Metadata of the chapter that will be visualized in SpringerLink

Book Title	The Economics of UK-EU Relations	
Series Title		
Chapter Title	Foreign Direct Investment and the Relationship Between the United Kingdom and the European Union	
Copyright Year	2017	
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Abstract

This paper investigates whether and to what extent foreign direct investment inflows into the United Kingdom are caused by its membership in the European Union (EU). It reports two main sets of econometric estimates: (a) synthetic counterfactual method with annual data for large sample of developing and developed countries over 1970–2014 and (b) gravity estimates using 34 OECD countries bilateral data for 1985–2013. The two sets of estimates strongly concur: EU membership increases FDI inflows by about 30%. This result is robust to changes in specification, country samples, time windows, and the use of different estimators (panel, PPML and Heckman).

Keywords (separated by '-')

Foreign direct investment - Gravity model - SCM - European union

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Foreign Direct Investment and the Relationship Between the United Kingdom and the European Union

Randolph L. Bruno, Nauro F. Campos, Saul Estrin and Meng Tian

AQ1

1 Introduction

Economic integration is often considered to be a conduit for international trade, but recent developments have shown it also to be a powerful force in FDI terms (Anderson and Van Wincoop 2003, 2004). At the same time, the gravity model, one of the most successful empirical models in economics (Anderson 2011) and a staple of international economics, explains remarkably well the observed variation in economic interactions in trade and factor movements, notably FDI. It analyses bilateral cross-border flows (trade, migration, investment, etc.) in terms of the

Prepared for Campos, N. and F. Coricelli (eds) *The Economics of the EU–UK Relationship: From the Treaty of Rome to the Vote for Brexit*, Palgrave MacMillan, forthcoming.

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N. Campos and F. Coricelli (eds.), *The Economics of UK-EU Relations*,
DOI 10.1007/978-3-319-55495-2_6

Layout: A5 POPSCI Book ID: 420727_1_En Book ISBN: 978-3-319-55494-5
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relative size and distance between countries/regions (see Head and Mayer 2014, for an authoritative review). A country's economic size is expected to have a positive effect on bilateral flows while distance is expected to have a negative effect. In fact, distance is often taken to reflect a whole range of trade costs including language, bureaucracy, culture, etc. The gravity model therefore highlights the potential for trade and FDI between relatively large economies that are close together geographically. This could be an important economic phenomenon because inward FDI has been found to be a major contributor to the diffusion of managerial best practices (Bloom et al. 2012). It increases competition and shores up technological innovation and it is believed to do so in a deeper and more resilient fashion than other international capital flows.

By reducing 'distance', the gravity model leads one to expect a significant positive impact on the level of FDI from institutionally embedded political and economic ties, such as the European Union, especially between spatially close and relatively large economies. However, although the benefits of FDI are well established in the economic literature,[1] there is a dearth of analysis of the impact of the European integration experience on the scale of FDI, not to mention a complete absence of literature concerning the impact of European disintegration. In the light of this, this paper offers more contemporary and rigorous estimates of the effect of membership of the European Union (EU) on inflows of foreign direct investment, which also provide an indication of the likely effect of EU exit. Given the recent vote by the UK to leave the European Union, we undertake additional empirical work with a special focus on United Kingdom. Despite the obvious importance of the subject, the literature focusing on potential reasons for foreign investors to choose the UK vis-à-vis say Germany, Poland or Switzerland remains scarce.

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We are also interested in the potential value of an indirect comparison between the trade effects of the EU and the FDI effects of currency unions such as the Euro, and the implications of recent methodological developments. For example, Glick and Rose (2016) find that their earlier estimates (Glick and Rose 2002) on the impact of currency unions were statistically fragile when subjected to a wide range of modern and sophisticated econometric techniques. We therefore parallel Glick and Rose in asking whether the use of modern econometric techniques eliminates the effects of the EU on FDI. *We find that it does not*. Using best available econometric methods, we find that EU membership always significantly increases FDI inflows, by around 28% depending on the precise choice of econometric technique and we posit this to be a lower bound. This result implies that for a country like the UK, leaving the EU would reduce FDI inflows by around 22%. We show that this finding is consistent with alternative methodologies that look specifically at the UK experience of FDI compared to other countries.

We first summarize recent conceptual and methodological developments in Sect. 2 before outlining the interpretation of some graphical analyses on FDI dynamics in Sect. 3. The data and empirical strategy are discussed in Sect. 4 while Sect. 5 reports the main new empirical findings about the significant positive effects of being in the EU, from a gravity model of bilateral FDI flows with a special focus on the United Kingdom. Section 6 concludes.

2 Background on FDI, Trade and the European Union: Recent Developments

The objective of this section is to put forward a conceptual framework that helps us to understand the effect of economic integration on FDI inflows. The distinction between shallow and deep integration is useful in this case: shallow integration is epitomized by the free trade area model and is restricted to economic integration, while deep integration combines economic and political aspects (Campos et al. 2015). An important

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case of deep integration is the customs union model in which economic ties are supported by the creation of common institutions to manage conflict, which may emerge, for instance, regarding the common external tariff. The European Union is the most sophisticated example of deep integration and it is quite remarkable to realize that considerable lacunae remain with respect to our understanding of whether and how EU integration has affected FDI inflows (Campos and Coricelli 2015).

2.1 The Impact of FDI

The changing nature of international trade (Baldwin 2016) is worthy of note for our understanding of FDI and the European Union. Traditionally, international trade has focused on final goods and was driven by the exploitation of mutual comparative advantage. In the last two or three decades, international trade has increasingly focused on trade in parts and components (instead of final goods) and has been increasingly driven by domestic absorptive capacity. Deep integration has contributed to the emergence of global value chains (Amador and di Mauro 2015) in which production is spread across various countries or, to put it differently, to a larger role for intra-industry trade. UNCTAD (WIR 2016) estimates that 60% of global trade is in intermediate goods and services.

There is an enormous literature on the impact of FDI on the host economy (see Bruno et al. 2016), which attests to the importance of these factor flows for national economic performance. As we have noted, FDI matters because the entry of foreign firms in the domestic market increases competition and shores up technological innovation both in terms of product and process (Alfaro et al. 2004). It also puts pressure simultaneously on their direct domestic competitors in the host economy, as well as on upstream and downstream firms (Javorcic 2004; Mastromarco and Simar 2015). Importantly, FDI entails the diffusion of frontier management practices (Bloom et al. 2012). FDI is often conceived as being more resilient than other international capital flows (portfolio investment, for instance) and may exhibit important complementarity patterns not only with respect to international trade, but also with other elements of financial globalization.

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To understand the nature of the phenomenon and how institutions of economic integration might influence FDI, it is useful to distinguish between horizontal and vertical effects of FDI.[2] The former refers to spillovers from the foreign firm to its domestic competitors, while the latter refers to spillovers to suppliers and customers; as noted above the latter is an increasing important element in global trade. Havránek and Iršová have authored two important surveys of the large literatures on horizontal and vertical spillovers. Havránek and Iršová (2011) focus on the latter. They estimate that spillovers from FDI to suppliers tend to be economically larger (and statistically significant) than spillover to buyers. Interestingly, they also find that these spillovers tend to be larger in countries with underdeveloped financial systems, that are more open to international trade, and that are generated by investors who have only a slight technological edge over local firms. This somewhat surprising pattern points to the importance of absorptive capacity and diffusion mechanisms.

Iršová and Havránek (2013) review the evidence on horizontal spillovers. They present a quantitative review of the econometric evidence using meta-regression analysis tools. In contrast to the findings about vertical spillovers, they conclude that horizontal spillovers are on average zero, but their sign and magnitude depend systematically on the characteristics of domestic and foreign firms' investors, with the size of the technological gap between them and ownership structure playing major roles. They find that joint ventures between domestic and foreign firms are the structure that delivers the largest benefits. Similar to the case of vertical spillovers, they find that the positive effects from FDI are substantially larger when the technological gap between domestic and foreign firms is small. Thus the evidence about the impact of FDI is consistent with that about its pattern, with increasing importance of global value chains and vertical spillover effects.

2.2 Methodological Developments in the FDI Literature

We saw in the 'Introduction' that the gravity model was originally developed for international trade flows but as Anderson (2011) has

pointed out, the theoretical underpinnings apply with equal force to output and factor input flows. The last two decades have witnessed enormous progress in this area. Among many influential pieces, Anderson and van Wincoop (2003) and Santos Silva and Tenreyro (2006) are the crucial ones for our purposes. This new structural gravity approach (Fally 2015) provides needed theoretical underpinnings as well as strong support for the econometric estimation of gravity models. But these advances in method have brought into question long-established findings. For example, focusing exclusively on trade, Glick and Rose (2016) find that earlier significant estimates of the effect of currency union membership are not robust to the application of newer and more sophisticated econometric techniques, specifically the Poisson estimator. Most of these techniques became standard after they published their original paper (Glick and Rose 2002).

The seminal paper in the econometric evaluation of free trade area agreements is by Baier and Bergstrand (2007). This paper is one of the first to make the point that moving away from a cross-section design to one based on panel data was necessary in order to deal with serious concerns about endogeneity bias (see also Baier et al. 2004; Egger and Pfaffermayr 2004). Moreover, this literature generates a number of valuable estimates of the economic benefits of deep vis-à-vis shallow integration. For instance, Baier et al. (2008) estimate that membership in the European Union leads to increases in bilateral international trade of the order of between 127 and 146% 10–15 years after joining. This compares very favourably with equivalently estimated benefits from shallow integration: for instance, they also find that membership in the European Free Trade Association (EFTA) generates increases in bilateral trade that are of about one quarter of the size of those generated from deep integration agreements [such as the EU and the European Economic Area (EEA)]. The latter show increases of only about 35% over the 10–15-years period following the start of membership.

There has also been important research on individual aspects of deep integration on FDI inflows. Of particular interest in our case is the role of deepening monetary integration (for instance, by using a single currency) in affecting trade and FDI inflows. de Sousa and Lochard's paper (2011) is especially relevant in this respect because it investigates whether

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the creation of the euro (in the context of the European Monetary Union, EMU) in 1999 explains the sharp increase in intra-European investment flows. They tackle these questions using a gravity model for bilateral foreign direct investment. Their main finding is that the euro increased intra-EMU FDI stocks by around 30%. More importantly, they find evidence that this effect varies over time and across EMU members: it is significantly larger for outward investments of those less-developed EMU members.

There has also been an important stream of recent studies about FDI from a regional economics perspective, of which a good example is that of Basile et al. (2008). This paper uses panel firm-level data over the period 1991–1999 covering more than 5500 foreign subsidiaries in 50 regions of eight different 8 EU countries. The methodology they use is the mixed-logit location choice model, which allows the investigation of the effects of EU regional policy (Structural Funds) on the location choice of foreign subsidiaries. Their main conclusion is that accounting for agglomeration economies and various regional and country-level characteristics, these regional policy instruments are found to be an effective factor in explaining FDI location. Although the eligibility criteria for EU regional assistance funds are restrictive—regions with per capita income below 70% of the EU average qualify—evidence of this positive effect provides an additional reason why we should expect an FDI premium from EU membership, especially in poorer countries or countries containing poorer regions, such as the UK.

One additional issue to consider is the complex relationship between international trade and FDI inflows. This has been traditionally framed in terms of tariff-jumping FDI decisions [see Motta (1992) for a classic treatment] and has gained further impetus with recent work on heterogeneous firms. Helpman et al. (2004) is the seminal piece in this respect. They put forward a multi-country, multi-sector general equilibrium model that highlights the decision of heterogeneous firms to sell in foreign markets either through exports or through a local subsidiary (FDI). Econometric evidence for the model is presented focusing on US affiliate sales and US exports in 38 countries and 52 sectors. Two particularly important findings for our purposes are (1) strong negative effects on export sales relative to FDI from sector and country-specific

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transport costs and tariffs, providing micro-foundations for distance effects within the gravity model, and (2) strong positive support for the effects of firm-level heterogeneity on the relative export and FDI sales (with greater firm heterogeneity found to lead to significantly more FDI sales relative to export sales.)

A more recent take on this issue is that of Conconi et al. (2015) which looks at how uncertainty affects firms' internationalization choices in terms of the trade-off between exports and foreign direct investment. The theoretical framework they put forward is centred on the notion that firms are uncertain about their profitability in a foreign market and thus experiment via exports before engaging in FDI. The main novel idea is therefore that firms first choose to export in order to learn about the market and the country and, once learning has taken place, go on to substitute these exports by directly investing. If firms export before investing in foreign markets, the trade-off is not rigid and may be subject to change over time. Conconi et al. (2015) find support for this prediction in that the probability that a firm starts investing in a foreign country significantly increases with its export experience in that country.

2.3 The Gravity Model

Although the gravity model was initially developed as a purely empirical model, in the last decade or so it has been given solid theoretical foundations in the trade literature. Maybe the simplest way to derive theoretically the gravity equation is to impose a market-clearing condition on an expenditure equation. We follow Baldwin and Taglioni (2007) (Head and Mayer 2014, provide a useful discussion of the main choices involved) and, using CES preferences for differentiated varieties, write the expenditure equation as

$$\vartheta_{od} \equiv \left(\frac{p_{od}}{p_d}\right)^{1-\sigma} E_d \tag{1}$$

where the left-hand side represents total spending in country d on a variety produced in country o (d for destination, o for origin), p_{od} is the

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consumer price in country d of a variety produced in country o, p_d is the price index of all varieties in country d, σ is the elasticity of substitution among varieties (assumed >1) and E_d is the total consumer expenditure in the destination country.

Profit maximization by producers in country o yields $p_{od} = \mu_{od} m_o \tau_{od}$ where μ_{od} is the optimal mark-up, m_o is the marginal cost and τ_{od} represents bilateral trade costs. Assuming monopolistic or perfect competition, the mark-up is identical for all destinations. For the case of Dixit–Stiglitz monopolistic competition, the mark-up is $\sigma/(\sigma-1)$ which means that consumer prices in country i are $p_{oo} = (\sigma/(\sigma-1))\, m_o \tau_{oo}$ and $\tau_{oo} = 1$ if we assume there are no internal/domestic barriers. Assuming symmetry of varieties for convenience and summing over all varieties yields

$$V_{od} = n_o p_{oo}^{1-\sigma} \frac{\tau_{od}^{1-\sigma}}{p_d^{1-\sigma}} E_d \tag{2}$$

where V_{od} is the aggregate value of the bilateral trade flow from origin to destination and n_o is the number of varieties produced in origin and sold in destination.

The market-clearing condition requires that supply and demand match: hence summing Eq. (2) over all destinations (including own sales) is set equal to the country total output (Y_o). The condition can then be stated as

$$Y_o = n_o p_{oo}^{1-\sigma} \sum_d \tau_{od}^{1-\sigma} p_d^{1-\sigma} E_d \tag{3}$$

and solving it yields $n_o p_{oo}^{1-\sigma} = Y_o/\Omega_o$ where Ω_o is an index of market-potential. Substituting this market-clearing condition on the expenditure function yields the gravity equation:

$$V_{od} = \tau_{od}^{1-\sigma} \frac{E_d Y_o}{p_d^{1-\sigma} \Omega_o} \tag{4}$$

For the econometric implementation of Eq. (4), E_d is proxied by the destination country's GDP, Y_o is proxied by the origin country's GDP,

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$p_d^{1-\sigma}\Omega_o$ is the multilateral trade resistance term, and τ is proxied by bilateral distance. The intuitive interpretation of the model is easy to visualize: bilateral trade is a positive function of the size of the trade partners and it is a negative function of the distance between them. Anderson (2011) explains how this framework can be extended for factor flows such as FDI.

3 FDI in European Union and the United Kingdom

This section aims to provide descriptive evidence to motivate our empirical analysis, explaining the trends and development of foreign direct investment in European Union, with a special focus on major economies such as France, Germany, Holland, and the UK. The UK is then further analysed as a major FDI recipient country which is now intending to leave the European Union.

3.1 The Performance of FDI Inflows Between and into EU Countries

Despite of the recent burst of FDI growth among emerging markets, the EU has maintained a stable growth of FDI at a level consistent with the remainder of the world economy and remaining as the largest investor and recipient of FDI globally. We focus our attention in this chapter on the impact of EU membership on FDI inflows in the context of OECD countries, as these economies share similar levels of development to most of EU member countries. Moreover, consistent bilateral FDI data over time, which is critical for the application of the gravity framework, is rarely available except within the OECD.

In Fig. 1 below, we report the dynamic of FDI inflows between OECD countries categorised into four types: inflows from EU to EU; from non-EU to non-EU; from non-EU to EU; and finally from EU to non-EU. The figure provides a clear indication that intra-EU inflows (from EU to EU) outperform all the other categories of foreign investment,

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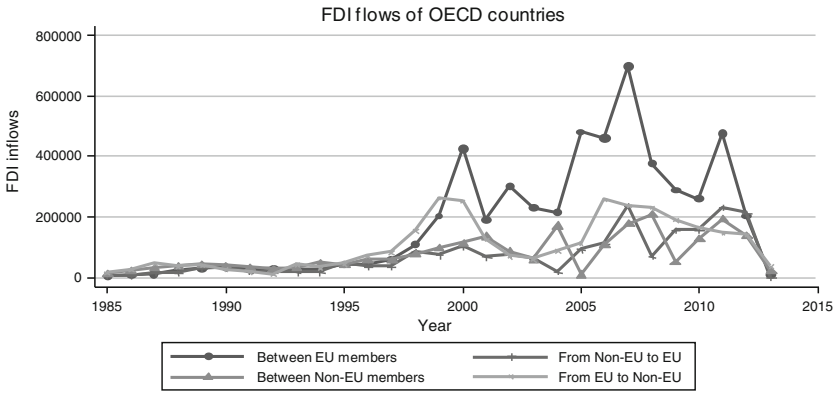

Fig. 1 FDI net inflows in OECD countries: 1985–2013. *Source* Authors' calculations

indicating how, within the OECD context, the EU can be seen as a powerful institutional device for integration through fixed capital flows.

The Figure also provides evidence that the EU has significant advantages among OECD countries in being able to attract FDI from non-OECD economies. This leads us to investigate how each member country has benefited from being in the union. Figure 2 presents FDI inflows as against GDP per capita for EU and non-EU members in 3 years, 1985, 2000 and 2015. We can take away three main messages. First, the FDI phenomenon has exploded only in recent years. If we compare 1985 with 2000 there has clearly been a major expansion in FDI inflows in the last decade of twentieth century. Second, in addition to the USA (which always been a major FDI host economy) there are three EU countries that stand out as major recipients of FDI in absolute terms in 2003: Germany, UK and Holland, though inflows are also high in France and Spain. Thirdly and particularly important for our analysis, subsequent to the 2008 crisis there has been a sort of re-convergence effect of FDI in absolute values in 2015.

More specifically, we take a closer look at the recent performance of four of the largest FDI recipient countries in the EU, the UK, Holland, France, and Germany in Fig. 3. We find that the volumes that went to France and Germany were relatively stable during the examined period. However, the UK enjoyed more growth between 2004–2008, and Netherlands experienced even higher growth for that period and after 2010.

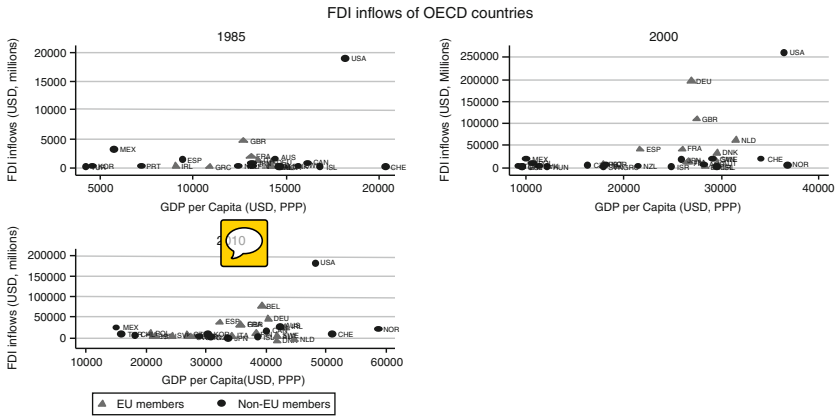

Fig. 2 FDI net inflows and GDP per capita: a snapshot in 1985, 2000 and 201[illegible]. *Source* Authors' calculations

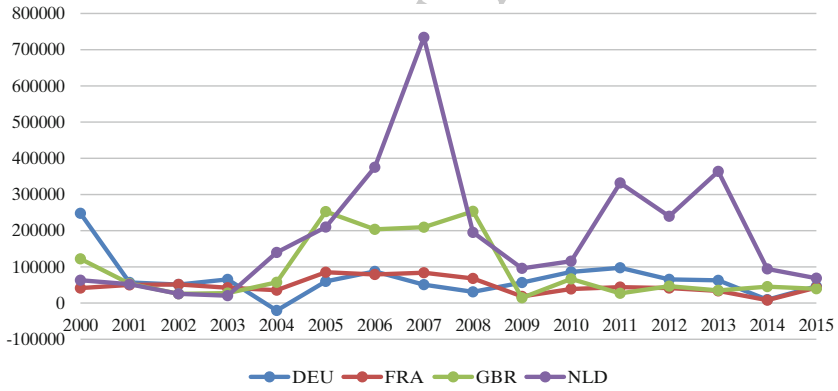

Fig. 3 FDI inflows into UK, Holland, France and Germany, 2000–2015 (millions of USD). *Source* Authors' calculations

3.2 UK as the Main FDI Recipient Within EU

In fact, the United Kingdom has long been one of the main FDI recipients in Europe. If we consider FDI stocks, in 2015 these represented 55% of GDP in the UK as against 42% in Germany (OECD 2016a, b). Stocks reached 71% of GDP in 2009, compared with only

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48% across the European Union in that year. Turning to flows (Fig. 4), in line with global FDI flows, net FDI inflows to the UK were small in absolute terms until the mid-1990s. In the subsequent period they exhibited two periods of rapid expansion, one in the second half of the 1990s and the other before the financial crisis up to 2008. The 2008 financial crisis generated a substantial 'sudden stop' in UK FDI inflows.

Figure 4 presents the FDI inflows into the UK by source regions: EU member countries, non-EU OECD members, and the rest of world. As exhibited in the figure, the EU has been the most important source of FDI to the UK, and the volume also grows with the same pattern as the total FDI inflows into the UK. Even though with the expansion of emerging markets, UK begun to receive more investments from other parts of the world, the importance of EU is not diminishing. Being a member of the EU is often regarded as one of the major attractions of the UK to bring in foreign investors. UK firms have long enjoyed the benefits of unrestricted access to the huge European Single Market.

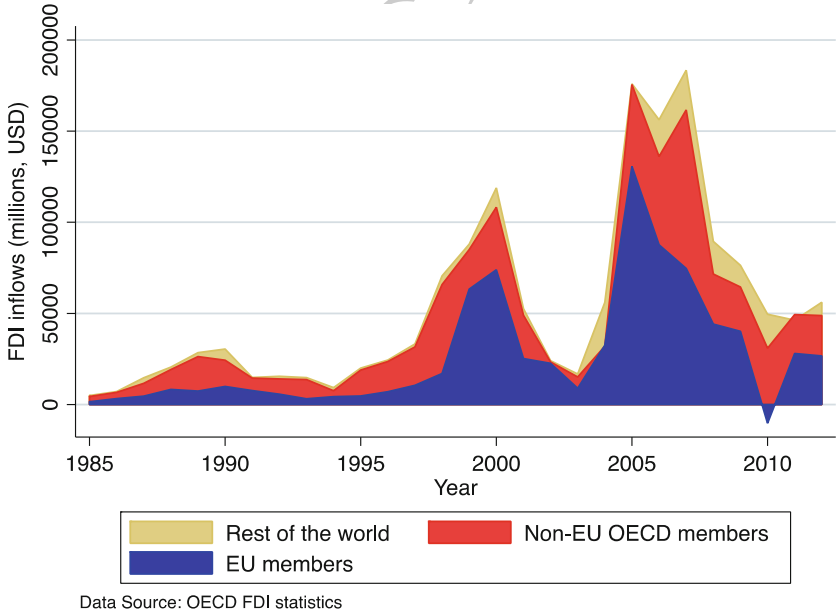

Fig. 4 Inward foreign direct investment flows to the UK by source region: 1985–2014

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One important final consideration regards the sectoral distribution of FDI inflows into the UK. Not only a huge share of it goes into services (which includes financial intermediation) but more importantly this percentage has been rising over time. In 2011, the share of FDI stock in the service sector crossed the mark of 70% of the total. This represents a substantial increase from similar figures of around 60% in the late 1990s (Driffield et al. 2013). The comparable share for manufacturing moves down from 27% in late 1990s to <20% recently. This has significant and still under-appreciated consequences in light of the decision to leave the EU. The type of FDI the UK has been attracting the most is the most mobile type, that is, FDI that can change location quickly and at relatively little cost.

4 Data and Empirical Strategy

Our objective is to estimate the impact of EU membership on FDI, with particular reference to the UK. To achieve this, we first use the synthetic control method (SCM) to investigate the impact of the UK joining the European Single Market in 1986 using data from the World Bank's World Development Indicators. The main part of our study is based on the estimation of a gravity model, and for this we collected the most recently available data on bilateral FDI flows, GDP and GDP per capita (sender and target, i.e. origin and destination), bilateral distance and the shares of manufacturing output, exports and imports in total GDP which covers 34 OECD countries between 1985 and 2013.[4] The OECD is the only systematic source of bilateral FDI flows, which are required for the estimation of gravity FDI models, and hence the only feasible data to estimate our models. Even so, our data still represent more than 70% of global FDI inflows. Moreover, the countries being all OECD members, implies that the data are likely of reasonable quality and collected in a homogenous manner. The disadvantage of our data is that of necessity they exclude most developing countries, including China and India, and they have become increasingly significant for FDI in recent years, though not historically over the whole sample period. Notice that a by-product

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of this drawback is that we are limited in the currency unions we can study (for example, vis-à-vis Glick and Rose 2016).

Our first exercise is to explore the impact of EU membership on UK FDI by using the '*synthetic control methods for causal inference in comparative case studies'* or, in short, synthetic counterfactuals, which was initially proposed in Abadie and Gardeazabal (2003). The method has since become extremely widely used. Imbens and Wooldridge (2009) discuss the synthetic counterfactuals method among other recent developments in the econometrics of programme evaluation and Athey and Imbens describe it as 'one of the most important developments in programme evaluation in the last decade' (Athey and Imbens 2016, p. 5). The synthetic control method estimates the effect of a given intervention by comparing the evolution of an aggregate outcome variable for a country affected by the intervention vis-à-vis the evolution of the same aggregate outcome for a synthetic control group.

The synthetic counterfactual method therefore exploits the construction of a 'synthetic control group', or in the words of Imbens and Wooldridge, of an 'artificial control group' (2009, p. 72). It does so by searching for a weighted combination of other units (in this case, control countries), which are chosen to match as close as possible the country affected by the intervention, before the intervention or treatment occurs, for a set of predictors of the outcome variable. The evolution of the outcome for the synthetic control group is an estimate of the counterfactual. It shows what the behaviour of the outcome variable, in our case FDI inflows, would have been for the affected country if the intervention (the creation of the Single European Market) had (not) happened in the same way as in the control group.

Our other modelling strategy follows the standard structural gravity approach recently developed in the literature: a similar specification is used by Baier and Bergstrand (2007, e.g. see Eqs. (9) and (10)). Gravity has gravitas. The original gravity study was authored by Jan Tinbergen, the first winner of the Nobel Prize in Economics. These original estimations used pooled OLS methods without time or country fixed-effects. The inclusion of fixed effects has (justifiably) become a standard estimation feature, usually by adding 'dyadic fixed effects', that is, a dummy variable for each 'unordered' pair of countries involved in a bilateral flow.

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These dummies control for any *time-invariant* characteristic common to every pair of trading partners. A number of theoretically important determinants of FDI fall into this category of fixed effects, particularly the distance between countries—a key element of the gravity framework—and whether countries share a common culture, language or border. The subsequent step in the evolution of gravity modelling was the use of time-varying country as well as dyadic fixed effects, to further control for time-specific factors across countries, such as the dynamic of common macroeconomic shocks. The current stage in the evolution of modelling gravity is the use of the Poisson estimator (Santos Silva and Tenreyro 2006), which takes account of the fact that FDI from each source economy tends to arrive independently of FDI from every other economy.

Baldwin (2006) and Baldwin and Taglioni (2007) provide important insights for the application of the gravity model in the empirical analysis. They derive the basic gravity estimating equation for trade that we use for FDI:

$$ln\left(bilateral\,flow\,of\,FDI_{o,d,t}\right) = \alpha_0 + \alpha_1 lnX_{o,t} + \alpha_2 lnX_{d,t} + \alpha_3 Z_{o,d,t} + \eta_{o,d} + T_t + u_{o,d,t} \quad (5)$$

where *ln(.)* stands for a natural logarithm and the $X_{o,t}$ is a vector of characteristics of the origin country, *o*, in year *t*. This can be derived from Eq. (4) above (Anderson 2011) and will include measures of the size (GDP) and wealth (GDP per capita) of the country. Similarly $X_{d,t}$ is a vector of destination nation's characteristics. The $Z_{o,d,t}$ is a vector of time-varying characteristics specific to a country pair. Being a member of the EU will be one of the time-varying observable characteristics of a country that enter the $X_{o,t}$ and $X_{d,t.}$ vectors. It is hard to control adequately for the wide variety of FDI-relevant characteristics using observable variables. To deal with this potential major source of unobserved heterogeneity, a dyadic fixed effect ($\eta_{o,d}$) is therefore included in the equation, i.e. a dummy variable for each unordered pair of countries —around 630 fixed effects. It will include things like geographical

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distance (a proxy for trade costs) and cultural distance (colonial history, common language, etc.) since geography is time invariant over our sample period and cultural factors do not change greatly over time. Hence the coefficients of interest are identified from the impact of changes in trading relationships (and other economic variables) over time on the change in FDI flows over time. We also include a full set of time dummies T_t to control for global macroeconomic shocks.

Dyadic fixed effects and time dummies are important for this analysis. The inclusion of bilateral fixed effects helps to minimize the impact of the exclusion of many of the usual suspects in explaining FDI flows, i.e. pair unobserved heterogeneity such as cultural distance, bilateral regulatory agreements, etc. In other words, the model mitigates the usual concern regarding 'omitted variable bias' in these types of empirical analyses. Year fixed effects are also important. They reflect the macro phenomena that are common across all country-pairs. The $u_{o,d,t}$ is an error term. The standard errors are clustered by dyadic pair to allow for serial correlation of the errors.

Our specification follows a threefold estimation strategy. First, we estimate a baseline model using the natural logarithm of bilateral FDI flows as dependent variable; second, we estimate a Poisson model; and finally, we estimate a Heckman model that takes into account the zero flows bilateral trade and as such has a larger number of observations. Let us outline them in order.

The first is the baseline model against which we compare our results. The second is our preferred estimation model given the state of the art of the literature (see Glick and Rose 2016) and the final model allows us to address the selection problem caused by the large number of countries for which there is no observation on bilateral FDI flows. The OLS and Poisson regression may be biased by the inclusion of 'positive only' data of bilateral FDI flows since 41% of the observations are zero. The OLS model deals with this by giving a value of $1 of FDI to the missing value that allows us to take logarithms. But this is rather arbitrary and the fact that there are no bilateral trade flows between two countries may be telling us more about the costs of doing business between the pair of countries. We address this issue via a Heckman selection model in which we first estimate a selection equation. The likelihood of non-zero flows is

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modelled as a function of manufacturing, exports and import shares as well as the per capita GDP of the destination country.

5 Econometric Results

This section presents three sets of econometric results. The first uses the synthetic control method to investigate by how much FDI inflows into the UK would differ under the counterfactual scenario of the UK not having joined the European Single Market in 1986. We then go on to present the results from our gravity equation estimates. We use the findings to calculate the 'FDI premium' from EU membership. Finally, we go on the present a hypothetical 'EU without the UK' empirical exercise, in other words an UK outside the EU counterfactual via an empirical regression model instead, to gauge the statistically significance of such an event. In order to assess the role of EU for the UK vis-à-vis other countries, we perform the same exercise for Germany, France and Italy.

5.1 Synthetic Counterfactuals Method

Our first step is to estimate counterfactual scenarios illustrating what would be the levels of FDI inflows if the UK had never been a full-fledged member of the European Union using the synthetic counterfactuals methodology. We estimate the effect of the onset of the European Single Market Programme by comparing the evolution of FDI inflows for a country affected by the intervention vis-à-vis the evolution of FDI for a synthetic control group. The synthetic control method answers questions such as 'what would have been the level of FDI inflows in the UK after 1986 if the UK had not had full access to the ESM?'

In Fig. 5, the dashed red line shows their 'synthetic counterfactual' estimates, showing what would have been FDI net inflows after 1986 if the UK had decided *not* to join the Single Market. They are based on a simple model focusing on per capita GDP, GDP growth rates, the share of manufacturing value added in GDP, the share of government consumption in GDP, investment, and trade openness as determinants of

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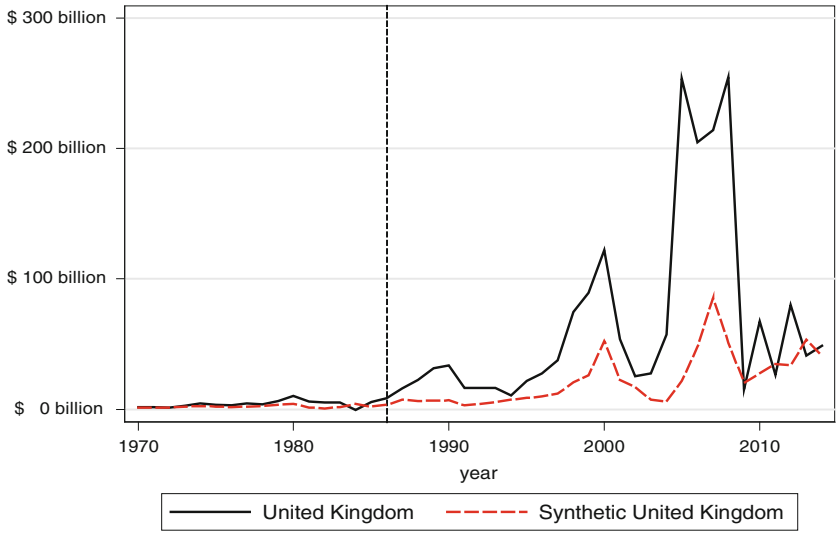

Fig. 5 What would UK FDI net inflows be if the UK had not been in the EU Single Market? *Source* Authors' calculations. *Notes* FDI is measured in nominal US$. The actual FDI flows for the UK (*solid black line*) are compared to a counterfactual (*dashed line*) of a "synthetic UK" made up of a weighted basket of basically three other countries (mostly Canada and New Zealand, but also United States). *Vertical line marks* year 1986 and onset of the EU Single Market

FDI location choice. The following estimated weights were obtained: Canada (approximately 60%), New Zealand (approximately 30%) and the United States (approximately 5%) with other countries having smaller weights.

The results suggest that the Single Market played a key role in mobilizing FDI to and from the UK. Interestingly, they show that the bulk of these benefits (indicated by comparison with the FDI would have received in the circumstance when the UK had chosen to opt out of the Single European market) occurred post-Euro (Sanso-Navarro 2011, Christodoulakis and Sarantides 2016), between the dot-com bubble and the financial crisis. In other words, these results suggest that for the whole period of 1986–2014, the UK would have received on average about 30% less FDI had it not been in the EU, but that this average conceals large variations over time that deserve further study; the bulk of the 'loss'

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was from the mid-1990s. Here we use these estimates simply to motivate and gauge those from the gravity framework that follows so future research will benefit from taking a closer look at this issue using the synthetic control method.

5.2 The Gravity Model Estimates

We now turn to our gravity equation estimates. Table 1 reports our main results with the dependent variable being the bilateral FDI flows and the independent variables being the GDP and the GDP per capita for both sender and receiver country (all in logs). How can one assess the impact of EU membership? We use the country-specific step dummies (zero prior to membership, unity post-membership) to capture the *membership treatment effect* for both the target and the sender country though our discussion will focus on the interpretation of the former, i.e. the effect of membership on FDI inflows.[5]

As can be seen in Table 1, the regressors in all three specifications, i.e. OLS, Poisson and Heckman, carry the expected signs. As predicted by the gravity model, the impact of the size (measured by GDP) of country pair engaging in FDI is positive and has a coefficient close to one while the level of development (GDP per capita) of the sender also exerts a positive effect on FDI inflows. Turning to the Heckman methodology in columns (3) and (4) of Table 1, the selection equation generates some interesting lessons: a higher likelihood of positive FDI flows is related to lower per capita GDP in the destination country (FDI goes to countries where the return to capital is higher), higher industry shares (better integration in the value chain), lower export shares (substitution effect between FDI and trade) and higher import shares of the target.

The main variable of interest for this study is the one capturing the effect of EU membership on FDI *inflows*, for which there are estimates for all three methodologies in columns (1) to (3) respectively. The estimated coefficients for the EU target dummy for the host economy ranges between 14 and 38% depending on the estimator. This coefficient is always statistically significant. On the baseline OLS estimate of column (1), the effect is 33% ($=e^{0.285} - 1$). In the Poisson model of column (2),

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Table 1 Panel estimates of the effects of EU membership on FDI inflows

Dependent variable	(1) Ln (1 + FDI)	(2) FDI	(3) Ln (FDI)	(4) Dummy 1 (FDI > 0)
EU member (target)	0.285***	0.320*	0.132***	
	(0.077)	(0.163)	(0.050)	
EU member (sender)	−0.010	0.828***	0.199***	
	(0.079)	(0.191)	(0.050)	
Ln (GDP, target)	0.473***	3.799***	0.686***	
	(0.056)	(1.432)	(0.226)	
Ln (GDP, sender)	0.500***	3.903***	0.766***	
	(0.154)	(1.462)	(0.226)	
Ln (GDP per capita, target)	0.180	−1.489	−0.010	0.230***
	(0.158)	(1.513)	(0.255)	(0.017)
Ln (GDP per capita, sender)	1.450***	−1.125	1.655***	
	(0.154)	(1.623)	(0.254)	
Manufacturing value added/GDP (target)				0.005***
				(0.002)
Exports/GDP (target)				−0.013***
				(0.001)
Imports/GDP (target)				0.011***
				(0.002)
Mills' Ratio			1.043***	
			(0.164)	
Observations	33,524	33,147	33,524	33,524

Notes *** indicates significance at the 1% level, ** at the 5% level and * at the 10% level. Coefficients with standard errors (clustered by 630 bilateral country pair in first two columns) in brackets. All regressions include fixed effects for years and dyadic pair. Column (1) is estimated by OLS. Column (2) is estimated by Poisson PML. Columns (3) and (4) are a two-part Heckman selection equation. The dependent variable in column (4) is a dummy equal to 1 if there are any FDI inflows and zero otherwise. The Mills' ratio is constructed from this column and included in column (3). The 34 OECD countries included are Austria, Australia, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, Norway, New Zealand, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, UK and the US. "Target" indicates the country which is the recipient of the FDI and "sender" indicates the country is the sender of the FDI

it is 38% ($=e^{0.32}-1$). In column (3), which tries to control for selection on the zeros, the effect is 14% ($=e^{0.13}-1$). A simple average of these three estimates would be 28% and we consider this as the 'baseline case'.

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This suggests that EU membership increases FDI inflows to each member country by about 30%, and that this can be applied in particular to the UK.

In terms of considering the impact of Brexit, one would be running the same experiment in reverse (with a country leaving rather than joining the EU) so the proportionate effect would be smaller. For example, if joining the EU increases FDI in a country by 28%, we would predict that the same country's leaving the EU would reduce FDI by 22% (28% = 0.22/(1 + 0.22)). Similarly, the three estimates of 14, 33 and 38% translate to average exit-induced falls of FDI of 12, 25 and 28%, respectively. These estimates would apply to any country considering exit, including the UK.

Can one use these estimates of the past effects of the EU on FDI as a guide to the future, with reference to calculating the effect of Brexit? It is true that the effects going forward of EU membership could be smaller than in the past. But it is equally possible they may be larger. These results are the best estimates at present on the basis of current evidence. A baseline case that things will be similar to what has occurred in the past, unless there is a strong reason to think otherwise, seems a reasonable starting point for discussion.[6]

5.3 Robustness Checks

We have subjected our estimates to a wide range of robustness checks. First, we are implicitly treating the counterfactual to EU membership as being a member of the World Trade Organization (WTO), the reason being that the omitted category is non-EU that broadly speaking is identified with WTO members (as OECD countries are). In fact, when we think specifically of Brexit, we may believe that membership of the European Free Trade Association (EFTA) or the European Economic Area (EEA) would be a more likely alternative for the UK after leaving the EU (Dhingra et al. 2016). This is what is reported in Table 2. If we add two dummy variables for being an EFTA sender or target to column (1) and (2) OLS and PPML, respectively, both coefficients are statistically insignificant and the EU recipient dummy remains positive and significant

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Table 2 Panel estimates of the effects of EU, EFTA and NAFTA membership

Dependent variable	(1) OLS Ln(1+FDI)	(2) PPML FDI	(3) OLS Ln(1 + FDI)	(4) PPML FDI
EU member (target)	0.32495***	0.38476***	0.28616***	0.49704***
	(0.10146)	(0.12344)	(0.076)	(0.158)
EU member (sender)	0.02813	0.31516	−0.02331	0.67110***
	(0.09968)	(0.20758)	(0.076)	(0.18)
EFTA member (target)	−0.06782	−0.49005		
	(0.14473)	(0.31264)		
EFTA member (sender)	0.12395	0.87104**		
	(0.15167)	(0.35417)		
NAFTA member (target)			−0.17292	−0.37798
			(0.141)	(0.266)
NAFTA member (sender)			−0.23923	−1.12852***
			(0.147)	(0.308)
Ln (GDP, target)	0.40517***	3.85951***	0.42154***	5.19508***
	(0.05226)	(1.45283)	(0.053)	(1.58)
Ln (GDP, sender)	0.45067***	4.04238***	0.45750***	5.38103***
	(0.05418)	(1.48331)	(−0.054)	(−1.611)
Ln (GDP per capita, target)	−0.46443***	−1.56296	−0.44021***	−3.15931**
	(0.14305)	(1.47634)	(0.135)	(1.61)
Ln (GDP per capita, sender)	0.80930***	−1.15654	0.89843***	−2.5781
	(0.14116)	(1.55632)	(0.133)	(1.709)
Observations	31779	29785	32,538	30,535

Notes *** indicates significance at the 1% level, ** at the 5% level and * at the 10% level. Coefficients with standard errors (clustered by 630 bilateral country pair in first two columns) in brackets. All regressions include fixed effects for years and dyadic pair. Column (1) and (3) are estimated by OLS. Column (2) and (4) are estimated by Poisson PML

(in the 0.32–0.38 range and highly significant). This suggests that it is being in the EU that matters. Further, the point estimate on being an EFTA recipient is actually negative. This implies that there may be some diversion from EFTA members like Switzerland to EU members (for example, because Switzerland is not in the single market for financial services). In columns (3) and (4), we repeat the same exercise by looking at NAFTA instead. Similar conclusions unfold: the EU membership dummy remains highly significant and positive and no premium seems to be associated with NAFTA as far as FDI inflows (i.e. looking at the target dummy) are concerned.

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Second, our approach has focused on modelling FDI inflows, but an alternative would be to use FDI *stocks*. Our robustness checks show that doing so yields qualitatively similar results.[7] With stocks rather than flows as the dependent variable, the EU membership recipient dummy always attracts a positive coefficient in the three specifications.

How do these results compare with other estimates in the literature? As noted in Sect. 2, the synthetic cohort approach generates EU membership effects of 25–30% for the United Kingdom, which are very much in the same ballpark. Straathof et al. (2008) also use a gravity model to look at bilateral FDI stocks. One of their specifications uses dyadic fixed effects but a somewhat different set of controls on earlier data (1981–2005). They find that if a country is a member of the EU, it enjoys a 28% increase in its inward FDI stocks from other EU countries and a 14% increase from non-EU countries.

We can also look at the bilateral trade flows literature for a comparison, but we need to bear in mind that we focus on bilateral FDI flows in our model. Baier and Bergstrand (2007) find that free trade areas (FTAs) increase trade by about 100% after 10 years. We find instead that EU membership increases FDI inflows by about 28% over the medium to long run in a country that is a member of the EU. The difference in the size of the coefficient may be caused by the fact that trade is easier to adjust than FDI flows.

5.4 UK Specific Effects

Thus far, our results represent an average effect for all EU economies applied to the case of the UK. We next analyse whether the EU premium is country specific, in particular how the UK stands in this regard in comparison with the three other major EU economies, namely Germany, France and Italy.

The exercise we now run is the following: suppose we create a new purely theoretical EU variable that excludes—in turn—the United Kingdom, Germany, Italy and France from the step dummy coding of the EU membership variable upon which our analysis so far has been based. These four countries are the largest and politically the most

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important ones in the European Union. As an example, consider the following regressions: the EU membership target variable is constructed as the all EU members in the OECD database except UK, Germany, Italy and France, respectively, which will be codified as a separate target (d) country dummy:

$$\begin{aligned} ln\left(Bilateral\ Inflow\ of\ FDI_{o,d,t}\right) =& \alpha_0 + \alpha_1 lnX_{o,t} + \alpha_2 lnX_{d,t} + \alpha_3 Z_{o,d,t} \\ &+ \alpha_4 EU_{d,t}^{(\text{but}-\text{UK})} + \alpha_5 UK_{d,t} \\ &+ \eta_{o,d} + T_t + u_{o,d,t} \end{aligned} \tag{6}$$

$$\begin{aligned} ln\left(Bilateral\ Inflow\ of\ FDI_{o,d,t}\right) =& \alpha_0 + \alpha_1 lnX_{o,t} + \alpha_2 lnX_{d,t} + \alpha_3 Z_{o,d,t} \\ &+ \alpha_4 EU_{d,t}^{(\text{but}-\text{Germany})} + \alpha_5 Germany_{d,t} \\ &+ \eta_{o,d} + T_t + u_{o,d,t} \end{aligned} \tag{7}$$

$$\begin{aligned} ln\left(Bilateral\ Inflow\ of\ FDI_{o,d,t}\right) =& \alpha_0 + \alpha_1 lnX_{o,t} + \alpha_2 lnX_{d,t} + \alpha_3 Z_{o,d,t} \\ &+ \alpha_4 EU_{d,t}^{(\text{but}-\text{France})} + \alpha_5 France_{d,t} \\ &+ \eta_{o,d} + T_t + u_{o,d,t} \end{aligned} \tag{8}$$

$$\begin{aligned} ln\left(Bilateral\ Inflow\ of\ FDI_{o,d,t}\right) =& \alpha_0 + \alpha_1 lnX_{o,t} + \alpha_2 lnX_{d,t} + \alpha_3 Z_{o,d,t} \\ &+ \alpha_4 EU_{d,t}^{(\text{but}-\text{Italy})} + \alpha_5 Italy_{d,t} \\ &+ \eta_{o,d} + T_t + u_{o,d,t} \end{aligned} \tag{9}$$

Taking Eq. (6) as an illustration of the method, the interpretation of the two separate dummies (step for EU and country for UK)[8] is as follow: taking the excluded country—UK—as the reference country and assuming it has not joined the EU in the 1985–2013 time span, we measure its '*independent*' effect on FDI inflows vis-à-vis the *restricted* EU

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(but-UK). Any significant positive sign on the UK dummy will support the hypothesis that FDI had flowed to UK due to *its* national own specificities, i.e. a benefit in FDI inflows *regardless* of the EU membership, whereas a significant sign on the EU dummy would signal a genuine membership effect, i.e. a benefit in FDI inflows *independent* of the characteristics of the UK.

In order to corroborate our empirical strategy, we perform the same exercise for four major economies in the all-EU compact,[9] as mentioned these being the United Kingdom, Germany, Italy and France. We summarize the four separate hypotheses in Table 3.

The EU membership target variable excludes one country at the time and the specific country-target dummy is reported separately to disentangle the country/EU membership effect (see Table 4). In all four columns of Table 4, we use our preferred empirical gravity model from

Table 3 Comparing UK, Germany, France and Italy in separate empirical models

	Empirical model	Specification	Hypothesis tested
United Kingdom	Separate UK effect from the EU compact	EU-but-UK step dummy for target UK country Dummy for target	Genuine UK benefits in terms of FDI inflows due to country's characteristics VS. genuine EU membership effect (where UK is excluded)
Germany	Separate Germany effect from the EU compact	EU-but-Germany step dummy for target Germany country Dummy for target	Genuine Germany benefit in terms of FDI inflows due to country's characteristics VS. genuine EU membership effect (where Germany is excluded)
France	Separate France effect from the EU compact	EU-but-France step dummy for target France country Dummy for target	Genuine France benefit in terms of FDI inflows due to country's characteristics VS. genuine EU membership effect (where France is excluded)
Italy	Separate Italy effect from the EU compact	EU-but-Italy step dummy for target Italy country Dummy for target	Genuine Italy benefit in terms of FDI inflows due to country's characteristics VS. genuine EU membership effect (where Italy is excluded)

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Table 4 Regressions of the effects of EU membership vis-à-vis the four major economies on FDI inflows (target): PPML

	UK versus. EU	Germany versus. EU	France versus. EU	Italy versus. EU
EU member (target, excl. UK)	0.35245**			
	(0.16365)			
UK_d (target)	0.16054			
	(0.27549)			
EU member (target, excl. Germany)		0.32590**		
		(0.15980)		
$Germany_d$ (target)		0.31293		
		(0.29246)		
EU member (target, excl. France)			0.33197**	
			(0.15695)	
$France_d$ (target)			0.21474	
			(0.25393)	
EU member (target, excl. Italy)				0.31978**
				(0.15815)
$Italy_d$ (target)				0.55976
				(0.34456)
EU member (sender)	0.79253***	0.83222***	0.82450***	0.83746***
	(0.18803)	(0.18330)	(0.18732)	(0.18420)
lnGDP (sender)	3.90119***	3.90185***	3.90123***	3.90514***
	(1.44654)	(1.44691)	(1.44765)	(1.44699)
lnGDP (target)	3.80584***	3.79836***	3.79991***	3.79866***
	(1.41892)	(1.41876)	(1.41804)	(1.41835)
lnGDPPC (sender)	−0.95913	−0.96771	−0.96296	−0.97089
	(1.52164)	(1.52344)	(1.52568)	(1.52303)
lnGDPPC (target)	−1.34307	−1.32519	−1.32951	−1.3243
	(1.42114)	(1.42103)	(1.41940)	(1.42098)
Observations	30,535	30,535	30,535	30,535
R-squared	0.4354	0.43451	0.43436	0.43508
Year FE	Yes	Yes	Yes	Yes
Bilateral FE	Yes	Yes	Yes	Yes
Clustered	Dyadic pair	Dyadic pair	Dyadic pair	Dyadic pair

Notes *** indicates significance at the 1% level, ** at the 5% level and * at the 10% level. Coefficients with standard errors (clustered by 630 bilateral country pair in first two columns) in brackets

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Table 5 The effects of EU membership vis-à-vis the four major economies on FDI inflows, an interpretation

	Empirical question	Four possible outcomes in Eqs. 6–9	Summary of results from Table 3
United Kingdom	Is there a genuine benefits in terms of FDI inflows due to country's effect? Alternatively are those benefits due to the European Union membership?	1. α_4 & α_5 insignificant => no membership nor country effect	EU effect (α_4 significant), no country effect (α_5 significant)
Germany		2. α_4 & α_5 significant => both membership and country effect	EU effect (α_4 significant), no country effect (α_5 significant)
France		3. Only α_4 significant => no independent country effect	EU effect (α_4 significant), no country effect (α_5 significant)
Italy		4. Only α_5 significant => independent country effect	EU effect (α_4 significant), no country effect (α_5 significant)

Table 1, the PPML estimation regression. The results are clear-cut: the EU membership target dummy (premium of EU) remains always highly significant and the individual country dummies (Germany, France, Italy and United Kingdom)[10] are never statistically significant. This means that the impact of individual country factors in terms of FDI inflows is not independent from that of EU membership for all four major economies. Hence all four countries would have performed much worse in terms of FDI inflows had they stayed outside the EU in the 1985–2013 time span.

In order to develop our understanding of the relationship between EU membership and FDI, let us look at the taxonomy presented in Table 5 for the four regressions testing the same hypothesis for each country separately. We can conclude that United Kingdom, Germany, France and Italy do not appear to experience a benefit in term of FDI inflows due to an independent country effect. On the contrary, they all have benefitted from EU membership. We posit that these results corroborate

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our synthetic counterfactual results: had UK been outside ESM, it would have lost in terms of FDI in the last three decades.

Finally, we report the impact of EU membership on FDI for sub-samples excluding one country at the time. In Fig. 6, the vertical bars for each country reports the effect of EU membership if one country at the time is excluded from the regression sample when estimating our baseline model from Eq. (5) in Sect. 4 'Data and Empirical Strategy'. What we can note is the remarkable stability of the regressions results for each subsample, meaning that there is no a single country that, if excluded from the EU, would massively affect the EU membership impact on FDI inflows. We posit that this finding would carry some weight in future studies of the impact of UK Brexit *on* the EU itself. We leave this point for further research.

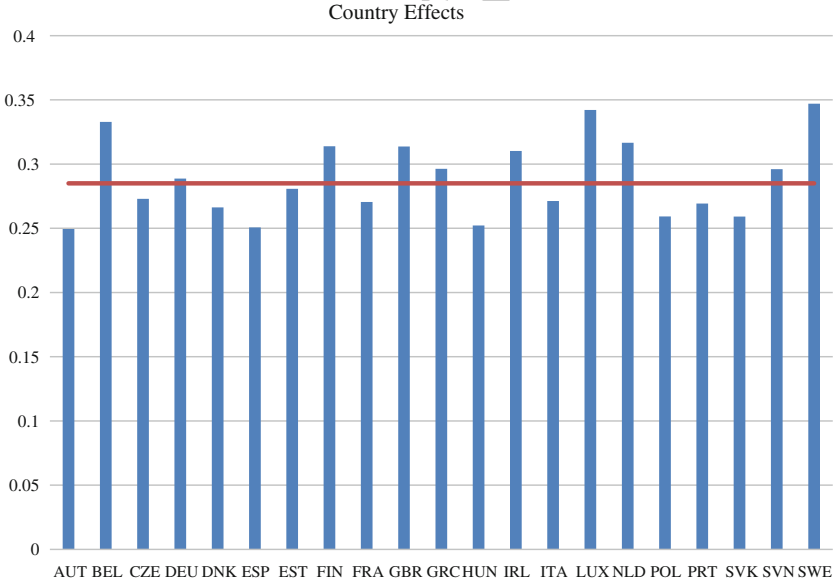

Fig. 6 The EU membership impact on FDI target for a sub-samples excluding one country at the time

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6 Conclusions

The relationship between the United Kingdom and the European Union was never straightforward and has become increasingly complex as the mode of integration has deepened over time, in particular after the launch of the European Single Market in the mid-1980s. Foreign direct investment is one avenue that was not acutely important when the UK joined back in 1973, but has become absolutely central to comprehend the UK–EU relationship today. Despite wide agreement about the central relevance of FDI, at least since the mid-1990s, there remains a surprising dearth in terms of the empirical evidence about main drivers of FDI flows within the EU in general and especially for the UK case. This is remarkable given the fact that the UK is one of the top sources as well as destinations of FDI in the world. The objective of this chapter was to contribute to closing this gap in knowledge.

In this chapter, we investigated how much additional FDI inflows a country receives as a direct consequence of it being a member of a trading bloc, in our case, a member of the European Union. Specifically, the question we addressed was: is there substantive evidence that EU membership, in general, increased the inflows on FDI into the United Kingdom?

This chapter presents novel econometric evidence from two very different econometric methods, namely the synthetic control method and the gravity model, of the direct effect of EU membership on FDI inflows. The two methods also use very different types of data which of course help us to assess the robustness of our results. The synthetic control method employs annual macroeconomic data series and focuses on constructing a counterfactual scenario in which we estimate FDI inflows to the UK if it had not joined the Single Market in 1986. The gravity framework uses bilateral (dyadic) FDI data from 34 OECD countries between 1985–2013.

We find it to be very reassuring that our two main sets of results turn out to be quite similar (especially given the different methods, data type, data series, sample of countries and time window). All our results indicate that EU membership in general (and Single Market access specifically) increases FDI inflows by about 30%. This implies that a country leaving the EU would face a reduction in FDI inflows of around 22%. Our three

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main estimates range between 14 and 38% depending on the choice of econometric technique. The impact of EU membership on FDI to the UK are comparable to other major economies within the EU, like Germany, France and Italy, and for all of them, national characteristics seem less important than EU membership. In a nutshell, we find that the effect of EU membership has been robustly to increase FDI inflows.

There are various directions for future research one can discuss but we shall focus on three. One important issue to be further investigated in this context regards the potential lessons from further disaggregation of the data. Sectoral analysis is particularly important in this case in light of the rapidly increasing share of financial services in overall FDI inflows since the early 1990s. Further disaggregation in terms of different regions of the UK, especially in light of the Brexit vote, also seems to be a rather fruitful avenue to better understand the extent to which EU membership effects are heterogeneous within a given country.

A second direction we believe should be pursued more attentively is to examine more deeply the macroeconomic effects of FDI, especially whether there are important differences between its effects on gross output vis-à-vis total factor productivity. This type of analysis could also easily be combined with the previous suggestion in order to give us a firmer grip on the issue of potential endogeneity.

The third and final direction for further research involves trying to go deeper in terms of the political economy determinants of FDI and how they strategically complement or substitute for the more traditional drivers. The idea here would be to try to bring together as many as possible of the potential channels between deep integration and FDI and to examine more closely how these determinants, as a whole, affect the direction and dynamics of FDI inflows.

Notes

1. For example, see Alfaro et al. (2004) on international macro data or Haskel et al. (2007) on UK micro-data.
2. For an overview of the FDI literature, see Faeth (2009) for a survey organized in terms of the main theoretical models, Yeaple (2013) for a survey with emphasis on industrial organization literature,

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Rodríguez-Clare and Harrison (2010) for a survey that tried to give equal weight to both developing and developed countries as well as to trade and FDI linkages among these countries, and Aggarwal (1980) and Saggi (2002) for surveys of the earlier (pre-globalization) literature.

3. The 2015 figure reports a much less stark increase vis-à-vis 1985 due to the post financial crises drop in FDI in Western countries.
4. The maximum theoretical number of observations is 34 * 33 * 29 = 32,538. For many countries, especially before the 1980s, bilateral FDI flows are in fact zero. The missing values for FDI in the data reflect these zeros (and a few near zero). Missing observations are assigned zeros (which explains the different number of observations in Tables 2 and 3). We used the Heckman selection model below to address whether we should treat these zeros in FDI in a special way.
5. For some countries in the 1985–2013 sample the dummy will be always 0 (e.g. USA), for other always 1 (e.g. Italy) and for others a step dummies (e.g. Estonia). No country yet has a switch from 1 to 0; Brexit represents the first occurrence of this type. Future research will always exploit this type of variation. What qualifies the switch of the step dummy from 0 to 1 is membership of the EU not the OECD.
6. PWC (2016) find that Brexit will induce a fall of UK FDI by 25% by 2020, a very similar magnitude to our own.
7. Available upon request.
8. And likewise for Germany, France and Italy in Eqs. (7), (8) and (9), respectively.
9. We could check the results of the regression for each and every EU member ideally, but we would indeed not expect that minor countries (e.g. Estonia) would be responsible for the overall EU membership effect.
10. We cannot exclude that, for other smaller EU economies, the impact might be different.

Acknowledgments We would like to thank, without implicating, Fabrizio Coricelli, Nicholas Crafts, Swati Dhingra, Peter Egger, Jan Fidrmuc, Michele Ruta, John Springford, John Van Reenen and seminar participants at Brunel University London, DIW, ECB, LSE, NIESR and World Bank for valuable comments on previous versions.

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