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The Impact of the Global Tax Reforms on Ireland's Attractiveness to Foreign Direct Investment and the Wider Economy

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Abstract

This paper explores the possible effects of the global tax reforms on Ireland's attractiveness to foreign direct investment (FDI) and FDI-related employment. We use data on new greenfield FDI in Ireland and other EU countries over 2011-2020 and estimate a range of possible outcomes on Ireland's attractiveness to FDI and FDI-related new jobs in the medium and long term. Relative to a situation of no change in the effective corporate tax rates in Ireland and other EU countries, we estimate that the global minimum effective corporate tax of 15 percent could result in a lower number of new FDI projects coming to Ireland by 3.4 percent over three years and 3.8 percent over ten years while the corresponding volume of new FDI invested could be lower by 12.3 percent after three years and by 14.6 percent after ten years. Further, we estimate that the number of FDI-related new jobs associated with the number of new FDI projects, could be lower by 2.7 percent over three years and by 3.0 per cent over ten years while the number of FDI-related new jobs associated with the new FDI invested could be lower by 3.3 percent after three years and by 5.7 percent after ten years.

1   Introduction

Foreign direct investment by multinational enterprises is crucially important for Ireland's economy. Foreign-owned enterprises are highly productive and account for substantial shares of gross value added (GVA), business expenditures on research and development (R&D), innovation outputs, exports, tax revenues and jobs. The importance of FDI for Ireland's economy is evident when looking at key business sector indicators.

Recently published research on the contribution of multinational enterprises to the Irish economy finds that, in 2021, the multinational sector accounted for 29% of the National Income and a third of the wage bill (FitzGerald, 2023). A recent report published by Ireland's Central Statistics Office (CSO, 2023a) highlights the substantial contribution foreign-owned enterprises make to the Irish economy: in 2021, foreign-owned enterprises were five times more productive than domestic firms and they accounted for 95% of GVA in manufacturing and 49% of GVA in services. Data released by the CSO on Business Expenditures on Research and Development (CSO, 2023b) finds that in 2021 almost 70% of R&D expenditures in the business sector (€2.7 bn) were by foreign-owned enterprises; foreign-owned enterprises accounted for 76.1% (€2.35 bn) of the R&D expenditures by the top 100 enterprises (which accounted for almost 80% of all R&D expenditures in Ireland). Survey data on innovation activities by enterprises show that in 2020, 72.4% of foreign-owned enterprises with 10 or more persons engaged had technological innovation activities (compared to 51.2% of Irish-owned enterprises). Foreign-owned enterprises accounted for 73% of innovation expenditures in Ireland (€5.4 bn) and for almost three-quarters of Ireland's exports, with IDA-supported foreign-owned companies representing around 72% of all exports in 2020 (IDA, 2023). In terms of employment, at the end of 2019, IDA supported foreign-owned companies employed over 257,397 people representing 12% of Ireland's workforce. According to the IDA, for every ten jobs created by IDA-supported foreign-owned enterprises, eight jobs were created in the Irish economy in multiple sectors. In terms of tax revenues, foreign-owned enterprises resident in Ireland paid €19.6 billion in corporate tax in 2022, accounting for 86.5% of the net corporate tax receipts (McCarthy, 2023).

Following on from the theory of investment (Hall and Jorgenson, 1967), corporate taxation affects investment through two channels: (i) the cost of capital – corporate taxes increase the cost of capital and reduce the number of viable investment projects; (ii) corporate taxes reduce the cash flow and reduce investment by liquidity constrained firms.

A large body of international evidence indicates that investment by multinationals in a given jurisdiction is negatively affected by increases in the effective corporate tax rates in that jurisdiction (de Mooij and Everdeen, 2003, 2008; Davies et al., 2021). However, recent research indicates that the sensitivity of investment to corporate tax is heterogeneous: larger MNEs are less responsive (Davies et al., 2021; Hanappi et al, 2023); most and least profitable MNEs are less responsive (Millot et al., 2020). The tax sensitivity of investment varies also across industries and age groups (Vartia, 2008; Schwellnus and Arnold, 2008; Fuest et al., 2018; Federici and Parisi, 2015). More intangible-intensive firms (with intangible assets more than 10% of total fixed assets) have become less sensitive to corporate taxation compared to other firms after 2009 (González Cabral et al. 2023). International evidence indicates that in response to tax increases in host jurisdictions, MNEs reallocate economy activity within the group across countries (Becker and Riedel 2012). Further evidence (Bena et. al, 2020) indicates that economic conditions in a given jurisdiction where a MNE operates can affect economic activities of that MNE across other locations.

Intensified tax competition and cross-border profit shifting in the context of increased globalisation and digitalisation have resulted in calls for reforming the international corporate tax system, especially

in the aftermath of the global financial crisis. A major reform of the international corporate tax system has been agreed in 2021 as part of the OECD/G20 Inclusive Framework on Base Erosion and Profit Shifting (BEPS). The key components of this agreement are set out in the *Statement on a Two-Pillar Solution to Address the Tax Challenges Arising From the Digitalisation of the Economy* issued on 1 July 2021.[2] The agreed framework for global tax reforms consists of two Pillars: Pillar One establishes rules for the reallocation of taxing rights to the market jurisdictions where they have a significant economic presence; Pillar Two establishes a coordinated common approach to a global minimum effective corporate tax rate. Details of the established rules as part of the Inclusive Framework 2021 are given in Box 1.

Box 1: The Global Tax Reforms

The OECD/G20 Inclusive Framework (IF) on Base Erosion and Profit Shifting agreed in 2021 and signed by 139 countries (as of 9 June 2023) consists of two Pillars.

Pillar One establishes rules for the reallocation of a portion of taxing rights to market jurisdictions. While the implementation of Pillar One of the global tax reforms will impact on tax revenues collected in each of the signatory countries, it is seen unlikely to affect investment decisions in a significant way (UNCTAD 2022). At this point in time, it covers just over 100 very large multinational enterprises with turnover of at least €20 billion (this turnover threshold is foreseen to be lowered to €10 billion following a review after 7 years) in sectors other than the natural resources and financial sectors. The implementation of Pillar One will result in the allocation of 25 percent of profits exceeding a 10 percent return on revenue to market jurisdictions ("Amount A"). The taxing right in the market jurisdiction is not dependent on the multinational enterprise having a physical presence (i.e., a permanent establishment). Taxable profits are determined on a group basis (rather than applying transfer prices to single entities). As Pillar One also includes rules to relieve double taxation (allocation of income and responsibility for eliminating double taxation will be achieved on a group jurisdictional basis). The agreement also requires countries to remove and not introduce new unilateral digital services taxes (DSTs) and similar measures. Furthermore, Pillar One includes a simplification of the arm's length principle applied to marketing and distribution ("Amount B").

Pillar Two establishes a *common approach basis* for a global minimum 15 percent effective corporate tax to be applied to multinational enterprises having a global turnover greater than €750 million. The minimum 15 percent effective corporate tax will apply to excess profits in each country in which the multinational enterprise operates; excess profits are profits above a substance-based income exclusion defined as a return of 10 percent of payroll and 8 percent of tangible assets (the income to be excluded is envisaged to fall to a return of 5 percent of payroll and 5 percent of tangible assets over 10 years). It is envisaged that the minimum tax will be implemented through three interrelated tax rules (IMF 2023):

• **An "income inclusion rule" (IIR)** will subject the foreign-earned profits of multinational enterprises to a top-up tax in their residence country if they are effectively taxed below the 15 percent minimum rate in any jurisdiction. The application of the IIR can be pre-empted in source jurisdictions by implementing a *qualified domestic minimum top-up tax* (QDMTT), based on the same scope and rates as the IIR.

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[2] Available at https://www.oecd.org/tax/beps/statement-on-a-two-pillar-solution-to-address-the-tax-challenges-arising-from-the-digitalisation-of-the-economy-july-2021.pdf.

• An **"undertaxed profits rule" (UTPR)** will allow source countries to apply a top-up tax (for example, by denying tax deductions) if no IIR or QDMTT applies. These tax rules are jointly known as the Global Anti-Base Erosion (GloBE) rules.

• A **"subject to tax rule" (STTR)** is a treaty-based rule allowing source jurisdictions to impose limited source taxation (for example, withholding taxes) on certain related-party payments subject to tax below a minimum rate of 9 percent.

In case more than one rule applies, the STTR has priority, followed by the QDMTT, the IIR, and the UTPR.

The common approach basis of Pillar Two means that its implementation is not mandatory. However, the above rules incentivise its implementation by the signatory countries given that the forgone corporate tax will be paid elsewhere.

Source: OECD (2021) and IMF (2023).

To the best of our knowledge, to date, there is only limited evidence on the possible impacts of the global minimum effective corporate tax rate on investment. Existing evidence is based on simulations carried out by international organisations with respect to global FDI flows. The global minimum effective tax is likely to impact investment decisions by multinational enterprises via a number of channels (UNCTAD 2022): (i) the choice of the location of new investments; (ii) the scale of new investments; (iii) profit shifting; and (iv) tax competition. Recent research by UNCTAD (2022) finds that the global minimum effective tax will reduce the global FDI flows by 2% - 4% and will impact the distribution of FDI across regions with a reallocation from low-tax to high-tax regions expected. It is expected that the global minimum effective tax rate will have a larger impact on the conduit FDI (FDI other than investments with physical presence): its share of conduit FDI in the FDI stocks in Offshore Financial Centres (OFCs) is predicted to decrease by 10% to 35%.

Recent economic analysis by the IMF on the impact of a global minimum effective tax rate on corporate taxes (IMF 2023) finds that 18.5 % of global profits of MNEs is taxed below 15%: the average on these profits tax is estimated to be 5%. The IMF estimates that the implementation of the global minimum effective corporate tax will result in a reduction by 36% of the profits reallocated for tax purposes.

Against this background, this research paper addresses the following three questions:

How would the proposed tax changes affect the location choice of multinationals and the attractiveness of Ireland to foreign direct investment? We focus on new greenfield FDI projects – new productive FDI operations with physical presence established by foreign companies at a new site in Ireland and other EU countries as competing locations[3].

How sensitive would Ireland's foreign direct investment be to the proposed tax changes? We examine changes in the volume of new greenfield FDI invested conditional on the location choice decision.

What economic impacts would the proposed tax changes have in the medium and long term on employment? We estimate the effects of the proposed tax changes on (i) FDI-related new jobs created

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[3] New greenfield FDI projects are new operations established by foreign companies at a new site. The foreign company may or may not already be present in the country, but the FDI project is in a new location within the country. It can also include relocation from one country to another.

via the decision to locate in Ireland; and (ii) FDI-related new jobs created via the decision on how much to invest in Ireland.

This research paper builds on previous research on Ireland's attractiveness to FDI (Barry and Bradley, 1997; Barrios et al., 2006; McCoy et al., 2018; Siedschlag et al. 2021) and on benefits from multinationals' activity to the wider Irish economy in terms of new jobs (Siedschlag and Tong Koecklin 2019) and spillovers on the productivity and trade performance of Irish-owned firms (Haller, 2014; Di Ubaldo et al., 2018; Di Ubaldo and Siedschlag (2022).

To the best of our knowledge, this is the first empirical analysis of the possible effects of the global minimum effective corporate tax rate on Ireland's attractiveness to FDI and FDI-related new jobs. More specifically, we provide novel evidence on the possible effects of a global minimum effective corporate tax rate of 15% on a range of outcomes in the medium and long-term relative to a situation of no changes in the effective corporate tax rates in Ireland and other EU countries. The considered outcomes are the following: the change in the number of new greenfield FDI projects; the change in the volume of FDI invested; and the change in the number of FDI-related new jobs.

Taken together, the results of this analysis suggest that the effects of the global minimum effective tax rate of 15% on new FDI and FDI-related new jobs in Ireland in the medium and long term are likely to be negative but not sizeable. While Ireland's effective corporate tax rates will remain competitive relative to many other EU countries, Ireland's attractiveness to FDI could be maintained and increased with respect to other factors that influence the location choice of FDI. While we consider a broad range of factors that influence the investment behaviour related to new greenfield FDI projects in Ireland and other EU countries, the wider economic impacts of the Global Tax Reforms might be influenced by other factors such as the worldwide adoption of Pillar Two, progress of ongoing negotiations on Pillar One, EU tax policy, and investment in intangible assets.

The remainder of this paper is structured as follows. Section 2 discusses the empirical approach and the model specifications used for the analysis. Next, Section 3 describes the data and presents descriptive statistics of the main variables. Section 4 discusses the empirical results, and Section 5 concludes.

2   Empirical Approach

To address the research questions set out above, we first estimate a range of baseline models to identify and quantify the sensitivity of Ireland's attractiveness to FDI (in terms of the number of new FDI projects and the volume of new FDI invested) and FDI-related new jobs to changes in effective tax rates (ETRs) in Ireland and other EU countries.[4] Next, we generate corresponding counterfactual outcomes over three, five and ten years in a situation of minimum effective corporate tax rates of 15% in Ireland and other EU countries having ETRs below 15%. Finally, we assess the difference between the counterfactual outcomes with ETRs in Ireland and other EU countries at 15% and the baseline outcomes.

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[4] We consider the other EU countries as Ireland's most likely competing locations for FDI going to Europe.

2.1   Baseline Estimates

Using econometric models, we estimate four sets of outcomes as part of a baseline scenario:

(1) the percent change in the number of new FDI projects attracted to Ireland with respect to a one percentage point change in the effective average tax rates (EATRs);

(2) the percent change in the volume of FDI in Ireland with respect to a one percentage change in the effective marginal tax rates (EMTR);

(3) the percent change of the number of FDI-related new jobs created in Ireland associated with a one percent change in the number of new FDI projects attracted to Ireland;

(4) the percent change of the number of FDI-related new jobs created in Ireland associated with a one percent change in the volume of new FDI in Ireland;

The econometric model specifications are described below. Detailed definitions and data sources for the variables included in the empirical analysis are provided in Appendix A.

(1) Modelling the location choice of new FDI going to Ireland and other EU countries. The objective of this analytical stage is to estimate the percent change in the number of new FDI projects attracted to Ireland with respect to a one percentage point change in the effective average tax rate (EATR).

To examine the importance of the effective corporate tax and other factors that determine the location choice of new FDI to Ireland and other EU countries, we use a count data model, the Poisson model with fixed effects.[5] We discuss below the underlying assumptions of the model and key outcomes to be estimated.[6]

Assume that there are N investing firms, $i=1,...N$ and a set of J possible investment locations $j=1, ...J$. When deciding where to invest, a given firm i considers the profitability of the investment project in each location j at time t, π_{ijt}. While the investment profitability is not observable ex-ante, it is assumed to be a function of observable location characteristics X_{jt} and a stochastic term of unobservable profit specific to each firm and location, μ_{ijt}:

$$\pi_{ijt} = \alpha_j + X_{jt}\beta + \mu_{ijt} \tag{1}$$

where β is a vector of parameters to be estimated related to the corresponding vector of observable location characteristics X_{jt} and α_j is the fixed effect that is specific to each location. The investor i will choose the location j that provides the maximum π_{ijt} among all J possible location alternatives.

Given Eq.(1), we obtain the expected number of investment projects n_{jt} in location j at time t, $E(n_{jt})$, as follows:

$$E(n_{jt}) = \exp(\alpha_j + X_{jt}\beta) \tag{2}$$

For the purpose of our empirical analysis, the parameter of interest to be estimated is β_k, the change in the number of expected investment projects in country j at time t with respect to a change in the location-specific characteristic k in country j:

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[5] Previous published research using this modelling of the location choice of FDI include among others, Papke (1991), Guimarães et al. (2003, 2004), Brülhart and Schmidheiny (2015), McCoy et al. (2018), and Siedschlag et al. (2021).

[6] A more detailed discussion of the underlying assumptions of the Poisson model with fixed effects in the context of modelling the location choice of FDI projects and advantages over other modelling options is provided by Siedschlag et al. (2021).

$$\beta_k = \frac{\partial lnE(n_{jt})}{\partial x_{jkt}} \tag{3}$$

The probability of country j to be chosen as a location for FDI, P_{jt}, can be obtained as the share of the expected number of investment projects in country j at time t and the total number of expected investment projects across all possible locations J, $\sum_{j=1}^{J} E(n_{jt})$:

$$P_{jt} = \frac{E(n_{jt})}{\sum_{j=1}^{J} E(n_{jt})} \tag{4}$$

The dependent variable in the econometric models of the location choice of new FDI we estimate is the annual count of new greenfield FDI projects established in Ireland and other EU countries over the period 2011-2020. The explanatory variables, location-specific factors that influence the location choices of FDI, are lagged by one year with respect to the dependent variable.

The explanatory variable of interest for the analysis of the location choice of new greenfield FDI projects in Ireland and other EU countries in this paper is the effective average tax rate (EATR). Other location-specific factors we include in the econometric modelling of the location choice of FDI in Ireland and other EU countries are the following:[7] domestic market size (real GDP), EU market potential (a measure of market access combining the market size of other EU countries and associated transport costs), labour costs (real wage per employee), workforce skills (percentage of working age population with tertiary education), adult life-long learning (percentage of working age population enrolled in education and training programmes), public investment in R&D (gross expenditures on R&D in the public sector within Government and Higher Education sectors), complexity of market regulations, availability of housing (percent of investment in dwellings in gross fixed capital formation),[8] and digital infrastructure (broadband access).

(2) Estimating the volume of new FDI invested conditional on Ireland and other EU countries being chosen as location. Using the results obtained in the first analytical stage, we estimate the percent change in the volume of new FDI invested in Ireland with respect to a one percentage point change in the effective marginal tax rate (EMTR).

To estimate the volume of new FDI conditional on a given EU country being chosen as location, we use the following model specification:

$$lnFDI_{jt+1} = \alpha + \beta X_{jt} + \gamma M_{jt} + \delta_j + \varepsilon_{jt} \tag{5}$$

The dependent variable, FDI_{jt}, is the volume of new FDI investment in a given country j at time $t+1$; X_{jt} is a vector of host country co-variates associated with the size of FDI: the effective marginal tax rate (EMTR), domestic market size, EU market potential, real wage per employee, workforce skills (percentage of working age population with third level education), R&D expenditures intensity, FDI stock as percent of GDP, and a measure of political and economic uncertainty (World Uncertainty Index). Given that we only observe the reported investments, to control for potential selection bias, as suggested by Dubin and McFadden (1984), using the estimates from modelling the location choice

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[7] International evidence on determinants of the location choice of foreign affiliates of multinational firms has been reviewed by, among others, by Fontagné and Mayer (2005), Nielsen et al. (2017), Lawless et al. (2018), Davies et al. (2021) and Siedschlag et al. (2021).

[8] The limited availability of housing in Ireland has been identified in discussions with international tax experts as a matter of concern expressed by multinationals.

of new FDI,[9] we construct and include in the regression model, the Inverse Mills Ratio, M_{jt}.[10] α is a constant and δ_j is a vector of country-specific fixed effects controlling for time-invariant unobserved country-specific characteristics that might affect both the volume of FDI and explanatory variables.

(3) Estimating the number of FDI-related new jobs: using panel data methods, we estimate the number of new FDI-related jobs (i) as a function of the number of new FDI projects attracted to a given location and other relevant factors; and (ii) as a function of the volume of new FDI invested in a given location and other relevant factors.

The model specification is as follows:

$$lnY_{jt+1} = \alpha + \beta lnFDI_{jt} + \gamma X_{jt} + \sigma_j + \varepsilon_{jt} \tag{6}$$

Y_{jt+1} is the reported number of new jobs created by new greenfield FDI in country *j* at time *t*; FDI_{jt} is a measure of FDI activity in country *j* at time *t*; X_{jt} is a vector of variables associated with job creation in a given location *j* at time *t*. Following on from the relevant theoretical and empirical literature,[11] the variables associated with job creation included in the model are the following: capital stock as percent of GDP, real wage per employee, the growth of the real wage per employee, educational attainment (the share of the working age population with third level education), the intensity of R&D expenditures (public and private R&D expenditures as percent of GDP), and financial development (domestic private credit as percent of GDP). σ_j are unobserved country-specific effects affecting both the dependent and explanatory variables. Such unobserved variables include for example, wage bargaining institutions and other labour market institutions affecting the number of FDI-related new jobs and real wages.

The parameter of interest is β, the average percent change in the number of FDI-related new jobs associated with a one percent change in the FDI activity.

2.2   Counterfactual Estimates

Using the estimates obtained in the analytical stages (1)–(3) as a baseline scenario (no change in the ETRs), we generate counterfactual estimates in a situation of ETRs at 15% in Ireland and other EU countries where ETRs are below the minimum rate. The counterfactual estimates are upper-bound estimates without substance-based carve-outs, without within country ETRs variation. Using the counterfactual estimates, we then calculate the deviations/changes with respect to the baseline scenario (no change in the ETRs).

The considered outcome variables for Ireland are the following:

- the number of new FDI projects located in Ireland;
- the volume of new FDI invested in Ireland, conditional on Ireland being chosen as location for new FDI;
- the number of new FDI-related jobs associated with the number of new FDI projects;
- the number of new FDI-related jobs associated with the volume of new FDI invested in Ireland.

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[9] More specifically, the estimates obtained with the fDi Markets data reported in Column 1 in Table 7.
[10] This approach has been previously used by Davies et al. (2021).
[11] See for example Nickell and Nicolitsas (1999).

To obtain the effects of the global minimum corporate tax rate on the above-mentioned outcome variables we proceed as follows. In the first step, we obtain the in-sample number of FDI located in Ireland over three, five and ten years predicted by the models using the baseline Poisson model with fixed-effects described by Eq. (2). We then estimate counterfactual in-sample predictions for the number of new FDI projects assuming the EATR increases to 15% when below this level in Ireland and other EU countries as follows:

$$E\big(n_{jt}\big|\boldsymbol{X'}_{jt}\big) = \exp(\bar{\alpha}_j) + \exp(\boldsymbol{X'}_{jt}\boldsymbol{\beta'}) \tag{7}$$

where $\boldsymbol{X'}_{jt}$ is the vector of location characteristics once the EATR is increased to 15% when applicable and $\exp(\bar{\alpha}_j)$ are the country fixed effects we recover from estimating the baseline Poisson model described by Eq. (2). By using $\bar{\alpha}_j$, we allow time-invariant characteristics non-related to the EATRs that make locations attractive to remain constant as in the baseline scenario. The effect of the global minimum corporate tax rate on the number of new FDI projects is then the percentage change in the in-sample predictions from the baseline to the counterfactual scenario.

In the second step, we use a similar procedure by estimating the in-sample predictions of the fixed effects panel regression in Eq. (5) and we compare them with the predictions of the counterfactual scenario using the following model:

$$ln\widehat{FDI}_{jt+1} = \hat{\beta}X'_{jt} + \hat{\gamma}\widehat{M}_{jt} + \bar{\delta}_j \tag{8}$$

where $\boldsymbol{X'}_{jt}$ is the vector of location characteristics once the EMTR is increased to 15% when applicable, $\widehat{M}_{jt}$ is the Inverse Mills Ratio predicted when we modified the EATRs in the previous step, and $\bar{\delta}_j$ are the country fixed effects in the baseline estimates. It is worth noticing that, by including $\widehat{M}_{jt}$, we allow the FDI investment volumes to change indirectly through the likelihood of each country to be chosen as a location in the first place.

Finally, we estimate counterfactuals for the FDI-related new jobs through the extensive and intensive margins by comparing in-sample estimates of panel regression models (5) and (6) using the actual number or volumes of FDI with the in-sample predictions obtained when we feed the counterfactual prediction from the two previous steps following:

$$ln\hat{Y}_{jt+1} = \hat{\beta}ln\widehat{FDI}_{jt} + \hat{\gamma}X_{jt} + \bar{\sigma}_j \tag{9}$$

where $\widehat{FDI}_{jt}$ is the number of new FDI projects under 15% EATRs obtained with (8) or the FDI volumes under 15% EMTRs obtained with Eq. (9).

In relation to our empirical approach, a number of clarifications and caveats are in order. Our estimates are *"what if"* counterfactual outcomes and these should not be interpreted as forecasted effects of the global tax reforms on the attractiveness of Ireland to FDI and the wider economy. The estimated effects are *deviations* from baseline estimates ("no change" of ETRs baseline scenario). The analysis relies on a number of *assumptions* based on the past responsiveness of MNEs to changes in ETRs. *Government reactions* in terms of the implementation of Pillar Two are unknown and difficult to predict at this stage. While the data we use is the best available to us, there are *limitations* in terms of data coverage, granularity, consistency, and timelines. There is still a degree of uncertainty at this stage given that some *details of the global tax reforms are still to be agreed* while other details are difficult to model. Data is not available at the required level of detail to capture all these dimensions.

3   Data and Descriptive Statistics

To carry out the empirical analysis, we use firm-level data on new greenfield FDI projects combined with country-level data on effective corporate tax rates and macroeconomic variables that have been found to influence the investment decisions of multinationals and FDI-related new jobs. Data on greenfield FDI are sourced from two data sets:

- **fDi Markets data set compiled by Financial Times:** data on new greenfield FDI projects, new greenfield FDI value (capital expenditures), new greenfield FDI-related jobs in the EU27 countries and the UK over 2011-2020.

- **ORBIS Europe, provided by Bureau van Dijk:** data on new foreign affiliates established in Ireland and other EU countries, employment, tangible and intangible assets, sales, profitability over 2011-2020. Unconsolidated financial accounts and ownership links among subsidiaries within MNE groups. Previous research papers have used the ORBIS data to analyse the responsiveness of investment to corporate taxation (Davies et al., 2021; Hannapi et al., 2023; Hannapi and Whyman, 2023) and the impact of the global tax reforms on business investment (OECD, 2020; Millot et al., 2020).

- **ETRs data:** Forward-looking effective average tax rates (EATRs) and effective marginal tax rates (EMTRs)[12] over 2010-2020. These data are sourced from the OECD and Oxford University. Since there is no data series covering consistently the analysed period, we combine OECD ETRs series for 2010-2017 with the Oxford University ETRs series for 2017-2021. In the analysis, we use an average of the two series in 2017, the overlapping year.[13]

- **Location-specific characteristics:** domestic market size (real GDP), EU market potential, labour costs (real wages per employee), educational attainment, public investment in R&D, investment in housing, broadband access, business regulations, business uncertainty - sourced from the Eurostat, OECD, the World Bank, and IMF.

- **Additional control variables for FDI-related new jobs:** capital stock (percent of GDP), real wage per employee, the growth of real wage per employee, R&D expenditures intensity, financial development (domestic credit to the private sector, percent of GDP) – sourced from the World Bank.

Table 1 shows the distribution of new greenfield FDI projects across EU countries over the analysed period, 2011-2020. While larger countries have the largest shares of the total number of FDI projects, when countries' size is taken into account, small countries have the largest FDI intensity measured as the number of FDI projects per 1 million inhabitants and the number of FDI projects per 1 million EUR of GDP. Ireland's share in the total number of FDI projects located in the European Union over 2011-2020 is 3.3%, higher than the shares of other small advanced economies such as Belgium, Denmark Finland, and Austria. In terms of the number of FDI projects per 1 million inhabitants, Ireland ranks

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[12] Forward-looking effective tax rates (ETRs) are synthetic tax policy indicators calculated on the basis of a hypothetical investment project (see for example OECD 2022). The advantages of using forward-looking ETRs are twofold: (i) they take into account fiscal depreciation and other tax deductions and thus they capture the importance of investment incentives; (ii) they are not influenced by past investment decisions i.e. they are exogenous relative to investment decisions (Hanappi et al. 2023).

[13] While simple, this procedure is satisfactory as both series report consistent figures for 2017. On average, in our sample, the Oxford University EATR is 19.8% in 2017, while the OECD EATR for the same year is 19.4%, implying a mean difference in absolute value of 0.22 percentage points and a standard deviation of 3.1 percentage points. For Ireland, the figures are 11.6% and 11.3%, respectively. Among all countries included in our analysis, the highest difference in absolute values between the two series in 2017 is 7.49 percentage points.

second, with 25.3 FDI projects per 1 million inhabitants. The number of FDI projects per 1 billion euros of GDP in Ireland is above the average for the EU and greater than in other small advanced economies such as Luxembourg, Denmark, Belgium, and Austria.

Table 1: New Greenfield FDI projects in the European Union by Country, fDi Markets, 2011-2020

	Share in total (%)	FDI projects per 1 million inhabitants	FDI projects per 1 billion EUR of GDP
Luxembourg	0.5	34.6	378.6
Ireland	3.3	25.3	524.7
Malta	0.3	23.6	1,170.9
Finland	3.1	20.5	531.7
Denmark	2.2	13.9	288.1
Lithuania	1	12.4	974.9
United Kingdom	20.3	11.4	335.5
Netherlands	5.2	11.1	270.4
Estonia	0.4	10.7	727.6
Germany	21.7	9.7	267.8
Belgium	2.9	9.3	254.0
Cyprus	0.2	7.5	331.7
Latvia	0.4	6.9	578.3
Spain	7.8	6.1	257.6
Sweden	1.6	5.8	129.9
Czech Republic	1.6	5.7	351.9
Poland	5.6	5.3	479.8
Austria	1.2	5.2	134.4
Slovakia	0.8	5.2	367.3
France	9.3	5.1	155.6
Bulgaria	1	5.1	840.3
Hungary	1.4	5.1	447.9
Romania	2.8	5.1	656.2
Portugal	1.4	5.1	277.7
Croatia	0.5	4.4	393.5
Slovenia	0.2	4.2	215.7
Greece	0.6	2.1	123.5
Italy	2.9	1.8	63.3
All EU countries	100	9.6	411.8

Note: The numbers shown in the table are averages over the period 2011-2020.
Source: Authors' calculations based on data from fDi Markets, Financial Times.

Table 2 compares the distribution of new greenfield FDI projects across EU countries over the analysed period obtained with data from the fDi Markets and the distribution of new greenfield FDI across EU countries obtained with data from the Orbis Europe data set. The Spearman rank correlation coefficient between the two series is 0.71. Table 2 also reports the distribution of new greenfield FDI across EU countries available from the Orbis Europe data set broken down by manufacturing and services sectors.

Table 2: New Greenfield FDI projects by country, fDi Markets and Orbis data, 2011-2020

| | fDi Markets | Orbis Europe | | |
	All new FDI	All new FDI	Manufacturing	Services
Luxembourg	0.54	0.02	0.00	0.02
Ireland	3.26	2.50	1.51	2.73
Malta	0.29	…	…	…
Finland	3.07	1.49	1.37	1.44
Denmark	2.17	2.47	1.53	2.65
Lithuania	0.99	0.91	1.00	0.91
United Kingdom	20.29	14.86	9.04	16.05
Netherlands	5.16	3.78	2.95	4.09
Estonia	0.39	1.05	0.84	1.13
Germany	21.68	8.27	9.48	8.30
Belgium	2.86	2.48	2.76	2.50
Cyprus	0.18	0.08	0.07	0.08
Latvia	0.37	1.79	1.51	1.87
Spain	7.83	7.05	5.97	7.44
Sweden	1.55	3.44	2.16	3.65
Czech Republic	1.63	1.30	2.62	1.12
Poland	5.58	3.59	6.20	3.20
Austria	1.23	2.50	1.84	2.61
Slovakia	0.77	1.39	2.53	1.24
France	9.34	2.15	2.07	2.23
Bulgaria	1.01	4.17	3.39	4.39
Hungary	1.37	0.95	1.51	0.87
Romania	2.75	13.99	16.31	11.78
Portugal	1.43	7.08	6.71	7.20
Croatia	0.51	1.48	1.14	1.57
Slovenia	0.24	0.49	0.70	0.45
Greece	0.64	0.25	0.21	0.26
Italy	2.89	10.48	14.59	10.20
Number of new FDI projects	36,530	33,377	4,367	26,904
Spearman rank correlation	1	0.71		

Notes: The new FDI projects in the ORBIS data set are newly established firms with at least 10% foreign ownership. Firm-level data from unconsolidated financial accounts for Malta are not available in the Orbis Europe data set.
Source: Authors' calculations based on data from fDi Markets, Financial Times and ORBIS Europe.

Table 3 shows average effective tax rates (ETRs) in Ireland, other EU countries and other EU countries with ETRs less than 15% over the period 2010-2019. While ETRs in Ireland are significantly lower than the average for the other EU 27 countries, they are slightly higher than the ETRs in other EU countries with ETRs lower than 15%.[14]

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[14] The other EU countries with EATRs below 15% are: Bulgaria, Cyprus, Hungary, Lithuania, Romania, and Slovenia; all EU countries with the exception of Germany had EMTRs below 15% in at least two years over the analysed period. Ireland and ten other EU countries had EMTRs below 15% over the whole analysed period. The other ten EU countries are: Belgium, Bulgaria, Croatia, the Czech Republic, Hungary, Luxembourg, the Netherlands, Poland, Romania, Slovenia.

Table 3: Average ETRs in Ireland and other EU countries, 2010-2019

	Ireland	Other EU countries	Other EU countries with ETRs less than 15%
EATR	11.36	20.61	11.31
EMTR	8.16	11.31	7.85

Source: Authors' calculations based on data from the OECD and University of Oxford.

Table 4 reports summary statistics for country-level variables used in the econometric analysis. As shown in the table, there is a wide variation of the country-specific factors that influence the location choice of FDI across EU countries.

Table 4: Summary statistics for country-level explanatory variables, 2010-2019

	Obs.	Mean	SD	Min	Max
Effective Average Tax Rate – EATR (%)	248	20.2	5.9	8.2	35.4
Effective Marginal Tax Rate – EMTR (%)	230	12.5	6.4	0.5	32.7
GDP in 2010 prices (€ m)	280	486,524.6	728,574.2	6,815.8	2,986,827.5
EU market potential (€ m)	280	14,884.0	5,681.2	5,267.9	32,529.4
Real wage per employee (€ per employee)	280	27,799.4	18,853.1	4,085.9	104,770.4
Growth of real wage per employee (%)	280	2.9	3.7	-9.5	20.2
Tertiary education (% of pop. aged 25-64)	280	30.7	8.6	13.6	47.3
Adult life-long learning (% of pop. aged 25-64)	280	10.8	7.7	0.9	34.3
GERD in the public sector (€ per population)	280	182.4	150.2	13.2	580.8
R&D expenditure (% of GDP)	280	1.6	0.9	0.4	3.7
FDI stock (% of GDP)	280	168.8	313.3	0.0	2,377.8
Capital stock (% GDP)	280	20.7	4.1	10.7	54.3
Complexity of market regulations	280	1.4	0.2	0.8	2.1
Investment in housing, % of GFCF	280	15.3	9.4	0.0	35.8
Broadband access (% of households)	280	78.7	12.3	33.0	98.0
World Uncertainty Index	240	0.1	0.1	0	0.4

Notes: GERD stands for Gross Expenditures on Research and Development. GFCF stands for gross fixed capital formation.
Source: Authors' calculations based on data for 2020 sourced from the Eurostat, OECD, and the World Bank.

Table 5 compares Ireland's performance with respect to key FDI attractiveness factors other than the corporate tax rate that can be influenced by policy with the performance of other competing locations for FDI in the EU. With the exception of investment in housing, Ireland performs better than the average for other EU countries with EATRs below 15%. Relative to the averages for the group of EU countries with EATRs above 15% Ireland lags behind with respect to adult life-long learning, R&D expenditures intensity, gross expenditures on R&D (GERD) in the public sector, complexity of market regulations, and investment in housing. Table 2 also shows the countries with the best performance in the EU for each of the considered factors.

Table 5: Summary statistics for policy variables other than ETRs, Ireland and other EU countries

Policy variables	Ireland	Other EU countries with EATRs below 15%	Other EU countries with EATRs above 15%	Best performance in the EU
Tertiary education attainment (% of pop. aged 25-64)	49.9	35.2	36.4	Ireland (49.9)
Adult life-long learning (% of pop aged 25-64)	11.0	6.3	12.1	Sweden (28.6)
R&D expenditures intensity (% GDP)	1.1	1.1	2.1	Sweden (3.5)

GERD in the public sector (€ per population)	242.6	94.2	263.8	Denmark (605)
Complexity of market regulations (0-6 index)	1.4	1.5	1.3	United Kingdom (0.8)
Investment in housing, % of GFCF	5.0	7.2	20.4	Germany (32.2)
Broadband access (% of households)	92.0	87.2	91.2	Netherlands (97)

Notes: GERD stands for Gross Expenditures on Research and Development. GFCF stands for gross fixed capital formation.
Source: Authors' calculations based on data for 2020 sourced from the Eurostat, OECD, and the World Bank.

4 Results

4.1 Baseline Estimates

Modelling the location choice of new FDI going to Ireland and other EU countries

Table 6 summarises the estimated coefficients for EATR and other factors on the location choice of new FDI in Ireland and other EU countries using the Poisson model with fixed effects described in Section 3 above. Column 1 reports estimates obtained with data on new greenfield FDI from fDi Markets and Column 2 shows estimates obtained with data from the Orbis Europe data set.

The estimated coefficients for EATR are negative as expected, indicating a lower number of new FDI projects associated with a higher EATR, over and above the effects of other location-specific factors. The estimated coefficient for the EATR is larger when the data from the Orbis Europe data set is used. However, the test statistics indicate that the goodness-of-fit of this model is lower than the one obtained with the fDi Markets data.

Table 6: Determinants of the location choice of new FDI projects in EU countries

	(1) fDi Markets	(2) Orbis Europe
EATR (%)	-0.011***	-0.041***
	(0.003)	(0.0001)
EU Market Potential (log)	1.077***	3.679***
	(0.2216)	(0.0054)
Real GDP 2010 prices (log)	0.635***	-0.940***
	(0.1419)	(0.0045)
Real wage per employee (log)	-0.596***	1.557***
	(0.1183)	(0.0024)
Tertiary education attainment (%)	-0.004	-0.048***
	(0.0052)	(0.0001)
Adult long-life learning (%)	0.021***	0.004***
	(0.0029)	(0.0001)
GERD in the public sector (log)	0.028	2.947***
	(0.1262)	(0.0031)
Complexity of business regulations	-0.083	-1.368***
	(0.0575)	(0.0014)
Investment in housing, % of gross fixed capital formation	0.010***	-0.023***
	(0.0034)	(0.0001)
Broadband access (%)	0.001	-0.008***
	(0.0020)	(0.0000)

	(1)	(2)
Observations	248	248
Locations	28	28
Number of new FDI projects/foreign affiliates	36,530	27,849
Pseudo R^2	0.945	0.822
Wald chi^2	91.49	113.90
Wald chi^2 p-value	0.000	0.000
Log-likelihood	-1392.7	-6043181.4

Notes: The dependent variable is the annual count of new greenfield FDI projects in Ireland and other EU countries over 2011–2020. Estimates are obtained with a Poisson with fixed effects model. Explanatory variables are lagged by one year with respect to the dependent variable. GERD stands for Gross Expenditures on Research and Development. * p<0.10, ** p<0.05, *** p<0.01. Standard errors are shown in parentheses. Regressions using the Orbis Europe data are weighted. The weights are calculated using data from the fDi Markets on the number of new greenfield FDI projects for Ireland and other EU countries.

Source: Authors' estimates using data from the fDi Markets and Orbis Europe.

Using data from the Orbis Europe dataset, we have further explored possible heterogeneous effects of the EATR on the location choice of new foreign affiliates located in Ireland and other EU countries. The data preparation and cleaning procedures applied are described in Annex B. Table B1 reports summary statistics of the firm-level variables. The groups of foreign affiliates considered are the following: new foreign affiliates with effective tax rates below 15%; new foreign affiliates with excess profits; new foreign affiliates with parent companies having turnover greater than €750 million. The estimates for these groups of foreign affiliates are reported in Table B2. The estimated coefficients for the EATR are all negative and smaller than the estimated EATR coefficient obtained for all new foreign affiliates. Table B3 reports estimates for new foreign affiliates in manufacturing and services. The estimated coefficients for EATR are negative for both sectors. The estimates indicate that the location of new FDI in services has been more sensitive to changes in the EATR.

Estimated volume of new FDI invested conditional on Ireland and other EU countries being chosen as a location

Table 7 reports the estimates of determinants of the volume of new FDI invested conditional on a given location being chosen. Column 1 shows estimates obtained with the model specification described by Eq. (5) while the estimates shown in Column 2 include a linear time trend to account for time-specific effects.

Table 7: Determinants of the volume of new FDI invested

	(1)	(2)
EMTR (%)	-0.028***	-0.029***
	(0.0086)	(0.0086)
EU Market Potential (log)	2.417*	7.055**
	(1.2522)	(3.4344)
Real GDP (log)	3.337***	3.241***
	(0.7982)	(0.7986)
Real wage per employee (log)	-3.753***	-3.591***
	(0.6566)	(0.6642)
Tertiary education attainment (%)	-0.016	-0.001
	(0.0292)	(0.0309)

Adult long-life learning (%)	0.019	0.019
	(0.0213)	(0.0213)
R&D expenditures intensity (%)	-0.191	-0.196
	(0.2252)	(0.2246)
FDI Stock, percent of GDP (%)	-0.002*	-0.002
	(0.0010)	(0.0010)
World Uncertainty Index	-3.011***	-3.103***
	(0.8668)	(0.8666)
Sample selection (Inverse Mills Ratio)	40.633**	42.327**
	(18.3159)	(18.2998)
Constant	15.047	268.452
	(18.8880)	(175.8290)
Observations	222	222
Locations	24	24
Number of new FDI projects	36,530	36,530
R^2 - within	0.268	0.276
R^2 - between	0.376	0.257
Log-likelihood	-144.0	-142.8
AIC	310.047	309.567
Hausman p-value	0.0022	0.0013
Location fixed effects	Yes	Yes
Time trend	No	Yes

Notes: The dependent variable is the reported capital expenditures in 2010 prices related to new greenfield FDI in Ireland and other EU countries over 2011–2020. Estimates are obtained with a fixed effects panel regression. Explanatory variables are lagged by one year with respect to the dependent variable. * p<0.10, ** p<0.05, *** p<0.01. Standard errors are shown in parentheses. The Inverse Mills Ratio accounts for potential selection bias and is obtained by taking the ratio between the probability density function and the cumulative distribution function of the estimated probabilities from the Poisson model with fixed effects reported in Table 6.

Source: Authors' estimates using data from the fDi Markets.

Estimated number of FDI-related new jobs

Table 8 shows the estimates for the number of FDI-related new jobs created. Column 1 reports the results with the number of new FDI projects as a measure of FDI activity and column 2 reports the results when the volume of FDI invested in a given location is used as a measure of FDI activity. The estimates indicate that a 10% increase in the number of new FDI projects is associated with a 3.8% increase in the number of new jobs created while a 10% increase in the volume of FDI invested is associated with an increase by 3.6% of the number of FDI-related new jobs created.

Table 8: Determinants of FDI-related new jobs created conditional on the number of new FDI projects and volume of FDI invested

	(1)	(2)
New greenfield FDI projects (log)	0.377***	
	(0.1096)	
Volume of FDI invested (log)		0.358**
		(0.1389)
Capital stock, percent of GDP (%)	-0.046***	-0.033**

	(0.0165)	(0.0164)
Real wage per employee (log)	-0.765	0.140
	(0.6564)	(0.7755)
Real wage per employee growth (%)	-0.009	0.002
	(0.0120)	(0.0120)
Real GDP (log)	2.257**	0.610
	(0.9868)	(1.1026)
Tertiary education attainment (%)	0.032*	0.047**
	(0.0183)	(0.0191)
Adult long-life learning (%)	0.014	0.002
	(0.0183)	(0.0187)
R&D expenditures intensity (%)	0.318	0.239
	(0.1967)	(0.2144)
Financial development (%)	-0.010***	-0.012***
	(0.0035)	(0.0036)
Constant	-13.039	-3.257
	(8.2617)	(8.7980)
Observations	224	224
Locations	28	28
Number of new FDI-related jobs	36,530	36,530
R^2 - within	0.339	0.360
R^2 - between	0.536	0.321
Hausman p-value	0.0000	0.0002

Notes: Dependent variable: log of new jobs created by greenfield projects in the EU over 2011–2020. Estimates are obtained with a fixed effects panel regression. Explanatory variables are lagged by one year with respect to the dependent variable. * $p<0.10$, ** $p<0.05$, *** $p<0.01$. Standard errors are shown in parentheses.

Source: Authors' estimates using data from the fDi Markets.

4.2   Counterfactual Estimates

Using the baseline estimates obtained in the analytical stages (1)-(3), we generate counterfactual estimates for the chosen outcome variables for Ireland in a situation of a 15% ETRs in Ireland and other EU countries where ETRs are currently below the minimum rate. The counterfactual estimates are upper-bound estimates without substance-based carve-outs, without within country ETRs variation. Using the counterfactual estimates for Ireland, we then calculate the deviations/changes in the levels of the outcome variables with respect to the baseline scenario for the corresponding outcome variables for Ireland.

Table 9 summarises the percent changes in the considered outcome variables for Ireland in a situation of 15% ETRs in Ireland and other EU countries having currently ETRs below the minimum global tax rate. The percent changes are calculated over three, five and ten years.

Table 9: Percentage changes of macroeconomic variables in Ireland, in a global minimum effective corporate tax rate of 15% relative to baseline scenario (no change in ETRs)

	3 years	5 years	10 years
Number of new FDI projects	-3.4	-3.6	-3.8
Volume of new FDI invested	-12.3	-13.8	-14.6
New FDI-related jobs via the number of new FDI projects	-2.7	-2.8	-3.0
New FDI-related jobs via the volume of new FDI invested	-3.3	-4.8	-5.7

Source: Authors' calculations based on estimates obtained with data from fDi Markets.

As shown in the table above, we estimate that the global minimum effective corporate tax of 15% could have the following effects on FDI and employment in Ireland relative to a situation of no change in the effective corporate tax rates in Ireland and the other EU countries with effective corporate tax rates below 15%:

- the number of new FDI projects coming to Ireland would be lower by 3.4% after three years; by 3.6% after five years; and by 3.8% after ten years;
- the volume of new FDI coming to Ireland would be lower by 12.3% after three years; by 13.8% after five years; and by 14.6% after ten years;
- the number of FDI-related new jobs associated with the number of new FDI projects would be lower by 2.7% after three years; by 2.8% after five years; and by 3.0% after ten years;
- the number of FDI-related new jobs associated with volume of new FDI invested would be lower by 3.3% after three years; by 4.8% after five years; and by 5.7 % after ten years.

The larger negative effect of the global minimum effective corporate tax on the volume of new FDI relative to the effect on the number of new FDI projects is due to the fact that EMTRs are below 15% in a larger number of countries relative to the number of countries with EATRs below 15%.

5   Conclusion and Policy Implications

This paper provides empirical estimates on the possible effects of a global minimum effective corporate tax rate of 15% on Ireland's attractiveness to FDI and FDI-related new jobs.

Taken together, the results of this analysis suggest that the effects of the global minimum effective tax rate of 15% on new FDI and FDI-related new jobs in Ireland in the medium and long term are likely to be negative but not sizeable. While Ireland's effective corporate tax rates will remain competitive relative to many other EU countries, Ireland's attractiveness to FDI could be maintained and increased with respect to other factors that influence the location choice of FDI.

More specifically, comparing Ireland's performance to the best performance in competing EU countries with respect to factors that can be influenced by policy, we suggest that Ireland's attractiveness to FDI could be further enhanced by improving its performance with respect to public and private investment in R&D, adult life-long learning, investment in housing, and broadband access.

While this analysis takes into account a broad range of factors that influence the investment behaviour related to new greenfield projects, the wider economic and revenue impacts of the Global Tax Reforms might be influenced by other factors such as the worldwide adoption of Pillar Two, progress of ongoing negotiations on Pillar One, EU tax policy, and investment in intangible assets.

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Appendix A   Definitions of Variables and Data Sources

Table A1:   Definitions of variables and data sources

Variable	Definition	Data source
Corporate Taxes		
EATR	Effective average tax rate	OECD and the University of Oxford
EMTR	Effective marginal tax rate	OECD and the University of Oxford
Demand Factors		
Real GDP	GDP in 2010 prices, million euros	Eurostat
Population		Eurostat
EU market potential	The sum of the inverse distance-weighted GDP of all alternative locations in the European Union other than the host country.	Authors' calculations based on GDP data from Eurostat and bilateral distance from CEPII
Bilateral distance	Average distance in km between the biggest cities of those two countries, weighted by the share of the city in the overall country's population.	CEPII, http://www.cepii.fr/
Real GDP per capita	GDP in constant prices over midyear population in host country	Eurostat
Real GDP	GDP in constant prices	Eurostat
Real GDP growth	Annual change in real GDP	Own calculations based on data from the Eurostat
Production Costs		
Real wage per employee	Real wage per employee (euros)	Eurostat
Real wage per employee growth	Annual change in the real wage per employee (Euros)	Own calculations based on data from the Eurostat
Capital stock	Total fixed assets, % of GDP	Eurostat
Financial Development		
Financial development	Domestic credit to the private sector, % of GDP	The World Bank, Economy & Growth Indicators
Knowledge Base Factors		
R&D expenditure intensity	Public and private R&D expenditure, % of GDP	The World Bank, Science & Technology Indicators and Eurostat
GERD in the public sector per population	Gross domestic expenditure on R&D (GERD) in the government sector and in the higher education sector per person	Eurostat
Tertiary education	The share of the population with tertiary education in the population in the age group 25-64	Eurostat
Adult long-life learning	Participation rate in education or training, percentage of population age 25-64 years.	Eurostat
Trade and FDI Openness		
FDI openness	FDI stock, % of GDP	World Investment Report, UNCTAD
Infrastructure		
Broadband access	Percentage of households with broadband access, % of population	Eurostat
Business Regulations		
Complexity of regulatory procedures	Country score measuring complexity of regulatory procedures in licenses and permits system and in communication and simplification of rules and procedures. The	OECD indicators of product market regulations.

	country scores range from 0 (least complexity) to 6 (highest complexity).	
Business Uncertainty		
World Uncertainty Index	Index computed by counting the frequency of the word "uncertainty" (or its variant) in EIU country reports. The indices are normalized by total number of words and rescaled by multiplying by 1,000. A higher number means higher uncertainty and vice versa.	IMF
Housing		
Investment in housing	Investment in dwellings by households, % of gross fixed capital formation	OECD

Appendix B   Analysis of Firm Heterogeneity

This analysis uses firm level data from the Orbis Europe data set. More specifically, we first extracted data for all the foreign affiliates with more than 10% direct foreign ownership located in the European Union countries. The sample was then constrained to firms with unconsolidated financial accounts that incorporated between 2011 and 2020. Further cleaning steps included dropping firms with missing sector codes or identity of the parent companies. We also drop any year observation with negative values for total assets or employment. As we got data for the last 10 year of observations per firm, we then identify the year of incorporation and create measurements of assets, employment, turnover, taxes, fixed assets, depreciation, cost of employment, cost of goods, and EBIT by finding the closest non-missing value of each variable with respect to the year of incorporation. A similar procedure is applied in order to retrieve data on parents' assets and turnover at the year of the subsidiary's incorporation by finding their information separately in Orbis Europe.

Table B1: Summary statistics, new foreign affiliates in EU countries, 2011-2020

	Obs.	Mean	SD	Min	Max
Years of operation	31,311	4.4	3.1	0	9.0
Assets (€ m)	31,311	23.3	449.4	0.01	53,703.1
Employees	31,311	27.0	583.3	0	99,828.0
Turnover (€ m)	22,864	10.4	158.9	- 9.4	13,744.4
Profit margin (%)	22,306	0.001	0.0	- 0.1	0.1
Taxation (€ m)	23,675	0.1	3.1	-336.4	211.8
Fixed Assets (€ m)	28,573	15.8	271.6	-0.3	16,686.6
Depreciation (€ m)	20,723	0.4	5.6	-13.3	460.7
Cost of Employees (€ m)	21,065	2.0	72.1	- 0.2	7,505.3
Cost of Goods (€ m)	3,990	20.6	264.6	-0.1	11,437.1
EBIT margin (%)	18,179	3.4	29.9	-100.0	100.0
Effective tax rate (%)	11,358	15.0	14.3	0.0	69.9
Profits (€ m)	18,179	1,110.3	65,803.4	- 108,852.3	8,814,273.0
Excess profit (€ m)	5,872	2,196.3	115,489.1	- 111,868.5	8,813,302.0
Top-up tax rate (%)	6,242	10.4	5.1	0.0	15.0
Parent turnover (€ m)	9,802	7,478.8	24,123.9	- 1,288.7	467,317.0
Parent turnover over €750 m (0/1)	4,520	0.53	0.49	0	1

Notes: Effective tax rates are calculated as positive taxation/(EBIT margins*turnover).
Excess profits are calculated as income minus substance-based income exclusion (8% tangible assets and 10% payroll)
Top-up tax rates are calculated as the difference between effective tax rates and 15%.

Source: Authors' calculations based on data from Orbis Europe.

Table B2: Determinants of Location Decisions of new FDI in EU countries, firm heterogeneity

	All new foreign affiliates	New foreign affiliates with effective tax rates below 15%	New foreign affiliates with excess profits	New foreign affiliates with parent's income above 750mn
EATR (%)	-0.041***	-0.032***	-0.033***	-0.036***
	(0.0001)	(0.0003)	(0.0003)	(0.0010)
EU Market Potential (log)	3.679***	-2.007***	-1.444***	-7.151***
	(0.0054)	(0.0174)	(0.0233)	(0.0746)
Real GDP 2010 prices (log)	-0.940***	-1.534***	-1.008***	2.769***
	(0.0045)	(0.0109)	(0.0137)	(0.0399)
Real wage per employee (log)	1.557***	2.147***	2.841***	-0.448***
	(0.0024)	(0.0072)	(0.0092)	(0.0306)
Tertiary education (%)	-0.048***	0.002***	-0.025***	0.025***
	(0.0001)	(0.0004)	(0.0006)	(0.0016)
Adult life-long learning (%)	0.004***	0.062***	0.054***	0.032***
	(0.0001)	(0.0002)	(0.0004)	(0.0011)
GERD in the public sector (log)	2.947***	0.024**	0.166***	-1.184***
	(0.0031)	(0.0107)	(0.0131)	(0.0411)
Complexity of market regulations	-1.368***	-1.342***	-1.191***	-0.005
	(0.0014)	(0.0042)	(0.0054)	(0.0167)
Investment in housing, % of GFCF	-0.023***	-0.095***	-0.079***	-0.142***
	(0.0001)	(0.0003)	(0.0004)	(0.0012)
Broadband access (%)	-0.008***	-0.000***	-0.009***	0.032***
	(0.0000)	(0.0001)	(0.0002)	(0.0005)
Observations	248	248	248	248
Locations	28	28	28	28
Number of new foreign affiliates	27,849	5,331	2,783	362
Pseudo R^2	0.822	0.670	0.539	0.324
Wald chi^2	113.90	23.35	10.33	15.88
Wald chi^2 p-value	0.000	0.001	0.412	0.103

Notes: Dependent variable: annual count of new greenfield FDI projects in the EU and UK over 2011–2020. Estimates are obtained with a Poisson with fixed effects estimator. Explanatory variables are lagged by one year with respect to the dependent variables. GERD stands for Gross Expenditures on Research and Development. GFCF stands for gross fixed capital formation. * p<0.10, ** p<0.05, *** p<0.01. Standard errors are shown in parentheses. Regressions are weighted using weights calculated on the basis of data from the fDi Markets on the number of new greenfield FDI projects for Ireland and other EU countries.

Source: Authors' estimates obtained with data from Orbis Europe.

Table B3: Determinants of Location Decisions of new FDI in EU countries, sector heterogeneity

	All	Manufacturing	Services
EATR (%)	-0.041***	-0.007***	-0.043***
	(0.0001)	(0.0003)	(0.0001)
EU market potential (log)	3.679***	2.849***	3.698***
	(0.0054)	(0.0154)	(0.0060)
Real GDP 2010 prices (log)	-0.940***	-0.390***	-1.076***
	(0.0045)	(0.0131)	(0.0049)
Real wage per employee (log)	1.557***	1.069***	1.718***
	(0.0024)	(0.0076)	(0.0027)
Tertiary education (%)	-0.048***	-0.059***	-0.052***
	(0.0001)	(0.0004)	(0.0002)
Adult long-life learning (%)	0.004***	0.027***	-0.000***
	(0.0001)	(0.0003)	(0.0001)
GERD public sector (log)	2.947***	1.593***	3.169***
	(0.0031)	(0.0088)	(0.0034)
Complexity of market regulations	-1.368***	-1.421***	-1.338***
	(0.0014)	(0.0040)	(0.0016)
Investment in housing, % of GFCF	-0.023***	0.002***	-0.026***
	(0.0001)	(0.0003)	(0.0001)
Broadband access (% of households)	-0.008***	-0.005***	-0.004***
	(0.0000)	(0.0001)	(0.0001)
Observations	248	248	248
Locations	28	28	28
Number of foreign affiliates	27,849	3,777	22,381
Pseudo R^2	0.822	0.606	0.822
Wald chi2	113.90	47.85	120.43
Wald chi2 *p*-value	0.000	0.000	0.000

Notes: Dependent variable: annual count of new greenfield FDI projects in the EU and UK over 2011–2020. Estimates are obtained with a Poisson with fixed effects estimator. Explanatory variables lagged by one year with respect to the dependent variable. GERD stands for Gross Expenditures on Research and Development. GFCF stands for gross fixed capital formation. * p<0.10, ** p<0.05, *** p<0.01. Standard errors are shown in parentheses. Regressions are weighted using weights calculated on the basis of data from the fDi Markets on the number of new greenfield FDI projects for Ireland and other EU countries.

Source: Authors' estimates obtained with data from Orbis Europe.