Declining Effective Tax Rates of Multinationals: The Hidden Role of Tax Base Reforms

April 2025

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April 7, 2025

Abstract

This paper documents the rise of corporate tax-base narrowing measures in the EU using a novel dataset covering both tax rate and tax base reforms implemented between 2014 and 2022. Our findings indicate a shift away from the 'cut rate − broaden base' approach, as governments increasingly align corporate taxation with industrial policy objectives. We show that EU tax competition exerts downward pressure on high-tax countries, while the likelihood of tax cuts also varies with the political orientation of governments. Using financial accounts from more than 40,000 affiliates, we find that the average effective tax rate of multinational enterprises in the EU has declined more rapidly than the statutory rate and estimate that tax base reforms account for 24% of this decline. The estimated revenue cost of all reforms combined amounts to 3.5% of total corporate tax revenue collected from the sample firms. These revenue losses should be carefully weighed against the anticipated benefits of tax reforms.

1   Introduction

Profit shifting by multinational corporations has attracted increased interest from the media, policy makers and researchers over the last decade. Recent estimates suggest that MNEs shift about 37% of their foreign profits to tax havens globally and that this share has more than doubled since the early 1990s (Wier and Zucman, 2023). This has motivated unprecedented international cooperation in the field of corporate taxation: the reforms implemented under the OECD's Anti-BEPS initiative, the global minimum tax, and reforms enforced by the EU Code of Conduct group were built around the emerging consensus that opportunities for MNEs to shift profits to low-tax countries should be reduced. No consensus was reached, however, on generally limiting international tax competition over real economic activity despite its likely detrimental impact on global corporate tax revenue collection. Research by García-Bernardo et al. (2022) suggests, for example, that only about 5% of the decline of effective tax rates paid by MNEs in the EU between 2005 and 2015 can be explained by profit shifting while 68% can be explained by tax reforms.

In this paper, we argue that corporate tax policy making in the EU has shifted away from the 'cut rate - broaden base' approach. Instead, tax-base narrowing measures have been the most frequently implemented type of reform and their impact on tax revenue collection has likely been substantial. Building on a novel database of tax reforms adopted in the EU between 2014 and 2022, we show that while the average statutory tax rate declined only little, member states adopted more than 250 changes affecting the corporate tax base, of which the majority had a base-narrowing impact. Overall, EU governments have introduced or extended regimes that aim at boosting investment and innovation, mostly through cost-based investment incentives, R&D expense deductions and intellectual property regimes. At the same time, they tightened the conditions under which corporations can carry losses against profits, and implemented measures to prevent tax avoidance and profit shifting.

As we observe variation in reform activity across countries, we analyze the determinants of corporate tax reforms using a logistic regression model. The probabilities of implementing rate cuts and base narrowing reforms are significantly associated with our measures of international tax competition suggesting asymmetric pressure on high-tax countries to align with the EU average. While governments across the political spectrum have contributed to the rise of base-narrowing reforms and also implemented similar types of reforms, we also find that left-wing governments were less likely to implement rate cuts and that their ratio of base-narrowing to base-broadening reforms was more balanced on average.

Finally, we analyze the contribution of tax reforms to the decline in effective tax rates paid by multinational enterprises based on affiliate-level unconsolidated financial accounts from the Orbis database. A simple two-way fixed effects regression suggests that on average one additional base narrowing reform is associated with a decrease in the affiliate-level ETR by 0.38 percentage points, which is equivalent to a 1.75 percent decrease in the statutory rate. We use the regression results to simulate the tax revenue cost of the reforms. We estimate that statutory rate reforms have decreased the EU-wide average ETR by 0.9 percentage points while the net contribution of base reforms is an additional reduction of 0.6 percentage points. Taken together, all corporate tax reforms are associated with a cumulated revenue loss of EUR 16 bn. which amounts to 3.5% of total tax revenue collected from the sample firms over the period.

Overall, our findings suggest a shift in the nature of tax competition toward base-narrowing measures which might be an indication of governments aligning their tax policy with industrial policy goals. At the same time governments might face less public scrutiny when implementing this specific form of pro-business redistribution as the revenue cost of tax base reforms is often less evident. Monitoring all types of base reforms and their interaction with backward-looking effective tax rates can help increase transparency in this regard.

1.1 Related Literature

We make several contributions to the literature. First, we follow the growing literature on backward-looking effective tax rates which are increasingly used as a proxy for the effective tax burden on companies (Bachas *et al.*, 2023; Hugger *et al.*, 2023; Janský, 2023; Tørsløv *et al.*, 2023) and which complement analyses based on forward-looking effective tax rates (Devereux and Griffith, 2003; Spengel *et al.*, 2014; Evers *et al.*, 2015; González Cabral *et al.*, 2023).[1] We extend the results of García-Bernardo *et al.* (2022) who documented the downward trend in effective tax rates in the EU for the period 2005-2015. Our results are also in line with other studies documenting this trend in other countries, such as Dyreng *et al.* (2017) for the United States between 1988 and 2012, and Fuest *et al.* (2022) for OECD countries between 1995 and 2016.

We are the first to establish a direct link between base reforms and trends in backward-looking effective tax rates. The closest study to our paper is that of García-Bernardo *et al.* (2022), who decompose the trend in effective tax rates but without explicitly modeling tax base reforms. Instead, all changes in ETR which they cannot explain by statutory rate changes or profit shifting are attributed to tax base changes. Interestingly, they find that 39% of the decline in effective tax rates can be explained by EU member states cutting statutory tax rates, and about 29% by tax-base narrowing measures. Our results are relatively close at 36% and 24%, respectively, despite using a very different methodology.

Second, we contribute to the debate on the so called "rate-revenue" puzzle. Our analysis shows that EU governments did not adhere to the 'cut rate, broaden base' approach, which was widely adopted by most developed countries in the late 20th century. This is in sharp contrast to Kawano and Slemrod (2016) who documented this approach for OECD countries between 1980 and 2004. Our findings challenge the view that base-broadening measures compensate for rate cuts in the so called rate-revenue puzzle (Devereux *et al.*, 2002). On the contrary, we suggest that over the last nine years, base reforms have accelerated the downward trend in effective tax rates. This finding provides additional support for a more recent literature that provides alternative explanations for why corporate income tax revenues have continued to increase while statutory rate have fallen (Perret *et al.*, 2023; Fuest *et al.*, 2022; de Mooij and Nicodème, 2008).

Finally, our research also relates to the tax competition literature. The decline in corporate tax rates is frequently explained by international tax competition, where governments set tax rates in a non-cooperative way to attract mobile tax bases (Wilson and Wildasin, 2004). The

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[1]Forward-looking or model-based effective tax rates incorporate some tax features that affect the corporate tax base, such as capital allowances or R&D incentives. Backward-looking effective tax rates, in contrast, simply calculate the ratio of taxes paid to financial profits.

continued decline of affiliates' ETRs in the EU and the high number of tax-base narrowing reforms adopted by member states over the last decade support the view of Hebous (2021) that international reforms aimed at reducing "harmful" tax competition have not decreased the general intensity of tax competition. Exploring the potential drivers of tax reforms, we find that governments of all political orientations have contributed to the rise of base-narrowing reforms and that this pattern aligns with tax policies being shaped by international tax competition. However, as pointed out by Leibrecht and Hochgatterer (2010), empirical approaches often cannot effectively isolate the effect of tax competition from other general trends such as common intellectual trends promoted by an international public finance literature, or changes in the political climate such as a weakening of egalitarian values in Western societies.[2] In addition, we observe some variation in reform patterns depending on the political orientation of the government in office. This suggests that the extent to which governments yield to competitive pressures remains a policy choice.

The rest of the paper is organized as follows: Section 2 outlines the novel data we use. Section 3 documents the rise of tax base narrowing measures and analyses its determinants. Section 4 provides evidence on the declining effective tax rates of affiliates in the EU, and presents our analysis of the effect of tax reforms on effective tax rates. Section 5 concludes. Additional tables and figures are available in the Data Appendix.

2   Data

For our analysis, we mainly rely on two datasets. First, we construct our own dataset of corporate tax reforms implemented between 2014 and 2022 to document the EU-wide policy trends. Second, we use a sample of affiliates of multinational enterprises from the Orbis database to analyze the development of backward-looking effective tax rates. The following two sub-sections (2.1 and 2.2) describe each dataset in more detail. We complement our data with information on the political orientation of governments and macroeconomic variables from the Comparative Political Data Set by Armingeon *et al.* (2023).

2.1   A New Database on Corporate Tax Reforms

The data on tax reforms come from the annual Taxation Trends Reports published by the European Commission. For each EU-27 Member State, the reports include a list of the corporate income tax reforms that occurred during the previous year. They include brief descriptions of each measure and the enforcement date. We build our tax reforms database as follows. First, we extract all tax base reforms related to the corporate income tax system from 2014 to 2022. Second, we focus on reforms that can have a relevant impact on the tax base of multinationals' affiliates.[3] Then, we define as "base-broadening" reforms those that

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[2]Indeed, our findings would also be consistent with common intellectual trends or the hypothesis that corporate tax policy is an issue of low political salience negotiated in the arena of "quiet politics" (Culpepper, 2010). A strand of political economy literature suggests that corporate taxation plays a limited role in election debates and is instead primarily negotiated within the sphere of state-business interactions (Bohle and Regan, 2021; Morgan and Ibsen, 2012) — a hypothesis that may be even more applicable to the subfield of tax base reforms.

[3]For example, we leave aside reforms targeting start-ups, specific sectors, or regions. We also drop reforms that we deem negligible such as changing rules for advance tax payments, tax incentives targeting very specific expenses (e.g. for the use of hybrid or electrical vehicles or for sports promotion within the company), and

broaden the definition of taxable profits which, ceteris paribus, should increase the effective tax rate, as opposed to "base-narrowing" reforms, which narrow the corporate tax base, e.g. exemptions or deductions. Finally, we classify the tax base reforms into nine distinct categories:

1. Anti-tax avoidance reforms

2. Cost-based investment regimes

3. Research and Development regimes

4. Intellectual property regimes

5. Allowance for corporate equity regimes

6. Loss carry regimes

7. Rules on capital gains and dividends

8. Withholding taxes on dividends, interests, and royalties

9. Other reforms

We complement our measure of tax base reforms with the statutory corporate income tax rates provided by the European Commission (2024). Appendix A.1 includes additional information on our database. It provides more details on our methodology to build the new database. Table A1 includes a short description and a concrete example for each category. Finally, for the most frequent reform categories, we discuss the content of some reforms and the countries that have implemented them.

2.2 Backward-Looking Effective Tax Rates

The data on effective tax rates of affiliates come from the Orbis database. Orbis is a rich private company dataset with information on more than 550 million entities.[4] It provides an extensive coverage of affiliates' characteristics, including information on the ownership structure, the industry of operation, and the financial accounts. Importantly, in some cases it displays the unconsolidated financial accounts of affiliates. This feature is of particular interest for this study, as it disaggregates the consolidated activity of multinationals at the affiliate level. It allows us to look directly at the effect of the national tax reforms on affiliates' effective tax rates. In the regression analysis, it also allows us to control for affiliates' size and for time constant characteristics through the addition of fixed effects.[5]

Our empirical analysis focuses on the effective tax rates of majority-owned affiliates in the European Union from 2014 to 2022. For the descriptive analysis in Section 4.1, we use an

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limits on the deduction of corporate gifts for customers

[4]Orbis is a commercial product from the Bureau van Dijk company. It aggregates data sources from more than 170 data providers, ranging from national public registers to private consulting firms.

[5]We do not claim to be able to reconstruct consolidated financial accounts at the group level. As presented in Tørsløv *et al.* (2023), a large part of the profits of multinationals cannot be observed at the unconsolidated level in the Orbis database. However, we argue that the use of affiliate financial accounts is crucial to identify the role played by each country in the dynamics of international tax competition and to document how national tax reforms influence the taxes paid by multinationals through their effect on affiliate-level effective tax rates.

unbalanced panel of 260,299 affiliates, representing 1,439,830 observations.[6] For the econometric analysis in Section 4.2, we keep a balanced sample of 41,511 affiliates. Appendix A.2 provides the list and definition of Orbis variables, the sample's selection steps, the number of affiliates in each country, and the summary statistics for our sample.

We define the effective tax rate of each multinationals' affiliate i in country c at year t as the ratio of its net tax liability CIT_{ict} to its profit before tax Π_{ict}:

$$ETR_{ict} = \frac{CIT_{ict}}{\Pi_{ict}} \tag{1}$$

We follow García-Bernardo *et al.* (2023) and drop outlier observations with effective tax rates higher than 100%. For robustness, we also compute average effective tax rates based on earnings before interest and taxes in Appendix B to exclude financial profits from the computation.

The concept of (backward-looking) effective tax rates is commonly used in the literature and it capture taxes paid as a ratio of all profits booked within the firm (Bachas *et al.*, 2023; Janský, 2023; Tørsløv *et al.*, 2023) with the aim of measuring the effective tax burden of corporations. The difference between the statutory and the effective tax rate arises from conceptual differences between financial and tax accounting (Hanlon and Maydew, 2009). It might serve as proxy to understand how tax provisions affect the share of financial accounting profits to which the statutory tax rate is ultimately applied. However, the difference does not only reflect the effect of tax provisions that define taxable profits but also to what extent companies make use of these provisions (Janský, 2023). For this reason, a company's ETR might vary over time even in the absence of changes in the legal definition of the tax base.

3 Shifting Priorities in Corporate Taxation

Between 2014 and 2022, EU governments have implemented 295 changes in corporate tax systems. As the majority of reforms targeted the tax base, the overall nature of these changes can hardly be understood by looking at statutory tax rates alone. This section documents the frequency and the nature of corporate tax system changes (Subsection 3.1) and analyzes the determinants of tax reforms across countries (Subsection 3.2).

3.1 The Rise of Tax-Base Narrowing Measures

Our new database of EU corporate tax reforms allows us to look at the cumulative number of base reforms and rate changes per direction. An analysis of changes in corporate tax systems at the extensive margin reveals that base-narrowing reforms were implemented far more frequently than any other type of reform. Between 2014 and 2022, EU governments have implemented 141 base-narrowing reforms, equivalent to 5.2 reforms per country on average, or 15.7 reforms per year. For comparison and if we exclude EU/OECD anti-avoidance regulations, the number of base broadening reforms that have been implemented is 69, equivalent

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[6]We use an unbalanced sample for the descriptive analysis in order to provide information on tax rate trends in all EU Member States. When we restrict our analysis to a balanced sample, we miss information for Denmark due to data limitations.

to 2.6 reforms per country, or 7.7 reforms per year on average.[7] The third most frequent type of reform were tax rate cuts with 31 rate cuts, equivalent to 1.1 rate cut per country, or 3.4 per year. In contrast, there were only 10 rate hikes, equivalent to 0.4 per country, or 1.1 per year. Taken together, base reforms are 5 times more likely to be used by governments than changes in statutory rates which suggests that analyses based on statutory rate changes only, miss a significant part of reform activity.

With regard to the direction of reforms, we find that 58% of corporate tax reforms implemented since 2014 were tax reductions in the form of base-narrowing measures or rate cuts. If we disregard EU/OECD anti-avoidance measures, even 69% of tax reforms aimed at reducing corporate taxation. This is consistent with the observed decline in effective tax rates paid by affiliates of multinationals in the EU (Section 2.2). The predominance of base-narrowing measures indicates that governments might have actively contributed to the widening gap between the average statutory and effective tax rate.

Figure 1: Cumulative Tax Reforms
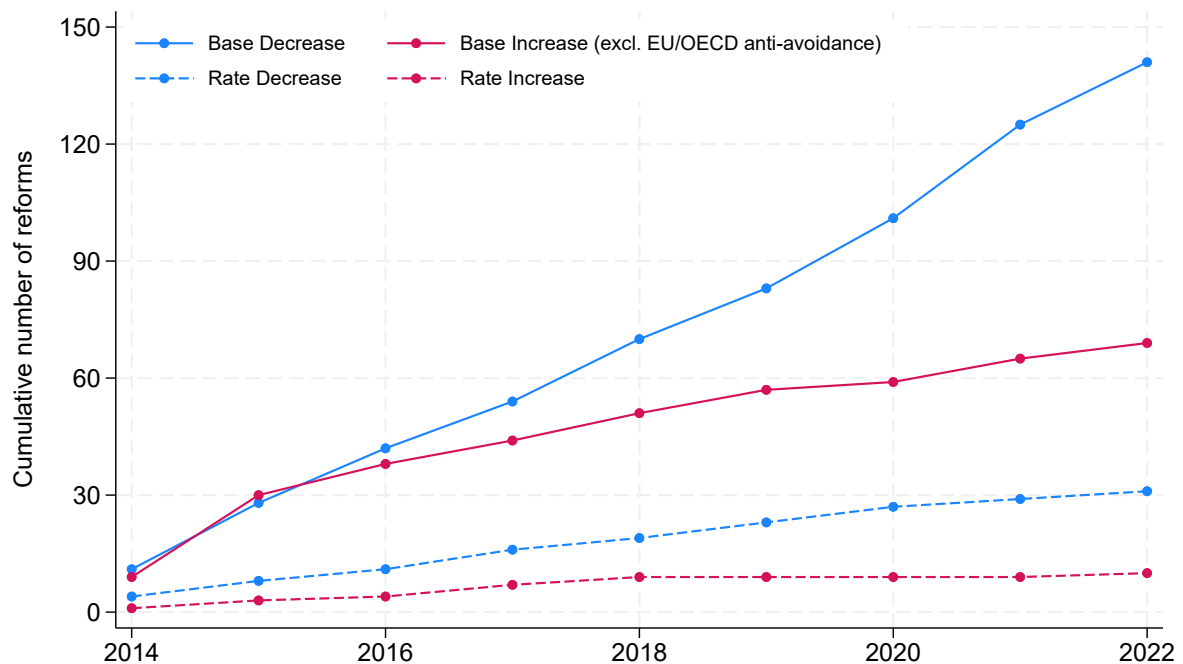
Notes: This figure presents the cumulative number of tax reforms over the period 2014-2022. The blue (red) lines represent tax reforms increasing (decreasing) the corporate tax burden. The solid lines refer to base reforms, while the dashed lines refer to rate reforms. Base broadening reforms exclude anti-avoidance regulations enacted upon the initiative of the European Union or the OECD.

One important contribution made by this paper is to update the figures from Kawano and Slemrod (2016) to the 2014-2022 period for EU Member States. In their paper, the authors document the frequency and simultaneity of base reforms and statutory rate changes for OECD countries between 1980 and 2004. One key finding was that countries were adopting a "cut rate, broaden base" approach, where they would drastically cut their statutory rate but expand the definition of the tax base at the same time. This was in line with the policy

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[7]We exclude anti-avoidance measures that transpose international regulations into national laws. However, we keep anti-avoidance measures that derive from the initiative of individual governments.

recommendation of international institutions (OECD, 2010) which promoted the 'cut rate - broaden base' approach as efficiency-enhancing and thus supposedly growth-friendly. Panel A of Figure B2 in Appendix B.3 presents Kawano & Slemrod's Figure 1 for direct comparison.

Figure 2 displays the relationship between the net number of base changes and the change in statutory rate for each EU Member State in 2014-2022. The results suggest that the 'cut rate, broaden base' approach was rather the exception than the rule in the EU in recent years: 12 countries have cut their statutory tax rate but only 3 of them adopted more base-broadening than base-narrowing measures. Instead, 6 countries combined statutory tax rate cuts with more base-narrowing than base-broadening measures. 6 countries have left their statutory rate unchanged but implemented more base-narrowing than base-broadening reforms.

These findings provide some insight into the trends in tax policies followed by EU Member States in recent years. However, they fail to capture changes at the intensive margin. Specifically, simply counting reforms may obscure differences in how strongly they impact the effective tax rates of multinationals for at least two reasons. First, some reforms can be very broad in scope. For instance, Latvia fully exempted undistributed profits from its corporate income tax while implementing four base-broadening and three base-narrowing reforms. Second, the count may include reforms targeting only highly aggressive multinationals. For example, the Netherlands, which implemented 15 base-broadening and 3 base-narrowing reforms, appears to have pursued the most extensive base-broadening strategy. However, six of these reforms were anti-avoidance measures aimed at the most aggressive multinationals.

Figure 2: Statutory Rate and Base Changes, 2014-2022
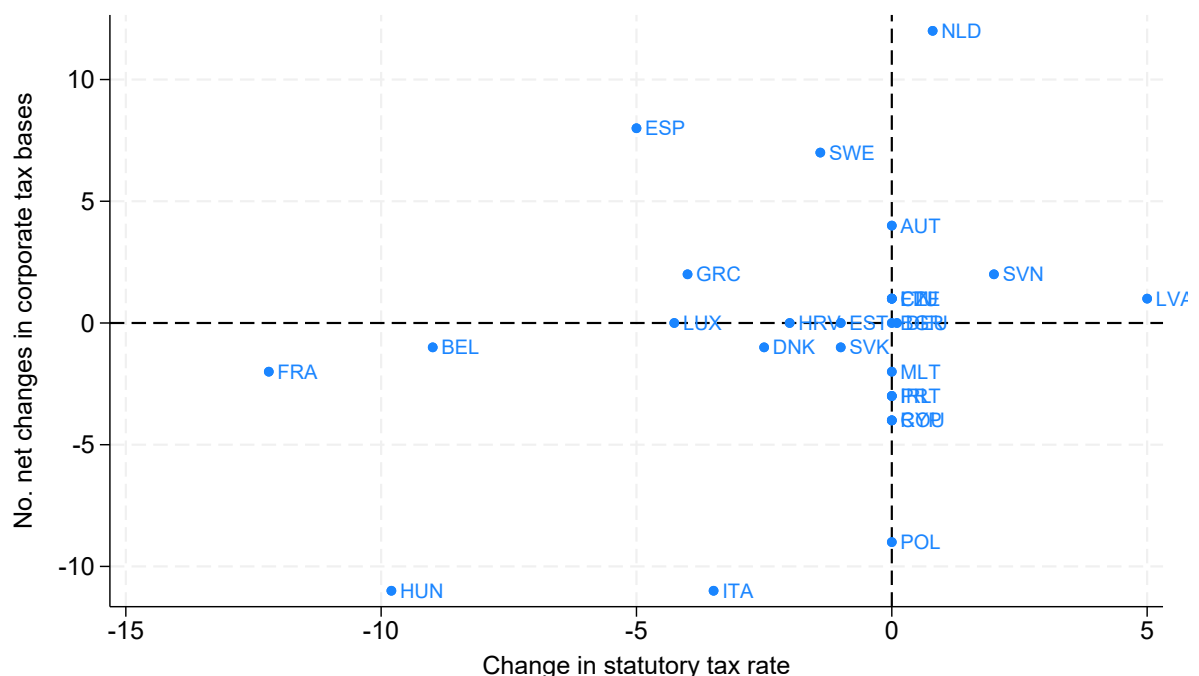
Notes: This figure plots the change in the statutory tax rate against the number of net changes in corporate tax bases. A negative number of net changes implies that the country adopted more base-narrowing than base-broadening reforms.

Our classification of reforms according to their purpose also reveals some interesting patterns: Overall, EU governments have introduced or extended regimes that aim at boosting

investment and innovation or at attracting intellectual property income from multinationals, while at the same time tightening the conditions under which corporations can carry losses against profits, and implementing measures to prevent tax avoidance and profit shifting. Among the base-broadening reforms, anti-avoidance measures were the most frequently adopted (54), followed by revisions of loss carry regimes (17) (Table 1). Among the base-narrowing reforms, introductions or modifications of cost-based investment incentives (38) were the first category of reforms, followed by R&D incentives (19), and intellectual property regimes (11). (See Appendix A.1 for a more detailed description of reforms). The shift from tax rate cuts to targeted, mostly cost-based, base-narrowing measures might be a sign of generally changing policy trends in the post-neoliberal era, where tax incentives related to certain industrial policy objectives might become more popular (Wade, 2012).

Table 1: Categories of Tax Reforms

	Increasing	Decreasing
Base Reforms	113	141
Anti-tax avoidance regulations	54	0
Cost-based investment regimes	9	38
Research and Development regimes	3	19
Intellectual Property regimes	4	11
Allowances for Corporate Equity regimes	2	6
Loss carry regimes	17	7
Taxation of capital gains and dividends	5	7
Withholding taxes on dividends, interests, and royalties	2	3
Other reforms	17	50
Statutory Rate Reforms	10	31
Total Number of Reforms	123	172

Notes: This table presents our categorization of the corporate income tax reforms implemented in the European Union from 2014 to 2022. The total number of reforms refers to the sum of statutory tax rate and tax base reforms.

3.2 Country Determinants of Tax Reforms

The previous sections have highlighted common trends such as declining statutory rates as well as a general shift towards implementing tax-base narrowing measures. However, we also observe different reform patterns across countries. In some countries, statutory rates have not declined and a few countries have combined broadly stable or increasing statutory rates with more base-broadening than base-narrowing reforms (Figure 2 in Section 3.1). In this section, we thus investigate potential determinants of tax reforms. In particular, we examine the role of tax competition within the European Union, policy preferences between political parties, and macroeconomic factors such as the state of public finances, unemployment rate, or GDP growth.

We find that left-wing governments are less likely to adopt base narrowing reforms than right-wing or bipartisan governments. Figure 3 shows the number of reforms per year in office for right-wing, bipartisan, and left-wing governments. On average, right-wing and bipartisan governments implemented, 0.66 and 0.7 base narrowing reforms per year, respectively, — more than twice the rate observed under left-wing governments (0.31). Moreover, left-wing governments adopted a roughly balanced number of base base-narrowing and base-broadening measures. For the other types of reforms, the patterns were similar across different political orientations of governments: the average number of base-broadening reforms per year is very close for left-wing and right-wing, at 0.3 and 0.32, respectively. Rate cuts were also implemented by all political orientations, from 0.1 per year for left-wing, to 0.16 for bipartisan governments. Finally, rate hikes are the less likely type of reform, ranging from 0.11 for bipartisan governments, to 0.02 for right-wing governments.

In addition, we show that governments of all political orientations have enacted relatively similar categories of reforms while in office. Table B1 in Appendix B.1 counts the number of reforms per category and per type of government. All three political orientations implemented more base-narrowing than base-broadening reforms for the following categories: cost-based investment incentives, R&D incentives, IP boxes, and allowances for corporate equity regimes. They also made loss-carry regimes more restrictive.

Figure 3: Tax Reforms by Political Orientation of Governments
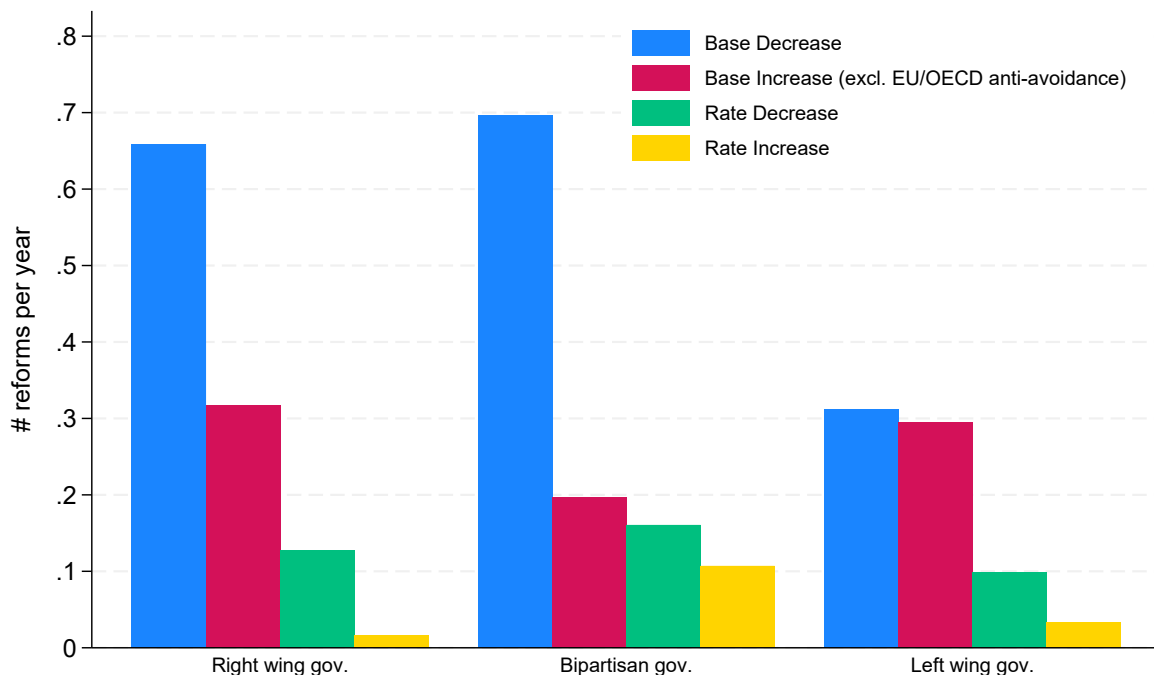
Notes: This figure presents the number of reforms by political orientation, divided by the number of years the respective government is in office. The reforms are split into four groups: base narrowing, base broadening, rate decreasing, and rate increasing. Base broadening reforms exclude anti-avoidance regulations enacted upon the initiative of the European Union or the OECD.

We use a logistic regression model to analyze the determinants behind corporate tax reforms in the European Union more systematically. The corresponding econometric specifi-

cation is:

$$\log\left(\frac{p(Reform_{i,t}=1)}{1-p(Reform_{i,t}=1)}\right) = \alpha_{i,t} + \beta_1 Comp_{i,t-1} + \beta_2 Politics_{i,t} + \beta_3 Macro_{i,t-1} + \epsilon_{i,t} \quad (2)$$

where $Reform_{i,t}$ denotes the reform variable of interest in an EU Member State i during year t ($t = \{2014 : 2022\}$). $p(Reform_{i,t} = 1)$ is the probability that a type of reform occurs in country i during year t. We run separate regressions for the probability that a country changes its statutory rate (Table 2) and for the probability that a country changes its definition of the tax base (Table 3). The term $\log p(Reform_{i,t} = 1)/(1 - p(Reform_{i,t} = 1))$ is the log probability of the reform type to occur divided by the probability that it will not occur. $\epsilon_{i,t}$ is the error term.

The vector $Comp_{i,t-1}$ refers to the distance of each country to the average tax rate of the other Member States in the previous year. The aim of this variable is to capture the tax competition pressure which might be stronger if a country deviates a lot from the Union average. We use the distance to the average statutory rate when estimating the probability of implementing a statutory rate cut (Table 2) and we use the distance to the average effective tax rate for the probability of implementing a tax-base reform (Table 3). The vector $Politics_{i,t}$ includes one categorical variable that captures the political orientation of the government. Finally, the vector $Macro_{i,t-1}$ refers to macroeconomic variables at the country level in the previous year. It includes the real GDP growth, the public deficit, the current account, and the unemployment rate.[8]

The regression results reveal a positive correlation of our tax competition measure and the likelihood of adopting tax rate changes: The higher a country's statutory rate compared to the EU average, the more likely it is to implement a rate change (Table 2, Column 1). This relationship remains significant when we consider the political orientation of governments in column (2), and when we add macroeconomic factors in column (3). When we run the regressions separately for rate hikes and rate cuts, we find that rate cuts are more likely the higher a country's statutory rate compared to the mean. For rate hikes, in contrast, this relationship is not significantly different from zero. We are thus confident that what we capture is a downward pressure on tax rates rather than convergence to the mean. For every additional statutory rate point above the average statutory rate of other EU Member States, a country is 15% more likely to implement a rate cut.

Left-wing governments are less likely than right-wing governments to implement rate cuts. The regression results suggest an odd ratio below 1 and significant at the 10% level, which implies a negative relationship between rate cuts and left-wing governments (Table 2, Column (5)). The probability of tax cuts is estimated to be about 72% lower when there is a left-wing government in office compared to a right-wing government. We do not find a different probability of tax rate changes between right-wing and bipartisan governments. The unexpected positive correlation of bipartisan governments and rate hikes disappears once we drop the small rate changes in Germany that were actually caused by variations in local trade taxes while the Grand coalition Federal government did not enact any statutory rate changes.

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[8]More details on the data sources and summary statistics are also available in Appendix A.3.

Table 2: Determinants of Statutory Tax Rate Reforms

	(1) Rate change	(2) Rate change	(3) Rate change	(4) Rate hike	(5) Rate cut
EU Tax Competition					
Lag dist. av. statutory rate	1.119***	1.143***	1.144***	1.084	1.147***
	(0.027)	(0.034)	(0.036)	(0.070)	(0.039)
National Politics					
Bipartisan gov.		1.549	1.527	5.453*	0.936
		(0.624)	(0.666)	(5.210)	(0.465)
Left wing gov.		0.401	0.338*	1.215	0.284*
		(0.236)	(0.198)	(1.257)	(0.189)
Macroeconomic Conditions					
Lag real GDP growth			1.007	1.056	0.989
			(0.055)	(0.047)	(0.066)
Lag public deficit			1.116*	1.032	1.131*
			(0.073)	(0.113)	(0.083)
Lag current account			1.019	1.191*	0.969
			(0.062)	(0.115)	(0.067)
Lag unemployment rate			1.100**	1.119	1.084**
			(0.042)	(0.088)	(0.040)
Observations	243	243	243	243	243

Notes: This table presents estimates from the regression in Equation 2. Standard errors are robust to heteroskedasticity. The sample is a simple cross section of 243 country × year observations. The coefficients are in odd ratios. A logistic regression model is used. In Column (1) to (3), the dependent variable is the probability for a statutory rate change in any direction, while we focus on rate hikes in Column (4), and on rate cuts in Column (5).

Most coefficients for macroeconomic conditions are not significantly different from zero. Two exceptions are worth mentioning. First, net exporters are more likely to implement national tax increases compared to net importers. A one percentage point increase in the current account is associated with an increase in the odds of increasing the tax rate by 19%. This might indicate that net exporters might be less concerned about their international competitiveness.[9] Second, countries with higher levels of unemployment rates are more likely to implement tax cuts. A one percentage point increase in the unemployment rate is associated with an increase in the likelihood of a rate cut by 8%. This result is coherent with governments facing higher pressure to cut corporate taxes during economic downturns.

Next, we turn to the determinants of tax base reforms (Table 3). We find that the likelihood of implementing tax base-narrowing reforms increases with the distance to the average effective tax rate which we would interpret as an effect of tax competition. The coefficient of the tax competition variable suggests that for every additional percentage point above the average effective tax rate of other EU Member States, a country is 5% more likely to implement a base narrowing reform (Column 5). We learn from Column (6) that this coefficient

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[9]Note however, that this correlation is not significant anymore, once we disregard the German rate hikes caused by local trade taxes.

goes up to 11% when we restrict to base narrowing R&D incentives.[10] The coefficients of the tax competition variable are also higher than 1 for general base changes and base-broadening measures indicating a positive relationship (Columns 3 and 4) but not statistically different from zero which again points to downward pressures rather than convergence.

Table 3: Determinants of Tax Base Reforms

	(1) Base change	(2) Base change	(3) Base change	(4) Base up	(5) Base down	(6) R&D down
EU Tax Competition						
Lag dist. av. effective rate	1.021	1.032	1.020	1.006	1.049*	1.107*
	(0.021)	(0.023)	(0.024)	(0.028)	(0.028)	(0.058)
National Politics						
Bipartisan gov.		0.818	0.921	0.542	1.018	3.365*
		(0.298)	(0.355)	(0.309)	(0.408)	(2.400)
Left wing gov.		0.594	0.618	0.553	0.511	0.476
		(0.223)	(0.240)	(0.289)	(0.226)	(0.407)
Macroeconomic Conditions						
Lag real GDP growth			1.021	0.958	1.035	1.086
			(0.036)	(0.040)	(0.041)	(0.056)
Lag public deficit			0.907**	1.026	0.879**	0.975
			(0.043)	(0.060)	(0.044)	(0.075)
Lag current account			1.034	1.137**	0.964	0.831**
			(0.045)	(0.059)	(0.043)	(0.075)
Lag unemployment rate			1.033	1.126***	0.963	1.021
			(0.036)	(0.044)	(0.037)	(0.079)
Observations	213	213	213	213	213	213

Notes: This table presents estimates from the regression in Equation 2. Standard errors are robust to heteroskedasticity. The sample is a simple cross section of 213 country × year observations. The coefficients are in odd ratios. A logistic regression model is used. In Column (1) to (3), the dependent variable is the probability for a change of the base definition in any direction, while we focus on base broadening reforms in Column (4), on base narrowing reforms in Column (5), and on R&D base narrowing reforms only in Column (6). Base broadening reforms exclude anti-avoidance regulations enacted upon the initiative of the European Union or the OECD.

The political orientation of governments seems to be a less robust predictor of reform activity when it comes to tax base reforms. We observe that the coefficient for left-wing governments is below 1 across all specifications which is consistent with leftist governments implementing fewer reforms altogether (Table 3, Columns 1-6). If a left-wing government is at office, the probability of a base change would decrease by 38%, the probability of a base-broadening measure would decrease by 45% and the probability of a base-narrowing measure would decrease by 49% compared to a right-wing government. However, we cannot reject the hypothesis that the coefficients are different from zero.

Finally, the macroeconomic situation also seems to play a role. Base broadening reforms are significantly and positively correlated with the current account and the unemployment

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[10]The regression results for other categories of base reforms are available in Appendix B.1, Table B3.

rate. In line with what we observed for the statutory rate hikes, net exporters are more likely to implement base-broadening reforms. The unemployment rate, however, also enters positively, which seems a bit counter-intuitive. In addition, we find that base-narrowing reforms are significantly less likely to occur when the public deficit is high.

Taken together, the tax base reforms seem to be somewhat harder to predict than the tax rate reforms. This might be related to the fact that base reforms are more diverse and sometimes address very specific issues rather than being a global one-dimensional policy tool like the statutory tax rate. Given their technical nature, tax base reforms may generally be less politicized and therefore less influenced by electoral considerations.

4   Tax Reforms and Effective Tax Rates of Multinationals

The documented rise of tax-base narrowing measures seems to reflect a broader shift from the "cut rate - broaden base" approach towards more targeted and industrial-policy related tax incentives. While most tax incentives serve certain economic policy goals, they also produce revenue costs which are often less transparent at a macro level than simple tax rate cuts. In this chapter we analyse the contribution of tax reforms to the widening gap between the statutory and effective tax rates paid by corporations based on a sample of multinational affiliates.

4.1   Declining Tax Rates of Multinationals' Affiliates

To begin, Figure 4 presents the trend in tax rates faced by affiliates of multinationals in the European Union. Overall, both the statutory and the effective tax rates have declined. The average statutory rate fell from 22.9% in 2014 to 21.2% in 2022, representing a reduction of 7.6% in 8 years. The average statutory corporate tax rate in the EU has reached its lowest level since the signature of the Maastricht treaty in 1992. At the same time, the average effective tax rate follows a similar, though more pronounced, downward trend. It declined from 20.8% to 18.1%, which corresponds to a drop of 13.2%. This is equivalent to saying that every year, the average effective tax rate faced by affiliates of multinationals operating in the European Union fell by a third of a percentage point.[11]

The effective tax rate on profits booked by multinational corporations in the European Union has fallen at a faster rate than the average statutory tax rate. Therefore, the fall in statutory tax rate is not sufficient to explain the fall of the effective tax rate. Instead, the gap between the two measures has widened, from 2.1 percentage points in 2014 to 3.1 in 2022, with a maximum recorded at 3.7 in 2021. The fact that the effective tax rate fell more than the statutory tax rate suggests that countries have adopted narrower definitions of corporate tax bases.

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[11]For robustness, we compute three alternative measures of effective tax rates in the European Union. The trends for these alternative measures are depicted in Figure B1 in the Additional Results Appendix.

Figure 4: Trends in Tax Rates of Affiliates
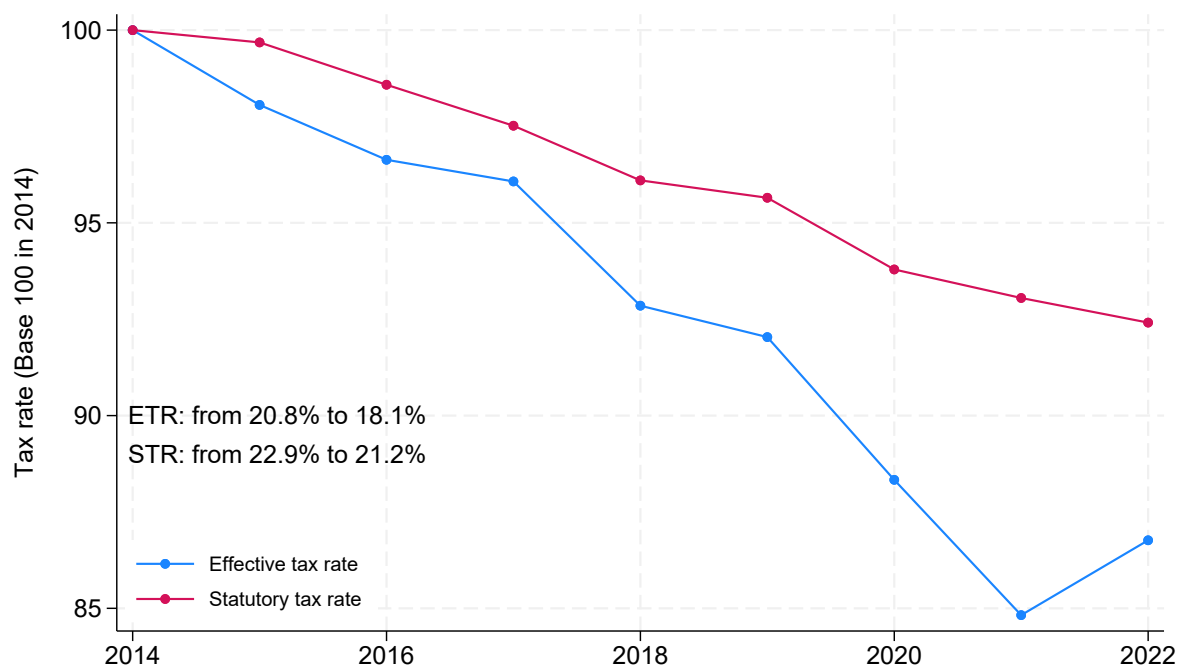
Notes: This figure presents the evolution of corporate tax rates in the European Union from 2014 to 2022. The red curve represents the average statutory tax rate, while the blue curve represents the average effective tax rate of multinationals' affiliates. Both are normalized to 100 in 2014.

The EU-wide trend broadly reflects individual country patterns. The great majority of countries exhibit a decline in the effective tax rates faced by multinationals between 2014 and 2022 (Figure 5). 22 countries experienced a decrease, out of which 15 have seen a drop by more than 10%, and 8 by 15% or more. In 4 of the 5 countries where an increase in the effective tax rate happened, this increase has been limited to less than 3%. In Bulgaria, the effective tax rate increased by 19.5%, but in absolute values, it went from 9% to 10.8%, increasing by 1.4 percentage points in the last year. At the extreme opposite, Latvia's effective tax rate was more than halved, mostly due to a reform of its corporate tax system introducing an exemption of any corporate income tax for retained profits.

Regarding statutory rates, Latvia implemented the largest increase from 15% to 20%, followed by Slovenia (+11.8%), the Netherlands (+3.2%), and Germany (+0.3%).[12] Interestingly, 12 countries did not change their statutory rates between 2014 and 2022. 11 countries decreased their headline statutory rate, of which 8 by more than 10%. Hungary decided to cut its headline statutory rate from 20.6% to 10.8%, making it the second lowest headline statutory rate (including surcharges) in the European Union, following Bulgaria at 10%. France progressively cut its statutory rate from 38% to 25.8% - a decline by 32%. Belgium also cut its statutory rate from 34% to 25%.

The evolution of the gap between the statutory and the effective tax rate is of particular interest. We document that this gap has widened in 15 countries, aligning with our intuition that countries have predominantly relied on base-narrowing reforms instead of statutory rate

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[12]Germany did not actually change the statutory corporate income tax. The small increase reflects changes in the weighted average of regional trade taxes (Gewerbesteuer) set by municipalities

changes to lower the effective corporate tax rate. However, in the three countries with the most significant reductions in statutory rates, Hungary, France, and Belgium, the gap has narrowed.

Figure 5: Change in Tax Rates of Affiliates, 2014-2022
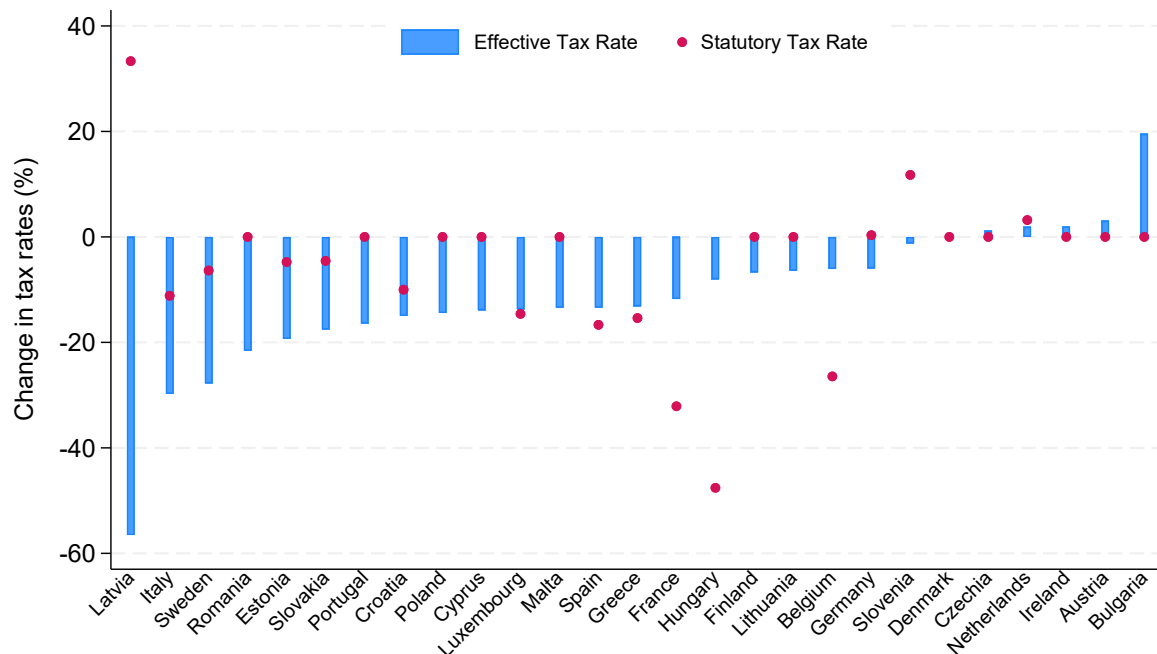
Notes: This figure presents the percent change in statutory and effective tax rates of affiliates between 2014 and 2022. Due to data limitation, the period considered for Denmark is 2017-2022.

4.2 The Effect of Tax Reforms on Effective Tax Rates

What is the contribution of the described tax reforms to the decline of the average ETR of affiliates in the EU? There is little doubt that rate reforms have on average reduced the corporate tax burden because 12 countries have cut their statutory tax rates by 1 to 10 percentage points while only two countries have increased it by more than one percentage point compared to 2014. The relationship between the tax base reforms and the ETR is less straightforward. We know that EU governments have implemented more base-narrowing than base-broadening reforms but we do not have a consistent measure of the intensity of tax base reforms.

Figure 6 suggests that all countries which have cut their statutory rate have seen the ETR of multinational affiliates decline. However, the correlation is blurred by a number of countries without tax rate changes but with declining ETRs (Panel A). The number of net changes in corporate tax bases also seems to correlate positively with the ETR (Panel B), implying that implementing more base-narrowing than base-broadening reforms more often coincides with declining ETRs. In addition, also countries implementing more base-broadening than base-narrowing reforms have declining ETRs which might indicate that the base-narrowing reforms were more intensive on average.

16

Figure 6: Tax Reforms and Change in Effective Tax Rates, 2014-2022
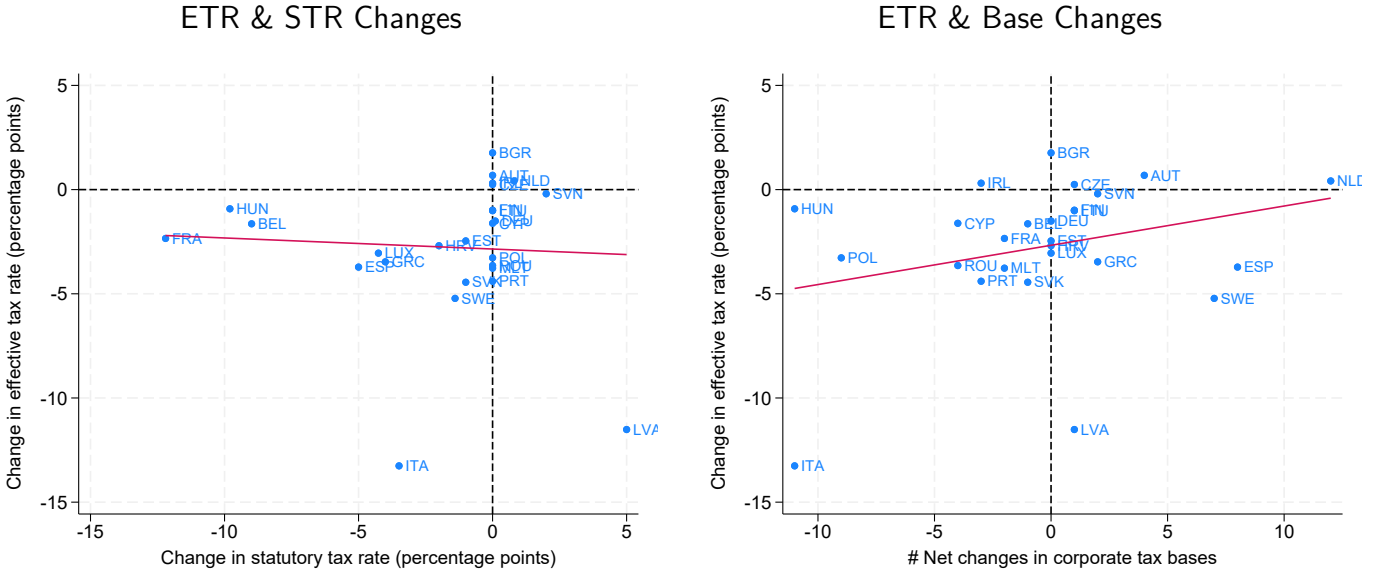
Notes: The left panel of this figure plots the effective tax rate change in percentage points against the statutory tax rate change in percentage points for the period 2014-2022. The right panel plots effective tax rate change in percentage points against the number of net changes in corporate tax bases, for the same period. A negative number of net changes in the corporate tax base implies that the country as implemented more base-narrowing than base-broadening reforms.

For a more systematic analysis of the contribution of tax reforms to the declining ETRs, we regress ETRs at firm-level on the statutory tax rate, the cumulative number of reforms adapted in each country and some affiliate-level and country-level control variables. In the first specification we follow Kawano and Slemrod (2016) who use the cumulative sum of net tax base changes ($B_{c,t}$) as explanatory variable (equation 3). In our preferred specification, we use two different variables for tax-base broadening ($B_{c,t}^B$) and tax-base narrowing ($B_{c,t}^N$) measures to allow for a different average intensity of reforms (equation 4).

$$etr_{i,c,t} = \alpha str_{c,t} + \beta B_{c,t} + \epsilon_{i,c,t} \tag{3}$$

$$etr_{i,c,t} = \alpha str_{c,t} + \beta_1 B_{c,t}^B + \beta_2 B_{c,t}^N + \Gamma Z_{c,t} + \Upsilon X_{i,t} + \lambda_i + \mu_t + \epsilon_{i,c,t} \tag{4}$$

At the country level we include the annual GDP growth rate as control variable to account for cyclical variation in ETRs.[13] At the affiliate-level we include log tangible assets and turnover.[14] We also include affiliate fixed effects to account for unobserved heterogeneity between firms and year fixed effects. We use heteroskedasticity-robust standard errors clustered at the country-year level in all regressions.

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[13]Backward-looking ETRs might increase in cyclical upswings because the dampening effect of capital allowances diminishes relatively when corporate profits soar. For our sample, we can rule out potential cyclical effects of loss carryover because we include only profit-making affiliates.

[14]In earlier versions we also experimented with the number of employees and the ratio of financial profits to total profits but the coefficients were close to zero and not significant.

Table 4: Regression Results for Affiliate-level Effective Tax Rates

	(1)	(2)	(3)	(4)
Corporate tax rate	0.173**	0.210***	0.210***	0.216***
	(0.072)	(0.066)	(0.066)	(0.067)
Cum. base changes		0.382**		
		(0.150)		
Cum. base broadeners			0.371	0.366
			(0.245)	(0.244)
Cum. base narrowers			-0.384***	-0.378***
			(0.145)	(0.145)
Real GDP growth				0.015
				(0.074)
Log assets				-0.858***
				(0.126)
Log revenues				0.041
				(0.121)
Observations	373,599	373,599	373,599	373,599
R-squared	.59	.59	.59	.59

Notes: This table presents the regression results for affiliate-level effective tax rates. The sample is a balanced sample of 41,511 affiliates in the European Union over the period 2014-2022. In each specification, affiliate fixed effects and year fixed effects are included. Standard errors are clustered at the country $\times$ year level. Withholding tax rates reforms and loss carry regimes reforms are excluded from the cumulative base changes coefficients. Latvia is excluded, and Denmark is missing.

Our regression results confirm that the affiliate-level ETR correlates positively with statutory tax rates and that this correlation is stronger when we control for tax base reforms: Regression (1) suggests that an increase in the statutory tax rate by 1 percentage point is associated with an increase in the ETR by 0.17 percentage points. Once we add the cumulative net base change in regression (2), the coefficient of the the statutory rate increases to 0.21. The positive coefficient of the base reform variable (the cumulative difference between base-broadening and base-narrowing reforms) indicates that, on average, the ETR increased by 0.38 percentage points when one more base-broadening than base-narrowing measure was implemented (or decreased by 0.38 percentage points when one more base-narrowing than base-broadening measure was implemented).

When we split the tax base reform variable into the cumulative count of base-broadening and the cumulative count of base-narrowing measures, we find that, on average, an additional base-narrowing reform is associated with a decline of the ETR by 0.38 percentage points. Conversely, a base-broadening reform is associated with an increase of the ETR by 0.37 percentage points but the correlation coefficient of base-broadening measures is not statistically significant. At the affiliate level we find a significant negative correlation of log tangible assets and the ETR, which would be in line with a dampening effect of capital allowances or other investment incentives on the corporate tax. The coefficients of real GDP growth and log revenues are positive pointing to the automatic stabilizer function of corporate taxation (Musgrave and Musgrave, 1989) but are not significant.

4.3 Revenue Cost Estimates

To illustrate the quantitative implications of our results, we simulate the average contribution of tax rate and base changes to the overall decline of affiliates' ETRs based on our regression model. We use the estimated coefficients of regression (4) to predict the change of affiliates' ETRs over the sample period. We then predict alternative ETRs keeping either the statutory rate, the base-broadening or base-narrowing measures constant at their 2014 value (Figure 7, Panel A). In this way we can simulate how the ETR would have developed if the statutory tax rate had remained constant in all countries (yellow line) and compare it to how the ETR would have developed if no additional base-broadening or base-narrowing measures had been adopted after 2014 (green and red lines). The simulation suggests that the average ETR would have remained broadly stable, if only tax rate cuts and base-broadening measures had been implemented, i.e. if governments had followed the "cut rate - broaden base" approach. As the coefficient of the base-broadening reforms was not significantly different from zero, their contribution is uncertain but even when assuming an symmetric intensity of base-narrowing and base-broadening reforms (as in regression 1), base-narrowing reforms would have outweighed the base-broadening because the latter were less frequent.

Based on the results of regression 4, we also plot the cumulative contribution of each factor to the change in the ETR (Figure 7, Panel B). Taken together, all base-narrowing measures would account for a 2.1 drop in the weighted average ETR. Base-broadening measures would account for an increase of 1.5 percentage points which counteracts the decline, so that the net contribution of base reforms would be a decline 0.6 percentage points. The statutory tax rate cuts would account for a decrease of the ETR of 0.9 percentage points. Note that the actual ETR declines more than what our model would predict. This is because the ETR might partly be driven by factors we cannot observe in the data. For example, we are not able to control how much companies actually make use of certain tax incentives as we do not have information on their R&D expenses and we also cannot control for a varying share taxable versus non-taxable financial income in total profits.

To estimate the overall cost of tax reforms, we apply the effective tax rate of 2014 to the total sample profits in each year. We thus assume that governments would have collected more taxes from affiliates of multinational firms, if the effective tax rate had not declined. The estimated tax revenue loss represents 8.2% of the total tax revenues collected from the sample firms between 2014 and 2022. Half of this revenue loss can be predicted by the model given the actual development of explanatory variables: Taken together, all corporate tax reforms are associated with a cumulated revenue loss of EUR 16 bn. which amounts to 3.5% of total tax revenue collected from the sample firms over the period (Figure 7, Panel C). The reduction of statutory tax rates accounts for a tax revenue loss of 2.2%. Base-narrowing reforms alone would account for a loss of 5.9%, but they are compensated by a revenue gain of 4.6% associated with base-broadening reforms (see Table B2 for a summary of all estimates). The annual revenue losses increase each year, as more tax reforms are added, e.g. while the reforms were close to revenue-neutral in 2015 but in 2022, the annual revenue loss associated with all reforms amounted to EUR 4.8 bn.

Figure 7: Estimated Tax Reduction for Multinationals

Counterfactual Effective Tax Rates

Change in Effective Tax Rates

Tax Revenue Losses
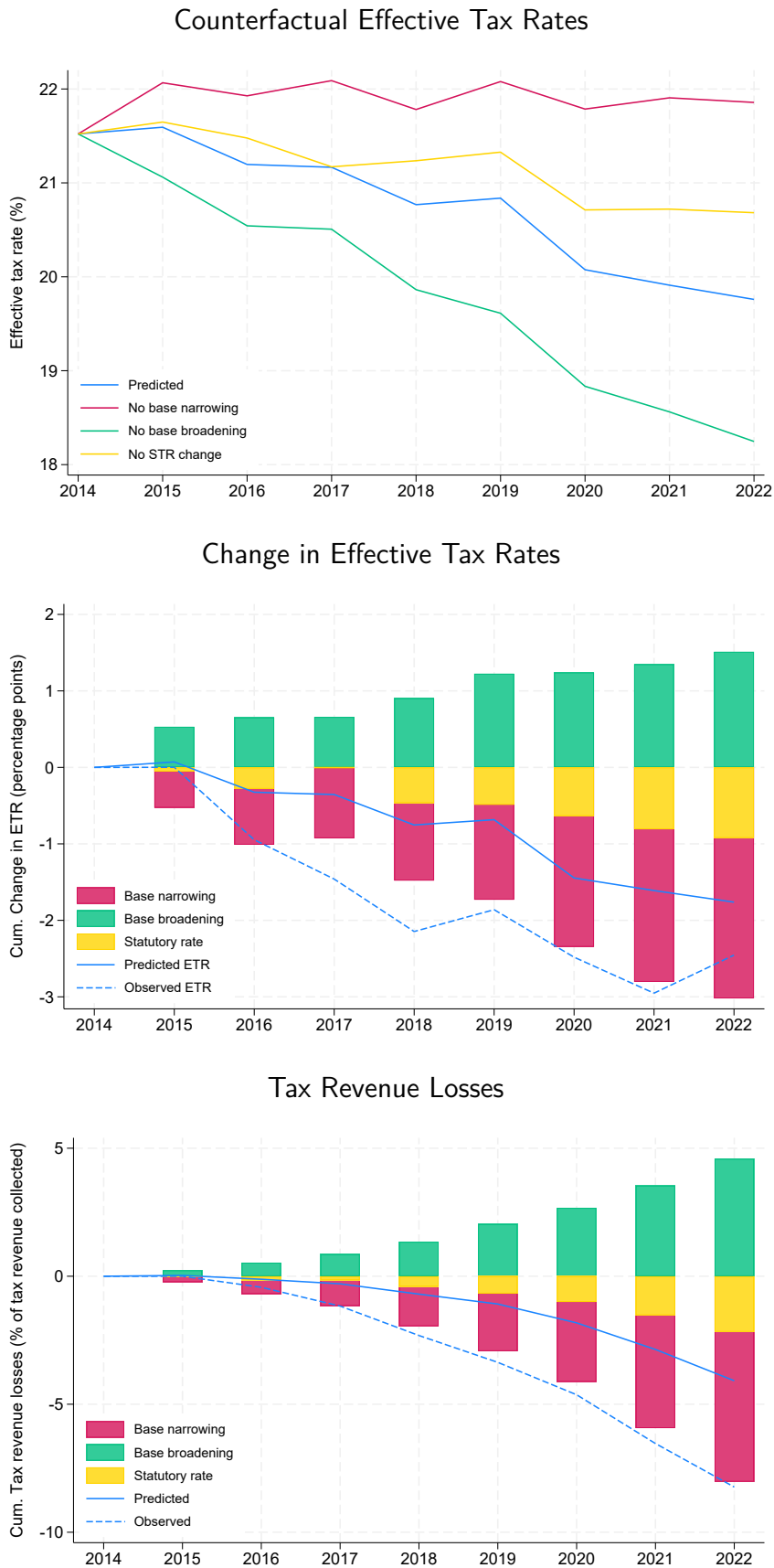
Notes: Panel A plots hypothetical ETRs predicted by our regression model each time keeping one tax reform factor constant. Panel B plots the estimated cumulative contribution of each reform factor to the development of the average ETR paid by affiliates of multinational enterprises. Panel C plots the estimated cumulative tax revenue losses associated with the reduction of multinationals' effective tax rates.

5 Conclusion

This paper analyzes corporate tax reforms implemented in the European Union between 2014 and 2022 using a new dataset that covers both tax rate and tax base reforms. Our findings suggest that corporate tax policymaking has shifted away from the "cut rate - broaden base" approach. Instead, tax-base narrowing measures have been the most frequently implemented type of reform, especially in the form of cost-based investment and R&D incentives, or tax relief for intellectual property income.

We observe that countries with higher statutory or effective tax rates relative to the EU average were more likely to introduce rate reductions or base-narrowing measures, suggesting that tax competition within the EU exerts downwards pressure on corporate taxation. We find that governments across the political spectrum have contributed to the trend of implementing more base-narrowing than base-broadening reforms. However, political preferences still seem to play a role, as left-leaning governments were less inclined to implement tax rate cuts and exhibited a more balanced ratio of base-narrowing to base-broadening reforms compared to right-wing, bipartisan or centrist governments.

The rise of tax base-narrowing measures has contributed to widening the gap between statutory tax rates and effective tax rates paid by affiliates of multinationals in the EU. Over the sample period, the effective tax rate has decreased by 13.2% while the average statutory tax rate has decreased by only 7.6%. Based on an econometric model, we simulate the effects of tax reforms on the ETR. We find that tax reforms are associated with a 1.5 percentage points drop in the average ETR. Tax base-narrowing reforms alone would have reduced the ETR by approximately 2 percentage points, a decline only partially offset by base-broadening reforms. All else being equal, we estimate that due to the tax reforms EU countries have forgone EUR 16 bn. in tax revenue or 3.5% of the tax revenue collected from the sample MNEs over 8 years.

Our findings suggest that tax revenue collection has been weakened deliberately and despite increased efforts to limit the scope for tax avoidance by multinational enterprises. As governments align their tax policies with industrial policy objectives, they should carefully evaluate the potential benefits relative to the associated costs. Monitoring tax base reforms and backward-looking effective tax rates — alongside statutory and model-based effective tax rates — can enhance transparency regarding the costs and distributional implications of un-coordinated tax policymaking in the EU. More openness towards corporate tax harmonization beyond the implementation of anti-avoidance measures might be needed to counteract further base erosion.

References

ARMINGEON, K., ENGLER, S., LEEMANN, L. and WEISSTANNER, D. (2023). *Comparative Political Data Set 1960-2021*. Codebook, University of Zurich, Leuphana University Lueneburg, and University of Lucerne.

BACHAS, P., BROCKMEYER, A., DOM, R. and SEMELET, C. (2023). *Effective Tax Rates and Firm Size*. Policy Research Working Paper 10312, World Bank, Washington, DC.

BOHLE, D. and REGAN, A. (2021). The comparative political economy of growth models: Explaining the continuity of fdi-led growth in ireland and hungary. *Politics & Society*, **49** (1), 75–106.

CULPEPPER, P. (2010). *Quiet politics and business power: corporate control in Europe and Japan*. Tech. rep., Cambridge University Press.

DE MOOIJ, R. A. and NICODÈME, G. (2008). Corporate tax policy and incorporation in the eu. *Int Tax Public Finance*, **15**, 478–498.

DEVEREUX, M. and GRIFFITH, R. (2003). Evaluating tax policy for location decisions. *International Tax and Public Finance*, **10**, 107–126.

—, — and KLEMM, A. (2002). Corporate income tax reforms and international tax competition. *Economic Policy*, **17** (35), 449–495.

DYRENG, S. D., HANLON, M., MAYDEW, E. L. and THORNOCK, J. R. (2017). Changes in corporate effective tax rates over the past 25 years. *Journal of Financial Economics*, **124** (3), 441–463.

EUROPEAN COMMISSION (2024). *Data on Taxation Trends. New data updated in March 2024 including tax revenue data up to 2022*. March, DG Taxation and Customs Union.

EVERS, L., MILLER, H. and SPENGEL, C. (2015). Intellectual property box regimes: effective tax rates and tax policy considerations. *Int Tax Public Finance*, **22**, 502–530.

FLAMANT, E., GODAR, S. and RICHARD, G. (2021). *New Forms of Tax Competition in the European Union: an Empirical Investigation*. Report no. 3, EU Tax Observatory.

FUEST, C., HUGGER, F. and WILDGRUBER, S. (2022). Why is corporate tax revenue stable while tax rates fall? evidence from firm-level data. *National Tax Journal*, **75** (3).

GARCÍA-BERNARDO, J., JANSKY, P. and TØRSLØV, T. (2022). Decomposing multinational corporations' declining effective tax rates. *IMF Economic Review*, **70** (2), 338–381.

—, — and TØRSLØV, T. (2023). Multinational corporations' effective tax rates: Evidence from orbis. *PLoS One*, **18** (11), e0293552.

GONZÁLEZ CABRAL, A. C., BUCCI, M. and ET AL., A. S. (2023). *A time series perspective on income-based tax support for R&D and innovation*. Oecd taxation working papers no. 62, OECD.

HANLON, M. and MAYDEW, E. (2009). Book-tax conformity: Implications for multinational firms. *National Tax Journal*, **62** (1), 127–153.

HEBOUS, S. (2021). *Has Tax Competition Become Less Harmful?* in: De mooij, klemm, and perry: Corporate income taxes under pressure, International Monetary Fund.

HUGGER, F., CABRAL, G., A. and O'REILLY, P. (2023). *Effective tax rates of MNEs : New evidence on global low-taxed profit*. Documents de travail de l'ocde sur la fiscalité n° 67, Éditions OCDE, Paris.

JANSKÝ, P. (2023). Corporate effective tax rates for research and policy. *Public Finance Review*, **51** (2), 171–205.

KAWANO, L. and SLEMROD, J. (2016). How do corporate tax bases change when corporate tax rates change? with implications for the tax rate elasticity of corporate tax revenues. *International Tax and Public Finance*, **2016** (23), 401–433.

LEIBRECHT, M. and HOCHGATTERER, C. (2010). Tax competition as a cause of falling corporate income tax rates: a survey of empirical literature. *Journal of Economic Surveys*, pp. 1–37.

MORGAN, G. and IBSEN, C. (2012). Quiet politics and the power of business: New perspectives in an era of noisy politics. *Politics & Society*, **49** (1), 3–16.

MUSGRAVE, R. and MUSGRAVE, P. (1989). *Public Finance in Theory and Practice*. McGraw-Hill, 5th ed.

OECD (2010). *Tax Policy Reform and Economic Growth*. OECD Tax Policy Studies 20, OECD, Paris.

— (July 2024). *R&D Tax Incentives Database*. https://oe.cd/rdtax, OECD, Paris.

PERRET, S., HOURANI, D., MILLAR-POWELL, B. and RAMM, A. (2023). The taxation of labour vs. capital income: A focus on high-income earners. *OECD Taxation Working Papers*, **65**.

SPENGEL, C., ELSCHNER, C., ENDRES, D. and ET AL. (2014). *Effective tax levels using the Devereux/Griffith methodology*. Project for the eu commission taxud/2013/cc/120., ZEW.

TØRSLØV, T., WIER, L. and ZUCMAN, G. (2023). The missing profits of nations. *The Review of Economic Studies*, **90** (3), 1499–1534.

WADE, R. H. (2012). Return of industrial policy? *International Review of Applied Economics*, **26** (2), 223–239.

WIER, L. and ZUCMAN, G. (2023). *Global profit shifting, 1975–2019*. Wider working paper 2022/121, United Nations University World Institute for Development Economics Research.

WILSON, J. D. and WILDASIN, D. E. (2004). Capital tax competition: bane or boon. *Journal of Public Economics*, **88** (4), 1065–1091.

A Data Appendix

A.1 Corporate Tax Reforms

For each country, the Taxation Trends Reports include a list of the corporate income tax re-forms that occurred during the previous year. They include brief descriptions of each measure, the enforcement date, and a classification indicating if the reform has a positive or negative impact on the tax rate or tax base of corporations. The reports are made publicly available by the European Commission and represent a valuable resource for researchers and policy-makers. However, they suffer from some short-comings. Notably, there are inconsistencies in classification over time, inclusion of reforms beyond corporate income taxation, and sometimes very short or inaccurate descriptions of the reforms so that in several cases additional investigation is required.

Figure A1 below is an extract from the 2016 Taxation Trend Report. It displays the tax reforms implemented in Ireland for the subsequent year. Two reforms fall under the label *Corporate income tax*. One is a 3-year relief for start-up companies, which does not target multinational corporations. Consequently we remove it from our sample. The second reform is the introduction of the Knowledge Development Box, a patent box that reduces the tax rate from 12.5% to 6.25% for profits from certain patents resulting from R&D activities carried out in Ireland. While the table classifies this reform as a rate decrease, we reclassify it as a corporate tax base measure, as it does not change Ireland's headline statutory rate. Instead, it provides a preferential taxation regime to eligible companies. It can also be argued that this measure is equivalent to taxing only half of the profits resulting from the patents.

In this case, it is straightforward to classify the reform as a IP regime. For more ambiguous cases or when less information is provided, we rely on additional sources such as the websites of consulting firms (e.g. PwC, EY, Deloitte), publications in official journals, newspaper articles, and supplementary online research. Table A1 presents our categorization, together with a short description and a concrete example for each category from our new database.

Figure A1: Extract from the 2016 Taxation Trends Report: Ireland

Description of measure	Change	Date
Personal income tax		
Increase in Home Carer Tax Credit (raised from EUR 810 to EUR 1 000 and income threshold from EUR 5 080 to EUR 7200)	Base decrease	In force from: 01/01/2016
Introduction of an Earned Income Credit for self-employed traders and business owners	Introduction (decrease)	In force from: 01/01/2016
Capital Acquisitions Tax - increase in tax threshold for parent to child gifts or inheritances from EUR 225 000 to EUR 280 000	Base decrease	In force from: 14/10/2015
Film Relief - Cap on eligible expenditure to be increased to EUR 70 million, subject to EU State Aid approval	Base decrease	Legislation:01/01/2016
Corporate income tax		
Knowledge Development Box - 6.25% corporate tax rate for profits from certain patents and copyrighted material resulting from R&D carried out in Ireland	Rate decrease	In force from: 01/01/2016
3 year relief for start-up companies	Base decrease	In force from: 01/01/2016
Tobacco excises		
Increase in tobacco products tax	Rate increase	In force from: 31/10/2015
Other, non-harmonised excises		
Motor Tax reduction for large vehicles	Rate decrease	In force from: 01/01/2016
Other types of tax		
Reduction in base and rates of the Universal Social Charge - USC rates were cut in each of the 3 lowest bands: from 1.5% to 1% for €0 to €12 012; from 3.5% to 3% for €12 013 to €18 668; and from 7% to 5.5% for €18 669 to €70 044. The entry level was raised from €12 012 to €13 000.	Both base and rate decrease	In force from: 01/01/2016
Tax relief for young farmers extended to 2018	Base decrease	Legislation:01/01/2016
Capital Gains Tax (CGT) Entrepreneur relief	Rate decrease	In force from: 01/01/2016

Source: DG Taxation and Customs Union.

Table A1: Description of Tax Reform Categories

	Category	Short Description	Example
1	Anti-tax avoidance reforms	Regulations to prevent profit-shifting such as: controlled foreign company rules, exit taxes, interest deduction limitations,thin-capitalization rules.	France 2014: Limitation of the deductibility of interest to 75%.
2	Cost-based investment regimes	Investment deductions, capital allowances for investment, depreciation schemes.	Ireland 2015: Removal of restriction on capital allowances on intangibles.
3	Research and Development regimes	Incentives and tax credits for research and development expenses.	Finland 2021: Additional 50% deduction for R&D costs of cooperation with research organizations in 2021-2025.
4	Intellectual property regimes	Reduced rate and favorable taxation of income from intellectual property regimes.	Poland 2019: Preferential taxation with the reduced 5% corporate income tax rate with reference to income derived from the qualified intellectual property rights.
5	Allowances for corporate equity regimes	Allowances on the cost of equity to correct for the bias that favors debt finance over equity.	Cyprus 2015: Notional Interest Deduction on equity capital up to 80% of taxable income on new equity capital introduced on or after 1 January 2015.
6	Loss carry regimes	Provisions allowing businesses to offset current profits with losses incurred in previous years.	Spain 2017: New limits to offset losses: 70% of tax base with a minimum of EUR 1 million.
7	Taxation of capital gains and dividends	Rules on the taxation of profits derived from the sale of assets (capital gains) and income distributed to shareholders as dividends.	Belgium 2018: Raising the dividend exemptions to 100% and abolishing the minimum rate for capital gains of large companies.
8	Withholding taxes on dividends, interests and royalties	Regulations specifying the withholding tax rates applicable to payments such as dividends, interests, and royalties made to non-resident entities.	Bulgaria 2015: Exemption from withholding tax on the interest and royalty payments made from a Bulgarian economic operator to associated companies of another Member State.
9	Other reforms	Reforms that do not fall into the other classifications such as deductions of specific business expenses (cars, restaurant, etc) and tax credits related to employment and social security contributions (e.g. staff training).	Austria 2014: Salaries above EUR 500.000 are no longer deductible from the Corporate Income Tax.

Anti-tax avoidance reforms   A significant part of the base-broadening reforms are anti-avoidance measures (54/113). These measures were enacted at the level of the OECD or the European Union, which led especially Poland (7), the Netherlands (6), Slovenia (4), and Finland (4), to introduce several anti-avoidance measures missing in their national legislation. In particular, one key regulation is the Council Directive 2016/1164, also referred to as the Anti Tax Avoidance Directive (ATAD), which contains a series of measures against tax avoidance including interest limitation rule, exit taxation rule, general anti-abuse rule and controlled foreign company rule. From 2016 to 2022, most of the anti tax avoidance reforms implemented are related to it.[15] We would assume that the impact of anti-avoidance measures on the average ETR is limited because they should in principle target only the most aggressive firms.

Cost-based investment incentives   Most of the tax base narrowing reforms implemented between 2014 and 2022 were cost-based investment incentives: Capital allowances or depreciation rules became more generous in Belgium, Czechia, Finland, Germany, and Poland. Also Luxembourg increased the tax credit for investments and Portugal relaxed the conditions for tax relief on reinvested earnings twice. In addition, several countries adopted incentives targeting more specific investment projects: Hungary introduced a tax incentive allowing companies to deduct the triple amount of investment into start-ups, made tax credits and tax-free provision for certain investment projects more generous, and relaxed depreciation rules for lump-sum depreciation. Poland introduced an additional write-off of robotization costs including tangible and intangible assets and training. Slovenia introduced a new tax allowance for investment into the green and digital transition. Slovakia introduced tax incentives for investment in industry 4.0 in 2022 (but tightened general depreciation rules in 2015). Since 2018, Lithuania allows companies investing in technological renewal to decrease their taxable profits by up to 100% of the investment amount instead of previously 50%. Additional temporary cost-based investment incentives were put in place in Cyprus in 2017 and during the pandemic in Belgium, Czechia, Finland, Germany, Italy, and Lithuania.

Some countries changed their capital allowances for intangible assets: Ireland removed the of restriction on the capital allowance on intangibles (2015) and reintroduced a limitation of 80% of the trading income later on. The cap of 80% on the amount of relief that may be claimed, indicates that the tax relief might be substantial in individual cases. Cyprus relaxed the rules for tax amortization of intellectual property. Spain made depreciation rules for intangible assets more generous in 2016, and tightened depreciation rules for tangible fixed assets.

R&D and Intellectual Property Regimes   Between 2014 and 2022, 10 member states have implemented or extended R&D tax incentives, sometimes several times. This is in line with a general upward trend in public support for private R&D over the last two decades, where direct government financing of R&D has remained broadly constant in % of GDP, but the indirect support in the form of tax incentives has increased (OECD, July 2024).[16]

Existing tax credits for R&D became more generous in Austria, Ireland, Spain and Italy which implemented additional temporary tax credits in 2020 and 2021. Finland introduced an additional 50% deduction for R&D costs of cooperation with research organizations and extended it to 150% in 2022. Poland introduced a new tax relief to incentivize employment

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[15]This finding gives credit to the idea that the EU institutions can limit to some extent the proliferation of harmful tax practices and limit the degree of tax competition in the European Union.

[16]Direct government funding of business R&D has remained at 0.08% of GDP since 2000 and R&D tax expenditure has increased from 0.01% in 2000 or 0.07 in 2014 to 0.1% in 2021 (OECD, July 2024).

in R&D activities and to support product development costs. In addition, existing R&D tax relief was made more generous so that companies can deduct up to 200% of R&D staff costs and other qualified costs. Slovakia introduced a R&D tax credit in 2015 and increased the deduction limit of 25% to 100% later on. Italy replaced the previous patent box regime with a cost-based incentive: Since 2021/22, 110% of the costs for R&D activities related to intellectual property such as software, patents, technical industrial know how, industrial designs and models can be recognized for tax purposes (PWC 2023).

A number of countries provide preferential tax treatment of income from intangible assets such as patents, software, and utility models with varying generosity. A total of 14 intellectual property regimes currently exist in the EU which tax eligible incomes at rates of 15% or less (Flamant *et al.*, 2021). Since 2022, Poland allows for a simultaneous use of R&D and IP Box relief which implies that companies can deduct R&D costs from taxable profits and pay lower tax on IP income.

Other reforms The second most frequent base-broadening measures concerned loss carry regimes. Greece, Latvia, Lithuania, Luxembourg, Slovakia, and Spain introduced general limitations for loss carryover, other countries adopted restrictions for more specific cases, e.g. impairment losses, group taxation or joint use with other tax incentives. Our category "other reforms" groups together reform measures that do not fit into the typical categories. These range from substantial reforms such as the introduction of a 0% statutory tax rate for reinvested profits in Latvia to likely less important deductions concerning staff training, marketing costs, the use of company cars or a threshold for the deductibility of top salaries.

A.2   Affiliates of Multinationals Corporations

In Table A2 below, we present the selection steps to create the final sample of affiliates of multinational corporations. We start from the universe of active affiliates in the European Union recorded in Orbis. Because we focus on private companies, we remove public authorities. In step 3, we select ultimate owners with at least two affiliates located in different Member States. This step ensures that we do not include purely domestic groups. We do however include domestic affiliates of domestic *multinational* groups. The next step is a key step in our analysis. In Orbis, multinational corporations report either consolidated accounts at the group level or unconsolidated accounts for each affiliate. The aim of this study is to investigate the impact of national tax base reforms on the effective tax rates of multinationals. Consequently, we opt to use unconsolidated accounts, as consolidated accounts encompass the dynamics of multiple countries, which would confound our investigation.

Table A2: Selection of Affiliates

	Selection Steps	No. Affiliates
	In Orbis	
1	Select active affiliates in the EU	14,267,810
2	Drop public authorities	13,441,624
3	Select ultimate owners with ≥ 2 affiliates in $2 \neq$ EU countries	890,061
4	Select affiliates with unconsolidated accounts	438,923
	Computing Effective Tax Rates	
5	Drop affiliates in non-relevant industries*	388,182
6	Select affiliates with > 0 profits and ≥ 0 taxes	317,306
7	Select affiliates with ETR $\leq 100\%$	315,496
8	Select affiliates with ≥ 2 observations	260,299

Notes: This table presents the selection steps to create the final sample of affiliates. Affiliate definition: a company is identified as an affiliate if it has a shareholder with over 50% ownership, disregarding aggregated unnamed private shareholders and the public for listed companies. Ultimate owner definition: the ultimate owner is defined as the shareholder that ultimately owns over 50% of the affiliate, either directly or indirectly, and that is itself not majority owned by another shareholder. Non-relevant industries: financial and insurance companies, public administrations and defence, compulsory social security, household activities, extraterritorial organizations. Source: data downloaded on June 20, 2024 from the Bureau van Dijk website.

Following the common practices in the literature, we apply additional selection steps to compute the effective tax rates. First, we exclude the financial sector, public administration and defense, compulsory social security, household activities, and extraterritorial organizations. Then, we keep observations of affiliates reporting null or positive corporate taxes, and strictly positive profits before taxes. This selection step allows us to include profit-making affiliates paying zero corporate taxes. For our descriptive analysis, we exclude affiliates that appear only once in our sample. For our regression analysis, we use a balanced sample of affiliates that report a positive effective tax rate every year from 2014 to 2022.

Our final sample is an unbalanced panel of 260,299 affiliates, representing 1,439,830 observations over the period from 2014 to 2022. In Table A3, we present the number of affiliates and observations by country, along with the average duration an affiliate remains in the sample. Notably, the number of affiliates per country exhibits considerable variation, ranging from 500 in Cyprus to 39,762 in France. On average, an affiliate remains in our sample for 5.4 out of 9 years, though this duration fluctuates from 3.2 years in Cyprus to 6.5 years in Hungary.

Table A4 reports summary statistics of the average affiliate by country for the year 2022. We observe large variations in the average revenues, profits, tangible assets, employees, and effective tax rates of affiliates across countries. Affiliates in the Netherlands, Luxembourg, and Ireland report the highest average revenues, with € 378 million, € 283 million, and € 248 million, respectively. Conversely, affiliates in Latvia and Slovakia report the lowest revenues at € 15 million both. The highest average profits are recorded in Ireland (€ 46 million), the Netherlands (€ 28 million), and Luxembourg (€ 19 million). Ireland is also by far the first country in terms of tangible assets (€ 483 million), followed by Luxembourg (€ 278 million),

and the Netherlands (€ 259 million), suggesting that tangible assets tend to follow profits.

Looking at effective tax rates, 9 countries have an average effective tax rate below 15%, led by Latvia (8.9%), Estonia (10.3%), Hungary (10.6%), and Bulgaria (10.8%). On average, the effective tax rates weighted by profits are lower, suggesting that affiliates booking more profits pay proportionally less corporate income taxes. The average macroeconomic effective tax rate of affiliates in the EU is 15.5, which is very close to the minimum 15% effective tax rate implemented by the Pillar 2 Directive. The difference is particularly high in countries with high statutory rates such as France (3.8), Germany (6.7pp), Italy (5.5pp) and Denmark (8pp); and in Belgium (10.2pp), Ireland (6.6pp), and Luxembourg (6pp).

The list of variables from the Orbis database and their definitions are presented hereafter: Turnover (OPRE) are the sum of net sales excluding value-added taxes, other operating revenues, and stock variations. Profits before taxes (PLBT) are the sum of operating and financial profits (profits resulting from all financial activities of the affiliate). Operating profits (EBIT) correspond to the earnings before interest and taxes, and are equal to the operating revenues minus the cost of goods sold and other operating expenses. Tangible assets (TFAS) include all tangible assets such as buildings, land, machinery, furnishings, etc. Finally, corporate income taxes (TAXA) include all corporate taxes paid, accrued, or deferred, during the accounting period.

Table A3: Sample of Affiliates from Orbis

	Affiliates	Affiliates (%)	Observations	Observations (%)	Av. # Years in Sample
Austria	4,053	1.56	23,086	1.60	5.70
Belgium	12,688	4.87	78,689	5.47	6.20
Bulgaria	6,342	2.44	31,610	2.20	4.98
Croatia	2,558	0.98	15,060	1.05	5.89
Cyprus	500	0.19	1,618	0.11	3.24
Czechia	14,750	5.67	75,217	5.22	5.10
Denmark	11,324	4.35	49,081	3.41	4.33
Estonia	1,490	0.57	7,987	0.55	5.36
Finland	6,178	2.37	37,982	2.64	6.15
France	39,762	15.28	213,825	14.85	5.38
Germany	14,680	5.64	78,872	5.48	5.37
Greece	1,147	0.44	7,144	0.50	6.23
Hungary	3,336	1.28	21,558	1.50	6.46
Ireland	4,231	1.63	20,235	1.41	4.78
Italy	31,983	12.29	188,310	13.08	5.89
Latvia	3,187	1.22	14,929	1.04	4.68
Lithuania	2,618	1.01	13,336	0.93	5.09
Luxembourg	1,427	0.55	5,853	0.41	4.10
Malta	721	0.28	3,222	0.22	4.47
Netherlands	4,284	1.65	22,031	1.53	5.14
Poland	14,585	5.60	80,069	5.56	5.49
Portugal	8,326	3.20	49,195	3.42	5.91
Romania	11,122	4.27	64,607	4.49	5.81
Slovakia	15,793	6.07	82,977	5.76	5.25
Slovenia	1,854	0.71	11,178	0.78	6.03
Spain	21,732	8.35	125,869	8.74	5.79
Sweden	19,628	7.54	116,290	8.08	5.92
EU 27 Simple Av.	260,299	100.00	1,439,830	100.00	5.36

Notes: This table presents the unbalanced sample of affiliates from the Orbis database. The total number of affiliates and observations per country is reported, together with the average number of years an affiliates remains in the sample, the maximum possible being 9 years.

Table A4: Summary Statistics on Affiliates

	Turnover	Net Profits	Net Tax Liability	Tangible Assets	Simple ETR	Weighted ETR	Statutory Tax Rate	# Affiliates
Austria	163.24	12.04	2.59	108.42	23.1	21.5	25.0	2,914
Belgium	109.65	5.13	0.78	74.16	25.4	15.2	25.0	9,406
Bulgaria	71.78	5.85	0.61	46.42	10.8	10.5	10.0	878
Croatia	16.14	1.38	0.22	15.05	15.3	15.7	18.0	1,974
Cyprus	179.29	15.56	1.69	72.07	10.0	10.9	12.5	56
Czechia	46.22	3.16	0.58	37.08	20.4	18.5	19.0	8,419
Denmark	196.35	9.03	1.11	51.27	20.3	12.3	22.0	8,815
Estonia	19.13	1.85	0.14	15.71	10.3	7.5	20.0	1,026
Finland	45.68	4.81	0.57	47.21	13.8	11.8	20.0	4,479
France	73.52	8.22	1.13	84.93	17.6	13.8	25.8	23,518
Germany	216.42	15.99	2.73	167.91	23.8	17.1	29.8	7,844
Greece	81.06	6.85	1.74	76.84	22.9	25.4	22.0	885
Hungary	58.10	3.56	0.28	45.69	10.6	8.0	10.8	2,588
Ireland	247.84	46.12	4.32	482.51	16.0	9.4	12.5	2,570
Italy	56.79	4.71	1.21	65.48	31.3	25.8	27.8	23,111
Latvia	14.86	1.19	0.07	8.76	8.9	5.9	20.0	1,713
Lithuania	24.83	2.25	0.25	17.60	14.8	11.0	15.0	2,041
Luxembourg	282.95	19.17	2.53	277.61	19.2	13.2	24.9	578
Malta	28.95	8.45	1.72	38.99	24.3	20.4	35.0	35
Netherlands	377.75	28.34	6.58	259.44	22.1	23.2	25.8	2,182
Poland	53.46	3.81	0.66	45.59	19.4	17.2	19.0	10,484
Portugal	26.75	2.72	0.58	28.08	22.4	21.3	31.5	6,132
Romania	23.77	1.98	0.26	16.49	13.2	13.2	16.0	8,261
Slovakia	15.24	1.08	0.26	12.58	20.9	24.1	21.0	9,661
Slovenia	25.96	1.58	0.23	18.59	16.3	14.3	19.0	1,550
Spain	67.33	6.00	1.34	68.16	24.0	22.4	25.0	14,587
Sweden	31.23	4.65	0.43	38.03	13.6	9.3	20.6	14,702
EU-27 av.	94.60	8.35	1.28	82.25	18.2	15.5	21.2	6,311

Notes: This table presents summary statistics for the average affiliate within each country in 2022. Net profits, net tax liability, and tangible assets are in million euros. The simple effective tax rate is the simple average of the effective tax rate of affiliates. The weighted effective tax rate is the ratio between total net tax liability and total net profits of affiliates within each country. The statutory tax rate is the top rate faced by corporations at the central level, including surtaxes. The last column is the number of a affiliates in sample in 2022. The last row is a simple average across the 27 Member States.

A.3 Additional Data Sources

The political and macroeconomic variables used in the analysis of the determinants of corporate tax reforms come from the Comparative Political Data Set (Armingeon *et al.*, 2023). This dataset includes political and institutional variables at the country level over time. Specifically, it includes the political orientation of governments. This variable is based on the share of cabinet posts held by left-wing parties, weighted by the number of days spend in office during a given year. This variable originally included five categories reflecting the hegemony, dominance, or balance of power among right-wing (and centre) parties and left-wing (and social-democratic) parties. However, to simplify the analysis, we streamline these categories into three broad classifications. The simplified categorization is as follows: a government is labeled right-wing if less than one-third of cabinet posts are occupied by left-wing parties, and left-wing if more than two-thirds of cabinet posts are held by left-wing parties. If this share falls between one-third and two-thirds, it is classified as a bipartisan government as there is a relative balance of power between right-wing and left-wing parties. This allocation rule is summarized bellow:

$$\text{Political orientation} = \begin{cases} \text{Right-wing,} & \text{if } S_{left} \leq 33.33\% \\ \text{Bipartisan,} & \text{if } 33.33\% < S_{left} < 66.67\% \\ \text{Left-wing,} & \text{if } S_{left} \geq 66.67\% \end{cases} \tag{5}$$

where S_{left} is the share of cabinet posts occupied by left-wing parties. Figure A2 illustrates the evolution of the political orientation of EU governments from 2014 to 2022. The overall trend in the European Union shows an increase in the number of right-wing governments, rising from 11 in 2014 to 16 in 2022. Meanwhile, bipartisan and left-wing parties have seen their presence decreasing, going down from 8 to 4, and 8 to 5 governments, respectively.

Figure A2: Political Orientation of Governments in the European Union
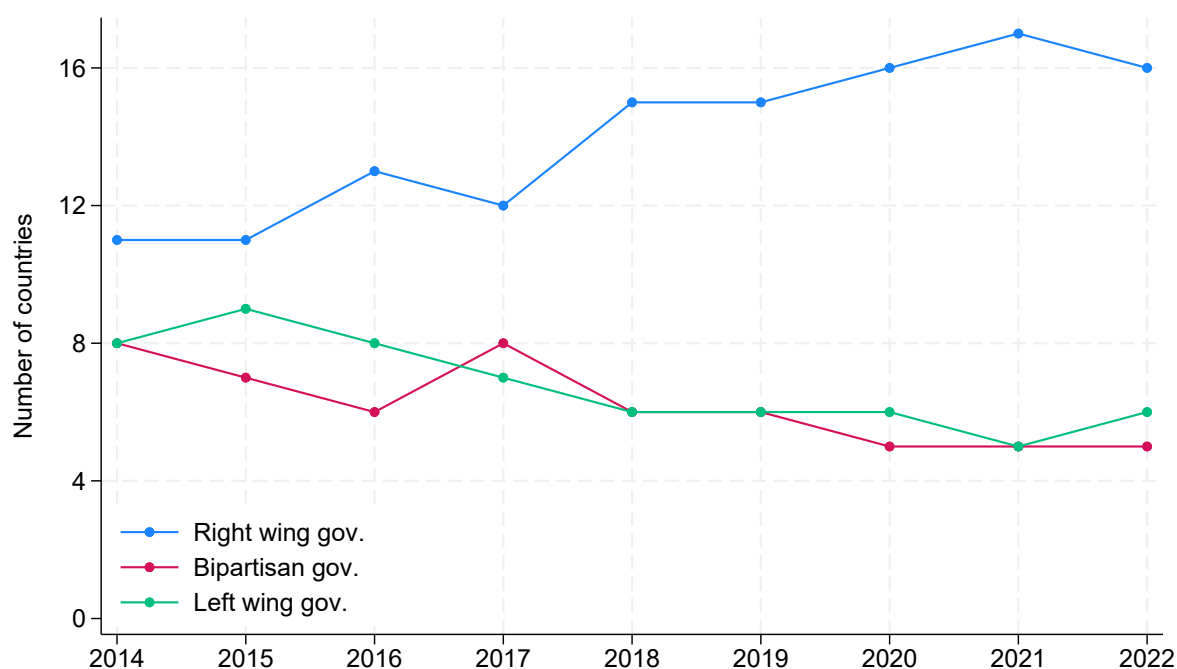
Notes: This figure plots the political orientation of governments in the European Union from 2014 to 2022.

In addition to the political orientation of government, we select the following macroeconomic variables: real GDP growth (% change of GDP), public deficit (in % of GDP), current account balance (the sum of net trade, net income abroad, and net current transfers, in % of GDP), and unemployment rate (in % of civilian labor force). Table A4 presents the summary statistics.

Table A5: Summary Statistics for Macroeconomic Variables

	Mean	SD	Min	Median	Max
Real GDP growth	2.79	3.92	-10.82	2.87	25.36
Public deficit	-2.45	3.10	-11.39	-2.10	3.78
Current account	1.65	3.98	-11.36	1.20	12.50
Unemployment rate	7.79	4.20	2.00	6.80	26.60

Notes: This table presents summary statistics for the following macroeconomic variables: real GDP growth, public deficit, current account balance, and unemployment rate.

B Additional Results Appendix

B.1 Additional Descriptive Results

Figure B1: Alternative Effective Tax Rates of Affiliates
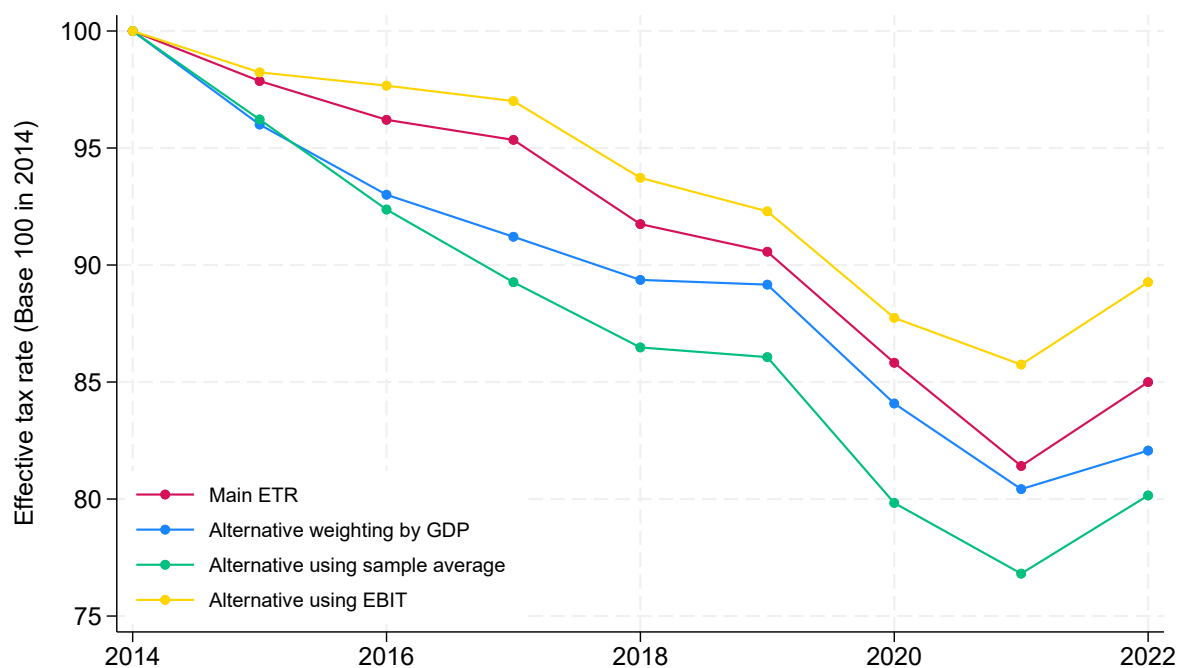
Notes: This figure plots alternative trends in effective tax rates for our sample of affiliates in the European Union. For comparison, the red curve is the same effective tax rate as presented in Figure 4. It is computed as follows: in each country, the simple average of the effective tax rates of affiliates is computed, then, the simple average of the countries' effective tax rates is computed. For the blue curve, countries' effective tax rates are weighted by GDP, effectively giving a higher weight to large economies. For the green curve, the effective tax rates are averaged across all our sample in one shot, independently of the country of location of the affiliates. Finally, for the yellow curve, the calculation steps are identical to the main effective tax rate, but the effective tax rate is computed as the ratio between the taxes paid and the earnings before interest and taxes (EBIT), thus excluding financial profits from the computation.

Table B1: Categories of Tax Reforms by Party

	Right wing gov.		Bipartisan gov.		Left-wing gov.	
	+	-	+	-	+	-
Base Reforms	64	83	24	39	25	19
Anti-tax avoidance regulations	28	0	15	0	11	0
Cost-based investment regimes	6	22	0	12	3	4
Research and Development regimes	3	10	0	7	0	2
Intellectual Property regimes	3	8	1	1	0	2
Allowances for Corporate Equity regimes	2	4	0	1	0	1
Loss carry regimes	9	3	3	3	5	1
Taxation of capital gains and dividends	3	4	1	2	1	1
Withholding taxes on dividends, interests, and royalties	2	2	0	1	0	0
Other reforms	8	30	4	12	5	8
Statutory Rate Reforms	2	16	6	9	2	6
Total Number of Reforms	66	99	30	48	27	25

Notes: This table presents the number of reforms, their direction, and their category, implemented by right-wing, bipartisan, and left-wing governments. Note that this table presents absolute numbers, which are different from our Figure 3, where we divide these numbers by the year in office. The table can be read as follows: between 2014 and 2022, right-wing governments in the EU implemented 8 base narrowing intellectual property reforms.

Table B2: Contribution of Tax Reforms to the Decline in ETR

	ETR Decline (pp)	Tax Revenue Loss (bn €)	Tax Revenue Loss (% collected)
Observed	2.5	37.4	8.2
Predicted by the model	1.8	18.6	4.1
Corporate tax reforms	1.5	15.7	3.5
Statutory rate changes	*0.9*	*9.8*	2.2
Base narrowing reforms	*2.1*	*26.6*	5.9
Base broadening reforms	*-1.5*	*-20.7*	-4.6
Other controls	0.3	2.9	0.6
Unexplained by the model	0.7	18.8	4.1

Notes: The table presents the predicted cumulated effect of reforms on the ETR paid by affiliates of MNEs and the predicted cumulated revenue losses between 2014 and 2022 in absolute values and in % of total tax revenues collected from the sample affiliates.

Table B3: Determinants of Tax Base Reforms by Category

	(1) Anti-avoidance up	(2) Carry regimes up	(3) Other up	(4) Investment incentives down	(5) IP regimes down	(6) Other down
EU Tax Competition						
Lag dist. av. effective rate	1.009	1.051	0.960	1.044	1.108	1.000
	(0.031)	(0.057)	(0.036)	(0.041)	(0.093)	(0.033)
National Politics						
Bipartisan gov.	1.176	0.548	1.091	1.297	0.515	0.804
	(0.549)	(0.507)	(0.963)	(0.594)	(0.590)	(0.400)
Left wing gov.	0.687	0.133	1.238	0.359	0.480	0.751
	(0.380)	(0.192)	(0.945)	(0.249)	(0.480)	(0.429)
Macroeconomic Conditions						
Lag real GDP growth	1.052	0.862*	0.977	0.939	1.246***	1.050
	(0.038)	(0.070)	(0.038)	(0.040)	(0.068)	(0.047)
Lag public deficit	1.013	1.225**	1.158**	0.862**	1.005	0.867***
	(0.062)	(0.108)	(0.081)	(0.050)	(0.125)	(0.048)
Lag current account	1.066	1.245**	1.060	1.081	0.879	1.024
	(0.067)	(0.127)	(0.095)	(0.053)	(0.074)	(0.049)
Lag unemployment rate	0.926	1.169**	1.161***	1.001	1.000	0.949
	(0.072)	(0.085)	(0.066)	(0.054)	(0.078)	(0.054)
Observations	213	213	213	213	213	213

Notes: This table presents estimates from the regression in Equation 2 for selected categories of base broadening and base narrowing reforms. We restrict to categories with at least 10 reforms implemented during 2014-2022. Standard errors are robust to heteroskedasticity. The sample is a simple cross section of 213 country × year observations. The coefficients are in odd ratios. A logistic regression model is used. The dependent variable is a dummy equal to one if the following reforms have been implemented: Anti-avoidance measures (Column 1), broadening loss-carry regimes (2) other base broadening measures (3), base narrowing investment incentives (4), base narrowing intellectual property regimes (5), and other base narrowing reforms (6). Anti-avoidance measures exclude regulations enacted upon the initiative of the European Union or the OECD.

B.2 Robustness Checks

One might be worried that including financial profits in the denominator could bias effective tax rates, because intra-company dividends are partly exempted from taxation while interest received are not. As these two types of income cannot be distinguished in the profits before taxes variable, we compute alternative effective tax rates based on operating profits (EBIT) only. The regression results using this alternative measure are reported in Table B4. Using alternative effective tax rates, the coefficient for the statutory rate that not change. However, the absolute value of base change coefficients is smaller. In Column (2), the coefficient for base changes is 0.27, while it was 0.38 in our main results. When including the control variables the coefficient for base broadening measures is 0.27 instead of 0.37, but remains non significant. Similarly, the coefficient for base narrowing measures is -0.26, instead of -0.38, and is significant at the 5% level.

Table B4: Robustness Checks for Affiliate-level ETRs: Alternative ETRs

	(1)	(2)	(3)
Corporate tax rate	0.200***	0.200***	0.207***
	(0.057)	(0.057)	(0.058)
Cum. base changes	0.271**		
	(0.113)		
Cum. base broadeners		0.278	0.272
		(0.180)	(0.179)
Cum. base narrowers		-0.271**	-0.264**
		(0.110)	(0.109)
Real GDP growth			0.023
			(0.061)
Log assets			-1.064***
			(0.189)
Log revenues			0.196
			(0.162)
Observations	351,711	351,711	351,711

Notes: This table presents the regression results for affiliate-level effective tax rates using operating profits. The balanced sample is reduced to 39,079 affiliates as EBIT are available less systematically than profits before taxes.

As discussed above, by simply counting the reforms implemented, we can only capture changes in the corporate tax systems at the extensive margin. As simply put by Kawano and Slemrod (2016): "we know whether a given aspect was changed but not how much it changed". To address this limitation, we conduct several robustness checks, including or excluding specific categories of reforms that may influence the results. In particular, anti-avoidance reforms primarily target aggressive multinationals and may have a limited impact on the average affiliate in our sample. Likewise, we suspect that reforms classified under "Other Reforms" have a relatively small effect on effective tax rates.

Table B5 presents our robustness checks. Columns (1) to (3) display our main results

for comparison. The next three columns include withholding tax reforms into the cumulative tax base changes, while columns (7) to (9) exclude anti-avoidance measures. The final three columns exclude reforms categorized as "Other Reforms". Our robustness checks reveal that including withholding taxes decreases the coefficient for base-broadening reforms from 0.37 to 0.18, while excluding anti-avoidance reforms increases this coefficient to 0.46. In contrast, excluding "Other Reforms" primarily affects the coefficient for base-narrowing measures, reducing it from -0.38 to -0.66. This suggests that reforms falling in this category have been less intensive on average.

Table B5: Robustness Checks for Affiliate-level ETRs: Alternative Count of Reforms

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Main			Incl. Withholding Taxes			Excl. Anti-Avoidance			Excl. Other Reforms		
Corporate tax rate	0.210***	0.210***	0.216***	0.183***	0.182***	0.188***	0.233***	0.240***	0.246***	0.192***	0.196***	0.201***
	(0.066)	(0.067)	(0.067)	(0.067)	(0.065)	(0.066)	(0.069)	(0.078)	(0.079)	(0.068)	(0.065)	(0.067)
Cum. base changes	0.382**			0.275**			0.371**			0.586**		
	(0.150)			(0.128)			(0.150)			(0.270)		
Cum. base broadeners		0.369	0.365		0.181	0.178		0.462	0.459		0.344	0.338
		(0.245)	(0.243)		(0.160)	(0.159)		(0.339)	(0.338)		(0.263)	(0.262)
Cum. base narrowers		-0.384***	-0.377***		-0.313**	-0.307**		-0.363**	-0.358**		-0.675**	-0.663**
		(0.145)	(0.145)		(0.130)	(0.130)		(0.141)	(0.142)		(0.275)	(0.274)
Real GDP growth			0.015			0.011			0.018			-0.001
			(0.074)			(0.082)			(0.077)			(0.078)
Log assets			-0.858***			-0.885***			-0.870***			-0.884***
			(0.126)			(0.129)			(0.132)			(0.129)
Log revenues			0.041			0.045			0.049			0.064
			(0.121)			(0.121)			(0.123)			(0.124)
Observations	373,599	373,599	373,599	373,599	373,599	373,599	373,599	373,599	373,599	373,599	373,599	373,599

Notes: This table presents the regression results for affiliate-level effective tax rates using operating profits. The sample is a balanced sample of 41,511 affiliates in the European Union over the period 2014-2022. In each specification, affiliate fixed effects and year fixed effects are included. Standard errors are clustered at the country × year level. Loss carry regime reforms are excluded from the cumulative base changes coefficients. Latvia is excluded, and Denmark is missing.
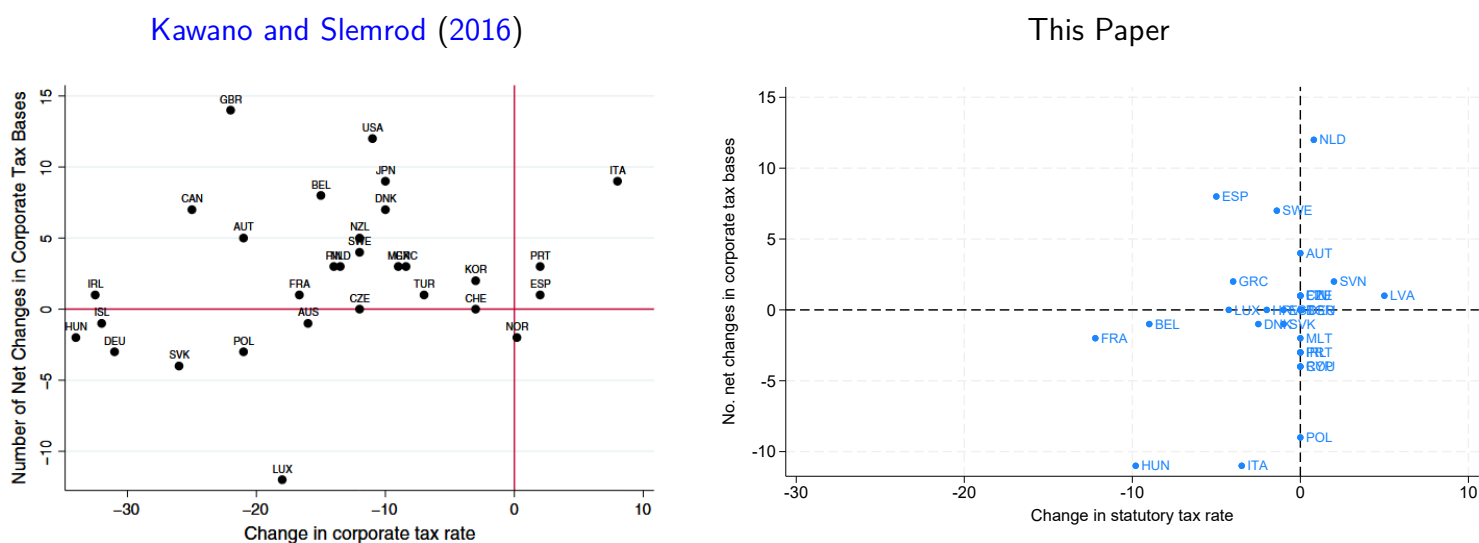
B.3 Comparison with Kawano and Slemrod (2016)

Kawano and Slemrod (2016) are the first to reexamine the relationship between tax rates and tax revenues taking into account simultaneous changes in base definitions. In this subsection, we compare our methodology and our results to their paper.

Their analysis covers OECD countries from 1980 to 2004, while we focus on EU countries from 2014 to 2022. They identify a clear trend in corporate tax policy among nearly all OECD countries at the end of the 20th century: a simultaneous reduction in statutory tax rates and broadening of the tax base, commonly referred to as the "cut rate - broaden base" approach. In contrast, our findings indicate that this pattern has disappeared in EU countries over the past decade.

Figure B2 replicates Figure 1 from their paper on the left, and Figure 2 from this paper on the right, with rescaling to enable direct comparison. For their sample and period of time, most countries are located in the top left corner of the figure, very often with rate cuts above 10 percentage points.[17] In our case, with the exception of France and Hungary, the change in statutory rates as remained limited below 10 percentage points. Countries rather adjust the definition of their tax base in both directions, ending the "cut rate - broaden base" approach.

Figure B2: Statutory Rate and Base Changes

Kawano and Slemrod (2016)   This Paper

Notes: The panel on the left of this figure is a replication of Figure 1 in Kawano and Slemrod (2016), while the panel on the right is a replication of our Figure 2, with the x-and y-axes rescaled in order to allow for a direct comparison. Both figures plot the number of net changes in corporate tax bases against the change in statutory tax rate in percentage points.

One important contribution of their paper is to document the frequency, and simultaneity of tax base changes. For comparison, we present their main findings in Table B6 alongside results for our sample and time period. The table highlights a shift in tax policy trends: EU countries from 2014 to 2022 are more likely to implement base reforms and less likely to adjust statutory rates compared to OECD countries from 1980 to 2004. The frequency of

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[17]It should be noted that they cover 25 years while we cover only 9. Thus countries in their sample have more time to implement their tax policy, which could lead to higher absolute changes in statutory rates and base reforms.

base changes has risen from 44% to 50%, while the frequency of rate changes has declined from 26% to 17%. As a result, the likelihood of a rate change combined with a stable base has decreased from 12% to 7%, whereas the likelihood of a base change with a stable rate has increased from 33% to 40%. Another notable shift is the increased simultaneity of base changes, with multiple base-narrowing measures rising from 6% to 14%. Finally, the likelihood of a base-narrowing reform occurring conditionally on both a rate hike or a rate cut has increased, from 16% to 40%, and from 26% to 36%, respectively.

Table B6: Frequency of Statutory Rate and Tax Base Changes

	Kawano and Slemrod (2016)	This Paper
Base Change Frequency		
Base change	44.1	49.8
of which base broadening	56.9	44.5
of which base narrowing	43.1	55.5
Rate Change Frequency		
Rate change	26.1	16.9
of which rate hike	21.6	24.4
of which rate cut	78.4	75.6
Simultaneity of Rate & Base Changes		
Base change & Rate change	13.7	10.3
Base stable & Rate change	12.3	6.6
Base change & Rate stable	33.4	39.5
Base stable & Rate stable	40.5	43.6
Simultaneity of Base Changes		
Both directions	8.3	12.8
Multiple base broadening	8.7	8.6
Multiple base narrowing	6.3	13.6
Likelihood of Base Change		
Conditional on stable rate	45.2	47.5
Conditional on changing rate	52.6	61.0
Likelihood of Base Change Conditional on Rate Hike		
Base change	51.4	70.0
Base broadening	37.8	30.0
Base narrowing	16.2	40.0
Likelihood of Base Change Conditional on Rate Cut		
Base change	53.0	58.1
Base broadening	36.6	41.9
Base narrowing	26.1	35.5

Notes: This table presents the frequency of tax base and statutory tax rate changes for our sample of country × year observations on the right, versus for the sample in Kawano and Slemrod (2016). Numbers displayed are in percent of the country × year observations. The table can be read as follows: a change in base definition occurred 44.1% of the times for OECD countries in 1980-2004, but 49.8% of the times for EU countries in 2014-2022. The number of country × year observations in Kawano and Slemrod (2016) is 656, while it is 243 for our sample.

A key methodological difference between their analysis and this paper at hand lies in how reforms are accounted for. To capture changes in the base definition, they employ a -1;+1

system, assigning each country-year observation a value between -1 and 1 for each identified reform category. Unlike their approach, we do not limit the count of each reform category to one per observation. For instance, if a country implemented two R&D base-broadening reforms in the same year, we allow both to be counted. Additionally, we explicitly account for the temporary nature of some measures, removing them from the cumulative variable once they expire. This is an important adjustment for our paper given that many COVID-19 measures implemented in 2020 are temporary.

For comparison, we apply their methodology and re-estimate the effective tax rate regressions. Table B7 presents the results: Column (1) shows estimates based on our methodology, while Column (2) reflects their approach. Interestingly, the tax base change coefficients are highly similar and statistically significant at the 5% level. Using their measure, the coefficient for the statutory rate decreases slightly from 0.21 to 0.19 but remains very close to our original estimate.

Table B7: Regression Results using Kawano and Slemrod (2016) Measure

	(1)	(2)
Corporate tax rate	0.210***	0.191***
	(0.066)	(0.064)
Cum. base changes	0.382**	
	(0.150)	
Cum. base changes (KS 2016)		0.385**
		(0.163)
Observations	373,599	373,599

Notes: This table reports regression results for affiliate-level effective tax rates. The sample is a balanced sample of 41,511 affiliates in the European Union over the period 2014-2022. In both specifications, affiliate fixed effects and year fixed effects are included. Standard errors are clustered at the country $\times$ year level. Withholding tax reforms and loss carry regimes are excluded from the cumulative base changes coefficients. Latvia is excluded, and Denmark is missing.