Tax Competition and Employment

Stephen Glaeser
University of North Carolina at Chapel Hill
stephen_glaeser@kenan-flagler.unc.edu

Marcel Olbert
London Business School
molbert@london.edu

Ann-Catherin Werner
University of Mannheim
awerner@uni-mannheim.de

This version: September, 2022

ABSTRACT: We examine how exposure to international tax competition affects domestic firms' employment. Consistent with prior work, we find evidence that reductions in foreign tax rates affect the domestic competitive environment via increases in import competition and investment in foreign-owned firms. We posit that these changes in the competitive environment can cause managers to reduce their firms' employment levels. Consistent with our expectation, we find that relative decreases in foreign tax rates negatively affect total labor compensation at domestic firms *ex ante* exposed to import competition and competition from foreign-owned peers. The effect of exposure to tax competition is greater for firms more exposed to product market competition and those that are less able to expand investment without also increasing employment levels. Taken together, our results suggest that foreign tax rate changes can affect managers' domestic employment decisions by changing the domestic competitive environment.

Keywords: Tax competition, Competition, Employment, Real effects, Trade

JEL classifications: E24, F14, F16, H23, H35

Acknowledgements: We gratefully acknowledge valuable comments from Peter Brok, Alissa Bruehne (discussant), Michael Donohoe, John Gallemore, Luzi Hail, Brad Hepfer, Robert Hills, Jeff Hoopes, John Kepler, Becky Lester, Ed Maydew, Michele Mullaney, Reining Petacchi (discussant), David Samuel, Bharat Sarath (discussant), Terry Shevlin, Christoph Spengel, Florin Vasvari, Connie Weaver (editor), Ryan Wilson, two anonymous reviewers, the WHU - Otto Beisheim School of Management tax reading group, and the University of Arizona tax reading group, as well as from seminar participants at the 30th Annual Conference on Financial Economics and Accounting, 6th Annual Berlin-Vallendar Conference on Tax Research, 10th EIASM Conference on Current Research in Taxation, the University of Mannheim, the University of California-Irvine, and the University of North Carolina at Chapel Hill. The authors gratefully acknowledge research support from the Leibniz ScienceCampus MannheimTaxation, London Business School, University of North Carolina at Chapel Hill, University of Mannheim Business School, Julius-Paul-Stiegler Gedaechtnis Foundation, and German Academic Exchange Service (DAAD IPID4all).

1. Introduction

The average corporate income tax rate among Organisation for Economic Co-operation and Development (OECD) countries declined by 26% over the last two decades (from 32.5% in 2000 to 23.9% in 2018). Tax competition, which occurs when governments reduce tax rates relative to other countries to attract capital and income, is a central cause of this decline (Devereux et al., 2008; Devereux and Loretz, 2013). Despite the significant changes in corporate income tax rates due to international tax competition, empirical evidence of how they affect employment in other countries is scarce (Lester, 2021). We help fill this gap in the literature by documenting how exposure to foreign tax rate changes causes managers to alter their firms' employment levels.

Foreign tax rate changes can cause domestic managers to alter their firms' employment levels by changing the domestic competitive environment. For example, foreign tax rate changes can affect whether the managers of foreign firms invest in marginal projects, which can result in new products and production improvements (e.g., Djankov et al., 2010; Mukherjee et al., 2017; Lester, 2019). These investment changes can directly affect the competitive environment in other countries by changing import competition and changing competition from local competitors cross-subsidized by foreign parents. Further, foreign tax rate changes can also indirectly affect the domestic competitive environment due to the threat of potential competitive actions by the managers of foreign firms (Tirole, 1988). Consistent with foreign tax cuts affecting the competitive environment in other countries, Kim et al. (2021) find that they cause US domestic-only firms to use more competition-related words in their 10-Ks and decreases their price to cost margins, which prior work suggests indicates reduced market power (e.g., Aghion et al., 2005; Gaspar and Massa, 2006; Peress, 2010). In total, foreign tax rate changes likely affect the competitive environment in other countries.

How these changes in the domestic competitive environment due to changes in foreign tax rates affect managers' employment decisions is *ex ante* ambiguous. Prior work finds that product market competition forces managers to cut expenses and excesses, increasing their firms' efficiency (Holmes and Schmitz, 2010). One expense that managers can potentially cut is labor expense, either by firing workers or reducing their wages and hours. Product market competition can also affect how managers invest.[1] The study that we build on most directly, Kim et al. (2021), finds that exposure to foreign tax cuts increases domestic firms' investment and efficiency. Investment generally correlates with employment, for example because workers must run factories and because the majority of research and development (R&D) spending is scientists' wages (Jankowski, 2012). Therefore, changes in investment due to changes in foreign tax rates can positively affect employment. In total, how investment and cost cutting decisions due to foreign tax rate changes will affect domestic employment on average is an open empirical question.

We examine the question of how changing foreign tax rates affect managers' employment decisions by constructing measures of firms' exposure to changes in foreign tax rates via competition from imports and from foreign-owned domestic peer firms. Specifically, we measure exposure to tax competition via the import competition channel using the summed difference between the domestic corporate tax rate and different foreign corporate tax rates, weighted by the share of prior-year industry imports originating from each foreign country (see Kim et al., 2021 for a similar approach). We measure exposure to tax competition via the multinational presence channel using an analogous approach. We first calculate the difference between the domestic tax rate and the foreign tax rate faced by the foreign parents of domestic subsidiaries. We then weight

[1] Dixit (1980), Sutton (1991), and Khanna and Tice (2000) find or argue that managers use investment to escape product market competition, while Fresard and Valta (2016) and Autor et al. (2020) find that product market competition causes managers to reduce their investment.

these differences by the share of prior-year industry sales made by each foreign-owned domestic subsidiary.

We begin our empirical analysis by presenting evidence supporting our assumption that changes in foreign tax rates affect the domestic competitive environment. Consistent with Bernini and Treibich (2016) and Federici et al. (2020), we find that changes in tax rates negatively relate to changes in exports. Because these exports ultimately appear as imports into other countries, this finding suggests that changes in foreign tax rates can affect the competitive environment in other countries via the import competition channel. Consistent with Lester (2019) and De Vito et al. (2021), we find that changes in the corporate tax rate for parent firms negatively relates to their investment by subsidiaries located in other countries. Because these investments will help the subsidiary compete with peer firms, this finding suggests that changes in foreign tax rates can affect the competitive environment in other countries via the multinational presence channel. Finally, consistent with Donohoe et al. (2022) and Kim et al. (2021), we find that changes in our measures of exposure to tax competition negatively relate to changes in domestic firms' margins and markups. Because firms that are more insulated from product market competition are able to earn higher margins and charge higher markups, this result suggests that changes in our measures of exposure to tax competition relate to changes in the domestic competitive environment (De Loecker et al., 2020; Kim et al., 2021).

Having verified our assumption that changes in foreign tax rates affect the domestic competitive environment, we next turn to our central research question of how affected managers adjust their firms' employment levels in response. We measure employment levels using firms' total labor compensation in order to capture managers' employment decisions on the intensive and extensive margins (i.e., by changing wage rates and working hours and by firing and hiring

workers). We find that the effect of exposure to tax competition on employment levels via both the import competition channel and the multinational presence channel is economically significant. The results from our preferred specification suggest that a one standard deviation increase in our import competition based measure would decrease affected firms' total labor expense by 0.5%. The results also suggest that a one standard deviation increase in our multinational presence-based measure would decrease affected firms' total labor expense by 0.1%.[2]

We also find that the effect of exposure to tax competition on employment levels concentrates at domestic-only firms without foreign subsidiaries or foreign parents, and which therefore lack the international tax planning and diversification opportunities to help weather exposure to, or even benefit from, tax competition. This evidence suggests exposure to tax competition can affect employment via mechanisms other than income or operations shifting because domestic-only firms cannot move operations abroad.[3] This in turn suggests that limits on income or operations shifting would be insufficient to prevent all adverse effects of exposure to tax competition on domestic employment.

We next examine how the effect of exposure to tax competition on employment levels varies for managers who are more likely to adjust employment in response to changes in product market competition due to changes in exposure to tax competition. Doing so allows us to document heterogeneity in the effect of exposure to tax competition on employment levels and helps rule out potential alternative explanations for our findings.

[2] While these estimates could seem small at face value, even small changes in employment levels have important managerial and macroeconomic implications. For comparison, Fuest et al. (2018) find that a 1% increase in the local tax rate associates with a 0.39% decrease in wages. The smaller effect via the multinational presence channel is consistent with two potential explanations. First, increased employment at multinational firms' domestic subsidiaries may partially offset employment declines at other domestic firms. Second, multinationals may mainly compete with other large firms, limiting the effect via the multinational presence channel to large firms, while importers may compete with all firms, leading to a broader effect via the import competition channel.

[3] While domestic-only firms can cease operations and reopen in another country as a new firm, we estimate a within-firm changes design which means that any such behavior cannot drive the results of our tests.

We first examine how product differentiation moderates managers' responses to changes in exposure to tax competition. Product differentiation can soften the effects of exposure to product market competition by insulating firms from competitors.[4] For example, Kim et al. (2021) finds that managers whose firms produce more unique products respond less to foreign tax changes (see, also, Hombert and Matray, 2018, who show that firms with more differentiated products are less sensitive to import competition). Consequently, we predict that managers whose firms sell more differentiated products will be less sensitive to changes in exposure to tax competition, and hence less likely to alter their employment in response. Consistent with this prediction, we find that managers operating in industries with more distinct product codes adjust employment less in response to changes in exposure to tax competition.

The second source of cross-sectional variation that we examine is capital-labor complementarity. When capital and employment are more complementary, managers cannot expand capital investment in response to changes in product market competition without also expanding employment levels. Conversely, when capital and employment are more substitutional, managers can expand capital investment in response to changes in product market competition without altering employment levels, or even by lowering them to cut costs. Consequently, we predict that when capital and employment are more complementary, employment will be less sensitive to changes in exposure to tax competition. Consistent with this prediction, we find that managers operating in country-industries where the correlation between fixed tangible capital and employment is greater adjust employment levels less in response to changes in exposure to tax competition (Jacob and Vosseburger, 2021).

[4] Shaked and Sutton (1982), Tirole (1988), Sutton (1991), Kim et al. (2021).

Finally, we estimate a number of extensions of our main results. We find that countries that engaged less in tax competition experienced relative declines in aggregate employment. This finding provides suggestive evidence that tax competition from foreign governments imposed costs on these countries in the aggregate. We also estimate a single country changes-in-changes test. Beginning in 2009, the UK began aggressively cutting its corporate tax rate, but Germany did not. We examine how the managers of German firms exposed to UK tax competition changed employment levels after 2009. Consistent with our multi-country results, we find that the managers of German firms that faced more competition from UK imports or UK-owned peer firms relatively decreased their firms' employment levels after the UK tax cuts.

We also separately estimate effects of changes in exposure to tax competition based on whether the firm already faces a disadvantageous tax position relative to international competitors. We find that the effect of changes in exposure to tax competition concentrates at firms facing a relatively higher domestic tax rate. This finding suggests that greater exposure to tax competition lowers domestic firms' employment more when they are located in country-industries that are relatively poorly positioned in the international tax competition landscape. This result is consistent with laggards in tax competition falling farther behind when other firms increase the tax competition gap. In contrast, leaders in tax competition do not suffer when other countries partially close the tax competition gap.

We contribute to the literature on the effects of taxes on multinational firms' decision-making by answering the call of Lester (2021) for research on the effect of taxation on investment and employment. Prior work in this literature largely focuses on how tax policy that directly targets firms or their employees and investors affect firm outcomes.[5] Consequently, our main contribution

[5] See Hanlon and Heitzman (2010) for a review of the literature. Subsequent studies include Graham, Hanlon, and Shevlin (2011); Doidge and Dyck (2015); Hanlon et al. (2015); Heider and Ljungqvist (2015); Dobbins and Jacob

to this literature is to document evidence that *foreign* tax rates can affect employment at *domestic* firms by altering the domestic competitive environment.[6]

The most closely related studies in this literature are Gaertner et al. (2020), De Vito et al. (2021), Kim et al. (2021), and Donohoe et al. (2022). These studies present evidence that tax cuts affect the investment and performance of firms not directly targeted by the tax cut, and hence alter product market competition. However, how the effects documented by these prior studies translate to the relation between exposure to tax competition and domestic employment is *ex ante* unclear. Clarifying this relation is important because employment is a first-order concern in the eyes of many policymakers.[7] Clarifying this relation is also important because a central policy debate is how to best protect domestic employment from the adverse effects of exposure to tax competition (e.g., Commission of the European Communities, 1997; Peterson Institute for International Economics, 2017). Our result can inform this debate by showing that limits on income and operations shifting cannot fully prevent the adverse effects of exposure to tax competition on employment (see Avi-Yonah, 2008a and Avi-Yonah and Xu, 2017 for discussions of how countries can respond to tax competition, besides lowering their own tax rates). Our results may also inform the policy debate around the recent agreement on the global corporate minimum tax

(2016); Suarez Serrato and Zidar (2016): Bird et al. (2017); Ljungqvist et al. (2017); Nessa (2017); Armstrong et al. (2018); Bird et al. (2018); Chow et al. (2018); Langenmayr and Lester (2018); Williams (2018); Armstrong et al. (2019); Lester (2019); Cen et al. (2020); Dyreng and Hills (2021); Donohoe et al. (2022); Chen et al. (2022); Glaeser et al. (2022); Hoopes et al. (2022). Jacob (2022) is a recent review of this literature.

[6] Prior work finds that increased competition from foreign imports, and in particular Chinese imports, reduces US manufacturing employment (e.g., Revenga, 1992; Autor et al., 2013; Acemoglu et al., 2016). Coupled with evidence that foreign tax cuts increase exporting, these prior results help affirm our findings. We build on this prior work by additionally documenting the effect of exposure to tax competition via the cross-subsidization channel. Further, our estimates additionally capture the effect of the threat of competition due to lower foreign tax rates, and not just the effect of realized levels of imports (e.g., Tirole, 1988; Kim et al., 2021). Finally, we examine a broader set of industries beyond just manufacturing and a broader set of foreign countries, beyond just China.

[7] For example, a search of the Library of Congress reveals that the U.S. Congress considers over a hundred employment bills each year: https://www.congress.gov/search?q={%22source%22:%22legislation%22,%22subject%22:%22Labor+and+Employment%22}&searchResultViewType=expanded.

(OECD Pillar 2), which may intensify tax rate competition among industrial nations (Devereux et al., 2022)

We organize the rest of the paper as follows: Section 2 provides details on tax competition and develops our predictions. Section 3 describes our data sources and research design. Section 4 discusses our results. Section 5 concludes.

2. Background and predictions

2.1 Tax competition

On December 22, 2017 President Trump signed the Tax Cuts and Jobs Act into law. The act reduces the United States' (US') statutory corporate tax rate from 35% to 21%, continuing a worldwide downward trend in corporate tax rates. Proponents of the act and of reducing corporate tax rates argue that lower tax rates improve domestic firms' competitiveness (see, e.g., Peterson Institute for International Economics, 2017; Dyreng and Hills, 2021). Opponents argue that lower tax rates are the result of tax competition, which they consider harmful (see, e.g., G20, 2018).

Regardless of whether tax competition is harmful or beneficial, it appears that tax competition will remain a fact of life absent significant changes in the approach to worldwide taxation (OECD, 1998; 2019; Avi-Yonah, 2012). Trade liberalization and communication and transport technology innovations have made it simpler to move income and capital across borders (e.g., Dehejia and Genschel, 1999; Avi-Yonah, 2000; Devereux et al., 2021). Consequently, domestic income and capital are increasingly sensitive to foreign tax rates. Governments respond to this sensitivity by undercutting foreign tax rates to attract taxable capital and income, resulting in tax competition and a "race to the bottom" in corporate tax rates (Wilson, 1999; Devereux et al., 2008: G20, 2018). As a result, the worldwide average GDP-weighted statutory tax rate declined from 46.63% in 1980 to 26.47% in 2018 (Tax Foundation, 2018). While OECD Pillar 2 will

introduce a minimum tax rate to combat the most aggressive forms of profit shifting to tax havens, tax rate competition across industrial countries to attract real capital will likely continue and may even intensify (Gomez-Cram and Olbert 2022; Devereux et al., 2022).

Tax competition is particularly intense in the EEA because goods, capital, and labor can move freely between EEA countries and because the European Commission maintains a fairly homogeneous regulatory policy across EEA countries (Devereux and Loretz, 2013). This homogeneity extends to some matters of taxation, such as the collection procedure for consumption taxes, but not to all. In particular, EEA countries retain almost total sovereignty with regards to corporate taxation, resulting in particularly intense corporate tax competition. Consequently, we focus on competition in corporate statutory tax rates in the EEA.

Corporate statutory tax rates have the advantage of being directly measurable and affecting all firms that anticipate being profitable at some point in time. The theoretical literature on tax competition also frequently focuses on statutory tax rate competition and surveys suggest managers predominately use statutory tax rates to evaluate business decisions (Devereux and Loretz, 2013; Graham et al., 2017). However, we note that tax competition can also take other forms, including some that only manifest in marginal or effective tax rates (e.g., allowing tax avoidance strategies; Shevlin et al., 2019). However, marginal and effective tax rates are simultaneously determined with endogenous corporate investment and profitability, while foreign statutory tax rates are more likely exogenous in our setting. Consequently, focusing on statutory tax rates allows us to avoid potential endogeneity issues with focusing on marginal and effective tax rates (e.g., Ljungqvist et al., 2017).

2.2 Predictions

We consider two nonexclusive channels through which exposure to tax competition can affect domestic firms' employment levels. The two channels do not involve a direct effect of domestic tax rates on domestic employment, but instead operate indirectly through foreign tax rates affecting the domestic competitive environment. We refer to the first channel as the import competition channel. Changes in foreign tax rates can change the resources available to financially constrained foreign firms, affecting their investment in process improvements, product improvements, and/or capacity expansions (e.g., Almeida and Campello, 2007). To the extent these foreign firms export products and services abroad, these investments can affect the competitive environment in other countries by changing the quality and/or quantity of import competition.[8]

Further, tax competition can affect the domestic competitive environment via the import competition channel even if foreign firms are financially unconstrained. This is because changing tax rates can affect foreign firms' cost of capital and expected after-tax profits, leading them to undertake or forgo marginal investments and sales that would improve their products and expand their capacity. Consistent with foreign tax differentials affecting the domestic competitive environment, Flach, Irlacher, and Unger (2019) find that tax differentials between country pairs increase the range of products exported from the low-tax country to the high-tax country. Further, Kim et al. (2021) find that lower foreign tax rates in countries from which the US economy imports goods cause US domestic-only firms to use more competition-related words in their 10-Ks and decrease their price to cost margins. In total, changes in foreign tax rates should affect the domestic competitive environment via the import competition channel.

[8] Consistent with these arguments, Manova (2013) finds that financial constraints prevent firms from exporting and Law and Mills (2015) and Edwards et al. (2016) find that firms use tax planning to alleviate financial constraints.

We refer to the second channel through which tax competition can affect domestic firms' employment levels via changes to the domestic competitive environment as the multinational presence channel. Changing tax rates can affect the ability of multinational firms to subsidize their subsidiaries located abroad with internal capital market transfers. For example, Boutin et al. (2013) find that multinationals transfer cash to subsidiaries facing potential market entrants when their headquarters' tax rates are relatively lower. Further, Lester (2019) finds that lower home-country tax burdens cause US multinationals to invest in subsidiaries located abroad. Similarly, Hoopes et al. (2022) find that UK multinational firms increase their investments in subsidiaries located abroad after the UK significantly lowered the domestic corporate income tax rate. Finally, De Vito et al. (2021) demonstrate that subsidiaries reduce their investment in response to foreign tax increases that affect group-member firms (although they focus on non-headquarters' tax rate changes). These investments and capital transfers will help the subsidiary compete, ultimately affecting the domestic competitive environment in the country where the subsidiary is located.

Tax competition can also affect the domestic competitive environment via the multinational presence channel even absent any direct investments or capital transfers. This is because changing tax rates at corporate headquarters will change hurdle rates and cash flows, both of which can affect headquarters' investment in process or product improvements. If these process or product improvements help the foreign-owned subsidiary compete with domestic firms, they will affect the domestic competitive environment. In total, changes in foreign tax rates should also affect the domestic competitive environment via the multinational presence channel.

How the changes to the domestic competitive environment caused by tax competition will affect domestic employment is *ex ante* unclear. Prior work finds that managers respond to increases in competition by cutting expenses (Holmes and Schmitz, 2010), potentially including labor

expense by firing workers or reducing their wages and hours. Consequently, changes in the domestic competitive environment due to changes in foreign tax rates can cause managers to decrease employment levels. However, Kim et al. (2021) finds that exposure to foreign tax cuts causes the managers of domestic firms to increase their investment, which generally correlates with employment (e.g., because workers must run stores). Similarly, investments in and capital transfers to foreign-owned domestic subsidiaries may increase their employment levels, offsetting, or partially offsetting, any negative effect on the employment levels of their competitors. Therefore, changes in the domestic competitive environment due to changes in foreign tax rates can also cause managers to increase employment levels.

In total, prior work suggests an *ex ante* ambiguous effect of exposure to tax competition on domestic firms' employment levels via the import competition and multinational presence channels. However, prior work suggests that any effect of exposure to tax competition should vary with the ability of managers to increase investment without increasing, or even decreasing, employment levels (i.e., with the degree to which capital and labor are substitutes or complements). Similarly, prior work suggests that any effect should also vary with the degree to which domestic firms are insulated from product market competition, for example because they sell differentiated products.

2.3 Prior work on indirect competitive effects of corporate taxation

The closest prior work to our own is Kim et al. (2021), Lester (2019), Donohoe et al. (2022), and De Vito et al. (2021). These prior studies also document indirect competitive effects of corporate tax policy. Kim et al. (2021) document the effects of foreign corporate tax rate reductions on public US manufacturing firms' profitability and investment. Lester (2019) documents that the American Jobs Creation Act's (AJCA's) production tax incentives caused U.S.

manufacturing firms to substitute capital for labor and invest in foreign subsidiaries. Donohoe et al. (2022) document that competitors of firm more affected by the AJCA's corporate tax holiday suffered reduced profitability. De Vito et al. (2021) document that multinational subsidiaries reduce investments when foreign tax hikes affect same-group firms, ultimately affecting country-level employment.

Our results build on Kim et al. (2021), Lester (2019), and Donohoe et al. (2022) by documenting how exposure to tax competition affects employment. Kim et al. (2021) and Donohoe et al. (2022) find that competitor corporate tax rate reductions lower US firms' profitability. However, Kim et al. (2021) also find that these firms increase their investment and total factor productivity, ultimately preventing import competition and suggesting an *ex ante* unclear effect on employment. Further, Lester (2019) finds domestic production tax incentives cause multinational firms to invest in their foreign subsidiaries. It is *ex ante* unclear how this investment will affect employment levels at the subsidiary and its competitors. Lester (2019) suggests that the investment may cause the subsidiary to substitute capital for labor, and may also affect competitors' employment levels. In total, the primary difference between our papers are the different research questions.

While the primary difference between our paper and Kim et al. (2021), Lester (2019), and Donohoe et al. (2022) is our different research question, there are several other notable differences. Our sample is a separate universe of firms, across multiple EAA countries. Tax competition is particularly intense in the EAA and a central reoccurring policy issue facing the EU (OECD, 1998; 2019). Our sample also includes smaller, private firms, in addition to the large public firms examined by prior work. Small, private firms are plausibly the most affected by tax competition because they lack the diversification and international tax avoidance opportunities to weather or

benefit from tax competition. Consequently, we quantify the effect of exposure to tax competition on what are potentially the most vulnerable firms. Finally, our data allows us to separately quantify the relative importance of the import competition and multinational presence channels. Our work complements De Vito et al. (2021) by examining employment effects via the import competition channel. We also build on De Vito et al. (2021) by documenting firm-level employment effects, which allows us to document how firm and market characteristics moderate the effect of exposure to tax competition on employment levels. Finally, we build on De Vito et al. (2021) by examining parent-country tax rate changes, while they focus on tax hikes affecting group members not located in the parent country. Therefore, our results speak to a separate set of policy issues than do the results of prior work.

3. Data

3.1 Main sample

Table 1 describes our sample construction for our firm-level tests. We download unconsolidated company financial data for all public and private firms in the Orbis Generics flat files from July 2018.[9] We obtain data for the 28 member states of the European Union (EU), plus Norway and Switzerland. We merge this data to corporate ownership data using the historical annual versions of the Orbis database. We use this corporate ownership data to identify standalone firms and firms that belong to a multinational group.[10] For multinational groups, we identify member firms' worldwide subsidiaries and ultimate corporate owners (i.e., the parent firm at the

[9] Following the recommendations in Kalemli-Özcan et al. (2015), we track ID changes to accurately match the financial data to ownership and industry information, interpolate information on accounting standards used, delete duplicate observations with respect to accounting standards and firm ID, and delete observations with negative values for total assets, tangible assets, employees, and sales. We also linearly interpolate missing financial data if the firm has non-missing financial information in the year before and after a year with missing information. We drop firms whose total assets or sales do not exceed €10,000 at least once during the sample period. We also drop observations with missing industry classifications and zero employees or labor expense because of potential data errors.

[10] See De Simone and Olbert (2022) and Olbert (2022) for additional details on the identification of ownership structures and the construction of the ownership panel.

top of the organizational structure). We exclude financial institutions and utilities because their unique regulatory and institutional structures may affect their sensitivity to import competition and tax competition (Kubick et al., 2015). Similarly, we exclude firms active in the fields of public administration and defense, activities of extraterritorial organizations and bodies, and activities of households as employers.

We merge firm financial data with country-pair import data from the World Input-Output Database (WIOD).[11] We hand collect country-level tax rate data from the European Commission, KPMG, and OECD to calculate tax rate differentials. We require non-missing data for all dependent and control variables. Our final sample comprises 22,732,942 firm-year observations from 28 European countries from 2006 to 2015.[12] Table 2, Panel B provides a breakdown of our sample by year and country.[13]

3.2 Measuring domestic firms' exposure to tax competition

To explore how exposure to tax competition affects firms' employment levels, we develop measures of exposure to tax competition via the import competition and multinational presence channels. Our first measure, *ImpCompTax*, measures annual country-industry exposure to foreign tax differentials via import competition (see Kim et al., 2021, for a similar approach):

$$ImpCompTax_{j,c,t} = \sum_f \frac{Imports_{f,c,j,t-1}}{Imports_{c,j,t-1}} * (CIT_{c,t} - CIT_{f,t}) \quad (1).$$

[11] Available at http://www.wiod.org/database/wiots16 (see Timmer et al., 2015). The WIOD comprises annual time series of input-output tables of global trade at the country-industry level for the 28 EU countries and 15 other major economies around the world.

[12] The sample starts in 2006 because we require non-missing ownership information to construct changes in firm-level outcomes and control variables and ownership data begins in 2005. Our sample ends in 2015 because the last year of import data from the most recent WIOD update is 2014 and we use lagged values to compute our tax competition measures.

[13] Lithuania and Cyprus eventually drop out of the sample due to missing information. Our sample is larger than those in prior studies that also use Orbis data because we retrieve financial and ownership information from every annual historical update of the Orbis database (e.g., Shroff et al., 2014; Beaver et al., 2019; Beuselinck et al., 2019).

ImpCompTax weights the corporate tax rate differential between foreign country *f* and domestic country *c* in year *t* by the share of prior year import competition in industry *j* and country *c* originating from the foreign country *f*. We sum over all foreign countries.

Our second measure, *PeerCompTax*, measures annual country-industry exposure to foreign tax differentials via competition from foreign-owned domestic competitors (i.e., exposure to tax competition via the multinational presence channel):

$$PeerCompTax_{j,c,t} = \sum_g \frac{Sales_{g,c,j,t-1}}{Sales_{c,j,t-1}} * (CIT_{c,t} - CIT_{p,f,t}) \quad (2)$$

PeerCompTax weights the corporate tax rate differential between the parent firm's home country *f* and the domestic country *c* by the share of prior year country-industry sales in the domestic country made by domestic firm *g* owned by foreign parent firm *p*. We sum the measure over all domestic firms with foreign parents. We only include parent firms located in EAA countries because internal capital market transfers between affiliated EAA firms are common and not inhibited by withholding taxes, customs, or other trade barriers. Doing so also ensures that the foreign parent is close enough to the domestic subsidiary in a regulatory and legal sense to support the subsidiary. However, these same arguments suggest our inferences do not generalize to support from foreign parents that are distant in a regulatory or legal sense (Glaeser and Guay, 2017).

We examine the headquarters' tax rate, rather than the sales-weighted tax rate throughout the group, because we believe the headquarters' tax rate will unambiguously affect the firm's foreign investment decisions (we present evidence consistent with this assumption in Table 3). We also focus on headquarters' tax rates because lower corporate tax rates may cause investments in managerial resources, such as consulting or information systems, or in knowledge assets, such as innovation, that can benefit foreign subsidiaries. However, many of these investments are likely to only occur, or more likely to occur on average, at corporate headquarters (e.g., Glaeser et al.,

2022 find that firms are more likely to locate scientists near headquarters, suggesting that investment in innovation will be particularly sensitive to the corporate headquarters' tax rate).[14] Appendix B provides an example calculation for *ImpCompTax* and *PeerCompTax*.

3.3 Descriptive statistics

Table 2 presents descriptive statistics for our sample. Appendix A provides definitions for all variables. We winsorize all firm- and industry-level continuous variables at the 1st and 99th percentiles. The average firm in our sample pays total labor expense, *Labor Expense*, of €0.8 million. The standard deviation of *Labor Expense* is €57.1 million. The mean of *ImpCompTax* in Panel A of Table 1 is -0.96, suggesting our sample is slightly weighted towards low-tax countries (consistent with corporate taxes discouraging firm creation). The standard deviation of the change in *ImpCompTax* is 1.07 and the standard deviation of the change in *PeerCompTax* is 1.77, suggesting significant variation in both measures. Figure 1 provides histograms of the sample distribution of changes in both changes in *ImpCompTax* and *PeerCompTax* benchmarked against the normal distribution, as well as their means by sample country. Countries with high (low) statutory tax rates have larger negative (positive) competition-weighted tax rate differentials.

4. Empirical approach and results

4.1 Tax rate changes and the competitive environment

Before examining how exposure to tax competition affects domestic employment, we confirm that tax rate changes in one country affect the competitive environment in other countries. To do so, we first examine how changes in corporate tax rates relate to changes in exporting activity using the following country-industry-level ordinary least squares (OLS) regression:

$$\Delta ln(Exports_{j,c,t}) = \alpha_0 + \gamma_1 \Delta CIT\ Domestic_{c,t} + \Delta X\phi + \alpha_c + \alpha_{j,t} + \varepsilon_{j,c,t} \quad (3),$$

[14] We examine results using the sales-weighted tax rate throughout the group in Table 9, and find weaker results using this alternative measure.

where *CIT* refers to the statutory corporate income tax rate (for prior evidence consistent with tax rates affecting exports in other samples, see Bernini and Treibich, 2016; Federici et al., 2020). The dependent variable, *Exports*, is the amount of exports originating from a given country-industry in the current year. We identify industries using 2-digit NACE Rev. 2 codes.[15] We take the natural logarithm of exports because exports are highly skewed. Δ*CIT Domestic* is the main independent variable of interest, and captures changes in corporate income tax rates. We take the change from the prior period to the current period, denoted by the Δ operator, of all variables other than the fixed effects to control for time invariant aspects of the country-industry. In all specifications, we follow Correia (2015) and exclude observations nested within a fixed effect (singletons).[16]

The vector *X* includes the change in total country GDP, *GDP Total Domestic*, per-capita GDP, *GDP Capita Domestic*, and the value-added tax, *VAT Domestic*, which capture other features of tax policy and country-level economic conditions that may affect changes in exporting activity. In addition, *X* includes foreign direct investment inflows and outflows as a percentage of GDP, *FDI Inflow / Outflow (% GDP)* as well as total population, *Population*. Finally, Eq. (4) includes country fixed effects (α_c) to control for time-invariant country characteristics, and industry-year fixed effects ($\alpha_{j,t}$) to control for time-varying industry factors that might affect exporting activity (e.g., automation or a global steel shortage that affects car manufacturing production). We cluster standard errors by country-industry due to potential serial dependence within country-industries.

Table 3, Panel A presents the results of estimating Eq. (3). In columns (1)-(3), we examine a global sample of country-industries. In columns (4) and (5), we examine only EEA country-industries that are representative of our firm-level sample. The results of our preferred

[15] Using 2-digit NACE codes allows us to match data from the WIOD. The NACE industry classification for European markets is analogous to the NAICS or SIC classifications in the US.
[16] Consequently, the observations used in each regression do not match precisely to Table 2; note that singletons can vary between specifications and hence we choose to report descriptive statistics before removing singletons.

specification reported in column (5) suggest that a one standard deviation decrease in the change in the corporate income tax rate of 1.20, equal to a bit less than one tenth of the TCJA rate reduction, increases exports from a country-industry by 0.3% (*t*-statistics of -1.98).[17] Because these exports appear as imports in other countries and thereby affect product market competition in those countries, this result suggests that foreign tax rates can affect the domestic competitive environment via the import competition channel.

We continue to explore our assumption that foreign tax rates affect the domestic competitive environment by examining whether firms owned by a foreign parent change their investment activity in response to changes in the corporate income tax rate faced by their foreign parent. To do, we estimate the following subsidiary-level OLS regression:

$$\Delta Subsidiary\ Investment_{i,t} = \alpha_0 + \gamma_1 \Delta CIT\ Parent_{p,t} + \Delta Y\phi + \alpha_f + \alpha_{c,t} + \alpha_{j,t} + \varepsilon_{i,t} \quad (4),$$

where *p* denotes the headquarters country of the parent of firm *i* (for prior evidence consistent with tax rates affecting foreign subsidiary investment in other samples, see Lester, 2019; De Vito et al., 2021; Hoopes et al., 2022). The dependent variable, *ΔSubsidiary Investment*, is the subsidiary's annual change in fixed tangible assets as a percentage of lagged total assets in a given year. Following prior work (e.g., Bethmann et al., 2018 and Jacob et al., 2019), we do not take the natural logarithm of subsidiary investment because the variable can take negative values and is not heavily skewed. The main independent variable of interesting is *CIT Parent*, which is the corporate income tax rate faced by the foreign parent of firm *i*.

The vector *Y* includes the total and per capita GDP of the parent's home country, *GDP Total Parent* and *GDP Capita Parent*, which may affect the parent's corporate income tax rate and investment in foreign subsidiaries. Eq. (4) also includes industry-year fixed effects to control for

[17] $e^{(-1.20/100 \times -0.247)} - 1 = 0.003$.

time-varying industry factors that may affect investment, and domestic country-year fixed effects ($\alpha_{c,t}$) to control for all domestic country factors (e.g., the domestic tax rate). We cluster standard errors at the level of the subsidiaries' parent due to potential serial dependence within the same multinational firm over time.

Table 3 presents the result of estimating Eq. (4) in Panel B. The results of our preferred specification reported in column (5) suggests that a one standard deviation decrease in the change in the corporate income tax rate facing a parent firm of 2.35 percentage points increases subsidiary fixed asset investment by about 0.06% of total assets, equivalent to a 14.6% increase on the sample mean (*t*-statistic of -2.58). This result suggests that changes in foreign tax rates can affect the domestic competitive environment by changing the investment of local competitors owned by a foreign parent directly affected by the foreign tax rate.

4.2 Exposure to tax competition and the domestic competitive environment

Having established that tax cuts lead firms to export more and invest more in their foreign subsidiaries, we now explore our assumption that foreign tax rates affect the domestic competitive environment through these channels. To so do so, we examine how changes in exposure to tax competition affect measures tied directly to the domestic competitive environment. We estimate the following firm-level OLS regressions (for prior evidence of foreign tax rates affecting the domestic competitive environment, see De Loecker et al., 2020 and Kim et al., 2021):

$$\Delta Competition\ Outcome_{i,t} = \alpha_0 + \gamma_1 \Delta ImportCompTax_{j,c,t} + \gamma_2 \Delta PeerCompTax_{j,c,t} + \alpha_{c,t} + \alpha_{j,t} + \varepsilon_{i,t} \quad (5).$$

The dependent variable, *Competition Outcome*, is one of several measures related to a firms' market power. Prior work indicates that a firm's price to cost margins reflect their ability to extract rents, and hence their market power (Aghion et al., 2005; Gaspar and Massa, 2006). Because we do not have cost of goods sold data to calculate profit margins, we calculate margins as earnings

before interest, taxes, and depreciation (EBITDA) margin, *EBITDA Margin*, and labor expense divided by revenues, *Labor Margin*.

We also examine two measures of industry markups, which capture the degree to which industry firms are able to price their goods above average cost, and hence their market power (De Loecker et al., 2020). First, follow the approach of De Loecker and Warzynski (2012) and De Loecker et al. (2020) to construct *Markups (De Loecker et al., 2020)*, which is structurally calculated as "the wedge between a variable input's expenditure share in revenue (directly observed in the data) and that input's output elasticity" (De Loecker et al., 2020, p. 564). Specifically, we calculate *Markups (De Loecker et al., 2020)* as the product of output productivity and the ratio of revenue to revenue less EBITDA of our sample firms.[18] Second, we use proprietary data from the Competitiveness Research Network (CompNET). Specifically, *Markups (CompNET Industry Data)* captures industry-wide markups with respect to firms' labor input costs.

Table 4 presents the results of estimating Eq. (5) with our measures of margins as the dependent variables in Panel A and our measures of markups as the dependent variables in Panel B. The results of our preferred specifications reported in columns (3) and (6) of Panel A suggest that a one standard deviation decrease in the change in *ImpCompTax* (*PeerCompTax*) decreases affected firms' *EBITDA Margin* by 0.26 (0.04) percentage points, and their *Labor Margin* by 0.10 (0.01) percentage points. The results of our preferred specifications reported in columns (3) and (6) of Panel B suggest that a one standard deviation decrease in the change in *ImpCompTax* (*PeerCompTax*) decreases the affected firms' *Markups (De Loecker et al. 2020)* by 0.16 (0.04) percent, and their *Markups* (CompNET Industry Data) by 2.46 (0.93) percent. Collectively, this evidence indicates that changes in exposure to tax competition via the cross subsidization channel

[18] We use the output productivity measures for NAICS 2-digit industry-years provided in De Loecker et al. (2020). We weight mean industry-wide markups by firms' number of employees.

and, especially, via the import competition channel, reduce affected firms' margins and markups, suggesting reduced market power and increased competition.[19]

4.3 Exposure to tax competition and employment

Having found consistent evidence that exposure to tax competition affects the domestic competitive environment, we turn to our central research question of how it affects domestic employment levels. To do so, we estimate the following firm-level OLS regression:

$$\Delta ln(LaborExpense_{i,t}) = \alpha_0 + \gamma_1 \Delta ImportCompTax_{j,c,t} + \gamma_2 \Delta PeerCompTax_{j,c,t} + \Delta Z\phi + \alpha_{c,t} + \alpha_{j,t} + \varepsilon_{i,t} \quad (6)$$

The dependent variable, *LaborExpense*, is a firm's total labor expense in a given year. We take the natural logarithm of labor expense because it is highly skewed. We examine firms' total labor expense to capture changes in employment levels driven by changing wage rates and hours worked, as well as by the hiring and firing of workers (Artuç et al., 2010).[20]

The vector *Z* includes time-varying firm characteristics that potentially affect employment: the natural logarithm of cash holdings, *Log. Cash*, total fixed assets, *Log. Total Assets*, and revenue, *Log. Revenue*. The vector *X* also includes time-varying country-industry characteristics that potentially affect employment and reflect pre-existing differences in competition: the Herfindahl-Hirschman-Index of market concentration, calculated as the sum of squared market shares of all firms in a country-industry, *HHI*, the share in a country-industry of firms that belong to a multinational group with operations in a tax haven country, *Tax Haven MNEs (%)*, import penetration in the country-industry, measured as imports over imports plus domestic production,

[19] Note that we exclude control variables from Eq. (5) as they plausibly capture lagged market power and mechanisms through which exposure to tax competition can affect margins and markups, and hence may represent bad controls (Angrist and Pischke, 2008). In untabulated results, we find that including these controls causes five of the 16 coefficients of interest in Table 4 to become marginally statistically insignificant, although none are inconsistent with our Table 4 results (i.e., of opposite sign or even markedly different magnitude).

[20] In untabulated tests we examine employment and labor expense per worker and find that our results are driven by changes in employment, rather than salaries and wages.

Import Penetration, and the market share of foreign-owned subsidiaries in the country-industry, *MNE Presence*.[21] These latter two controls hold lagged import penetration and multinational presence fixed in a country-industry, ensuring that they do not drive our results. We take the change from the prior period to the current period of all variables, other than the fixed effects and industry-country variables, to control for time-invariant features of firms and their exposure to tax competition.

Eq. (6) includes country-year fixed effects to control for all time-varying characteristics of the country in which the firm operates (e.g., the political environment or financial reporting quality; Glaeser and Omartian, 2022). Importantly, the country-year fixed effects also control for domestic tax policy. Consequently, Eq. (3) largely identifies γ_1 and γ_2 using variation in *ImpCompTax* and *PeerCompTax* driven by changes in foreign tax policy, and not by changes in domestic tax policy or overall import competition or multinational presence (which are included as controls). We do not expect foreign governments to set tax policy with respect to employment in other countries, and therefore do not expect selection to bias our results. However, governments may change tax policy in anticipation of expected employment shocks in key industries, and these expected employment shocks may also affect same-industry employment in other countries. For example, Germany may lower its corporate tax rate in response to a global steel shortage that it expects to reduce employment in the car manufacturing industry. To the extent this steel shortage affected car manufacturing employment in France, and France does not adjust its corporate tax

[21] Tax haven countries include European countries that offer preferential tax regimes and are considered non-cooperative (De Simone and Olbert, 2022) as well as worldwide tax (Bennedsen and Zeume, 2018). The list of non-cooperative countries in Europe is published by the Tax Justice Network (http://datafortaxjustice.net/paradiselost/) and includes Switzerland, Cyprus, Ireland, Luxembourg, Malta, Netherlands, and the United Kingdom. We do not treat the United Kingdom as a tax haven given its large real economy. The list of tax havens in Bennedsen and Zeume (2018) includes small dot havens, such as the Cayman Islands, and countries with somewhat larger economies but preferential tax regimes, such as Hong Kong and Singapore.

rate, this could bias our results. To address this and other correlated omitted variable concerns, we include industry-year fixed effects to control for all time-varying factors at the industry level.

As a result of our industry-year and country-year fixed effects, only an omitted variable at the country-pair-industry-year level that is not common to firms in an industry in a given year *and* not common to firms in a country in a given year can bias our results. Moreover, this variable must be related to changes in domestic firms' employment levels and changes in corporate tax rate differentials (e.g., the omitted variable must be related to reductions in country *f*'s tax rate, but not to reductions in country *c*'s tax rate). We think it is unlikely that such a variable exists across country pairs, in particular because almost all firms in foreign countries engaging in tax competition are also domestic firms facing tax competition (i.e., countries in our data are both importers and exporters).

We lag firm and industry controls by one year to avoid potential bad control problems (e.g., because declines in sales are one mechanism through which tax competition affects employment levels). We cluster standard errors at the country-industry level to address serial dependence within country-industries. This clustering, while appropriate, substantially reduces power. Although our sample includes several million observations, clustering at the country-industry level means that we do not treat observations of *ImpCompTax* and *PeerCompTax* within country-industries as independent. Consequently, we do not have millions of independent sources of variation to estimate the coefficients on *ImpCompTax* and *PeerCompTax*. Instead, we rely on variation in *ImpCompTax* and *PeerCompTax* across 1,237 unique country-industries.

Table 5 presents the results of estimating Eq. (6). In column (1) we exclude *PeerCompTax*, in column (2) we exclude *ImpCompTax*, and in columns (3)-(6) we exclude neither. In column (4), we report results for domestic-only firms (Non-MNEs) that lack direct exposure to foreign tax

rates and hence any ability to benefit from changes in tax competition. In column (5), we report results for multinational enterprises with the international operations to benefit from, or the international diversification to help weather exposure to, relatively lower foreign tax rates.

The results reported in column (3) suggest that a one standard deviation increase in the change in *ImpCompTax* decreases affected firms' total labor expense by about 0.5%, on average (*t*-statistic of -2.10).[22] The results also suggest that a one standard deviation increase in the change *PeerCompTax* decreases affected firms' total labor expense by about 0.1%, on average (*t*-statistic of -2.94).[23] Turning to columns (4) and (5), the results suggest that the relation between tax competition and employment levels via the import competition channel is almost three times larger for domestic-only firms than for multinational firms, and almost one and a half times larger via the multinational presence channel. Further, the results in column (5) suggest that the effect of exposure to tax competition at multinational firms via both channels is not statistically different from zero. In total, we conclude that exposure to tax competition via the multinational presence channel and, especially, the import competition channel, reduces firms' overall employment levels.

4.4 Cross-sectional differences in the effect of exposure to tax competition

We next investigate cross-sectional differences in the effects documented in Table 5 based on firms' sensitivity to product market competition. Product differentiation can soften the effects of exposure to tax competition by protecting firms from product market competition.[24] Consequently, we predict that the managers whose firms compete in markets with more

[22] $e^{([-0.427/100] \times -1.07)} - 1 = 0.00458$.

[23] We note that the greater effect via the import competition channel is consistent with our prior results that the effect of exposure to tax competition on the domestic competitive environment is greater via the import competition channel.

[24] E.g., Shaked and Sutton (1982); Tirole (1988); Sutton (1991); Hombert and Matray (2018); Kim et al. (2021). Glaeser and Landsman (2021) find that firms release patent disclosures to signal their product-market advantages and discourage competition.

differentiated products will be less sensitive to changes in exposure to tax competition, and hence less likely to alter their employment levels in response.

We develop a measure of product differentiation at the country-industry level. Within each 2-digit NACE industry, Eurostat assigns distinct products 4-digit NACE codes. We assume that industries with more distinct product codes produce more differentiated products. For example, we assume that industry C-12, Manufacture of tobacco products, which includes one product code[25], produces less differentiated products than does C-30, Manufacture of other transport equipment, which includes five product codes.[26] We use the count of product codes within each 2-digit NACE industry to measure product differentiation (*Product Differentiation*).

Table 6, Panel A reports the results of estimating our main specification after splitting the sample on whether the country-industry (columns (1) and (2)) or the country-industry-year (columns (3) and (4)) is in the highest quartile of *Product Differentiation*.[27] Consistent with product differentiation mitigating the effect of exposure to tax competition, we find that the effect of exposure to tax competition on managers' employment decisions is greater in industries that sell less differentiated products. Moreover, the difference in the effect of exposure to tax competition between and high and low product differentiation country-industries is statistically significant.

We also consider how the degree to which capital and labor are complements moderates how managers adjust employment levels in response to changes in exposure to tax competition. When capital and labor are more complementary, managers cannot expand capital investment in

[25] C-12.0 Manufacture of tobacco products.
[26] C-30.1 Build of ships and boat, C-30.2 Manufacture of railway locomotives and rolling stock, C-30.3 Manufacture of air and spacecraft related machinery, C-30.4 Manufacture of military fighting vehicles, C-30.9 Manufacture of transport equipment n.e.c.
[27] We choose the highest quartile because the number of products across 2-digit industries is not normally distributed, with a high number of observations around the median number of products, such that a median split would result in many industries being included in both subsamples across years and countries.

response to changes in product market competition without also expanding employment (and vice versa; managers cannot easily terminate workers because they are needed to operate capital investments). Consequently, employment at firms where capital and employment are more complementary should be less sensitive to changes in exposure to tax competition. Conversely, when capital and employment are more substitutional, managers can expand capital investment in response to changes in product market competition without altering employment, or even lowering it to cut costs. We follow Jacob and Vosseburger (2021) and estimate the correlation between fixed tangible capital and employment using within country-industry regressions of firms' fixed tangible capital on the number of employees. A smaller coefficient on the number of employee variable suggests that the two are less complementary, while a negative coefficient suggests that the two are substitutes. A larger positive coefficient suggests that capital and labor are more complementary. We refer to the resulting measure as *Capital-Labor Complementarity*.

Table 6, Panel B reports the results of estimating our main specification after splitting the sample on whether the relation between capital and labor in the country-industry (columns (1) and (2)) or country-industry-year (columns (3) and (4)) is above the median (i.e., more complementary). Consistent with capital-labor complementarity mitigating the effect of exposure to tax competition, we find that the effect of exposure to tax competition on managers' employment decisions is greater when capital and labor are less complementary (more substitutional). Moreover, the difference in the effect of exposure to tax competition between high and low capital-labor complementarity subsamples is statistically significant.[28]

[28] We validate this result using alternative measures for capital-labor complementarity that do not rely on within-sample regressions. Specifically, we use administrative data from the EU KLEMS database on capital and labor statistics at the European country-industry-year level and follow Perez-Laborda and Perez-Sebastian (2020) to construct country-industry-year measures of capital-labor substitutability (the opposite of complementarity). We find qualitatively similar results, although the results are only statistically significant for *PeerCompTax*. We choose not to tabulate this test because it labor statistics in the EU KLEMS database are only available for one third of our sample's country-industry-years (potentially explaining the statistically insignificant results for *ImpCompTax*).

4.5 Evidence from a single-country changes-in-changes design

A potential concern is that heterogeneous effects of domestic tax rates across industries and countries may drive our results. In light of this concern, we estimate a single country changes-in-changes test. Beginning in 2010, the UK began aggressively cutting its corporate tax rate to improve the competitive position of UK firms (Hoopes et al. 2022). In contrast, Germany did not change its corporate tax system in the same period. Consequently, we examine how employment at German firms exposed to UK tax competition changed after 2009. To do so, we estimate the following OLS regression for sample German firms from 2006 to 2015:

$$\begin{aligned}\Delta\ln\left(LaborExpense_{i,t}\right) = {} & \alpha_0 + \gamma_1 Post\ UK\ Tax\ Cuts * \ UK\ Import\ Competition_{j,2009} \\ & + \gamma_2 Post\ UK\ Tax\ Cuts * \ UK\ Peer\ Competition_{j,2009} \\ & + \Delta Z\phi + \alpha_t + \alpha_j + \varepsilon_{i,t} \end{aligned} \quad (7)$$

Where *Post UK Tax Cuts* is an indicator that the takes the value of one beginning when the UK began decreasing tax rates after 2009. *UK Import Competition* and *UK Peer Competition* measure firm *i*'s 2009 exposure to import competition originating from the UK and to UK-owned firms competing in Germany (i.e., we use the same UK-exposure information that we use to calculate our main measures in Eq. (1) and (2)).

Table 7 reports the results of estimating Eq. (7). We find consistent evidence that managers of firms more exposed to competition from UK-owned firms and import competition originating from the UK in 2009 relatively reduced their firms' employment levels after the UK began decreasing tax rates. Because Germany did not alter its corporate income tax rate, this test helps further address concerns that changes in domestic tax rates bias our results. In terms of economic magnitudes, the estimates in column (3) suggest that German firms in industries with a one standard deviation higher exposure to UK import (peer) competition in 2009 relatively reduced their employment levels by approximately 0.54% (0.74%) after the UK tax rate reductions. We

also examine how managers adjusted employment levels in response to the tax cuts in event time (i.e., by accumulating the estimated coefficients on the interactions of each year *t* with *UK Peer Competition* and *UK Import Competition*). The results, reported in Figure 3, suggest that managers did not adjust employment levels based on *UK Import Competition* and *UK Peer Competition*, prior to the UK tax reform, consistent with the parallel trends assumption.

4.6 Domestic employment and a country's position in tax competition

We next turn to the descriptive question of whether the effects of *ImpCompTax* and *PeerCompTax* on employment levels are symmetric, as any asymmetric effect may be of interest to policymakers and managers (for example when evaluating tax policy and location choices; e.g., Devereux and Griffith, 1998 and Djankov et al., 2010). In Table 8, we separately estimate effects of changes in exposure to tax competition based on whether the firm faces a positive or negative value for *ImpCompTax* or *PeerCompTax* in its country-industry (note that there are no observations where *ImpCompTax* or *PeerCompTax* are exactly zero).

We find that the effect of changes in exposure to tax competition via both channels is negative and statistically significant only when *ImpCompTax* or *PeerCompTax* are positive. This finding suggests that greater exposure to tax competition (lower foreign rates) lowers domestic firms' employment levels more when they are located in country-industries that are relatively poorly positioned in the international tax competition landscape. Although we are cautious not to *ex post* over-interpret this result, we note it is consistent with laggards in tax competition falling farther behind when other firms increase the tax competition gap (e.g., when a firm already positively exposed to tax competition via the import channel due to relatively higher domestic tax rates sees foreign importers enjoy a tax break, employment at that firm suffers more). In contrast, leaders in tax competition do not suffer when other countries partially close the tax competition

gap (e.g., when a firm negatively exposed to tax competition via the import channel due to relatively lower domestic tax rates sees foreign importers enjoy a tax break, employment changes at that firm are statistically indistinguishable from zero).

4.7 Aggregate effects of exposure to tax competition

To corroborate our firm-level evidence and provide suggestive evidence of the aggregate effects of tax competition , we finally examine whether countries with decreasing tax rates have more employment at the end of the period, relative to the other countries. This analysis increases confidence that our prior firm-level results generalize to the country level, albeit with the tradeoff that we cannot control for as many factors in this analysis (e.g., we cannot include country-year fixed effects).

We regress country-level employment on the corporate income tax at the end of our sample period on the difference in a country's corporate income tax rate between the beginning and the end of our sample period, controlling for a country's GDP, inflation, personal income tax rate and average firm profitability. We visualize our results in Figure 3. This figure plots binned averages in logged employment in 2015 against the change in a country's corporate income tax rate from 2006 to 2015 after residualizing on the macro-level controls. The line of best fit, plotted in red, highlights that changes in countries' corporate income tax rate over the sample period explain a relatively higher employment at the end of our sample period. In terms of economic magnitude, a one percentage point decrease in the corporate income tax rate over our sample period is associated with 1.1 percent higher levels of employment at the end of the sample period, holding constant important other macroeconomic determinants of employment. This macro-level correlation is consistent with countries that relatively lower their corporate income tax rate improving their position in international tax competition and experiencing higher employment.

4.8 Robustness tests

Table 9 reports the results of several robustness tests. Column (1) reports results excluding control variables. We find similar results, suggesting our results are not driven by our choice of control variables. In column (2), we include an additional control variable that measures indexed labor costs at the country-industry level (*Labor Cost Index*). We find that our inferences are unchanged, mitigating concerns around omitted variables that vary at the country-industry-year level and affect labor outcomes. Column (3) reports results after including two alternative measures of exposure to tax competition constructed using personal, instead of corporate, income tax rates. These results document whether domestic firms' employment levels responds to personal income tax competition rather than, or in addition to, corporate income tax competition (Kubik, 2004). The coefficients on these measures are insignificant and our main results remain unchanged.[29]

In column (4) we report results replacing *PeerCompTax* with *PeerCompTax (Avg. MNE)*, which uses the average corporate tax rate across the peer firm's multinational group, rather than the headquarters' tax rate, to construct the sales-weighted tax competition measure. The coefficient on *PeerCompTax (Avg. MNE)* is about 70% of the magnitude of the corresponding coefficient on *PeerCompTax* in Table 4, column (3), and statistically insignificant (*t*-statistic of -1.11). In column (5), we include *PeerCompTax* and find that *PeerCompTax* subsumes *PeerCompTax (Avg. MNE)*. We conclude that using the headquarters corporate tax rate to measure the effect of foreign taxes on the support of subsidiaries is appropriate in our setting.

[29] This result may be somewhat surprising as the tax incidence literature argues that the incidence of the corporate and personal income tax should be the same. Consequently, the economic effects should not differ between the two types of taxes. However, a common empirical finding is that who is taxed appears to matter, potentially due to differences in the salience of different taxes to different groups or differences in the ability to avoid taxes across groups (e.g., Kopczuk et al., 2016 and Armstrong et al., 2018).

Our inferences remain unchanged in Panel B, column (1) when excluding tiny firms that switch from one to two employees and vice versa. Our inferences also remain largely unchanged in column (2) when only retaining firms with above-median total assets. In total, we conclude that our results are not driven solely by employment changes at the smallest firms.[30]

To further address the concern that changes in domestic tax rates drive our inferences, we re-estimate our main specification after excluding observations where the domestic corporate income tax rate changes in a four year period around the year of the contemporaneous change in tax competition *t* (i.e., domestic changes within two years before year *t*, in year *t*, and the following year). The results, reported in column (3), are similar in magnitude to their counterparts in Table 5, although slightly less statistically significant (likely due to the 55% reduction in sample size). In column (4), we report results after excluding observations in Great Britain, which is the country that most significantly changed its domestic corporate income tax rate during our sample period and is also a country with a relatively large domestic economy. We again find similar results. Finally, in column (5) we interact our industry fixed effects with changes in the domestic corporate income tax rates and again find similar results. We conclude that heterogeneous effects of domestic corporate income tax rate changes across do not drive our results. In untabulated results, we also show that our inferences are unchanged if we use the number of employees as opposed to total labor expense as the dependent variable.

Tax havens play an important role in tax competition. However, tax competition by tax havens is potentially the least likely to manifest as differences in statutory corporate income tax

[30] Our prior firm-level results treat all firms equally, regardless of size. Consequently, if larger or smaller firms are more sensitive to exposure to tax competition, then aggregate country-industry effects may differ from firm-level effects. In light of this possibility, we re-estimate Eq. (6) at the country-industry level after aggregating the firm level data to the country-industry level. Untabulated results suggest that the effects of exposure to tax competition via both the import competition channel and the multinational presence channel are greater at the aggregate country-industry level.

rates. Tax competition by tax havens is also the least likely to affect real economic activity, while our focus is on real economic activity in the form of subsidiary operations and imported goods. Consequently, we explore the importance of tax havens to our results.[31] Specifically, In Table 10 we report the results of re-estimating Eq. (5) after excluding observations from tax havens. In column (1), we modify *ImpCompTax* to exclude imports originating from European tax haven countries. In columns (2) to (6), we exclude firms located in or affiliated with other firms located in European or worldwide tax havens. In all columns, we find similar results after removing imports originating from, or firms located in, or affiliated with firms located in, tax havens. In total, these results suggest that tax haven activity, while relevant to tax competition, does not appear to drive our results.

5. Conclusion

We find that variation in foreign tax rates can affect the domestic competitive environment by increasing import competition originating from the foreign country and increasing competition from domestic peer firms owned by parent firms located in the foreign country. Further, foreign tax rates affect employment levels at firms *ex ante* exposed to import competition from countries where tax rates change and to competition from peers owned by parent firms in these countries. These results suggest that exposure to tax competition can affect domestic outcomes via changes in product market competition and that limits on tax base mobility cannot prevent all adverse effects of foreign tax competition on domestic employment levels. Our results should be of interest to policymakers, as they suggest that relatively lower foreign taxes can reduce domestic firms' employment levels. Consequently, our results may provide insight to international policymakers as they debate how to respond to recent US tax reforms. While we do not opine on how, or even

[31] We do not exclude tax havens throughout our prior analyses, as tax havens can affect real economic activity (Serrato, 2019), and we want to capture this potential effect.

whether, these or other policymakers should respond to decreasing foreign tax rates, we do refer interested readers to discussions in Avi-Yonah (2008a,b; 2019) and Avi-Yonah and Xu (2017).

References

Acemoglu, D., Autor, D., Dorn, D., Hanson, G.H., Price, B., 2016. Import Competition and the Great US Employment Sag of the 2000s. *Journal of Labor Economics, 34*(S1), S141-S198.

Aghion, P., Bloom, N., Blundell, R., Griffith, R., Howitt, P., 2005. Competition and Innovation: An Inverted-U Relationship. *The Quarterly Journal of Economics*, 120(2), 701–728.

Almeida, H., Campello, M., 2007. Financial Constraints, Asset Tangibility, and Corporate Investment. *The Review of Financial Studies* 20 (5), 1429-1460.

Angrist, J.D., Pischke, J.S., 2009. *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton University Press.

Armstrong, C.S., Glaeser, S., Huang, S., Taylor, D.J., 2018. The Economics of Managerial Taxes and Corporate Risk-taking. *The Accounting Review* 94 (1), 1-24.

Armstrong, C.S., Glaeser, S., Kepler, J.D., 2019. Strategic Reactions in Corporate Tax Avoidance. *Journal of Accounting and Economics* 68 (1), 1-26.

Artuç, E., Chaudhuri, S., McLaren, J., 2010. Trade Shocks and Labor Adjustment: A Structural Empirical Approach. *American Economic Review, 100*(3), 1008-45.

Autor, D., Dorn, D., Katz, L. F., Patterson, C., Van Reenen, J. (2020). The Fall of the Labor Share and the Rise of Superstar Firms. *The Quarterly Journal of Economics*, 135(2), 645–709. https://doi.org/10.1093/qje/qjaa004

Autor, D. H., Dorn, D., Hanson, G. H., 2013. The China Syndrome: Local Labor Market Effects of Import Competition in the United States. *The American Economic Review*, 103(6), 2121–2168.

Avi-Yonah, R. S., 2000. Globalization, tax competition, and the fiscal crisis of the welfare state. Harvard Law Review, 1573-1676.

Avi-Yonah, R. S., 2008a. Globalization and tax competition: Implications for developing countries. Taxation and Latin American Integration, 173-94.

Avi-Yonah, R. S., 2008b. The OECD harmful tax competition report: a tenth anniversary retrospective. U of Michigan Law & Economics, Olin Working Paper, (08-013).

Avi-Yonah, R. S., 2012. Tax Competition and the Trend toward Territoriality. U of Michigan Public Law Research Paper, (297).

Avi-Yonah, R. S., 2019. Globalization, Tax Competition and the Fiscal Crisis of the Welfare State: A Twentieth Anniversary Retrospective. U of Michigan Law & Econ Research Paper, (19-002).

Avi-Yonah, R. S., Xu, H., 2017. Evaluating BEPS. Erasmus L. Rev., 10, 3.

Beaver, W.H., Cascino, S., Correia, M., McNichols, M.F., 2019. Group Affiliation and Default Prediction. *Management Science* 65 (8), 3559-3584.

Bennedsen, M., Zeume, S., 2018. Corporate Tax Havens and Transparency. *The Review of Financial Studies*, 31(4), 1221-1264.

Bernini, M., Treibich, T., 2016. Killing a second bird with one stone? Promoting firm capital growth and exports through tax policy. *Industrial and Corporate Change*, *25*(5), 829–845.

Bethmann, I., Jacob, M., Müller, M.A., 2018. Tax Loss Carrybacks: Investment Stimulus versus Misallocation. *The Accounting Review*, 93(4), 101-125.

Beuselinck, C., Cascino, S., Deloof, M., Vanstraelen, A., 2019. Earnings Management within Multinational Corporations. *The Accounting Review* 94 (4), 45-76.

Bird, A., Edwards, A., Ruchti, T.G., 2018. Taxes and Peer Effects. *The Accounting Review* 93 (5), 97-117.

Bird, A., Edwards, A., Shevlin, T., 2017. Does U.S. Foreign Earnings Lockout Advantage Foreign Acquirers? *Journal of Accounting and Economics* 64 (1), 150-166.

Boutin, X., Cestone, G., Fumagalli, C., Pica, G., Serrano-Velarde, N., 2013. The Deep-Pocket Effect of Internal Capital Markets. *Journal of Financial Economics* 109 (1), 122-124.

Cen, L., Maydew, E. L., Zhang, L., Zuo, L., 2020. Tax Planning Diffusion, Real Effects, and Sharing of Benefits. *Kenan Institute of Private Enterprise Research Paper 18-15*.

Chen, S., De Simone, L., Hanlon, M., Lester, R., 2022. The effect of innovation box regimes on income shifting and real activity. Working Paper. https://ssrn.com/abstract=3486428

Chow, T., Huang, S., Klassen, K.J., Ng, J., 2018. The Influence of Corporate Income Taxes on Investment Location: Evidence from Corporate Headquarters Relocations. Working Paper. https://doi.org/10.2139/ssrn.2867298.

Commission of the European Communities. 1997. 'A Package to Tackle Harmful Tax Competition in the European Union: Communication from the Commission to the Council and the European Parliament.' Office for Official Publications of the European Communities.

CompNET. 2021. User Guide for the 8th Vintage CompNet Dataset.

Correia, S., 2015. Singletons, cluster-robust standard errors and fixed effects: A bad mix. Technical Note, Duke University.

De Loecker, J., Eeckhout, J., Unger, G. (2020). The Rise of Market Power and the Macroeconomic Implications. *The Quarterly Journal of Economics*, *135*(2), 561–644.

De Loecker, J., Warzynski, F., 2012. Markups and Firm-Level Export Status. *American Economic Review*, *102*(6), 2437–2471.

De Simone, L., Olbert, M., 2022. Real Effects of Private Country-by-Country Disclosure, *The Accounting Review, 97*(6).

Dehejia, V.H., Genschel, P., 1999. Tax Competition in the European Union. *Politics & Society* 27 (3), 403-430.

Devereux, M.P., Griffith, R., 1998. The Taxation of Discrete Investment Choices (No. W98/16). IFS Working Papers.

Devereux, M. P., Lockwood, B., Redoano, M. 2008. Do Countries Compete over Corporate Tax Rates?. *Journal of Public Economics*, *92*(5-6), 1210-1235.

Devereux, M.P., Loretz, S., 2013. What Do We Know about Corporate Tax Competition? *National Tax Journal* 66 (3), 745-774.

Devereux, M.P., Auerbach, A.J., Keen, M., Oosterhuis, P., Vella, J. Schön, W. 2021. *Taxing Profit in a Global Economy*. Oxford University Press.

Devereux, M.P., Vella, J., Wardell-Burrus, H., 2022. Pillar 2: Rule Order, Incentives, and Tax Competition. Oxford University Centre for Business Taxation Policy Brief 2022, Available at SSRN: https://ssrn.com/abstract=4009002.

De Vito, A., Jacob, M., Xu, G., 2021. How Do Tax Increases Affect Investment Allocation within Multinationals?. Working Paper. https://ssrn.com/abstract=3643481.

Dixit, A., 1980. The Role of Investment in Entry-Deterrence. *Economic Journal*, *90*(357), 95–106.

Djankov, S., Ganser, T., McLiesh, C., Ramalho, R., Shleifer, A., 2010. The Effect of Corporate Taxes on Investment and Entrepreneurship. *American Economic Journal: Microeconomics* 2 (3), 31-64.

Dobbins, L., Jacob, M., 2016. Do corporate tax cuts increase investments?. *Accounting and Business Research*, *46*(7), 731-759.

Doidge, C., Dyck, A., 2015. Taxes and Corporate Policies: Evidence from a Quasi Natural Experiment. *Journal of Finance* 70 (1), 45-89.

Donohoe, M.P., Jang, H., Lisowsky, P., 2022. Competitive Externalities of Tax Cuts, *Journal of Accounting Research* 60 (1), 201-259.
Dyreng, S., Hills, R., 2021, Foreign Earnings Repatriations and Domestic Employment. Available at SSRN: https://ssrn.com/abstract=3977297.
Edwards, A., Schwab, C., Shevlin, T., 2016. Financial Constraints and Cash Tax Savings. *The Accounting Review* 91 (3), 859-881.
Federici, D., Parisi, V., Ferrante, F., 2020. Heterogeneous Firms, Corporate Taxes and Export Behavior: A Firm-level Investigation for Italy. *Economic Modelling*, *88*(C), 98–112.
Flach, L., Irlacher, M., Unger, F., 2019. Corporate Taxes and Multi-Product Exporters: Theory and Evidence from Trade Dynamics, CESifo Working Paper Series 7809. https://ssrn.com/abstract=3467942.
Frésard, L., Valta, P. (2016). How Does Corporate Investment Respond to Increased Entry Threat? *The Review of Corporate Finance Studies*, *5*(1), 1–35.
Fuest, C., Peichl, A., Siegloch, S., 2018. Do Higher Corporate Taxes Reduce Wages? Micro Evidence from Germany. *American Economic Review*, *108*(2), 393–418.
G20, 2018. Trade, Investment and Tax Cooperation. Tax Competition. https://doi.org/10.4135/9781412965811.n307.
Gaertner, F. B., Hoopes, J. L., Williams, B. M. (2020). Making only America great? Non-US market reactions to US tax reform. *Management Science*, *66*(2), 687-697.
Gaspar, J., Massa, M., 2006. Idiosyncratic Volatility and Product Market Competition. *The Journal of Business*, *79*(6), 3125–3152. https://doi.org/10.1086/505251
Glaeser, C. K., Glaeser, S., Labro, E. (2022). Proximity and the Management of Innovation. *Management Science*.
Glaeser, S., Guay, W.R., 2017. Identification and Generalizability in Accounting Research: A Discussion of Christensen, Floyd, Liu, and Maffett (2017). *Journal of Accounting and Economics* 64 (2-3), 305-312.
Glaeser, S. A., Landsman, W. R., 2021. Deterrent Disclosure. *The Accounting Review*, *96*(5), 291-315.
Glaeser, S., Omartian, J. D., 2022. Public Firm Presence, Financial Reporting, and the Decline of US Manufacturing. *Journal of Accounting Research*, *60*(3), 1085-1130.
Graham, J.R., Hanlon, M., Shevlin, T., 2011. Real Effects of Accounting Rule: Evidence from Multinational Firms' Investment Location and Profit Repatriation Decisions. *Journal of Accounting Research* 49 (1), 137-185.
Graham, J.R., Hanlon, M., Shevlin, T., Shroff, N., 2017. Tax Rates and Corporate Decision-Making. *Review of Financial Studies* 30 (9), 3128-3175.
Hanlon, M., Heitzman, S., 2010. A Review of Tax Research. *Journal of Accounting and Economics* 50 (2-3), 127-178.
Hanlon, M., Lester, R., Verdi, R., 2015. The effect of repatriation tax costs on US multinational investment. *Journal of Financial Economics*, *116*(1), 179-196.
Heider, F., Ljungqvist, A., 2015. As Certain as Debt and Taxes: Estimating the Tax Sensitivity of Leverage from State Tax Changes. *Journal of Financial Economics* 118 (3), 684-712.
Holmes, T. J., Schmitz, J. A., 2010. Competition and Productivity: A Review of Evidence. *Annual Review of Economics*, *2*(1), 619–642.
Hombert, J., Matray, A., 2018. Can Innovation Help U.S. Manufacturing Firms Escape Import Competition from China? *The Journal of Finance*, *73*(5), 2003–2039. https://doi.org/10.1111/jofi.12691

Hoopes, J., Klein, D., Lester, R. Olbert, M. 2022. Corporate Tax Policy in Developed Countries and Economic Activity in Africa. Working Paper.
Jacob, M., 2022. Real Effects of Corporate Taxation: A Review. *European Accounting Review*, *31*(1) 269-296.
Jacob, M., Michaely, R., Müller, M. A. 2019. Consumption Taxes and Corporate Investment. *The Review of Financial Studies*, 32(8), 3144-3182.
Jacob, Martin, Vossebuerger, Robert. 2021. The Role of Personal Income Taxes in Corporate Investment Decisions. Available at SSRN: https://ssrn.com/abstract=3744357.
Jankowski, J. E. (2012). Business use of intellectual property protection documented in NSF survey. NSF info brief, NSF, 12-307.
Kalemli-Özcan, Ş., Sørensen, B.E., Villegas-Sanchez, C., Volosovych, V., Yeşiltaş, S., 2015. How to Construct Nationally Representative Firm Level Data from the ORBIS Global Database, Working Paper. https://doi.org/10.2139/ssrn.2660191.
Khanna, N., Tice, S., 2000. Strategic Responses of Incumbents to New Entry: The Effect of Ownership Structure, Capital Structure, and Focus. *Review of Financial Studies*, *13*(3), 749–779.
Kim, J., Nessa, M., Wilson, R. J., 2021. How do reductions in foreign country corporate tax rates affect US domestic manufacturing firms? *The Accounting Review*, *96*(3), 287-311.
Kopczuk, W., Marion, J., Muehlegger, E., Slemrod, J., 2016. Does tax-collection invariance hold? evasion and the pass-through of state diesel taxes. *American Economic Journal: Economic Policy*, *8*(2), 251-86.
Kubick, T.R., Lynch, D.P., Mayberry, M.A., Omer, T.C., 2015. Product Market Power and Tax Avoidance: Market Leaders, Mimicking Strategies, and Stock Returns. *The Accounting Review* 90 (2), 675–702.
Kubik, J.D., 2004. The Incidence of Personal Income Taxation: Evidence from the Tax Reform Act of 1986. *Journal of Public Economics* 88 (7-8), 1567-1588.
Langenmayr, D., Lester, R., 2018. Taxation and Corporate Risk-Taking. *The Accounting Review* 93 (3), 237-266.
Law, K.K.F., Mills, L.F., 2015. Taxes and Financial Constraints: Evidence from Linguistic Cues. *Journal of Accounting Research* 53 (4), 777-819.
Lester, R., 2019. Made in the USA? A Study of Firm Responses to Domestic Production Incentives. *Journal of Accounting Research* 57 (4), 1059-1114.
Lester, R., 2021. Tax Accounting Research on Corporate Investment: A Discussion of the Impact of IP Box Regimes on the M&A Market by Bradley, Ruf, and Robinson (2021). *Journal of Accounting and Economics*, *72*(2).
Ljungqvist, A., Zhang, L., Zuo, L., 2017. Sharing Risk with the Government: How Taxes Affect Corporate Risk Taking. *Journal of Accounting Research* 55 (3), 669-707.
Manova, K., 2013. Credit constraints, heterogeneous firms, and international trade. *Review of Economic Studies*, *80*(2), 711-744.
Mukherjee, A., Singh, M., Žaldokas, A., 2017. Do Corporate Taxes Hinder Innovation? *Journal of Financial Economics* 124 (1), 195-221.
Nessa, M.L., 2017. Repatriation Tax Costs and U.S. Multinational Companies' Shareholder Payouts. *The Accounting Review* 92 (4), 217-241.
OECD, 1998. Harmful Tax Competition An Emerging Global Issue. OECD Publishings, Paris.
OECD, 2019. Harmful Tax Practices - 2018 Progress Report on Preferential Regimes Inclusive Framework on BEPS: Action 5. OECD Publishings, Paris.

Olbert, M., 2022. The Impact of Tax Shields on Bankruptcy Risk and Resource Allocation, Working Paper. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3467669.

Gomez-Cram, R. Olbert, M., 2022. Measuring the Effects of the Global Tax Reform-Evidence from High-frequency Data. Available at SSRN 4052575. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4052575

Peterson Institute for International Economics, 2017. Business Tax Cuts Will Boost US Competitiveness. https://www.piie.com/blogs/realtime-economic-issues-watch/business-tax-cuts-will-boost-us-competitiveness (November 24, 2019).

Peress, J., 2010. Product Market Competition, Insider Trading, and Stock Market Efficiency. *The Journal of Finance*, *65*(1), 1–43. https://doi.org/10.1111/j.1540-6261.2009.01522.x

Perez-Laborda, A., Perez-Sebastian, F., 2020. Capital-skill Complementarity and Biased Technical Change Across US Sectors. *Journal of Macroeconomics*, 66, p.103255.

Revenga, A.L., 1992. Exporting Jobs?: The Impact of Import Competition on Employment and Wages in U.S. Manufacturing. *The Quarterly Journal of Economics* 107 (1), 255-284.

Shaked, A., Sutton, J., 1982. Relaxing Price Competition Through Product Differentiation. *The Review of Economic Studies*, *49*(1), 3–13. https://doi.org/10.2307/2297136

Shevlin, T., Shivakumar, L., Urcan, O., 2019. Macroeconomic Effects of Corporate Tax Policy. *Journal of Accounting and Economics* 68 (1), 1-22.

Shroff, N., Verdi, R.S., Yu, G., 2014. Information Environment and the Investment Decisions of Multinational Corporations. *The Accounting Review*, 89 (2), 759-790.

Serrato, J. C. 2019. Unintended Consequences of Eliminating Tax Havens. National Bureau of Economic Research Working Paper.

Suárez Serrato, J. C., Zidar, O. 2016. Who Benefits from State Corporate Tax Cuts? A Local Labor Markets Approach with Heterogeneous Firms. *American Economic Review*,106(9), 2582-2624.

Sutton, J. 1991. *Sunk Costs and Market Structure: Price Competition, Advertising, and the Evolution of Concentration.* MIT press.

Tax Foundation, 2018. Corporate Tax Rates Around the World. https://taxfoundation.org/corporate-tax-rates-around-world-2018/ (November 24, 2019).

Timmer, M. P., Dietzenbacher, E., Los, B., Stehrer, R., De Vries, G. J. (2015). An illustrated user guide to the world input–output database: the case of global automotive production. *Review of International Economics*, *23*(3), 575-605.

Tirole, J., 1988. The Theory of Industrial Organization. In *MIT Press Books* (Vol. 1). The MIT Press. https://ideas.repec.org/b/mtp/titles/0262200716.html

Williams, B. M., 2018. Multinational tax incentives and offshored US jobs. *The Accounting Review*, *93*(5), 293-324.

Wilson, J.D., 1999. Theories of Tax Competition. *National Tax Journal* 52 (2), 269-304.

Appendix A: Variable Definitions

Dependent Variables	
Exports (bn)	A country-industry's total exports in USD billion.
Fixed Tangible Assets (th)	A firm's fixed tangible assets in EUR thousands.
Δ Sub. Investment	A firm's change in fixed tangible assets scaled by lagged total assets.
EBITDA Margin	A firm's earnings before profit, taxes, depreciation and amortization over revenues.
Labor Margin	A firm's revenues less labor expenses over revenues.
Markups (De Loecker et al. 2020)	Industry-wide average markups constructed using our main sample, following de Loecker at al. (2020). We use their data on NAICS 2-digit output productivity as an input measure. Markups are weighted by individual firms' number of employees to consutruct average markups at the industry level.
Markups (CompNET)	Industry-wide average markups taken from the Competitiveness Research Network (CompNet). We use median industry markups following CompNet's firm markup definition given a firm's labor input decision (Spec. 3).
Labor Expense (th)	A firm's total labor expense in EUR thousands.
Variables of Interest	
CIT Domestic	A country's statutory corporate income tax rate.
CIT Parent	A firm's parent country's statutory corporate income tax rate.
ImpCompTax	Import-weighted foreign tax rate differential as defined in Section 3.
PeerCompTax	Foreign-owned peer firm weighted foreign tax rate differential as defined in Section 3.
Control Variables	
Cash (th)	A firm's cash and cash equivalent assets in EUR thousands.
HHI (t-1)	Herfindahl-Hirschman Index of market concentration calculated as the sum of squared market shares of firms within a two-digit NACE industry segment in a given country.
Import Penetration (t-1)	Ratio of net imports to the sum of net imports and domestic production for each 2-digit NACE industry segment in a given country.
MNE Presence (t-1)	Market share of foreign-owned subsidiaries for each 2-digit NACE industry segment in a given country.
Revenue (th)	A firm's revenue in EUR thousands.
Tax Haven MNEs (%) (t-1)	Share of firms that are part of a multinational group with tax haven operations for each 2-digit NACE industry segment in a given country.
Total Assets (th)	A firm's total assets in EUR thousands.
Cross-sectional Variables	
MNE	Indicator variable set equal to one if a firm is part of a multinational group.
Capital-Labor Complementarity	The coefficient of industry-level regressions of fixed tangible capital on the number of employees to proxy for the association between changes in labor and capital inputs (following Jacob and Vossebuerger, 2021).
Product Differentiation	The number unique of products and services traded within a 2-digit NACE industry segment according to the Eurostat International Trade in Goods database.
Post UK Tax Cuts	Indicator variable equal to one for years after 2009.
UK Import Competition	Share of imports from the UK in a given German 2-digit NACE industry segment in 2009.
UK Peer Competition	Share of UK-owned subsidiaries in a given German 2-digit NACE industry segment in 2009.
Country-level Control Variables	
FDI Inflow (% GDP)	A country's FDI inflow relative to the total GDP.
FDI Outflow (% GDP)	A country's FDI outflow relative to the total GDP.
GDP Capita Domestic (th)	A country's GDP per capita in USD thousands.
GDP Capita Parent (th)	A firm's parent country's GDP per capita in USD thousands.
GDP Total Domestic (bn)	A country's total GDP in USD billion.
GDP Total Parent (bn)	A firm's parent country's total GDP in USD billion.
Population (m)	A country's total population count in millions.

Variable Sources: This table provides definitions for variables used throughout the analyses. Time subscripts are omitted for brevity. Firm-level variables are from Bureau van Dijk's (BvD) Orbis database. Import and export data are from the World Input-Output Database (WIOD). Industry-level product differentiation data is from the Eurostat International Trade in Goods database. Markup data is from De Loecker at al. (2020) and from the Competitiveness Research Network (CompNet). Country-level employment is from the OECD short term labor database. Tax rates are from the European Commission, KPMG, and the OECD. Macro-economic variables are from Worldbank Open Data (World Development Indicators).

Appendix B: Computation of Exposure to Tax Competition

We calculate our import and multinational firm presence tax competition measures using the tax rate differential between a domestic country and each foreign country weighted by the shares of imports originating from that country or the market share of all domestic subsidiaries owned by a multinational firm from that country, summed over all foreign countries. We observe imports at the 2-digit NACE Rev. 2 domestic industry level from 42 import partner countries and foreign multinational parent firms in 30 European Economic Area countries over the period 2006-2015. Below we provide an example calculation of our measures for the construction industry (2-digit NACE code 40) in France in 2013 and 2015. To simplify the example, we assume that imports and foreign owned subsidiaries' parent firms only come from the Netherlands, Italy, and the United Kingdom. The respective raw data values are presented in the table below.

In the period 2013-2015, the domestic corporate income tax rate (CIT) in France was 38%, and had not changed since the prior year. In the Netherlands and Italy, the CIT was also unchanged. In the United Kingdom, the tax rate fell from 23% to 21%. In 2013, the construction industry in France imported goods and services worth 1.82, 5.38, and 2.26 USD billion from the Netherlands, Italy, and the United Kingdom, respectively. These import partner countries accounted for 3.9, 12.9, and 5.4% of all construction imports. French subsidiaries owned by parent firms headquartered in the Netherlands, Italy, and the United Kingdom had combined revenues of 0.23, 1.31, and 0.39 EUR billion, respectively, which represents 1.8%, 10.2%, and 3.0% of all revenues reported by foreign-owned subsidiaries in the French construction industry in 2013. In 2015, the import and market shares were largely similar.

Following equation (1) in Section 3.2, the value for *ImpCompTax* in the construction industry in France in 2013 would be:

$$ImpCompTax = \frac{1,181.1 * (38 - 25) + 5,384 * (38 - 31) + 2,256.4 * (38 - 23)}{1,181.1 + 5,384 + 2,256.4} = 9.90 \quad (1)$$

In 2015 the measure would be 10.48.

Following equation (2) in Section 3.2, the value for *PeerCompTax* in the construction industry in France in 2013 would be:

$$PeerCompTax = \frac{230.7 * (38 - 25) + 1,305.8 * (38 - 31) + 391.8 * (38 - 23)}{230.7 + 1,305.8 + 391.8} = 9.07 \quad (2)$$

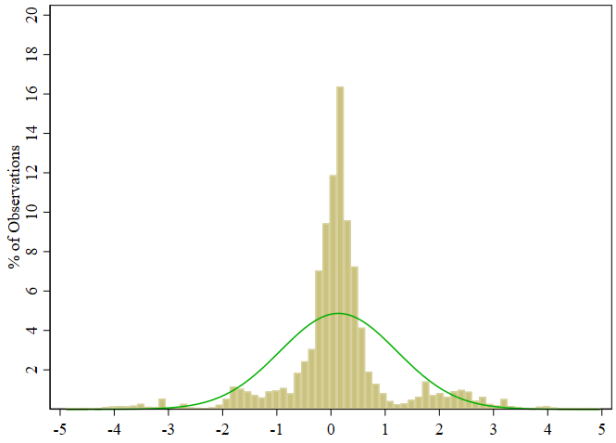
In 2015 the measure would be 9.50.

Panel A: Import Competition	2013			2015		
Import Partner Country	Imports (m)	Import Share	CIT	Imports (m)	Import Share	CIT
Netherlands	1,816.1	4.3%	25	1,859.9	4.2%	25
Italy	5,384.0	12.9%	31	5,470.2	12.4%	31
United Kingdom	**2,256.4**	**5.4%**	**23**	**2,121.8**	**4.8%**	**20**
Panel B: MNE Presence	2013			2015		
Foreign Parent Country	Market Share (m)	Market Share	CIT	Market Share (m)	Market Share	CIT
Netherlands	230.7	1.8%	25	255.5	2.0%	25
Italy	1,305.8	10.2%	31	1,680.6	13.1%	31
United Kingdom	**391.8**	**3.0%**	**23**	**456.9**	**3.6%**	**20**

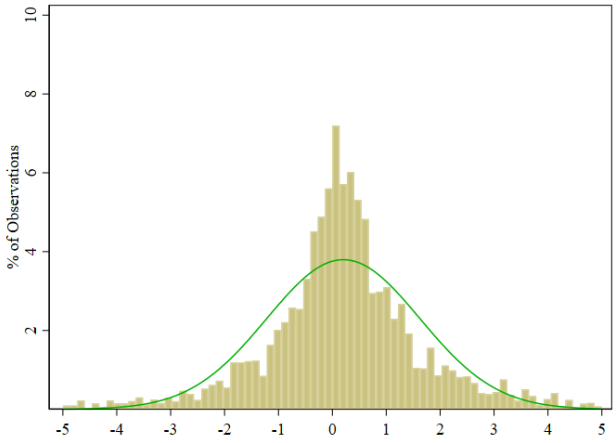
Notes: This table shows an excerpt of the raw data input that is used to construct the tax competition measures *ImpCompTax* and *PeerCompTax*. Import and market shares (in %) are based on total net imports and the total revenues reported by all foreign-owned subsidiaries.

Figure 1: Distribution of Tax Competition Measures

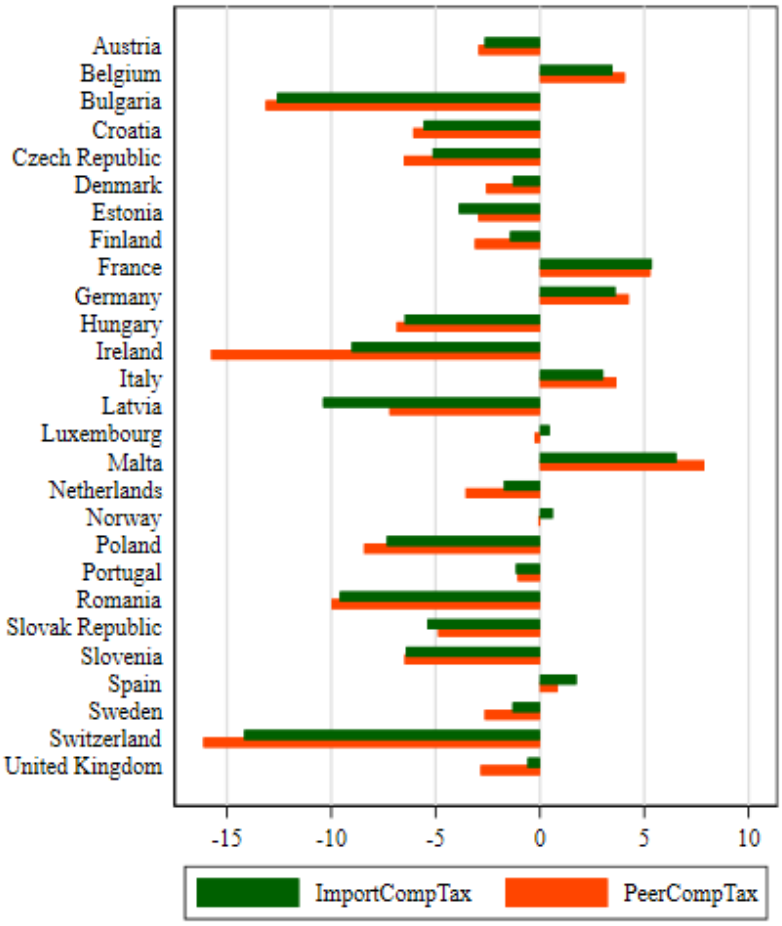
(A) Distribution of Changes in *ImportCompTax*



(B) Sample Distribution of Changes in *PeerCompTax*



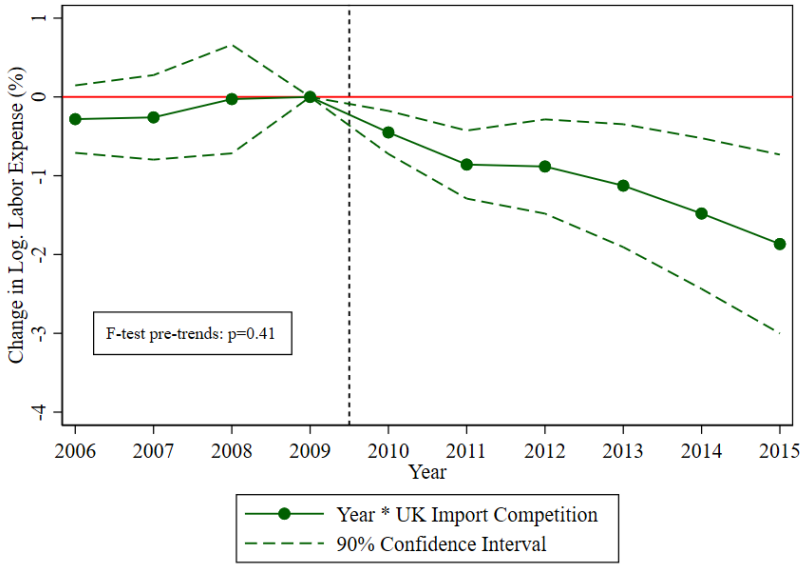
(C) Means in Tax Competition Measures by Country



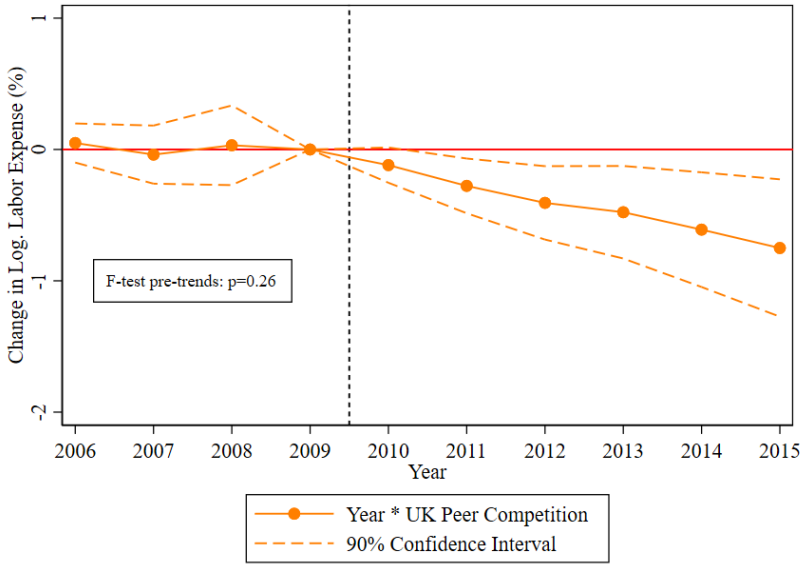
Notes: Panel (A) of this figure plots the distribution of changes in the tax competition measure *ImportCompTax* against the normal distribution. Panel (B) plots the distribution of changes in the tax competition measure *PeerCompTax* against the normal distribution. Panel (C) plots the means of *ImportCompTax* and *PeerCompTax* by sample country.

Figure 2: Single-Country Setting - Evidence from Changes-in-Changes Analyses

(A) *UK Tax Rates Cuts after 2009 and Differential Exposure of German Firms to UK Import Competition*

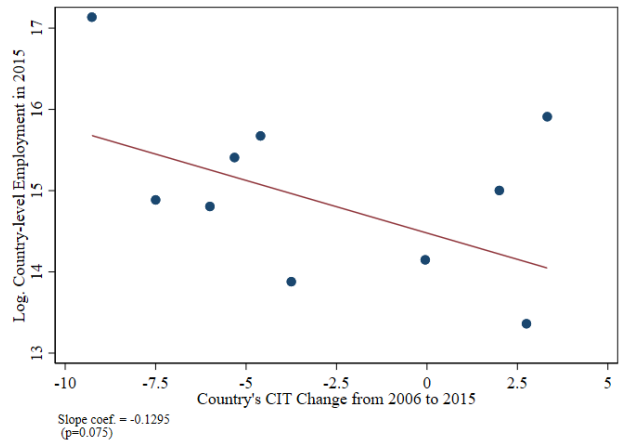


(B) *UK Tax Rates Cuts after 2009 and Differential Exposure of German Firms to UK Peer Competition*



Notes: This figure plots the cumulative annual effects of measures of German firms' exposure to tax competition from the U.K. on changes in the German firms' labor expense around the announcement of major corporate tax rate reductions in the United Kingdom in 2010. In Panel (A), German firms' exposure to tax competition is measured as the share of imports from the U.K. in a given German industry in 2009 (*UK Import Competition*), the year before the tax rate reductions in the U.K. The figure then plots the sum of the point estimates of the interaction of *UK Import Competition* and an indicator for each calendar year on changes in labor expense (green). In Panel (B), German firms' exposure to tax competition is measured as the share of U.K.-owned subsidiaries in a given German industry in 2009 (*UK Peer Competition*). The Figure then plots the sum of the point estimates of the interaction of *UK Peer Competition* on changes in labor expense (orange). 2009 is the omitted baseline year. The dashed lines report 90% confidence intervals for the estimates are reported by the dashed lines. The graphs also report the p-values for F-tests that test whether the sum coefficients of the interactions of pre-period event years and the tax competition measure is different from zero. Controls as in the baseline specification as well as controls for import competition and multinational presence from U.S.-owned firms, country-industry, and year fixed effects are included in the specifications. Robust standard errors are clustered at the firm level.

Figure 3: Domestic Tax Cuts and Domestic Employment



Notes: This graph plots a binned scatterplot that illustrates the relation between the sample countries' natural logarithm of total employment at the end of the sample period against the change in their corporate income tax rate over the sample period. We use total employment from the administrative data provided by EU KLEMS.

Table 1: Sample Construction

Sample Selection Step	Unique Firms	Firm-Years
Firms in European Sample countries with unconsolidated financial statement information in the Orbis database during the period 2006-2015	35,992,464	148,117,942
Drop firms without industry classification and in sectors of public administration, extraterritorial organisations, defence, utilities, household employers	31,846,966	132,251,207
Drop firms with missing total assets or employees, total assets never exceeding EUR 10,000, negative entries for total assets, revenues, employees or labor expense	9,488,889	42,651,895
Require non-missing changes in labor expense	6,890,522	32,850,993
Require non-missing information on firm-level control variables	4,339,008	22,732,942

Notes: This table presents the sample selection process for the main firm-level regression sample.

Table 2: Descriptive Statistics

Panel (A)	Summary Statistics					
	Obs	Mean	SD	Median	P25	P75
Dependent Variables						
Exports (bn)	24,161	24.48	73.92	4.45	0.87	17.65
Δ *Log. Exports*	24,762	6.69	43.39	7.03	-1.51	15.98
Fixed Tangible Assets (th)	3,323,272	5988.59	176202.50	199.83	24.85	1294.59
Δ *Sub. Investment*	3,323,272	0.41	8.51	-0.23	-1.84	0.63
EBITDA Margin	21,341,056	0.03	0.37	0.06	0.01	0.14
Δ *EBITDA Margin*	21,168,136	-0.01	0.28	-0.00	-0.04	0.03
Labor Margin	22,612,882	0.68	0.30	0.75	0.58	0.88
Δ *Labor Margin*	22,612,882	-0.01	0.17	-0.00	-0.04	0.03
Markups (De Loecker et al. 2020)	9,847	0.32	0.12	0.34	0.25	0.39
Δ *Markups (De Loecker et al. 2020)*	9,001	-0.41	4.60	-0.10	-2.60	2.13
Markups (CompNET)	3,632	1.20	0.70	0.99	0.84	1.34
Δ *Markups (CompNET)*	3,277	0.54	17.64	0.75	-7.18	8.31
Labor Expense (th)	22,732,942	792.07	57107.41	83.35	22.96	279.39
Δ *Log. Labor Expense*	22,732,942	-0.10	43.70	2.02	-10.47	14.13
Variables of Interest						
CIT Domestic	330	23.08	7.22	22.50	19.00	28.59
Δ *CIT Domestic*	330	-0.29	1.20	0.00	0.00	0.00
CIT Parent	1,008	23.21	9.73	25.00	17.50	30.00
Δ *CIT Parent*	1,008	-0.29	2.35	0.00	0.00	0.00
ImpCompTax	22,708,418	-0.96	5.45	0.56	-5.00	2.95
Δ *ImpCompTax*	22,708,418	0.11	1.07	0.12	-0.20	0.37
PeerCompTax	22,602,854	-0.85	5.29	0.51	-3.54	2.42
Δ *PeerCompTax*	22,529,950	0.22	1.77	0.16	-0.48	0.89
Control Variables						
Cash (th)	22,624,596	370.40	14150.09	22.93	4.60	97.89
HHI (t-1)	22,732,942	0.02	0.04	0.01	0.00	0.01
Import Penetration (t-1)	22,708,418	7.66	4.99	6.28	4.30	9.78
MNE Presence (t-1)	22,732,942	16.56	13.38	13.35	5.84	24.21
Revenue (th)	22,668,143	5200.53	147325.94	358.53	107.39	1297.54
Tax Haven MNEs (%) (t-1)	22,732,942	0.73	1.88	0.24	0.07	0.66
Total Assets (th)	22,732,942	5248.89	172722.05	310.69	89.39	1170.00
Cross-sectional Variables						
MNE	22,732,942	0.05	0.21	0.00	0.00	0.00
Capital-Labor Complementarity	22,732,871	1.13	0.28	1.18	0.96	1.32
Product Differentiation	22,732,942	28.58	17.17	31.00	11.00	46.00
Post UK Tax Cuts	169,031	0.71	0.45	1.00	0.00	1.00
UK Import Competition	169,031	5.33	1.87	4.65	4.27	6.05
UK Peer Competition	169,031	4.88	5.63	3.75	1.59	7.76
Country-level Control Variables						
FDI Inflow (% GDP)	330	7.51	14.50	3.28	1.49	7.49
FDI Outflow (% GDP)	330	5.40	17.94	2.41	0.63	6.01
GDP Capita Domestic (th)	330	38.51	24.96	38.64	16.75	51.59
GDP Capita Parent (th)	973	27.26	26.89	17.48	7.06	41.81
GDP Total Domestic (bn)	330	661.53	939.90	266.13	60.07	574.09
GDP Total Parent (bn)	973	807.61	2129.18	213.86	47.63	528.21
Population (m)	330	18.30	22.98	8.37	4.56	19.70
VAT Domestic	294	20.90	2.55	20.00	19.60	23.00

Panel B	Sample Composition		
Year	Obs.	Country	Obs.
2006	1,831,286	Austria	32,274
2007	1,899,418	Belgium	393,565
2008	2,192,866	Bulgaria	719,171
2009	2,307,736	Croatia	523,413
2010	2,183,590	Czech Republic	682,728
2011	2,262,901	Denmark	91,811
2012	2,465,016	Estonia	257,468
2013	2,562,276	Finland	556,598
2014	2,537,888	France	3,323,618
2015	2,489,965	Germany	193,199
		Hungary	1,182,695
		Iceland	23,914
		Ireland	37,717
		Italy	3,263,695
		Latvia	11,673
		Luxembourg	4,764
		Malta	292
		Netherlands	23,098
		Norway	533,931
		Poland	168,315
		Portugal	1,266,939
		Romania	2,128,818
		Slovak Republic	370,731
		Slovenia	219,608
		Spain	4,857,042
		Sweden	1,425,517
		Switzerland	1,959
		United Kingdom	438,389
Total		22,732,942	

Notes: Panel (A) of this table presents summary statistics for all variables used in the main analyses. All variables are defined in Appendix A. For dependent variables and the main variables of interest, the table shows summary statistics for the raw variables and the changes in the logged variables as used in the regressions. The numbers of observations represent the respective regression samples prior to removing singletons. Macro-economic variables which are used throughout the different analyses are displayed with country-years as the unit of observation. Panel (B) table presents the distribution of our final sample by sample period year and by country. Our main sample consists of 22,732,942 firm-year observations from 28 European countries from 2006 to 2015.

Table 3: Domestic Corporate Tax Changes and Exports and Foreign Subsidiary Investment

Panel (A)	(1)	(2)	(3)	(4)	(5)
	Δ *Log. Exports*				
	Global Country Sample			EEA Country Sample	
Δ *CIT Domestic*	-0.216***	-0.219**	-0.248**	-0.226**	-0.247**
	(-2.58)	(-2.45)	(-2.25)	(-2.02)	(-1.98)
Δ *GDP Total Domestic*	0.009***	0.009***	0.009***	-0.005	-0.005
	(7.71)	(7.65)	(7.87)	(-1.63)	(-1.60)
Δ *GDP Capita Domestic*	0.913***	0.916***	0.920***	0.520***	0.515***
	(12.76)	(12.82)	(12.77)	(5.22)	(4.98)
Δ *VAT Domestic*				-0.044	0.098
				(-0.05)	(0.10)
Obs.	24,161	24,161	24,161	16,692	16,692
Adj. R2	0.053	0.061	0.062	0.052	0.053
Macro Controls	No	No	Yes	No	Yes
Ctry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	.	.	.	.
Ind-Year FE	No	Yes	Yes	Yes	Yes
Panel (B)	Δ *Sub. Investment*				
	Global Country Sample			EEA Country Sample	
Δ *CIT Parent*	-0.084***	-0.040***	-0.035***	-0.032***	-0.024***
	(-10.49)	(-5.00)	(-4.33)	(-3.47)	(-2.58)
Δ *CIT Domestic*	-0.056***				
	(-7.30)				
Δ *GDP Total Domestic*	0.002***				
	(39.28)				
Δ *GDP Capita Domestic*	0.051***				
	(24.73)				
Δ *GDP Total Parent*			0.000**		0.000**
			(2.35)		(2.31)
Δ *GDP Capita Parent*			0.018***		0.033***
			(5.09)		(5.57)
Obs.	3,323,272	3,323,268	3,321,099	2,958,165	2,958,165
Adj. R2	0.007	0.015	0.015	0.014	0.014
Parent Ctry FE	Yes	Yes	Yes	Yes	Yes
Ctry-Year FE	No	Yes	Yes	Yes	Yes
Ind-Year FE	Yes	Yes	Yes	Yes	Yes

Notes: This table presents the results of OLS regressions of Eq. (3) in Panel (A) and Eq. (4) in Panel (B). Eq. (3) models changes in country-industry exports as a function of domestic corporate income tax rate changes. Eq. (4) models changes in multinational firm subsidiary investment as a function of changes in multinational parent firm country corporate income tax rate changes. In Panel (A), the dependent variable is the change in the natural logarithm of a country-industry's annual exports as provided in the World Input-Output Database (WIOD). We multiply the logged dependent variable by 100 to ease interpretation of the estimated coefficients. In Panel (A), additional macro-economic controls include foreign direct investment inflows and outflows (in % of GDP) and total population count. In Panel (B), the dependent variable is a multinational firm subsidiary's change in fixed tangible assets scaled by lagged total assets, multiplied by 100. In Panel (A), robust standard errors are clustered at the domestic country-industry level. In Panel (B), robust standard errors are clustered at the subsidiaries' parent (multinational firm) level. T-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

Table 4: Tax Competition and Domestic Product Market Competition

Panel (A)	(1)	(2)	(3)	(4)	(5)	(6)
	Δ *EBITDA Margin*			Δ *Labor Margin*		
Δ *ImpCompTax*	-0.247**		-0.256**	-0.090*		-0.092*
	(-2.43)		(-2.50)	(-1.73)		(-1.75)
Δ *PeerCompTax*		-0.020*	-0.020*		-0.013**	-0.013**
		(-1.87)	(-1.79)		(-2.39)	(-2.34)
Obs.	22,522,200	22,522,200	24,482,876	21,146,983	20,976,728	20,976,728
Adj. R2	0.052	0.024	0.003	0.008	0.008	0.008
Controls	No	No	No	No	No	No
Ctry-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Ind-Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Panel (B)	Δ *Markups* (De Loecker et al. 2020)			Δ *Markups* (CompNET)		
Δ *ImpCompTax*	-0.149**		-0.146**	-2.274**		-2.299**
	(-2.13)		(-2.08)	(-2.09)		(-2.11)
Δ *PeerCompTax*		-0.024**	-0.024**		-0.524**	-0.526**
		(-2.18)	(-2.13)		(-2.27)	(-2.28)
Obs.	8,981	8,981	8,981	3,228	3,228	3,228
Adj. R2	0.813	0.813	0.813	0.014	0.015	0.017
Controls	No	No	No	No	No	No
Ctry-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Ind-Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table presents the results of OLS regressions of Eq. (5), which models changes in domestic product market competition outcomes as a function of changes in exposure to tax competition. Panel (A) presents results from regressions at the firm level. In Columns (1) to (3), the dependent variable is the change in a firm's EBITDA margin, defined as a firm's earnings before profit, taxes, depreciation and amortization over revenues. In Columns (4) to (6), the dependent variable is the change in a firm's labor margin, defined as revenues less labor expenses over revenues. The changes in firm-level margins in Panel (A) are multiplied by 100 for readability. Panel (B) presents results from regressions at the industry level. In Columns (1) to (3), the dependent variable is the change in average markups constructed using our main sample, closely following de Loecker at al. (2020). Specifically, we use their data on NAICS 2-digit output productivity as an input measure. Markups are weighted by individual firms' number of employees to consutruct average markups at the industry level. In Columns (4) to (5), the dependent variable is the change in markups using proprietary obtained from the Competitiveness Research Network (CompNet). We use median industry markups following CompNet's firm markup definition given a firm's labor input decision (Spec. 3). Changes in markups in Panel (B) are percentage difference between prices and marginal costs because markups are defined as the ratio between prices and marginal costs and is not related to the output unit, nor to the level of costs (CompNET, 2021). Robust standard errors are clustered by country-industry. T-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

Table 5: Tax Competition and Domestic Firms' Employment

	(1)	(2)	(3)	(4)	(5)
	Δ *Log. Labor Expense*				
	Pooled Sample			Non-MNEs	MNEs
Δ *ImpCompTax*	-0.425**		-0.416**	-0.435**	-0.189
	(-2.14)		(-2.05)	(-2.07)	(-1.13)
Δ *PeerCompTax*		-0.057***	-0.055***	-0.056***	-0.037
		(-2.87)	(-2.80)	(-2.82)	(-0.93)
Δ *Log. Total Assets (t-1)*	0.147***	0.147***	0.147***	0.147***	0.157***
	(49.99)	(49.61)	(49.62)	(48.06)	(49.25)
Δ *Log. Cash (t-1)*	0.007***	0.007***	0.007***	0.007***	0.002***
	(14.82)	(14.73)	(14.73)	(15.08)	(5.18)
Δ *Log. Revenue (t-1)*	0.075***	0.075***	0.075***	0.075***	0.062***
	(17.35)	(17.21)	(17.20)	(16.59)	(19.81)
Import Penetration (t-1)	0.172***	0.174***	0.175***	0.183***	0.064**
	(2.74)	(2.72)	(2.74)	(2.75)	(2.24)
MNE Presence (t-1)	-0.011	-0.011	-0.011	-0.012	0.002
	(-1.31)	(-1.33)	(-1.30)	(-1.34)	(0.29)
HHI (t-1)	-0.237	-0.484	-0.506	-0.366	-0.412
	(-0.20)	(-0.38)	(-0.39)	(-0.27)	(-0.38)
Tax Haven MNEs (%) (t-1)	-0.049	-0.050	-0.050	-0.009	-0.067***
	(-1.34)	(-1.35)	(-1.37)	(-0.19)	(-2.75)
Obs.	22,708,418	22,522,200	22,522,200	21,442,598	1,079,598
Adj. R2	0.052	0.052	0.052	0.052	0.051
Ctry-Year FE	Yes	Yes	Yes	Yes	Yes
Ind-Year FE	Yes	Yes	Yes	Yes	Yes

Notes: This table presents the results of OLS regressions of Eq. (5), which models changes in labor expense as a function of changes in exposure to tax competition. The dependent variable is the logarithmic annual change in labor expense. We multiply the logged dependent variable by 100 to ease interpretation of the estimated coefficients. Robust standard errors are clustered by country-industry. T-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

Table 6: Tax Competition and Employment - Cross-sectional Differences in Firm Responses

	(1)	(2)	(3)	(4)
	Δ *Log. Labor Expense*			
Panel (A)	*Product Differentiation*			
	(Country-Industry)		*(Country-Industry-Year)*	
	High	Low	High	Low
Δ *ImpCompTax*	0.228	-0.396*	0.247	-0.390*
	(0.90)	(-1.71)	(0.97)	(-1.69)
Δ *PeerCompTax*	-0.010	-0.065***	-0.007	-0.064***
	(-0.41)	(-2.84)	(-0.28)	(-2.76)
Diff. in Δ ImpCompTax	-0.624*		-0.637*	
	(-1.82)		(-1.85)	
Diff. in Δ PeerCompTax	-0.056*		-0.057*	
	(-1.69)		(-1.71)	
Obs.	7,066,159	15,456,039	7,034,288	15,487,911
Ad. R2	0.056	0.051	0.056	0.051
Panel (B)	*Capital-Labor Complementarity*			
	(Country-Industry)		*(Country-Industry-Year)*	
	High	Low	High	Low
Δ *ImpCompTax*	-0.159	-0.904**	-0.189	-0.889**
	(-1.13)	(-2.53)	(-1.35)	(-2.46)
Δ *PeerCompTax*	0.006	-0.115***	0.009	-0.109***
	(0.33)	(-4.07)	(0.45)	(-3.71)
Diff. in Δ ImpCompTax	-0.745*		-0.701*	
	(-1.94)		(-1.80)	
Diff. in Δ PeerCompTax	-0.121***		-0.118***	
	(-3.58)		(-3.36)	
Obs.	11,273,900	11,248,300	22,522,200	11,621,721
Ad. R2	0.061	0.046	0.053	0.059
Controls	Yes	Yes	Yes	Yes
Ctry-Year FE	Yes	Yes	Yes	Yes
Ind-Year FE	Yes	Yes	Yes	Yes

Notes: This table presents the results of OLS regressions of Eq. (6), which models changes in labor expense as a function of exposure to changes in exposure to tax competition, estimated after splitting the sample based on product market-competition and capital-labor complementarity. In Panel (A), *Product Differentiation* is based on the number of unique products within a country's 2-digit NACE Rev. 2 industry according to the Eurostat International Trade in Goods database. Sample splits are based on 75th vs 25th percentile, i.e., "High" indicates that firm-years fall into the highest quartile. In Columns (1) and (2) of Panel (A), the sample splits are taken within each country-industry cell. In Columns (3) and (4) of Panel (A), the sample splits are taken within each country-industry-year cell. In Panel (B), *Capital-Labor Complementary* is based on the coefficient of regressions of capital on labor to proxy for the association between changes in labor and capital inputs (following Jacob and Vossebuerger, 2021). Sample splits are based on median splits, i.e., "High" indicates that firm-years are above median. In Columns (1) and (2) of Panel (B), the sample splits are taken based on the medians of coefficients when regressing logged fixed tangible assets on logged employment in country-industry regressions over the sample period. In Columns (3) and (4) of Panel (B), the sample splits are taken based on the country-industry-year medians of coefficients when regressing logged fixed tangible assets on logged employment in country-industry regressions over the sample period. All specifications include controls, industry-year, and country-year fixed effects as in Column (3) of Table 5. Robust standard errors are clustered by country-industry. All variables are as defined in Appendix A. Sample descriptive characteristics are found in Table 2. T-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

Table 7: Single-Country Setting - Evidence from Changes-in-Changes Analyses

	(1)	(2)	(3)	(4)
		Δ *Log. Labor Expense*		
*Post UK Tax Cuts * UK Import Competition*	-0.360***		-0.291**	-0.298**
	(-2.72)		(-2.19)	(-2.09)
*Post UK Tax Cuts * UK Peer Competition*		-0.151***	-0.133***	-0.122***
		(-4.29)	(-3.76)	(-3.38)
Obs.	169,031	169,031	169,031	169,031
Adj. R2	0.004	0.004	0.004	0.017
Controls	No	No	No	Yes
Ctry-Ind FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Notes: This table presents the results of OLS regressions of Eq. (7), which models changes in German firms' labor expense as a function of exposure to tax competition from the U.K. before and after the announcement of major corporate tax rate reductions in the United Kingdom in 2010. The dependent variable is the logarithmic annual change in labor expense. We multiply the logged dependent variable by 100 to ease interpretation of the estimated coefficients. *UK Import Competition* is defined as the share of imports from the U.K. in a given German industry in 2009, the year before the tax rate reductions in the U.K. *UK Peer Competition* is defined as the share of U.K.-owned subsidiaries in a given German industry in 2009, the year before the tax rate reductions in the U.K. Robust standard errors are clustered by country-industry-year and firm. T-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

Table 8: Tax Competition and Employment - Firm Responses Conditional on a Country's Position in Tax Competition

	(1)	(2)	(3)
	Δ *Log. Labor Expense*		
Δ *ImpCompTax * ImpCompTax>0*	-0.611*		-0.612*
	(-1.70)		(-1.69)
Δ *ImpCompTax * ImpCompTax<0*	0.323		0.350
	(0.97)		(1.01)
Δ *PeerCompTax * PeerCompTax>0*		-0.086***	-0.084***
		(-3.12)	(-3.08)
Δ *PeerCompTax * PeerCompTax<0*		0.057	0.056
		(1.46)	(1.43)
Obs.	22,522,200	22,522,200	22,522,200
Adj. R2	0.052	0.052	0.052
Controls	Yes	Yes	Yes
Ctry-Year FE	Yes	Yes	Yes
Ind-Year FE	Yes	Yes	Yes

Notes: This table presents the results of OLS regressions of Eq. (6), which models changes in labor expense as a function of changes in exposure to tax competition after interacting changes in our tax competition measures with an indicator variable taking on the value of one if a firm's country-industry has a negative value on the tax competition variable (i.e., if it has a relatively favorable position in terms of international tax competition). The dependent variable is the logarithmic annual change in labor expense. We multiply the logged dependent variable by 100 to ease interpretation of the estimated coefficients. Robust standard errors are clustered by country-industry. T-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

Table 9: Robustness Tests

Panel (A)	(1)	(2)	(3)	(4)	(5)
	Δ *Log. Labor Expense*				
	Baseline	Additional Controls		PeerCompTax	
	Without Controls	Labor Cost Index	PIT Competition	Using Average Tax Rates in MNE Group	
Δ *ImpCompTax*	-0.481**	-0.483**	-0.467**	-0.424**	-0.415**
	(-2.05)	(-2.23)	(-2.26)	(-2.07)	(-2.05)
Δ *PeerCompTax*	-0.047**	-0.060***	-0.058***		-0.054***
	(-2.31)	(-2.77)	(-2.81)		(-2.75)
Δ *ImpCompPIT*			0.007		
			(0.47)		
Δ *PeerCompPIT*			0.124		
			(1.51)		
Δ *PeerCompTax (Avg. MNE)*				-0.045	-0.028
				(-1.11)	(-0.72)
Labor Cost Index		-0.042*			
		(-1.94)			
Obs.	22,522,200	21,704,596	22,522,200	22,520,166	22,520,166
Adj. R2	0.024	0.053	0.052	0.052	0.052
Controls	No	Yes	Yes	Yes	Yes
Ctry-Year FE	Yes	Yes	Yes	Yes	Yes
Ind-Year FE	Yes	Yes	Yes	Yes	Yes

Panel (B)	(1)	(2)	(3)	(4)	(5)
	Size Cut		No Domestic Tax Rate Changes		
	No Tiny Firm Changes	Firms with > Median Total Assets	No Changes in [t-2;t+1]	No Firms in UK	Ind. FE * Δ CIT
Δ *ImpCompTax*	-0.401**	-0.530**	-0.476**	-0.406*	-0.421**
	(-2.00)	(-1.98)	(-2.13)	(-1.93)	(-2.16)
Δ *PeerCompTax*	-0.054***	-0.039*	-0.070*	-0.054***	-0.053***
	(-2.72)	(-1.68)	(-1.74)	(-2.69)	(-2.65)
Obs.	21,544,296	11,268,314	10,744,615	22,083,811	22,522,200
Adj. R2	0.053	0.068	0.048	0.052	0.052
Controls	Yes	Yes	Yes	Yes	Yes
Ctry-Year FE	Yes	Yes	Yes	Yes	Yes
Ind-Year FE	Yes	Yes	Yes	Yes	Yes

Table 9: Robustness Tests (*continued*)

Notes: This table presents the results of OLS regressions of variations of Eq. (6), which models changes in labor expense as a function of changes in exposure to tax competition. In Panel (A), we alter the empirical specification. In Column (1), we report results without including control variables. In Column (2), we include a control variable for domestic labor costs, *Labor Cost Index*. In Column (3), we include tax competition measures calculated using the difference between the domestic and foreign personal income tax rate (PIT): *ImportCompPIT* and *PeerCompPIT*. In Column (4), we replace the peer tax competition measure by an alternative measure calculated using the average statutory corporate income tax rates faced by affiliated subsidiaries of a multinational firm instead of the parent firm headquarters country's tax rate. In Column (5), we include this alternative measure in addition to the main peer tax competition measure. In Columns (1) to (5) In Panel (B), we alter the sample composition. In Column (1), we report results after excluding very small firms that change from one to two employees or vice versa. In Column (2), we report results after retaining only firms of above-median size based on total assets. In Column (3), we exclude firm-year observations in a four-year window around domestic tax rate changes. In Column (4), we exclude firm-year observations from the UK. In Column (6), we interact the vector of industry fixed effects with domestic corporate income tax rate changes. The dependent variable is the logarithmic annual change in labor expense. We multiply the logged dependent variable by 100 to ease interpretation of the estimated coefficients. Robust standard errors are clustered by country-industry. T-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

Table 10: Robustness of Main Results to Excluding Tax Havens

	(1)	(2)	(3)	(4)	(5)	(6)
	Δ *Log. Labor Expense*					
		No Tax Haven Countries in Europe	No MNEs from Tax Haven Countries in Europe	No Firms of MNEs with Tax Haven Countries	No Firms of MNEs with Tax Haven Countries in Europe	No MNEs from Tax Haven Countries
Δ *ImpCompTax*	-0.619**					
(excl. Tax Haven Imports)	(-2.22)					
Δ *ImpCompTax*		-0.436**	-0.438**	-0.437**	-0.429**	-0.438**
		(-2.11)	(-2.14)	(-2.12)	(-2.10)	(-2.11)
Δ *PeerCompTax*	-0.059***	-0.058***	-0.058***	-0.057***	-0.058***	-0.059***
	(-2.95)	(-2.88)	(-2.93)	(-2.88)	(-2.94)	(-2.96)
Δ *Log. Total Assets (t-1)*	0.143***	0.144***	0.143***	0.144***	0.143***	0.143***
	(48.27)	(48.15)	(48.04)	(48.16)	(48.23)	(47.58)
Δ *Log. Cash (t-1)*	0.006***	0.006***	0.006***	0.006***	0.006***	0.007***
	(14.65)	(14.65)	(14.67)	(14.65)	(14.65)	(14.81)
Δ *Log. Revenue (t-1)*	0.077***	0.077***	0.077***	0.077***	0.077***	0.078***
	(18.00)	(17.96)	(17.92)	(17.97)	(17.98)	(17.73)
Import Penetration (t-1)	0.183***	0.182***	0.181***	0.182***	0.181***	0.185***
	(2.78)	(2.75)	(2.77)	(2.75)	(2.76)	(2.79)
MNE Presence (t-1)	-0.012	-0.012	-0.012	-0.012	-0.012	-0.013
	(-1.33)	(-1.32)	(-1.31)	(-1.34)	(-1.29)	(-1.34)
HHI (t-1)	-0.393	-0.405	-0.428	-0.364	-0.467	-0.457
	(-0.31)	(-0.31)	(-0.33)	(-0.28)	(-0.36)	(-0.35)
Tax Haven MNEs (%) (t-1)	-0.050	-0.055	-0.048	-0.051	-0.055	-0.027
	(-1.30)	(-1.36)	(-1.23)	(-1.28)	(-1.38)	(-0.62)
Obs.	22,523,360	22,458,418	22,395,401	22,473,140	22,492,756	22,082,927
Adj. R2	0.056	0.056	0.056	0.056	0.056	0.056
Ctry-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Ind-Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table presents the results of OLS regressions of variations of Eq. (6), which models changes in labor expense as a function of changes in exposure to tax competition. In column (1), we modify the independent variable *ImpCompTax* to exclude imports from tax haven countries when calculating the tax competition measure. In columns (2) to (6), we exclude firm observations based on a firm's location in or affiliation with other firms located in tax havens as indicated in the table headings. The dependent variable is the logarithmic annual change in labor expense. We multiply the logged dependent variable by 100 to ease interpretation of the estimated coefficients. Robust standard errors are clustered by country-industry. T-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.