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Tax Competition and Employment

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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 subsidiaries. We posit that these changes in the domestic 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.

JEL Classifications: E24; F14; F16; H23; H35.

Keywords: tax competition; competition; employment; real effects; trade.

I. INTRODUCTION

The average corporate income tax rate among Organisation for Economic Co-operation and Development (OECD) countries declined by 26 percent over the last two decades (from 32.5 percent in 2000 to 23.9 percent in 2018). Tax competition, which occurs when countries reduce tax rates relative to other countries, is a central cause of this decline (Devereux, Lockwood, and Redoano 2008; Devereux and Loretz 2013). Despite the significant decline in corporate income tax rates due to international tax competition, empirical evidence of how changing tax rates 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.

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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, Ganser, McLiesh, Ramalho, and Shleifer 2010; Mukherjee, Singh, and Žaldokas 2017; Lester 2019). These new products and production improvements can directly affect the competitive environment in other countries by increasing import competition and competition from local peers owned and cross-subsidized by foreign parents. Further, foreign tax rate changes can indirectly affect the competitive environment in other countries due to the threat of potential competitive actions by the managers of foreign firms (Tirole 1988). Consistent with foreign tax rate changes affecting the competitive environment in other countries, Kim, Nessa, and Wilson (2021) find that foreign tax cuts cause U.S. domestic-only firms to use more competition-related words in their 10-Ks and decrease their price-to-cost margins, which prior work suggests indicates reduced market power (e.g., Aghion, Bloom, Blundell, Griffith, and Howitt 2005; Gaspar and Massa 2006; Peress 2010). In total, foreign tax rate changes likely affect the competitive environment in other countries.

How 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 causes managers to cut expenses (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 managers' physical investment. Dixit (1980), Sutton (1991), and Khanna and Tice (2000) find or argue that product-market competition causes mangers to increase physical investment, whereas Frésard and Valta (2016) find that product-market competition causes managers to decrease their physical investment. The study that we build on most directly, Kim et al. (2021), finds that exposure to foreign tax cuts increases domestic firms' capital expenditures. Capital expenditures generally correlate with employment, and employment can even be considered a form of investment (Jung, Lee, and Weber 2014). Therefore, changes in investment due to changes in foreign tax rates might also positively affect employment. How the investment and expense-cutting responses to foreign tax rates net to affect employment, and hence how foreign rate changes affect employment, is an open empirical questions.

To answer the question of how foreign rate changes affect managers' employment decisions, we first present evidence supporting our assumption that changes in foreign tax rates affect the domestic competitive environment. Consistent with Bernini and Treibich (2016) and Federici, Parisi, and Ferrante (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 an import-competition channel. Consistent with Lester (2019); De Vito, Jacob, and Xu (2021); and Hoopes, Klein, Lester, and Olbert (2022), we find that subsidiaries owned by a foreign parent inversely change their investment in response to changes in the parent's corporate income tax rate. Because investments 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 a multinational presence channel.

To further explore whether changes in foreign rates affect the competitive environment, we construct 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 these differences by the share of prior-year industry sales made by each foreign-owned domestic subsidiary. Using these measures, we find that changes in 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 affect the domestic competitive environment (De Loecker, Eeckhout, and Unger 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 along all margins, including changing wage rates and working hours, as well as firing and hiring workers. We find that the effect of exposure to tax competition on employment 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

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0.5 percent and that a one-standard-deviation increase in our multinational presence-based measure would decrease affected firms' total labor expense by 0.1 percent.

We also find that the effect of exposure to tax competition on employment 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. Because domestic-only firms cannot move operations abroad, the concentrated effect of exposure to tax competition at domestic-only firms suggests that tax competition can affect employment via mechanisms other than income or operations shifting.[1] 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 varies for managers who are more likely to adjust employment in response to changes in product competition. Doing so allows us to document heterogeneity in the effect of exposure to tax competition and helps rule out potential alternative explanations for our findings. First, we examine how product differentiation moderates managers' responses to changes in exposure to tax competition. Product differentiation can soften the effects of product-market competition by insulating firms from competitors.[2] For example, Kim et al. (2021) find that managers whose firms produce more unique products respond less to foreign tax changes, and Hombert and Matray (2018) find 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.

Second, we examine how capital-labor complementarity moderates managers' responses to changes in exposure to tax competition. When capital and employment are more complementary, managers cannot expand capital investment in response to changes in product-market competition without also expanding employment. 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 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 our 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 Vossebürger 2022).

We also estimate a number of extensions of our main results. We find that countries that engaged less in tax competition over our sample period 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 U.K. began aggressively cutting its corporate tax rate, but Germany did not. We examine how the managers of German firms exposed to U.K. tax competition changed employment levels after 2009. Consistent with our multicountry results, we find that the managers of German firms that faced more competition from U.K. imports or U.K.-owned peer firms relatively decreased their firms' employment levels after the U.K. 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, 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 taxes and firms' decision-making by answering the call of Lester (2021) for research on the effect of taxation on investment and employment in particular. Prior work in this literature largely focuses on how tax policy that directly targets firms or their employees and investors affects firm outcomes.[3] Consequently, our main contribution to this literature is to document evidence that *foreign* tax rates affect employment at *domestic* firms. The most closely related studies in this literature are Gaertner, Hoopes, and Williams (2020), De Vito

[1] Although 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.

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

[3] See Hanlon and Heitzman (2010) for a review of the literature. Subsequent studies include Graham, Hanlon, and Shevlin (2011); Doidge and Dyck (2015); Hanlon, Lester, and Verdi (2015); Heider and Ljungqvist (2015); Dobbins and Jacob (2016); Suárez Serrato and Zidar (2016): Bird, Edwards, and Shevlin et al. (2017); Ljungqvist, Zhang, and Zuo (2017); Nessa (2017); Armstrong, Glaeser, Huang, and Taylor (2019a); Bird, Edwards, and Ruchti (2018); Chow, Huang, Klassen, and Ng (2018); Langenmayr and Lester (2018); Williams (2018); Armstrong, Glaeser, and Kepler (2019b); Lester (2019); Cen, Maydew, Zhang, and Zuo (2020); Dyreng and Hills (2021); Donohoe et al. (2022); Chen, De Simone, Hanlon, and Lester (2022); C. Glaeser, S. Glaeser, and Labro et al. (2022); and Hoopes et al. (2022). Jacob (2022) is a recent review of this literature.

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et al. (2021), Kim et al. (2021), and Donohoe, Jang, and Lisowsky (2022). These studies present evidence that tax cuts affect the investment and performance of firms not directly targeted by the tax cut. 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.[4] 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 results can inform the policy debate about how to protect domestic employment from exposure to tax competition by demonstrating that limits on income and operations shifting cannot fully prevent the adverse effects of exposure to tax competition on employment (see Avi-Yonah 2008 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 (OECD Pillar 2), which may intensify tax rate competition among industrial nations (Devereux, Vella, and Wardell-Burrus 2022)

II. BACKGROUND AND PREDICTIONS

Tax Competition

On December 22, 2017, President Trump signed the Tax Cuts and Jobs Act into law. The act reduces the U.S. statutory corporate tax rate from 35 percent to 21 percent, 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., von Haldenwang et al. 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, often 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: von Haldenwang et al. 2018). As a result, the worldwide average GDP-weighted statutory tax rate declined from 47 percent in 1980 to 26 percent in 2018 (Tax Foundation 2018). Although 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 will likely continue and may even intensify (Gomez-Cram and Olbert 2023; Devereux et al. 2022). The potential for greater tax rate competition across industrial economies highlights the importance of understanding the effect of tax competition on employment.

Tax competition is particularly intense in the European Economic Area (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 regard to setting corporate tax rates, resulting in particularly intense corporate tax competition. Consequently, the EEA is an ideal setting in which to study the effects of tax competition. However, these same arguments imply that our inferences may not generalize to non-EEA settings, such as those where capital and labor cannot move easily between borders.

Within the EEA, we focus on competition in corporate statutory income tax rates. 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 that managers predominately use statutory tax rates to evaluate business decisions (Devereux and Loretz 2013; Graham, Hanlon, Shevlin, and Shroff 2017). Nonetheless, tax competition can also take other forms, including some that only manifest in marginal or effective tax rates, such as allowing tax-avoidance strategies (Shevlin, Shivakumar, and Urcan 2019). However, marginal and effective tax rates are simultaneously determined with endogenous corporate investment and profitability, whereas foreign statutory tax rates are more likely exogenous in our setting. Consequently,

[4] For example, a search of the Library of Congress reveals that the U.S. Congress considers over 100 employment bills each year: https://www.congress.gov/search?q={%22source%22:%22legislation%22,%22subject%22:%22Labor+and+Employment%22}&searchResultViewType=expanded

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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).

Predictions

We consider two nonexclusive channels through which exposure to tax competition can affect domestic firms' employment levels. 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 (e.g., Almeida and Campello 2007). To the extent that 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.[5]

Tax competition can affect the domestic competitive environment via the import-competition channel, even if foreign firms are financially unconstrained. 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. Consistent with foreign tax differentials affecting the domestic competitive environment, Flach, Irlacher, and Unger (2021) 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 U.S. economy imports goods cause U.S. 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.

We refer to the second channel through which tax competition can affect domestic firms' employment levels 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, Cestone, Fumagalli, Pica, and Serrano-Velarde (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 U.S. multinationals to invest in subsidiaries located abroad. Similarly, Hoopes et al. (2022) find that U.K. multinational firms increase their investments in subsidiaries located abroad after the U.K. 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 nonheadquarters' 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. Holmes and Schmitz (2010) find that managers respond to increases in competition by cutting expenses, potentially including labor expense. Prior work also finds that increased import competition, and in particular from Chinese imports, reduces U.S. manufacturing employment (e.g., Revenga 1992; Autor, Dorn, and Hanson 2013; Acemoglu, Autor, Dorn, Hanson, and Price 2016).[6] 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) find that exposure to foreign tax cuts causes the managers of domestic firms to increase their investment, which generally correlates with employment and can even be considered a form of employment (Jung et al. 2014). 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 increase employment levels.

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

[6] 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.

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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. Similarly, prior work suggests that any effect should also vary with the degree to which domestic firms are insulated from product-market competition.

III. DATA

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.[7] We obtain data for the 28 member states of the European Union (EU), plus Norway and Switzerland. We merge these data to corporate ownership data using the historical annual versions of the Orbis database. We use these corporate ownership data to identify standalone firms and firms that belong to a multinational group.[8] For multinational groups, we identify member firms' worldwide subsidiaries and ultimate corporate owners (i.e., the parent firm at the 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, Lynch, Mayberry, and Omer 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).[9] We hand-collect country-level tax rate data from the European Commission, KPMG, and OECD. We require nonmissing 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.[10] Table 2, Panel B provides a breakdown of our sample by year and country.[11]

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):

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

ImpCompTax weights the corporate tax rate differential between domestic country c and foreign country f 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):

[7] Following the recommendations in Kalemli-Özcan, Sørensen, Villegas-Sanchez, Volosovych, and Yeşiltaş (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 nonmissing 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.

[8] See De Simone and Olbert (2022) and Olbert (2023) for additional details on the identification of ownership structures and the construction of the ownership panel.

[9] Available at http://www.wiod.org/database/wiots16 (see Timmer, Dietzenbacher, Los, Stehrer, and De Vries 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.

[10] The sample starts in 2006 because we require nonmissing ownership information to construct changes in firm-level outcomes and control variables, and ownership data begin 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.

[11] 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, Verdi, and Yu 2014; Beaver, Cascino, Correia, and McNichols 2019; Beuselinck, Cascino, Deloof, and Vanstraelen 2019).

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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 organizations, defense, 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 nonmissing changes in labor expense	6,890,522	32,850,993
Require nonmissing information on firm-level control variables	4,339,008	22,732,942

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

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

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 EEA countries because internal capital market transfers between affiliated EEA 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 that 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 are 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).[12] Appendix B provides an example calculation for *ImpCompTax* and *PeerCompTax*.

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 that our sample is slightly weighted toward 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.

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

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TABLE 2

Descriptive Statistics

Panel A: Summary Statistics

	Obs	Mean	Std. Dev.	Median	P25	P75
Dependent Variables						
Exports (bn)	24,161	24.48	73.92	4.45	0.87	17.65
Δln(Exports)	24,762	6.69	43.39	7.03	−1.51	15.98
Fixed Tangible Assets (th)	3,323,272	5,988.59	176,202.50	199.83	24.85	1,294.59
ΔSub. 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
ΔEBITDA 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
ΔLabor 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
ΔMarkups (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
ΔMarkups (CompNET)	3,277	0.54	17.64	0.75	−7.18	8.31
Labor Expense (th)	22,732,942	792.07	57,107.41	83.35	22.96	279.39
Δln(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
ΔCIT 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
ΔCIT 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
ΔImpCompTax	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
ΔPeerCompTax	22,529,950	0.22	1.77	0.16	−0.48	0.89
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
Control Variables						
Cash (th)	22,624,596	370.40	14,150.09	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	5,200.53	147,325.94	358.53	107.39	1,297.54
Tax Haven MNEs (%) $(t-1)$	22,732,942	0.73	1.88	0.24	0.07	0.66
Total Assets (th)	22,732,942	5,248.89	172,722.05	310.69	89.39	1,170.00
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
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	2,129.18	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

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TABLE 2 (continued)

Panel B: Sample Composition

Year	Obs.	Country	Obs.
2006	1,831,286	Austria	32,274
2007	1,899,418	Belgium	3,93,565
2008	2,192,866	Bulgaria	7,19,171
2009	2,307,736	Croatia	5,23,413
2010	2,183,590	Czech Republic	6,82,728
2011	2,262,901	Denmark	91,811
2012	2,465,016	Estonia	2,57,468
2013	2,562,276	Finland	5,56,598
2014	2,537,888	France	33,23,618
2015	2,489,965	Germany	1,93,199
		Hungary	11,82,695
		Iceland	23,914
		Ireland	37,717
		Italy	32,63,695
		Latvia	11,673
		Luxembourg	4,764
		Malta	292
		Netherlands	23,098
		Norway	5,33,931
		Poland	1,68,315
		Portugal	12,66,939
		Romania	21,28,818
		Slovak Republic	3,70,731
		Slovenia	2,19,608
		Spain	48,57,042
		Sweden	14,25,517
		Switzerland	1,959
		United Kingdom	4,38,389
Total			2,27,32,942

Panel A of this table presents summary statistics for all variables used in the main analyses. 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. Macroeconomic variables that are used throughout the different analyses are displayed with country-years as the unit of observation. Panel B presents the distribution of our final sample by sample period year and by country. Our main sample consists of 2,27,32,942 firm-year observations from 28 European countries from 2006 to 2015. All variables are defined in Appendix A.

IV. EMPIRICAL APPROACH AND RESULTS

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:

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

where *CIT* refers to the statutory corporate income tax rate. The dependent variable, *Exports*, is the amount of exports originating from a given country-industry in the current year. We identify industries using two-digit Nomenclature of Economic Activities (NACE) Revision (Rev.) 2 codes.[13] We take the natural logarithm of exports because exports are

[13] Using two-digit NACE codes allows us to match data from the WIOD. The NACE industry classification for European markets is analogous to the North American Industry Classification System (NAICS) or SIC classifications in the U.S.

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TABLE 3

Domestic Corporate Tax Changes and Exports and Foreign Subsidiary Investment

Panel A: Exports

	(1)	(2)	(3)	(4)	(5)
	Δln(Exports)				
	Global Country Sample			**EEA Country Sample**	
ΔCIT Domestic	−0.216***	−0.219**	−0.248**	−0.226**	−0.247**
	(−2.58)	(−2.45)	(−2.25)	(−2.02)	(−1.98)
ΔGDP Total Domestic	0.009***	0.009***	0.009***	−0.005	−0.005
	(7.71)	(7.65)	(7.87)	(−1.63)	(−1.60)
ΔGDP Capita Domestic	0.913***	0.916***	0.920***	0.520***	0.515***
	(12.76)	(12.82)	(12.77)	(5.22)	(4.98)
ΔVAT Domestic				−0.044	0.098
				(−0.05)	(0.10)
Obs.	24,161	24,161	24,161	16,692	16,692
Adjusted R^2	0.053	0.061	0.062	0.052	0.053
Macro Controls	No	No	Yes	No	Yes
Country FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	—	—	—	—
Industry-Year FE	No	Yes	Yes	Yes	Yes

Panel B: Subsidiary Investment

	ΔSub. Investment				
	Global Country Sample			**EEA Country Sample**	
ΔCIT Parent	−0.084***	−0.040***	−0.035***	−0.032***	−0.024***
	(−10.49)	(−5.00)	(−4.33)	(−3.47)	(−2.58)
ΔCIT Domestic	−0.056***				
	(−7.30)				
ΔGDP Total Domestic	0.002***				
	(39.28)				
ΔGDP Capita Domestic	0.051***				
	(24.73)				
ΔGDP Total Parent			0.000**		0.000**
			(2.35)		(2.31)
ΔGDP 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
Adjusted R^2	0.007	0.015	0.015	0.014	0.014
Parent Country FE	Yes	Yes	Yes	Yes	Yes
Country-Year FE	No	Yes	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes	Yes	Yes

***, **, * Denote statistical significance at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively.

This table presents the results of OLS regressions of Equation (3) in Panel A and Equation (4) in Panel B. Equation (3) models changes in country-industry exports as a function of domestic corporate income tax rate changes. Equation (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 WIOD. We multiply the logged dependent variable by 100 to ease interpretation of the estimated coefficients. In Panel A, additional macroeconomic controls include foreign direct investment inflows and outflows (in percent 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.

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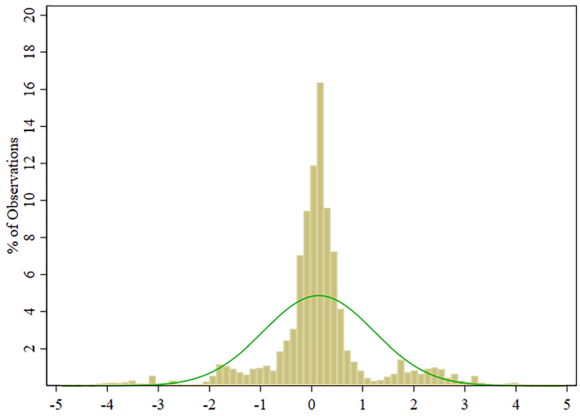
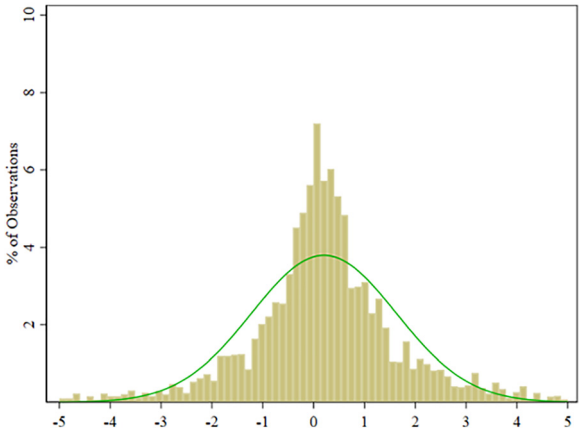
FIGURE 1
Distribution of Tax-Competition Measures

Panel A: Distribution of Changes in *ImportCompTax*



Panel B: Distribution of Changes in *PeerCompTax*



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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).[14]

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, Equation (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 Equation (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 specification reported in column (5) suggest that a one-standard-deviation

[14] 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.

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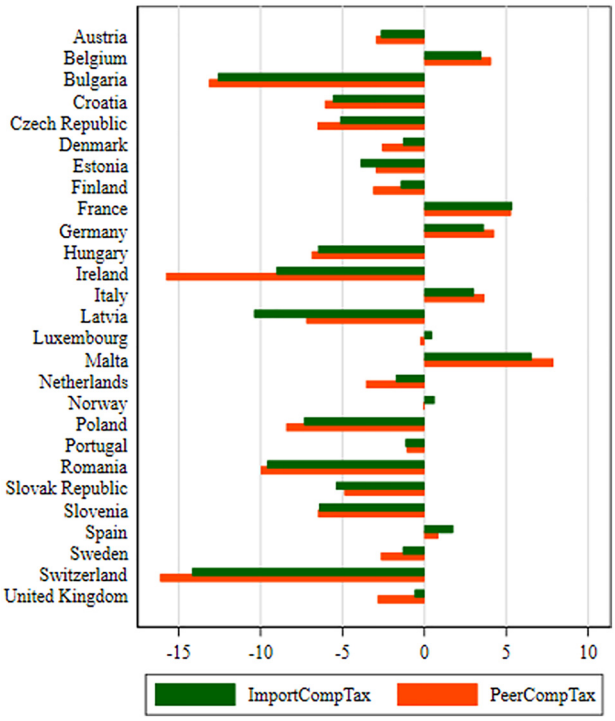
FIGURE 1 (continued)
Panel C: Means of Tax Competition Measures by Country



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.
(The full-color version is available online.)

decrease in the change in the corporate income tax rate of 1.20, equal to a bit less than 1/10th of the Tax Cuts and Jobs Act rate reduction, increases exports from a country-industry by 0.3 percent (t-statistics of −1.98).[15] 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 so, 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. The dependent variable, Δ*Subsidiary Investment*, is the subsidiary's annual change in fixed tangible assets as a percentage of lagged total assets in a given year.[16] The main independent variable of interest 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. Equation (4) also includes industry-year fixed effects to control for 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

[15] $e^{(-1.20/100 \times -0.247)} - 1 = 0.003$.
[16] Following prior work (e.g., Bethmann, Jacob, and Müller 2018 and Jacob, Michaely, and Müller 2019), we do not take the natural logarithm of subsidiary investment because the variable can take negative values and is not heavily skewed.

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cluster standard errors at the level of the subsidiaries' parent due to potential serial dependence within the same multinational firm over time.

Table 3, Panel B presents the result of estimating Equation (4). 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 percent of total assets, equivalent to a 14.6 percent 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.

Exposure to Tax Competition and the Domestic Competitive Environment

Having established that tax rate changes relate to exporting and investment in 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:

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

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) and revenues less labor expense, both divided by revenues, labeled *EBITDA Margin* and *Labor Margin,* respectively.

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, we follow the approach of De Loecker and Warzynski (2012) and De Loecker et al. (2020) to construct *Markups*, 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, 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.[17] 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 Equation (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 and, especially, via the import-competition channel, reduce affected firms' margins and markups, suggesting reduced market power due to increased competition.[18]

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 exposure to tax competition affects domestic employment levels. To do so, we estimate the following firm-level OLS regression:

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

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

[18] Note that we exclude control variables from Equation (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 2009). In untabulated results, we find that including these controls causes 5 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).

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TABLE 4

Tax Competition and Domestic Product-Market Competition

Panel A: Firm-Level

	(1)	(2)	(3)	(4)	(5)	(6)
	ΔEBITDA Margin			*ΔLabor Margin*		
ΔImpCompTax	−0.247**		−0.256**	−0.090*		−0.092*
	(−2.43)		(−2.50)	(−1.73)		(−1.75)
ΔPeerCompTax		−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
Adjusted R^2	0.052	0.024	0.003	0.008	0.008	0.008
Controls	No	No	No	No	No	No
Country-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Panel B: Industry-Level

	ΔMarkups (De Loecker et al. 2020)			*ΔMarkups (CompNET)*		
ΔImpCompTax	−0.149**		−0.146**	−2.274**		−2.299**
	(−2.13)		(−2.08)	(−2.09)		(−2.11)
ΔPeerCompTax		−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
Adjusted R2	0.813	0.813	0.813	0.014	0.015	0.017
Controls	No	No	No	No	No	No
Country-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes	Yes	Yes	Yes

***, **, * Denote statistical significance at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively.
This table presents the results of OLS regressions of Equation (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)–(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)–(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)–(3), the dependent variable is the change in average markups constructed using our main sample, closely following De Loecker et al. 2020. Specifically, we use their data on NAICS two-digit output productivity as an input measure. Markups are weighted by individual firms' number of employees to construct average markups at the industry level. In columns (4) and (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 are 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.

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, Chaudhuri, and McLaren 2010).[19]

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, *Import Penetration*; and the market share of foreign-owned

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

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subsidiaries in the country-industry, *MNE Presence*.[20] 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. 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.[21]

Equation (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; Kim and Olbert 2022). Importantly, the country-year fixed effects also control for domestic tax policy. Consequently, Equation (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 that this steel shortage affected car manufacturing employment in France, and France does not adjust its corporate tax 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.

Table 5 presents the results of estimating Equation (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 0.45 percent (t-statistic of −2.05).[22] This result is consistent with managers reducing employment in response to increases in exposure to tax competition via the import-competition channel. The results also suggest that a one-standard-deviation increase in the change in *PeerCompTax* decreases affected firms' total labor expense by about 0.1 percent (t-statistic of −2.80).[23] This result is consistent with managers reducing employment in response to increases in exposure to tax competition via the multinational presence channel.

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 on 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 domestic-only firms' overall employment levels.

[20] Tax haven countries include European countries that offer preferential tax regimes and are considered noncooperative (Bennedsen and Zeume 2018; De Simone and Olbert 2022). The list of noncooperative 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.

[21] This clustering, although 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.

[22] Although this effect could seem small at face value, even small changes in employment levels have important managerial and macroeconomic implications. For comparison, Fuest, Peichl, and Siegloch (2018) find that a 1 percent increase in the local tax rate associates with a 0.39 percent decrease in wages.

[23] 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.

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TABLE 5

Tax Competition and Domestic Firms' Employment

	(1)	(2)	(3)	(4)	(5)
			Δln(Labor Expense)		
	Pooled Sample			**Non-MNEs**	**MNEs**
ΔImpCompTax	−0.425**		−0.416**	−0.435**	−0.189
	(−2.14)		(−2.05)	(−2.07)	(−1.13)
ΔPeerCompTax		−0.057***	−0.055***	−0.056***	−0.037
		(−2.87)	(−2.80)	(−2.82)	(−0.93)
Δln(Total Assets) (*t*−1)	0.147***	0.147***	0.147***	0.147***	0.157***
	(49.99)	(49.61)	(49.62)	(48.06)	(49.25)
Δln(Cash) (*t*−1)	0.007***	0.007***	0.007***	0.007***	0.002***
	(14.82)	(14.73)	(14.73)	(15.08)	(5.18)
Δln(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
Adjusted R^2	0.052	0.052	0.052	0.052	0.051
Country-Year FE	Yes	Yes	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes	Yes	Yes

***, **, * Denote statistical significance at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively.
This table presents the results of OLS regressions of Equation (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.

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 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 measure product differentiation at the country-industry level. Within each two-digit NACE industry, Eurostat assigns distinct products four-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 fewer 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 two-digit NACE industry to measure product differentiation (*Product Differentiation*).

[24] For example, Shaked and Sutton (1982); Tirole (1988); Sutton (1991); Hombert and Matray (2018); and Kim et al. (2021). Glaeser and Landsman (2021) find that firms release patent disclosures to signal their product-market advantages and discourage product-market competition.
[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, and C-30.9 Manufacture of transport equipment n.e.c.

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TABLE 6

Tax Competition and Employment—Cross-Sectional Differences in Firm Responses

Panel A: Cross-Sectional Differences Based on *Product Differentiation*

	(1)	(2)	(3)	(4)
	Δln(Labor Expense)			
Cross-Sectional Split Based on:	***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
Adjusted R^2	0.056	0.051	0.056	0.051

Panel B: Cross-Sectional Differences Based on *Capital-Labor Complementarity*

	Δln(Labor Expense)			
Cross-Sectional Split Based on:	***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	11,271,264	11,250,936
Adjusted R^2	0.061	0.046	0.061	0.046
Controls	Yes	Yes	Yes	Yes
Country-Year FE	Yes	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes	Yes

***, **, * Denote statistical significance at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively.
This table presents the results of OLS regressions of Equation (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 two-digit NACE Rev. 2 industry according to the Eurostat International Trade in Goods database. Sample splits are based on 75th versus 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 Vossebürger 2022). Sample splits are based on median splits, i.e., "High" indicates that firm-years are above the 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. Sample descriptive characteristics are found in Table 2. t-statistics are reported in parentheses.
All variables are as defined in Appendix A.

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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.

We also consider how the degree to which capital and labor are complements moderates managers' employment responses to changes in exposure to tax competition. When capital and labor are more complementary, managers cannot expand capital investment in response to changes in product-market competition without also expanding employment. 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. Consequently, employment at firms where capital and employment are more complementary should be less sensitive to changes in exposure to tax competition. We measure *Capital-Labor Complementarity* following Jacob and Vossebürger (2022) as the correlation between fixed tangible capital and employment estimated by within country-industry regressions of firms' fixed tangible capital on the number of employees.

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).[28]

Evidence from a Single-Country Changes-in-Changes Design

A potential concern with our main results 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 U.K. began aggressively cutting its corporate tax rate to improve the competitive position of U.K. firms (Hoopes et al. 2022). In contrast, Germany did not alter its corporate tax rate. We examine how employment at German firms exposed to U.K. tax competition changed after 2009. To do so, we estimate the following OLS regression for sample German firms from 2006 to 2015:

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

where *Post UK Tax Cuts* is an indicator that takes the value of 1 beginning when the U.K. 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 U.K. and to U.K.-owned peer firms in Germany.

Table 7 reports the results of estimating Equation (7). We find consistent evidence that managers of firms more exposed to competition from U.K.-owned peer firms and import competition originating from the U.K. relatively reduced their firms' employment levels after the U.K. 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 U.K. import (peer) competition in 2009 relatively reduced their employment levels by approximately 0.54 percent (0.74 percent) after the U.K. 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 2, suggest

[27] We choose the highest quartile because the number of products across two-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.

[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 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*).

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TABLE 7

Single-Country Setting—Evidence from Changes-in-Changes Analyses

	(1)	(2)	(3)	(4)
	Δln(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
Adjusted R^2	0.004	0.004	0.004	0.017
Controls	No	No	No	Yes
Country-Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

***, **, * Denote statistical significance at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively.
This table presents the results of OLS regressions of Equation (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.

that managers did not adjust employment levels based on *UK Import Competition* and *UK Peer Competition* prior to the U.K. tax reform, consistent with the parallel trends assumption.

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* is 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* overinterpret this result, we note that it 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.

Aggregate Effects of Exposure to Tax Competition

Finally, we examine whether countries with decreasing tax rates have relatively more employment at the end of our sample period. 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).

Figure 3 plots binned averages of logged employment in 2015 against the change in a country's corporate income tax rate from 2006 to 2015 after residualizing both against the country's GDP, inflation, personal income tax rate, and average firm profitability. 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 1-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

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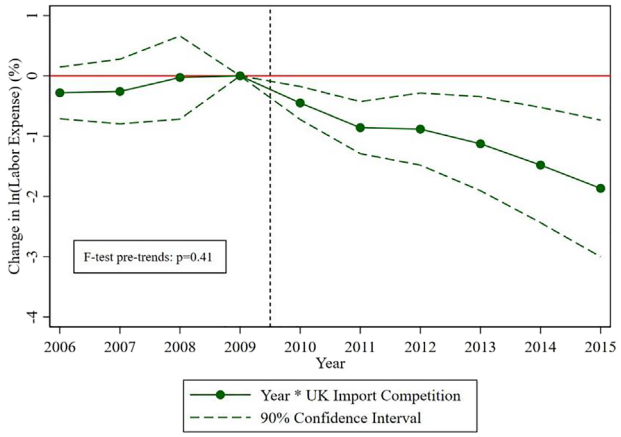
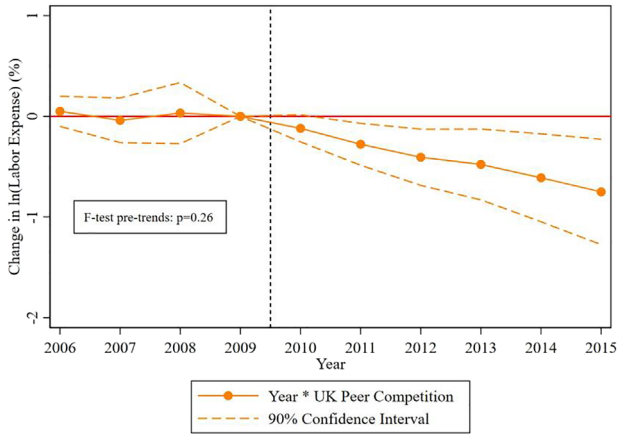
FIGURE 2

Single-Country Setting—Evidence from Changes-in-Changes Analyses

Panel A: U.K. Tax Rates Cuts and Differential Exposure of German Firms to *UK Import Competition*



Panel B: U.K. Tax Rates Cuts and Differential Exposure of German Firms to *UK Peer Competition*



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), where 2009 is the omitted baseline year. The dashed lines report 90 percent confidence intervals for the estimates. 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 0. 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.
(The full-color version is available online.)

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.

Robustness Tests

Table 9 reports the results of several robustness tests. Column (1) reports results excluding control variables. We find similar results, suggesting that our results are not driven by our choice of control variables. In column (2), we

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TABLE 8

Tax Competition and Employment—Firm Responses Conditional on a Country's Position in Tax Competition

	(1)	(2)	(3)
		Δln(Labor Expense)	
$\Delta ImpCompTax \times ImpCompTax > 0$	−0.611*		−0.612*
	(−1.70)		(−1.69)
$\Delta ImpCompTax \times ImpCompTax < 0$	0.323		0.350
	(0.97)		(1.01)
$\Delta PeerCompTax \times PeerCompTax > 0$		−0.086***	−0.084***
		(−3.12)	(−3.08)
$\Delta PeerCompTax \times PeerCompTax < 0$		0.057	0.056
		(1.46)	(1.43)
Obs.	22,522,200	22,522,200	22,522,200
Adjusted R^2	0.052	0.052	0.052
Controls	Yes	Yes	Yes
Country-Year FE	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes

***, **, * Denote statistical significance at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively.
This table presents the results of OLS regressions of Equation (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 1 if a firm's country-industry has a negative value for 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.

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 that omitted variables that vary at the country-industry-year level and affect labor outcomes drive our results. Column (3) reports results after including two alternative measures of exposure to tax competition constructed using personal, instead of corporate, income tax rates. The coefficients on these measures are insignificant, and our main results remain unchanged, suggesting that firms' employment does not respond to personal income tax competition.[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 percent 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.

In Panel B, column (1), we exclude tiny firms that switch from one to two employees and *vice versa* and find that our inferences remain unchanged. 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 within two years before

[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, Marion, Muehlegger, and Slemrod 2016; Armstrong et al. 2019a).

[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 Equation (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, if anything, greater at the aggregate country-industry level.

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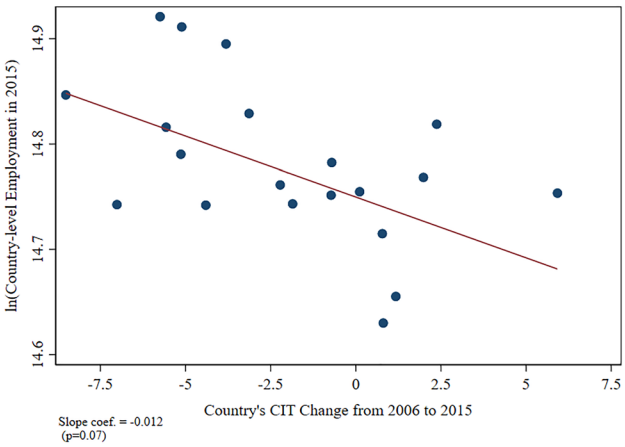
FIGURE 3
Domestic Tax Cuts and Domestic Employment



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 (2015) against the change in their corporate income tax rate over the sample period (2006–2015). We use total employment from the administrative data provided by EU KLEMS. Country-level employment as of 2015 and the change in corporate income tax rates from 2006 to 2015 are residualized against a country's GDP, inflation, personal income tax rate, and average firm profitability.
(The full-color version is available online.)

TABLE 9
Robustness Tests

Panel A: Alternative Specifications

	(1)	(2)	(3)	(4)	(5)
	Δln(Labor Expense)				
	Baseline	**Additional Controls**		***PeerCompTax***	
	Without Controls	**Labor Cost Index**	**PIT Competition**	**Using Average Tax Rates in MNE Group**	
ΔImpCompTax	−0.481**	−0.483**	−0.467**	−0.424**	−0.415**
	(−2.05)	(−2.23)	(−2.26)	(−2.07)	(−2.05)
ΔPeerCompTax	−0.047**	−0.060***	−0.058***		−0.054***
	(−2.31)	(−2.77)	(−2.81)		(−2.75)
ΔImpCompPIT			0.007		
			(0.47)		
ΔPeerCompPIT			0.124		
			(1.51)		
ΔPeerCompTax (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
Adjusted R^2	0.024	0.053	0.052	0.052	0.052
Controls	No	Yes	Yes	Yes	Yes
Country-Year FE	Yes	Yes	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes	Yes	Yes

(continued on next page)

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TABLE 9 (continued)

Panel B: Alternative Sample Compositions

	(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
Adjusted R^2	0.053	0.068	0.048	0.052	0.052
Controls	Yes	Yes	Yes	Yes	Yes
Country-Year FE	Yes	Yes	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes	Yes	Yes

***, **, * Denote statistical significance at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively.
This table presents the results of OLS regressions of variations of Equation (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 with an alternative measure calculated using the average statutory corporate income tax rates faced by the 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)–(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 U.K. 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.

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 percent 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 industries do not drive our results.

Tax havens play an important role in tax competition. Consequently, we explore the importance of tax havens to our results.[31] Specifically, in Table 10, we report the results of re-estimating Equation (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)–(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, although relevant to tax competition, does not appear to drive our results.

V. 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, we find that 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

[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.

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TABLE 10

Robustness of Main Results to Excluding Tax Havens

	(1)	(2)	(3)	(4)	(5)	(6)
			Δln(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
ΔImpCompTax (excl. Tax Haven Imports)	−0.619** (−2.22)					
ΔImpCompTax		−0.436** (−2.11)	−0.438** (−2.14)	−0.437** (−2.12)	−0.429** (−2.10)	−0.438** (−2.11)
ΔPeerCompTax	−0.059*** (−2.95)	−0.058*** (−2.88)	−0.058*** (−2.93)	−0.057*** (−2.88)	−0.058*** (−2.94)	−0.059*** (−2.96)
ΔLog. Total Assets (*t*−1)	0.143*** (48.27)	0.144*** (48.15)	0.143*** (48.04)	0.144*** (48.16)	0.143*** (48.23)	0.143*** (47.58)
ΔLog. Cash (*t*−1)	0.006*** (14.65)	0.006*** (14.65)	0.006*** (14.67)	0.006*** (14.65)	0.006*** (14.65)	0.007*** (14.81)
ΔLog. Revenue (*t*−1)	0.077*** (18.00)	0.077*** (17.96)	0.077*** (17.92)	0.077*** (17.97)	0.077*** (17.98)	0.078*** (17.73)
Import Penetration (*t*−1)	0.183*** (2.78)	0.182*** (2.75)	0.181*** (2.77)	0.182*** (2.75)	0.181*** (2.76)	0.185*** (2.79)
MNE Presence (*t*−1)	−0.012 (−1.33)	−0.012 (−1.32)	−0.012 (−1.31)	−0.012 (−1.34)	−0.012 (−1.29)	−0.013 (−1.34)
HHI (*t*−1)	−0.393 (−0.31)	−0.405 (−0.31)	−0.428 (−0.33)	−0.364 (−0.28)	−0.467 (−0.36)	−0.457 (−0.35)
Tax Haven MNEs (%) (*t*−1)	−0.050 (−1.30)	−0.055 (−1.36)	−0.048 (−1.23)	−0.051 (−1.28)	−0.055 (−1.38)	−0.027 (−0.62)
Obs.	2,25,23,360	2,24,58,418	2,23,95,401	2,24,73,140	2,24,92,756	2,20,82,927
Adjusted R^2	0.056	0.056	0.056	0.056	0.056	0.056
Country-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes	Yes	Yes	Yes

***, **, * Denote statistical significance at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively.
This table presents the results of OLS regressions of variations of Equation (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)–(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.

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.

REFERENCES

Acemoglu, D., D. Autor, D. Dorn, G. H. Hanson, and B. Price. 2016. Import competition and the great US employment sag of the 2000s. *Journal of Labor Economics* 34 (S1): S141–S198. https://doi.org/10.1086/682384

Aghion, P., N. Bloom, R. Blundell, R. Griffith, and P. Howitt. 2005. Competition and innovation: An inverted-U relationship. *The Quarterly Journal of Economics* 120 (2): 701–728. http://dx.doi.org/10.1162/0033553053970214

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Almeida, H., and M. Campello. 2007. Financial constraints, asset tangibility, and corporate investment. *Review of Financial Studies* 20 (5): 1429–1460. https://doi.org/10.1093/rfs/hhm019

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

Armstrong, C. S., S. Glaeser, and J. D. Kepler. 2019b. Strategic reactions in corporate tax avoidance. *Journal of Accounting and Economics* 68 (1): 101232–101226. https://doi.org/10.1016/j.jacceco.2019.03.003

Armstrong, C. S., S. Glaeser, S. Huang, and D. J. Taylor. 2019a. The economics of managerial taxes and corporate risk-taking. *The Accounting Review* 94 (1): 1–24. https://doi.org/10.2308/accr-52193

Artuç, E., S. Chaudhuri, and J. McLaren. 2010. Trade shocks and labor adjustment: A structural empirical approach. *American Economic Review* 100 (3): 1008–1045. https://doi.org/10.1257/aer.100.3.1008

Autor, D. H., D. Dorn, and G. H. Hanson. 2013. The China syndrome: Local labor market effects of import competition in the United States. *American Economic Review* 103 (6): 2121–2168. https://doi.org/10.1257/aer.103.6.2121

Avi-Yonah, R. S. 2000. Globalization, tax competition, and the fiscal crisis of the welfare state. *Harvard Law Review* 113 (7): 1573–1676. https://doi.org/10.2307/1342445

Avi-Yonah, R. S. 2008. Globalization and tax competition: Implications for developing countries. In *Taxation and Latin American Integration*, edited by V. Tanzi, A. Barreix, and L. Villela, 173–194. Cambridge, MA: Harvard University Press.

Avi-Yonah, R. S. 2012. Tax competition and the trend toward territoriality (University of Michigan Public Law Research Paper 297).

Avi-Yonah, R. S, and H. Xu. 2017. Evaluating BEPS. *Erasmus L. Rev* 10: 3. https://doi.org/10.5553/ELR.000080

Beaver, W. H., S. Cascino, M. Correia, and M. F. McNichols. 2019. Group affiliation and default prediction. *Management Science* 65 (8): 3559–3584. https://doi.org/10.1287/mnsc.2018.3128

Bennedsen, M., and S. Zeume. 2018. Corporate tax havens and transparency. *The Review of Financial Studies* 31 (4): 1221–1264. https://doi.org/10.1093/rfs/hhx122

Bernini, M., and T. Treibich. 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. https://doi.org/10.1093/icc/dtw029

Bethmann, I., M. Jacob, and M. A. Müller. 2018. Tax loss carrybacks: Investment stimulus versus misallocation. *The Accounting Review* 93 (4): 101–125. https://doi.org/10.2308/accr-51956

Beuselinck, C., S. Cascino, M. Deloof, and A. Vanstraelen. 2019. Earnings management within multinational corporations. *The Accounting Review* 94 (4): 45–76. https://doi.org/10.2308/accr-52274

Bird, A., A. Edwards, and T. G. Ruchti. 2018. Taxes and peer effects. *The Accounting Review* 93 (5): 97–117. https://doi.org/10.2308/accr-52004

Bird, A., A. Edwards, and T. Shevlin. 2017. Does U.S. foreign earnings lockout advantage foreign acquirers? *Journal of Accounting and Economics* 64 (1): 150–166. https://doi.org/10.1016/j.jacceco.2017.06.004

Boutin, X., G. Cestone, C. Fumagalli, G. Pica, and N. Serrano-Velarde. 2013. The deep-pocket effect of internal capital markets. *Journal of Financial Economics* 109 (1): 122–145. https://doi.org/10.1016/j.jfineco.2013.02.003

Cen, L., E. L. Maydew, L. Zhang, and L. Zuo. 2020. Tax planning diffusion, real effects, and sharing of benefits (Kenan Institute of Private Enterprise Research Paper 18-15).

Chen, S., L. De Simone, M. Hanlon, and R. Lester. 2022. The effect of innovation box regimes on investment and employment activity. (Working paper). https://ssrn.com/abstract=3486428

Chow, T., S. Huang, K. J. Klassen, and J. Ng. 2018. The influence of corporate income taxes on investment location: Evidence from corporate headquarters relocations. *Management Science* 68 (2): 1404–1425. https://pubsonline.informs.org/doi/abs/10.1287/mnsc.2020.3906?casa_token=m2sMckGCADsAAAAA:OYQ8b9N_TNVtAttIBYcPq7QbkIV4Eaclsl6leEQL4QrqTFXugq_pGH2KWE7RjF4V-XIVB88c

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*. Brussels, Belgium: Office for Official Publications of the European Communities.

CompNET. 2021. User guide for the 8th vintage CompNet dataset. https://www.comp-net.org/fileadmin/_compnet/user_upload/2021-11-04%208th%20Vintage%20User%20Guide%20Final.pdf

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

De Loecker, J., and F. Warzynski. 2012. Markups and firm-level export status. *American Economic Review* 102 (6): 2437–2471. https://doi.org/10.1257/aer.102.6.2437

De Loecker, J., J. Eeckhout, and G. Unger. 2020. The rise of market power and the macroeconomic implications. *The Quarterly Journal of Economics* 135 (2): 561–644. https://doi.org/10.1093/qje/qjz041

De Simone, L., and M. Olbert. 2022. Real effects of private country-by-country disclosure. *The Accounting Review* 97 (6): 201–232. https://doi.org/10.2308/TAR-2020-0714

Dehejia, V. H., and P. Genschel. 1999. Tax competition in the European Union. *Politics & Society* 27 (3): 403–430. https://doi.org/10.1177/0032329299027003005

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American Accounting Association

Devereux, M. P., and R. Griffith. 1998. The taxation of discrete investment choices (IFS Working Paper No. W98/16). https://www.econstor.eu/handle/10419/90851

Devereux, M. P., and S. Loretz. 2013. What do we know about corporate tax competition? *National Tax Journal* 66 (3): 745–773. https://doi.org/10.17310/ntj.2013.3.08

Devereux, M. P., B. Lockwood, and M. Redoano. 2008. Do countries compete over corporate tax rates? *Journal of Public Economics* 92 (5-6): 1210–1235. https://doi.org/10.1016/j.jpubeco.2007.09.005

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

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

De Vito, A., M. Jacob, and G. Xu. 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. *The Economic Journal* 90 (357): 95–106. https://doi.org/10.2307/2231658

Djankov, S., T. Ganser, C. McLiesh, R. Ramalho, and A. Shleifer. 2010. The effect of corporate taxes on investment and entrepreneurship. *American Economic Journal: Microeconomics* 2 (3): 31–64. https://www.jstor.org/stable/25760308

Dobbins, L., and M. Jacob. 2016. Do corporate tax cuts increase investments? *Accounting and Business Research* 46 (7): 731–759. https://doi.org/10.1080/00014788.2016.1192985

Doidge, C., and A. Dyck. 2015. Taxes and corporate policies: Evidence from a quasi natural experiment. *The Journal of Finance* 70 (1): 45–89. https://doi.org/10.1111/jofi.12101

Donohoe, M. P., H. Jang, and P. Lisowsky. 2022. Competitive externalities of tax cuts. *Journal of Accounting Research* 60 (1): 201–259. https://doi.org/10.1111/1475-679X.12403

Dyreng, S., and R. Hills. 2021. Foreign earnings repatriations and domestic employment (Working paper). https://ssrn.com/abstract=3977297

Edwards, A., C. Schwab, and T. Shevlin. 2016. Financial constraints and cash tax savings. *The Accounting Review* 91 (3): 859–881. https://doi.org/10.2308/accr-51282

Federici, D., V. Parisi, and F. Ferrante. 2020. Heterogeneous firms, corporate taxes and export behavior: A firm-level investigation for Italy. *Economic Modelling* 88 (C): 98–112. https://doi.org/10.1016/j.econmod.2019.09.012

Flach, L., M. Irlacher, and F. Unger. 2021. Corporate taxes and multi-product exporters: Theory and evidence from trade dynamics. *Journal of International Economics* 132: 103515. https://doi.org/10.1016/j.jinteco.2021.103515

Frésard, L., and P. Valta. 2016. How does corporate investment respond to increased entry threat? *The Review of Corporate Finance Studies* 5 (1): 1–35. https://doi.org/10.1093/rcfs/cfv015

Fuest, C., A. Peichl, and S. Siegloch. 2018. Do higher corporate taxes reduce wages? Micro evidence from Germany. *American Economic Review* 108 (2): 393–418. https://doi.org/10.1257/aer.20130570

Gaertner, F. B., J. L. Hoopes, and B. M. Williams. 2020. Making only America great? Non-US market reactions to US tax reform. *Management Science* 66 (2): 687–697. https://doi.org/10.1287/mnsc.2019.3451

Gaspar, J., and M. Massa. 2006. Idiosyncratic volatility and product market competition. *The Journal of Business* 79 (6): 3125–3152. https://doi.org/10.1086/505251

Glaeser, C. K., S. Glaeser, and E. Labro. 2022. Proximity and the management of innovation. *Management Science* (forthcoming). https://doi.org/10.1287/mnsc.2022.4469

Glaeser, S., and W. R. Guay. 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. https://doi.org/10.1016/j.jacceco.2017.08.003

Glaeser, S. A., and W. R. Landsman. 2021. Deterrent disclosure. *The Accounting Review* 96 (5): 291–315. https://doi.org/10.2308/TAR-2019-1050

Glaeser, S., and J. D. Omartian. 2022. Public firm presence, financial reporting, and the decline of US manufacturing. *Journal of Accounting Research* 60 (3): 1085–1130. https://doi.org/10.1111/1475-679X.12411

Gomez-Cram, R., and M. Olbert. 2023. Measuring the expected effects of the global tax reform. (Working paper). https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4052575

Graham, J. R., M. Hanlon, and T. Shevlin. 2011. Real effects of accounting rule: Evidence from multinational firms' investment location and profit repatriation decisions. *Journal of Accounting Research* 49 (1): 137–185. https://doi.org/10.1111/j.1475-679X.2010.00395.x

Graham, J. R., M. Hanlon, T. Shevlin, and N. Shroff. 2017. Tax rates and corporate decision-making. *The Review of Financial Studies* 30 (9): 3128–3175. https://doi.org/10.1093/rfs/hhx037

Hanlon, M., and S. Heitzman. 2010. A review of tax research. *Journal of Accounting and Economics* 50 (2-3): 127–178. https://doi.org/10.1016/j.jacceco.2010.09.002

Hanlon, M., R. Lester, and R. Verdi. 2015. The effect of repatriation tax costs on US multinational investment. *Journal of Financial Economics* 116 (1): 179–196. https://doi.org/10.1016/j.jfineco.2014.12.004

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Heider, F., and A. Ljungqvist. 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. https://doi.org/10.1016/j.jfineco.2015.01.004

Holmes, T. J., and J. A. Schmitz. 2010. Competition and productivity: A review of evidence. *Annual Review of Economics* 2 (1): 619–642. https://doi.org/10.1146/annurev.economics.102308.124407

Hombert, J., and A. Matray. 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., D. Klein, R. Lester, and M. Olbert. 2022. Corporate tax policy in developed countries and economic activity in Africa (Working paper). https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4254414

Jacob, M. 2022. Real effects of corporate taxation: a review. *European Accounting Review* 31 (1): 269–296. https://doi.org/10.1080/09638180.2021.1934055

Jacob, M., and R. Vossebürger. 2022. The role of personal income taxes in corporate investment decisions. *Journal of Corporate Finance* 77: 102275. https://doi.org/10.1016/j.jcorpfin.2022.102275

Jacob, M., R. Michaely, and M. A. Müller. 2019. Consumption taxes and corporate investment. *The Review of Financial Studies* 32 (8): 3144–3182. https://doi.org/10.1093/rfs/hhy132

Jung, B., W.-J. Lee, and D. P. Weber. 2014. Financial reporting quality and labor investment efficiency. *Contemporary Accounting Research* 31 (4): 1047–1076. https://doi.org/10.1111/1911-3846.12053

Kalemli-Özcan, Ş., B. E. Sørensen, C. Villegas-Sanchez, V. Volosovych, and S. Yeşiltaş. 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., and S. Tice. 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. https://doi.org/10.1093/rfs/13.3.749

Kim, J., and M. Olbert. 2022. How does private firm disclosure affect demand for public firm equity? Evidence from the global equity market. *Journal of Accounting and Economics* 74 (2-3): 101545. https://doi.org/10.1016/j.jacceco.2022.101545

Kim, J., M. Nessa, and R. J. Wilson. 2021. How do reductions in foreign country corporate tax rates affect US domestic manufacturing firms? *The Accounting Review* 96 (3): 287–311. https://doi.org/10.2308/TAR-2018-0568

Kopczuk, W., J. Marion, E. Muehlegger, and J. Slemrod. 2016. Does tax-collection invariance hold? Evasion and the pass-through of state diesel taxes. *American Economic Journal: Economic Policy* 8 (2): 251–286. https://doi.org/10.1257/pol.20140271

Kubick, T. R., D. P. Lynch, M. A. Mayberry, and T. C. Omer. 2015. Product market power and tax avoidance: Market leaders, mimicking strategies, and stock returns. *The Accounting Review* 90 (2): 675–702. https://doi.org/10.2308/accr-50883

Langenmayr, D., and R. Lester. 2018. Taxation and corporate risk-taking. *The Accounting Review* 93 (3): 237–266. https://doi.org/10.2308/accr-51872

Law, K. K. F., and L. F. Mills. 2015. Taxes and financial constraints: Evidence from linguistic cues. *Journal of Accounting Research* 53 (4): 777–819. https://doi.org/10.1111/1475-679X.12081

Lester, R. 2019. Made in the USA? A study of firm responses to domestic production incentives. *Journal of Accounting Research* 57 (4): 1059–1114. https://doi.org/10.1111/1475-679X.12269

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 (2-3): 101451. https://doi.org/10.1016/j.jacceco.2021.101451

Ljungqvist, A., L. Zhang, and L. Zuo. 2017. Sharing risk with the government: How taxes affect corporate risk taking. *Journal of Accounting Research* 55 (3): 669–707. https://doi.org/10.1111/1475-679X.12157

Manova, K. 2013. Credit constraints, heterogeneous firms, and international trade. *The Review of Economic Studies* 80 (2): 711–744. https://doi.org/10.1093/restud/rds036

Mukherjee, A., M. Singh, and A. Žaldokas. 2017. Do corporate taxes hinder innovation? *Journal of Financial Economics* 124 (1): 195–221. https://doi.org/10.1016/j.jfineco.2017.01.004

Nessa, M. L. 2017. Repatriation tax costs and U.S. multinational companies' shareholder payouts. *The Accounting Review* 92 (4): 217–241. https://doi.org/10.2308/accr-51633

OECD. 1998. *Harmful Tax Competition An Emerging Global Issue*. Paris, France: OECD Publishings.

OECD. 2019. *Harmful Tax Practices—2018 Progress Report on Preferential Regimes Inclusive Framework on BEPS: Action 5*. Paris, France: OECD Publishings.

Olbert, M. 2023. The impact of tax shields on bankruptcy risk and resource allocation. (Working paper). https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3467669

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

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., and F. Perez-Sebastian. 2020. Capital-skill complementarity and biased technical change across US sectors. *Journal of Macroeconomics* 66: 103255. https://doi.org/10.1016/j.jmacro.2020.103255

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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. https://doi.org/10.2307/2118329

Shaked, A., and J. Sutton. 1982. Relaxing price competition through product differentiation. *The Review of Economic Studies* 49 (1): 3–13. https://doi.org/10.2307/2297136

Shevlin, T., L. Shivakumar, and O. Urcan. 2019. Macroeconomic effects of corporate tax policy. *Journal of Accounting and Economics* 68 (1): 101233–101222. https://doi.org/10.1016/j.jacceco.2019.03.004

Shroff, N., R. S. Verdi, and G. Yu. 2014. Information environment and the investment decisions of multinational corporations. *The Accounting Review* 89 (2): 759–790. https://doi.org/10.2308/accr-50643

Serrato, J. C. 2019. Unintended consequences of eliminating tax havens (National Bureau of Economic Research Working Paper).

Suárez Serrato, J. C., and O. Zidar. 2016. Who benefits from state corporate tax cuts? A local labor markets approach with heterogeneous firms. *American Economic Review* 106 (9): 2582–2624. https://doi.org/10.1257/aer.20141702

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

Tax Foundation. 2018. Corporate tax rates around the world. https://taxfoundation.org/corporate-tax-rates-around-world-2018/

Timmer, M. P., E. Dietzenbacher, B. Los, R. Stehrer, and G. J. De Vries. 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. https://doi.org/10.1111/roie.12178

Tirole, J. 1988. *The Theory of Industrial Organization*. Cambridge, MA: The MIT Press. https://ideas.repec.org/b/mtp/titles/0262200716.html

von Haldenwang, C., T. Faccio, T. Hentze, T. Mättig, I. J. Mosquera Valderrama, A. Redonda, G. Rigoni, J. Schwab, and R. Vos. 2018. Trade, investment and tax cooperation. *Tax Competition*. T20 Argentina 2018. https://scholarlypublications.universiteitleiden.nl/access/item%3A2952496/view

Williams, B. M. 2018. Multinational tax incentives and offshored US jobs. *The Accounting Review* 93 (5): 293–324. https://doi.org/10.2308/accr-52008

Wilson, J. D. 1999. Theories of tax competition. *National Tax Journal* 52 (2): 269–304. https://doi.org/10.1086/NTJ41789394

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.
ΔSub. Investment	A foreign-owned 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 et al. (2020). We use their data on NAICS two-digit output productivity as an input measure. Markups are weighted by individual firms' number of employees to construct 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 III.
PeerCompTax	Foreign-owned peer firm weighted foreign tax rate differential, as defined in Section III.
Post UK Tax Cuts	Indicator variable equal to 1 for years after 2009.
UK Import Competition	Share of imports from the U.K. in a given German two-digit NACE industry segment in 2009.
UK Peer Competition	Share of U.K.-owned subsidiaries in a given German two-digit NACE industry segment in 2009.

(continued on next page)

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APPENDIX A (continued)

Control Variables	
Cash (th)	A firm's cash and cash equivalent assets in EUR thousands.,
HHI	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	Ratio of net imports to the sum of net imports and domestic production for each two-digit NACE industry segment in a given country.
MNE Presence	Market share of foreign-owned subsidiaries for each two-digit NACE industry segment in a given country.
Revenue (th)	A firm's revenue in EUR thousands.
Tax Haven MNEs (%)	Share of firms that are part of a multinational group with tax haven operations for each two-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 1 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 Vossebürger 2022).
Product Differentiation	The number unique of products and services traded within a two-digit NACE industry segment according to the Eurostat International Trade in Goods database.
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 are from the Eurostat International Trade in Goods database. Markup data are from De Loecker et 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. Macroeconomic variables are from Worldbank Open Data (World Development Indicators).

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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 two-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 (two-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 percent 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 percent to 20 percent. 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 4.3 percent, 12.9 percent, and 5.4 percent 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 percent, 10.2 percent, and 3.0 percent 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 III, 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 III, 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.

TABLE B1

Panel A: Import Competition

	2013			2015		
	Imports (m)	**Import Share (%)**	**CIT**	**Imports (m)**	**Import Share (%)**	**CIT**
Import Partner Country						
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		
	Market Share (m)	**Market Share (%)**	**CIT**	**Market Share (m)**	**Market Share (%)**	**CIT**
Foreign Parent Country						
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

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.

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