What shapes corporate tax policy?

Alissa I. Brühne, Martin Jacob, and Harm H. Schütt*

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Keywords: tax policy, business changes, tax avoidance

JEL Classification: M48, H25, H26

Data Availability: data sources are identified in the manuscript.

* Brühne is at LMU Munich (bruehne@bwl.lmu.de), Jacob is at WHU – Otto Beisheim School of Management (martin.jacob@whu.edu), and Schütt is at Tilburg University (H.H.Schutt@uvt.nl). We thank Thorben Wulff for excellent research assistance.

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1 Introduction

In this paper, we examine the trends in corporate tax policy in OECD countries over the past two decades and the role of business changes in shaping corporate tax policy. Corporate tax policy has important macroeconomic consequences, for example, on growth (Romer and Romer 2010; Barro and Redlick 2011; Mertens and Ravn 2013) or corporate tax revenues (Auerbach and Poterba 1987; Goncharov and Jacob 2014). Hence, what drives tax regulation is of special interest to policymakers, practitioners, and researchers alike. We contribute to the literature by examining the determinants of countries' corporate tax policy design choices. While there is a large literature on tax competition via statutory corporate tax rates (e.g., Kanbur and Keen 1993; Slemrod 2004; Devereux, Lockwood, and Redoano 2008), little is known about what shapes corporate tax policy that strives to incentivize investments (e.g., bonus depreciation schemes) or to combat tax avoidance (e.g., thin-capitalization rules). We therefore take a broad view of corporate tax policy and examine not only why countries set certain tax rates, but also what shapes countries' decision to set tax-related investment incentives or anti-tax avoidance rules.

One major challenge in empirically analyzing tax policy is the issue of simultaneity (e.g., Devereux et al. 2008). Since countries compete for mobile capital, one country might react to tax policy changes of another country and vice versa. It is thus hard to isolate the causes for tax policy changes, as one requires country-specific variation in the incentive to adjust tax policy. We propose that large business changes induce such country-specific variation. Since countries differ in their industry composition, there is substantial cross-country variation in the exposure to global business changes. Further, business changes could trigger tax policy adjustments because changes in corporate business models may not only change firms' input factors (and thus investment distortions) but also key costs in countries' tax competition game (e.g., mobility costs, cost of

capital, or costs associated with determining the nexus of taxation). In other words, technological change and corporate innovation can lead to a mismatch between current tax policies and new economic realities, to which policymakers respond by adjusting corporate tax policy (Desai and Hines 2004).

To study tax policy reactions to business changes, we construct a measure for country-specific exposure to business changes of U.S. industries. This approach offers several benefits and addresses the issue of simultaneity. First, it gives us a long time-series of business changes in specific industries. As countries differ in the exposure to certain industries, our measure captures cross-country variation in exposure to business changes. Second, we assume that given the role of the U.S. in the global economy, U.S. business changes are likely representative of global business changes. Third, it is unlikely that tax policies in other countries drive U.S. business changes.[1] To construct our proxy for industry-specific business changes, we measure the proportion of information and communication technology (ICT) jobs in every U.S. industry using U.S. census data. We define large business changes as an annual increase in the proportion of ICT jobs of more than 1.5 percentage points that does not fully reverse over the subsequent period. We then construct annual measures of each country's exposure to business changes by weighting the U.S. industry business changes with the importance of the respective industry in that country.

To operationalize countries' tax policy choices, we construct measures for three different tax policy dimensions. First, we follow prior literature and collect data on statutory tax rates (e.g., Slemrod 2004; Devereux et al. 2008; Vegh and Vuletin 2015). Second, we collect data on nine tax base elements, such as loss offset rules or bonus depreciation, and construct an index capturing investment incentives induced by corporate tax rules. Prior literature shows that corporate

[1] We test this reverse assumption empirically. We find no indication that tax policies of OECD countries (excluding the U.S.) shape business changes in the U.S.

investment is indeed affected by loss offset rules (e.g., Ljungqvist, Zhang, and Zuo 2017; Bethmann, Jacob, and Müller 2018) and bonus depreciation (e.g., Zwick and Mahon 2017). Third, we construct an index consisting of nine items capturing anti-tax avoidance rules. Among others, these nine items comprise thin-capitalization rules and transfer pricing regimes designed to reduce international profit shifting (e.g., Buettner, Overesch, Schreiber, and Wamser 2012; or the review by Dharmapala 2014). Our final sample comprises 34 OECD countries and covers a period of 21 years (1996-2016).[2]

Our empirical analysis proceeds in four steps. First, we present descriptive evidence on our three tax policy measures. While we observe a considerably positive trend towards stricter anti-tax avoidance rules and a clear decline in statutory tax rates for our sample countries, we do not find a clear time trend for traditional investment incentives. Irrespective of these general trends, we do not observe that rules are converging across countries: the variation across countries in each of the three tax policy dimensions remains high or even increases slightly over time.

Second, we employ a lead-lag design and find that business change exposure incrementally predicts positive changes in anti-tax avoidance rules, while there is no statistically significant relation between business changes and changes in the other two tax policy dimensions (i.e., statutory tax rates and investment incentives). This evidence is consistent with the notion that business changes raise firms' opportunities to shift income into low-tax countries via intangibles or labor location decisions (e.g., Drake, Goldman, and Murphy 2018). To adequately react to these shifting activities, countries tighten their anti-tax avoidance rules. At the same time, traditional investment incentive policies such as accelerated depreciation schemes for tangible assets are used less frequently by policymakers. Our findings thus provide evidence for the argument by Desai

[2] Our sample does not cover all OECD countries due to limited data availability. We also exclude the U.S. (due to potential endogeneity issues of business changes) and Estonia (due to a corporate tax of 0% if profits are retained).

and Hines (2004) that spurring corporate investment via traditional investment channels has frustrated policymakers in the recent past.

Third, we examine cross-country differences in the response to large business changes. The literature on tax competition argues that contextual factors can lead to cross-sectional variation in tax policy design (Bucovetsky 1991; Wilson 1991). If this is the case, the average reaction to business changes, which we report in our main specification, could hide important competitive dynamics between countries. We therefore rerun our main regression and account for cross-sectional variation in countries' size and their competitive position. Our findings indicate that smaller countries deviate from the general trend towards stricter anti-tax avoidance rules and react significantly less to business changes than larger countries. In other words, smaller countries appear to compete for mobile capital by not following the general trend towards stricter anti-tax avoidance rules. We do not find significant incremental associations between past business changes and the other two tax policy variables. Our findings are consistent with smaller countries striving for less salient, indirect investment incentives in the global competition for mobile capital. By setting less strict anti-tax avoidance rules, small countries provide firms more flexibility and more opportunities to reduce their effective tax payments. This likely serves as an indirect investment incentive for firms.

In a second set of cross-sectional tests, we provide additional evidence that countries might use anti-tax avoidance rules strategically to compete for mobile capital. We find that relative to geographically close competitor countries, countries with historically less stringent anti-tax avoidance rules react less to business changes. Put differently, if geographically close competitor countries enforce stricter tax avoidance rules, one way to secure capital inflows might be to offer firms relatively more tax planning flexibility.

In the final step, we examine two mechanisms that can explain why countries respond to business changes by adjusting anti-tax avoidance rules. First, we examine how listed firms in our sample countries respond to U.S. business changes. One trigger for tax policy changes following business changes is that firms adjust their investment behavior and change their factor inputs. Using data on listed firms from Compustat Global, we find that following large business changes, firms reduce tangible investments and decrease their capital-to-labor ratios. In other words, labor input appears to become more important for firms. Hence, the necessity of policymakers to "fix" the distortions of capital investments via traditional investment incentives decreases. Instead, policymakers respond to potential tax distortions via tax avoidance incentives related to labor input. Since anti-tax avoidance rules are mostly related to intangibles created by high-skilled labor, firms' real responses (more labor input) are consistent with countries' tax policy responses (adjusting anti-tax avoidance rules).

The second potential mechanism that can explain why countries adjust anti-tax avoidance rules instead of tax rates relates to the salience of different tax policy tools. Tax rates are very salient and can easily be understood by the public. Due to this salience, tax rate cuts might have a higher chance of triggering undesired tax justice debates. In contrast, anti-tax avoidance rules are often complex and thus not well understood by the public. To illustrate this point, we show that around the U.S. Tax Cuts and Jobs Act of 2017, the tax rate cut received considerably more media attention than the broad set of adjusted or newly introduced anti-tax avoidance rules.

Our paper contributes to the literature in several ways. First, we contribute to the literature on the role of tax competition for tax policy design and the race-to-the-bottom phenomenon (e.g., Kanbur and Keen 1993; Haufler and Schjelderup 2000; Kind, Knarvik, and Schjelderup 2000; Devereux et al. 2008; Devereux 2012). Specifically, our results indicate that recent trends in

technological development have changed the way countries compete for businesses and tax revenues. Prior literature suggests that countries compete via statutory tax rate levels (e.g., Slemrod 2004; Devereux et al. 2008). However, at least in response to business changes, this no longer seems to be the case. Instead, our results show that, following large business changes, smaller countries compete for mobile capital by setting less stringent anti-tax avoidance rules, while larger countries use stricter anti-tax avoidance rules to preserve tax revenues. Hence, despite harmonization efforts of the OECD Base Erosion Profit Shifting (BEPS) initiative, countries will set the rules, i.e., the anti-tax avoidance rules as indicated by our results, in a way that caters national interests.[3] Thus, we add to Devereux and Vella (2014) proposing that international harmonization efforts, such as the OECD BEPS project, will not curb existing tax competition across countries.

Second, we contribute to the literature on the determinants and consequences of tax policy. For example, Goncharov and Jacob (2014) examine the tax revenue consequences of accrual versus cash accounting rules for tax purposes. Another large strand of the literature examines the effects of corporate taxes on investment responses (Djankov, Ganser, McLiesh, Ramalho, and Shleifer 2010; Giroud and Rauh 2018), risk-taking (Ljungqvist et al. 2017), or capital structure (Heider and Ljungqvist 2015). We show that business changes affect investment activity and that, because of these investment changes, countries adjust their tax policy and, in particular, rules that aim to combat corporate tax avoidance. Our paper additionally points towards the potential endogeneity of corporate tax policy. We thus complement prior research on the endogeneity and

[3] The U.S. is one example for such a behavior. The Chairman of the Senate Finance Committee Orrin G. Hatch and the Chairman of the House Ways and Means Committee write in their joint statement on BEPS that "Congress is tasked with writing the tax laws of the United States, including those associated with cross-border activities of U.S. Companies. Regardless of what the Treasury Department agrees to as part of the BEPS project, Congress will craft the tax rules that it believes work best for U.S. companies and the U.S. economy" (https://www.finance.senate.gov/chairmans-news/hatch-ryan-call-on-treasury-to-engage-congress-on-oecd-international-tax-project, last accessed on November 29, 2018).

exogeneity of tax policy (e.g., Romer and Romer 2010) by showing that corporate tax policy is partly endogenous to large business changes.

Finally, we believe that the resources we develop in our paper—the cross-country business change data as well as the tax policy measures—can be valuable for future empirical research on the real effects of taxation or on the macroeconomic consequences of business changes. Our tax policy variables provide a comprehensive overview of different tax rules (rates, investment incentives, and anti-tax avoidance rules) in OECD countries over the past two decades.

2 Hypotheses

2.1 General Aspects

To examine what drives tax policy, we first consider policymakers' rationale for tax policy design choices. Public economics theory argues that tax policies should be designed in a way that tax systems do not distort investment decisions, foster fair and equitable tax systems, and result in predicable tax revenues for governments (Gordon 1986; Devereux and Freeman 1991). In other words, when choosing corporate tax policy, countries must balance multiple, potentially conflicting objectives such as minimizing tax-induced investment distortions (to minimize efficiency losses), attracting foreign investment (to generate additional tax revenues), combatting tax avoidance (to obtain an equitable tax system where every firm pays its "fair" share), or securing predictable tax revenues that are ideally less pro-cyclical.

Existing tax systems deviate from this equilibrium, for example, because they distort corporate investment decisions (Sandmo 1974; Gruber 2015). Investment distortions occur when tax depreciation differs from accounting depreciation or when there is an asymmetric tax treatment of profits and losses. The latter example demonstrates a typical trade-off policymakers face in their tax policy design choices: On the one hand, an immediate full loss offset results in a tax system

that does not affect risk taking.[4] On the other hand, an immediate full loss offset results in very volatile corporate tax revenues (Goncharov and Jacob 2014) and an unconditional tax refund may distort the competitive selection of firms (Bethmann et al. 2018). The example of loss carrybacks shows that tax policy design choices are complex due to the various costs and benefits.

The trade-off policymakers face when setting their tax policies is further complicated by international aspects. Countries compete for mobile corporate capital and other production factors such as labor (e.g., Kind et al. 2000). While some countries may exploit the signaling effect of low statutory tax rates to attract mobile capital, other countries may set investment incentives via tax base elements (e.g., immediate write-off rules for selected assets). In addition, one country's tax policy can have important implications for other countries. Hence, countries' tax policy design choices should not be considered in isolation but conditional on other countries' tax policies (Wilson 1986; Zodrow and Mieszkowski 1986; Wilson 1987; Black and Hoyt 1989; Bucovetsky 1991; Wilson 1999; Janeba 2000; Wilson and Wildasin 2004).

2.2 Business Changes as Events to Explain Tax Policy Changes

Despite the large amount of theoretical work, the dynamics arising from tax competition pose significant challenges to empirically examining this equilibrium. As highlighted above, one country's tax policy likely depends on the tax policy design choices of other countries and vice versa. This interdependence can give rise to simultaneity problems: It is often difficult to disentangle whether country *i*'s tax policy change is driven by country *j*'s tax policy change, or vice versa. Thus, while one may draw suggestive conclusions from cross-sectional differences, one needs shocks to the equilibrium to examine how countries respond and how the responses differ across countries. In this paper, we propose that business changes can act as such shocks to a

[4] Supporting this argument, Langenmayr and Lester (2017) and Ljungqvist, Zhang, and Zuo (2017) show that reducing the asymmetric treatment of losses and profits can increase corporate risk-taking.

country's tax policy. Business changes may trigger tax policy adjustments because changes in firms' business models may not only change firms' input factors but also key costs in the tax competition game (e.g., mobility costs, cost of capital, or costs associated with determining the nexus of taxation) as well as the investment distortions created by the tax system.

In line with this reasoning, the OECD in its 2015 BEPS action plan points out that the spread of the digital economy is challenging existing tax systems since digitization and technological change reduce distances and increase cross-border mobility (OECD 2015). The report further stresses that recent business changes have especially been triggered by the evolution and expansion of information and communication technologies. The OECD identifies the mobility of intangibles and business functions, the volatility of the changing business models (resulting from low entry barriers and rapidly evolving technologies) and the nexus of taxation as key tax challenges resulting from recent business changes (OECD 2015).

If business changes indeed create a tax policy mismatch (i.e., existing tax systems no longer fit the economic situation), countries might feel the pressure to react in order to secure corporate tax revenues (Desai and Hines 2004).[5] To do so, policymakers can make use of various tax policy tools. We divide tax policy tools into three groups, reflecting the trade-off between investment distortions and securing revenues. First, countries can change statutory tax rates. The statutory tax rate is the most salient tax policy tool (see Section 4.4.3) and the predominant characteristic considered in policy comparisons (e.g., European Commission 2015; OECD 2018) and corporate decision making (e.g., Buettner and Ruf 2007; Graham, Hanlon, Shevlin, and Shroff 2017; Powers, Seidman, and Stomberg 2017). Second, countries can set investment incentives via tax base

[5] The U.S., for instance, has been highly criticized prior to the 2017 tax reform for not having kept pace with immense economic changes in the U.S. and on a global level (Auerbach and Smetters 2017).

elements such as depreciation schedules, provisioning, or loss offset rules.[6] Third, countries can introduce anti-tax avoidance rules that aim at preventing corporate attempts to reduce tax payments by exploiting legal arrangements.

To the best of our knowledge, existing theoretical work does not develop unambiguous, testable predictions about how countries would adjust these three tax policy tools following large business changes. Business changes, which primarily increase the mobility of intangible assets, could induce an increase in anti-tax avoidance rules, since countries strive to combat profit shifting. However, if competition for capital is severe enough, inducing stricter anti-tax avoidance rules might have the undesired effect of triggering corporate relocation. Hence, tax competition among countries could also lead to a reduction in anti-tax avoidance rules. Alternatively, countries could react to business changes by raising traditional investment incentives or by reducing statutory tax rates, as they are a very salient policy tool. At the same time, due to this salience, tax rate cuts could have the drawback that they can trigger undesired tax justice debates at the public level. Moreover, tax rate cuts could have the undesired consequence that competing countries keep trace, diminishing any competitive advantages (so-called `race to the bottom' argument). Hence, countries might pick less salient tax policy tools following business changes, to realize more persistent competitive advantages.

In the light of the above, we consider countries' tax policy reactions to business shocks as an open empirical question. We therefore formulate our hypotheses as follows:

H1a: *Business changes trigger policy changes in statutory tax rates.*

[6] Combinations of these potential policy reactions can be observed. For instance, a popular strategy pursued by many countries is a *tax rate cum base broadening* strategy, which implies that the tax base is broadened through tax policy measures while there is a simultaneous reduction of the statutory tax rate in a country (e.g., Devereux 2012). An exemplary tax reform that lead to simultaneous adjustments of the statutory tax rate and tax base elements was the U.S. tax reform in 1986.

H1b: *Business changes trigger policy changes related to investment incentives.*

H1c: *Business changes trigger policy changes in anti-tax avoidance rules.*

In addition, there are several reasons why the responses may differ across countries depending, for example, on the size of the country and the competition faced by a country. Theoretical tax competition models predict that contextual factors can lead to cross-sectional variation in tax policy design. For example, Bucovetsky (1991) and Wilson (1991) argue that the after-tax cost of capital in large countries is less sensitive to tax rate changes compared to small countries. Large countries will thus compete less vigorously for capital, resulting in relatively higher tax rates in large countries as compared to small countries. A different argument leading to a similar outcome is proposed by Baldwin and Krugman (2004). They argue that industrial concentration and well-developed infrastructure can result in 'agglomeration rents'. For instance, a car-manufacturer will likely locate its business close to suppliers. The resulting economies of scale and network effects from corporate agglomeration allow large countries with high industrial concentration to charge higher tax rates without losing capital due to lock-in effects. Effectively, these lock-in effects make corporate capital less mobile. If the effect of business changes on capital mobility varies with country size, the tax policy reaction to a business change in a larger country might not necessarily represent the appropriate tax policy choice for a smaller country.

In addition, we argue that a country's tax position relative to its competitors can give rise to differential tax policy reactions to business changes. When competing for firms' mobile capital, tax policy tools of one country can have substantial externalities for competing countries (e.g., Wilson 1999). Due to this interdependence of tax policies, countries likely take competitors' tax policies into account when adjusting their own tax policy. A further twist in the tax competition game is that not all countries place equal emphasis on the same set of competitors. Instead,

countries might focus more on regionally close competitors. Regionally close countries usually share a comparable culture and often belong to the same economic region. Thus, when setting its tax policy, the average tax policy of geographically close competitors might be more relevant for a country's own tax policy than the tax policies of more remote countries. Stated differently, geographical proximity likely reflects the intensity of competitive pressure.

Taken together, we expect that business changes can affect tax policy design. We further expect that countries' tax policy responses to business changes differ with respect to country size or the competitive position of a country relative to geographically close competitors. We are, however, open to the direction of such cross-sectional differences because it is ultimately an empirical question how countries respond to large business changes.

3 Data Collection and Research Design

3.1 Sample Construction

Our final sample comprises 34 OECD countries over the years 1996 to 2016. We focus on OECD countries for several reasons. First, data on industry weights, which are necessary to construct a measure for countries' exposure to business changes, is only available for OECD countries. Moreover, we can collect detailed data on tax policy characteristics for these countries. Second, the extent of economic integration of most OECD countries allows us to focus on tax policy changes at the country-level, while at the same time accounting for competitive pressures and policy externalities among countries. Taking all OECD countries as a starting point, we drop Estonia from our sample because it does not levy any corporate income tax if profits are retained.[7]

[7] Estonia solely levies taxes upon profit distributions (e.g., dividends, fringe benefits, or payments not related to the payer's business). Corporate income per se is not subject to taxation in Estonia.

We further exclude the U.S. from our analyses to overcome endogeneity concerns related to our core explanatory variable, which is based on U.S. business changes.

3.2 Measure Construction and Variation

3.2.1 Tax Policy Measures

When setting their corporate tax policies, countries make use of different policy tools. Statutory tax rates represent the most salient tool in countries' tax policy mix. We collect data on statutory corporate tax rates from the *OECD.stats* database and the Ernst & Young *Corporate Tax Guides*.[8] However, while extant work almost exclusively focuses on statutory tax rates (e.g., Slemrod 2004; Vegh and Vuletin 2015; Chirinko and Wilson 2017), we argue that statutory tax rates alone do not sufficiently capture the variety of tax policy tools, a country can exploit to react to business changes (e.g., Devereux and Griffith 1998).

To account for other tax policy tools, we construct two indices: One captures tax policies that strive to stimulate investment in a country (*InvScore*) and one comprises a country's set of anti-tax avoidance rules (*AntiTAScore*). We collect the necessary data for constructing the two indices for the full sampling period (1996 to 2016) from the *European Tax Handbooks,* published by the International Bureau of Fiscal Documentation (IBFD), the PricewaterhouseCoopers *Corporate Taxes – Worldwide Summaries*, the Ernst & Young *Corporate Tax Guides,* the *OECD.stats* database, and countries' official tax authority websites.[9] In general, both indices consist of nine items and range from zero to one. Higher values of *InvScore* indicate tax policies

[8] We follow prior work (e.g., Devereux, Griffith, Klemm, Thum, and Ottaviani 2002; Alexander, Vito, and Jacob 2016) and calculate the sum of top marginal tax rates, average local tax rates, and supplementary charges, whenever regional differences in statutory tax rates exist for a country (e.g., for Germany or Italy).

[9] Prior work uses the same tax summaries as data basis for index construction in other contexts (e.g., Goncharov and Jacob 2014; Schanz, Dinkel, and Keller 2017). Investigating countries' use of *tax rate cum base broadening* policies, Kawano and Slemrod (2016) use IBFD tax handbooks to trace changes of varying tax base elements (e.g., R&D tax credits, credits for foreign taxes paid, depreciation allowances). We also cross-check some country-year observations of specific index items with the data from Alexander et al. (2016) and Jacob, Michaely, and Müller (2018).

with more favorable rules designed to foster corporate investment and economic growth. Higher values of *AntiTAScore* indicate higher regulatory effort to combat corporate tax avoidance.

Specifically, our investment score measure, *InvScore*, consists of nine components. The measurement of the first two components, loss carryback (LCB) rule and loss carryforward (LCF) restrictiveness, follows the operationalization in Bethmann et al. (2018). *InvScore* further contains three binary items referring to tangible assets (i.e., accelerated depreciation, immediate write-off, and bonus depreciation) and one item referring to intangible assets (i.e., R&D incentives). To equally weight tax incentives referring to tangible and intangible assets, we use adjusted weights for the three items related to tangible asset treatment. For the construction of our R&D incentives item, we follow the general methodology of the B-index (e.g., McFetridge and Warda 1983; Warda 2001). The B-index proxies for the fiscal generosity of tax systems with regards to R&D investments (see e.g., Bloom, Griffith, and van Reenen 2002; Wilson 2009). We adjust the original B-index by holding some parameters, such as the statutory tax rate, constant over time. Thereby, we ensure that changes in our adjusted B-index are not mechanically driven by statutory tax rate changes, which we consider as a separate tax policy dimension in our analysis. Consistent with the interpretation of the original B-Index, lower values of our modified B-index represent higher R&D tax incentives. We subtract our modified measure from 1 and normalize the resulting measure over the range between 0 and 1. Finally, *InvScore* contains binary items accounting for the existence of an allowance for corporate equity system, a group tax relief system, or any tax rules assigning beneficial tax treatment to venture capital investments. All these items represent reductions in the after-tax cost of capital investment. Hence, higher values indicate more favorable investment conditions.

Our second index, *AntiTAScore*, measures countries' political efforts to combat corporate tax avoidance. The index also comprises nine items. We include binary items for the existence of a general anti-avoidance rule (GAAR), hybrid mismatch rules, an exit tax regime, a tax-related disclosure regime, and country-by-country reporting rules. Moreover, a categorical variable accounting for the progressiveness of the transfer pricing regime is included in *AntiTAScore*. To account for the strictness of controlled foreign company (CFC) regimes, we construct a measure that consists of the low-tax threshold set in a CFC regime, divided by the statutory tax rate in the country of control. Larger values of our CFC item thus represent higher CFC regime strictness. We also account for the strictness of earnings-stripping and thin-capitalization rules in a country building on the methodology in Buettner, Overesch, Schreiber, and Wamser (2012). Table 1 summarizes the items included in our two indices and provides more detailed information on item measurement and weighting.

Figure 1 displays average time trends for each tax policy measure. We observe declining tax rates, relatively stable investment incentives, and a trend towards stricter anti-tax avoidance rules over time. In Figure 1, we also report the variation of these tax rules across countries as indicated by the gray areas depicting inter-quartile ranges. The inter-quartile ranges reveal substantial variation around the general trend. For all three tax policy measures, we do not observe any convergence in tax policy design across countries. Instead, variation seems to increase over time despite coordinated tax policy efforts at the EU or OECD level to harmonize tax policies.

Figures 2 and 3 present the levels of our three tax policy measures (*StatTR, InvScore, AntiTAScore*) for each sample country over the period 1996–2016. Specifically, Figure 2 shows the country-level variation in statutory tax rates. Some countries maintain relatively high statutory tax rates over the full sampling period (e.g., France, Germany, or Italy), while others historically

rely on low statutory tax rates (e.g., Hungary, Ireland, or Latvia). One potential explanation for this divergence in statutory tax rates could be that the first group of countries benefits from agglomeration rents and can maintain higher statutory tax rates without losing mobile capital. The latter group seems to consist of rather small (periphery) countries. These countries appear to use the salience of low statutory tax rates intentionally to attract mobile capital and overcome other locational disadvantages such as a less-developed infrastructure (for a similar argumentation, see e.g., Garretsen and Peeters 2007).

In general, we observe a declining trend in statutory tax rates to a rate of approximately 25% during the last decade. This average decline is consistent with evidence from prior studies (e.g., Slemrod 2004; Dyreng, Hanlon, Maydew, and Thornock 2017). Figure 2 also shows that countries with historical tax rates higher than the 25% level converge to this rate from above, whereas some countries with historically low tax rates (e.g., Chile or the Slovak Republic) approach the average level of 25 % through slight increases in their statutory tax rates over time. Yet, despite the declining trend on average, there seems to be high cross-sectional variation in statutory tax rate levels. Figure 2 further suggests that some countries seem to frequently change their statutory tax rates over the considered sampling period (e.g., Greece), while other countries exhibit rather constant statutory tax rate levels over time (e.g., Norway or Sweden). Moreover, the majority of (large) tax rate cuts seems to occur rather in the first half of our sampling period. After 2006, statutory tax rates appear relatively stable.

Figure 3 plots our two indices, *InvScore* and *AntiTAScore,* for all countries over time. The country graphs display substantial cross-country heterogeneity. Over the full sampling period, *AntiTAScore* seems to be more volatile than *InvScore*. While the average level of *InvScore* does not change substantially over the sampling period, several smaller OECD countries (e.g., Belgium,

Ireland, Luxembourg, or Lithuania) seem to exhibit comparably high *InvScore* levels. The high *InvScore* levels can be explained by several investment stimulating tax reforms in these countries during the last years. Belgium, for instance, introduced an IP box regime in 2007, intended to incentivize corporate investment through the provision of a beneficial tax treatment for Belgian patent income.[10] The high *InvScore* levels for Ireland and Luxembourg, depicted in Figure 3, coincide with the fact that both countries are often classified as European tax havens (e.g., Hines and Rice 1994).[11] Ireland does not only offer investment incentives through low statutory tax rates but also through tax base related investment incentives: For instance, in 2004 Ireland introduced an R&D tax credit, granting a significant tax exemption to firms with R&D activity in the country. In 2009, the Irish government created further investment incentives through providing beneficial tax treatment to start-up firms investing in Ireland.

Another insight obtained from Figure 3 is that Switzerland exhibits comparatively low levels for our *InvScore* measure. The same holds for Korea and the Netherlands.[12] Countries with surprisingly high levels of *InvScore* are for instance the UK, France, Portugal, and Spain. The observation that the latter three countries develop relatively similar levels of *InvScore* could stem from regional tax policy spillovers. Prior literature suggests that a country's tax policy design represents a reaction to other countries' tax policy decisions, to reduce the effect of negative externalities (e.g., Wilson 1986; Devereux, Lockwood, and Redoano 2007; Heinemann, Overesch,

[10] Chen, DeSimone, Hanlon, and Lester (2017) argue that policymakers' primary objective to set up such a regime is the endeavor to retain a strong position in the competition for mobile capital. They investigate the link between IP box regimes and corporate income shifting in a European setting and find evidence consistent with a negative association between outbound income shifting and the existence of an IP box regime in a country. In line with the investment stimulus objective, Bornemann, Laplante, and Osswald (2018) provide evidence suggesting that the Belgian IP box regime is associated with an incremental increase in corporate innovative activity of Belgian companies.

[11] Consistent with Desai, Foley, and Hines (2006), we define tax havens as low-tax countries, offering substantial tax avoidance opportunities to foreign investors.

[12] Korea and the Netherlands are sometimes classified as countries with certain tax haven characteristics (e.g., Altshuler and Grubert 2006). The Dutch setting for instance enables firms to benefit from substantial tax benefits with regards to dividend and capital gains taxation.

and Rincke 2010). Such spillovers could explain why neighbor countries might align their tax policies over time.

With regards to anti-tax avoidance rules (*AntiTAScore*), Figure 3 corroborates the upward trend across countries shown in Figure 1. Figure 3 further shows that many countries seem to implement anti-tax avoidance rules rather towards the end of the sampling period. This observation might be attributable to the OECD BEPS Initiative, which was first raised in 2012. Moreover, many countries have recently implemented detailed transfer pricing documentation requirements to counteract firms' primary profit shifting strategy (e.g., Lohse and Riedel 2013; Heckemeyer and Overesch 2017). Further, while some countries have implemented a variety of anti-tax avoidance rules (e.g., Australia, Canada, Germany, or France), other countries exhibit rather low levels of *AntiTAScore* (e.g., Switzerland, Korea, or Slovenia). In addition, the timing of the implementation of anti-avoidance rules seems to vary across our sample countries. Some countries such as the Netherlands or France implement anti-tax avoidance rules early on, whereas other countries such as Chile or Ireland just recently enacted rules on this behalf. Australia and the UK can be regarded as pioneers in implementing certain anti-tax avoidance practices, which is also expressed in their high *AntiTAScore* levels and their recent policy actions. In 2015, the UK implemented a diverted profits tax that strives to tackle aggressive tax avoidance structures used by MNCs. In 2017, Australia introduced a diverted profits tax as well. Additionally, the UK and Australia recently passed regulations, which require firms to publicly disclose tax strategy information (The UK Finance Bill 2016 and the ATO Tax Transparency Code).

Taking together the insights from Figures 1 to 3, it appears as if changes in tax policies do not cluster around single years. Instead, tax policy changes seem to vary over time and across countries.

3.2.2 Business Change Measure

Our key source of identification stems from business changes in the U.S. We argue that business changes are a source of country-specific variation in tax policy designs. Business changes can trigger tax policy adjustments because business changes may not only change firms' input factors but also key costs in countries' tax competition game (e.g., mobility costs, cost of capital, or costs associated with determining the nexus of taxation). We construct a measure for country-specific exposure to business changes in U.S. industries. Since countries' industry structures differ, there is potentially cross-country variation in the exposure to business changes. Using business changes in the U.S. offers several benefits. First, it gives us a comparably long time-series with detailed industry-level data. Second, given the role of the U.S. in the global economy, business changes in the U.S. are likely to be representative of global business changes. Third, it does not appear likely that tax policies in other OECD countries drive U.S. business changes.

To proxy for business changes, we construct an input-related measure based on industry-specific job changes over time. Labor represents a key input factor of a firm's production function (Cobb and Douglas 1928). Business changes affect firms' production functions because technological progress changes input requirements. For instance, technological progress raises the need for more skilled jobs and reduces the impact of capital (Laitner and Stolyarov 2003).[13] We argue that industry-specific business changes should thus be reflected in changes in the job composition of the affected industry. We construct a measure of an industry's job structure based on the data provided by the integrated public use microdata series project from the University of Minnesota (IPUMS-USA, Ruggles et al. 2018). IPUMS facilitates the use of various census data sources. From this data, we collect information on the occupation and the employed industry for

[13] Consistently, the resource-based view of a firm regards corporate business models as a bundle of a firm's resources and capabilities (e.g., labor) (Wernerfelt 1984; Barney 1991).

each sampled individual in the U.S. census. In a subsequent step, we identify occupations labelled as information and communication technology (ICT) jobs and calculate the proportion of ICT jobs for each U.S. industry and year. The selected occupation labels are listed in Panel A of Table 2. To extrapolate proportions to each industry, we approximate the number of individuals in each occupation and industry, based on the census sampling weights.

We focus on ICT job proportions because the 2015 OECD report on taxing the digital economy highlights the role of ICT in transforming the business landscape: "The digital economy is the result of a transformative process brought by information and communication technology, which has made technologies cheaper, more powerful, and widely standardized, improving business processes and bolstering innovation across all sectors of the economy" (OECD 2015, p. 13). Based on the notion that industry-specific business changes should be reflected in changes in the ICT job composition of the affected industry, we use large persistent changes in the proportion of ICT jobs as an indication of business changes. Specifically, for each U.S. industry, we define a large business change as an annual increase in the proportion of ICT jobs of more than 1.5 percentage points that is not fully reversed over the subsequent period.[14] We then construct a binary variable that equals one for years with a large business change and zero otherwise. Figure 4 displays the event series of large business changes for the selected U.S. industries.

In a subsequent step, we measure the extent to which our sample countries are exposed to U.S. business changes based on the respective country's industry composition. For example, a strong technological change in the U.S. manufacturing industry should be especially relevant for countries that rely significantly on manufacturing (e.g., Germany or Japan). In accordance with

[14] We chose the 1.5 percentage point threshold because it represents the 95% quantile of the distribution of ICT job changes. In untabulated tests, we ensured that the results hold qualitatively for other thresholds (i.e., one or two percentage points).

this rationale, we construct yearly measures of each country's business change exposure by weighting the U.S. business change dummy with the importance of the respective industry in that country. We construct the industry weights for each country-year based on value added data by industry, year, and country from the OECD *STANi4* database.

Panel B of Table 2 shows the chosen level of industry disaggregation.[15] Figure 5 shows the variation of business change exposure across the 34 countries included in the sample. Since we use U.S. job changes to identify business change events, the timing of these events is the same for all countries. This induces a sizeable common trend. However, there is substantial cross-sectional variation in the exposure to these large business changes across our sample countries. For example, in 2012, a year with significant overall changes, Luxembourg experiences a very large business change whereas Lithuania experiences a very minor change (because of differences in the extent to which both are exposed to business change in the financial industry).

3.3 Research Design

Our basic research design is motivated by Reinhart and Rogoff (2011) and Hail, Tahoun, and Wang (2018). Consistent with these two studies, we model the time-series of our three tax policy variables as functions of their own past values and past values of large business changes. Stated differently, we use lead-lag relations to estimate the relation between business changes and our three tax policy variables in three separate regressions. Equation (1) outlines the main specification for our tests of H1:

$$TaxPolicy_{i,t} = \beta_1 BC_{i,[t-1\ to\ t-3]} + \beta_2 TaxPolicy_{i,[t-1\ to\ t-3]} + \boldsymbol{x_{i,t-1}\phi} + a_i + \gamma_t + u_{i,t} \quad (1)$$

[15] In a few cases, some country-years have missing values for some industries at the chosen level of industry classification. This occurs most often when an industry value is only available for a higher level of aggregation for an earlier time period. To overcome this issue, we impute these values based on time trends and industry proportions of the next higher industry-level.

where $TaxPolicy_{i,t}$ captures one of our three tax policy variables (*AntiTAScore*, *InvScore*, or *StatTR*). $BC_{i,[t-1\ to\ t-3]}$ is the lag of the three-period backward-looking moving average of our business change proxy.[16] As explained above, we construct a country-specific yearly measure of large business changes based on exposure to ICT job proportion changes in U.S. industries. For each U.S. industry, we define each year with an increase in the proportion of ICT jobs by more than 1.5 percentage points that is not fully reversed over the subsequent period, as a year with a large business change. We then define a dummy variable that equals one for years with a large business change and zero otherwise. To obtain the final country-specific business change measure, we weight these dummies according to the industry composition in each sample country. The coefficient β_1 can be interpreted as the predictive ability of business changes for tax policy changes. $TaxPolicy_{i,[t-1\ to\ t-3]}$ is the lag of the three-period backward-looking moving average of the same tax policy measure used as dependent variable. It is included in the regression to account for a potential time dependence between the design of current and previous tax systems. Thus, β_2 captures a possible persistence of tax policy design choices.

The vector $\boldsymbol{x_{i,t-1}}$ consists of several controls for macroeconomic and political conditions, which we obtain from the OECD or the Worldbank. We follow prior literature (e.g., Devereux et al. 2008) and include lagged values of government expenditures, measured as percentage of GDP *(GovExppGDP)*, GDP growth (*GDPGr*), GDP per capita (*GDPpCap*), unemployment, measured as percentage of the total labor force in a country (*Unemp*), capital inflows, measured as foreign direct investment inflows minus foreign direct investment outflows (*CapitalIn*) and election years (*ElYear*). We collect election data from the ParlGov Initiative (Döring and Manow 2018). Detailed

[16] We chose to account for three lag periods due to sampling considerations. Since we have 34 countries and 21 years, each additional lag year would decrease our sample size by more than 4%. Choosing an event window of three years moreover is consistent with prior literature investigating policy changes and their determinants (e.g., Hail, Tahoun, and Wang 2018).

variable descriptions can be found in Table 3. In addition, we include country fixed effects (α_i), and, depending on the specification, either a trend variable (*Year*) or year fixed effects (γ_t). As Hail et al. (2018) note, including year fixed effects is conservative as they capture general trends, including those related to our variables of interest. We cluster standard errors at the country-level.

Our research design in equation (1) offers the advantage of reducing collinearity by including a single lag of a three-period backward-looking moving average instead of including multiple lags (Reinhart and Rogoff 2011). Accounting for more than one lag is crucial since it is ex-ante unclear whether, and if so when, tax policy reacts to large business changes. Hence, our approach also captures long-term tax policy reactions to business changes. Furthermore, through including lagged values of the dependent variable, the research design allows us to also test the reverse direction (i.e., the predictive ability of tax policy changes on large business changes). We do so in additional tests (Section 4.5).

4 Results

4.1 Descriptive Results

Table 4 presents descriptive statistics for our sample. Our sample consists of 578 country-year observations for 34 countries, covering the period from 1996 to 2016. We lose some observations because of missing data on control variables and because we require several lags of business changes. Table 4 provides three important insights. First, most countries do not use the full spectrum of tax policy tools available. This becomes apparent by the 95-percentile of *AntiTAScore* being 0.505 and *InvScore* being 0.503 respectively. Second, the average exposure to a business change (*BC*) of our sample countries amounts to 7% (0.071). This magnitude seems plausible given that we weight business changes according to industry affiliation. As outlined in Figure 4, most business changes occur in industries such as the telecommunication industry, which

receive a moderate weight in most countries. Third, there are differences in tax policies between geographical neighbor countries (*DiffAntiTAScore, DiffInvScore, DiffStatTR)*. While, on average, it appears that the rules are similar (as indicated by average differences being close to zero), there is substantial variation in both directions (as indicated by the relatively high standard deviation of *DiffAntiTAScore* and *DiffInvScore*). Hence, despite geographic proximity, corporate tax rules appear to differ across countries for all three tax policy dimensions.

4.2 Main Specification Results

In Table 5, we report the results from estimating our main specification for the three different tax policy variables. The results suggest that large business changes primarily precede changes in a country's anti-tax avoidance rules, as indicated by the positive and significant coefficient for $BC_{i,[t-1\ to\ t-3]}$ in column 3. This finding suggests that a 100% exposure to a large business change in the three preceding periods—a rather unrealistic scenario—is associated with an increase in *AntiTAScore* of 0.421. We consider this magnitude to be economically significant, given that the average exposure to large business changes of our sample countries amounts to 7% (see Table 4). Our finding implies that this average exposure to business changes is associated with an average increase in *AntiTAScore* of 0.03, or 11% of the sample's median *AntiTAScore*. In contrast, we do not find a significant relation between our large business change measure and either statutory tax rates (*StatTR*) or our investment incentive measure (*InvScore*).

The predictive ability of business changes for anti-tax avoidance rules and the lack of a predictive ability for statutory tax rates and investment incentives could be interpreted as follows: The ongoing digitization and the recent rise of new technologies have changed business models in a way that new economy firms benefit from more mobile capital. Business changes have raised opportunities for such firms, to shift income into low-tax countries via intangibles or labor location

decisions (e.g., Drake et al. 2018). As our findings suggest countries will react on these shifting activities by tightening their anti-tax avoidance rules. More "traditional" investment incentives included in the investment score appear to be less important in attracting this mobile capital (Desai and Hines 2004). One potential explanation for this is that tax base elements such as bonus depreciation become less important for business models relying primarily on high-skill labor input.

The estimations in Table 5 also include a common, linear time trend variable (*Year*) and our set of control variables. The trend variables are significant for tax rates (supporting the downward trend) and for anti-tax avoidance rules (supporting the upward trend) but insignificant for investment incentives. Considering the coefficients of our controls variables, we find statistically significant coefficients on GDP growth (*GDPGr*) in columns 2 and 3. The findings are consistent with the idea that policy design reflects countries' systematic responses to variation in their economic situation. Stated differently, our findings support the notion of cyclicality (Vegh and Vuletin 2015). In good (bad) times, tax policy design will focus less (more) on the creation of investment incentives. The negatively significant coefficient for *InvScore* as dependent variable and the positively significant coefficient for *AntiTAScore* support this logic: In bad times, countries may either incentivize corporate investment directly via tax base incentives (e.g., accelerated depreciation) or indirectly via less stringent anti-tax avoidance rules.

4.3 Cross-Sectional Variation in Tax Policy Responses

Increased capital mobility following recent business changes may also fuel competition among countries to attract capital through tax incentives (e.g., Devereux et al. 2008). However, our main results in Table 5 indicate that traditional tax policies that strive to encourage investments (*InvScore)* do not react to business changes. One possible reason could be that our *InvScore* measure overweights tangible investment incentives (e.g., accelerated depreciation schemes for

PPE). Given that new economy firms likely focus on income shifting of intangibles or labor (e.g., DeSimone et al. 2017; Drake et al. 2018), traditional investment incentives might no longer represent an adequate tool to attract mobile capital of these new economy firms.

Another way for countries to attract capital following recent business changes is to refrain from tightening anti-tax avoidance rules relative to other countries' attempts. Providing relatively more flexibility and more opportunities to reduce corporate tax payments may serve as an indirect tax incentive for corporate investment in a country. If this is the case, we would expect to see cross-sectional variation around the general trend towards stricter anti-tax avoidance rules. To test for cross-sectional variation, we expand the main specification in the following way:

$$TaxPolicy_{i,t} = \beta_1 BC_{i,[t-1\ to\ t-3]} + \beta_2 TaxPolicy_{i,[t-1\ to\ t-3]} + \beta_3 M_{i,t-1} BC_{i,[t-1\ to\ t-3]} + \beta_4 L_{i,t-1} BC_{i,[t-1\ to\ t-3]} + \beta_5 M_{i,t-1} + \beta_6 L_{i,t-1} + \boldsymbol{x_{i,t-1}\phi} + a_i + \gamma_t + u_{i,t} \quad (2)$$

We propose that depending on a country's size or its competitive position in the tax realm, the country might react differently to large business changes. To test for such differences in reaction patterns, we construct grouping indicators based on tercile splits ($L_{i,t-1}$ denoting observations in the lowest tercile and $M_{i,t-1}$ denoting observations in the middle tercile) and interact them with our business change measure ($BC_{i,[t-1\ to\ t-3]}$). For the size split, we sort countries based on their population size and construct three groups (*Small*, *Middle*, *Large*).

Figure 6 plots the mean values of our three tax policy measures for the different size groups. In terms of traditional investment incentives, countries do not differ much. However, for anti-tax avoidance rules, there seems to be substantial variation in the sample means among size groups. Larger countries appear to have stricter anti-tax avoidance rules than smaller countries.

In the first cross-sectional test, we thus examine whether differential reactions to business changes can explain these differences. Table 6 provides results for both cross-sectional tests. Accounting for a common time trend in anti-tax avoidance rules (*AntiTAScore*), the results in

column 3 show that large countries, which serve as the baseline in this model, exhibit a positive but insignificant coefficient on $BC_{i,[t-1\ to\ t-3]}$. More important though, the coefficient on the interaction between $BC_{i,[t-1\ to\ t-3]}$ and the indicator for small countries is significantly negative. This suggests that small countries react to business changes by reducing anti-tax avoidance rules relative to other countries' trend in having stricter anti-tax avoidance rules. This is consistent with the idea that smaller countries try to use relatively less stringent anti-tax avoidance rules to attract investments. At the same time, large countries might be less concerned about capital outflows because of other factors such as agglomeration rents (e.g., Baldwin and Krugman 2004).

As an alternative way to estimate the differences between small and large countries, we estimate separate regressions including a linear time trend for the large and small country sub-groups. Results are presented in Columns 5 and 6. Through these models, we account for potentially differing time trends among these groups. The large country specification in column 4 shows a positive and significant coefficient on $BC_{i,[t-1\ to\ t-3]}$, while column 5 (small country specification) exhibits a significantly smaller coefficient. Once more, this is consistent with smaller countries resisting the global trend towards stricter anti-tax avoidance rules. Additionally, the insignificant difference in linear time trends between column 4 and 5 gives us further confidence that the specification in column 3 with general year fixed effects is well specified.

In the second set of cross-sectional tests, we examine how tax policy and the response to business changes is related to tax competition. We measure a country's competitive tax position as its tax policy design relative to the weighted average tax policy design of other OECD countries. The weights are based on the geographical distance between countries' capitals (e.g., Devereux and Loretz 2013). Hence, we use geographical distance to proxy for competitive pressure. We propose that a country with a higher *AntiTAScore* than the distance weighted average *AntiTAScore*

of other countries will be in a different competitive situation than a country with a lower *AntiTAScore*, or a similar one to the distance weighted average. We thus use the difference between a country's *AntiTAScore* and the distance weighted average *AntiTAScore* as a measure of competitive position. We then group countries into three groups (*Lower*, *Similar*, *Higher*) in the same way as we did for population size. We apply this procedure to every tax policy variable.

Column 8 in Table 6 shows different reactions to business changes: For countries with stricter anti-tax avoidance rules relative to their competitors, we find an insignificant coefficient. In contrast, countries with less stringent anti-tax avoidance rules react to business changes by further reducing their anti-tax avoidance legislation relative to the positive common trend. However, as for the size split, we do not observe any difference in the response of tax rates or investment incentives across the groups (Columns 6 and 7). Overall, it appears as if countries compete via the level of anti-tax avoidance rule strictness following large business changes.

4.4 Additional Tests

4.4.1 Disaggregating AntiTAScore

Our main specification tests indicate that there seems to be substantial variation in tax policy design choices. Specifically, our evidence suggests that countries seem to compete over the strictness of anti-tax avoidance rules. While larger countries seem to react on large business changes by enacting stricter anti-tax avoidance rules, smaller countries do not follow this trend. This is consistent with small countries' desire to attract mobile capital (Bucovetsky 1991; Wilson 1991). By providing relatively more flexibility and more opportunities to reduce corporate tax payments, smaller countries may create indirect incentives for corporate investment. To get a better understanding of the specific anti-tax avoidance rules used by countries to create such incentives,

we disaggregate *AntiTAScore* and rerun the size-split specification from Table 6 for each of the nine items.

Table 7 reports the results of these additional tests. Consistent with the capital mobility argument, we observe significantly positive changes in exit tax rules following business changes in the case of large countries, while smaller countries exhibit a significantly lower reaction. Our results further suggest that small countries deviate from the general trend towards strict hybrid mismatch regimes that can be observed at the international level (e.g., through OECD BEPS Action 2). For the other *AntiTAScore* items, we do not observe noteworthy significant differences. However, this can potentially be attributed to our conservative research design. Given that the time series variation of the *AntiTAScore* items is significantly lower than that of the full index, country and year fixed effects may already absorb a notable part of the variation.

4.4.2 Business Changes and Real Effects

Why do some countries reduce anti-avoidance rules and why don't they increase investment incentives? In the next step of our analysis, we try to answer this question by examining whether the business changes indeed trigger changes in the factor input mix by firms. This analysis examines one potential mechanism that explains why countries adjust their tax rules. If investment behavior changes, the tax-system induced distortion also change. Put differently, unless firms actually change their investment behavior following these job changes, countries have little incentives to adjust tax rules. We therefore examine how business changes affect capital and labor input in listed firms.

We use firm-level data from Compustat Global on all listed firms for our sample countries over our sample period.[17] We then estimate the following equation:

[17] We apply the usual sample restrictions following prior literature (e.g., Baker, Stein, and Wurgler 2003; Jacob et al. 2018) and require firms to have non-negative cash holdings, sales, assets, equity, and capital expenditures.

$$Investment_{i,j,t} = a_i + \beta \mathrm{BC}_{j,[t-1\ to\ t-3]} + \Delta\Pi_{i,t} + \Delta\Gamma_{j,t} + \alpha_i + \gamma_t + u_{i,t} \quad (3)$$

where $Investment_{i,j,t}$ is either capital investment relative to prior year's total assets (*CapEx/Assets*), capital investment relative to prior year's property, plant, and equipment, PPE, (*CapEx/PPE*), the change in PPE (ΔPPE), the natural logarithm of capital expenditures over total wages (*Capital to Labor*), or wage expenses relative to prior year's total assets (*Total Wages*). Our main coefficient of interest is β. We make no predictions regarding the direction of the effect of business changes. We note that any significant coefficient implies that firms adjust their level and/or mix of factor inputs. Such a shift could then potentially trigger tax policy changes.

In our regression, we include several control variables following prior literature on investments (e.g., Baker, Stein, and Wurgler 2003; Becker, Jacob, and Jacob 2013; Jacob, Michaely, and Müller 2018). The vector $\Pi_{i,t}$ includes firm level controls for the level of cash holdings, leverage, Tobin's q, firm size, profitability, and growth in sales. These variables are included to control for firm level investment incentives and the availability of funds. Second, we include the vector $\Gamma_{j,t}$ includes several country-level controls for the tax system (tax rate on corporate profits, the value added tax rate, and the personal income tax rate on wages; see, also, Jacob et al. 2018) and for the overall economic conditions (level of GDP, GPD growth, inflation, and a governance factor). We further include firm fixed effects (α_i) and year fixed effects (γ_t). Hence, our identification of investment responses stems from variation in our measure of business changes ($BC_{j,[t-1\ to\ t-3]}$) and not from cross-country differences. Our statistical inferences are based on robust standard errors clustered at the country-level.

Table 8 presents the regression results from estimating equation (2) for a sample of listed firms from 32 OECD countries for which we could obtain information from Compustat Global. The results indicate the larger business changes results in less capital expenditures. This result is

robust to alternative scaling of capital expenditures (Column 2) or to using the change in PPE (Column 3). The results in Column (4) and (5) indicate that these business changes decrease the ratio of capital to labor input (Column 4), while keeping the ratio of wages to total assets constant.

Collectively, the evidence in Table 8 suggests that firms' input factors are, as expected, affected by business changes. Input factors appear to shift away from capital towards more labor input. This finding can partly explain why countries hit by large business changes rather reduce anti-avoidance rules instead of increasing capital investment incentives. Current tax systems typically limit the deductibility of capital expenses, e.g., by disallowing firms to deduct cost of financing or by allowing for depreciation that is below the true economic depreciation (e.g., Sandmo 1974; Gruber 2015). This distorts capital investment decisions and provides an incentive for firms to use more labor input. If business changes now trigger that firms move more towards labor input (for non-tax reasons), the necessity of policymakers to "fix" the distortions of capital investments decreases. Instead, following the business change induced increase in labor input, policymakers might now try to reduce potential tax distortions related to this type of input. Since anti-tax avoidance rules are related to intangibles created by high-skilled labor, the results in Table 8 are consistent with the tax policy responses observed in our main analysis. As capital becomes less important relative to labor, tax rules affecting the output generated by high-skilled labor (i.e., anti-tax avoidance rules) are adjusted and relaxed.

4.4.3 Salience of Tax Policy Tools

Another potential mechanism that can explain why countries use less stringent anti-tax avoidance rules instead of lower statutory tax rates to incentivize corporate investment, relates to the lower salience of anti-tax avoidance rules. Tax rates are very salient and can easily be understood by the public. Due to this salience, tax rate cuts might be more likely to trigger

undesired tax justice debates among the public (Chetty, Looney, and Kroft 2009; Finkelstein 2009). In contrast, anti-tax avoidance rules are complex and not well understood by the public.

To provide empirical support for this notion, we examine newspaper attention to different reform items. Using the U.S. Tax Cuts and Jobs Act of 2017, Figure 7 provides anecdotal evidence for this line of argumentation. The figure plots the monthly number of articles published in the top six U.S. newspapers on selected components of the 2017 U.S. tax reform. We are interested in articles published during the period from November 1, 2017 until March 31, 2018 around the enactment of the reform. The number of articles is obtained via Factiva using two different search phrases. The first search phrase (‘tax rate and "21" and cut’) captures news articles referring to the salient tax rate cut from 35% to 21%. The second phrase (‘("GILTI" or "FDII" or base erosion) and tax’) captures articles on other, less salient but also important, tax reform changes tackling corporate tax avoidance.[18] Comparing the two article count series over the five-month period reveals a strong media focus on the tax rate change, while the policy changes in anti-tax avoidance rules received substantially less coverage. To be more precise, in each month (with non-zero mentions of anti-tax avoidance provisions) the tax rate cut received at least 83% more press coverage than the anti-tax avoidance provisions. We interpret this anecdotal evidence as support for our argumentation line, that countries can exploit less salient policy measures, such as anti-tax avoidance rules, to set indirect investment incentives for firms.

4.5 Anti-Tax Avoidance Rules Predicting Business Change Exposure

While our results suggest that business changes act as an antecedent to tax policy changes, prior literature has often focused on the effect of tax policy changes on business decisions (see

[18] Specifically, we first employ the search term combination ‘tax rate and "21" and cut’. Thereby, we strive to find articles that include all of the following terms: “tax rate”, “21”, and “cut”. The second search combination ‘("GILTI" or "FDII" or base erosion) and tax’ can be read as follows: Match articles that contain the term “tax” and one of the following three terms: “GILTI”, “FDII”, or “base erosion”.

Hines 1997 for a review). Our research design allows us to also test whether tax policy changes precede business changes (e.g., Reinhart and Rogoff 2011; Hail et al. 2018). However, our measurement approach limits the chance of tax policy changes affecting business change exposure due to the following reasons. First, we identify business changes based on large ICT job proportion changes in U.S. industries. While we cannot rule out that international tax policy changes affect the job structure in the U.S., we regard this as rather unlikely. Second, we use a country's industry weights to project U.S. business changes to the countries included in our sample and construct a measure of country-specific business change exposure. Tax policies could of course affect a country's industry composition to some extent. However, since we examine lead-lag relations within three-year periods, it seems rather unlikely that industry weighting can change substantially within this time window. Nevertheless, to test our conjectures, we examine whether changes in tax policies predict business change exposure for large versus small countries. In other words, we reverse the baseline estimation equation.

Table 9 provides results from this test. We only observe a significant and negative persistence parameter for business change exposure. This suggests that business changes are to some extent transitory over time. More important, however, we do not find significant results on the predictive ability of prior periods' tax policies for business changes. This finding gives us confidence that our identification strategy helps us to isolate the sequential order of events.

5 Conclusion

We examine trends in corporate tax policy design choices over the past two decades and the role of business changes in shaping corporate tax policy, using data on 34 OECD countries over the period 1996–2016. We measure tax policy along three dimensions: statutory tax rates, investment incentives, and anti-tax avoidance rules. While tax rates declined, investment

incentives remained stable, and anti-tax avoidance rules became stricter over the last decades. However, cross-country variation in tax rules did not decrease despite several harmonization efforts at the international level. Exploiting a new measure of business changes as a source of variation in tax policy, we provide evidence suggesting that countries primarily compete via anti-tax avoidance rules after business changes. While, on average, countries seem to implement stricter anti-tax avoidance rules in response to technological change, especially smaller countries and countries exposed to competitive pressure deliberately set less stringent anti-tax avoidance rules.

Our results have important implications. First, our results indicate that anti-tax avoidance rules appear to be an important dial for smaller countries to attract mobile capital and that traditional investment incentives (e.g., depreciation allowances) are not utilized for this purpose anymore. Instead, countries appear to opt for means that are less salient to the public, namely less stringent anti-tax avoidance rules. Second, our results point towards the potential endogeneity of anti-tax avoidance rules. Hence, empirical work exploiting changes in anti-tax avoidance rules should be aware of the potential endogeneity of these types of regulation with respect to business changes. Our paper faces several limitations. We can only examine the rules set by policymakers, but not the level of enforcement. Moreover, we cannot draw any welfare implications. Our objective is to examine the determinants of corporate tax policy. An interesting and important avenue for future research is to analyze the effectiveness and macroeconomic consequences of setting corporate tax policy along the three dimensions, tax rates, investment incentives, and anti-tax avoidance rules.

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6 Figures and Tables

Figure 1: Tax Policy Measure Variation

This figure plots the average annual tax policy measure (*StatTR, InvScore*, *AntiTAScore*) for all 34 sample countries over the sampling period (1996-2016). Annual inter-quartile ranges are depicted in the figure (grey corridors), to illustrate cross-sectional variation in the three tax policy measures.

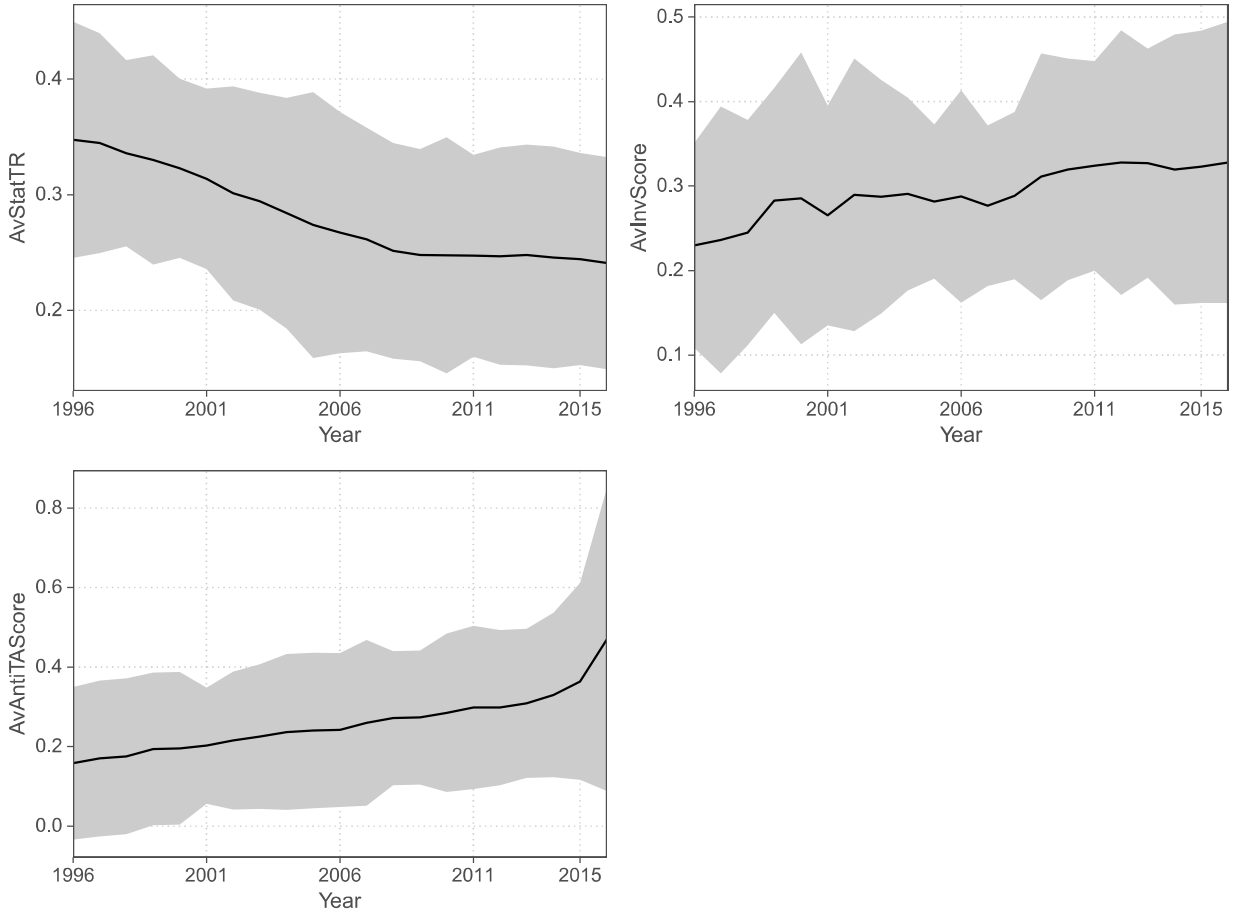

Figure 2: Corporate Statutory Tax Rate Development by Country

This figure depicts the statutory corporate tax rates for the 34 sample countries over the sampling period (1996-2016). Data on statutory tax rates has been obtained from the *OECD.stats* database and the Ernst & Young *Corporate Tax Guides.*

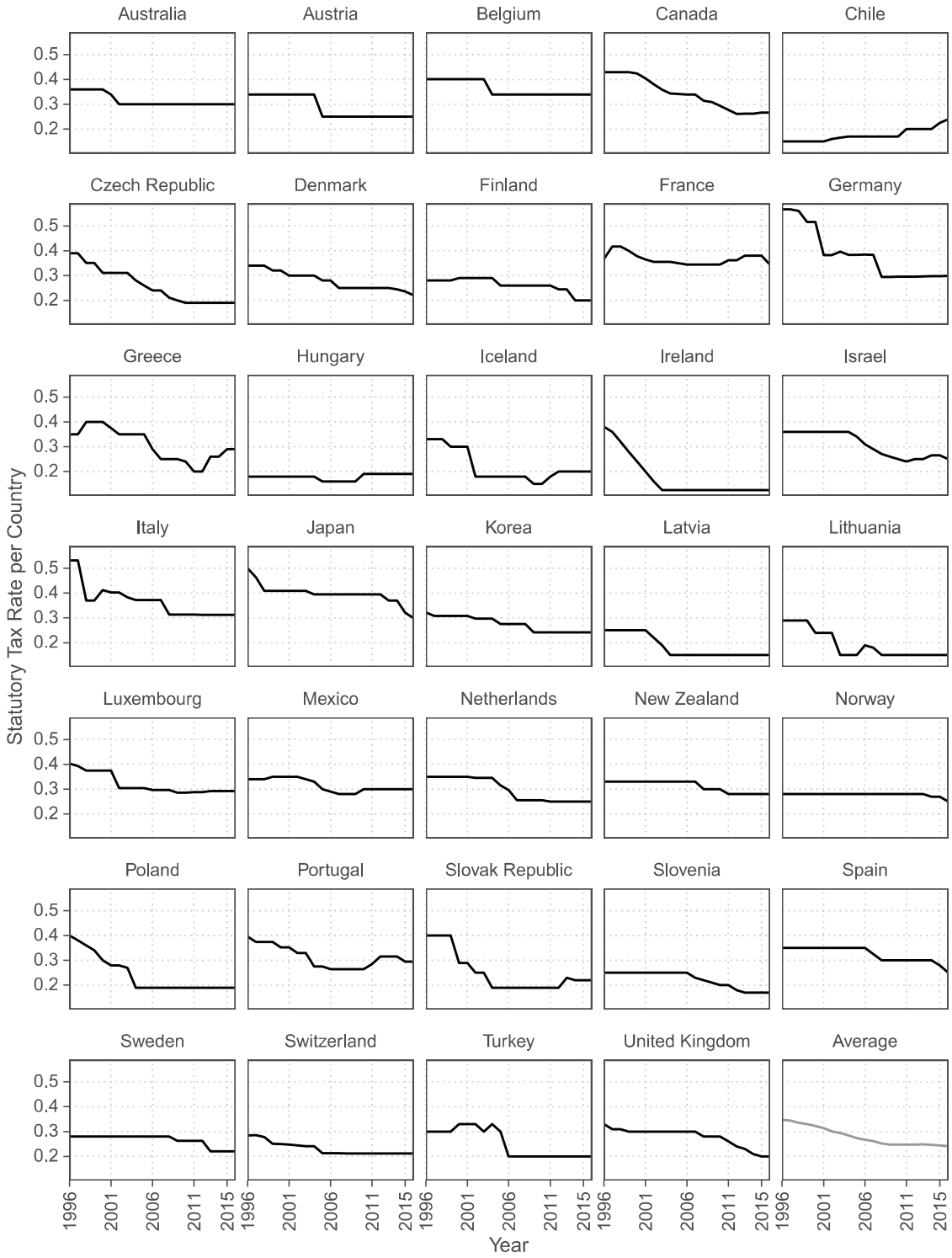

Figure 3: AntiTAScore and InvScore Development by Country

This figure depicts the levels of *AntiTAScore* and *InvScore* for the 34 sample countries over the sampling period (1996-2016). Detailed information on index construction is included in Table 1. The underlying data has been obtained from the *IBFD European Tax Handbooks,* the PricewaterhouseCoopers *Corporate Taxes – Worldwide Summaries*, the Ernst & Young *Corporate Tax Guides,* the *OECD.stats* database, and countries' official tax authority websites.

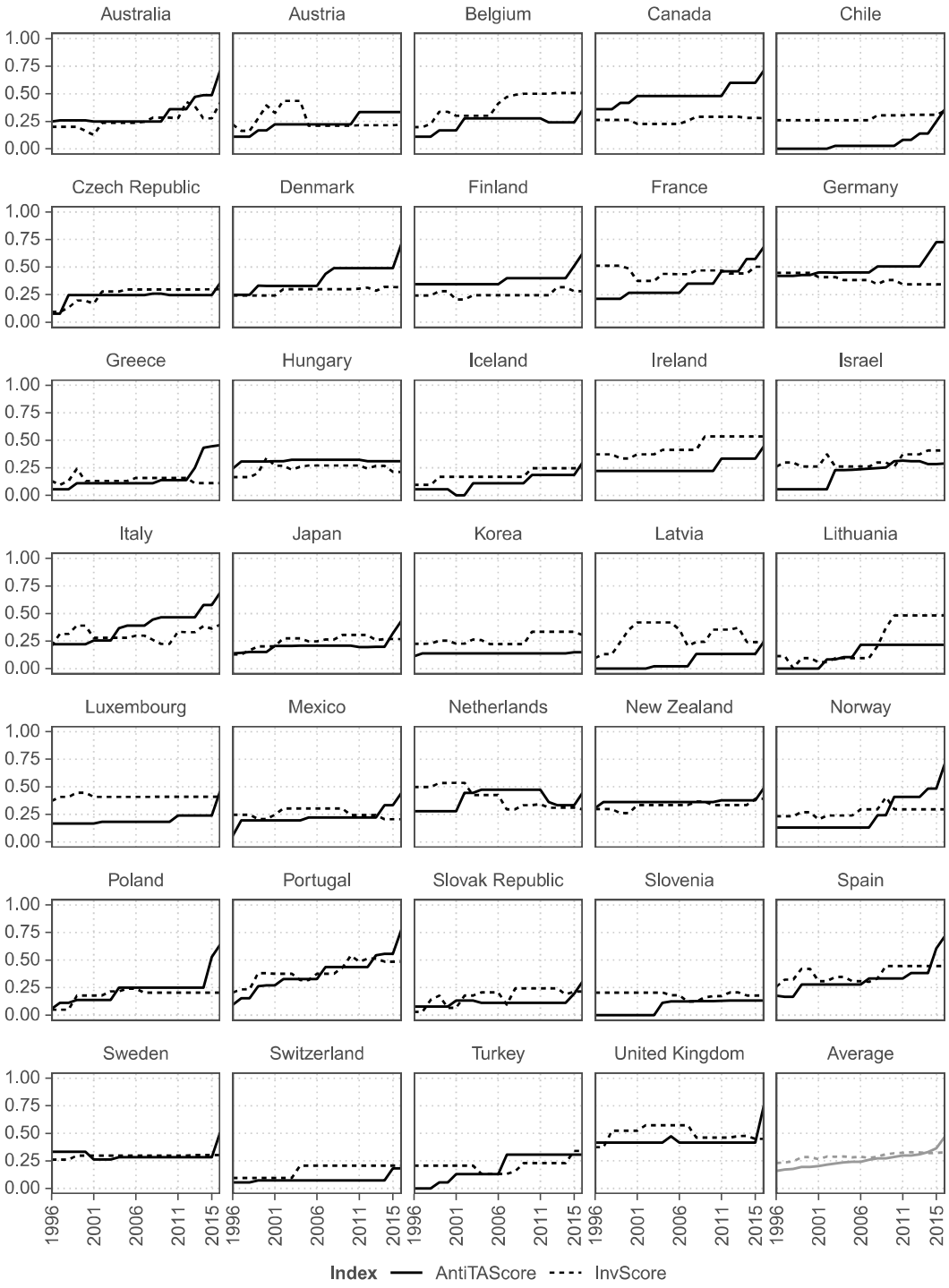

Figure 4: Large Business Change Events by U.S. Industry

This figure plots the occurrence of large business change events for U.S. industries over the sampling period (1996-2016). For each U.S. industry, we define a large business change as an annual increase in the proportion of ICT jobs of more than 1.5 percentage points that is not fully reversed over the subsequent period.

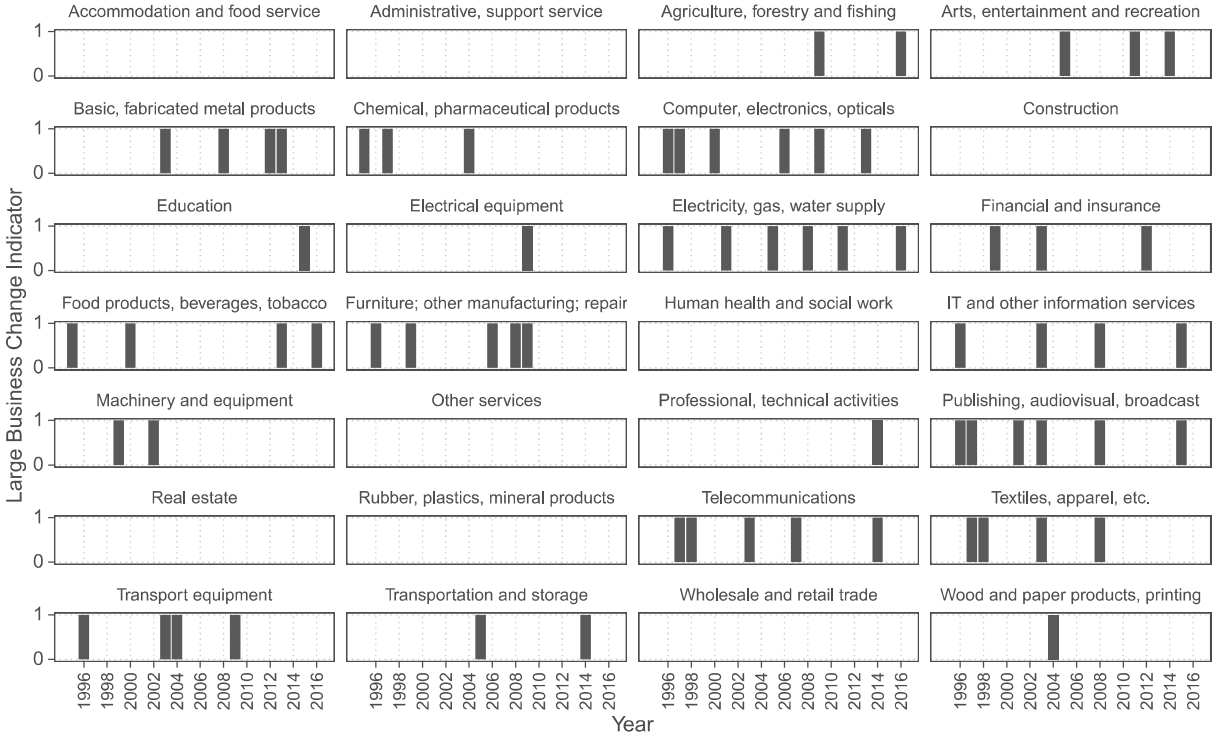

Figure 5: Variation in Business Change Exposure by Sample Country

This figure shows cross-sectional variation in the exposure to U.S. business changes. While the timing of the business change events is the same for all countries, exposure varies depending on country-specific industry structures.

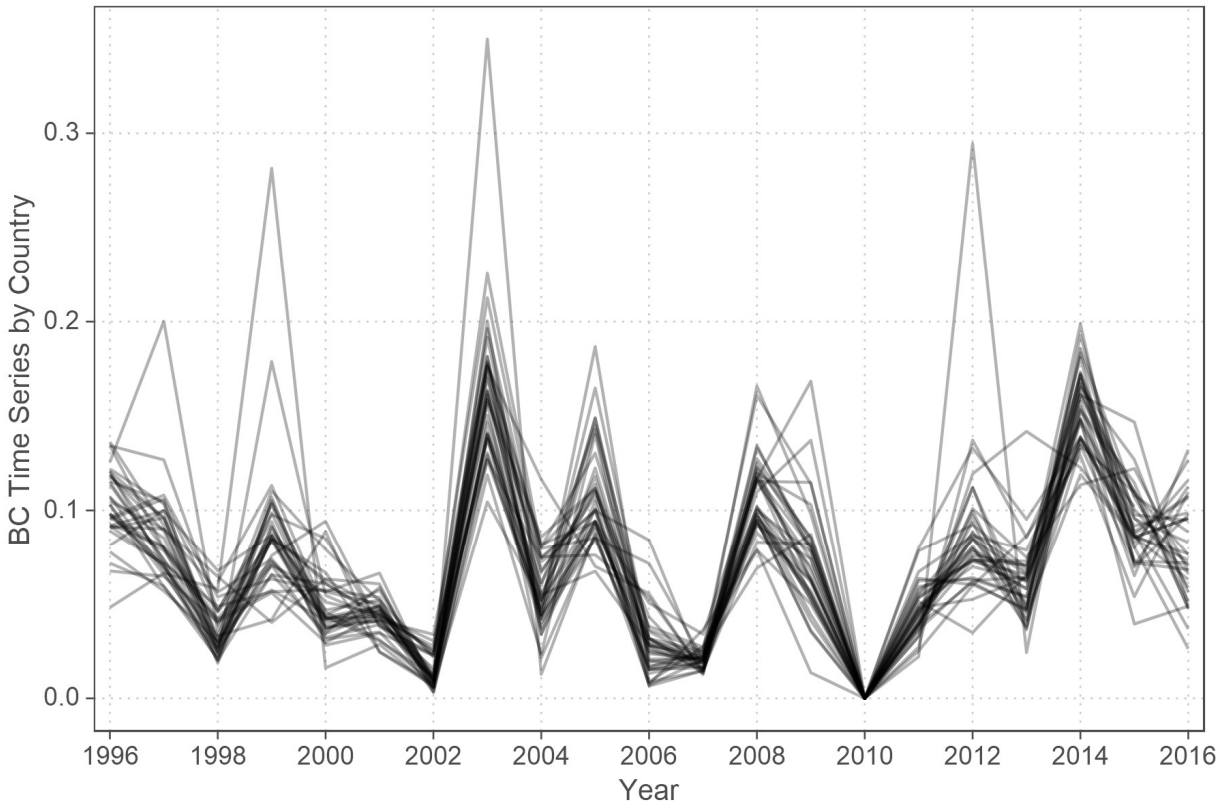

Figure 6: Average Tax Policy Levels by Country Size

This figure depicts the average levels of statutory tax rates (*StatTR*), tax rules providing traditional investment incentives (*InvScore*), and anti-tax avoidance rules (*AntiTAScore*) by country size group. We use tercile ranks of country population size to sort countries into three groups (*Small*, *Medium*, *Large*).

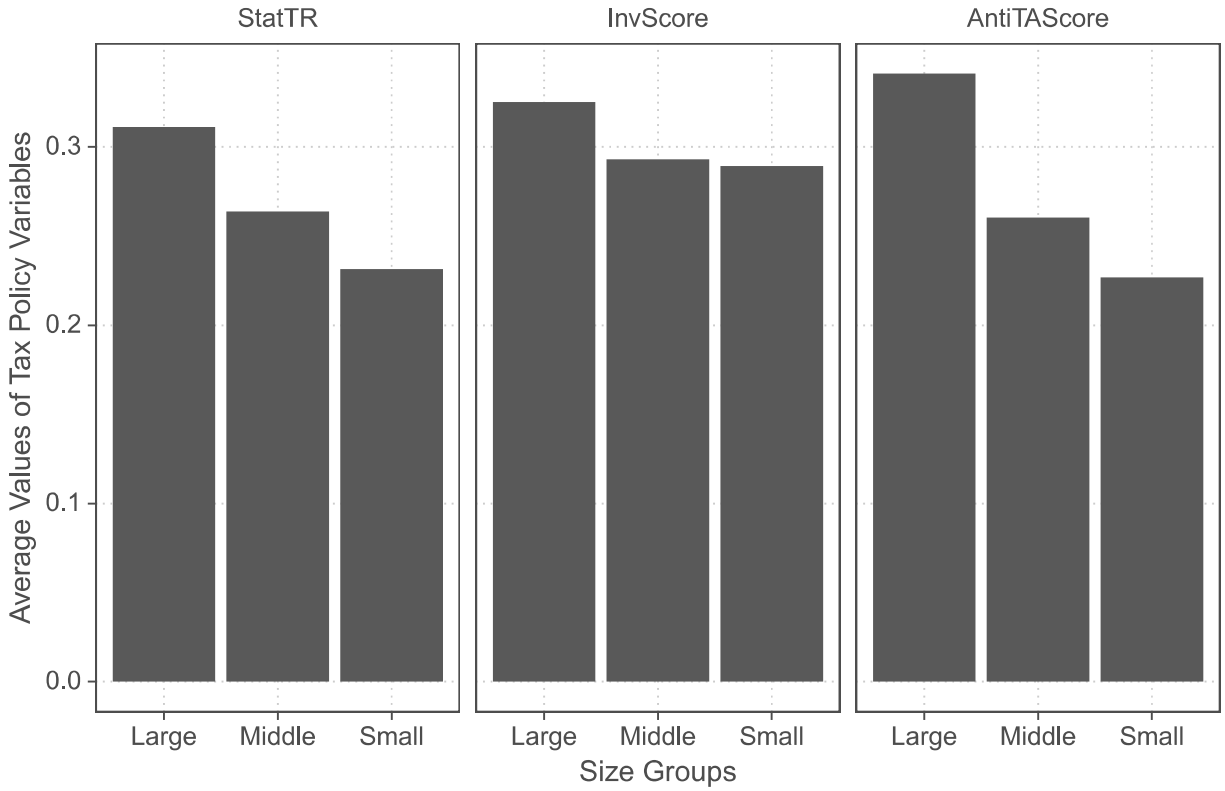

Figure 7: Number of Newspaper Articles around the 2017 U.S. Tax Reform

This figure plots the monthly number of newspaper articles published in either the Wall Street Journal, New York Times, Chicago Tribune, New York Post, Los Angeles Times, or Washington Post from November 1, 2017 until March 31, 2018. We used two different search phrases in Factiva, one related to the salient tax rate cut and one for other, less salient but also substantial, tax reform changes related to tax avoidance. The explicit search phrases are outlined below.

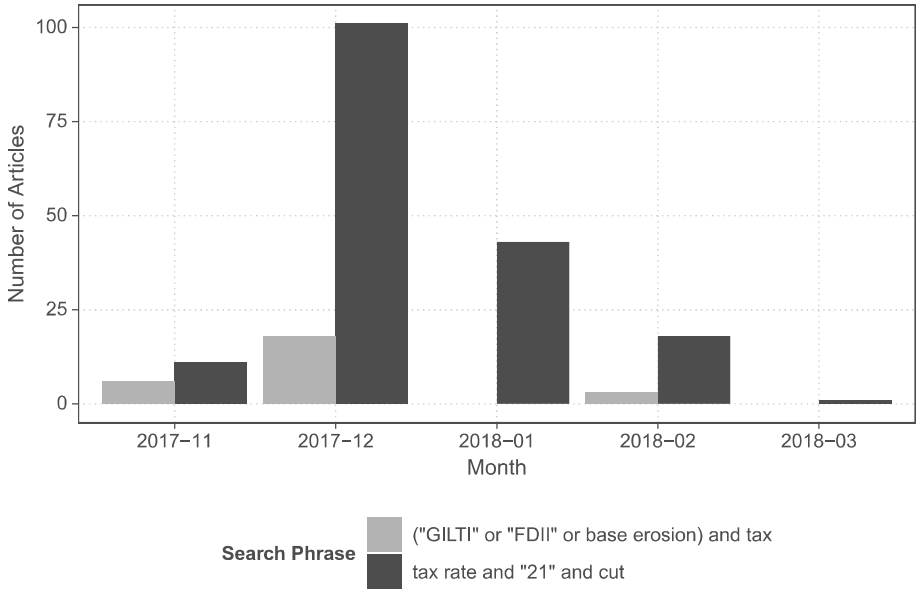

Table 1: Construction of Indices

	Item	Rating	Weight
Panel A: InvScore			
(1)	Loss carry back rule	1 – Yes | 0 – No	1/7
(2)	Loss carry forward measure[a]	Range between 0 and 1 depending on LCF regime characteristics	1/7
(3)	Group taxation regime	1 – Yes | 0 – No	1/7
(4)	Corporate equity allowance	1 – Yes | 0 – No	1/7
(5)	Venture capital tax benefits	1 – Yes | 0 – No	1/7
(6)	Accelerated depreciation[b]	1 – Yes | 0 – No	1/21
(7)	Immediate write-off option[b]	1 – Yes | 0 – No	1/21
(8)	Bonus depreciation[b]	1 – Yes | 0 – No	1/21
(9)	R&D tax incentives	1 minus Adjusted B-Index[c] (values normalized between 0 and 1)	1/7
Panel B: AntiTAScore			
(1)	Hybrid mismatch rule	1 – Yes | 0 – No	1/9
(2)	General anti-tax avoidance rule	1 – Yes | 0 – No	1/9
(3)	Transfer pricing regime	0 – No regime effective; 0.5 – only Arm's Length Principle; 1 – more complex transfer pricing rules	1/9
(4)	Thin capitalization regime strictness	1 minus debt-to-total assets-ratio; 0 – if no regime	1/9
(5)	Earnings stripping rule strictness	1 minus earnings stripping threshold (in percent); 0 – if no regime	1/9
(6)	CFC regime strictness	Low-tax country threshold tax rate divided by statutory tax rate in the country of control	1/9
(7)	Exit tax system	1 – Yes | 0 – No	1/9
(8)	Tax-specific voluntary or mandatory disclosure regime	1 – Yes | 0 – No	1/9
(9)	Installation of country-by-country reporting rules	1 – Yes | 0 – No	1/9

This table displays the construction of our two self-constructed tax policy indices *InvScore* and *AntiTAScore*. [a] Our loss carry forward measure follows the operationalization in Bethmann et al. (2018). [b] We weight the three items referring to tax incentives related to tangible assets incentives with 1/21 each, to ensure equal weighting of tangible and intangible tax incentives in our final score. [c] The original B-Index formula follows McFetridge and Warda (1983); we make several simplifying assumptions for our adjusted B-index calculation (i.e., we assume constant tax rates, constant wage portions, constant portions of current expenses, constant investments over time).

Table 2: Occupations and Industries Used to Construct Weighted Job Proportions

Panel A:	**Occupations labeled as information, communication, technology related**
Census Code	**Description**
110	Computer and information systems managers
1000	Computer scientists and systems analysts/network systems analysts/web developers
1010	Computer programmers
1020	Software developers, applications and systems software
1050	Computer support specialists
1060	Database administrators
1100	Network and computer systems administrators
1200	Actuaries
1220	Operations research analysts
1230	Statisticians
1240	Mathematical science occupations
1400	Computer hardware engineers
2900	Broadcast and sound engineering technicians and radio operators, and media and communication equipment workers, all other
5030	Communications equipment operators, all other
5800	Computer operators
7900	Computer control programmers and operators

Panel B:	**Industries used for weighting**		
ISIC4 Code	**Description**	**ISIC4 Code**	**Description**
D01T03	Agriculture, forestry and fishing	D45T47	Wholesale and retail trade
D10T12	Food products, beverages, tobacco	D49T53	Transportation and storage
D13T15	Textiles, wearing apparel, leather and related	D55T56	Accommodation and food service
D16T18	Wood and paper products, printing	D58T60	Publishing, audiovisual and broadcasting
D19	Coke and refined petroleum products	D61	Telecommunications
D20T21	Chemical and pharmaceutical products	D62T63	IT and other information services
D22T23	Rubber, plastics, mineral products	D64T66	Financial and insurance
D24T25	Basic metals and fabricated metal products	D68	Real estate
D26	Computer, electronic and optical products	D69T75	Professional, scientific, technical activities
D27	Electrical equipment	D77T82	Administrative, support service
D28	Machinery and equipment	D85	Education
D29T30	Transport equipment	D86T88	Human health and social work
D31T33	Furniture; other manufacturing; repair	D90T93	Arts, entertainment and recreation
D35T39	Electricity, gas and water supply; sewerage, waste	D94T96	Other services
D41T43	Construction		

This table displays industry aggregation levels used for constructing our business change measure. Occupation codes in Panel A are U.S. Census occupation codes. Panel B industry codes are the International Standard Industrial Classification for all Economic Activities codes (fourth revision).

Table 3: Variable Descriptions

Variable	Description
AntiTAScore	Annual index capturing strictness of anti-tax avoidance rules. See Table 1 for an explanation of the index components and their weighting.
InvScore	Annual index capturing tax rules providing investment incentives. See Table 1 for an explanation of the index components and their weighting.
StatTR	Annual statutory tax rate. Data was obtained from the OECD.stats database and the Ernst & Young Corporate Tax Guides.
BC	Weighted exposure to large business changes in a U.S. industry *j* ($T_{j,t}$). $T_{j,t} = 1\ if\ \Delta ICTJobs_{j,t} > 0.015 \wedge\ \Delta ICTJobs_{j,t+1} > -0.015$ and zero otherwise. We measure business change exposure of country *i* by weighting $T_{j,t}$ with industry *j*'s weight (value added) in country *i*: $$BC_{i,t} = \sum_j T_{j,t} * IndustryWeight_{i,j,t} \,/\, \sum_j IndustryWeight_{i,j,t}$$
CapitalIn	Capital inflows from direct investment (% of GPD). Consists of the sum of foreign direct investment net inflows (Worldbank data code: BX.KLT.DINV.WD.GD.ZS) minus foreign direct investment net outflows (Worldbank data code: BM.KLT.DINV.WD.GD.ZS). We winsorize at the 1% and 99% percentiles.
DiffAntiTAScore	Difference between country *i*'s *AntiTAScore* in a year and the distance-weighted *AntiTAScore* average of all other OECD countries. Distance weights ($DWtd_{i,j}$) are based on distances between capital cities, taken from the CEPII geodistance database: $DiffAntiTAScore_{i,t} = AntiTAScore_{i,t} - \sum_j AntiTAScore_{j,t} * DWtd_{i,j} \,/\, \sum_j DWtd_{i,j}$
DiffInvScore	Difference between country *i*'s *InvScore* and the distance-weighted *InvScore* average of all other OECD countries. Distance weights ($DWtd_{i,j}$) are based on distances between capital cities, taken from the CEPII geodistance database: $DiffInvScore_{i,t} = InvScore_{i,t} - \sum_j InvScore_{j,t} * DWtd_{i,j} \,/\, \sum_j DWtd_{i,j}$
DiffStatTR	Difference between country *i*'s *StatTR* and the distance-weighted *StatTR* average of all other OECD countries. Distance weights ($DWtd_{i,j}$) are based on distances between capital cities, taken from the CEPII geodistance database: $DiffStatTR_{i,t} = StatTR_{i,t} - \sum_j StatTR_{j,t} * DWtd_{i,j} \,/\, \sum_j DWtd_{i,j}$
ElYear	Indicator for election years. Data obtained via progov.org.
GDPGr	Gross domestic product growth (OECD national accounts)
GovExppGDP	Government expenses for operating activities (% of GDP)
lnGDPpCap	Logarithm of gross domestic product per capita (OECD national accounts)
Population	Country population (Worldbank data code: SP.POP.TOTL)
Size	Logarithm of population of a country, averaged over all years
Unemp	Unemployment (% of labor force, Worldbank data code: SL.UEM.TOTL.ZS)

Table 4: Descriptive Statistics

Variable	N	Mean	StDev	P05	P25	Median	P75	P95
Tax Policy Variables								
AntiTAScore	578	0.275	0.151	0.028	0.139	0.259	0.361	0.505
StatTR	578	0.268	0.072	0.15	0.21	0.28	0.313	0.384
InvScore	578	0.302	0.107	0.132	0.226	0.295	0.374	0.503
Business Change Variables								
BC	578	0.071	0.050	0	0.036	0.064	0.098	0.166
$BC_{[t-1 \text{ to } t-3]}$	578	0.067	0.024	0.033	0.050	0.062	0.082	0.112
Split Variables								
Size	578	16.268	1.391	13.087	15.481	16.153	17.561	18.266
$DiffAntiTAScore_{t-1}$	578	0.001	0.134	-0.215	-0.109	0	0.094	0.226
$DiffInvScore_{t-1}$	578	0.008	0.111	-0.151	-0.071	-0.01	0.085	0.201
$DiffStatTR_{t-1}$	578	-0.016	0.071	-0.139	-0.071	-0.011	0.035	0.09
Controls								
$CapitalIn_{t-1}$	578	0.385	3.323	-6.015	-1.552	0.32	2.164	7.587
$ElYear_{t-1}$	578	0.256	0.437	0	0	0	1	1
$GDPGr_{t-1}$	578	2.491	3.283	-3.552	1.143	2.626	4.041	7.097
$GovExppGDP_{t-1}$	578	33.208	10.513	15.885	25.868	35.201	41.367	46.884
$lnGDPpCapUSD_{t-1}$	578	10.353	0.395	9.632	10.101	10.433	10.614	10.914
$Unemp_{t-1}$	578	7.865	4.198	3.229	4.823	7.065	9.628	16.217

This table shows descriptive statistics for the final sample used in our analyses. See Table 3 for a detailed description of the computation for each variable.

Table 5: Average Predictive Ability of Business Changes

	StatTR	**InvScore**	**AntiTAScore**
	(1)	(2)	(3)
StatTR $_{[t-1 \text{ to } t-3]}$	0.692***		
	(0.038)		
InvScore $_{[t-1 \text{ to } t-3]}$		0.729***	
		(0.059)	
AntiTAScore $_{[t-1 \text{ to } t-3]}$			0.890***
			(0.058)
$BC_{[t-1 \text{ to } t-3]}$	0.022	-0.061	0.415***
	(0.041)	(0.106)	(0.126)
$GovExppGDP_{t-1}$	0.0004	-0.001	0.001
	(0.0005)	(0.001)	(0.001)
$GDPGr_{t-1}$	0.0002	-0.004**	0.002*
	(0.0003)	(0.002)	(0.001)
$Unemp_{t-1}$	0.001	0.001	0.0002
	(0.001)	(0.002)	(0.002)
$ElYear_{t-1}$	0.003**	0.0002	0.0002
	(0.002)	(0.004)	(0.004)
$CapitalIn_{t-1}$	-0.00000	-0.0002	0.001
	(0.0004)	(0.001)	(0.001)
$lnGDPCap_{t-1}$	0.016	0.004	-0.081**
	(0.015)	(0.122)	(0.036)
Year	-0.001***	-0.0003	0.005***
	(0.0004)	(0.002)	(0.001)
FE	C	C	C
Country Cluster	Yes	Yes	Yes
Observations	578	578	578
Adjusted R^2	0.929	0.837	0.896

This table reports the regression results for our analysis of the lead-lag relation between our business change proxy ($BC_{[t-1 \text{ to } t-3]}$) and our three tax policy measures. The dependent variables are the level of statutory tax rates (*StatTR*), our index capturing tax-induced investment incentives (*InvScore*), and our index capturing the strictness of anti-tax avoidance rules (*AntiTAScore*). The key explanatory variable ($BC_{[t-1 \text{ to } t-3]}$) measures country-specific exposure to large business changes. See Table 3 for a detailed description of the definitions and computation of each variable. We report robust standard errors clustered at the country level in parentheses. The superscripts ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 6: Cross-Sectional Differences in Business Change Reaction

	Size Split					Competitive Position Split		
	StatTR	**InvScore**	**AntiTAScore**	**AntiTAScore**	**AntiTAScore**	**StatTR**	**InvScore**	**AntiTAScore**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Trend				0.007***	0.006***			
				(0.001)	(0.001)			
$StatTR_{[t-1 \text{ to } t-3]}$	0.662***					0.649***		
	(0.044)					(0.063)		
$InvScore_{[t-1 \text{ to } t-3]}$		0.739***					0.777***	
		(0.056)					(0.090)	
$AntiTAScore_{[t-1 \text{ to } t-3]}$			0.869***	0.938***	0.842***			0.759***
			(0.055)	(0.098)	(0.123)			(0.056)
$BC_{[t-1 \text{ to } t-3]}$	0.101	0.048	0.441	0.807***	0.148	0.131	-0.188	0.357
	(0.136)	(0.259)	(0.272)	(0.272)	(0.140)	(0.121)	(0.271)	(0.309)
$BC_{[t-1 \text{ to } t-3]} \times Middle$	-0.137	-0.137	-0.427					
	(0.112)	(0.266)	(0.314)					
$BC_{[t-1 \text{ to } t-3]} \times Small$	0.037	-0.377	-0.515*					
	(0.110)	(0.255)	(0.268)					
$BC_{[t-1 \text{ to } t-3]} \times Lower$						0.034	-0.023	-0.379*
						(0.117)	(0.303)	(0.204)
$BC_{[t-1 \text{ to } t-3]} \times Similar$						-0.087)	-0.133	-0.482*
						(0.122)	(0.231)	(0.291)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FE	C + Y	C + Y	C + Y	C	C	C+Y	C + Y	C + Y
Country Cluster	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	578	578	578	186	199	578	578	578
Adjusted R^2	0.933	0.843	0.918	0.885	0.908	0.932	0.843	0.918

This table reports the regression results for our size and competition sample split analysis of the lead-lag relation between our business change proxy and our three tax policy measures. Columns (1) to (3) displays the size split and Columns (6) to (8) the competition split. Columns (4) and (5) show the sample split results for large (4) and small (5) countries separately. See Table 3 for a detailed description of the computations for each variable. We report robust standard errors clustered at the country level in parentheses. The superscripts ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 7: Predictive Ability of Business Changes on Subcomponents of AntiTAScore

	HybMisRul	GAAR	TransPric	ThinCap Strictness	EarnStrip Strictness	CFC Strictness	CbC Reporting	ExitTax	DiscReg
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$BC_{[t-1 \text{ to } t-3]}$	1.368	0.813	-1.226	0.381	-0.663	1.464	1.024	2.627**	0.230
	(1.467)	(1.062)	(1.183)	(0.562)	(0.902)	(1.028)	(0.707)	(1.064)	(0.700)
$BC_{[t-1 \text{ to } t-3]} \times Middle$	-3.375**	-0.296	0.627	-0.739**	0.491	0.141	-1.085	-1.614	0.124
	(1.351)	(1.122)	(0.439)	(0.324)	(0.743)	(0.694)	(0.907)	(1.591)	(0.694)
$BC_{[t-1 \text{ to } t-3]} \times Small$	-3.403**	-0.409	1.041	-0.462	0.875	-0.446	-0.995	-2.349**	-0.426
	(1.472)	(0.805)	(0.733)	(0.345)	(0.853)	(0.746)	(0.847)	(1.092)	(0.543)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FE	C +Y	C + Y	C + Y	C + Y	C + Y	C + Y	C + Y	C + Y	C + Y
Country Cluster	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	578	578	578	578	578	578	578	578	578
Adjusted R^2	0.572	0.856	0.683	0.638	0.471	0.911	0.581	0.820	0.070

This table shows separate regressions for all nine *AntiTAScore* items. Table 1 contains information on index construction and the nine elements used as dependent variables in this analysis. See Table 3 for a detailed description of the computations for each variable. We report robust standard errors clustered at the country level in parentheses. The superscripts ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 8: Business Changes and Real Effects

	CapEx/Assets	CapEx/PPE	ΔPPE	Capital to Labor	Total Wages
	(1)	(2)	(3)	(4)	(5)
BC	-0.0649*	-0.2686*	-0.9897**	-2.3365*	0.0762
	(0.0362)	(0.1345)	(0.4729)	(1.1470)	(0.0840)
Controls	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No	Yes
Observations	47,139	45,200	44,128	47,015	47,139
Adj.R-squared	0.538	0.445	-0.000	0.615	0.777

This table presents regression results on investment behavior in OECD countries. The dependent variable is capital investment relative to prior year's total assets (*CapEx/Assets*) in Column (1), capital investment relative to prior year's property, plant, and equipment, PPE, (*CapEx/PPE*) in Column (2), the change in PPE (*ΔPPE*) in Column (3), the natural logarithm of capital expenditures over total wages (*Capital to Labor*) in Column (4), and wage expenses relative to prior year's total assets (*Total Wages*) in Column (5). In all columns, we include firm fixed effects and year fixed effects. We report robust standard errors clustered at the country level in parentheses. The superscripts ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 9: Predictive Ability of Tax Policy Changes for Business Changes

	BC	**BC**	**BC**
	(1)	(2)	(3)
$StatTR_{[t-1 \text{ to } t-3]}$	0.026		
	(0.040)		
$InvScore_{[t-1 \text{ to } t-3]}$		-0.026	
		(0.030)	
$AntiTAScore_{[t-1 \text{ to } t-3]}$			0.046
			(0.035)
$BC_{[t-1 \text{ to } t-3]}$	-0.498***	-0.502***	-0.497***
	(0.157)	(0.156)	(0.156)
$StatTR_{[t-1 \text{ to } t-3]} \times Middle$	-0.047		
	(0.049)		
$StatTR_{[t-1 \text{ to } t-3]} \times Small$	-0.037		
	(0.085)		
$InvScore_{[t-1 \text{ to } t-3]} \times Middle$		0.012	
		(0.036)	
$InvScore_{[t-1 \text{ to } t-3]} \times Small$		0.028	
		(0.037)	
$AntiTAScore_{[t-1 \text{ to } t-3]} \times Middle$			0.015
			(0.043)
$AntiTAScore_{[t-1 \text{ to } t-3]} \times Small$			-0.004
			(0.032)
Controls	Yes	Yes	Yes
FE	C + Y	C + Y	C + Y
Country Cluster	Yes	Yes	Yes
Observations	578	578	578
Adjusted R^2	0.791	0.791	0.793

This table reports the results of the reverse regression. The dependent variable is business changes in period t. The key explanatory variables are our three tax policy measures (*StatTR*, *InvScore*, *AntiTAScore*). See Table 3 for a detailed description of the computations for each variable. We report robust standard errors clustered at the country level in parentheses. The superscripts ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.