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Abstract

This paper explores empirically whether and how FDI is affected if multinationals' home countries change taxation of foreign earnings by switching from worldwide to territorial taxation. Our analysis employs data for German inbound FDI based on the ultimate investing country concept. We use a quasi-experimental approach and provide counterfactuals using the synthetic-control method. Our results confirm effects of the switch from worldwide to territorial taxation on FDI but point at the importance of the actual tax rate. For Japan, which charges a higher tax rate on corporate profits than Germany, we find a substantial increase of FDI in Germany after the switch from worldwide to territorial taxation. For the UK, which imposes a lower tax rate than Germany, the switch to territorial taxation is not found to exert any significant effects on investment in Germany.

JEL-Codes: H250, F230.

Keywords: FDI, double taxation, dividend exemption, tax competition, synthetic-control method, ultimate investor country.

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1 Introduction

A key issue in the taxation of multinational corporations (MNCs) is how profits of foreign subsidiaries are taxed in the home country of the multinational. Under the principle of worldwide taxation, all profits repatriated from abroad would be subject to profit taxation. The alternative principle, so called territorial taxation, exempts profits of foreign subsidiaries from taxation in the home country (for a discussion see, *e.g.*, Gresik, 2001).

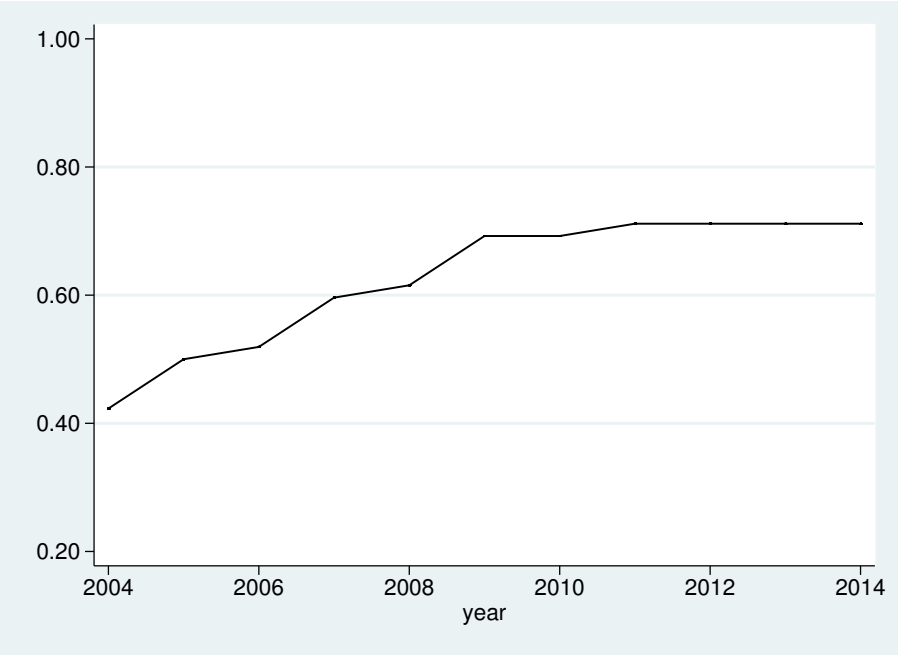
Under a system of worldwide taxation, multinational corporations with subsidaries in low-tax countries pay the same taxes on profits earned abroad and on profits generated at home. To avoid the higher taxes at home they can only defer the repatriation of profits. And, in fact, US multinationals – subject to worldwide taxation – accumulated huge cash holdings abroad (*e.g.*, Graham, Hanlon and Shevlin, 2010). To end deferral and the associated lock-in of cash in foreign subsidiaries, the US has recently moved towards territorial taxation by establishing a dividend exemption system.[1]

By exempting repatriated dividends, the US is following a global trend: a number of countries have switched to a system of territorial taxation in the recent past. Figure 1 displays the fraction of OECD/EU-member countries that follow a territorial approach in the period between 2004 and 2014. In 2004, the fraction is at 40%. At the end of the period, the fraction has increased to about 70%.

The switch of the tax-treatment of foreign earnings has potentially important effects on the host

[1]For a discussion of the changes of US corporate taxation by the Tax Cuts and Jobs Act see *e.g.* Dharmapala (2018), Lyon and McBride (2018) and Mintz (2018).

Figure 1: TERRITORIAL TAX REGIME AMONG OECD/EU MEMBERS



Fraction of countries with dividend exemption among a sample of 52 OECD/EU countries. Source: Ernst & Young, Annual Corporate Tax Guides, own calculations. The countries that have switched to territorial taxation during the observation period are Estonia, Finland, Latvia, South Africa in 2005, Turkey in 2006, Malta, Poland, Romania and Thailand in 2007, Russia in 2008, Bulgaria, Japan, New Zealand and the United Kingdom in 2009 and Greece in 2011.

countries of the foreign subsidiaries. In particular, the sensitivity of these subsidiaries with respect to local taxation will tend to increase (Hines, 1996, Bénassy-Quéré, Fontagné and Lahrèche-Révil, 2005). Under worldwide taxation, if profits are repatriated, local taxes paid by foreign subsidiaries are credited against taxes paid in the home country. Under territorial taxation, the definitive tax burden faced by foreign subsidiaries is determined by the host country. Consequently, for multinationals from countries with relatively high taxes, local taxes are of lesser importance for foreign direct investment under worldwide taxation than under territorial taxation. A switch to territorial taxation will tend to change the effective tax burden on FDI and multinationals may consider relocating their investments into low-tax countries. This creates a stronger incentive for host countries to set low tax rates. From this perspective, the trend to territorial tax regimes might have fueled tax competition and the associated declining trend in corporate income tax rates.[2]

This paper provides empirical evidence of the effect of a switch from worldwide to territorial taxation on foreign direct investment in other countries. We employ a quasi-experimental approach that exploits the timing of reforms. In order to provide a counterfactual, we employ the synthetic-control method (SCM) pioneered by Abadie and Gardeazabal (2003). More specifically, we use data on inbound FDI from countries that follow worldwide taxation and have not changed their system of international taxation in the observation period to construct counterfactual developments of inbound FDI. The comparison with the FDI from countries that have switched to territorial taxation enables us to identify the FDI effects.

The OECD benchmark definition of FDI provides two alternative ways to determine the origin of FDI (OECD, 2008). The immediate investing country (IIC) approach refers to the location

[2] Statutory tax rates have already been reduced substantially in many countries of the world. Devereux, Griffith, Klemm (2002) note that this process started in the 1980s and has continued over the 1990s. The more recent period after 2000 shows a continuing decline, but some slowdown in the 2010s (Steinmueller, Thunecke and Wamser, 2018).

of the immediate foreign owner, subject to the ownership threshold. This may be useful for the purposes of balance of payments statistics, but, from a tax perspective, it can be rather misleading. Multinationals often hold foreign investment through financial corporations (holdings) in offshore financial centers and through special purpose entities (Damgaard and Elkjaer, 2018). In these cases, the immediate investing country differs from the home country of the MNC. The alternative approach to determine the origin of FDI follows the ultimate investing country (UIC) concept which refers to the ultimate owner. FDI data following the UIC approach seems to be more appropriate for the analysis of the effects of the foreign tax regime, since especially multinationals from high-tax countries face incentives to hold their foreign subsidiaries through conduit entities (Mintz and Weichenrieder, 2010). Unfortunately, however, current FDI statistics are mostly following the IIC approach (Eurostat, 2014). By focusing on inward FDI into Germany, the current paper uses bilateral FDI data from the German central bank (Deutsche Bundesbank) based on the UIC approach.

Our results document a significant increase of inbound FDI into Germany by Japanese multinationals after Japan has switched from worldwide to territorial taxation in 2009. Quantitatively, the point estimates indicate that Japanese inbound investment increased by about 27% on average, and by 41% in the long run. In contrast, the UK's switch to territorial taxation in the same year is not found to exert a significant effect on the UK's FDI in Germany. By the time of the reform, the Japanese statutory corporate income tax rate exceeds the German tax rate by around 11 percentage points whereas the British tax rate is somewhat below that of Germany. Therefore, the different effects support the view that primarily FDI in countries with lower taxes is affected by a switch towards territorial taxation.

The existing empirical literature on the effects of a switch to territorial taxation is limited. Egger, Merlo, Ruf and Wamser (2015) investigate repatriation effects of the switch to territorial taxation in the UK. Hasegawa and Kiyota (2017) explore the effect of the switch to territorial taxation in Japan on repatriation of profits from foreign subsidiaries. The effects of the switches towards territorial taxation in Japan and the UK on the number of foreign acquisitions is analyzed by Feld, Ruf, Scheuering, Schreiber and Voget (2016). The authors find that in particular the switch in Japan exerts strong effects, a finding that they relate to the relatively high corporate income tax rate in Japan. Liu (2018) investigates the effect of the switch in the UK using microdata for multinationals and finds a significant increase of investments by UK affiliates in low-tax countries elsewhere in Europe. Our paper is the first to explore FDI effects of the switch from worldwide to territorial taxation using FDI data based on the ultimate investor country.

The paper proceeds as follows. The following section 2 lays out the methodology. Section 3 discusses the data, and section 4 provides the results. Section 5 concludes.

2 Methodology

The empirical analysis exploits a distinct tax reform in a country and explores its consequences for investment into Germany. Formally, it is based on a model of inbound FDI in period t with ultimate owner in country i

$$FDI_{i,t} = a_{0,i} + a_{1,t} + x'_{i,t}a_2 + b \cdot I(TR)_{i,t} + \lambda_t \cdot \mu_i + \epsilon_{i,t}, \quad (1)$$

where $a_{0,i}$ is a country-fixed effect, $a_{1,t}$ is a time-fixed effect, and $x'_{i,t}$ is a vector of control variables. $\epsilon_{i,t}$ is a random disturbance and $\lambda_t \cdot \mu_i$ reflects time effects among subgroups of the population. $I\left(TR\right)_{i,t}$ is a binary indicator of the treatment capturing all periods during which a territorial tax regime is implemented in country i. The coefficient on $I(TR)_{i,t}$ in equation (1), b, reveals whether and to what extent FDI changes under a territorial tax regime.

While it seems straightforward to employ a difference-in-difference approach, a crucial requirement is the common-trends assumption for treated and non-treated observations (*e.g.*, Lechner, 2011). Given substantial heterogeneity between countries' FDI developments, it seems difficult to rule out the existence of time-trends among subgroups of the population. We might follow standard practice and include controls that capture potentially important drivers of differences in FDI trends, such as GDP, and determine the parameter of interest b by an OLS estimate of equation (1). This is problematic, however, since the control variables might well be affected by major changes in tax policy.

To provide consistent estimates of b, we apply the synthetic-control method (SCM) estimator pioneered by Abadie and Gardeazabal (2003). To this end, we define a pool of I countries ("donors") that stick to worldwide taxation during the observation period. Among this pool of countries, we construct a weighted average of observations to produce a counterfactual series of inbound FDI, *i.e.* a synthetic control.

$$\sum_{i=1}^{I} w_{j,i} FDI_{i,t}$$

The weights $w_{j,i}$ are chosen such that the difference between the pre-intervention characteristics of treated and non-treated observations is minimized. The SCM estimator of the effect of country j's switch to territorial taxation is then the difference between the post-intervention values of inbound

FDI from the treated country and the synthetic control.[3]

$$\widehat{b}_{j,t} = FDI_{j,t} - \sum_{i=1}^{I} w_{j,i} FDI_{i,t}$$

With SCM estimates, there is no straightforward test for the significance of the treatment effect. Therefore, we follow Abadie, Diamond and Hainmueller (2010) and run a set of counterfactual or "placebo" estimations, in which the treatment is falsely assigned successively to each country in the set of "donor" countries out of which the synthetic control is formed. The remaining set of "donors" is used to construct counterfactuals for these false treatments. Comparing the resulting "placebo" treatment effects with the actual treatment effect allows us to assess whether our findings differ from or are within the range of a set of random results. Based on the standard deviation of outcomes we compute a confidence band around the predicted treatment effect.

Among the countries that have switched to territorial taxation in the observation period, the empirical analysis focuses on the two economies with the largest position of FDI in Germany: Japan and the UK. In both countries a switch took place in 2009. Because the statutory tax rate in Japan is high in comparison to Germany at the time of the reform (41% *vs.* 30%), we expect to find a considerable increase of FDI from Japan after the switch. The UK offers an interesting comparison case, since its tax rate is not much different from Germany's tax rate. Actually, at the time of the reform, the tax rate in the UK (28%) was even below the German tax rate. In this case, therefore, we expect no effect of the UK's switch towards the territorial regime on FDI in Germany.

The variables used to predict the development in FDI are in accordance with the empirical FDI

[3] In order to implement the SCM estimator, we employ STATA's *synth* command.

literature (*e.g.* Markusen, 1984; Yeaple, 2003). This includes GDP (in logs) and geographic distance to Germany (Berlin). To capture price developments, we use the log of the consumer-price index. In addition, the corporate income tax rate as well as an indicator of EU membership are employed.

3 Data

Standard foreign direct investment statistics, as provided by the OECD or by Eurostat, follow the IIC approach and report bilateral FDI by the country of the immediate investor. While this is useful for the balance-of-payments statistics, it does not seem to be an adequate data source for a study of effects of the taxation of the parent company of a multinational group. In Europe, in particular, the common market comprises a large number of countries with different tax systems and substantial variation in the corporate tax burden. Facing these differences, MNCs often set-up a complex structure of subsidiaries in different European countries in order to minimize the tax burden. This involves the establishment of holding entities in countries that provide special tax benefits for accumulated earnings from European affiliates.[4] Consequently, foreign direct investment often involves complex chains of ownership. Mintz and Weichenrieder (2010) provide descriptive statistics about the share of the total stock of inbound FDI in Germany ultimately owned by an investor located in a third country that differs from the immediate owner. In 1989, this share is around 15%. It displays a positive time trend, and in 2002, they find that about 25% of total inbound FDI is held through conduit entities in countries that differ from the country of the ultimate owner. Our data refers to the period from 2004 to 2014. Provided the trend found by Mintz and Weichenrieder (2010) has continued, in our observation period, conduit entities play an even more important role.

[4]Firms also establish "patent-boxes" that enjoy tax benefits for earnings specifically associated with immaterial property (see *e.g.* Evers, Miller and Spengel, 2015).

Table 1: TOP TEN COUNTRY BY INBOUND FDI

Immediate Investor Country (IIC)		Ultimate Investor Country (UIC)	
(1)	(2)	(3)	(4)
Netherlands	179,918	USA	148,426
USA	116,704	UK	94,428
Luxembourg	113,597	Netherlands	55,390
France	68,993	France	45,849
UK	62,295	Switzerland	34,341
Switzerland	41,877	Luxembourg	18,986
Austria	16,866	Japan	15,084
Belgium	16,086	Finland	10,678
Japan	14,231	Austria	9,954
Finland	13,645	Sweden	9,835

Foreign direct investment stocks in Germany in 2004 (in Billion Euro). Column (1) and (2) report top ten countries and their investment position by intermediate investor country (IIC). Column (3) and (4) report top ten countries by ultimate investor country (UIC). Source: OECD (IIC) and Deutsche Bundesbank (UIC).

Table 1 illustrates the differences in bilateral FDI statistics that result from the different methods of measurement using data for Germany in 2004. Columns (1) and (2) refer to the ten countries with largest inbound FDI based on the immediate investor country (IIC). Column (1) reports the name, column (2) the aggregate investment in billions of Euro. The largest position with an amount of about 180 billion Euro is held by the Netherlands. Also Luxembourg, Switzerland, and Belgium are ranked high. Note that all of these countries provide special tax regimes for holding corporations and special purpose entities (Mintz and Weichenrieder, 2010).

Columns (3) and (4) refer to the ten countries with largest inbound FDI based on the ultimate investor country. According to this statistic, the volume of FDI as well as the distribution by country are strikingly different. Consistent with the size of its economy, the US is the most important source of inbound investment into Germany, with an investment position that exceeds the amount reported

in column (2). Moreover, the US FDI position in Germany according to UIC is almost triple the amount of investment from the Netherlands. The investment from UK by UIC is also much more important than by IIC.

4 Results

The upper panel of Table 2 provides descriptive statistics for Japanese inbound investment in Germany and the counterfactual in the pre-treatment period. While the Bundesbank provides bilateral FDI for multiple countries, the number of potential "donor" countries that constantly apply a worldwide taxation system throughout the observation period is limited.[5] Nevertheless, the synthetic control seems to provide a rather accurate prediction of FDI and displays similar country characteristics.

Figure 2 depicts the development of FDI in Japan and the corresponding synthetic control over the whole period from 2004 until 2014. The results indicate that Japanese direct investment to Germany increased substantially in the second year after the reform. Table 3 provides descriptive statistics on the treatment effect. Accordingly, the average post-reform effect is about 27%. However, if the first two years after the reform are excluded, the average increase is estimated to be 41%.

Though the time-period is limited, the results point to a permanent rather than a temporary increase. Qualitatively, this is in accordance with theoretical predictions, since, until the end of the observation period, Japan continuously sets a higher tax rate than Germany. The tax-rate differential is about 11 percentage points. Based on the predicted FDI effects, this points to a

[5]The pool of potential donors in the data is limited to 11 countries: Brazil, Canada, Chile, China, Croatia, India, Ireland, Israel, Mexico, South Korea and the United States.

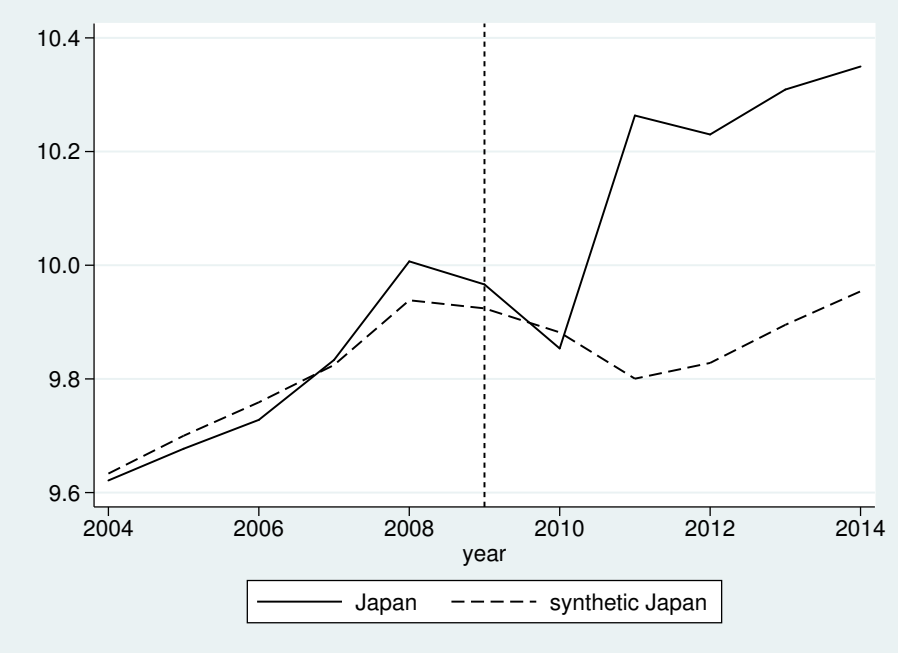
Table 2: DESCRIPTIVE STATISTICS: PRE-TREATMENT

	Japan	Synthetic Control
FDI stocks, log (in Euro)	9.773	9.778
Corporate income tax rate	41 %	37.6 %
Inverse distance to Germany (in km)	.00011	.00015
GDP total, log (in Euro)	15.06	14.81
CPI, log (2005=100)	4.61	4.63
EU 27	0	0
RMSPE		0.036

	UK	Synthetic Control
FDI stocks, log (in Euro)	11.307	11.302
Corporate income tax rate	29.6 %	36.3 %
Inverse distance to Germany (in km)	.0011	.00024
GDP total, log (in Euro)	14.50	15.54
CPI, log (2005=100)	4.63	4.64
EU 27	1	0.152
RMSPE		0.100

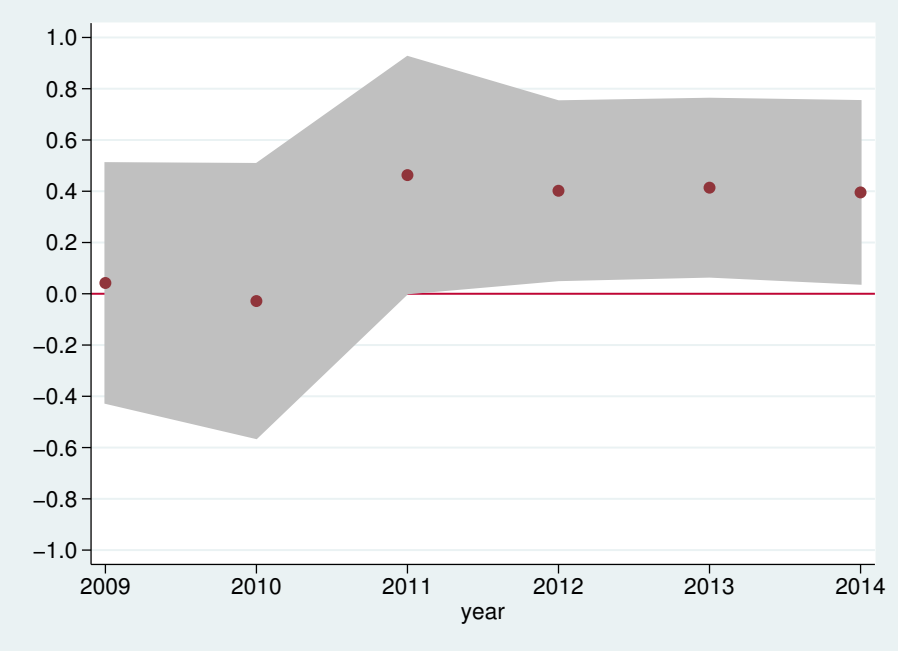
Means of variables in pre-treatment period. RMSPE reports the root mean square prediction error of the synthetic control. The synthetic control for Japan assigns weights of 43.6 % to USA, 46.6 to Canada and 9.8% to Brazil. The synthetic control for the UK assigns weights of 84.8 % to the USA and 15.2% to Ireland. The data sources for the variables are the following. FDI by UIC: Deutsche Bundesbank; Corporate income tax rate: Ernst & Young, Annual Corporate Tax Guides; inverse distance to Germany: own calculations; GDP in Euro and CPI: European Commission's Ameco Database.

Figure 2: ACTUAL AND COUNTERFACTUAL FDI: JAPAN



Japanese FDI (UIC) in Germany in logs.

Figure 3: TREATMENT EFFECT: JAPAN



Relative change in FDI. 90% confidence band is computed using placebo treatments for donor countries.

Table 3: ACTUAL *VS.* PREDICTED OUTCOMES

		Japan
	Actual	Synth. Control
FDI (post)	10.162	9.887
FDI (pre)	9.773	9.778
Av. treatment effect		.276

		UK
	Actual	Synth. Control
FDI (post)	11.315	11.404
FDI (pre)	11.307	11.302
Av. treatment effect		.005

Results of estimates obtained using SCM. It reports average pre- and post reform values for log FDI of Japan or the UK in Germany and their synthetic counterparts. The treatment effect reports the post-reform difference in this outcome variable.

semi-elasticity of FDI with respect to the tax rate of about 3 or larger. This fits well with the empirical literature on the sensitivity of FDI with regard to the statutory tax rate (De Mooij and Ederveen, 2008). However, the precision of the estimate is low as is evident also from the confidence band plotted in figure 3.

As the UK also switched to a territorial tax-system in 2009, the same period and set of potential "donor" countries are used to produce a counterfactual FDI series like in the case of Japan. The lower panel in table 2 provides descriptive statistics for the UK and its counterfactual in the pre-treatment period. While the set of potential "donors" is the same, the weights used to construct the counterfactual FDI series differ from the Japanese case. In case of the UK, the SCM procedure yields a less accurate representation of the pre-treatment FDI development than in the case of Japan. While the average prediction fits the actual FDI quite well, individual observations are not matched accurately. This is reflected in a much larger root mean squared error. Also in terms of

the characteristics, the synthetic control for the UK displays somewhat larger differences, as for instance, with regard to EU membership.

The less accurate representation of the pre-treatment development is also reflected in Figure 4.[6] After the switch to the territorial system, no deviation of FDI is found. This is confirmed by Figure 5 which plots the treatment effect together with a 90% confidence band. Since the UK statutory corporate income tax rate is similar to the German tax rate, the lack of an effect on inbound FDI from the UK is in accordance with theoretical expectations.

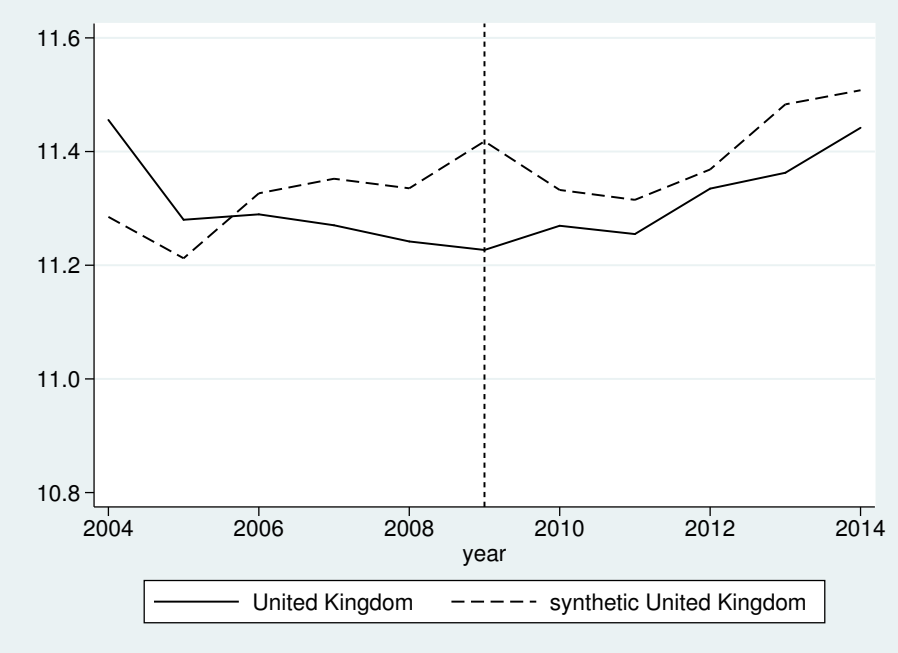
5 Summary and Conclusions

In recent years, several OECD and EU countries have switched from worldwide to territorial taxation, exempting earnings of foreign subsidiaries from domestic taxation. We have explored empirically whether this change in the taxation of foreign earnings exerts effects on foreign direct investment in other countries. Since standard FDI statistics refer to the immediate investor country, they do not reflect the location of the ultimate owner of the inbound FDI. Therefore, we have used data from the German Bundesbank that takes account of the ownership chain and reports FDI in Germany by the country of the ultimate investor. To identify the effects on FDI that result from a regime switch, the paper relies on counterfactual FDI developments computed using the synthetic-control method.

The results suggest that the effects of a switch to a territorial tax system depend on the tax-rate differential between the home country of the multinational and the host country. For Japan, whose

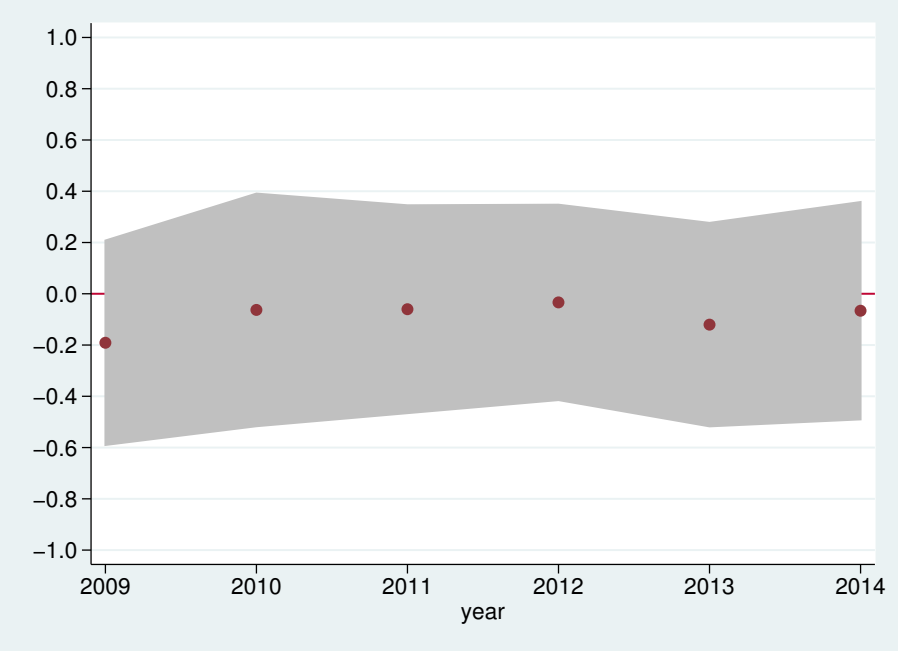
[6] Note that the graph is scaled similar to Figure 2; each tick represents a difference of 0.2 log points.

Figure 4: ACTUAL AND COUNTERFACTUAL FDI: UK



UK FDI (ultimate owner) in Germany in logs.

Figure 5: TREATMENT EFFECT: UK



Relative change in FDI. 90% confidence band is computed using placebo treatments for donor countries.

statutory corporate income tax rate exceeded the German by 11 percentage points at the time of the regime change, the switch to territorial taxation is found to have caused a strong and persistent increase of FDI in Germany. Quantitatively, the point estimates indicate an increase by 27% on average, and 41% in the long run. For the UK, whose statutory corporate income tax rate is slightly lower than the German tax rate, we do not find any change of FDI in Germany due to the regime change.

These findings support the view that a switch from worldwide towards territorial taxation makes a country's FDI more sensitive to local taxation: under territorial taxation, multinational corporations are subject to stronger tax incentives to locate FDI in low-tax countries. As these countries benefit from increased inbound FDI, our results suggest that the worldwide trend to territorial tax regimes has fueled tax competition and has contributed to the decline in corporate income tax rates.

From this perspective, the recent move of the US towards territorial taxation can be expected to further stimulate tax competition. However, since the US tax reform also includes a cut of the federal corporation tax rate, for many countries substantial reductions in the statutory tax rate are required to attract FDI from the US.

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