked difference-in-differences design – treatment dynamics for average effect (entropy balanced sample excluding Greece)

This figure shows annual treatment effects after re-estimating Figure 2 using an entropy balanced sample, excluding the 2016 tax-rate increase in Greece as a treatment event. Treatment effects indicate the difference in capital investment between treated firms (i.e., firms located in a country with an announced tax rate change) and control firms (i.e., firms located in a country without a tax rate change). We measure annual treatment effects relative to the year prior to the announcement of the tax rate change (i.e., year t-1). Whisker bars represent 95 percent confidence intervals.

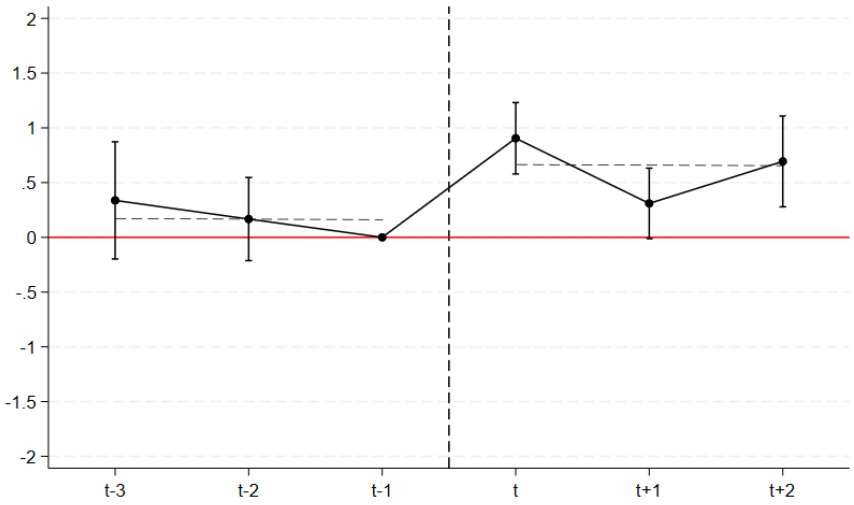
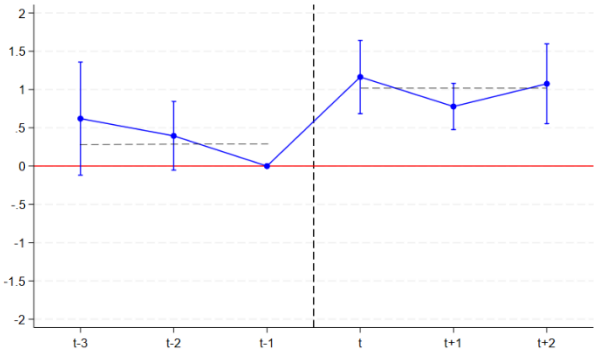


Figure OA-5: Stacked difference-in-differences design – treatment dynamics for treatment countries with low versus high tax complexity (entropy balanced sample excluding Greece)

This figure shows annual treatment effects after re-estimating Figure 3 using an entropy balanced sample, excluding the 2016 tax-rate increase in Greece as a treatment event. Treatment effects indicate the difference in capital investment between treated firms (i.e., firms located in a country with an announced tax rate change) and control firms (i.e., firms located in a country without a tax rate change). Panel a (b) plots the treatment effects for treatment countries with tax complexity below the median (above the median) in the year prior to the treatment event. We measure annual treatment effects relative to the year prior to the announcement of the tax rate change (i.e., year t-1). Whisker bars represent 95 percent confidence intervals.

(a) Low tax complexity



(b) High tax complexity

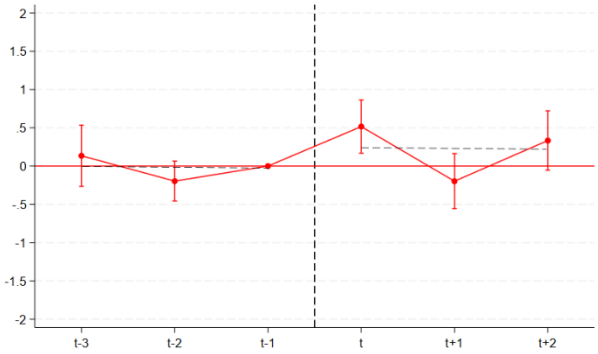


Figure OA-6: Stacked difference-in-differences design – treatment dynamics for average effect (entropy balanced sample including Poland)

This figure shows annual treatment effects after re-estimating Figure 2 using an entropy balanced sample, including Poland as a control country. Treatment effects indicate the difference in capital investment between treated firms (i.e., firms located in a country with an announced tax rate change) and control firms (i.e., firms located in a country without a tax rate change). We measure annual treatment effects relative to the year prior to the announcement of the tax rate change (i.e., year t-1). Whisker bars represent 95 percent confidence intervals.

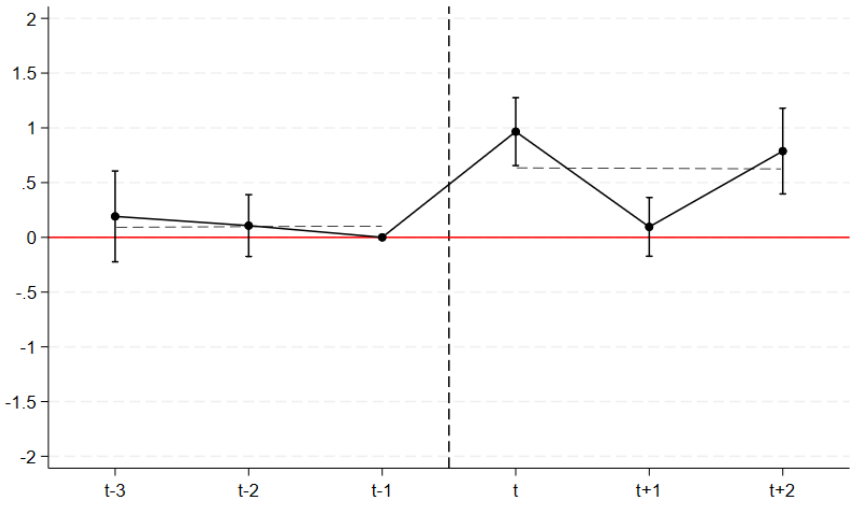
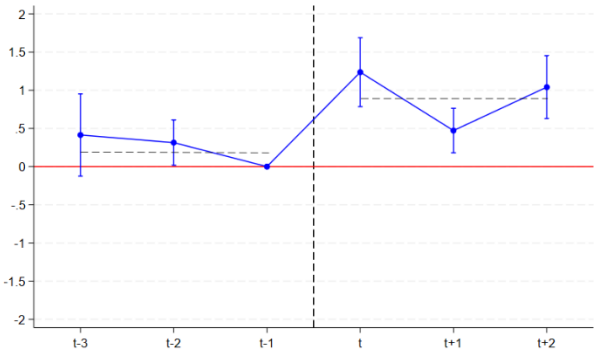


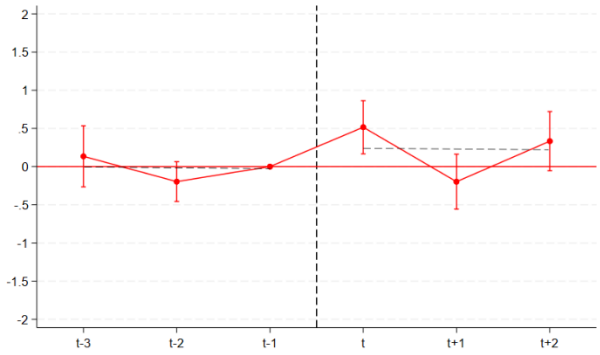
Figure OA-7: Stacked difference-in-differences design – treatment dynamics for treatment countries with low versus high tax complexity (entropy balanced sample including Poland)

This figure shows annual treatment effects after re-estimating Figure 3 using an entropy balanced sample, including Poland as a control country. Treatment effects indicate the difference in capital investment between treated firms (i.e., firms located in a country with an announced tax rate change) and control firms (i.e., firms located in a country without a tax rate change). Panel a (b) plots the treatment effects for treatment countries with tax complexity below the median (above the median) in the year prior to the treatment event. We measure annual treatment effects relative to the year prior to the announcement of the tax rate change (i.e., year t-1). Whisker bars represent 95 percent confidence intervals.

(a) Low tax complexity



(b) High tax complexity



E. Additional tables

Table OA-1: Stacked difference-in-differences design – non-entropy balanced sample

This table presents regression results for the effect of tax complexity on the sensitivity of investment to the tax rate using a stacked difference-in-differences design. We re-estimate the regressions reported in Table 5, but do not entropy balance treatment and control observations prior to estimating regressions. We report t-statistics in parenthesis, based on standard errors clustered by country-industry. *, **, and *** represent significance levels of 10%, 5%, and 1%, respectively (two-tailed).

	(1)	(2)	(3)	(4)
Dependent variable:	*Capital Investment*	*Capital Investment*	*Capital Investment*	*Capital Investment*
Sample:	*Full Sample*	*w/o small Tax Rate Change*	*Full Sample*	*w/o small Tax Rate Change*
Treat × *Post*	0.700***	0.801***		
	(5.136)	(5.835)		
Treat (LowTaxComplexity) × *Post*			0.929***	1.040***
			(5.049)	(6.175)
Treat (HighTaxComplexity) × *Post*			0.435***	0.446**
			(2.800)	(2.370)
Treat (LowTaxComplexity) × *Post* = *Treat (HighTaxComplexity)* × *Post*			$p = 0.03$	$p = 0.01$
Controls	YES	YES	YES	YES
Entropy Balancing	NO	NO	NO	NO
Observations	2,617,140	2,350,518	2,617,140	2,350,518
Adjusted R-squared	0.098	0.096	0.098	0.096
Firm × Cohort FE	YES	YES	YES	YES
Industry × Year × Cohort FE	YES	YES	YES	YES

Table OA-2: Stacked difference-in-differences design – entropy balanced sample excluding Greece

This table presents regression results for the effect of tax complexity on the sensitivity of investment to the tax rate using a stacked difference-in-differences design. We re-estimate the regressions reported in Table 5 but exclude the 2016 tax-rate increase in Greece as a treatment event. We entropy balance treatment and control observations prior to estimating regressions. We report t-statistics in parenthesis, based on standard errors clustered by country-industry. *, **, and *** represent significance levels of 10%, 5%, and 1%, respectively (two-tailed).

	(1)	(2)	(3)	(4)
Dependent variable:	*Capital Investment*	*Capital Investment*	*Capital Investment*	*Capital Investment*
Sample:	*Full Sample*	*w/o small Tax Rate Change*	*Full Sample*	*w/o small Tax Rate Change*
Treat × *Post*	0.545***	0.611***		
	(4.277)	(4.657)		
Treat (LowTaxComplexity) × *Post*			0.751***	0.843***
			(4.234)	(5.001)
Treat (HighTaxComplexity) × *Post*			0.242	0.156
			(1.437)	(0.751)
Treat (LowTaxComplexity) × *Post* = *Treat (HighTaxComplexity)* × *Post*			$p = 0.04$	$p = 0.02$
Controls	YES	YES	YES	YES
Entropy Balancing	YES	YES	YES	YES
Observations	2,380,296	2,113,674	2,380,296	2,113,674
Adjusted R-squared	0.105	0.103	0.105	0.103
Firm × Cohort FE	YES	YES	YES	YES
Industry × Year × Cohort FE	YES	YES	YES	YES

Table OA-3: Stacked difference-in-differences design – entropy balanced sample including Poland

This table presents regression results for the effect of tax complexity on the sensitivity of investment to the tax rate using a stacked difference-in-differences design. We re-estimate the regressions reported in Table 5 but include Poland as a control country. We entropy balance treatment and control observations prior to estimating regressions. We report t-statistics in parenthesis, based on standard errors clustered by country-industry. *, **, and *** represent significance levels of 10%, 5%, and 1%, respectively (two-tailed).

	(1)	(2)	(3)	(4)
Dependent variable:	*Capital Investment*	*Capital Investment*	*Capital Investment*	*Capital Investment*
Sample:	*Full Sample*	*w/o small Tax Rate Change*	*Full Sample*	*w/o small Tax Rate Change*
Treat × *Post*	0.583***	0.668***		
	(4.966)	(5.459)		
Treat (LowTaxComplexity) × *Post*			0.799***	0.887***
			(4.634)	(5.356)
Treat (HighTaxComplexity) × *Post*			0.286**	0.256
			(1.998)	(1.457)
Treat (LowTaxComplexity) × *Post* = *Treat (HighTaxComplexity)* × *Post*			$p = 0.02$	$p = 0.01$
Controls	YES	YES	YES	YES
Entropy Balancing	YES	YES	YES	YES
Observations	3,098,172	2,778,102	3,098,172	2,778,102
Adjusted R-squared	0.107	0.105	0.107	0.105
Firm × Cohort FE	YES	YES	YES	YES
Industry × Year × Cohort FE	YES	YES	YES	YES

Table OA-4: First difference specification

This table presents results for the effect of tax system complexity on the sensitivity of investment to the tax rate using a first-difference specification. The samples in all columns include observations for the years 2014 to 2019. The dependent variable is Δ *Capital Investment*, measured as the first difference of the annual change in tangible fixed assets scaled by lagged total assets. The main independent variable of interest is Δ *Tax Rate* × *Tax Complexity*. Δ *Tax Rate* is the annual change in a country's announced corporate tax rate. *Tax Complexity* is the country's average time to pay tax (in hours per year) based on the World Bank Doing Business survey. We standardize *Tax Complexity* to have a mean of zero and a standard deviation of one in the regression sample. Firm-level control variables are lagged by one year. All regressions include industry-year fixed effects. The regressions in columns 2 and 4 additionally include firm fixed effects. All variables are defined in the appendix. We report t-statistics in parenthesis, based on standard errors clustered by country-industry. *, **, and *** represent significance levels of 10%, 5%, and 1%, respectively (two-tailed).

	(1)	(2)		
Dependent variable:	Δ *Capital Investment*	Δ *Capital Investment*	Δ *Capital Investment*	Δ *Capital Investment*
Δ *Tax Rate*	-0.060***	-0.066***	-0.035**	-0.044**
	(-4.003)	(-4.174)	(-2.103)	(-2.275)
Tax Complexity			-0.015	-0.471*
			(-0.669)	(-1.671)
Δ *Tax Rate* × *Tax Complexity*			0.056***	0.068***
			(3.955)	(3.743)
Δ *Leverage*	-0.108***	-0.119***	-0.108***	-0.119***
	(-14.539)	(-14.443)	(-14.547)	(-14.455)
Δ *RoA*	0.011**	0.005	0.011**	0.005
	(2.536)	(1.170)	(2.533)	(1.160)
Δ *Size*	-2.512***	-2.646***	-2.512***	-2.646***
	(-9.405)	(-8.614)	(-9.414)	(-8.613)
Δ *Cash*	0.027***	0.024***	0.027***	0.024***
	(7.781)	(6.533)	(7.790)	(6.518)
Δ *Capital Intensity*	-0.487***	-0.536***	-0.487***	-0.536***
	(-31.792)	(-31.807)	(-31.798)	(-31.792)
Δ *GDP Growth*	0.173***	0.182***	0.167***	0.184***
	(2.696)	(2.991)	(2.713)	(3.100)
Δ *Inflation*	0.556***	0.605***	0.555***	0.616***
	(7.943)	(8.188)	(8.028)	(8.618)
Δ *Unemployment*	-0.032	-0.064	-0.045**	-0.091
	(-1.506)	(-1.062)	(-2.061)	(-1.481)
Δ *GDP per Capita*	-2.689*	-1.377	-2.403	-1.141
	(-1.721)	(-0.742)	(-1.604)	(-0.679)
Observations	2,502,960	2,502,960	2,502,960	2,502,960
Adjusted R-squared	0.151	0.029	0.151	0.029
Firm FE	NO	YES	NO	YES
Industry × Year FE	YES	YES	YES	YES

Table OA-5: Alternative measures for capital investment

This table presents results for robustness tests using alternative measures for capital investment: *Capital Investment Gross*, *Total Capital Investment*, *Total Capital Investment Gross*, and Δ *Tangible Fixed Assets*. We re-estimate the regression reported in Table 4, column 2. We report t-statistics in parenthesis, based on standard errors clustered by country-industry. *, **, and *** represent significance levels of 10%, 5%, and 1%, respectively (two-tailed).

	(1)	(2)	(3)	(4)
Dependent variable:	*Capital Investment Gross*	*Total Capital Investment*	*Total Capital Investment Gross*	Δ *Tangible Fixed Assets*
Tax Rate	-0.049*	-0.067*	-0.053	-0.268***
	(-1.666)	(-1.862)	(-1.486)	(-4.887)
Tax Complexity	-1.584***	-1.443**	-2.055***	-2.563**
	(-2.989)	(-2.337)	(-3.114)	(-2.395)
Tax Rate × Tax Complexity	0.070***	0.042**	0.085***	0.078*
	(4.600)	(2.500)	(4.596)	(1.776)
Controls	YES	YES	YES	YES
Observations	2,749,064	2,920,089	2,749,037	2,920,120
Adjusted R-squared	0.246	0.165	0.231	0.050
Firm FE	YES	YES	YES	YES
Industry × Year FE	YES	YES	YES	YES

Table OA-6: Alternative tax rate measures

This table presents results for robustness tests using alternative tax rate measures. We re-estimate the regressions reported in Table 4 but use a country's currently effective corporate tax rate. We report t-statistics in parenthesis, based on standard errors clustered by country-industry. *, **, and *** represent significance levels of 10%, 5%, and 1%, respectively (two-tailed).

	(1)	(2)
Dependent variable:	*Capital Investment*	*Capital Investment*
Tax rate measure:	*Tax Rate Effective*	*Tax Rate Effective*
Tax Rate	-0.077**	-0.069***
	(-2.521)	(-3.020)
Tax Complexity		-0.569
		(-1.580)
Tax Rate × Tax Complexity		0.049***
		(3.290)
Controls	YES	YES
Observations	2,920,120	2,920,120
Adjusted R-squared	0.128	0.128
Firm FE	YES	YES
Industry × Year FE	YES	YES

Table OA-7: Alternative samples

This table presents results for the effect of tax system complexity on the sensitivity of capital investment to the tax rate using alternative samples. We re-estimate the regression reported in Table 4, column 2. In column 1 (2), we exclude observations from Italy, France, and Spain (Bulgaria). In column 3, we exclude observations from countries that have either a progressive corporate tax system or offer reduced corporate tax rates for certain types of firms at least once during our sample period. In column 4, we additionally exclude observations in the bottom and top size quartile (in terms of total assets) within each country-year. We report t-statistics in parenthesis, based on standard errors clustered by country-industry. *, **, and *** represent significance levels of 10%, 5%, and 1%, respectively (two-tailed).

	(1)	(2)	(3)	(4)
Dependent variable:	*Capital Investment*	*Capital Investment*	*Capital Investment*	*Capital Investment*
Sample:	*Drop: Italy, France, and Spain*	*Drop: Bulgaria*	*Drop: Countries with Reduced CIT Rates*	*Drop: Countries with Reduced CIT Rates and Small and Large Firms*
Tax Rate	-0.106***	-0.060**	-0.104***	-0.043*
	(-3.453)	(-2.044)	(-4.003)	(-1.904)
Tax Complexity	-1.123**	-0.699*	-0.961***	-0.392
	(-2.205)	(-1.698)	(-2.870)	(-1.597)
Tax Rate × Tax Complexity	0.114***	0.021**	0.091***	0.048***
	(2.826)	(2.157)	(3.777)	(3.047)
Controls	YES	YES	YES	YES
Observations	1,233,596	2,773,036	1,771,056	2,271,605
Adjusted R-squared	0.141	0.127	0.125	0.130
Firm FE	YES	YES	YES	YES
Industry × Year FE	YES	YES	YES	YES

Table OA-8: Decile ranked and non-standardized values of *Tax Complexity*

This table presents results for robustness tests using decile ranked and non-standardized values of *Tax Complexity*. In column 1, we re-estimate the regression reported in Table 4, column 2 but use the decile ranks of *Tax Complexity* in our sample. We standardize *Tax Complexity* to have a mean of zero and a standard deviation of one in the regression sample. In columns 2 (3), we re-estimate the regression reported in Table 4, column 2 but demean *Tax Rate* and *Tax Complexity* to have a mean of zero in the regression sample (demean *Tax Rate* and use the raw values of *Tax Complexity*). *, **, and *** represent significance levels of 10%, 5%, and 1%, respectively (two-tailed).

	(1)	(2)	(3)
Dependent variable:	*Capital Investment*	*Capital Investment*	*Capital Investment*
Tax complexity measure:	*Decile Ranked*	*Demeaned*	*Raw*
Tax Rate	-0.080**	-0.058**	-0.144***
	(-2.554)	(-2.001)	(-3.600)
Tax Complexity	-0.752***	-0.014**	-0.014**
	(-2.963)	(-2.287)	(-2.287)
Tax Rate × *Tax Complexity*	0.018**	0.000**	0.000**
	(2.129)	(2.587)	(2.587)
Controls	YES	YES	YES
Observations	2,920,120	2,920,120	2,920,120
Adjusted R-squared	0.128	0.128	0.128
Firm FE	YES	YES	YES
Industry × Year FE	YES	YES	YES

Table OA-9: Additional analyses: Labor investment

This table presents results for robustness tests of the effect of tax complexity on the sensitivity of labor investment to the tax rate. We re-estimate the regressions reported in Table 9. In columns 1 and 3, we exclude observations with non-missing cost of goods sold (COGS). In columns 2 and 4, we additionally limit the sample to firms located in an EU country. We report t-statistics in parenthesis, based on standard errors clustered by country-industry. *, **, and *** represent significance levels of 10%, 5%, and 1%, respectively (two-tailed).

	(1)	(2)	(3)	(4)
Dependent variable:	*Labor Investment*	*Labor Investment*	*Labor Investment*	*Labor Investment*
Sample:	*Missing COGS*	*Missing COGS and EU Countries*	*Missing COGS*	*Missing COGS and EU Countries*
Tax Rate	-0.467***	-0.466***	-0.314***	-0.311***
	(-9.120)	(-9.193)	(-4.502)	(-3.841)
Tax Complexity			-2.699**	-1.492
			(-2.269)	(-1.315)
Tax Rate × Tax Complexity			0.332***	0.224***
			(6.722)	(4.901)
Controls	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Industry × Year FE	YES	YES	YES	YES
Observations	2,374,719	2,186,650	2,374,719	2,186,650
Adjusted R-squared	0.106	0.105	0.106	0.105

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