Labor Market Consequences of Antitax Avoidance Policies

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April 2022

Abstract

In this paper, I analyze the local labor market consequences of multinational firms reallocating employees across their affiliates in response to antitax avoidance policies. I leverage the introduction of a worldwide debt cap in 2010 in the United Kingdom as a quasi-natural experiment that limited one of the forms of profit shifting—debt shifting—for a group of multinational corporations (MNCs). Multinationals affected by the reform reallocated their employees from the United Kingdom to foreign locations. This affected London-based service sector firms the most. I show that this led to a reduction in the number of jobs available in regions exposed to the reform in the United Kingdom. In foreign countries, the initial reallocation of labor across firms resulted in a much larger expansion of the affected local labor markets. These results suggest that a reallocation of labor across firms generates asymmetries in how negative and positive firm-level shocks are amplified through regional markets.[1]

JEL Classification Codes: H25, H26, J21

Key words: Debt shifting, multinational companies, local labor markets

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[1]I acknowledge generous financial support from the Upjohn Institute Early Career Research Award. I would like to thank Nathan Taylor for his outstanding research assistance. I am grateful for all the comments I received from participants at the MannheimTax, NTA, and RIDGE Public Economics workshops.

1 Introduction

As of February 2022, the Global Minimum Tax proposal has an agreement from 141 countries. This unprecedented level of international cooperation follows a series of unilateral country-level reforms that introduced stricter rules to limit the extent of growing tax avoidance by multinational corporations, MNCs (Bilicka, 2019; Torslov et al., 2018). Such restriction, in practice, affect not only profit-shifting activities but also result in the reallocation of real activities, such as investment and employment, away from countries introducing those rules (Bilicka et al., 2020; Suárez Serrato, 2018). These reallocations may affect long-run regional employment and growth and exacerbate regional inequalities. As such, it is critical to understand whether and how such restrictions affect local domestic markets.

In this paper, I analyze the effects of an antitax avoidance regulation on local labor markets. To provide causal evidence, I leverage the introduction of the worldwide debt cap rule (WDC) in the United Kingdom in 2010 as a natural experiment. The WDC was aimed at tackling a particular form of profit shifting, debt shifting. The reform set up a maximum ratio of debt allowed to be held in the United Kingdom relative to the overall debt for each MNC — the gateway ratio. Interest expenses above the gateway ratio were disallowed for deductibility purposes increasing the costs of profit shifting. This created two groups of firms, the treated — those borrowing excessively, and control groups. Bilicka et al. (2020) show that although the WDC reduced excessive borrowing in the United Kingdom, it led to debt shifting toward foreign subsidiaries. This reallocation of debt was followed by the reallocation of real business activities. Affected MNCs shrank the size of total assets, fixed assets, and employment they held in the United Kingdom, while expanding elsewhere.

I take advantage of the same reform but focus on the local labor market implications of the employment reallocation from the United Kingdom to foreign countries that resulted from this antitax avoidance restriction. Consistent with Slemrod (1992) hierarchy of behavioral responses, when firms can easily shift profits between jurisdictions, they respond to regulations moving paper profits. However, if a regulation prohibits them from doing so, their accounting responses may result in reallocations of real activities. From a policy perspective, shifts in the allocation of debt and consequently profits between subsidiaries of MNCs matter for tax revenue collection across countries and regions. This effect could be exacerbated if the reallocation of debt generates distortions in the firm's real business activities, especially employment. If MNCs employ a large part of the population in a particular region, this may disproportionately affect local employment levels and have spillover effects

for regional growth.

The analysis proceeds in two steps. First, I show how the WDC affects firm-level employment across subsidiaries belonging to the affected MNCs. To identify the effect of the reform I use a difference-indifference strategy and compare employment for firms above and below the gateway ratio before and after the reform. This effectively replicates Bilicka et al. (2020), focusing on the longer panel of employment data. I show that affected MNCs reduced employment in the United Kingdom by 8.5 percent and increased employment in their foreign subsidiaries by 8.6 percent between 2010 and 2018. These estimates are larger than in Bilicka et al. (2020) suggesting the long-run effects of this reform on the employment of affected MNCs. Going beyond the findings in Bilicka et al. (2020), I explore the regional and industrial variation that the data offer. I show a large decline in employment in London and a substantial heterogeneity in local labor market responses across U.K. regions. The large labor decline in London is concentrated among service firms. This is consistent with potentially high mobility of employees in service sectors and, as a consequence, a lower cost of reallocation or rehiring new employees.

In the second part of the paper, I focus on the regional implications of this employment reallocation. I use the location of MNCs subsidiaries in the United Kingdom and in foreign countries, assign firms to regions (Nuts3 regions), and match these with regional jobs data from Eurostat. This means that the foreign implications presented here are only relevant for European Union countries for which I have data.[2] I define an exposed region as one that has at least one MNC subsidiary that failed the gateway test.[3]

I find that the number of jobs available in exposed regions in the United Kingdom declined following the WDC. I show a similar increase in unemployment rate and reduction in regional GDP growth. In turn, in foreign European countries, in regions exposed to WDC, I find an increase in the number of jobs available.[4] The magnitude of the estimates local labor market effect abroad is larger than the one in the United Kingdom, which suggests asymmetries in how positive and negative firm-level shocks translate into local economies. In placebo tests, I show no effects for regions that were simply exposed to MNCs in general. These results suggest that the reallocation of labor by MNCs that employ a large proportion of the

[2]The list of countries is as follows: Austria, Belgium, Bulgaria, Germany, Estonia, Spain, Finland, France, Greece, Hungary, Ireland, Luxembourg, Latvia, Malta, Netherlands, Norway, Poland, Portugal, Sweden, Slovenia, Slovakia. They are also graphed in Figure A4.

[3]As an alternative treatment group, I use regions where at least one MNC failed the gateway test *and* reduced their employment in the United Kingdom as a result.

[4]Within each region, I aggregate the firm-level employment data and show results consistent with regional-level data.

population locally affects local labor markets by reducing the number of jobs available and creating unemployment.

This paper provides a new contribution to the literature on the effects of antitax avoidance restrictions on local labor markets. The paper closest to this one is Suárez Serrato (2018), who analyzes the consequences of a domestic US, anti-tax avoidance policy regarding Puerto Rico. He uses regional unemployment data for the United States to show that firm-level responses affected local labor markets that were more exposed to the reform. In this paper, looking at an international regulation, I show that these types of restrictions also have implications for foreign countries' labor markets. Further, the magnitude of these foreign local labor market effects is much larger, despite similar firm-level responses.

More broadly, this paper adds to several strands of literature. First, there is evidence that profit shifting elicits real responses by MNCs, especially in terms of investment (Becker and Riedel, 2012; Egger and Wamser, 2015; Grubert and Slemrod, 1998; Mintz and Smart, 2004). While Desai et al. (2009) show that domestic and foreign investment are complements, Kovak et al. (2017) show that this does not necessarily translate to employment. These results focus on firm-level implications, while the present paper addresses local labor market consequences of such real responses. Second, I add to a growing literature that examines how MNCs respond to economic and policy shocks and how these shocks propagate across their subsidiaries, affecting the local and global economy (Almedia et al., 2015; Biermann, 2019; Boutin et al., 2013; Desai et al., 2007; Garrett et al., 2020; Giroud and Mueller, 2015, 2016, 2019; Huber, 2018; Kalemli-Ozcan et al., 2016; Santioni et al., 2017). The papers focus on how shocks to one establishment, through the firm network, affect the rest of the firm. This literature does not consider the implications of antitax avoidance restrictions and how they propagate across firm subsidiaries.

Third, this paper also relates to a large body of trade literature on spillover effects of multinationals on domestic markets and producers. The evidence from this literature is mixed, with Harrison and Aitken (1999) and Lu et al. (2017) finding negative effects, while Javorcik (2004), Haskel et al. (2007), Alfaro and Chen (2018), Keller and Yeaple (2009), Figlio and Blonigen (2000), Kee (2015), and many others finding positive effects. More recently, Setzler and Tintelnot (2019) show positive spillover effects of foreign MNCs on wages of domestic firms. My paper is related to those findings, as I show that negative shocks to MNC's operations affect employment in local markets negatively and the spillover effect to domestic firms is small, as they do not appear to pick up much of the slack in labor markets left by the MNCs.

2 Policy Context

Profit shifting has been at the forefront of political debate, as countries try to curb the ability of MNCs to move profits away from high-tax to low-tax jurisdictions. The three most popular profit-shifting methods include debt shifting (Desai et al., 2004; Huizinga et al., 2008), transfer pricing, (Cristea and Nguyen, 2016; Davies et al., 2018) and location of patents in low-tax jurisdictions (Dischinger and Riedel, 2011). Debt shifting relies on subsidiaries of MNCs located in low-tax countries lending money internally to subsidiaries located in high tax-countries and using interest deductibility to reduce taxable profits in high-tax countries. Transfer pricing relies on mispricing of goods when traded internally so that their costs can be written off against profits in high-tax countries. Location of patents in low-tax countries relies on firms' ability to lease those patents and pay royalties to low-tax countries at the same time reducing their taxable profits in high-tax countries.

Many countries already have restrictions in place to limit the extent to which MNCs can use those various profit-shifting strategies. For example, thin-capitalization rules set up a fixed ratio, such as the debt-to-equity ratio or the interest coverage ratio, and interest expense associated with debt exceeding the ratio is often disallowed for a tax deduction. These rules consider each subsidiary of an MNC separately, and despite being shown to be effective at reducing debt shifting (Blouin et al., 2014; Buettner et al., 2012), they have been widely criticized, as firms are able to circumvent those rules easily. Transfer pricing restrictions exist too, with countries agreeing to uphold "arms-pricing" restrictions, where firms have to show that the goods they trade internally have a price at which they would trade on the external market. Finally, patent location and the use of tax havens is being restricted by Controlled Foreign Company rules (Clifford, 2019).

In January 2010, the U.K. tax authority (the HMRC) introduced the WDC to restrict the generous tax deductions for financing expenses enjoyed by MNCs in the United Kingdom. These new rules were meant to complement the use of thin-capitalization rules. This worldwide approach evaluates the MNCs' allocation of debt across affiliates by comparing the amount of debt located in each host country to a worldwide consolidated benchmark. In case of the United Kingdom, this benchmark was set to be worldwide debt in 2010. This was replaced in April 2017 by Earnings before interest tax and depreciation (EBITDA).

The WDC applied to "relevant" MNCs with a corporate tax residence in the United Kingdom. The relevance was determined by ownership status, and only affiliates that were owned by more than 75 percent were affected by the reform. Further, the MNCs subject to

this reform had to have more than 250 employees, above €50m turnover, and/or above €43m balance sheet total assets. As such, the affected firms were large and employed a substantial number of people in the United Kingdom. The WDC required MNCs to calculate its net U.K. debt across all of their "relevant" subsidiaries and divide that by worldwide gross debt. If the ratio exceeded 75 percent, the interest deduction was disallowed for the exceeding level of interest expenses. Bilicka et al. (2020) discuss in detail the particular types of liabilities and assets that form the net U.K. debt.

The timing of the WDC coincides with the introduction of territorial tax reform in the United Kingdom in 2009. This reform exempts dividend repatriation by MNCs from being taxed in the United Kingdom. Further, U.K. government introduced a package of statutory corporate tax rate cuts that reduced its tax rate to 20 percent in 2015 and to 19 percent by 2018. Bilicka et al. (2020) already carefully show that these two reforms did not affect firms that failed the gateway test differently; hence, I do not focus on the confounding effects of those reforms in this paper.

3 Data and Methodology

3.1 Data

To examine the effects of the WDC on local labor markets, I use the dataset from Bilicka et al. (2020) and complement it with information on the location of multinational affiliates and hand-collected regional jobs and unemployment data. The firm-level data with the ownership and financial information come from Bureau van Dijk (BvD) Osiris matched with Orbis for non-U.K. financials and FAME for U.K. financials. I use FAME data for the U.K. portion of this study, as FAME offers much more detailed financial information that allows me to construct the gateway test ratios for firms with affiliates in the United Kingdom following the HMRC guidance exactly. I use these gateway test ratios to construct treatment and control groups and then match into the parent and foreign subsidiary information for firms from the ORBIS data. Combining these data sources together, the benchmark sample covers financial data for MNCs, both at the group level and the subsidiary level, during the period 2007–2018.

The regional U.K. data is at the county-city level (NUTS3 regions) and come from Eurostat. I have information on population, employment, GDP, number of jobs, and unemployment rate at the regional level, such as Manchester, Aberdeen, or Bristol and their

surrounding regions. Figure A2 in the Appendix shows distribution and borders of county-cities in the United Kingdom. Since the unemployment data come from Eurostat, my sample is limited to analyzing the local labor market implications for the United Kingdom and for foreign labor markets located in Europe.[5] In this paper, I focus on three variables in particular: number of jobs, unemployment rate, and regional GDP. Note that for some cities, data were not collected in all years. In those cases, I fill in the data by calculating an average of the surrounding time periods. For example, if employment in Aberdeen was 85,000 in 2008 and 90,000 in 2011, I calculate it to be 87,500 in both 2009 and 2010.

3.2 Empirical strategy

Firm level The empirical analysis proceeds in two steps. First, I analyze the firm-level effect of the reform on employment of affected MNCs in a difference-in-differences framework. MNCs that failed the gateway test in 2010 are in the treated group, while those that passed the test are in the control group. This replicates Bilicka et al. (2020), using a longer postreform time series and using affiliate-level information instead of aggregating at the MNC level.[6] I estimate the following model:

$$Y_{i,j,s,t} = \alpha + \beta \times Failed_i \times Post_t + \psi_t + \kappa_i + \epsilon_{i,j,t}, \tag{1}$$

where $Y_{i,j,s,t}$ is employment in subsidiary j that belongs to multinational i, located in host country s, in year t. $Failed_i$ is a dummy variable that equals 1 if MNC i failed the gateway test in 2010 and 0 otherwise, $Post_t$ is a dummy variable that equals 1 from 2010 onward, ψ_t is the time fixed effect, κ_i is the subsidiary fixed effect, and $\epsilon_{i,j,t}$ is the error term. The parameter of interest is β, which captures the effect of the WDC on MNCs' employment. In the empirical analysis I distinguish between U.K. subsidiaries and foreign subsidiaries, as we would expect the effects to be opposite for those two types of affiliates. Stanrd errors are clustered at the subsidiary level in all specifications.

The identification strategy at the firm level relies on the assumption that in the absence of the WDC reform, both the treated and control group firms would evolve in the same way before and after the reform. I test this assumption using a dynamic version of equation 1, in

[5]The following countries have regional employment data in Eurostat: Austria, Belgium, Bulgaria, Germany, Estonia, Spain, Finland, France, Greece, Hungary, Ireland, Luxembourg, Latvia, Malta, Netherlands, Norway, Poland, Portugal, Sweden, Slovenia, Slovakia, United Kingdom.

[6]I need to use affiliate level information here, because some MNCs have multiple subsidiaries in the United Kingdom and I match their location to the regional unemployment data.

which I estimate the annual evolution of employment for treated and control firms separately relative to year 2010, i.e. the year in which the reform was introduced.

Regional level Second, I use regional statistics to understand the effect of WDC on regional employment. I distinguish between two types of regions that theoretically should have been more exposed by the reform: 1) regions where a subsidiary of an MNC's firm that failed the gateway test is located, 2) regions where such MNCs also reduced their employment in the United Kingdom following the WDC. Further, I use placebo regions with more employment by MNCs to see whether the effects I observe could simply be the effect of exposure to MNCs. As such, I estimate the following models:

$$Y_{k,t} = \alpha + \beta Post_t \times Region_k + \psi_t + \mu_k + \epsilon_{i,j,s,t} \tag{2}$$

where $Y_{k,t}$ is employment in region k, in year t. $Post_t$ is a dummy variable that equals one from 2010 onward; $Region_k$ is a dummy equal to 1 for exposed regions. ψ_t is the time fixed effect, μ_k is region fixed effect, and $\epsilon_{k,t}$ is the error term. The parameter of interest is β, which captures the effect of the WDC on employment in regions more exposed to WDC. As a validation, I also aggregate firm-level data at the regional level by calculating the total number of employees for MNCs in each region and run the same set of regional regression as outlined in Equation (2).

The identification strategy at the regional level relies on the assumption that in the absence if the WDC reform, both the exposed and unexposed regions would evolve similarly in terms of employment. There are two potential threats to this identification strategy. First, it could be that firms respond to this reform by moving employment or moving subsidiaries across regions within the UK. This would affect the interpretation of the results. In principle, there is no tax incentives to relocate operations within the UK, as there is no differential taxation between regions. In practice, Bilicka et al. (2020) show no reallocation of real operations, debt or subsidiaries within the UK, but large reallocation abroad, consistent with tax incentives.

A second potential threat to the identification strategy could be an endogenous assignment of subsidiaries across regions. Specifically, it may be that regions that are more exposed to the reform are also those that have different unemployment and GDP and, more concerning, a different evolution of those variables before the reform. I discuss this second issue in section 3.3 and show that this is not the case.[7]

[7] Ideally, I would have an event study design at the regional level, in which I show no differential evolution

3.3 Sample description

Given the focus of the paper on local labor markets, I center the descriptive section of regional comparison. Table 1 shows regional descriptive statistics using the main identification strategy; in Panel A, I compare regions that were exposed to WDC and those that were not in the United Kingdom; in Panel B, I do the same for foreign regions.

There is no statistically significant difference between regions that were exposed to WDC and those that were not in terms of population, number of employed people, unemployment rate and regional GDP in the United Kingdom. Further, and more importantly, in my context, there is no difference in *growth* rates of these variables prior to the reform. This suggests that the regions that were more exposed to the reform and those that were not, grow at the similar rate when it comes to GDP and employment.[8]

For foreign regions, there is no difference between regions that were exposed to WDC and those that were not in terms of population. Regions that were exposed to the WDC had higher number of employed people and GDP, and lower unemployment rate. However, I show that the growth rate of any those variables does not differ between the regions more and less exposed to the WDC reform. Again, given that the identification strategy I use requires a common evolution of the variables of interest prior to the reform, this Table confirms the validity of this strategy.[9]

4 Firm-Level Results

4.1 Baseline results

In Table 2 I report results using firm-level data. In column 1 I include U.K. subsidiaries of MNCs, in column 2 I include domestic firms, and in column 3 I include only foreign subsidiaries belonging to MNCs that had at least one U.K. affiliate in 2010. In columns 1 and 3 treated is a dummy equal to 1 when the MNC was exposed to WDC, in column 2, treated is a dummy equal to 1 when the region was exposed to WDC.

of the variables of interest at the regional level. However, the sample size I have for that part of the analysis is limited and consequently confidence intervals are large. Still, I show results consistent with no pre-trends in Figure A1 in the Appendix.

[8]In Figure A2, I show the distribution of the intensity of exposure to WDC by region, and in Figure A3, I include a map of all regions in the United Kingdom for which data for regional employment is collected, how many people were employed in each region and the unemployment rate. The list of regions with available data is included in Table A3 in the Appendix.

[9]In Figure A4, I show the countries for which I have the regional unemployment data available.

Consistent with Bilicka et al. (2020), I show that after the WDC there was a significant reduction in employment in subsidiaries belonging to the affected MNCs in the United Kingdom. Further, there was an increase in the number of people employed by affected MNCs abroad. The magnitudes of the U.K. reduction and foreign increase are very similar; MNCs reduced employment in the United Kingdom by 8.5 percent and increased that abroad by 8.6 percent. There are two reasons why these estimates are different than Bilicka et al. (2020). First, in this paper, I consider a longer sample period to show the lasting effect of the WDC of employment. Second, to match MNC affiliates location with regional data I have to use subsidiary-level data instead of aggregating at the MNC level in the United Kingdom.

After 2010, there was also an increase in the number of people employed by domestic firms in the United Kingdom, but not necessarily in regions exposed to WDC. I show that there is a 14% increase in employment by domestic firms in the UK following 2010. In turn, there is a 2% reduction in employment in treated regions by domestic firms. The magnitude of this effect is much smaller than the magnitude of the change in MNC employment in those regions. Of course this reduction in domestic firm's employment may also contribute to the regional employment dynamics, but given the much smaller magnitude of the effect at the firm level and a large proportion of population employed by MNCs in exposed regions, the regional effect is still likely to be driven by the response of MNCs.

In Figure 1, I plot the dynamic evolution of the employment changes at the firm level. We can see that before the WDC, employment of affected and unaffected MNCs evolved similarly, both in the United Kingdom (Panel A) and abroad (Panel B). After the WDC, employment in the control group has remained stable, while in the United Kingdom the number of people employed by affected MNCs has gradually declined. The opposite happened in foreign countries. Note that from 2016 onward the difference between treated and control groups employment in the United Kingdom is not statistically significant. Part of this can be attributed to a gradual increase in the number of people employed by domestic firms in exposed regions in the United Kingdom (Panel C) that increased in 2016. Those firms are likely picking up some of the unemployment that was created by the MNCs that reduced the number of people they employed. Note that the increase in employment amongst domestic firms in the United Kingdom that I estimate in column 2 in Table 2 is concentrated outside of the regions exposed to the WDC. This could mean that there may be a substitution between domestic and multinational firms' employment, but that does not necessarily need to occur regionally.

4.2 Mechanisms: sectoral and regional variation

What could be driving the observed effects? In Figure 2, I explore the regional variation in labor reallocation. As such, I estimate the effect of WDC separately for firms in London and outside of London and plot those coefficient estimates in Panel A. Most of the employment decline in the United Kingdom is driven by firms located in London. They see a 22 percent decline in the number of people employed by treated firms. Panel B in that figure demonstrates that this is driven by a gradual fall in employment by treated firms and we do not see any effect for the control group firms in London. This suggests no substitution effect between firms that were affected by WDC and those that were not in London. Also, in Panel C, I do not find a significant reduction in the *average* employment outside of London. This average effect, of course, could mask a regional variation outside of London.

What is different about firms in London? Forty-one percent of London firms in 2010 belong to service industry, 23 percent to finance, 9.5 percent are construction, and 8.3 percent manufacturing. Outside of London only 26 percent of firms are services, while 29 percent are manufacturing and 16.5 percent finance. In Figure 3, I divide the sample of subsidiaries in London into sectors in which these firms operate and estimate the effect of the reform for each sector separately. I show that the negative effect for London is driven primarily by service and construction firms. Those are the only two significant coefficient estimates in Panel A. This is perhaps not surprising, as service firms are likely to be most mobile when it comes to capital and employment and may be able to relocate most efficiently and at the lowest cost. These findings, especially the emphasis on capital mobility, are consistent with the descriptive evidence provided by Bilicka (2022) on a decline in relative contributions of MNCs to tax revenues in the UK using the same time period.

In Panel B, I divide the sample of subsidiaries outside of London into sectors and estimate the effect of WDC within each sector separately. Even though the average estimate for employment reallocation for outside of London in Panel A of Figure 2 is not statistically significantly different from zero, there is a substantial sectoral heterogeneity here. I show that service firms actually reduce their employment outside of London too and the magnitude of this effect is comparable to those London firms. This again points toward capital mobility being important when firms are relocating their operations. This is consistent with the fact that I find no effect for manufacturing or wholesale trade sectors, which have much lower capital mobility. In Panel C in Figure 3, I show that the only sector where we see a significant increase in employment abroad is a service sector too.[10]

[10]Note that I do not estimate the secotral regressions for mining and construction in foreign countries due

In unreported exercises, I check whether the decline in employment in the service sector is linked with increase in other sectors, especially among firms unaffected by WDC. I find no such effects, which suggests that the observed effect is about service firms reallocating away from the United Kingdom to more preferable foreign locations and not about substitution between sectors and firm types. This also addresses one of the potential identification strategy violations for the regional data, i.e. the reallocation within the UK in response to the WDC reform.

5 Regional Estimates

To understand the implications of firm-level reallocation of employment on local labor markets, I proceed in two steps. First, I use regional statistics for the number of jobs available. Second, I aggregate firm-level data at the regional level and show results using aggregate number of people employed by MNCs in each region.

5.1 Baseline results

Regional data In Table 3 I show results using the number of jobs available. In all columns I control for logarithm of population to account for changes in population across regions. In Panel A, I show results for U.K. regions and in Panel B for foreign regions. I find that the number of jobs available in the United Kingdom declined in the exposed regions, while increasing in the foreign regions. These results are consistent with the firm-level results in which firms that failed the gateway test relocated their employees from U.K. to foreign countries. This result is consistent for regions that were exposed to firms failing the gateway test (column 1) and those regions that were exposed to firms that reduced their employment in the United Kingdom (column 2). In Table A2 in the Appendix, I show that exposed regions had a higher unemployment rate and lower regional GDP in the United Kingdom after the WDC as well. At the same time, exposed regions had lower unemployment and higher regional GDP in foreign countries.

One may be concerned that after the WDC and the financial crisis regions that were more exposed to MNCs did economically worse and that can be reflected in higher unemployment, lower regional GDP and fewer jobs available. Results from columns 3 in Table 3 show that this is not the case. I find no significant effect of WDC on regions that were simply more

to small sample size.

exposed to MNCs, both in the United Kingdom and abroad.

Firm-level aggregated data In Table 3 in columns 4–5 I show results using aggregate firm-level data. I find that in regions exposed to WDC in the United Kingdom, there is a substantial reduction in aggregated number of people employed by MNCs. The magnitude of the effect suggests a 17 percent decline in the number of people employed by MNCs in those regions relative to regions without MNCs that failed the gateway test in the United Kingdom. In foreign countries, I find an increase in the number of people employed by MNCs in regions that were more exposed to WDC. These results are qualitatively similar to the regional ones. Note that the estimated magnitudes are quantitatively different than using regional data, likely because ORBIS data do not have a complete coverage of all firms in each region and this coverage varies across regions and countries.

5.2 Mechanisms and magnitudes

The firm-level reallocation of labor appears to have large local labor market effects both in the United Kingdom and abroad. In spite of the fact that we observe similar magnitude of the firm-level reduction of employment in the United Kingdom and increase abroad, the regional data suggest some asymmetries. The reduction in the regional jobs available in the United Kingdom is 3.2–3.9 percent in magnitude, while the foreign increase is larger, 5.0–7.5 percent. There are three potential reasons for this disparity in magnitudes. First, as MNCs expand in the foreign locations where they reallocate employment, local labor markets can experience productivity gains through supply-chain linkages (Alfaro and Chen, 2018; Javorcik, 2004). These can create larger local gains than the initial firm-level expansion, which may affect local domestic firms as well, increasing local labor market size and reducing unemployment further. Thus, the initial expansion may be followed by further growth due to economies of scale. Note that I do not have sufficient prereform data to investigate the domestic labor effects in foreign countries.

Second, the initial decline in firm-level employment by MNCs in the United Kingdom persist until 2015 after which I observe a slight increase. This suggests that the negative shock is not permanent and that affected firms eventually offset the effects of WDC. Third, in the United Kingdom, I also find that domestic firms increased the number of people they employed, but not necessarily in the regions exposed to WDC. This suggests that domestic firms did not benefit from this negative shock by substituting labor locally, unlike in Desai et al. (2009). However, it is entirely plausible that domestic labor substitution occurred in

regions not exposed to WDC; that is, not locally. This substitution could explain a much smaller effect of the WDC on the U.K. local labor markets.

6 Conclusion

This paper demonstrates that antitax avoidance measures have substantial implications for local labor markets. As MNCs are often large employers, when they reallocate employment, it affects the number of jobs available in regions in which they are located. This effect is asymmetric between domestic and foreign regions. This suggests that firm-level shocks have a potential to amplify differentlially depending on whether they are positive or negative ones. From policy perspective, as reforms to tackle tax avoidance spill over to local economics, it is crucial to take these effects into account when designing the antitax avoidance policies.

Further, recent policy discussions around the introduction of the Global Minimum Tax show that countries are agreeing to implement restrictions on profit shifting multilaterally. The UK introduced the WDC reform unilaterally, which meant that firms had the ability to avoid these restrictions by reallocating to other countries. This paper highlights the importance of multilateral agreements when it comes to antitax avoidance policies, especially in the context of their broader implications on local economies.

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Table 1: Regional Comparison: Means

	(1) not exposed	(2) exposed	(3) diff	(4) t-test
Panel A: UK exposure				
population	320815.633	647096.396	-326280.762	-1.221
number of employed people	137.700	343.572	-205.872	-1.378
unemployment rate	8.200	8.596	-0.396	-0.747
GDP	8261.479	25583.157	-17321.678	-1.267
population growth	0.008	0.009	-0.001	-0.586
number of employed people growth	-0.007	0.003	-0.009	-1.659
unemployment rate growth	0.073	0.067	0.006	0.383
GDP growth	0.065	0.064	0.001	0.146
Panel B: foreign exposure				
population	996307.480	1567808.422	-571500.942	-1.613
number of employed people	475.002	826.676	-351.674*	-1.883
unemployment rate	12.577	10.869	1.707**	2.223
GDP	27361.098	53809.954	-26448.856**	-2.064
population growth	0.001	0.003	-0.002	-0.974
number of employed people growth	-0.010	-0.008	-0.002	-0.394
unemployment rate growth	0.011	0.023	-0.011	-0.798
GDP growth	0.020	0.029	-0.009	-0.698

NOTE: This table presents mean characteristics of regions in the treated and control groups in 2010. Exposed to failed MNC is 1 when a region has at least one MNC that failed the gateway test. The growth rate variables are defined as a change between year 2010 and 2009 divided by the outcome in 2009. In Panel A, I show statistics for U.K. regions. There are 68 unexposed and 56 exposed regions in Panel A. In Panel B, I show statistics for foreign regions. There are 169 unexposed and 84 exposed regions in Panel B.

Table 2: Firm-Level Baseline Results

Dep.var *log_empl*	(1) MNEs	(2) domestic	(3) MNEs
post=1 × treated=1	-0.085**	-0.163**	0.086**
	(0.033)	(0.068)	(0.035)
post=1		0.140***	
		(0.047)	
Year FE	✓	✓	✓
Firm FEs	✓	✓	✓
Sample	UK		non-UK
Observations	69,594	20,336	336,141
# firms	9,470	13,858	51,841
Mean	4.037	3.685	3.939

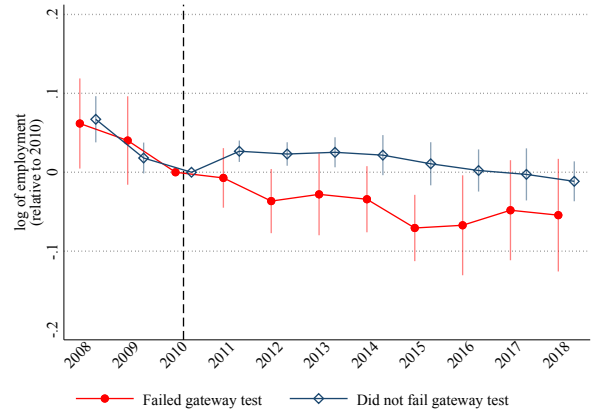
NOTE: This Table presents difference-in-difference firm-level results for the logarithm of employment as an outcome variable. In columns 1 and 3, treated is equal to 1 when MNC failed the gateway test in 2010. In column 2, treated is equal to 1 when the region was exposed to WDC by having at least one MNC that failed the gateway test. Post is equal to 1 from 2011 onward. Standard errors are clustered at the firm level. The sample spans years 2007–2018. Standard errors clustered at the firm level. I am not able to include the effect of the WDC on domestic operations in foreign countries, since I only have data after 2011 for them.

Table 3: Regional Level Results: Number of Jobs

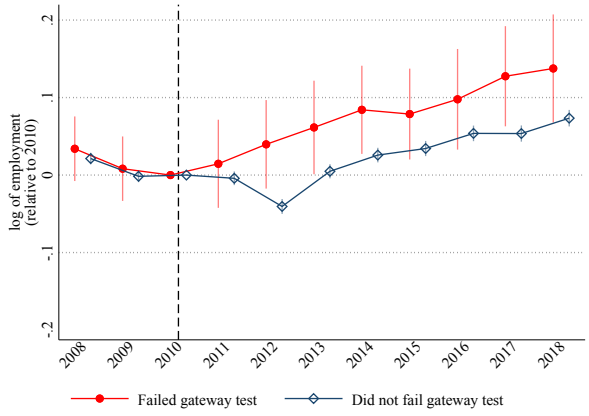
Dep.var. *log_nbjobs*	(1) exposed to failed firms	(2) large empl change	(3) exposed MNEs	(4) exposed to failed firms	(5) large empl change
	Regional data			Firm-level data	
Panel A: UK regions					
treated=1 × post=1	-0.039***	-0.032***	-0.017	-0.168*	-0.219**
	(0.010)	(0.010)	(0.010)	(0.095)	(0.101)
Observations	1586	1586	1586	543	447
# Regions	122	122	122	255	268
Mean	5.039	5.039	5.039	5.077	5.076
Panel B: Foreign regions					
treated=1 × post=1	0.050**	0.075**	-0.017	0.031***	0.026
	(0.020)	(0.030)	(0.012)	(0.010)	(0.156)
Observations	3955	3955	3955	2,394	2,398
# Regions	644	644	644	922	921
Mean	5.764	5.764	5.764	5.825	5.826
Year FE	✓	✓	✓	✓	✓
Region FEs	✓	✓	✓	✓	✓

NOTE: This Table presents results from regional-level specifications. The outcome variable is the logarithm of number of jobs available in each region in columns 1-3. The outcome variable in columns 5 and 6 is the aggregated number of employees for all firms that are resident in a particular region. Treated is equal to 1 in columns 1 and 4 when a region is exposed to at least one MNC that failed the gateway test. In columns 2 and 5, treated is equal to 1 when a region is exposed to at least one MNC that reduced employment following the WDC, and in column 3, treated is equal to 1 when a region in exposed to MNCs presence at all; Post is equal to 1 from 2011 onward. In all columns I control for the logarithm of population in each region. Standard errors clustered at the regional level.

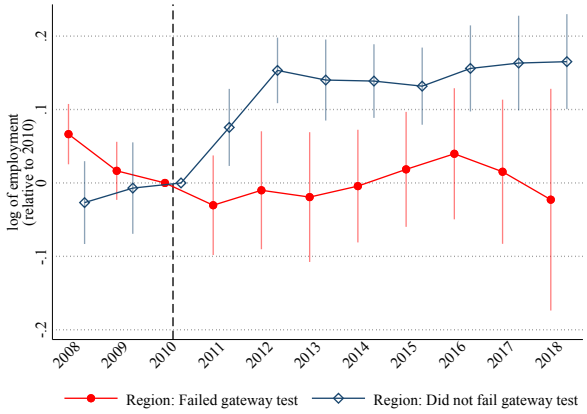
Figure 1: The Effect of the Reform on Firm-Level Employment



A. Multinationals: U.K.



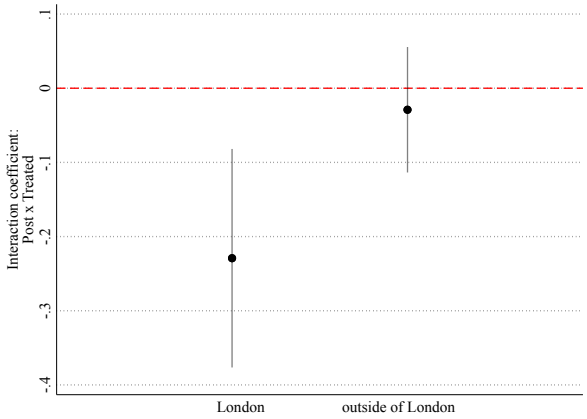
B. Multinationals: foreign



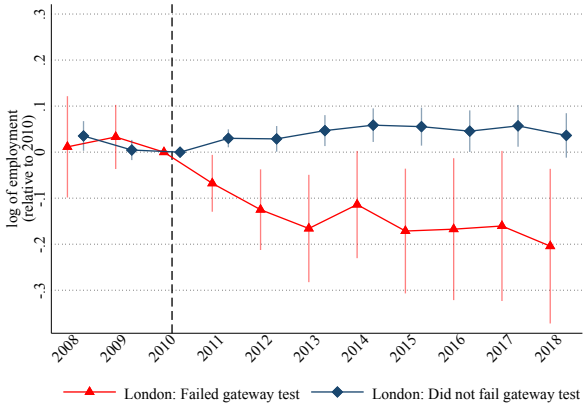
C. Domestic firms

NOTE: These Figures present the dynamic effects of the reform on firm-level employment. The outcome variable is the logarithm of the number of employees for each firm. Each hollow diamond corresponds to annual coefficient estimates on the difference in employment between year 2010, which is the benchmark year, and each year for control group firms. The red filled circles are coefficient estimates for these same differences for treated firms. In Panels A and B, treated is equal to 1 when MNC failed the gateway test in 2010; control is equal to 1 when MNC did not fail the gateway test in 2010. In Panel C, region is treated when there is at least one MNC that failed the gateway test in that region. Region is not treated if there were no MNCs exposed to WDC in that region. Standard errors clustered at the firm level. The sample spans years 2007–2018. Panel A includes employment in MNCs in the United Kingdom, Panel B includes employment in MNCs in foreign countries, and Panel C includes employment in domestic firms in the United Kingdom.

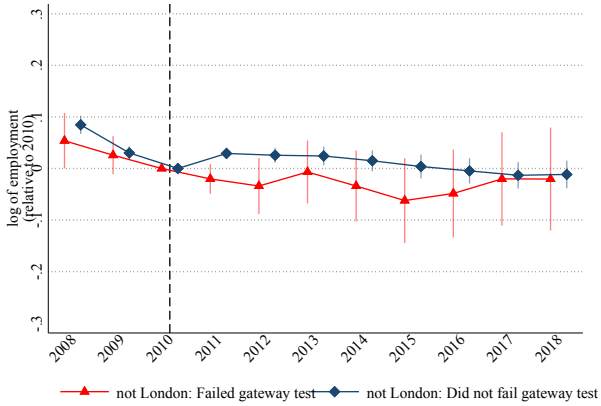
Figure 2: Heterogeneous Effect: Regions



A. Regional differences.



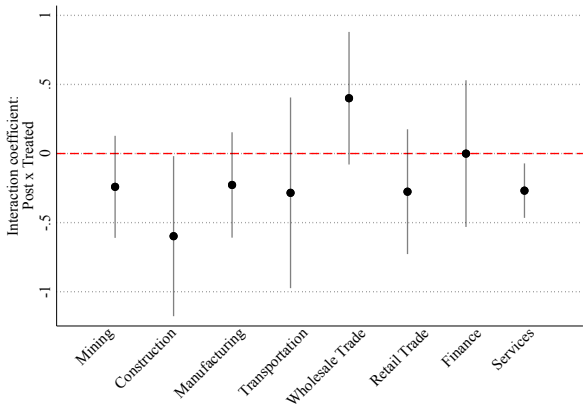
B. London.



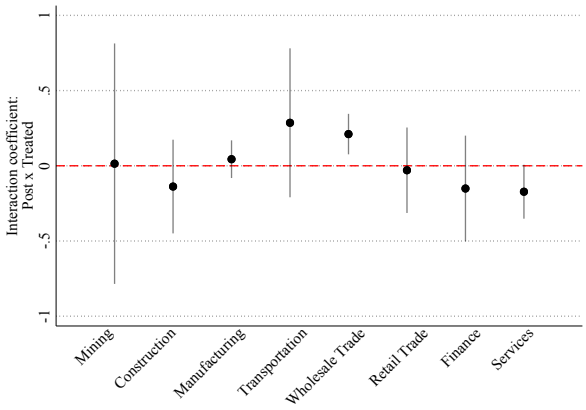
C. Outside of London.

NOTE: These Figures present the heterogeneous effects of the reform on firm-level employment. In Panel A, I compare the main difference-in-difference coefficient for London and outside of London sample; 30% of MNCs are located in London. In Panel B, I compare the evolution over time of coefficients for London-based firms, and in Panel C, for firms based outside of London. The outcome variable is the logarithm of the number of employees for each firm. In Panel A, black filled circles correspond to the average difference in difference coefficients for treated firms after the WDC reform for respective firm location. In Panels B and C, each hollow diamond corresponds to annual coefficient estimates on the difference in employment between year 2010, which is the benchmark year, and each year for control group firms. The red filled circles are coefficient estimates for these same differences for treated firms. In all panels, treated is equal to 1 when MNC failed the gateway test in 2010; control is equal to 1 when MNC did not fail the gateway test in 2010. Standard errors clustered at the firm level in all specifications.

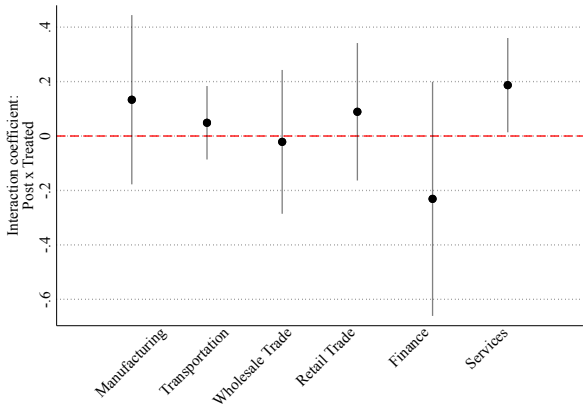
Figure 3: Heterogeneous Effect: Sectors



A. Sectoral changes - London.



B. Sectoral changes - outside of London.



C. Sectoral changes - foreign.

NOTE: These Figures present the heterogeneous effects of the reform on firm-level employment. Each filled circle plots the coefficient estimate for treated time post dummies. In Panel A, I compare the main difference in difference coefficient across sectors for London based firms. In Panel B, I compare the main difference in difference coefficient across sectors for firms based outside of London. In Panel C, I do the same for the foreign subsidiaries of firms affected by the WDC. In all panels, I exclude agriculture sector because there is not enough variation to estimate that for London. Further, I exclude mining and construction from the foreign panel for that same reason.

Appendices

A Additional results

Table A1: Regional comparison: means, alternative exposure definition.

	(1) not exposed	(2) exposed	(3) diff	(4) t-test
Panel A: UK exposure				
population	324981.441	693635.819	-368654.378	-1.194
number of employed	143.235	368.984	-225.748	-1.305
unemployment rate	8.290	8.528	-0.238	-0.424
GDP	8775.283	27655.851	-18880.568	-1.192
population growth	0.008	0.009	-0.000	-0.289
number of employed growth	-0.006	0.003	-0.009	-1.567
unemployment rate growth	0.070	0.071	-0.000	-0.028
GDP growth	0.064	0.065	-0.001	-0.152
Panel B: foreign exposure				
population	1248162.750	2270256.167	-1022093.417	-1.255
number of employed	653.877	1171.791	-517.914	-1.040
unemployment rate	11.719	8.683	3.036**	2.177
GDP	38417.119	79286.810	-40869.692	-1.364
population growth	0.003	0.004	-0.001	-0.122
number of employed growth	-0.015	-0.022	0.008	0.696
unemployment rate growth	0.067	0.060	0.007	0.185
GDP growth	-0.028	-0.008	-0.021	-0.733

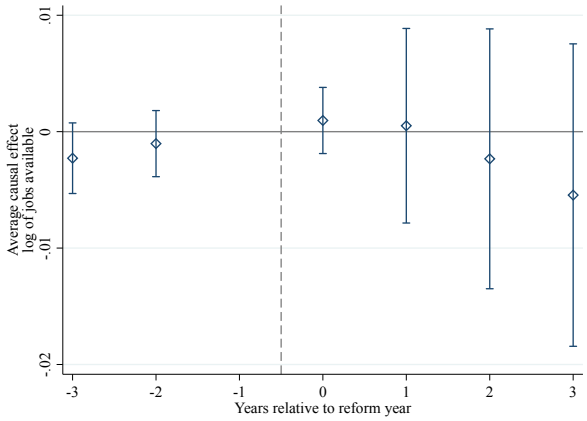
Note: This table presents mean characteristics of regions in the treated and control groups in 2010. Exposed to failed MNC is 1 when a region has at least 1 MNC that failed the gateway test and we observe employment decline for that MNCs subsidiary. The growth rate variables are defined as a change between year 2010 and 2009 divided by the outcome in 2009. In Panel A, I show statistics for UK regions; there is 78 unexposed and 46 exposed regions. In Panel B, I show statistics for foreign regions; there is 227 unexposed and 13 exposed regions.

Table A2: Regional level results: unemployment and GDP.

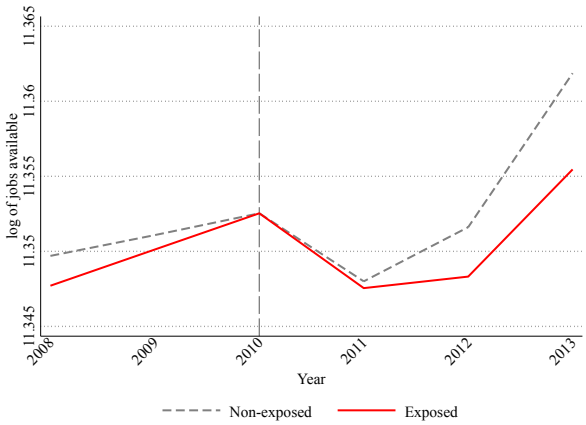
	(1) exposed to failed firms	(2) large empl change	(3) exposed MNEs	(4) exposed to failed firms	(5) large empl change	(6) exposed to MNEs
dep. var.	*log unemployment*			*log GDP*		
	Panel A: UK regions					
treated=1 × post=1	0.039**	0.048**	0.036	-0.023***	-0.025***	-0.025*
	(0.019)	(0.019)	(0.041)	(0.007)	(0.007)	(0.015)
Observations	1560	1560	1560	754	754	754
# firms	123	123	123	123	123	123
Mean	4.996	4.996	4.996	5.045	5.045	5.045
	Panel B: foreign regions					
treated=1 × post=1	-0.136*	-0.182**	-0.242***	0.034*	0.049**	0.025
	(0.073)	(0.128)	(0.049)	(0.018)	(0.021)	(0.020)
Observations	3792	3792	3792	911	911	911
# Regions	640	640	640	566	566	566
Mean	5.777	5.777	5.777	5.739	5.739	5.739
Year FEs	✓	✓	✓	✓	✓	✓
Region FEs	✓	✓	✓	✓	✓	✓

Note: This Table presents results from regional-level specifications. The dependent variable is logarithm of unemployment rate in columns 1-3 and logarithm of GDP in columns 4-6. Treated is 1 in columns 1 and 4 when a region is exposed to at least one MNC that failed the gateway test. In columns 2 and 5 treated is 1 when a region is exposed to at least one MNC that reduced employment following the WDC and in columns 3 and 6 treated is 1 when a region in exposed to MNCs presence at all; Post is equal to 1 from 2011 onwards. In all columns I control for log of population in each region. Standard errors clustered at the region level.

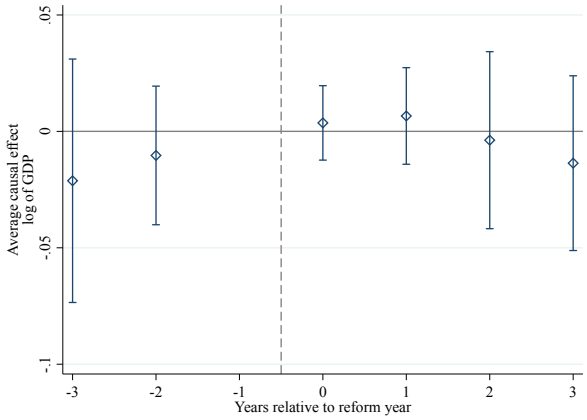
Figure A1: Dynamics: the effect on number of jobs available and GDP.



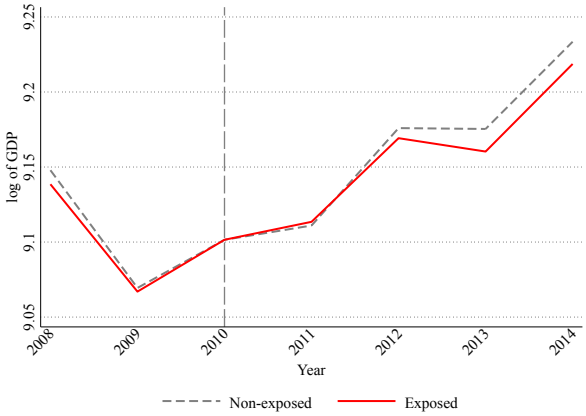
A. Difference in difference.



B. Evolution of exposed and not exposed regions.



C. Difference in difference.



D. Evolution of exposed and not exposed regions.

Note: These Figures present the dynamic effects of the reform on regional-level employment and GDP. This In Panel A, I plot the evolution of difference in difference coefficients over time for the logarithm of the number of jobs available. Each hollow diamond corresponds to difference between treated and control group regions for each year relative to the benchmark year, 2009. In Panel C, I do the same for logarithm of GDP. The vertical lines are 95% confidence intervals. In Panel B, I plot the evolution of the number of jobs available for exposed and not-exposed regions separately equalizing the lines in 2010. In Panel D, I do the same of GDP. Region is exposed when there is at least one MNC that failed the gateway test in that region. Region is not exposed if there were no MNCs exposed to WDC in that region. Standard errors clustered at the regional level.

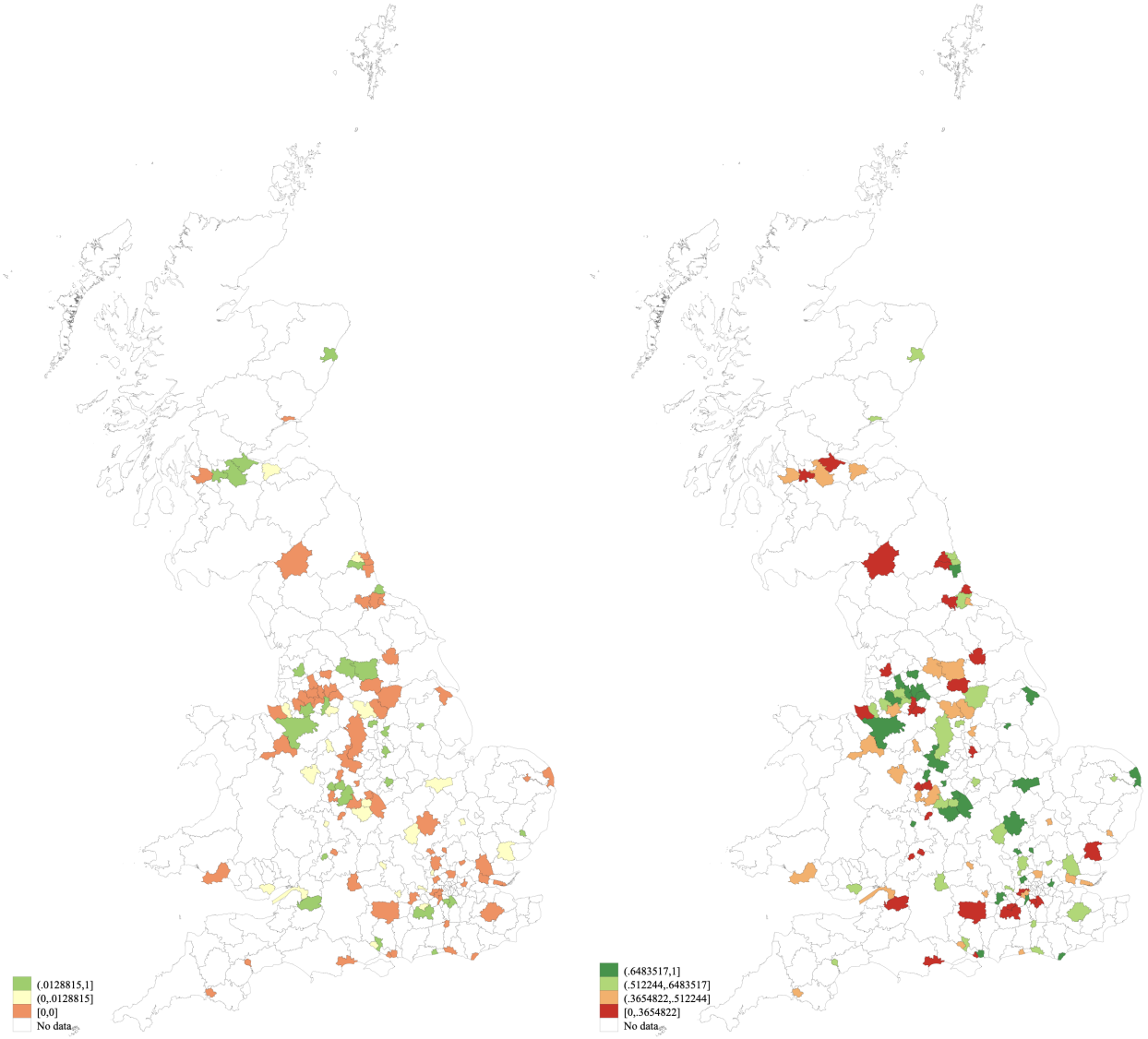
B Data descritpives

Table A3: List of cities included in the regional analysis.

Aberdeen City	City of London	Liverpool	South Tyneside
Barking and Dagenham	Colchester	Luton	Southampton
Barnet	Coventry	Maidstone	Southend-on-Sea
Barnsley	Crawley	Manchester	St Albans
Basildon	Croydon	Mansfield	St. Helens
Basingstoke and Deane	Darlington	Middlesbrough	Stevenage
Bath, NE Somerset	Derby	Milton Keynes	Stockport
Bedford	Derry & Strabane	Newcastle upon Tyne	Stockton-on-Tees
Bexley	Doncaster	North East Lincolnshire	Stoke-on-trent
Birmingham	Dudley	North Lanarkshire	Sunderland
Blackburn with Darwen	Dundee City	North Tyneside	Sutton
Blackpool	East Staffordshire	Northampton	Swansea
Bolton	Eastbourne	Norwich	Swindon
Bournemouth	Enfield	Nottingham	Tamworth
Bracknell Forest	Exeter	Nuneaton, Bedworth	Telford, Wrekin
Bradford	Falkirk	Oldham	Tunbridge Wells
Brent	Gateshead	Oxford	Wakefield
Brighton and Hove	Glasgow City	Peterborough	Walsall
Bristol	Gloucester	Plymouth	Warrington
Bromley	Great Yarmouth	Poole	Warwick
Burnley	Guildford	Portsmouth	Wigan
Bury	Harlow	Preston	Wirral
Cambridge	Harrow	Reading	Woking
Cannock Chase	Hartlepool	Redditch	Wolverhampton
Cardiff	Hastings	Richmond u. Thames	Worcester
Carlisle	Hounslow	Rochdale	Worthing
Chelmsford	Ipswich	Rotherham	Wrexham
Cheltenham	Kingston u.Thames	Salford	Wycombe
Cheshire West, Chester	Leeds	Sheffield	York
Chesterfield	Leicester	Slough	
City of Edinburgh	Lincoln	Solihull	

Note: This is the list of 122 regions with data for jobs and unemployment. MNCs in the UK are located across 663 regions, but most of those do not report employment data to Eurostat.

Figure A2: Map of UK counties: exposure.

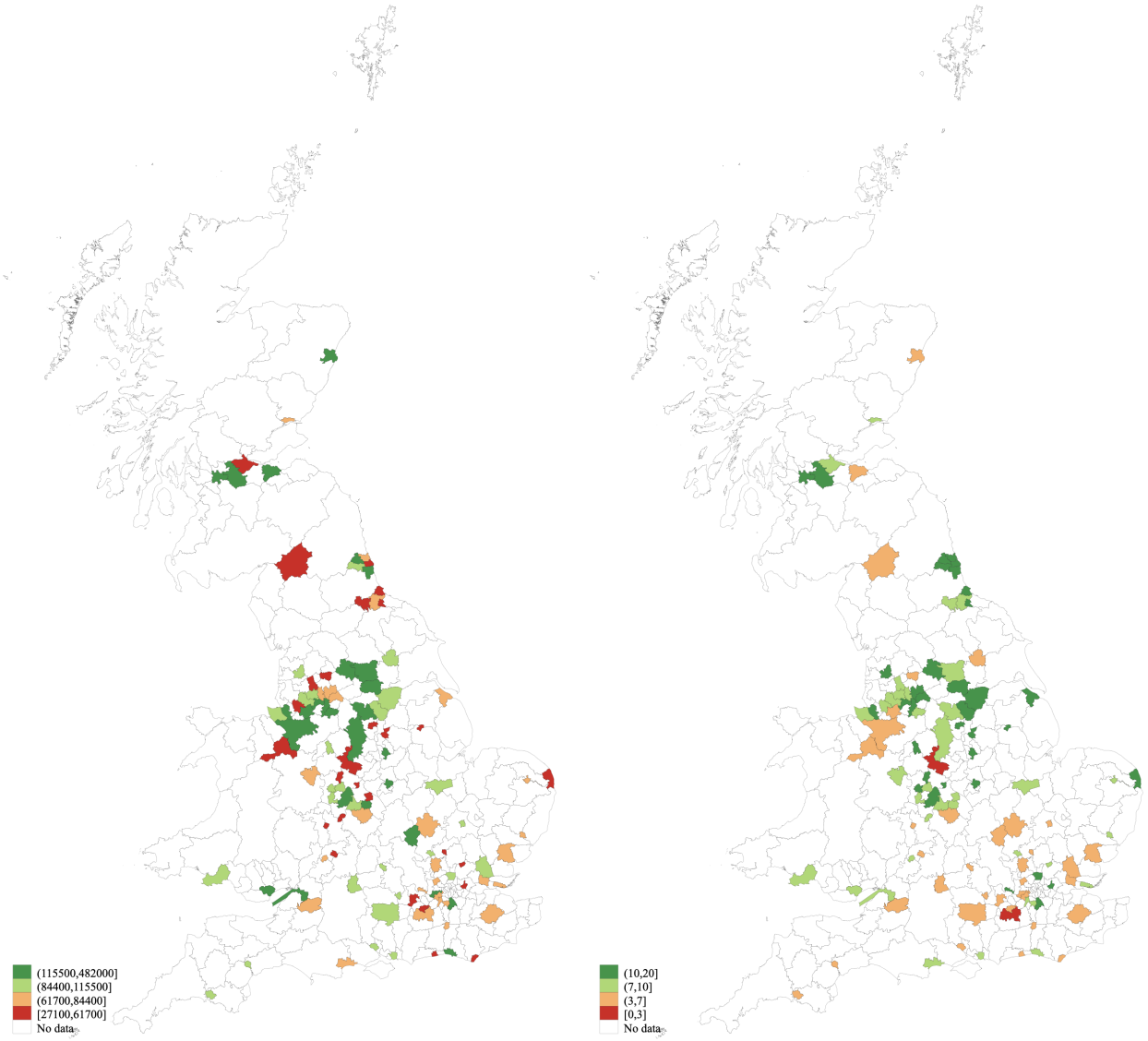


a Exposure to WDC

b Exposure to MNEs.

Note: UK counties, Nomenclature of Territorial Units for Statistics, level 3. The districts of England (also known as local authority districts or local government districts to distinguish from unofficial city districts) are a level of subnational division of England used for the purposes of local government. In Panel A: exposure to WDC: in orange are counties that were not exposed to WDC, in yellow counties with small exposure and in green counties with large exposure. In Panel B: in red small exposure to MNCs, in green large. In the remaining countries, we do not have any multinational firms in our dataset.

Figure A3: Map of UK counties: jobs and unemployment.

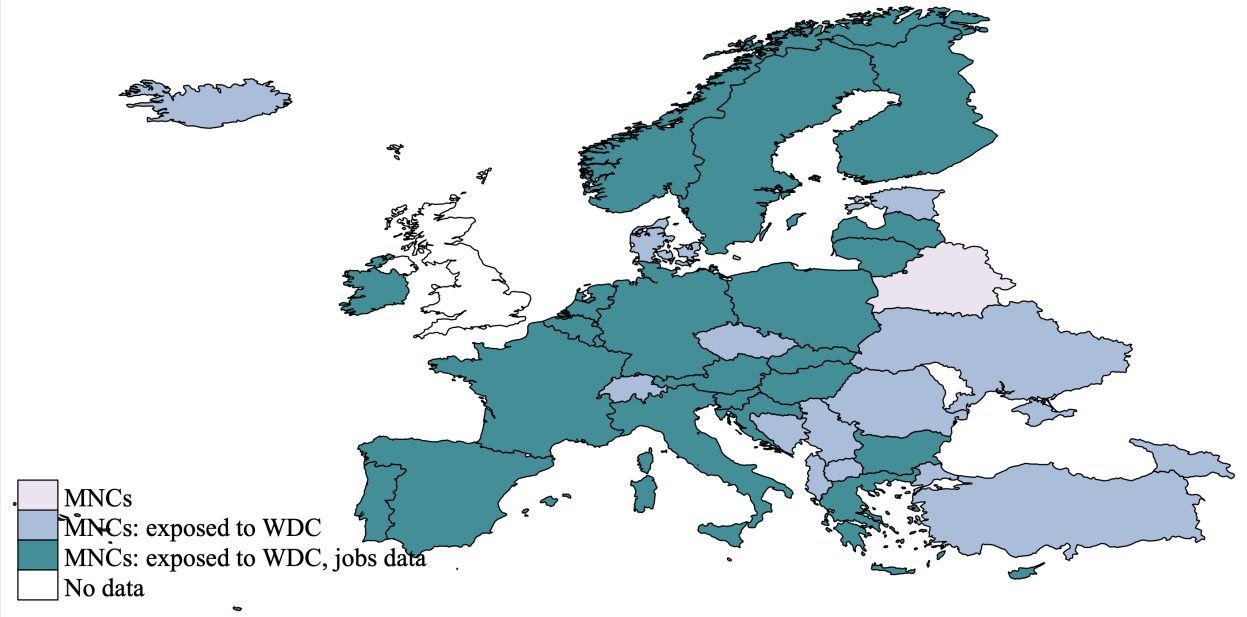


a Number of jobs available.

b Unemployment rate.

Note: UK counties, Nomenclature of Territorial Units for Statistics, level 3. The districts of England (also known as local authority districts or local government districts to distinguish from unofficial city districts) are a level of subnational division of England used for the purposes of local government. In Panel A: number of jobs available from Eurostat. Panel B: unemployment rate from Eurostat. All data in 2009, one year before WDC. In the remaining countries, we do not have any multinational firms in our dataset.

Figure A4: Europe availability of jobs data



NOTE: Data from Orbis and FAME, BvD matched with Eurostat employment information.