

Determinants of Greenfield Foreign Direct Investment in Business

Services

Abstract:

This article investigates the determinants of bilateral Greenfield FDI projects/flows in business services from OECD/BRIC countries to the EU-27 for the period 2003-2010. Three types of Greenfield FDI projects in business or producer services are used: (i) software and ICT services, (ii) business services and (iii) logistics, distribution & transportation and sales marketing & support activities. The results using the Poisson Pseudo Maximum Likelihood estimator show that corporate taxes, having a common border, sharing a common language and former colony relationship all play a significant role for determining bilateral Greenfield FDI projects/flows in the different types of services. However, the effects of corporate taxation are much higher for Greenfield FDI projects/flows in logistics, distribution, transportation, sales & marketing than for business services. In general, FDI in producer services is independent from the geographical distance between the investing and host country. A new empirical finding is that the semi-elasticity of Greenfield FDI in producer services with respect to the effective average tax rate is quite large with semi-elasticities much larger than reported in the literature for total FDI.

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Keywords: greenfield foreign direct investment, gravity equation, panel data, FDI determinants

1 Introduction

The globalization of business services increased rapidly in the last decades. The increase in internationalization of business services can be seen in many aspects. First, international trade in intermediate business services is growing substantially faster than in intermediate goods. Second, multinational firms are increasingly active in global sourcing of business services. Third, multinational enterprises are increasingly engaged in offshoring of business services. FDI in business services can be done by setting up a completely new business establishment or by mergers and acquisitions. The recent increase in FDI in business services raises the question of what are the main host and home country factors influencing the decision to invest in business services.

In this article a FDI gravity model based on Greenfield investment data derived from the “knowledge-capital” model of MNEs is estimated (Carr et al. 2001; Bergstrand and Egger, 2007). The data consists of bilateral Greenfield investment flows in different business services from 26 OECD/BRIC countries to the EU member states (EU-27) for the period 2003-2010 with about 5500 observations. The basic gravity model is augmented by a large number of policy and non policy factors (e.g. corporate taxes and labour costs of the host and home country, FDI regulation, costs of starting a business and labour market flexibility indicators) and factor endowments (e.g. skills, R&D and broadband penetration).

The main contribution of the paper is to estimate the determinants of Greenfield FDI flows in different business services using panel data methods that allow to control for fixed host and home country and common time effects. Business services are distinguished in three types: (i) business services, logistics, (ii) distribution &

transportation and sales and (iii) marketing & support activities. This article also contributes to the literature on service offshoring (Bunyaratavej, Hahn, and Doh, 2007; Doh, Bunyaratavej and Hahn, 2009). Offshoring of services involves FDI either through Greenfield FDI or mergers & acquisitions. Doh et al. (2009) investigates the determinants of service offshoring for three types of services, namely call centres, ICT services and shared service centre. The authors find that education, relative wage costs between the host and home country, language and distance are important and significant drivers of service offshoring. This article focuses on the determinants of Greenfield investment because of data availability.

The FDI gravity model is estimated using Poisson Pseudo-Maximum Likelihood (PPML) developed by Santos Silva and Tenreyro (2011a, 2011b). The PPML estimator makes it possible to account for zero flows and also allows to include host and home country factors as well as time dummies. Greenfield FDI data is drawn from the FDI markets database that contains flows for about 120,000 investment projects worldwide for the period 2003-2010. We select 37440 FDI projects in producer services from 26 parent countries to 27 host countries.

The literature on the determinants of FDI using gravity equations is extensive (Zwinkels and Beugelsdijk, 2010 and Fratianni, Marchionne and Oh, 2011). However, few studies have investigated the determinants of Greenfield FDI flows in business services. Nachum (2000) investigates the determinants of financial and professional services to the USA. Knowledge of the determinants of Greenfield FDI is particularly important to policy makers because Greenfield investment often leads to an increase in productivity and employment and in to technology spillovers in the host country, whereas the effects

of FDI through mergers and acquisitions are less straightforward. In fact, Wang and Wong (2009) find that Greenfield FDI is significantly positively related to economic growth whereas FDI through M&As is insignificant.

The structure of the paper is as follows. Section 2 presents the empirical model and the hypotheses. In Section 3, we present various summary statistics and in section 4 a range of empirical results are presented. Section 5 contains concluding remarks.

2 Empirical model and hypotheses

2.1 Previous literature and hypotheses

The literature on the determinants of bilateral FDI flows and stocks using gravity models is extensive (see Chakrabarti, 2001 for a survey). For FDI in services few studies are available (Kolstad and Villanger, 2008; Nachum, 2000; Ramasamy and Yeung, 2010; Riedl, 2010). Host country factors such as the role of corporate and labour taxes, investment incentives, FDI regulation and labour costs, skills and infrastructure have received the most attention in the recent literature. Home country conditions may also play an important role for outward FDI. Witt and Levin (2007) suggest that the increase in outward FDI is a strategic escape response caused by the home country institutional environment.

Blonigen and Piger (2011) show that the traditional gravity factors belong to the most robust determinants of FDI flows and stocks. Almost all studies using gravity models find that bilateral FDI flows and stocks decrease with the distance between host and source country and increase with host and home country GDP. This clearly indicates that FDI activities are higher between large countries (measured as the level of GDP), but the level of FDI activity decreases with the distance from the source economy.

Previous empirical studies widely agree that FDI flows in services or service offshoring is due to cost saving considerations (Doh et al. 2009; Bunyaratavej et al. 2008; Farrell 2005). In particular, corporate taxes and labour costs play an important role for attracting FDI in services. For total FDI activity, previous studies find that bilateral FDI flows are sensitive to changes in corporate tax rates of the host and also the parent countries. In general, higher parent country tax rates lead to higher FDI outflows, whereas higher host country tax rates leads to lower FDI inflows (De Mooij and Ederveen, 2003). However, measuring corporate taxation is a non-trivial issue (Feld and Heckemeyer, 2011). Statutory corporate rates are the most obvious measure and are readily available, but are often not an accurate measure of the effective tax burden. Effective average tax rates (EATR) are more appropriate since they capture many details of the tax system, such as possible tax exemptions (De Mooij and Ederveen, 2003). More recently, the bilateral effective average corporate tax rate (BEATR) between the host and the investor country is used as the measure of corporate taxation (Egger et al., 2009). This tax measure accounts for the complexity of tax treatments for the parent and host countries and also accounts for any double taxation agreements. Using a recent meta-analysis based on about 700 estimates for a broad set of OECD countries, Feld and Heckemeyer (2011) found a mean semi-elasticity of FDI between 1.2 and 2.5. This suggests that a one-percentage point increase in the host country corporate tax rate reduces FDI flows or stocks between 1.2 per cent and 2.5 per cent.

There is ample empirical evidence on the role of low unit labour costs (ULC) on FDI. Labour cost differentials between the parent and host countries play an important role for FDI in business services (Doh et al. 2009). Tight employment protection legislation

in the host countries is expected to have a negative effect on FDI inflows. In fact, the previous literature that labour market flexibility of the host country, or relative to that in the parent country, has a positive impact on FDI inflows (Görg, 2005; Javorcik & Spatareanu, 2005; Dewit, Görg & Montagna 2009; Leibrecht, and Scharler, 2009). Based on data for 19 EU countries, Javorcik and Spatareanu (2005) showed that a more flexible labour market in the host country leads to a higher likelihood of inward investment. Here, labour market flexibility is measured as the flexibility of hiring and firing practices and an index of rules of dismissal. This holds true for both indicators measured in absolute terms and the indicators measured relative to the parent country. Similarly, using OECD data, Nicoletti et al. (2003) found that both outward FDI stocks and flows decrease when the relative employment protection legislation of the host country becomes relatively more restrictive.

Abundance and quality of human capital has long been recognized as being important to FDI inflows, particularly for FDI inflows in services (Doh et al. 2009). Using data for OECD countries, Nicoletti et al. (2003) found that average years of education in the host country is significantly positively related to FDI inflows. Internet availability and investment of ICT are also important factors of the decision to offshore business services (Choi, 2003; Doh et al. 2009; Bellak, Leibrecht and Damijan; 2009). Furthermore, some studies revealed that FDI flows in services are higher between countries that are characterized by high cultural proximity (Doh et al. 2009).

FDI barriers in the host country are likely to discourage inward FDI since they lead to higher investment costs. FDI restrictions have many dimensions such as legal, legislative and regulatory frameworks, strength of investor protection, foreign

ownership restrictions and bureaucracy (Kalinova, Palerm and Thomsen, 2010). Azémar and Desbordes (2010) suggest that product-market regulations in the host country may also lead to additional costs on businesses and create barriers to entry for FDI. For the OECD countries, Nicoletti et al. (2003) found that both FDI restrictions and product market regulations are significantly negatively related to FDI activity.

To sum up, FDI inflows to the EU member states depend on a large number of factors. However, little is known on whether and to what extent the sign and magnitude of the FDI determinants are different when Greenfield FDI in different producer services instead of total FDI activity is considered.

2.2 Empirical model

The empirical specification takes in consideration a wide range of potentially relevant determinants of FDI. Recent studies by Carr, Markusen and Maskus (2001) and Bergstrand and Egger (2007) emphasized the role of differences in skill endowments and capital intensity between the host and home country in determining bilateral FDI flows. In addition, a wide range of characteristics of the host and home markets play an important role for FDI inflows in business services. As outlined above, these variables include market size, market growth, cost based factors, such as labour costs, corporate and labour taxes, skills, technological infrastructure and FDI and trade regulations.

The dependent variables are the number of Greenfield FDI projects as well as flows in software and ICT services, business services and other services. The types of services most likely associated with services offshoring tend to be those that are capable of being performed from a distance and whose products can be delivered through relatively new forms of advanced telecommunications (Internet). Software programming, accounting,

or telephone call centre services are among the service categories that are most easily outsourced to low-wage locations such as India or Central Eastern Europe. Blinder (2006) characterizes the kind of services that are the most susceptible to international outsourcing, as services that require no face-to-face interaction and services that can be impersonally delivered.

The empirical specification is based on a standard FDI gravity equation augmented by several host and home country factors:

$$\begin{aligned} FDISCVS_{ijt} = & \beta_0 \ln GDPHOME_{it-1} + \beta_1 \ln GDPHOST_{jt-1} + \beta_2 \ln DIST_{ij} + \beta_3 CORPTAXHOME_{it-1} + \\ & + \beta_4 CORPTAXHOST_{jt-1} + \beta_5 ULCHOME_{it-1} + \beta_6 ULCHOST_{jt-1} + \beta_7 \ln TERTIARYHOME_{it-1} + \\ & \beta_8 TERTIARYHOST_{jt-1} + \beta_9 \ln RELGDPCAP_{ijt-1} + \beta_{10} EURO_{ijt} \cdot NEWEURO_{ijt} \\ & + \beta_{11} EU_{ijt} \cdot EUNEW_{ijt} + \phi X_{ijt-1} + \theta Z_{ij} + \alpha_{ij} + \lambda_t + \varepsilon_{ijt} \quad , \end{aligned}$$

where i is the home country, j is the host country and \log is the natural logarithm. The variables are defined as follows:

$FDISVCS_{ijt}$ is the number of Greenfield FDI projects in one of the three service categories from the parent i to the source country j , in addition, the logarithm of estimated Greenfield FDI flows (plus one EUR) from parent country i to host country j are used;

$GDPHOME_{it-1}$, $GDPHOST_{jt-1}$ are home and host country GDP in current EUR;

$DIST_{ij}$ is the distance between capital cities of the investing and host country;

$CORPTAXHOME_{it-1}$, $CORPTAXHOST_{jt-1}$ are the effective average tax rate for the nonfinancial sector of the home and host country respectively;

$WHOME_{it-1}$, $WHOST_{jt-1}$ are wage costs of the home and host country respectively;

$TERTIARYHOME_{it-1}$, $TERTIARYHOST_{jt-1}$, are the share of labour force, aged 15 to 74, with tertiary education (levels 5 and 6) of the home and host country respectively;

X_{ijt-1} represents a set of time varying host and parent country factor variables (i.e. R&D/GDP ratio, FDI regulatory restrictiveness index, strength of legal rights index for getting credits, strength of investor protection index, cost of starting a business as a percentage of income per capita, employment protection legislation, top marginal tax rate, protection of intellectual property, hiring and firing practices, labor force share with wages set by centralized collective bargaining, fixed broadband Internet subscribers, Internet users per 100 people, total tax rate of businesses in per cent of commercial profits and quality of investment promotion agencies);

Z_{ij} represents time invariant control variables (i.e. contiguity, sharing the same language and when they share a (former) colonial link) and ε_{ijt} is the error term.

The gravity equation contains bilateral country-pair fixed effects, α_{ij} , in order to control for unobserved time-invariant heterogeneity and includes common time effects, λ_t .

Corporate taxation in the home country is expected to have a negative impact on FDI flows in services. Wages of the host and home country are measured as hourly labour costs in the business sector. It is expect that Greenfield FDI flows in producer services decrease with the host country's wage costs. A skilled labour force in the host country is another important determinant of FDI inflows in services. Furthermore, Greenfield FDI outflows in business services may be higher for countries characterized by a high level of skilled labour force. Another potential important determinant of bilateral Greenfield

FDI activity in business services is the ratio of R&D expenditures to GDP, which is an indicator of the innovation effort and input. Internet availability and a rapid diffusion ICT are also likely to simulate Greenfield FDI (Choi, 2003). Here, endowment of ICT is measured as broadband penetration and the share of Internet users. Host and home country regulation of product markets and labour market flexibility can also affect Greenfield FDI flows. Among the regulation indicators, FDI restrictions are considered to be the most important. Tight employment protection legislation in the host countries are expected to have a negative effect on Greenfield FDI inflows.

One estimation problem is the presence of zero or negative values of Greenfield FDI in the different types of business services. The share of zero Greenfield flows in services is more than 50 per cent for the period 2003-2010 and the sample of OECD/BRICs home and EU-27 host countries. It is well known that in the presence of zero investment flows, pooled OLS or fixed-effects estimates are biased due to heteroscedasticity. Here, Santos-Silva and Tenreyro (2006, 2011b) introduce the Poisson pseudo-maximum likelihood (PPML) estimator, which can handle zero values for the dependent variable and is consistent even in the presence of heteroscedasticity. The PPML estimator belongs to the count data regression models, but can be applied if the dependent variable is positive and continuous and the conditional mean function is exponential (Wooldridge 2002). Since the dependent variable meets these requirements, we use the fixed-effects PPML and cluster robust standard errors (clustered by host countries). In principle, the gravity equation can be directly estimated without taking the natural logarithm of the dependent variable. Another possibility is to add one unit to the dependent variable and then apply the natural logarithm. This makes it possible to

interpret the regression coefficients as elasticities or semi-elasticities. The PPML estimator enables us to control for target and source country factors, as well as time dummies. Since multinational enterprises will not react immediately to changes in the FDI determinants, all explanatory variables are lagged one year (t-1). All variables are assumed to be stationary over time, which is justified given the short time period. Note that the use of dynamic panel data methods and cointegration tests are difficult to apply when the dependent variables contain a large number of zero values.

3 Data and descriptive statistics

The data is drawn from various sources. Greenfield FDI in business services are drawn from the FDI markets database that contains flows for about 120,000 investment projects worldwide for the period 2003-2010. The FDI project information is derived from media sources and can be interpreted as investment commitments. The FDI markets database is used by the UNCTAD in its World investment report and is also widely used in the academic literature (Hahn, Bunyaratavej and Doh, 2011; Davies and Desbordes, 2012; Di Minin and Zhang; 2010). The FDI projects are aggregated across source and destination country and by type of services. The database is particularly appropriate for Greenfield FDI projects in services that are often characterized by low capital intensity and is also likely to be underrepresented in the balance of payments-statistics. Note that the value of Greenfield FDI is estimated. The advantage of data for Greenfield FDI flows is that they are less affected by measurement issues and are also less affected by round-tripping activities via various EU countries. It is well known that FDI activity in some EU countries is exaggerated by the phenomenon of the round-tripping FDI.

The data consists of Greenfield FDI projects and flows in three types of services of 26 major home countries (i.e. Australia, Austria, Belgium, Brazil, Canada, China, Denmark, Finland, France, Germany, Hong Kong, India, Ireland, Italy, Japan, Luxembourg, Netherlands, Norway, Portugal, Russia, South Korea, Spain, Sweden, Switzerland, United Kingdom and United States) to 27 host countries, namely the EU-27 member states for the period 2000-2010 (total bilateral FDI stock) and for the period 2003-2010 for Greenfield FDI. For the analysis we have extracted 32,744 FDI projects.

Data on distance, information on neighboring countries, sharing the same language and having a (former) colonial link are drawn from Mayer and Zignago (2006). Distance is measured into kilometers between the principal cities of countries weighted by population size, which takes into account the uneven spread of population across a country. Data for effective average tax rate for the non financial sector and are provided by the European Commission in its series “Taxation trends in the European Union” and are calculated by ZEW, based on Devereux and Griffith (1999, 2003).

Data on educational attainment are taken from NEW Cronos, OECD and national statistical offices. The ratio of R&D expenditures to GDP is based on various sources (OECD and EUROSTAT, World Bank). Data on hourly labour costs in the business sector is drawn from EUROSTAT data and the U.S. Bureau of labor office for some non EU countries. The remaining variables are drawn from various sources.

A number of explanatory variables are taken from the World Bank indicators database:

- strength of investor protection index (0-10) (10=highest investor protection)
- protection of intellectual property (0-10) (10=highest protection) - Source: World bank
- getting credit - strength of legal rights index (0-10) (10=best) - Source: World bank
- cost of starting a business (per cent of income per capita) - Source: World bank

- Fixed broadband Internet subscribers (per 100 people): Fixed broadband Internet subscribers are the number of broadband subscribers with a digital subscriber line, cable modem, or other high-speed technology - Source: World bank
- Internet users per 100 people - Source: World bank
- total tax rate (per cent of commercial profits) - Source: World bank

Two variables are drawn from the Economic Freedom database:

- top marginal tax rate in per cent
- hiring and firing practices (1-10) (1=least regulated, 10=most regulated)
- labor force share with wages set by centralized collective bargaining (1-10) (=1 highly centralized, 10=least centralized, i.e. best)

Employment protection and the OECD regulatory restrictiveness index are provided by the OECD. The FDI regulatory restrictiveness is scaled between 0 and 1, where 0=open and 1=closed (Kalinova, Palerm and Thomsen, 2010). For the FDI gravity equation using Greenfield FDI, the total number of possible combinations is 5,616 (i.e. 8 years x 26 parent countries x 27 host countries).

In order to give an initial idea of the strength of the relation, bivariate correlation coefficients are calculated. Table 1 in the Appendix reports the correlation coefficients between the ratio of inward Greenfield FDI flows in business services (aggregated across the three categories) from source country j to host country GDP and the host country factors. The lower panel contains the corresponding correlations between the ratio of Greenfield FDI flows in business services to home country GDP and the home country factors. Note that Greenfield FDI flows are divided by the host and home country GDP, unlike in the gravity equation, where the level of Greenfield FDI flows is employed. The correlations should be interpreted with caution because they suffer from omitted variable bias and do not reflect causal effects.

Unreported results show there is a strong decrease in the statutory corporate tax rates and effective average tax rates in both the EU-15 and EU-12 countries. Furthermore, the share of workers with tertiary education, R&D intensity and ICT infrastructure is increasing over time. The degree of FDI restrictions and costs of starting a business declined between 2000-2010, on average. Other measures of labour market flexibility and indicators of the burden of starting a business do not change much over the period and are, therefore, unlikely to have an impact on the time variation of bilateral FDI stocks.

There is a significant relationship between Greenfield FDI and corporate taxes of the host country (measured as the adjusted top statutory tax rate on corporate income in per cent and the effective average corporate tax rate in per cent). Greenfield FDI flows are lower in host countries with a higher employment protection legislation. However, some variables show the wrong sign, which is perhaps due to not accounting for source and host country effects as well as inappropriate pooling across different host countries. The correlation coefficients between Greenfield FDI outflows (normalized by parent country GDP) and parent country characteristics show that outflows increase with the level of broadband penetration, level of hourly wage compensation and decrease with the level of FDI protection and regulatory burden of starting a business, all measured for the parent country. Overall, this suggests that some of these characteristics are powerful determinants of FDI outflows, but are less important in explaining Greenfield FDI inflows.

4 Empirical results

Table 2 in the Appendix shows the marginal effects obtained from the Poisson Pseudo maximum likelihood (PPML) estimates of the determinants of bilateral Greenfield FDI projects in the three different types of business services in the EU-27 countries. Host country and parent country dummies are jointly significant, but not reported. Note that the majority of policy and non policy factors are excluded from the final specification because they are not significant at conventional significance levels. In particular, labour market flexibility, indicators of intellectual property rights protection and indicators of investor protection are not significant when source and host country fixed effects and common time effects are taken in account. Costs of doing a business and the FDI regulatory index have the expected negative sign, but are statistically insignificant even when based on one-sided-tests (p-value of 0.10). One reason for the insignificance of these variables is that the annual time variation is very small and a longer time series based on five year interval data is needed to explore the effects of these variables.

The gravity factors namely the logarithm of host country and home country GDP are not significantly different from zero. This holds true for all different types of producer services. The insignificance of host country GDP indicates that market seeking considerations are not relevant for service offshoring. The coefficient on the distance between the investing and host country is not significant indicating that geographical proximity does to lead to an increase of Greenfield FDI projects in the different types of services. This is consistent with Nachum and Zaheer (2005) who FDI in information intensive industries is unlikely to be driven by market seeking considerations.

In most of the cases, bilateral Greenfield FDI projects are higher if two countries share the same border, a common language or have former colony links.

The effective average corporate tax rate is negative and significant for FDI projects in ICT services and for FDI projects in other producer services (logistics, distribution, transportation, sales & marketing). It is interesting to note that offshoring of business services is rather insensitive to corporate taxation, where offshoring of other services is highly sensitive to change in corporate tax rates. The coefficients of hourly wages in the host country are negative as expected but only significant in case of business services. Surprisingly, the coefficient of the share of tertiary education in the host country is not significantly different from zero. The insignificance of the education variable might be related to the fact that education quantity is a poor measure of the skills of the workforce in the EU-27.

Parent country characteristics also play a role for service offshoring. In particular, FDI projects in software and ICT services increase with the R&D/GDP ratio and the skill endowment of the home country. These findings support the view that FDI projects in higher value added activities generally flow from skill and R&D intensive countries to countries with a lower skill and R&D intensity.

Table 3 shows the marginal effects obtained from the Poisson Pseudo maximum likelihood where the logarithm of (estimated) greenfield FDI plus one EUR is used as an additional dependent variable. For FDI projects in software and ICT and other services we find a high semi-elasticity of -3.4 and -7.2, respectively. This means that a one-percentage point increase in the effective average tax rate reduces the bilateral Greenfield FDI flows by 3.4 and 7.2 per cent. Overall, this is a very large effect and a

new empirical result in the literature when compared to the results of the meta-analysis of Feld and Heckemeyer, 2011). However, the semi-elasticities are not strictly comparable because of the different definition of FDI. Again, hourly wages in the host country are only significant for business services. The coefficient indicates that an increase in host country labour costs by one percentage point lead to a decrease in Greenfield FDI flows by 2.3 per cent.

For software and ICT services and other services the coefficient on the logarithm of parent country GDP and host country GDP are again not significant at conventional significance levels. Thus, market size is less important for Greenfield FDI than for total FDI flows. For business services parent country GDP and host country GDP are positive but only significant at the ten per cent significance level. Furthermore, bilateral Greenfield FDI flows are higher if two countries share the same border, a common language or have former colony links.

5 Conclusions and policy implications

In this article, the determinants of bilateral Greenfield FDI projects/flows in three types of services from OECD/BRIC countries to the EU-27 have been investigated. The FDI gravity equation is estimated using panel count data models that account for host, home and common time effects as well as zero values of Greenfield FDI flows. The findings using the Poisson Pseudo Maximum Likelihood estimator show that corporate taxes, common border and a common language and a former colony relationship all play a significant role for bilateral FDI flows in the different types of services. However, the effect of corporate taxation is much higher for FDI projects/flow in logistics, distribution, transportation, sales & marketing than for business services. Hourly wages

in the host country show the expected negative sign but are only significant for business services. In general, Greenfield FDI in producer services is independent from the geographical distance between the investing and host country. Variables measuring the regulatory burden of businesses and labour market protection indicators are also not significant. A new finding is that the semi-elasticity of Greenfield FDI in producer services with respect to the effective average tax rate is quite large with semi-elasticities much larger than reported in the literature for total FDI.

Most determinants (e.g., employment protection and cost of starting a business, ICT infrastructure, intellectual property rights and labour market protection) fail to have a significant impact on FDI activity in producer services when host, home and common time effects are controlled for. Some of these determinants are significant when based on partial correlation coefficients.

The finding that Greenfield FDI in services is highly sensitive with respect to changes in corporate taxes has several important policy implications. EU countries can lower the corporate tax rate in order to attract FDI flows in services. However, corporate tax rates in EU-12 countries have already converged at a low level and are now significantly lower than in other world regions. Given the low level of corporate tax rates in some EU countries, it is, therefore, not possible to differentiate from the neighbouring competitor countries. In addition, taxes are required to finance infrastructure and education, which may in turn help to attract FDI directly or indirectly via higher productivity growth. In the EU-15 countries average corporate tax rates are higher and lowering company taxation will lead to additional Greenfield FDI flows in services. However, in most of the EU-15 countries, Greenfield FDI flows in services represent only a tiny proportion

in terms of GDP, with a share of less than 0.2 per cent in GDP. Given the small share of Greenfield FDI, the loss of corporate taxes due to tax cuts are unlikely to be offset by additional revenues derived from Greenfield FDI.

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Appendix

Table 1: Correlations coefficients between the Greenfield FDI flows in business services (aggregated across the three types as a percentage of host and parent country GDP) and the explanatory variables

	Correlation coefficients between the					
	ratio of inward greenfield investment in producer services to host country GDP and FDI determinants in the host country			ratio of outward Greenfield investment to home country GDP and FDI determinants in the parent country		
	coef.	p	# obs	coef.	p	# obs
adjusted top statutory tax rate on corporate income in %	-0.05	0.00	5616	-0.03	0.06	5589
effective average corporate tax rate in %	-0.05	0.00	5616			
bilateral effective average corporate tax rate (host) in %	0.07	0.00	2695	0.00	0.91	2695
total tax rate (% of commercial profits)	-0.04	0.02	3276	-0.05	0.00	3456
top marginal tax rate in %	0.01	0.42	4914	0.01	0.42	4779
hourly wage compensation in EUR	-0.01	0.62	5564	0.04	0.00	5589
tertiary graduates share in %	0.00	0.94	5616	0.02	0.17	5589
R&D/GDP ratio in %	-0.02	0.15	5538	0.03	0.03	5346
fixed broadband internet subscribers (per 100 people)	-0.03	0.04	5590	0.04	0.01	5589
internet users per 100 people	-0.02	0.21	5616	0.04	0.00	5535
strength of investor protection index (0-10) (10=highest investor protection)	0.06	0.00	3276	0.00	0.82	3456
protection of intellectual property (0-10) (10=highest protection)	-0.01	0.59	4914	0.06	0.00	4914
getting credit - strength of legal rights index (0-10) (10=best)	0.04	0.00	4576	0.06	0.00	4833
FDI regulatory restrictiveness index (0-1) (0=open; 1=closed)	-0.01	0.37	4992	-0.03	0.02	5589
cost of starting a business (% of income per capita)	-0.01	0.40	5200	-0.03	0.05	5508
hiring and firing practices (1-10) (1=least regulated, 10=most regulated)	0.01	0.35	4914	0.04	0.00	4914
employment protection legislation, (0-6) (0= least and 6 most restrictive)	-0.08	0.00	2886	-0.04	0.02	3375
labor force share with wages set by centralized collective bargaining (1-10) (=1 highly centralized, 10=least centralized, i.e. best)	0.00	0.74	4914	-0.01	0.46	4914
GDP per capita in int. \$ US ppp	0.02	0.07	5616	0.03	0.01	5589
distance in kilometers	0.00	0.75	5616	-0.05	0.00	5589
former colony	0.02	0.12	5616	0.08	0.00	5589
common language	0.08	0.00	5616	0.09	0.00	5589
Contiguity	0.00	0.87	5616	0.09	0.00	5589

Source: European Commission, World Bank, OECD, Eurostat New Cronos.

Table 2: Poisson Pseudo maximum likelihood (PPML) estimates of the determinants of bilateral Greenfield FDI projects in the EU-27 countries (marginal effects)

	Software & IT services		business services		Logistics, distribution, transportation, sales & marketing	
	marg eff	z	marg eff	z	marg eff	z
host log GDP in EUR host country, t-1	-0.09	-0.99	0.13	0.59	-1.23	-0.83
parent log GDP in EUR parent country, t-1	-0.10 *	-1.64	0.28	1.23	0.99	1.27
host effective average corporate tax rate, t-1	-0.44 **	-2.37	-0.61	-1.60	-7.33 **	-2.48
parent log hourly wages costs, t-1	0.10 *	1.94	-0.27	-1.33	-0.15	-0.24
host log hourly wages costs, t-1	0.02	0.23	-0.40 **	-2.20	-0.38	-0.34
parent log share of tertiary education, t-1	0.13 **	2.08	-0.08	-0.48	1.31	1.56
host log share of tertiary education, t-1	0.08	0.66	0.16	0.72	-0.05	-0.03
parent log R&D/GDP ratio, t-1	0.10 **	2.02	-0.02	-0.25	1.49 ***	2.78
log distance	0.02	1.74	-0.02	-0.64	-0.31	-1.56
Contiguity	0.11 **	3.73	0.18 **	2.37	0.28	1.16
common language	0.11 ***	3.36	0.12	1.59	0.88 ***	2.69
former colony	-0.01	-1.00	0.22 **	2.06	0.60 *	1.96
time dummy 2004	0.03 ***	2.77	-0.02	-0.65	0.82 ***	6.46
time dummy 2005	0.06 **	2.01	0.04	1.14	1.49 ***	4.17
time dummy 2006	0.09 **	2.54	0.12 *	1.86	1.82 ***	4.01
time dummy 2007	0.07 *	1.73	0.09	1.24	1.24 ***	2.77
time dummy 2008	0.04	1.00	0.07	0.85	1.14 *	1.89
time dummy 2009	0.01	0.21	0.02	0.30	0.56	1.17
time dummy 2010	-0.01	-0.38	0.05	0.75	0.40	0.95
host country effects	yes		yes		yes	
home country effects	yes		yes		yes	
R ²	0.16		0.23		0.29	
# of obs	5455		5455		5455	
# of country-pairs	702		702		702	

Notes: The dependent variable is the number Greenfield FDI projects by type of services from country i to country j. ***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively.

Table 3: Poisson Pseudo maximum likelihood (PPML) estimates of the determinants of bilateral Greenfield FDI flows in the EU-27 countries (marginal effects)

	Software & IT services		business services		Logistics, distribution, transportation, sales & marketing	
	marg eff	z	marg eff	z	marg eff	z
host log GDP in EUR host country, t-1	0.82	0.74	2.43 *	1.84	1.41	0.62
parent log GDP in EUR parent country, t-1	-0.90 *	-1.82	2.24 *	1.73	1.18	0.84
host effective average corporate tax rate, t-1	-3.44 *	-1.94	-3.13	-1.25	-7.18 **	-2.18
parent log hourly wages costs, t-1	1.28 **	2.35	-1.49	-1.16	0.41	0.32
host log hourly wages costs, t-1	-1.54	-1.42	-2.34 *	-1.86	-2.69	-1.18
parent log share of tertiary education, t-1	2.89 ***	5.26	2.46 **	2.04	1.46	1.13
host log share of tertiary education, t-1	0.75	0.75	1.02	1.39	2.26	1.53
parent log R&D/GDP ratio, t-1	1.12 **	2.38	1.23 *	1.85	3.77 ***	4.18
time dummy 2004	0.21	1.55	-0.21	-1.16	0.82 ***	4.13
time dummy 2005	0.13	0.61	-0.12	-0.60	1.35 ***	3.72
time dummy 2006	0.16	0.65	-0.12	-0.46	1.36 ***	2.85
time dummy 2007	0.26	0.77	-0.12	-0.38	0.60	1.39
time dummy 2008	0.13	0.35	-0.35	-1.06	0.88 *	1.80
time dummy 2009	-0.17	-0.57	-0.70 **	-2.43	-0.19	-0.41
time dummy 2010	-0.32	-1.15	-0.58 **	-2.03	-0.12	-0.25
log distance	0.20	1.21	-0.07	-0.33	0.18	0.41
contiguity	1.43 ***	3.92	1.58 ***	2.77	1.67 ***	2.67
common language	0.43 **	2.44	0.39	1.04	1.34 ***	2.63
former colony	-0.27 ***	-3.27	0.72 *	1.83	0.57	1.15
host country effects	yes		yes		yes	
home country effects	yes		yes		yes	
R ²	0.34		0.39		0.47	
# of obs	5455		5455		5455	
# of country-pairs	702		702		702	

Notes: The dependent variable is the estimated value of Greenfield FDI flows (plus EUR1) transformed into logarithm from country i to country j in current EUROS. ***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively.