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Service Trade Restrictiveness and Foreign Direct Investment

Evidence from Greenfield FDI in Business Services

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Abstract

We study the impact of service trade restrictions on bilateral greenfield FDI projects in four different business services sectors within a gravity model framework. Project level FDI data for 42 destination countries and up to 41 source countries spanning the years 2014 to 2018 is taken from the fDi Markets database, and restrictions from the OECD's Service Trade Restrictiveness Index (STRI). Using a negative binomial estimator to explain the number of bilateral FDI projects, we find that service trade restrictions represent a significant barrier for greenfield FDI. In 3 out of 4 business services we obtain statistically significant evidence of a negative impact. Furthermore, the explanatory power of the models generally improves when using the sub-components of the STRI (restrictions to foreign entry, restrictions to the movement of people and other service trade restrictions), instead of the single aggregated index value. Based on the estimated impacts of the different restrictions, we carry out a series of simple simulations of how the number of expected FDI projects would increase in response to a hypothetical policy reform, and propose some sector-specific policy recommendations.

1 Introduction

The capacity to attract foreign direct investment (FDI) is generally seen as one dimension of a country´s economic competitiveness. For policymakers FDI is desirable as an additional source of capital and – by means of knowledge transfers and spill-overs – also for productivity gains. These and other potential benefits from FDI have been studied and quantified in a sizeable literature (e.g. Beugelsdijk et al. 2008, Francois and Hoekman 2010, Jungmittag and Welfens 2020). International organisations like the OECD or the World Bank have emphasized the negative impacts of FDI barriers and promoted their removal (e.g. Nicoletti et al. 2003, Borchert et al. 2012). Consequently, many countries have over time relaxed entry and foreign ownership restrictions and signed up to international guidelines that pledge non-discriminatory policies towards foreign investors.[1]

Yet, with the recent rise of protectionist tendencies, the introduction of new FDI restrictions resurged and reached a 20-year high in 2018 (UNCTAD 2019, p. xi). The ongoing questioning of globalization that has emerged in the aftermath of the Covid-19 crisis might further corroborate this trend (Irwin 2020; UNCTAD 2020, p.80ff). Therefore, a study of the downsides of restrictive regulation appears to be quite timely.

Even more this is the case in view of the lacklustre economic growth and stagnant productivity increases recorded over the last decade in large parts of the EU (Bauer et al. 2020). The removal of FDI obstacles could be one option to trigger more dynamism and harness underexploited opportunities in the EU Single Market (Aussilloux et al. 2017).[2] According to this reasoning, policymakers should focus on the service sectors, as they are the domain of most of the remaining restrictions (Mistura and Roulet 2019), and because of their dominating economic weight in most high-income economies. Business services, in particular, are singled out due to their increasingly systemic role for many value chains, including manufacturing. Services also represent an increasingly large share of total FDI, accounting in year 2018 for about one-half of all announced global greenfield FDI projects (48% by value, 53% by number). Business services represent again one-half of all service projects, or one-sixth in terms of value.[3]

The purpose of our article is to contribute to this debate by quantifying the extent to which restrictive regulation impedes inward FDI in business services. To capture FDI flows, we exploit microdata on bilateral greenfield investments the fDi Markets database in four specific business services, namely computer services, legal, architecture & engineering, and accounting services. This complements previous studies, which mostly used aggregate FDI stocks and flows (e.g. FATS database, IMF Balance of Payments) or sectoral data on M&A transactions (e.g. Mistura and Roulet 2019, Barattieri et al. 2016).

To estimate how FDI flows are impacted by restrictive regulation, we match our greenfield investment data with the sectoral Service Trade Restrictiveness Indicator (STRI) of the OECD. This compound indicator is broadly defined, capturing restrictions on any of the channels of international service trade, not only FDI. In fact, within the four *modes* of cross-country service trade defined by the WTO[4], greenfield FDI corresponds to 'commercial presence' – e.g. an architecture firm opening a branch in a foreign country – and thus belongs to mode 3. Empirically this is the most relevant mode, e.g. in year 2013 it accounted for 69% of all EU service exports to non-EU countries (Rueda-Cantuche et al. 2016).

The overall STRI is the sum of five individual sub-indicators, covering (i) entry restrictions, (ii) restrictions on movement of people, (iii) other discriminatory measures, (iv) barriers to competition, and (v) regulatory in-transparency. A natural ex-ante expectation is that the first sub-indicator on entry restrictions would be the most relevant FDI deterrent. However, as an added value of our study we include all sub-indicators and test whether they negatively affect FDI, which does not seem implausible in the case of, e.g., regulatory transparency.[5] It also explains why we refrain from using the ready-made OECD FDI Regulatory Restrictiveness Index[6], which has a narrower scope. In addition, the FDI regulatory restrictiveness index is based on statutory measures as reflected in official OECD instruments or identified in OECD Investment Policy

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1 E.g. OECD Declaration on International Investment and Multinational Enterprises.

2 Restrictions in some industries of strategic importance might of course be fully justified, with military as one obvious example. [Cite EU investment screening mechanism?]

3 Source: UNCTAD, based on information from the Financial Times Ltd, fDi Markets (www.fDimarkets.com). Among all service sectors, business services accounted for the third largest volume of announced greenfield FDI projects in 2018, surpassed only by the "electricity, gas and water" and "construction" sectors, which each accounted for almost a quarter of the greenfield FDI volume of the entire service sector.

4 Namely (1) cross border provision, (2) consumption abroad, (3) commercial presence, and (4) temporary movement of natural persons.

5 Correlations between the different sub-indicators can be high, and a principal component analysis shows that most of the variance between them can be explained with just two principal components (Jungmittag 2020).

6 https://www.oecd.org/investment/fdiindex.htm

Reviews and yearly monitoring reports, and unlike the OECD STRI, it does not take into account the actual implementation of legal and other restrictions.

The main contribution of our study is to provide new evidence on the negative effect of anti-competitive regulation on service FDI flows from so far unexploited data. We derive our results with a panel data gravity approach, using data for 42 destination countries and up to 41 source countries spanning from 2014 to 2018. We find that service trade restrictions represent a significant barrier for greenfield FDI. In 3 out of 4 business services we obtained statistically significant evidence of a negative impact, and in legal services the sign of the coefficients, albeit insignificant, was still always negative. Furthermore, for three sectors (computer services, legal services and architectural and engineering services) the explanatory power of the models improve statistically significantly if three sub-indices of STRI (restrictions to foreign entry, restrictions to the movement of people and other service trade restrictions) instead of the composite STRI are included in the models. This differentiation also makes it possible to derive clearer and more targeted policy recommendations.

To illustrate the potential impact on FDI flows from an ambitions reduction of regulatory barriers, we present hypothetical simulations of the effects of 50% reduction of the statistically significant service trade restrictions on the expected number of FDI projects. These simulations suggest that despite the already low level of current restrictions, there still is significant scope for policy reforms aiming to further reduce restrictions in several EU Member States.

In terms of policy implications our sector-specific approach clearly shows that it would be inefficient to simply dismantle barriers to trade in services across the board. Rather, policy measures should be geared towards reducing the restrictions that actually apply in specific sectors. Our study provides a number of starting points for this purpose.

The remainder of the paper is structured as follows. Section 2 provides a brief review of the relevant literature. Section 3 explains the empirical model and the estimation strategy. Section 4 describes the data used and includes also some descriptive statistics. Section 5 presents and discusses the estimation results and some policy simulations for each of the four business services sectors considered. Finally, section 6 contains a concise summarising cross-sectoral discussion of our findings and some conclusions drawn from them.

2 Literature Review

A large and well-known body of literature has investigated, mostly empirically, the determinants of FDI.[7] Gravity models emerged as the workhorse estimation approach to identify relevant macro-level determinants, which include country characteristics (economic size, distance and wage differential between partner countries, etc.) and institutional factors such as common language, trade openness, or ease of doing business. However, other than a few core variables there still is no robust consensus on the exact set of variables that are consistently relevant and, hence, should be included in such models (Blonigen and Piger 2014).

As in our study we are concerned with FDI mostly among OECD and only nine non-OECD countries, we do not review here the rich specific literature on the determinants of FDI in developing countries (e.g. Bénassy-Quéré et al. 2007). Instead, we directly turn to previous research on FDI in service sectors, which is less developed than that on FDI in manufacturing. One important insight from this literature is that the country variables commonly used to model manufacturing FDI are also relevant for service FDI, albeit with different relative importance (Ramasamy and Yeung 2010). For instance, market size and expected growth are significant drivers for both, but more strongly for manufacturing than for services FDI. The two also show a high temporal correlation, suggesting that service FDI follows (or accompanies) manufacturing FDI (Kolstad and Villanger 2008, Ramasay and Yeung 2010). Finally, findings are ambiguous with regard to trade openness: while Ramasamy and Yeung (2010) affirm its role as a positive determinant of FDI flows, Kolstad and Villanger (2008) do not corroborate this.

Markusen and Strand (2009) on theoretical grounds already pointed out the particular importance of regulatory barriers when it comes to trade and investment in services. They argue that certain regulatory restrictions – even domestic ones not targeting foreign firms – can have a detrimental effect on service trade, e.g. when they require to validate professional qualifications or to go through complicated licensing procedures. Crozet et al. (2016) eventually confirmed their conjecture empirically, using firm-level data.

Recent empirical research broadly confirms the negative impact of restrictive regulation on, inter alia, cross-border M&A in service sectors (Borchert et al. 2012), cross-border service trade by mode 1 (van der Marel and Shepherd 2013) or all modes except 3 (Nordås and Rouzet 2017), FDI in retail services (Jungmittag 2019), and domestic service competition (Rouzet and Spinelli 2016). Indirectly, service trade barriers also have a negative impact on the productivity (Beverelli et al. 2017) and export performance (Hoekman and Shepherd 2017) of downstream manufacturing.[8]

All of these studies used either the OECD STRI or a similar compound index from the World Bank to gauge service trade barriers. However, Marel and Shepherd (2013) showed that analyses with individual components of the index, which capture mode-specific restrictions, unveil additional insights on modal interplay, especially when combined with sectoral-level service trade data. In particular, while overall service trade shows inter-modal substitution between modes 1 and 3 (i.e. restrictions on direct imports are associated with an increase of foreign affiliates, and vice versa), business, financial and insurance services show complementarity.

A further differentiation was introduced by Nordås and Rouzet (2017), when they constructed a bilateral index of regulatory differences by exploiting the detailed information on policies underlying the STRI index. In the subsequent empirical analysis, they could confirm that regulatory heterogeneity has a negative impact on service trade (data did not encompass mode 3), especially when the two partners' individual STRI's are relatively low, i.e. in case of two relatively open countries. According to the authors, the presence of more severe measures that tend to close countries against trade override the effect of differently shaped regulation, which explains the observed effect.

Finally, a recent contribution closely related to ours is Mistura and Roulet (2019), who proxy FDI barriers by the newly conceived OECD FDI Restrictiveness Index and estimate its impact on bilateral FDI and cross-border M&A stocks. The data used in their econometric analysis covers 60 industrial and emerging economy countries, and 15 or more years. At the economy-wide level, they confirm a negative effect from FDI restrictiveness, both (and at comparable levels) on FDI positions and M&A stocks. When the estimation is repeated separately for the primary, manufacturing and service branch of the economy, it turns out that the negative effect is around one third stronger for services than for the overall economy.

In the latter exercise, FDI data was restricted to cross-border M&A, for lack of adequate sectoral data on total FDI stocks. With relevance for our study, the authors critically discuss the use of M&A data as a proxy for FDI, conceding that "these are potentially more asset-specific and, in this respect, possibly less sensitive to

[7] Theoretical approaches to the determinants of FDI are surveyed, for instance, by Faeth (2009).

[8] Francois and Hoekman (2010) provide a comprehensive review – including of the earlier empirical work – of the topic and its wider implications on productivity and growth.

competing locations than greenfield investments." In other words, greenfield investment is held to be more sensitive to countries' investment and regulatory conditions than M&A transactions. Although this assertion would merit further elaboration and perhaps some qualification (Davies et al. 2018), it still highlights the scope for an analysis based on greenfield data. What is more, our data is sectorally disaggregated and allows for a differentiated analysis of the number of FDI projects for four business services sectors.

3 Empirical Model and Estimation Strategy

We aim to estimate the effects of service trade restrictions on bilateral FDI activities in the business services sectors. An appropriate approach for such an undertaking is the gravity model. This model, first introduced by Tinbergen (1962) and Pöyhönen (1963), is now the workhorse of the empirical trade and FDI literature. Its original specifications had more or less ad hoc character and included as explanatory variables the GDP of trading partners (as a measure of country size) and the distance between them (as a proxy for transport costs), but later on it became increasingly linked to theoretical arguments. E.g., Anderson and van Wincoop (2003) provided general theoretical foundations of the gravity model based on differentiated products and homothetic preferences, and Eaton and Kortum (2002) came to similar conclusions using a Ricardian model with perfect competition. Furthermore, heterogeneous firm models of international trade à la Melitz (2003) also yield a gravity equation for aggregate bilateral trade flows, as shown by Melitz and Ottaviano (2008) and Helpman et al. (2008). Most recently, Chanery (2018) proposed a micro-level model where the geographic distribution of any one firm's exports depends on how distance affects the direct cost of creating contacts, and which still – after aggregation – yields a gravity equation at the macro level.

The gravity model is also increasingly employed to model bilateral FDI. Although it initially lacked a theoretical foundation, its use for horizontal FDI can be justified (Bénassy-Quéré et al. 2007). With a horizontal motivation for FDI, which might be prevailing in business services, firms aim to replicate their operations in other countries to be closer to consumers in those markets. Gravity variables like GDP of the source and destination country as proxies for supply and demand forces, and distance accounting for transaction costs and other frictions in international investment may adequately capture these motivations (Blonigen and Piger 2014). However, recent theoretical models of multinational enterprises' FDI decisions suggest additional factors that possibly determine FDI patterns and emphasize a number of modifications to a standard gravity model that may be necessary to explain horizontal and vertical FDI accurately (e.g. Carr et al. 2001; Bergstrand and Egger 2007).

Based on this branch of literature, we use a panel data gravity model to estimate the effects of service trade restrictions on greenfield FDI activities in four business services sectors. More specifically, we use as dependent variable the number of bilateral FDI projects of a source country *i* in a destination country *j* taken from the fDi Markets database (a detailed description of this data is provided in the next section). Thus, the dependent side is given by a count data variable. A common starting point for modelling count data is the Poisson regression model. However, our sample of bilateral FDI projects count data has a sample variance much greater than the sample mean, suggesting that a model incorporating this over-dispersion would be better suited for these counts. The negative binomial regression model, which arises as a natural extension of the Poisson regression model, is in the applied literature a popular choice for over-dispersed counts.[9]

Assuming that the mean μ_{ijt} of the negative binomial distribution of the numbers of bilateral FDI projects y_{ijt} of a source country *i* in a destination country *j* and in year t varies systematically with some independent variables, we place the value μ_{ijt}, as customary, within a loglinear model (Cameron and Trivedi 2005). Thus, our gravity model is

$$\mu_{ijt} = E\left[y_{ijt}|\mathbf{X}_{ijt}\right] = e^{\alpha_0+\alpha_i+\alpha_t+\beta_1 X_{1ijt}+\beta_2 X_{2jt}}, \quad (1)$$

[9] The Poisson estimator can also be applied to nonnegative continuous variables (Wooldridge 2002), referred to as the Poisson pseudo-maximum likelihood (PML) estimator, which is also consistent. In the econometric literature, the term PML refers to estimating by maximum likelihood (ML) under the assumption that the specified density is not correct (Gourieoroux et al. 1984). With respect to gravity models with continuous trade data (including zero trade flows), Santos Silva and Tenreyro (2006) stated that due to the logarithmic transformation of the equation, linear estimators may be inconsistent in the presence of heteroscedasticity, and that non-linear estimators, particularly the Poisson PML, should be used. They argue that the approach is consistent in the presence of heteroscedasticity and deals naturally with zero trade flows and thus, they deem it fit for estimating the gravity equation. The same argument holds for continuous data FDI flows or FDI stocks. As an extension, some researchers considered other PML estimators based on non-Poisson distributions. The negative binomial PML estimator is appealing because it encompasses both Poisson PML and gamma PML as special cases since the negative binomial distribution assumes that the conditional variance is a linear combination, to be estimated, of the conditional mean and of its square. It has been increasingly used in trade as well as mergers and acquisitions studies, e.g in Head, Mayer and Ries (2009), Burger, van Oort and Linders (2009), Briant, Combes and Lafourcade (2014), Westerlund and Wilhelmsson (2011) and Garita and van Marrewijk (2008). However, Bosquet and Boulhol (2010, 2014) showed that the negative binomial PML estimator is inappropriate when applied to continuous dependent variables, such as trade or FDI flows, because the estimates artificially depend on the choice of the measurement unit, which is arbitrary. In our study, we do not have to deal with the problem of scale-dependent nonnegative continuous data, since we use count data (numbers of FDI projects) with over-dispersion, meaning that a negative binomial maximum likelihood (ML) estimator appears to be the right choice.

where α_0 is the constant term, α_i are the source country fixed effects, and α_t are the time fixed effects. X_{1ijt} are bilateral explanatory variables (e.g. distance or common language) and X_{2j} are destination country specific explanatory variables (e.g. GDP per capita and the service trade restrictiveness indicators). β_1 and β_2 are the regression coefficients belonging to these variables. The next section provides a complete description of all variables. Ideally, a gravity model should include, besides bilateral explanatory variables, source and destination country fixed effects in order to capture multilateral resistance (Anderson and van Wincoop 2003). However, since the purpose of our analysis is to estimate the impact of destination countries' service trade restrictions, which show over time only very little variation, this approach is not feasible. Destination country fixed effects would absorb the effects of the service trade restrictions and all other destination country specific variables and impede the disentanglement of the effects of these variables.[10]

Using the notation from equation (1), our complete negative binominal regression model of the gravity equation for an observation *ijt* is

$$Pr(Y_{ijt} = y_{ijt}|\mu_{ijt}, \theta) = \frac{\Gamma(y_{ijt} + \theta^{-1})}{\Gamma(y_{ijt} + 1)\Gamma(\theta^{-1})}\left(\frac{1}{1 + \theta\mu_{ijt}}\right)^{\theta^{-1}}\left(\frac{\theta\mu_{ijt}}{1 + \theta\mu_{ijt}}\right)^{y_{ijt}}, \qquad (2)$$

where $\Gamma(\bullet)$ is the gamma function and $\theta(\geq 0)$ a dispersion parameter. In order to estimate this panel data model, we apply an unconditional negative binomial regression estimator with dummy variables to represent the destination country and time fixed effects. Allison and Waterman (2002) have shown that the often-used conditional negative binomial model for panel data, proposed by Hausman, Hall, and Griliches (1984), is not a true fixed–effects method, because it does not in fact control for all stable covariates. Looking for alternative estimators, the simulation study of Allison and Waterman (2002) yields good results for the unconditional negative binomial regression estimator with dummy variables for the fixed effects, and there is no evidence for any incidental parameters bias in the coefficients. To avoid a downward bias in the standard error estimates we use two-way clustered (source country and destination country) standard errors to evaluate the statistical significance of the coefficients' estimates.

[10] Nordås and Rouzet (2017) argue in a similar way in their analysis of the impact of service trade restrictions on trade flows.

4 Data Set and Descriptive Statistics

We assembled a data set from various data sources, allowing us to analyse for the first time the impact of service trade restrictions on bilateral greenfield FDI projects in four different business services sectors within a gravity model framework.

The number of bilateral FDI projects from a source country *i* in a destination country *j* are taken from the fDi Markets database, which is maintained by fDi Intelligence, a division of Financial Times Ltd. This online database contains a collection of worldwide FDI projects from 2003 onwards. According to the fDi Markets definition, a FDI project is the establishment of a new foreign enterprise or the expansion of an existing foreign investment, i.e. so-called greenfield investments, while cross-border mergers and acquisitions (M&A) are not included. The FDI project information is derived from company data and media sources and can be considered as investment commitments or investment plans. The data for the individual FDI projects includes information on the month when the FDI project started, the name of the investing company, the source and destination addresses of investment at the city level, the industry sector in which the investment takes place, the type of activity, the estimated amount of capital invested and the estimated number of jobs created. Data from the fDi Markets database has been used by the UNCTAD in its World Investment Reports series and in recent academic research (e.g. Burger et al. 2013; Crescenzi et al. 2014; Castellani and Pieri 2016; Castellani et al. 2016; Falk 2016; Amoroso and Müller 2018).

Since the amount of capital invested and the number of jobs created are only rough estimates, we use the *number* of bilateral FDI projects as dependent variable. Regarding the sectors to be included, the starting point for our data selection was Eurostat's definition that business services are activities (business functions) performed by enterprises for other enterprises or public administrations.[11] They comprise technical services such as architecture, engineering and technical studies, computer services such as software design and database management, and other professional services such as accounting, legal, consultancy and management services.

From an official statistics point of view, business services refer to economic activities covered by NACE Rev. 2 divisions 62 (computer programming, consultancy and related activities), 69 (legal and accounting activities), 71 (architecture and engineering activities, technical testing and analysis), 73 (advertising and market research), and 78 (employment activities), as well as groups 58.2 (software publishing), 63.1 (data processing, hosting and related activities, web portals), and 70.2 (management consultancy activities). Among these activities, the OECD STRI is only available for five sectors, namely computer services (NACE Rev. 2 divisions 62 and 63), legal services (NACE Rev. 2 group 69.1), accounting services (NACE Rev. 2 group 69.2), architecture services (NACE Rev. 2 group 71.1.1), and engineering services (NACE Rev. 2 group 71.1.2). Since the fDi Markets database combines the latter two into a joint sector of architecture and engineering services, we finally consider four business services sectors in the empirical analysis.

With respect to the time span and the included countries, the OECD STRI database again constitutes the bottleneck. It is available only from 2014 onwards, and only for the 36 OECD countries plus Brazil, the People's Republic of China, Colombia, Costa Rica, India, Indonesia, Malaysia, the Russian Federation and South Africa. Out of these 45 countries in total, we excluded as source countries all those for which no FDI project has been recorded during 2014 to 2018 in the sectors under consideration. For such countries, the country-fixed effects would otherwise perfectly explain the dependent variable. Furthermore, we omitted Iceland and Slovenia as destination countries, as no FDI projects in business services were recorded for them during the entire period.[12]

The resulting number of observations in each sector and some descriptive statistics are presented in Table 1. For example, for computer services, the aggregation of FDI projects across source-destination pairs yields bilateral FDI data for 41 source countries and 42 destination countries. In this case, these are 1724 country pairs with observations for the period 2014 to 2018, making a total of 8620 observations. Fewer observations are available for the other three sectors because there are fewer source countries according to the criteria mentioned above.

[11] https://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Business_services.

[12] The extent to which the sectoral allocation of FDI projects received by these two destination countries might be inaccurate cannot be clarified by us. However, UNCTAD (2019) records for Iceland a total of 202 FDI projects in 2017 and 585 in 2018, and for Slovenia a total of 428 projects in 2017 and 547 in 2018. As mentioned above, the figures in UNCTAD (2019) are also based on the fDi Market database.

Table 1: Descriptive statistics for the FDI projects data

	Source countries	Destination countries	Years	Nobs.	Mean	Median	Std. dev.	Min.	Max.
Computer services	41	42	5	8620	0.234	0	1.257	0	43
Accounting services	19	42	5	3990	0.067	0	0.422	0	10
Legal services	27	42	5	5670	0.084	0	0.591	0	15
Architecture and engineering services	29	42	5	6095	0.067	0	0.368	0	8

Source: fDi Markets database, own calculations

From the means and medians observable in Table 1 and the distributions of the number of FDI projects by country pair shown in Figure 1 it is obvious that this count data contains many zero counts. For accounting and legal services 96% of the observations are zero counts, for architectural and engineering services 95% and for computer services 90%. Even for the non-zero observations, the number of FDI projects per country pair is generally small. Furthermore, in all four sectors the variance of the number of FDI projects is much greater than the mean (by a maximum factor of 6.7 for computer services and a minimum factor of 2.0 for architecture and engineering services). This over-dispersion suggests that a negative binomial regression model is appropriate, being it a natural extension of the Poisson regression model (Blonigen and Piger 2014).

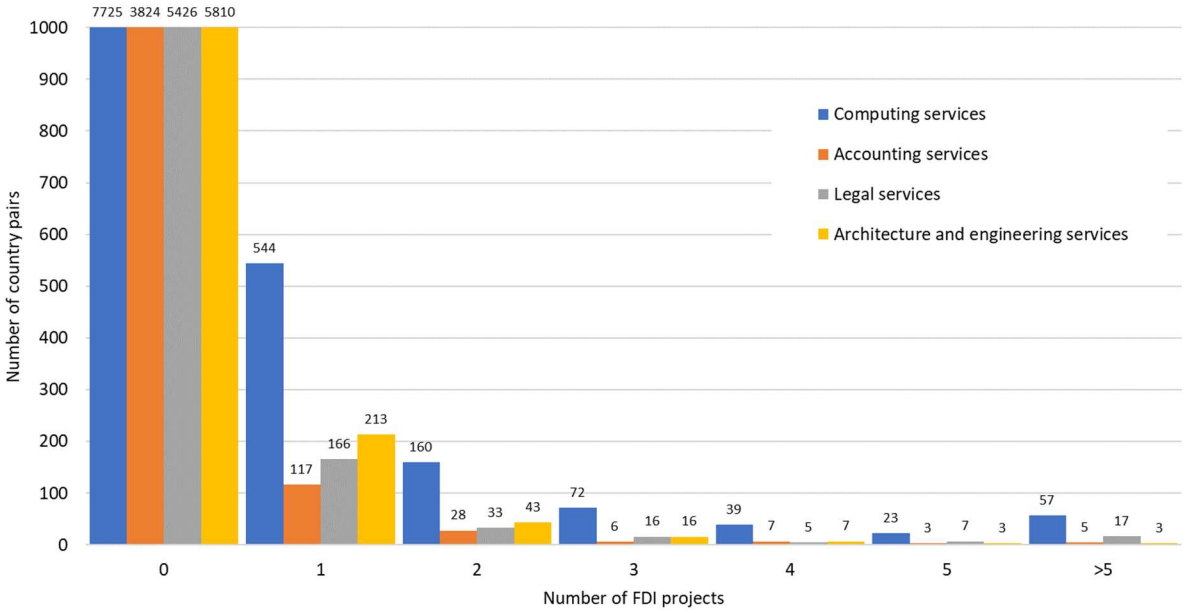

Figure 1: Distribution of bilateral FDI projects in business services, 2014-2018 (Source: fDi markets database, own calculations)

The explanatory variable of main interest in our analysis are the restrictions to service trade, with the hypothesis that they have a negative impact on FDI activities in the business services sectors. From a theoretical point of view, mainly restrictions on foreign entry should impede FDI, but other restrictions might also be relevant. The OECD service trade restrictiveness index (STRI) database synthesises information from more than 16,000 laws and regulations for 22 service sectors in 44 countries (OECD 2017, 2020) on a yearly basis starting in 2014 and up to 2019. For each sector, country, and year, this database provides an index value for five distinct policy areas:

- restrictions on foreign entry,
- restrictions on the movement of people,
- other discriminatory measures,

- barriers to competition,
- regulatory transparency.

The first three areas capture measures related to market access and national treatment, the first area being restrictions on market access via mode (3) and the second area restrictions on market access via mode (4). The fourth area comprises information on pro-competitive regulation (or lack thereof), and the fifth area provides information on transparency and administrative procedures. For each policy area and sector, the OECD converted the qualitative information into quantitative indices, initially with values ranging from zero (absence of any restrictive regulation) to one (completely closed sector). Finally, OECD also provides a composite STRI calculated as the simple sum of the sub-indices from the five policy areas, but rescaled so that it also ranges from zero to one.

The OECD STRI methodology follows the principle of the most-favoured nation (MFN) and, therefore, does not reflect the relevant level of regulation of service trade between countries with a preferential trade agreement (PTA) in force. However, in the group of countries covered in the OECD STRI, around 50% of cross-border services trade is with PTA partners. The share is highest for the member countries of the European Economic Area (EEA), which typically export more than 70% of their services to PTA partners, in particular to other EEA members.

As the EEA constitutes a common market and thus a deeper integration than a normal PTA, which is not captured by the STRI, the OECD has recently released an additional version of the STRI, the "Intra-EEA Services Trade Restrictiveness Index".[13] Covering the same five areas as the original STRI, this index is meant to accurately reflect service trade restrictions between the 25 EEA countries (the 23 EU countries available in the original STRI database plus Island and Norway). The report of Benz and Gonzales (2019) shows that services trade within the EEA is substantially more liberal than the multilateral policies applied by EEA member countries towards non-members, but a certain level of restrictiveness remains within the Single Market, demonstrating that there is potential for further market integration.

We make use both of the original and intra-EEA composite STRI, for the four business services sectors under consideration (computer services, accounting services, legal services, architecture and engineering services). Since the OECD provides two separate but highly correlated STRI series for architecture services and engineering service, we defined the STRI for the joint group of architecture and engineering services as the simple average of these two indices.

We assigned the Intra-EEA STRI value of the destination country to a country pair whenever both countries are EEA members. If at least one country of a country pair is not an EEA member, the original STRI of the destination country was used. In addition, some estimates of alternative regression models include sub-indexes of the restrictions on foreign entry and movement of people as well as the resulting sub-index of all other remaining restrictions (calculated as the sum of the other three remaining sub-types of restrictions).

The OECD FDI regulatory restrictiveness index (FDI RRI)[14] is another potential indicator to measure regulatory barriers to FDI. This index is only available for four business services sectors, and not for computer services. It covers the following four specific categories:

- limitations on foreign equity,
- discriminatory screening and approval procedures applied to inward FDI,
- restrictions on the employment of foreign key personnel,
- other restrictions such as on land ownership, corporate organisation or repatriation of profits and capital.

According to Mistura and Roulet (2019, Box 1), the extent of discrimination between foreign and domestic private investors is the central criterion to decide whether a measure should be scored, but non-discriminatory measures are also covered when they are considered more burdensome for foreign investors. The index is updated on yearly basis and covers 22 sectors in 62 countries (the OECD members and 22 other countries) for the period from 1997 to 2018.

The restrictions for each category are measured based on expert judgement and evaluated on a zero (open) to one (closed) scale. Foreign equity restrictions are given a higher score, followed by discriminatory screening measures, while restrictions on foreign key personnel and other measures receive relatively lower scores. The

[13] https://qdd.oecd.org/subject.aspx?Subject=STRI_INTRAEEA.
[14] https://www.oecd.org/investment/fdiindex.htm.

composite scores for the individual country-sector pairs reflect the sum of scores under each policy dimension, capped at a maximum value of one (OECD, 2017, Box 1; Mistura and Roulet, 2019, Box 1).

The information basis of the FDI regulatory restrictiveness index are statutory measures as reflected in official OECD instruments or identified in OECD Investment Policy Reviews and yearly monitoring reports. In contrast to the OECD STRI, the actual implementation of legal restrictions is not considered in the scoring process. Furthermore, other facets of the regulatory framework, such as the nature of corporate governance, the extent of state ownership, and institutional or informal restrictions, which may affect the FDI climate, are also not taken into account (Mistura and Roulet, 2019, Box 1; Kalinova, Palerm and Thomsen, 2010). Thus, for the purpose of our study the FDI RRI has some weaknesses compared to the STRI.

The relatively different approaches of the two indicators are also reflected in the scatterplots in Figure 2: for the year 2018 values of the four available business services sectors, only the accounting services show a weak correlation between them. However, even here the values of the two indicators are hugely different for some countries (e.g. South Korea, which has a score of 1 in the STRI and 0 in the FDI RRI).

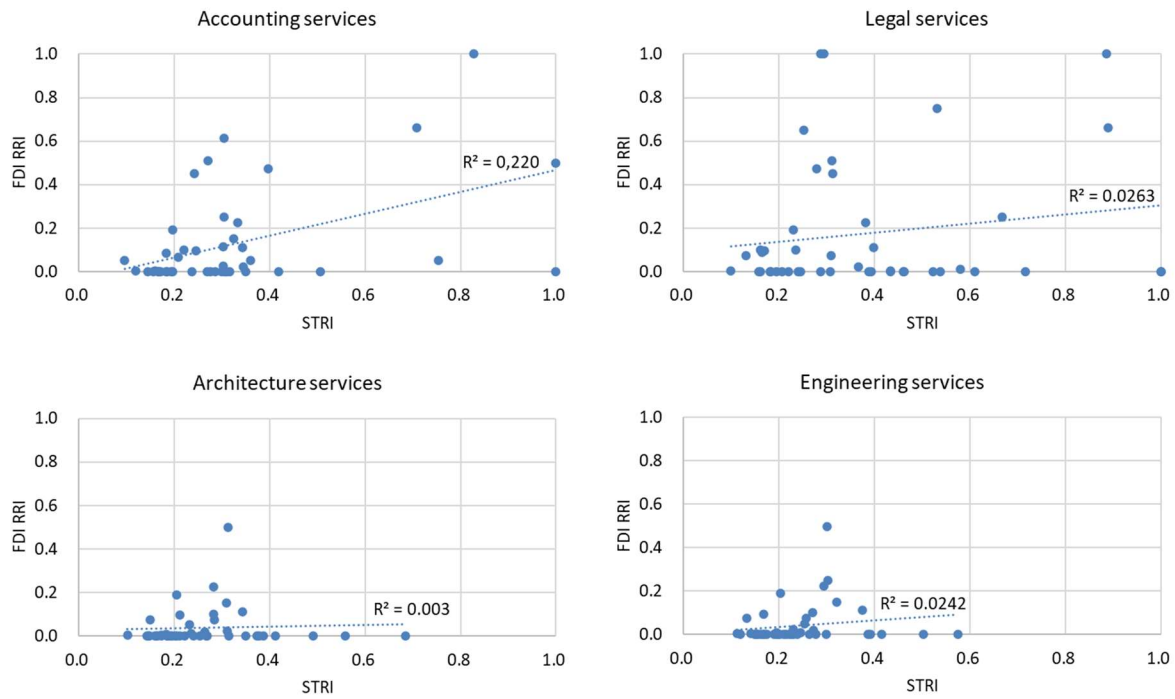

Figure 2: Scatterplots for the OECD STRI and OECD FDI RRI for year 2018 data (45 countries)

There are two other aspects of the FDI RRI that make it less appealing for our study. First, unlike the STRI, it does not allow a differentiation between pairs of countries with a high or low degree of integration. Second, it contains a remarkably high number of observations with an index value of zero (between 21 for accounting services and 29 for architectural services) for our sample of a maximum of 45 countries. For all these reasons, we have decided not to include this indicator in the analysis.[15]

The additional explanatory variables of the econometric analysis are, on the one hand, standard variables of the gravity model, and, on the other hand, variables identified in the review of the theoretical literature in Section 2. There are two types of explanatory variables, bilateral variables and destination country specific variables.

Four widely used bilateral gravity model variables are geographic distance and dummy variables for common borders (contiguity), common language and former colonial ties of a country pair. For our analysis, these four variables are taken from the GeoDist database of CEPII (Mayer and Zignago 2011). Some of our models

[15] Jungmittag (2020) provides a comprehensive comparison and multivariate statistical analysis of both indicators for the four business services that further supports this decision.

include as further bilateral variable an EEA dummy variable that takes the value one if both countries of a country pair are members of the EEA and zero otherwise.

Besides geographical distance, cultural distance also might be an important factor with an expected negative influence on business services FDI activities. Following previous research, we measure the cultural distance between the source and destination countries by the Kogut and Singh (1988) index, which in this analysis is based on the differences in scores on each of Hofstede's (2011) six dimensions of national culture. This index CD_{ij} is calculated as

$$CD_{ij} = \frac{1}{6}\sum_{c=1}^{6}\frac{\left(C_{ci} - C_{cj}\right)^2}{V_c}, \tag{3}$$

where C_{ci} represents country i's score of Hofstede's cth cultural dimension and V_c the variance of this dimension across all available countries. Although the Kogut–Singh index has been criticized (Shenkar 2001), we use this index to keep our dataset comparable to other studies.[16]

Horizontal FDI is the prevailing type of FDI in the business services sector, and, according to the knowledge-capital model, becomes more important when countries are similar in relative factor endowments and size (see Section 2). Furthermore, an investor may find it easier to invest in a country with a similar size that could offer more similarities with the home country (Fournier 2015). Following Golub et al. (2003) and Fournier (2015), a factor dissimilarity index (FD_{ijt}) is calculated as

$$FD_{ijt} = \left|\ln\left(\frac{Y_{it}}{POP_{it}}\right) - \ln\left(\frac{Y_{jt}}{POP_{jt}}\right)\right|, \tag{4}$$

where Y is GDP, POP is population, and the dissimilarity in GDP per capita is used as a proxy for the dissimilarity in the capital stock per worker between country i and j in year t.[17]

Finally, as the main destination-specific variable, market size is approximated by real GDP per capita (in Euro) and population size. Both are taken from Eurostat and are also used to calculate the factor dissimilarity indices. Table 2 shows the descriptive statistics for all explanatory variables.

Table 2: Descriptive statistics for the explanatory variables

Variable	Mean	Median	Std. Dev.	Min	Max
Computer services (nobs: 8620)					
STRI (index)	0,182	0,183	0,104	0	0,382
Foreign entry (index)	0,042	0,028	0,041	0	0,179
Movement of people (index)	0,055	0,049	0,043	0	0,148
Other restrictions (index)	0,085	0,086	0,043	0	0,154
GDP pc. destination (Euro)	33406	31927	16355	5065	93941
Population destination (in 1000)	108548	18045	277315	545	1382530
Distance (km)	6573	6545	5115	60	19772
Contiguity (dummy)	0,052	0	0,221	0	1
Common language (dummy)	0,068	0	0,253	0	1
Colony (dummy)	0,035	0	0,183	0	1
Cultural distance (index)	2,026	1,844	1,199	0,016	7,591
Factor dissimilarity (index)	0,581	0,476	0,475	0,000	2,885
EEA (dummy)	0,281	0	0,449	0	1
Accounting services (nobs: 3990)					
STRI (index)	0,267	0,194	0,239	0,053	1

[16] A similar argument can be found in Linders et al. (2005) or Zwinkels and Beugelsdijk (2010).

[17] Again, following Golub et al. (2003) and Fournier (2015), we also calculated an index of size similarity, but this index shows no statistical significance at the usual level in any of the estimated equations. Thus, we do not report these results.

Foreign entry (index)	0,120	0,077	0,129	0,022	0,531
Movement of people (index)	0,094	0,079	0,078	0,010	0,286
Other restrictions (index)	0,053	0,043	0,043	0	0,183
GDP pc. destination (Euro)	33308	31325	16320	5065	93941
Population destination (in 1000)	108337	17836	277476	545	1382530
Distance (km)	6359	6290	4969	81	19586
Contiguity (dummy)	0,060	0	0,238	0	1
Common language (dummy)	0,087	0	0,281	0	1
Colony (dummy)	0,048	0	0,213	0	1
Cultural distance (index)	1,817	1,651	1,115	0,020	7,475
Factor dissimilarity (index)	0,602	0,442	0,528	0,000	2,885
EEA (dummy)	0,330	0	0,470	0	1
Legal services (nobs: 5670)					
STRI (index)	0,299	0,231	0,240	0,015	1
Foreign entry (index)	0,137	0,081	0,135	0,000	0,503
Movement of people (index)	0,111	0,094	0,089	0	0,336
Other restrictions (index)	0,051	0,045	0,032	0	0,161
GDP pc. destination (Euro)	33335	31325	16291	5065	93941
Population destination (in 1000)	107588	18045	275860	545	1382530
Distance (km)	6636	6624	4932	81	19772
Contiguity (dummy)	0,054	0	0,226	0	1
Common language (dummy)	0,0794	0	0,270	0	1,00
Colony (dummy)	0,0388	0	0,193	0	1
Cultural distance (index)	2,079	1,883	1,231	0,020	7,494
Factor dissimilarity (index)	0,640	0,522	0,509	0,000	2,885
EEA (dummy)	0,271	0	0,444	0,000	1,00
Architecture and engineering services (nobs: 6095)					
STRI (index)	0,186	0,190	0,117	0,013	0,567
Foreign entry (index)	0,047	0,039	0,043	0,006	0,218
Movement of people (index)	0,080	0,077	0,067	0,000	0,309
Other restrictions (index)	0,060	0,059	0,032	0	0,129
GDP pc. destination (Euro)	33361	31325	16404	5065	93941
Population destination (in 1000)	108030	18045	276071	545	1382530
Distance (km)	6154	5992	4880	60	19586
Contiguity (dummy)	0,053	0	0,223	0	1
Common language (dummy)	0,080	0	0,271	0	1
Colony (dummy)	0,0369	0	0,189	0	1
Cultural distance (index)	2,026	1,857	1,178	0,020	7,494
Factor dissimilarity (index)	0,574	0,450	0,486	0,000	2,885
EEA (dummy)	0,307	0	0,461	0	1

Note: All STRI indices and sub-indices refer to the Intra-EEA index values if both countries of a country pair are EEA members and to the index values for non-PTA countries otherwise.

5 Empirical Results

We estimated two variants of the gravity model for FDI projects for each of the four business services sectors considered. In the first variant, we used the total STRI as for a measure of the services trade restrictions. This is a restricted estimate, assuming that the three sub-indices (restrictions on foreign entry, restrictions on the movement of people, and all other restrictions) have the same regression coefficient. This follows directly from the fact that the three sub-indices add up to the total STRI, i.e.

$$\beta \cdot STRI = \beta(entry + people + other) = \beta \cdot entry + \beta \cdot people + \beta \cdot other. \quad (5)$$

In the second variant, we included the three sub-indices in the model, but not the composite STRI. This is an unrestricted estimate, in which the sub-indices may have different regression coefficients. The disadvantage of the unrestricted estimation is that due to the often high collinearity of the sub-indices, these coefficient estimates can become very inaccurate and thus the influence of the individual sub-indices can no longer be meaningfully estimated. A likelihood ratio test can be used to check whether the restricted model has the same explanatory power as the unrestricted model, or whether the latter is preferable.

To check whether country pairs with both countries being EEA members are different from the other country pairs in terms of the influence of the explanatory variables, we estimated four versions of each of the two basic variants of the gravity model. The first version includes all country pairs, where EEA country pairs are given the EEA-STRI value of the destination countries, while the other country pairs take the original non-PTA STRI value of the destination countries. This first version also includes a dummy variable for the EEA country pairs to capture possible other effects of EEA membership. As this dummy variable did not prove to be significant in any case, it was omitted in the second version. In the third version, the estimation of the two variants of the gravity model is based only on EEA country pairs, whereas in the fourth version only country pairs with at least one non-EEA member were included.

In the following subsections, we present the empirical results for the four business services sectors one after the other.

5.1 Computer services

Table 3 shows the results of the fixed effects negative binomial estimations for the computer services, where the fixed effects are, on the one hand, source country fixed effects, and, on the other hand, time fixed effects. Likelihood-ratio tests show that both types of these effects are highly significant different from zero in all eight models. The total sample for the estimations comprises 8620 observations (1724 country pairs for the period from 2014 to 2018), which can be divided into an Intra-EEA subsample of 2420 observations (484 EEA country pairs for the period from 2014 to 2018) and a further subsample of 1240 country pairs with at least one country not being a EEA member (6200 observations for the period from 2014 to 2018).

The restricted model (1), including the total STRI and thus assuming the same coefficient for all sub-indices, shows the results for the whole sample. The gravity variables GDP per capita and the population size of the destination country have a highly significant positive impact on the number of FDI projects, while distance has an equally significant negative effect. A 1% increase of GDP per capita in the destination country increases the expected number of FDI projects by 0.78% and 1% larger population raises it by 0.67%, while a 1% increase of distance reduce it by 0.47%.[18] Surprisingly, a common border between the source country and the destination country shows a negative impact on the number of FDI projects, at least at a bilateral significance level of 10%. In contrast, a common language and colonial ties have, as expected, highly significant positive effects. The former will increase the expected value of the number of FDI projects by 179% and the latter by 130%. Although the coefficient estimate for cultural diversity has the expected negative sign, it just misses the significance level of 10%. The situation is different when it comes to the influence of differences in factor endowments. Contrary to theoretical expectations, larger differences increase the number of FDI projects highly significantly.

The coefficient for the total STRI for trade in computer services is highly significant negative. The estimate implies that an increase of the STRI by 0.01 index points reduces the expected number of FDI projects by 5%.

[18] In general, in a Poisson or negative binomial regression, the effect of an absolute change in an explanatory variable x_i on the percentage change of the expected value of the explanatory variable y can be determined as follows: $\%\Delta E(y|\mathbf{x}) = (\exp(\beta_i \cdot \Delta x_i) - 1) \cdot 100 \approx \beta_i \cdot \Delta x_i \cdot 100$. However, the approximation given in the last term should only be used for small values of $\beta_i \cdot \Delta x_i$, because it quickly becomes very inaccurate as $\beta_i \cdot \Delta x_i$ grows. If x_i is $\log(z_i)$ for a variable $z_i > 0$, then the coefficient β_i can be interpreted as an elasticity of the expected value of y with respect to z_i. Furthermore, if x_i is a dummy variable, then $(\exp(\beta_i) - 1) \cdot 100$ gives the percentage change of the expected value of y for a change of the dummy variable from zero to one.

The fact that the STRI variable takes into account the lower service trade restrictiveness within the EEA by using the intra-EEA STRI for the intra-EEA country pairs leads to the EEA dummy variable coefficient not being significantly different from zero. Thus, the positive effect of the EEA on FDI projects seems to be mainly due to the lower restrictions on trade in services.

Therefore, we omitted the EEA dummy variable in the restricted model (2). This has little effect on the other coefficient estimates. The coefficient estimate for the STRI is now somewhat smaller but is gaining in statistical significance. An increase in the STRI by 0.01 index points now reduces the expected number of FDI projects by 4%.

For the estimations of the restricted models (3) and (4), we split the whole sample into two subsamples. Model (3) is based on the 2420 observations for intra-EEA country pairs. Astonishingly, GDP per capita has no influence on the number of FDI projects within the EEA. In contrast, the effects of population size and distance are similar to those of the overall sample. The direct neighbourhood of two countries has no impact on the number of FDI projects, while a common language affects it positively. Colonial links do not play a role within the EEA, but cultural dissimilarities have a highly significant negative impact on the number of FDI projects, unlike for the whole sample. Conversely, differences in relative factor endowments do not affect the number of intra-EEA FDI projects.

Table 3: STRI and computer services FDI projects: results from negative binomial estimations

	All FDI projects		Intra-EEA FDI projects	Other FDI projects	All FDI projects		Intra-EEA FDI projects	Other FDI projects
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log(GDPPC_destination)	0.756***	0.818***	-0.123	0.891***	0.561***	0.575***	0.360	0.686***
	(0.219)	(0.191)	(0.530)	(0.205)	(0.215)	(0.187)	(0.441)	(0.211)
log(pop_destination)	0.674***	0.676***	0.841***	0.630 ***	0.700***	0.701***	0.808***	0.660***
	(0.067)	(0.068)	(0.166)	(0.061)	(0.064)	(0.064)	(0.143)	(0.059)
log(distance)	-0.470***	-0.408***	-0.518**	-0.391***	-0.414***	-0.396***	-0.484**	-0.344***
	(0.097)	(0.082)	(0.220)	(0.114)	(0.089)	(0.079)	(0.210)	(0.107)
Contiguity	-0.292*	-0.277*	-0.086	-0.084	-0.214	-0.208	-0.184	-0.017
	(0.159)	(0.147)	(0.186)	(0.242)	(0.162)	(0.156)	(0.155)	(0.242)
Common language	1.027***	1.041***	0.938**	1.083***	1.012***	1.015***	1.011***	1.069***
	(0.176)	(0.181)	(0.396)	(0.180)	(0.171)	(0.178)	(0.356)	(0.175)
Colony	0.835***	0.875***	0.139	0.924***	0.803***	0.813***	0.179	0.874***
	(0.209)	(0.208)	(0.433)	(0.258)	(0.216)	(0.214)	(0.416)	(0.257)
log(cultural dissimilarity)	-0.172	-0.174	-0.398***	-0.107	-0.174*	-0.175*	-0.438***	-0.108
	(0.108)	(0.107)	(0.145)	(0.110)	(0.103)	(0.102)	(0.153)	(0.103)
Factor dissimilarity	0.566***	0.556***	0.967	0.617***	0.552***	0.549***	0.979	0.584***
	(0.158)	(0.161)	(0.896)	(0.170)	(0.139)	(0.141)	(0.880)	(0.158)
EEA membership	-0.375	---	---	---	-0.111	---	---	---
	(0.436)				(0.263)			
STRI composite	-5.128***	-4.159***	-13.394***	-3.809**	---	---	---	---
	(1.851)	(1.096)	(4.529)	(1.884)				
Restrictions on foreign entry					-9.473***	-9.255***	42.394**	-8.902***
					(2.608)	(2.159)	(19.128)	(2.624)
Restrictions on the movement of people					1.748	2.186	---	1.453
					(2.739)	(2.316)		(2.549)
Other restrictions					-8.113***	-7.944***	-16.496***	-6.274**
					(2.891)	(2.553)	(4.144)	(3.127)
Observations	8620	8620	2420	6200	8620	8620	2420	6200
log likelihood	-2886.7	-2888.3	-800.5	-2043.4	-2872.6	-2872.7	-792.3	-2033.5
LR x^2 source country fixed effects	1608.2***	1638.0***	296.5***	1316.1***	1618.7***	1639.5***	306.3***	1326.8***
LR x^2 year fixed effects	31.7***	30.9***	30.7***	8.5*	30.0***	29.8***	34.0***	8.1*
LR x^2 same coefficients for the sub-indices	28.3***	31.2***	16.5***	19.7***	see model (1)	see model (2)	see model (3)	see model (4)

Notes: The dependent variable in all models is new FDI projects (FDI_{ijt}). Estimation is negative binomial with fixed effects. Two-way clustered (source country and destination country) standard errors appear in parentheses below the parameter estimates. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

Interestingly, the coefficient estimate for the intra-EEA STRI is considerably larger than that for the STRI in the whole sample, which includes both the original non-PTA STRI and the intra-EEA STRI. However, the mean value of the intra-EEA STRI in 2018 is only 0.04, while the mean value of the non-PTA STRI is 0.23. It is therefore also expected that the changes in the intra-EEA STRI will be much smaller than those of the non-PTA STRI. Assuming a proportionally similar increase in the Intra-EEA STRI of 0.002 (instead of 0.01 for the combined STRI), would imply a reduction of the expected number of FDI projects by 2.6%.

The results of model (4) for the subsample with all country pairs where at least one country is not an EEA member are very similar to the results for the whole sample, so there is no need to discuss them again.

For the unrestricted models (5) to (8) in Table 3, the three sub-indices for restrictions on foreign entry, restrictions on the movement of people, and other restrictions were included, while dropping the overall STRI. The likelihood ratio tests, which test the restricted models just presented against these unrestricted models, show in all cases that the unrestricted models outperform the restricted models and that the assumption of equal regression coefficients for the three sub-indices must be rejected. With respect to the effects of the usual gravity variables, there are hardly any changes in the unrestricted estimations, so that we can focus on the discussion of the results for the STRI sub-indices.

In computer services, intra-EEA restrictions on foreign entry and intra-EEA restrictions on the movement of people are largely non-existent. Only Denmark, Finland, Germany and Latvia have a small index score of 0.014 for intra-EEA restrictions on foreign entry in 2014, Finland, Germany, Latvia in 2015 and only Germany and Latvia from 2016 onwards. For intra-EEA restrictions on the movement of people, the index score is always zero.

In models (5) and (6), which are based on the entire sample, the restrictions on foreign entry have a highly significant negative impact on the number of FDI projects in computer services. Based on the coefficient estimate of model (6), as the EEA dummy variable in model (5) is not significantly different from zero, an increase of 0.01 index points in this type of restriction leads to an 8.8% reduction in the expected value of the number of FDI projects. Since the mean value of the non-PTA STRI in 2018 is 0.054 and the intra-EEA Index value in 2018 is zero with two exceptions, the EEA trade regime is associated with an increase in the expected number of FDI projects by 65%. Furthermore, restrictions on the movement of people have no significant effect on the number of FDI projects in these two models. However, the other restrictions have a highly significant negative effect. Based on model (6), an increase in these restrictions by 0.01 index points implies a decrease in the expected number of FDI projects by 7.6%.

In the model (7), which is based on the sub-sample of intra-EEA country pairs, only the restrictions on foreign entry and the other restrictions can be included because, as mentioned above, the intra-EEA restrictions on the movement of people are always zero. The significant positive impact of foreign entry restrictions estimated here appears to be a statistical artefact stemming from the small number of non-zero observations, which in addition always have the exact same value. In contrast, as expected, the other intra-EEA restrictions on trade in services have a highly significant negative impact on the number of FDI projects. They dominate the total intra-EEA STRI with a mean of 0.039 in 2018, which at the same time shows a mean of 0.040 for the 23 available EEA countries. For a hypothetical increase of 0.002 in this sub-index (as done above for the total intra-EEA STRI), the expected number of FDI projects would decrease by 3.2%.

The results of model (8), which is based on the subsample of country pairs with at least one non-EEA member, are again very similar to the results for the whole sample (like model (4) vis-à-vis (2). Only the point estimate of the coefficient for the other restrictions is slightly lower than that for the whole sample.

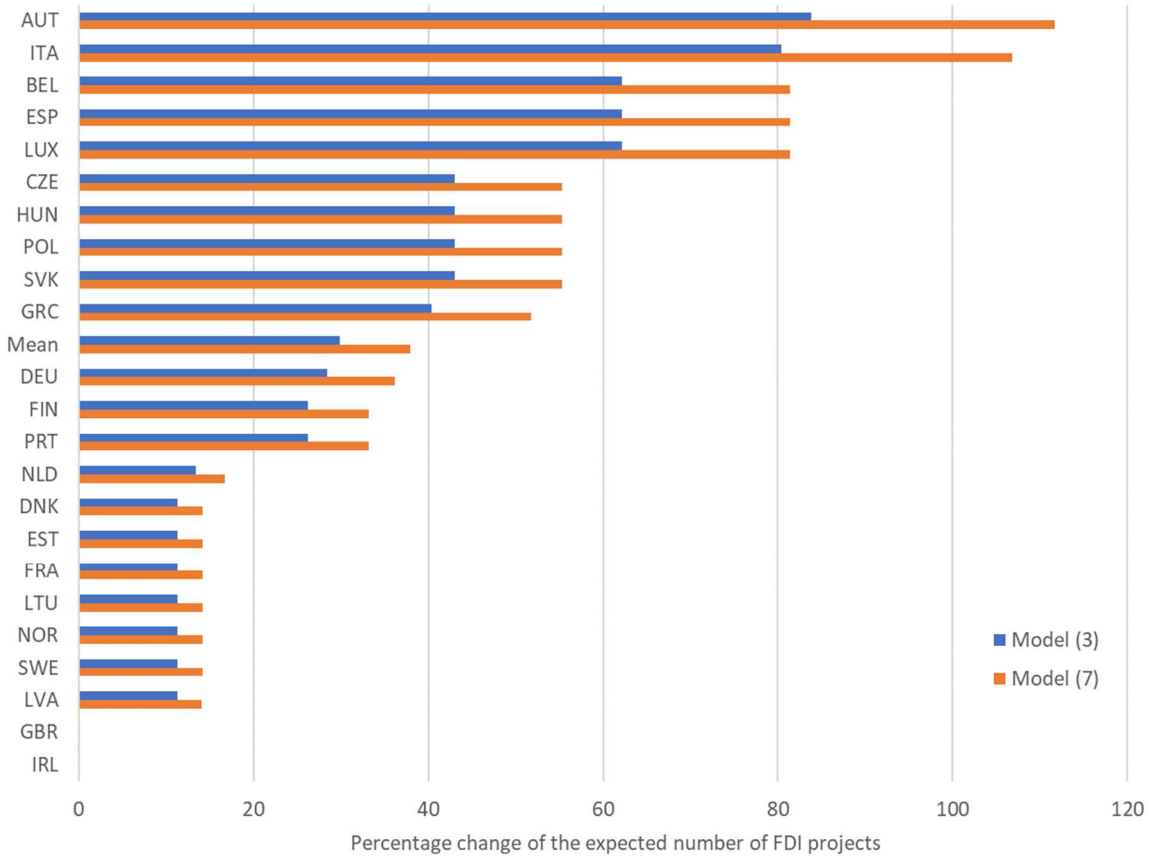

Figure 3: Effect of reducing 'other intra-EEA restrictions' in trade of computer services by 50%

To assess the potential impact of a major policy reform that would reduce trade restrictions in services on the number of FDI projects in computer services, we made two back-on-the-envelope calculations. First, regarding intra-EEA FDI projects, where for computer services only the other service trade restrictions are relevant, we assumed that each EEA member would eliminate 50% of these restrictions (year 2018 level) vis-à-vis other EEA members. To calculate the induced effects on the expected number of intra-EEA FDI projects, we used models (3) and (7) of Table 3, and show the results in Figure 3.

Relatively finely divided, there are six groups of EEA countries. Austria and Italy, as the two countries with the strongest other restrictions on trade in services, would experience the highest growth with increases in the expected number of intra-EEA FDI projects between 80% and 112%. As a second group, Belgium, Luxembourg and Spain would show increases between 62% and 81%. The third group includes five countries (Czech Republic, Hungary, Poland, Slovakia and Greece) with slightly above average intra-EEA restrictions, which would realise increases between 40% and 55%. The fourth group with Germany, Finland and Portugal is slightly below average and would record increases between 26% and 36%. The fifth group comprises the Netherlands, Denmark, Estonia, France, Lithuania, Norway, Sweden and Latvia, for which we calculate that increases of the expected number of intra-EEA FDI projects would range between 11% and 17%. Ireland and the United Kingdom as the sixth group no longer have intra-EEA restrictions on trade in services, so there is no scope for reform here.

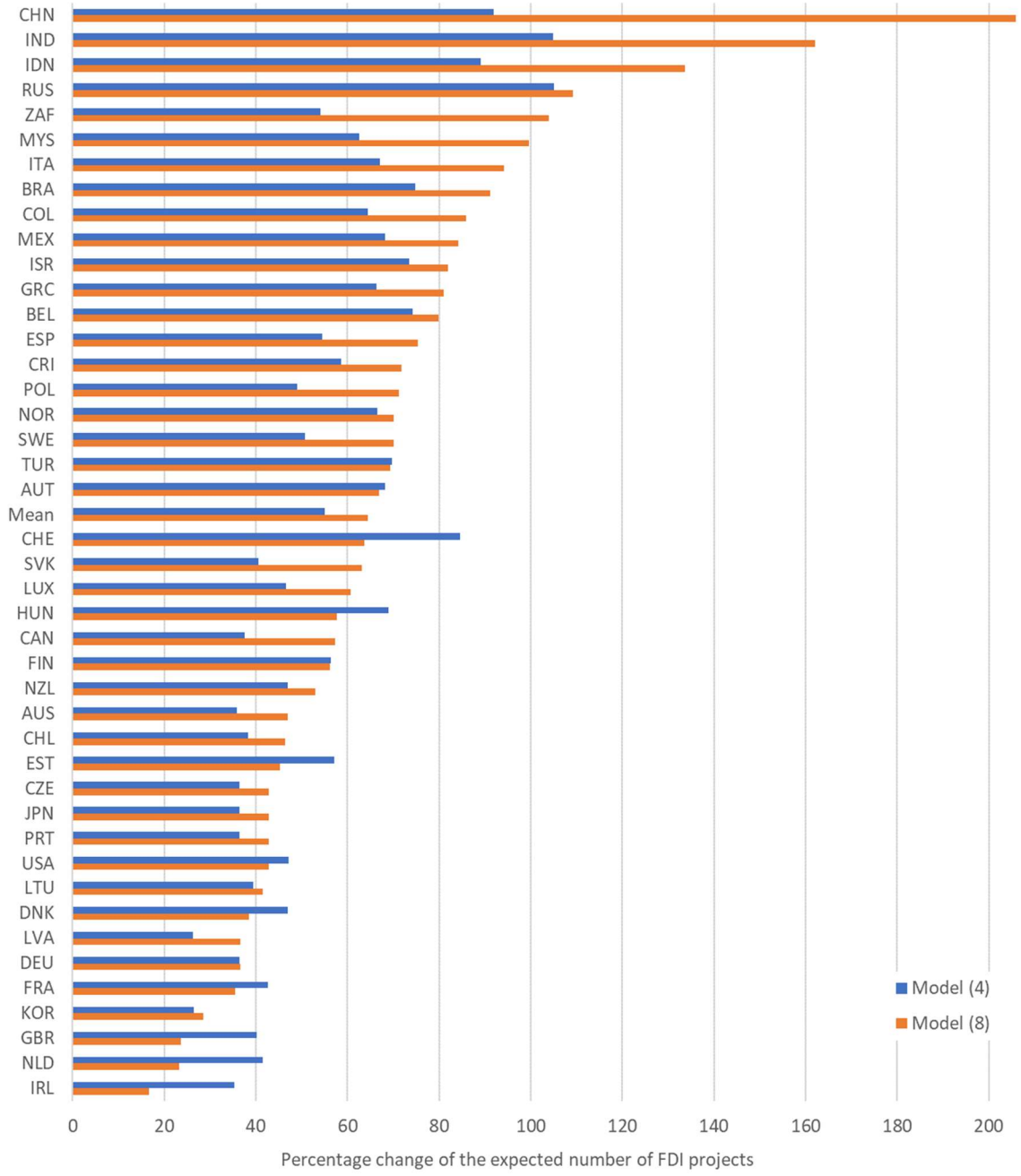

Figure 4: Effect of reducing the standard (non-PTA) computer services' STRI by 50%

Second, for the other FDI projects with at least one country not being a EEA member, we calculated the impact of 50% reduction of the year 2018 conventional (non-PTA) STRI on the expected number of non-intra EEA FDI projects in each of the 43 destination countries. On the one hand, we used model (4) in Table 3 to directly calculate the impact of this decrease of STRI, and, on the other hand, we used model (8), assuming that each of the three sub-indices is 50% lower (thus also the total STRI is 50% lower) and then aggregated the three effects into the total change of the expected number of non-intra EEA FDI projects. Figure 4 shows the result of these exercises.

The first thing to note is that for a number of countries the implied percentage change in the number of FDI projects is quite different between the two models (4) and (8) from which the coefficients were taken, with model (8) typically leading to larger effects. This is because in model (8) the restrictions on foreign entry and the other restrictions resulted to have a much stronger impact than in model (4), where implicitly all three sub-indices have the same impact.

However, there are two reasons for trusting model (8) more. Firstly, if only one sub-index is included separately in the regression model, the coefficient estimates are rather similar to those for the joint inclusion in model (8). Also, if only the restrictions on the movement of people are included, they are not significantly different from zero. Thus, there seem to be no problem of collinearity between the sub-indices in model (8). Secondly, the likelihood ratio test shows at a significance level below 1% that model (8) outperforms model (4).

As the second insight from Figure 4, it is obvious that the countries cannot be divided into groups as was the case with the intra-EEA restrictions (Figure 3), but that, on the basis of model (8), there is a gradual decline in the impacts, ranging from China, which with 206% would achieve the maximum increase in expected FDI projects, to Ireland, which with 17% would see the smallest increase. On average across all 43 destination countries, the expected number of non-intra-EEA FDI projects could increase by 64%.

5.2 Accounting Services

Table 4 shows the results obtained from the negative binomial estimations with fixed source country effects and fixed time effects for the accounting services. Likelihood-ratio tests confirm that the fixed source country effects are highly significant different from zero in all eight models, while the fixed time effects show hardly any statistical significance at the usual error levels. As we have only 19 source countries that can be used for accounting services, our total sample comprises only 3990 observations (798 country pairs for the period from 2014 to 2018), which can be divided into an Intra-EEA subsample of 1315 observations (263 EEA country pairs for the period from 2014 to 2018) and a further subsample of 535 country pairs with at least one non-EEA member (2675 observations for the period from 2014 to 2018).[19]

The two gravity variables GDP per capita and population have the same highly significant positive influence on the number of FDI projects in the restricted models (1) and (2) for the overall sample as well as in the restricted models (3) and (4) for the two different sub-samples. In contrast, the influence of distance varies. For the overall sample, the point estimate of the negative influence is slightly higher when the statistically non-significant EEA dummy variable is removed from the model. Comparing the results for the sub-sample of intra-EEA country pairs (model (3)) with those for the sub-sample of other country pairs (model (4)), distance has a significant negative impact in the former, while in the latter the impact is not statistically significant different from zero. A common border does not exert a statistically significant effect in any of the models. The situation is different with a common language and colonial ties. The former has a significant positive effect in the overall sample (models (1) and (2)) as well as in the sub-sample of the other country pairs (model (4)), while the effect is not significantly different from zero for the sub-sample of intra-EEA country pairs (model (3)). The latter, colonial ties, have in all four restricted models a positive impact on the number of FDI projects. Cultural dissimilarity does not influence the number of FDI projects in the overall sample and in the sub-sample of the other country pairs, but astonishingly has a positive effect within the EEA. In contrast, differences in factor endowment do not appear to be significant in any model.

[19] As mentioned in Section 4, a given source country is only used in the estimation if it has at least one non-zero observation for the number of FDI projects. Otherwise, if a source country had only zero value for the dependent variable, this would be perfectly explained by the corresponding fixed source country effect.

Table 4: STRI and accounting services FDI projects: results from negative binomial estimations

	All FDI projects		Intra-EEA FDI projects	Other FDI projects	All FDI projects		Intra-EEA FDI projects	Other FDI projects
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log(GDPPC_destination)	1.061***	0.998***	1.091***	1.183***	1.062***	1.027***	1.188*	1.105***
	(0.251)	(0.241)	(0.661)	(0.262)	(0.281)	(0.288)	(0.720)	(0.269)
log(pop_destination)	0.675***	0.662***	0.619***	0.665***	0.685***	0.671***	0.598***	0.675***
	(0.092)	(0.088)	(0.197)	(0.093)	(0.090)	(0.092)	(0.196)	(0.092)
log(distance)	-0.329*	-0.430***	-0.603**	-0.158	-0.326*	-0.415***	-0.578**	-0.068
	(0.170)	(0.114)	(0.256)	(0.250)	(0.167)	(0.126)	(0.227)	(0.247)
Contiguity	-0.403	-0.464	-0.150	-0.471	-0.363	-0.409	-0.285	-0.372
	(0.459)	(0.401)	(0.600)	(0.725)	(0.438)	(0.407)	(0.601)	(0.699)
Common language	1.119***	1.081***	0.645	1.178***	1.154***	1.099***	0.814	1.324***
	(0.269)	(0.270)	(0.770)	(0.317)	(0.277)	(0.285)	(0.907)	(0.351)
Colony	0.729**	0.710**	1.261*	0.510**	0.687**	0.681**	1.324*	0.467**
	(0.286)	(0.276)	(0.708)	(0.207)	(0.289)	(0.283)	(0.752)	(0.196)
log(cultural dissimilarity)	0.127	0.119	0.357*	0.062	0.154	0.150	0.424**	0.054
	(0.080)	(0.080)	(0.186)	(0.123)	(0.098)	(0.098)	(0.209)	(0.127)
Factor dissimilarity	0.289	0.292	-0.899	0.448	0.346	0.355	-0.853	0.277
	(0.338)	(0.353)	(1.013)	(0.385)	(0.360)	(0.375)	(0.997)	(0.377)
EEA membership	0.355	---	---	---	0.362	---	---	---
	(0.378)				(0.482)			
STRI	-1.951***	-2.123***	-17.423***	-1.787***	---	---	---	---
	(0.512)	(0.583)	(5.631)	(0.604)				
Restrictions on foreign entry					-1.457	-0.925	-3.010	-4.844**
					(3.009)	(2.704)	(14.296)	(1.883)
Restrictions on the movement of people					0.443	-0.532	-75.061*	1.058
					(2.061)	(2.313)	(38.713)	(1.817)
Other restrictions					-8.135	-9.140	-13.653	4.074
					(9.096)	(8.208)	(14.418)	(5.979)
Observations	3990	3990	1315	2675	3990	3990	1315	2675
log likelihood	-605.7	-606.1	-236.8	-350.6	-604.9	-605.2	-234.8	-349.4
LR x^2 source country fixed effects	329.7***	331.6***	47.4***	293.8***	329.6***	330.9***	46.9***	295.4***
LR x^2 year fixed effects	4.3	4.4	8.2*	1.2	4.6	4.6	8.7*	1.1
LR x^2 same coefficients for the sub-indices	1.5	1.7	4.0	2.5	see model (1)	see model (2)	see model (3)	see model (4)

Notes: The dependent variable in all models is new FDI projects (FDI_{ijt}). Estimation is negative binomial with fixed effects. Two-way clustered (source country and destination country) standard errors appear in parentheses below the parameter estimates. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

The overall STRI shows a highly significant negative effect in all four restricted models, with substantially higher coefficient estimates for the intra-EEA sub-sample (model (3)) than for the sub-sample of the other country pairs (model (4)). However, the mean of the STRI in the first sub-sample is much lower than that of the second sub-sample (0.082 vs. 0.326). Assuming for the latter a reduction of the STRI by 0.01 index points, the expected value of the number of FDI projects would increase by 1.8%. Assuming a similar proportional reduction of the STRI by 0.0025 index points for the intra-EEA sub-sample would imply an increase in the expected number of FDI projects by 4.5%.

In the four unrestricted models (5) to (8), in which the three sub-indices are included instead of the composite STRI, the estimated values of the coefficients for the gravity variables remain almost unchanged. On the other side, almost none of the STRI sub-indices show a significant impact on the number of FDI projects. The likelihood-ratio tests also show that the restricted models (1) to (4) have the same explanatory power as the unrestricted models (5) to (8). The corresponding null hypothesis cannot be rejected in any case. It can therefore be assumed that the three sub-indices affect the number of FDI projects with the same coefficient. The reason for this is that, on the one hand, each of the three sub-indices is highly correlated with the total STRI, and that, on the other hand, there is a high degree of collinearity between the three sub-indices (see Table 5).

Table 5: Correlation matrices for the accounting services' STRI and its sub-indices

	Foreign entry	Movement of people	Other	Foreign entry	Movement of people	Other
		All FDI projects			*Intra-EEA FDI projects*	
STRI	0.976	0.935	0.941	0.667	0.590	0.803
Foreign entry		0.847	0.899		0.225	0.174
Movement of people			0.849			0.314
					Other FDI projects	
STRI				0.980	0.913	0.927
Foreign entry					0.826	0.893
Movement of people						0.793

Since the unrestricted models (5) to (8) do not allow meaningful allocations of the effects of the individual sub-indices of the STRI, we use only models (3) and (4) for the accounting services to assess the effects of a policy reform prompting a substantial reduction of the STRI. Using model (3) for the intra-EEA FDI projects, we assumed that each EEA member would reduce its intra-EEA STRI by 50% in 2018. Figure 5 shows that Austria, Belgium and, with some distance, Portugal, would experience with values between 204% and 158% the largest percentage increases in the expected number of intra-EEA FDI projects. The remaining countries' expected increases fall relatively continuously from 135% for Luxembourg to 83% for Finland. Denmark, Estonia, Ireland, Latvia and Lithuania would expect an increase of about 70%, while for the UK the percentage increase in the expected number of FDI projects in accounting services is 59%. The mean percentage increase across all 23 intra-EEA destination countries is 104%.

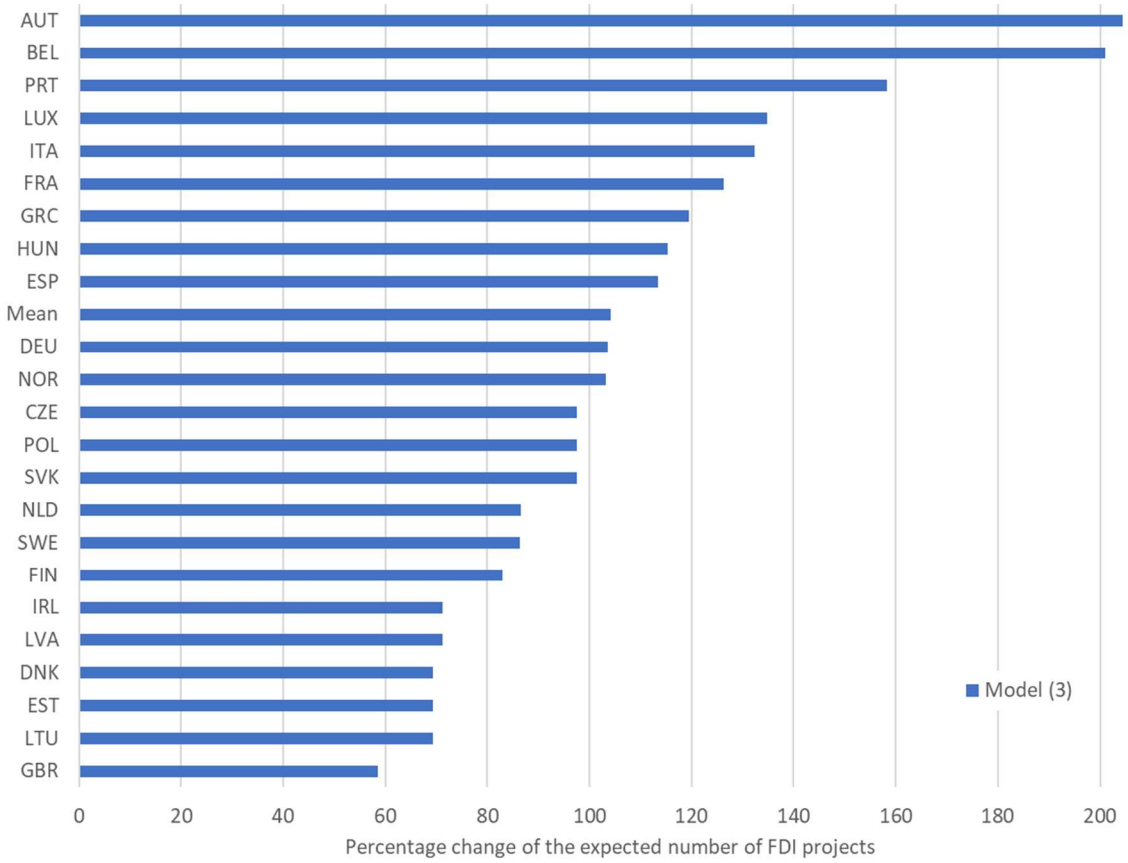

Figure 5: Effect of reducing accounting services' intra-EEA STRI by 50%

For the other FDI projects with at least one country not being a EEA member, we used model (4) and calculated the impact of a 50% reduction of the standard non-PTA STRI in 2018 on the expected number of other FDI projects in each of the 43 destination countries. Figure 6 shows the result of this exercise. Obviously, the possible percentage increases have a considerable range. Turkey and South Korea would achieve the largest increases, each with 144%, followed by India, China and Indonesia with increases between 109% and 88%. Thereafter, the possible increases decrease relatively continuously from 57% for Italy to 9% for Chile. The mean percentage increase across all 43 destination countries is 34%.

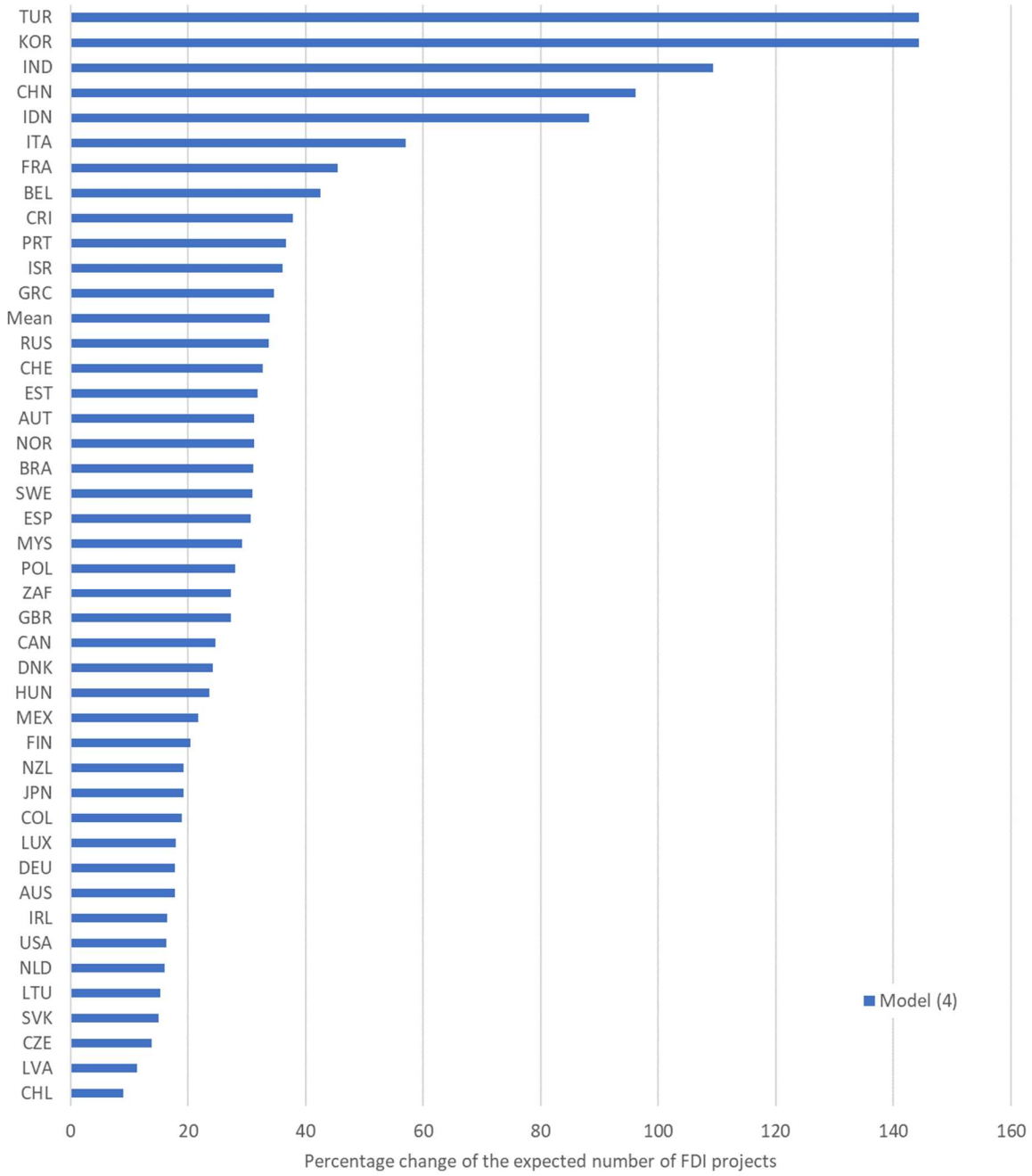

Figure 6: Effect of reducing the standardl (non-PTA) accounting services' STRI by 50%

5.3 Legal services

Table 6 shows the results from the negative binomial estimations with fixed source country effects and fixed time effects for the legal services. Likelihood-ratio tests confirm that both kinds of fixed effects are different from zero with high significance in all eight models. As we have 27 source countries with sufficient data in our sample for legal services, our total sample comprises 5670 observations (1134 country pairs for the period from 2014 to 2018), which can be divided into an Intra-EEA subsample of 1535 observations (307 EEA country pairs for the period from 2014 to 2018) and a further subsample of 827 country pairs with at least one non-EEA member (4135 observations for the period from 2014 to 2018).

Table 6: STRI and legal services FDI projects: results from negative binomial estimations

	All FDI projects		Intra-EEA FDI projects	Other FDI projects	All FDI projects		Intra-EEA FDI projects	Other FDI projects
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log(GDPPC_destination)	2.096***	2.070***	1.362**	1.974***	2.078***	2.058***	0.674	1.913***
	(0.358)	(0.341)	(0.592)	(0.381)	(0.374)	(0.361)	(0.501)	(0.404)
log(pop_destination)	0.825***	0.817***	1.043***	0.781***	0.826***	0.815***	1.129***	0.774***
	(0.070)	(0.066)	(0.223)	(0.087)	(0.077)	(0.068)	(0.236)	(0.083)
log(distance)	-0.246**	-0.298***	-1.134***	0.031	-0.239*	-0.298***	-1.576***	0.033
	(0.122)	(0.086)	(0.221)	(0.211)	(0.129)	(0.085)	(0.203)	(0.215)
Contiguity	-0.008	-0.043	-0.423**	0.533	-0.003	-0.040	-0.622**	0.565
	(0.294)	(0.267)	(0.178)	(0.475)	(0.311)	(0.272)	(0.266)	(0.488)
Common language	0.581	0.558	0.690	0.528	0.592	0.551	0.843	0.547
	(0.463)	(0.470)	(1.580)	(0.369)	(0.502)	(0.495)	(1.002)	(0.386)
Colony	0.856***	0.848***	0.112	1.030***	0.825***	0.837***	1.149	0.992***
	(0.202)	(0.194)	(1.332)	(0.109)	(0.236)	(0.234)	(0.784)	(0.151)
log(cultural dissimilarity)	-0.138	-0.140	-0.320	-0.123	-0.145	-0.146	-0.109	-0.132
	(0.144)	(0.143)	(0.377)	(0.112)	(0.137)	(0.138)	(0.385)	(0.107)
Factor dissimilarity	0.690*	0.694*	3.114***	0.545*	0.714*	0.710*	4.236***	0.597**
	(0.405)	(0.403)	(0.810)	(0.294)	(0.406)	(0.401)	(1.199)	(0.297)
EEA	0.212	---	---	---	0.253	---	---	---
	(0.371)				(0.469)			
STRI	-0.862	-0.969	-9.187	-0.784	---	---	---	---
	(0.945)	(0.864)	(7.397)	(0.912)				
Restrictions on foreign entry					-1.160	-0.934	-25.592***	-1.114
					(1.268)	(1.286)	(7.042)	(1.160)
Restrictions on the movement of people					0.192	0.395	-22.838	1.384
					(3.024)	(2.536)	(72.118)	(2.264)
Other restrictions					-3.278	-3.540	18.891	-8.256
					(5.522)	(5.465)	(12.806)	(7.896)
Observations	5670	5670	1535	4135	5670	5670	1535	4135
log likelihood	-823.8	-824.0	-198.4	-607.8	-823.5	-823.8	-192.0	-606.2
LR x^2 source country fixed effects	620.0***	619.8***	133.5***	473.6***	620.2***	620.1***	139.5***	474.0***
LR x^2 year fixed effects	13.4***	13.3***	9.1*	12.0**	13.3***	13.2**	12.8**	11.9**
LR x^2 same coefficients for the sub-indices	0.5	0.4	12.9***	3.1	see model (1)	see model (2)	see model (3)	see model (4)

Notes: The dependent variable in all models is new FDI projects (FDI_{ijt}). Estimation is negative binomial with fixed effects. Two-way clustered (source country and destination country) standard errors appear in parentheses beneath the parameter estimates. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

Compared with the estimates for computer and accounting services, the two gravity variables GDP per capita and population have in almost all eight models a stronger effect on the number of FDI projects in legal services. Looking at the models (3) and (4) as well as (7) and (8) for the sub-samples, the effect of GDP per capita is particularly strong in the sub-sample of other FDI projects, while the effect of population size is particularly strong in the subsample of intra-EEA FDI projects. Both, the restricted models (3) and (4) and the unrestricted models (7) and (8) reveal that the distance between the source and destination country has a strong negative effect on the number of intra-EEA FDI projects, while for other FDI projects the effect is not significantly different from zero. A common border has no impact on non-intra-EEA FDI projects, but a significant negative effect on intra-EEA FDI projects. However, this is likely to be a statistical artefact, as from 2014 to 2018 the UK is the source country for 73 of the 103 legal services FDI projects within the EEA. A common language does not exert a significant influence in any of the eight models. The situation is different with colonial ties. They have no effect on the number of FDI projects within the EEA but have a highly significant positive effect on other FDI projects. For the latter, colonial ties increase the expected number by between 170% (model (8)) and 180% (model (4)). Cultural dissimilarity does not affect the number of FDI projects, but differences in factor endowments have a strong statistically significant positive impact on intra-EEA FDI projects and a weaker, but still significant at the 10% (model (4)) and 5% (model (8)) confidence level, positive impact on the other FDI projects. The mere fact that both countries of a country pair are members of the EEA has no impact on the number of FDI projects (see models (1) and (5)).

The overall STRI has no significant impact in the restricted models (1) to (4). In the unrestricted models, in which the three sub-indices are included, the situation is similar with one important exception. In the two models (5) and (6) for the whole sample, the three sub-indices have no significant effect, nor in the model (8) for the sub-sample of other FDI projects. The likelihood ratio tests also confirm that these models have not more explanatory power than the corresponding restricted models (1), (2) and (4). The situation is different for the unrestricted model (7), which is based on the subsample of intra-EEA FDI projects. Here, restrictions on foreign entry have a highly significant negative impact. If these restrictions, which have a mean value of 0.044 across the 23 EEA members, were reduced by 0.002 index points, the expected value of the number of intra-EEA FDI projects would increase by 5.3%.

Thus, intra-EEA restrictions on foreign entry appear to be the only restrictions on trade in services where a policy-led substantial reduction should have a significant impact on the number of FDI projects in the legal services sector. We therefore assumed that the 2018 scores of these restrictions would be reduced by 50% and calculated the impact on the expected numbers of FDI projects. Figure 7 shows the results of this exercise. Some Central and Eastern European countries would experience large percentage increases in the expected number of intra-EEA FDI projects received by them (from 180% to 262%). However, also for the other countries, which have scores above the mean for these restrictions, the potential percentage increases are considerable. They range from 90% for Germany and 146% for France and Ireland. The average expected percentage increase across all the 23 EEA members would be 75%. At the lower end of the possible increases are Italy, Latvia, Norway and Sweden with 14% each and Finland with 0%.

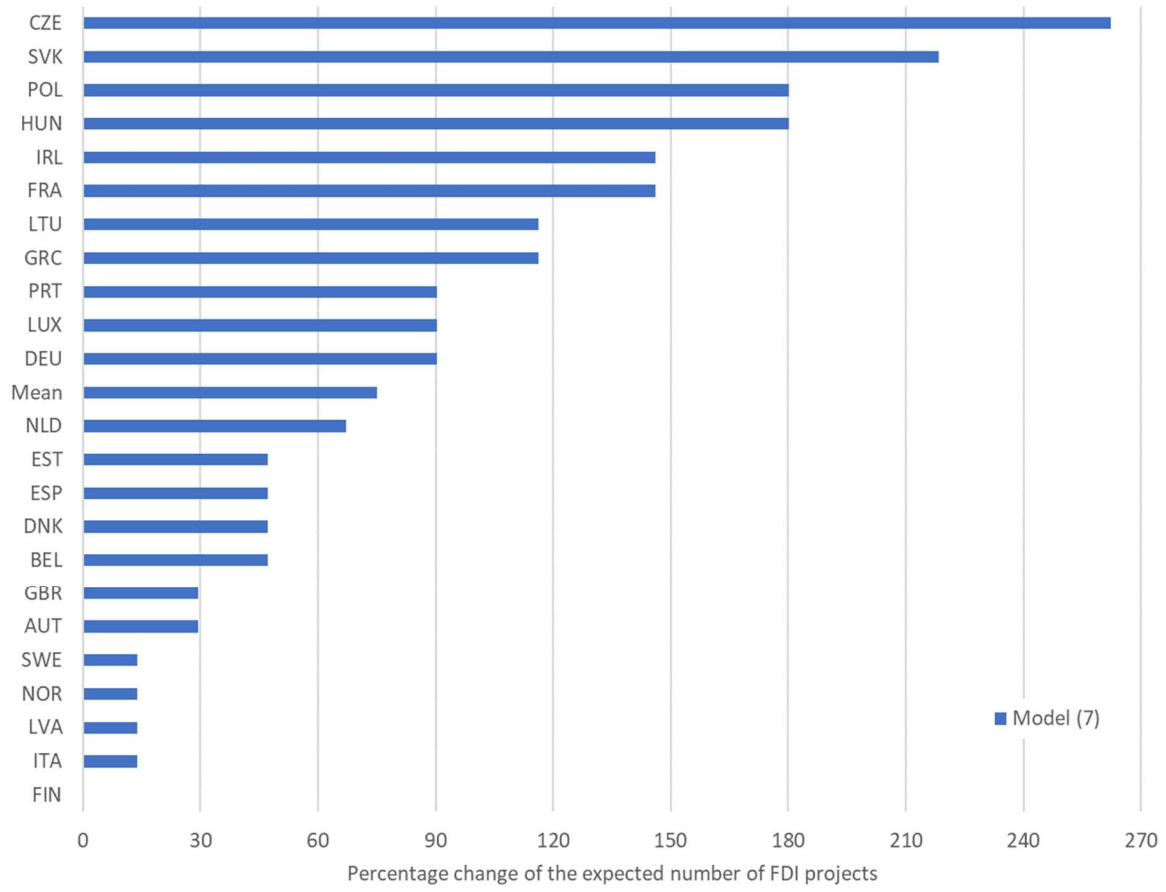

Figure 7: Effect of reducing intra-EEA foreign entry restrictions on trade in legal services by 50%

5.4 Architecture and engineering services

Table 7 shows the results of the negative binomial estimations with fixed source country effects and fixed time effects for the architecture and engineering services. Likelihood-ratio tests confirm that the fixed source country effects are highly significant different from zero in all eight models, while the fixed time effects are not statistically significant at the usual error levels. With 29 source countries that can be used for architecture and engineering services and 43 destination countries, our total sample comprises 6095 observations (1219 country pairs for the period from 2014 to 2018), which can be divided into an Intra-EEA subsample of 1870 observations (374 EEA country pairs for the period from 2014 to 2018) and a further subsample of 845 country pairs with at least one country not being a EEA member (4225 observations for the period from 2014 to 2018).

Looking first at the restricted models (1) to (4), i.e. those models that include the standard composite STRI and thus assuming that the three sub-indices have the same regression coefficient, GDP per capita and population size have highly significant positive effects on the number of FDI projects. From the models (3) and (4) for the sub-samples of intra-EEA FDI projects and the other FDI projects, it can be seen that within the EEA, high-income and large countries attract FDI projects to a larger extent than is the case for the non-intra-EEA country pairs. The distance between the source country and the destination country plays a statistically significant negative role only within the EEA, and only at a two-sided error level of 10% (see model (3)). Although the effect of a common border is not significantly different from zero in models (1) and (2) for the whole sample, it is in models (3) and (4) for the subsamples. Within the EEA, it increases the expected value of the number of FDI projects by 39%, and for the number of other FDI projects the expected value increases by an impressive 239%. A common language exerts a significant positive influence in all models, while colonial ties are again only relevant for the number of other FDI projects. In contrast, cultural differences have no influence on the number of FDI projects and differences in factor endowments only play a statistically significant positive role for the number of other FDI projects.

As for the other business services, the mere fact that both countries of a country pair are members of the EEA has no effect on the number of FDI projects in architecture and engineering services. Rather, it seems

that it is the low level of trade restrictions on services that leads to more FDI projects. This is also confirmed by the fact that the estimated STRI coefficient from model (1) hardly changes if the EEA dummy variable is omitted in model (2). Only the statistical significance of this coefficient increases. The unconditional expected value for the number of FDI projects for an intra-EEA country pair is 0.080, while for a country pair where the source country is not an EEA member and the destination country is an EEA member, it is only 0.043. For the former country pairs, the mean STRI in the destination country is 0.049, for the latter 0.247. This constellation, or more generally the difference between the two subsamples, seems to be mainly responsible for the significance of the STRI coefficient in the overall sample.

The situation is different within the two subsamples used in model (3) and (4), and a different interpretation is appropriate for the estimates of the STRI coefficients. In model (3) based on the subsample for the intra-EEA FDI projects, the intra-EEA STRI has a strong negative impact on the number of intra-EEA FDI projects. Thus, although the mean intra-EEA STRI is quite low, it varies so much that EEA members with a high intra-EEA STRI *ceteris paribus* seem to attract less intra-EEA FDI projects than EEA members with lower index values. By contrast, in model (4) based on the sub-sample for the other FDI projects and using the standard STRI, the STRI has no significant impact on the number of these FDI projects. Therefore, the STRI does not seem to vary to such an extent as to have an impact within this sub-sample. Actually, the minimum of the intra-EEA STRI of the first sub-sample is 0.013, the maximum is 0.118 (thus nine times the minimum) and the coefficient of variation is 0.654, while in the second sub-sample the minimum of the non-PTA STRI is 0.107, the maximum is 0.567 (only five times the minimum) and the coefficient of variation is 0.405.

In the unrestricted models (5) to (8), in which all three sub-indices of the STRI are included, the estimated values of the coefficients of the gravity variables hardly differ from those of the restricted models (1) to (4). In contrast, in the unrestricted estimations of all four models only the other service trade restrictions have a significant negative impact on the number of FDI projects. For all four model variants, the likelihood ratio tests show that the null hypothesis that the corresponding restricted and unrestricted models have the same explanatory power must be rejected.

Table 7: STRI and architecture & engineering services FDI projects: results from negative binomial estimations

	All FDI projects		Intra-EEA FDI projects	Other FDI projects	All FDI projects		Intra-EEA FDI projects	Other FDI projects
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log(GDPPC_destination)	1.252***	1.258***	2.131***	1.429***	1.367***	1.382***	2.145***	1.545***
	(0.298)	(0.274)	(0.630)	(0.287)	(0.387)	(0.371)	(0.599)	(0.389)
log(pop_destination)	0.801***	0.802***	1.115***	0.681***	0.778***	0.782***	1.001***	0.655***
	(0.096)	(0.097)	(0.232)	(0.067)	(0.096)	(0.095)	(0.204)	(0.075)
log(distance)	-0.299	-0.291	-0.660*	0.057	-0.336*	-0.309*	-0.703**	-0.042
	(0.234)	(0.206)	(0.340)	(0.299)	(0.198)	(0.185)	(0.301)	(0.284)
Contiguity	0.360	0.363	0.332*	1.222**	0.403	0.417	0.408**	1.155**
	(0.459)	(0.442)	(0.184)	(0.553)	(0.401)	(0.393)	(0.205)	(0.530)
Common language	1.359***	1.360***	1.354**	1.250***	1.328***	1.335***	1.535**	1.192***
	(0.265)	(0.278)	(0.590)	(0.344)	(0.288)	(0.300)	(0.600)	(0.362)
Colony	0.578***	0.580***	-0.900	0.776***	0.546***	0.549***	-1.727*	0.805***
	(0.121)	(0.123)	(0.643)	(0.181)	(0.112)	(0.112)	(0.919)	(0.183)
log(cultural dissimilarity)	-0.023	-0.023	-0.060	-0.055	-0.009	-0.009	-0.110	-0.049
	(0.105)	(0.105)	(0.078)	(0.152)	(0.101)	(0.101)	(0.093)	(0.148)
Factor dissimilarity	0.490	0.487	0.789	0.763**	0.428	0.419	0.562	0.800**
	(0.302)	(0.315)	(0.768)	(0.328)	(0.312)	(0.321)	(0.741)	(0.320)
EEA	-0.037	---	---	---	-0.134	---	---	---
	(0.529)				(0.499)			
STRI	-4.764*	-4.673***	-13.800***	-3.208	---	---	---	---
	(2.689)	(1.783)	(3.480)	(2.415)				
Restrictions on foreign entry					1.383	1.513	0.500	1.211
					(6.022)	(5.890)	(19.497)	(5.559)
Restrictions on the movement of people					-2.183	-1.792	51.745	-3.013
					(3.122)	(2.539)	(38.095)	(2.405)
Other restrictions					-15.703***	-15.410***	-35.820***	-10.957*
					(5.587)	(5.182)	(13.427)	(5.768)
Observations	6095	6095	1870	4225	6095	6095	1870	4225
log likelihood	-1010.6	-1010.6	-351.1	-611.0	-1003.0	-1003.1	-347.1	-608.7
LR x^2 source country fixed effects	304.2***	304.2***	88.3***	215.0***	299.8***	299.9***	89.7***	211.8***
LR x^2 year fixed effects	1.2	1.2	4.4	5.1	1.7	1.7	4.3	5.4
LR x^2 same coefficients for the sub-indices	15.2***	15.1***	7.9**	4.7*	see model (1)	see model (2)	see model (3)	see model (4)

Notes: The dependent variable in all models is new FDI projects (FDI_{ijt}). Estimation is negative binomial with fixed effects. Two-way clustered (source country and destination country) standard errors appear in parentheses below the parameter estimates. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

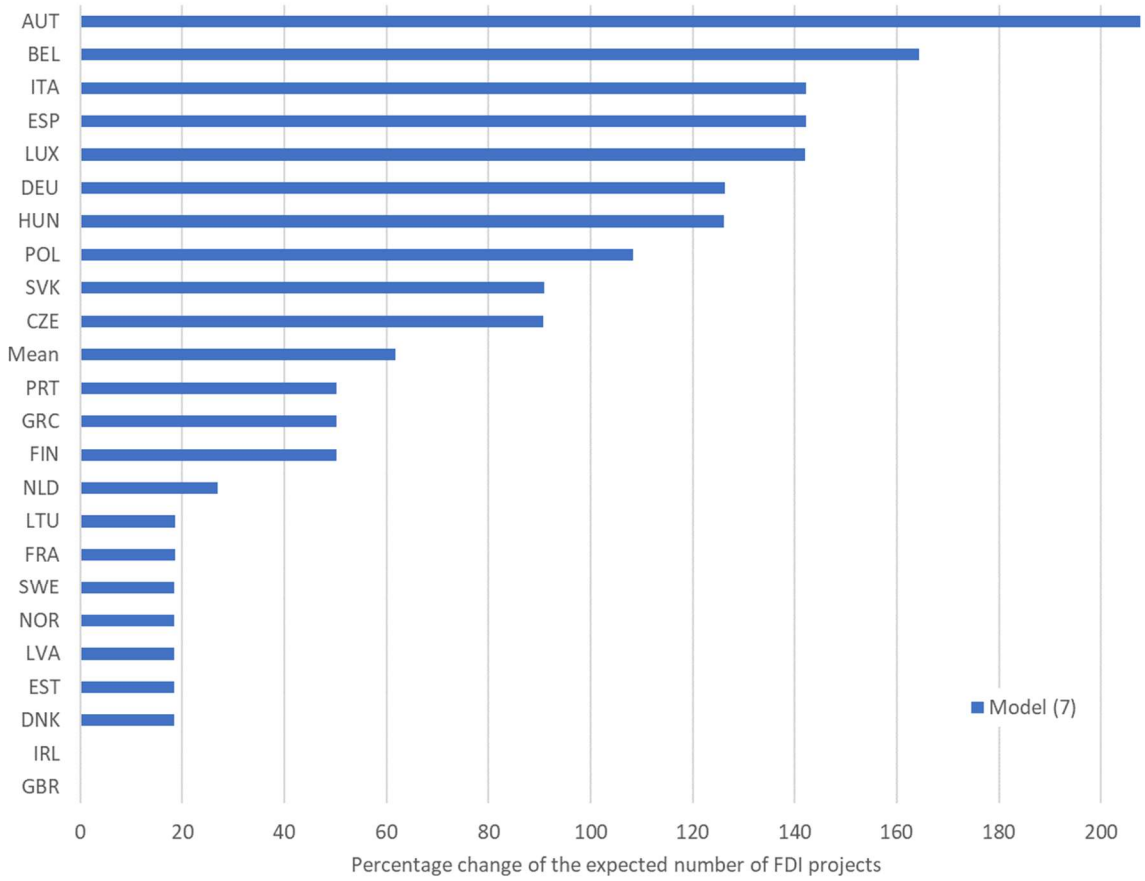

Figure 8: Effect of reducing intra-EEA other restrictions on trade in architecture and engineering services by 50%

The estimation results presented in Table 7 suggest the simulation of two policy-led substantial reductions of service trade restrictions for architecture and engineering services. First, model (7) was used to assess the impact of a 50% reduction of the 2018 intra-EEA other service trade restrictions on the expected number of intra-EEA FDI projects. This is more appropriate than using model (3) to calculate the effects of a 50% reduction in the total 2018 STRI, as the unrestricted model (7) outperforms the restricted model (3). Secondly, model (8) was used to quantify the effects of a 50% reduction of non-PTA other services trade restrictions in 2018 on the expected number of other FDI projects.

Figure 8 presents the results of the first back-on-the-envelope calculation. The greatest effects of a 50% reduction in intra-EEA other restrictions would be experienced by Austria with a 208% increase in the expected number of FDI projects and Belgium with an increase of 164%. Italy, Spain and Luxembourg would follow with 142% each. The expected increase would be above average for a further five countries, from Germany with 126% to the Czech Republic with 91%. The average increase in the expected number of intra-EEA FDI projects would be 62%. Below average increases could be realised for three groups of countries. Finland, Greece and Portugal could achieve an increase of 50%, the Netherlands an increase of 27%. Seven other EEA countries could still experience an increase in the expected number of intra-EEA FDI projects of 18% to 19%. Finally, Ireland and the United Kingdom would not achieve an improvement as they have already reached zero values for other services trade restrictions in architectural and engineering services.

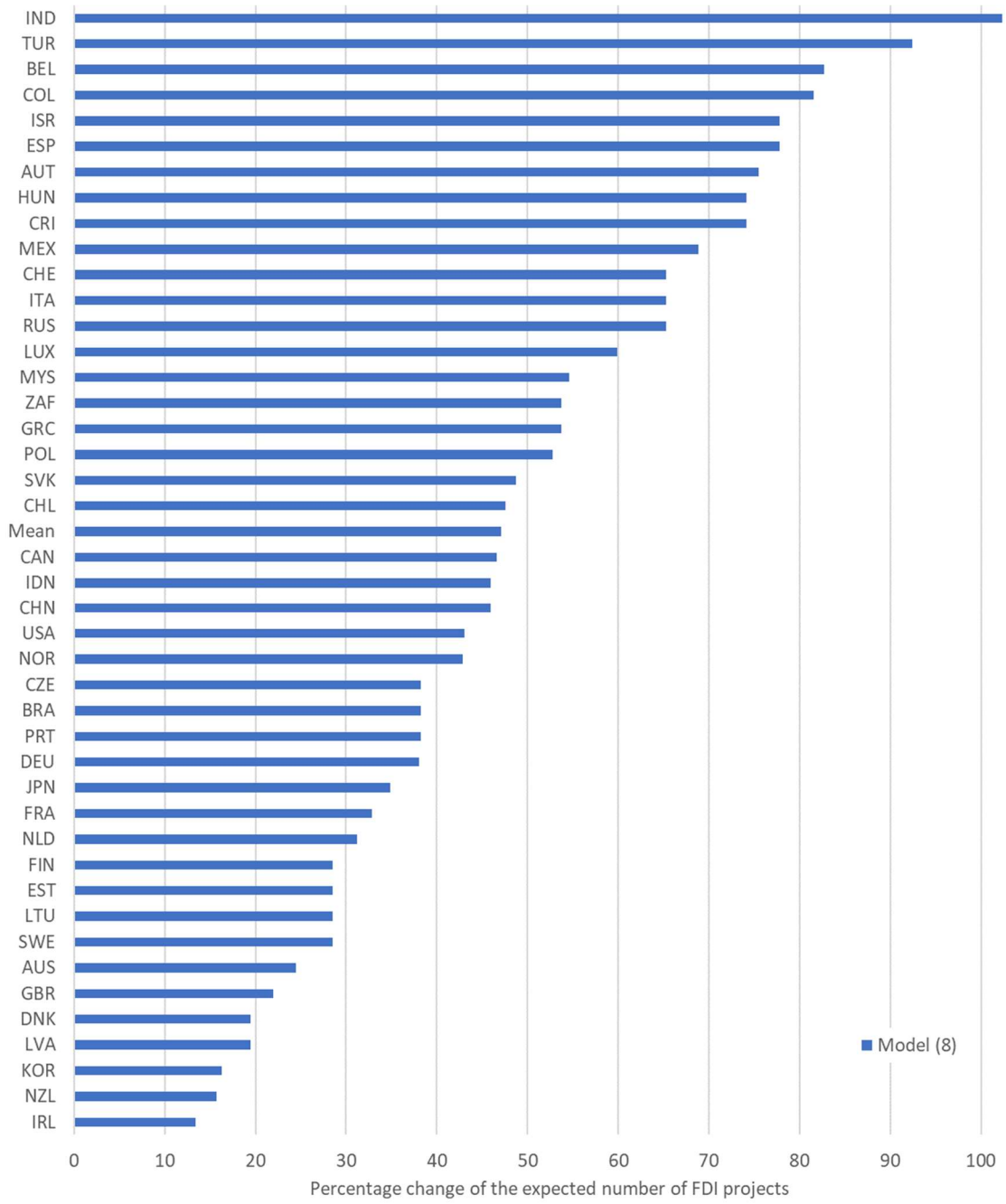

Figure 9: Effect of reducing non-PTA other restrictions on trade in architecture and engineering services by 50%

Figure 9 shows the results of the second back-on-the-envelope calculation for the other non-intra-EEA FDI projects. The greatest effects of a 50% reduction in non-PTA other restrictions would be realised in India with a 102% increase in the expected number of FDI projects and in Turkey with an increase of 92%. Then the percentage increases move continuously from 83% for Belgium over the mean value of 47% down to 13% for Ireland.

6 Discussion and Conclusions

This paper investigates empirically the relationships between sector specific service trade restrictions and the bilateral numbers of FDI projects (greenfield FDI) in four business services sectors using FDI projects micro data from the fDi Markets database and the OECD STRI as well as their sub-indices. We find that service trade restrictions represent a significant barrier for greenfield FDI. Table 8 summarises the STRI related coefficients of all regression models presented in the previous section (with the exception of those with the EEA dummy variable, which is always not significantly different from zero). In 3 out of 4 business services we obtained statistically significant evidence of a negative impact, and in legal services the sign of the coefficients, albeit insignificant, was still always negative. Furthermore, for three sectors (computer services, legal services and architectural and engineering services) the unrestricted estimates, where an individual coefficient is estimated for each sub-index of the STRI, are superior to the restricted estimates, where a common coefficient is assumed for all three sub-indexes. This is not the case for accounting services, because there is a very high collinearity between the three sub-indexes. In this respect, our results confirm the finding of van der Marel and Shepherd (2013) that it is important to consider separately the restrictions targeting the different modes of trade in services, as complementarity or substitution between the different modes may vary depending on the sector. Furthermore, such a separate estimate by type of restriction and sector gives more precise indications of where policy can take action in order to reduce restrictions on trade in services as efficiently as possible and thus promote new FDI projects.

Table 8: Summary of the regression coefficients for the STRI and their sub-indices

	Computer services			Accounting services		
	All FDI projects	Intra-EEA FDI projects	Other FDI projects	All FDI projects	Intra-EEA FDI projects	Other FDI projects
STRI composite	-4.159***	-13.394***	-3.809**	-2.123***	-17.423***	-1.787***
Restrictions on foreign entry	-9.255***	42.394**	-8.902***	-0.925	-3.010	-4.844**
Restrictions on the movement of people	2.186		1.453	-0.532	-75.061*	1.058
Other restrictions	-7.944***	-16.496***	-6.274**	-9.140	-13.653	4.074
	Legal services			Architecture & engineering services		
	All FDI projects	Intra-EEA FDI projects	Other FDI projects	All FDI projects	Intra-EEA FDI projects	Other FDI projects
STRI composite	-0.969	-9.187	-0.784	-4.673***	-13.800***	-3.208
Restrictions on foreign entry	-0.934	-25.592***	-1.114	1.513	0.500	1.211
Restrictions on the movement of people	0.395	-22.838	1.384	-1.792	51.745	-3.013
Other restrictions	-3.540	18.891	-8.256	-15.410***	-35.820***	-10.957*

In order to increase intra-EEA FDI projects in computer services, the only relevant leverage is to reduce other restrictions on trade in services. Here, our estimates imply that a 50% reduction of the mean index value of 0.039 would increase the number of intra-EEA FDI projects by 38%. For the other FDI projects in computer services, there are two main opportunities. In the case of foreign entry restrictions, a 50% reduction in the mean index value of 0.054 would raise the expected number of FDI projects by 27%, while in the case of other FDI service trade restrictions, a halving of the mean index value of 0.099 would imply a 38% increase in the expected number of FDI projects.

For accounting services, only the restricted estimations can reasonably be used to assess the effects of a reduction in service trade restrictions. If the average STRI index value of 0.082 would be halved, the expected number of FDI projects would increase by 104%. Assuming that this reduction would be achieved by halving

the mean value of each of the three sub-indices, the reduction of foreign entry restrictions would increase the expected number of FDI projects by 42%, followed by the reduction of movement of people with an implied increase of 22% and the reduction of other restrictions with an increase of 18%.[20] For non-EEA FDI projects, halving the average STRI index value of 0.326 leads to a 34% increase in the expected number of FDI projects. If this reduction in the STRI is achieved by halving the mean value of each sub-index, foreign entry restrictions contribute 13%, restrictions on the movement of people 12% and other restrictions 6%.

For legal services, only the intra-EEA restrictions on foreign entry have a significant negative impact on the number of intra-EEA FDI projects. Halving the mean value of 0.044 of this sub-index would imply a 75% increase in the expected number of intra-EEA FDI projects. All other restrictions on trade in legal services do not seem to have a significant impact on the expected number of FDI projects. This result is in line with the findings of a simulation study for the USA by Khachaturian and Riker (2019). These authors calibrate a model for the U.S. market for legal services in 2012 and estimate the impact of an increase of the low US legal services STRI to the OECD average. They find that this significant rise in the STRI has hardly any impact on domestic sales, foreign affiliate sales and cross-border imports (mode 1, 2 and 4) of legal services. Increasing all mode 1, 3, and 4 restrictions (STRI sub-indexes) to their international average levels would have only raised the US domestic market share by 0.08%, from 99.15% to 99.23%. Consequently, the authors conclude that the competitiveness of the domestic legal services sector reflects quality and cost advantages rather than protection from foreign suppliers. A similar argument may apply to Western European countries. Unfortunately, for the EEA countries in our analysis, based on Eurostat's FATS database, only the turnover shares of foreign affiliates can be calculated for the combined sector "legal and accounting activities". In 2017 the shares of foreign affiliates' turnover ranged from 1% for Italy to 7.4% for Ireland.[21] The situation is different in Central and Eastern Europe. Here, for the countries in our sample, the turnover shares of foreign affiliates range from 17% in the Czech Republic to 47% in Poland. Relatively high STRI index values do not seem to be an obstacle to these high turnover shares. For example, Poland has a STRI of 1 (completely closed) for legal services and within Central and Eastern Europe the second highest STRI index value of 0.277 for accounting services.

For architectural and engineering services, our estimates show that only the other service trade restrictions have a negative impact on the expected number of FDI projects. If the mean value of the intra-EEA index, which is 0.027, were reduced by 50%, the expected number of intra-EEA FDI projects would increase by 50%. The expected number of other FDI projects would rise by 47% if the mean value of the index of other service trade restrictions relevant to them, which is 0.070, could be reduced by 50%.

Summarised across the four business services sectors, our estimates show that intra-EEA FDI projects are not affected by restrictions on foreign entry and movement of people. Rather, attention should be paid to the reduction of other restrictions on trade in services. The only exception is legal services, where it seems that there are still restrictions on foreign entry that impede bilateral intra-EEA FDI projects. For the other FDI projects, it can only be significantly attested for computer services that the restrictions on foreign entry also have an inhibiting effect. This is also apparent for accounting services, but cannot be convincingly substantiated by the estimation of the unrestricted model because of the high collinearity between the three sub-indices. However, OECD (2018) also points out that most countries restricts accounting firms' ownership to locally qualified professionals, particularly in auditing services. Furthermore, ownership restrictions are often coupled with requirements that the majority of the board and the manager of auditing firms must be locally qualified.

Based on these reliable estimation results, back-of-envelop policy simulations suggest that despite the already low level of current restrictions, there still is significant scope for policy reforms aiming to further reduce restrictions, especially in some EU Member States, like Austria, Belgium, Hungary, Italy, Poland and Spain, where a percentage reduction of effective trade restrictions on services could lead to above average increases in the expected number of both intra-EEA and other FDI projects in at least three of the four business services sectors.

Due to the availability of reliable data on the number of FDI projects, our analysis focuses on mode 3 of trade in services and considers the possible complementarity or substitution between the four different modes of trade in services only by including the relevant sub-indices for each mode. Ideally, the relationships between sales of foreign affiliates, international movement of persons and cross-border trade flows should be

[20] The total growth factor of expected number of FDI projects (1 + 104/100) results from the three growth factors coming from the same reduction of the sub-indices, thus 2.04 = 1.42 • 1.22 • 1.18.

[21] An exception in Western Europe is Sweden with a turnover share of accounting and legal services foreign affiliates of 15%. No data is available for Belgium and Luxembourg.

analysed in a simultaneous model. However, the available data impose too tight limits on such an analysis. Although the TISMO database of the WTO is a step in the right direction here, its sectoral disaggregation is still far too coarse to adequately examine the effects of sector-specific restrictions, which only sector-specific policy measures can effectively reduce.[22] Should such disaggregated data become available for the different modes of trade in services, interesting new research opportunities would open up.

[22] For a description of this database see Rueda-Cantuche et al. (2016).

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