Estimating cost reductions of multinational activity of a potential Investment Facilitation Agreement.

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Abstract

In this paper a gravity framework is used to estimate the impact of investment facilitation on multinational activity and cost reductions of a potential Investment Facilitation Agreement (IFA) are calculated based on the estimate and scenarios for the IFA. Based on recent innovations in the gravity literature, both sales by foreign affiliates and sales of domestic owned firms are included in the estimation. The effect of the investment facilitation indicator (IFI), developed by the German Development Institute, is identified by interacting the IFI with a border dummy for sales by foreign affiliates. With this approach identification is based on the impact of the IFI on affiliate sales compared to sales of domestic owned firms, with as important advantage that multilateral resistance terms can be accounted for by including host and home country fixed effects. The estimation results show that there is a large and significant effect of investment facilitation on affiliate sales in most sectors, even after controlling for other variables measuring the attractiveness of foreign direct investment. The estimated coefficients are combined with scenarios on a potential IFA to calculate cost reductions associated with an IFA which can be used in computable general equilibrium models to simulate the potential economic effects of the IFA.

Keywords: Multinational firms, affiliate sales, gravity estimation, ad valorem equivalents

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1 Introduction

Following the successful conclusion of the Trade Facilitation Agreement at the 2013 Bali Ministerial Conference, there has been a gradual shift of attention to address issues of regulatory transparency and administrative burdens in the realm of international investment. The dialogue on investment facilitation initially took place through a series of engagements among groups of experts and scholars with supports from multilateral institutions such as the United Nations Conference on Trade and Development (UNCTAD), the Organisation for Economic Co-operation and Development (OECD) and the World Bank. Over the years, the topic of investment facilitation has been quickly gaining momentum. The most evident illustration of this is the 2016 Shanghai G20 Summits with the most notable outcome being the 9 non-binding 'G20 Guiding Principles for Global Investment Policymaking' agreed among the G20 trade ministers.

At the World Trade Organisation (WTO), the discussions have eventually led to the launching of a new joint initiative on investment facilitation by the "Friends of Investment Facilitation for Development" – a group of 14 WTO Members. This development accelerated in December 2017 when 70 WTO Members issued the 'Joint Ministerial Statement on Investment Facilitation for Development' at the 11th Ministerial Conference held in Buenos Aires, followed by a second joint statement in late 2019 with the number of participating Members expanding to 98. Finally, the long-awaited structured discussions on an Investment Facilitation Agreement (IFA) formally began on September 2020 with over 100 Members. Despite significant progress, at the time of writing the IFA is still under negotiation.

In this paper we attempt to quantify the expected ad valorem equivalent (AVE) cost reductions of a potential IFA for multinational companies engaging in foreign direct investment (FDI). To do so, we estimate a gravity equation of affiliate sales with a measure of investment facilitation – the Investment Facilitation Index (IFI) created by Berger et al. (2019) from the German Development Institute. The index assigns scores on a number of policy areas by evaluating the relevant laws, regulations as well as international commitments relating to a country's investment climate. As dependent variable we use sectoral bilateral foreign affiliate statistics (FATS) measuring the magnitude of multinationals' economic activities in various host countries. Regarding the identification of the expected impact of changes in the IFI, we use one of the recent innovations in gravity estimation (see for example Heid et al. (2017)) of including both international and intra-national trade flows. Through a border dummy, the novel method allows the identification of country-specific or non-discriminatory variables even with the inclusion of importer and exporter fixed effects that are widely applied in the literature to control for multilateral resistance (Anderson and van Wincoop, 2003). In the context of this paper, international and intra-national trade flows correspond to sales of foreign affiliates and sales of domestic firms respectively, and we construct the

latter by subtracting total sales of foreign affiliates from domestic output.

In our sectoral estimations we find that investment facilitation raises foreign affiliate sales relative to domestic sales in most manufacturing and services sectors. This suggests that there would be significant scope for an increase in multinational activity and FDI through a reduction in barriers associated with an IFA. We combine our estimated coefficients on the IFI with a number of scenarios, from conservative to optimistic, for changes in the IFI as a result of a potential IFA. This generates AVE cost reductions of multinational activity associated with the different scenarios. By assigning different scores on the IFI because of an IFA we can thus calculate the expected improvement in each country's investment climate following the implementation of the IFA. These cost reductions can be included in CGE simulation exercises to project the potential economic effects of an IFA.

Overall, we find that the cost reductions will be mainly concentrated in the service sectors owing to lower elasticities of substitution, which are used to map coefficients into AVE cost reductions. At the country-level, lower-income countries would benefit most from the implementation of the treaty given the fact that the scope for improvement in investment facilitation in developed nations is relatively small: very often there is already an adequate infrastructure in place and potential investors do not typically encounter high regulatory burdens.

With this study we aim to make two main contributions to the literature on modelling FDI and affiliate sales and their regulatory costs. First, our results serve as a first glance of the potential economic effects of an IFA. Second, our estimated AVE cost reductions can be employed in CGE models of FDI and affiliate sales, such as the GTAP-FDI framework (Lakatos and Fukui, 2014), to project the wider economic effects of an IFA. Our work should allow researchers to apply the calculated AVEs as input into a CGE model with relative ease in order to investigate the treaty's wider implications.

The rest of the paper is organised as follows: we provide a brief review of the current literature in Section 2; our empirical strategies are discussed in Section 3 and in Section 4 we introduce the different variables in the gravity estimation; the main results are presented in Section 5 which is followed by several robustness checks in Section 6; we calculate the AVE cost reduction in Section 7 before finally concluding in Section 8

2 Linkages with recent literature

Our work is related to at least two strands of literature: recent innovations in gravity estimation and modelling studies on the impact of trade and investment policies. There has been growing academic interest in innovating earlier literature on gravity estimation through the

inclusion of intra-national trade flows, specifically on topics such as the 'distance puzzle' and free trade agreements (FTAs)[1]. This estimation strategy is further extended by Heid et al. (2017) to identify not just bilateral variables, but also country-specific variables through interactions with a border dummy (See Section 3). On this front, our paper thus adds to the expanding list of studies that incorporate intra-national data to estimate country-specific policy determinants (Beverelli et al., 2018; Oberhofer et al., 2018; Esteve-Pérez et al., 2020; Felbermayr and Yotov, 2021). Moreover, the above research also highlights the need for international statistics and databases to include domestic data with one of the recent efforts being the International Trade and Production Database for Estimation (ITPD-E) which contains both international trade and domestic production data for 170 industries and 243 countries spanning across a 17-year period (Borchert et al., 2020).

While gravity estimation is mostly used to empirically analyse international trade flows, there is also a variety of applications of the model to empirically analyse international investment flows and multinational production. Regarding the inclusion of intra-national data in the context of international investment, we would like to highlight two studies. First, Benz and Jaax (2020) estimate the impact of services trade barriers on services trade by using the OECD's service trade restrictiveness index (STRI). For the index's identification the authors constructed within-country services trade and domestic services consumption[2]. Second, Kox and Rojas-Romagosa (2020) explore the role of international trade and investment agreements in promoting foreign direction investment (FDI). Like other work mentioned, the authors construct the domestic capital stock data to account for non-discriminatory domestic policies. Our work is inspired by the two papers mentioned above, specifically in the construction of our own dataset of international and intra-national sales as well as our choice of model specifications.

Second, our research is related to modelling work on the impact of investment policies and trade facilitation. In particular, our work is related to *ex-ante* simulations of the Trade Facilitation Agreement concluded in 2013. Generally speaking, most studies rely on either CGE simulations (Decreux and Fontagné, 2009; Mevel et al., 2015) or partial equilibrium analyses using gravity models (Hoekman and Nicita, 2011; Hufbauer and Schott, 2013). Alternatively, there is also the hybrid or two-step approach. For instance Zaki (2014) calculated AVEs of the time to export and import under a gravity framework which was subsequently implemented as inputs in a CGE simulation under the assumption of a 50% reduction in existing

[1]See, for example, (Yotov, 2012), (Dai et al., 2014) & (Bergstrand et al., 2015)

[2]Services trade are distinguished by 4 different modes, conceptually Mode 1, 2 and 4 are akin to the conventional cross-border trade of goods, albeit with many significant differences. Meanwhile Mode 3 services trade refers to the supply of services through commercial presence which is conceptually closer to international investment and operation of foreign affiliates. In the paper, the within-country services trade is constructed for the purpose of mode 1,2 and 4 of services trade while the construction of domestic consumption of services corresponds to mode 3 services trade

barriers to trade facilitation. In such context, our paper should be understood as the first step of the hybrid approach that aims to calculate AVE cost reduction based on realistic scenarios. More specifically, by exploiting the IFI and running sector-by-sector gravity estimation, we are able to attain AVEs of tariff reduction and hence liberalisation scenarios that are both sector- and country-specific.

3 Empirical Strategies

Since its first application in the mid 20th century[3], the gravity model has become one of the most popular 'workhorse tools' in trade policy analyses. Derived from Newton's Law of Universal Gravitation, the model is intuitive and even at its simplest form, it is capable of returning consistent results with surprisingly high goodness-of-fit. Over the past decades, the model has benefited from a thorough theoretical underpinning, most notably by Eaton and Kortum (2002) and Anderson and van Wincoop (2003), thus giving rise to the structural gravity model. Beyond the trade literature, the model has been extended and found to be empirically robust in other fields such as international migration and as in our case, international investment. Aside from pure empirical analyses, the gravity model to study multinational activities also has a strong theoretical underpinning under a general equilibrium framework owing to contributions by, among others, Bergstrand and Egger (2007) and Head and Ries (2008).

One of the most important feedback from theoretical developments to empirical application of gravity model is the need to control for inward and outward multilateral resistance terms, first coined by Anderson and van Wincoop (2003), they refer to trade or investment barriers relative to all third countries. These theoretical terms are not directly observable and can lead to estimation bias under a 'naive' gravity model. Currently, there exists several methods in the literature to account for the multilateral resistance terms[4]. However, the most followed approach is to absorb these terms with exporter and importer fixed effects (Feenstra, 2004), or exporter-time and importer-time fixed effects under a panel setting (Olivero and Yotov, 2012).

It is important to note that the key interest variable of this study, the IFI, is categorised as a country-specific variable under the gravity framework, meaning that unlike bilateral variables such as distance, there is only one value per host country which does not vary by the source country. Indeed, a country's investment climate is non-discriminatory by nature and equally applies to all potential investors. However, this would pose an identification challenge in our estimation since the inclusion of host (importer) and source (exporter) fixed

[3](Isard, 1954; Tinbergen, 1962)

[4]See, for example, the use of a 'remoteness index' by Wei (1996) and the construction of international and intra-national trade cost ratio by Novy (2013)

effects would effectively absorb all country-specific variables. To overcome this estimation challenge, Heid et al. (2017) developed a simple but yet theory-consistent method to identify non-discriminatory variables in the presence of fixed effects. This involves the inclusion of both international and intra-national trade flows which are distinguished via a border dummy that takes the value of 1 for international trade flows. By simply interacting the said country-specific variable with the border dummy, this 'bilateralised' the variable such that it will no longer be absorbed by the importer or exporter fixed effects[5], thus making identification possible.

Aside from reconciling the use of fixed effects and the identification of IFI, another estimation challenge lies in the fact that the index reflects the scope of the current negotiation which aims to reduce unnecessary red tapes. Therefore it only covers policy areas such as regulatory transparency and electronic governance that mainly affects the **ease** of investment. Indeed, as opposed to FTAs or bilateral investment traeties (BITs), it is highly unlikely that final agreement would contain provisions that lower legal/formal investment barriers[6] or grant foreign investors additional rights and protection. This is because international investment law are generally outside of the WTO legal system which mainly focuses on the trade of merchandised goods and services, therefore for many Members it is crucial that the current negotiation does not exceed the WTO's mandate or restrict individual country's right to regulate. Consequently, in the empirical application the index could pick up other types of investment barrier as they tend to be highly correlated – countries with liberal entry conditions generally have favourable investment climate. To address the potential omitted variable bias, we build on insights from the empirical literature on the determinants of FDI and multinational activity and expand our model specification to include relevant policy indices and also interact these with the border dummy. As such we mitigate the risk of overestimating the impact of the IFI.

Since over 60% of our FATS data consist of zero values, we adopt the Poisson pseudo maximum likelihood (PPML) estimator as recommended by Santos Silva and Tenreyro (2006) which also account for potential bias arising from heteroskedasticity in the data. Given the fact that the IFI is only available for one year (2019), this necessarily restricts our estimation to a cross-sectional analysis. As a result, we take averages from 2016 to 2018 in order to retain as much data as possible while also limiting data volatility. We estimate the gravity equation sector-by-sector to consider heterogeneity in the impact of the IFI on multinational activity. This leads to the following estimated gravity equation with k, i, j representing sector, host country, and source country respectively:

[5]Under a gravity setting, interaction with the border dummy meant that the country-specific variable will take the value of 0 for every intra-national country-pair (importer = exporter)

[6]Examples of these barriers include foreign equity limitations, investment screening, and restrictions on foreign employment

$$FATS_{ij,k} = \exp(\beta_1 + \beta_2 Border_{ij} + \beta_3 IFI_i \times Border_{ij} + \delta X_{i,k} \times Border_{ij} + \gamma Z_{ij} + \eta_{i,k} + \mu_{j,k} + \epsilon_{ij,k}) \quad (1)$$

As discussed above, the IFI is identified by interacting with the border dummy which equals 1 if $i \neq j$); X refers to a vector of country-specific control variables that are similarly identified through interaction with the border dummy; Z is a vector of bilateral control variables; finally, $\eta_{i,k}$ and $\mu_{j,k}$ represent the host and source country fixed effects which are included to account for the multilateral resistance terms.

4 Data Description

In this section, we present an overview of the different components of our gravity dataset and in turn introducing the dependent, interest and control variables. More specifically, we take a detailed look at the collection of the FATS data, the construction of the domestic sales data, the literature behind the selection of the control variables as well as various data adjustments.

4.1 Dependent Variable

a) Foreign Affilate Statistics (FATS)

When it comes to the proxy for measuring the activities of multinational firms, many studies heavily rely on the use of FDI stock or flow information available from various multilateral FDI databases. However, the accuracy of FDI statistics is subject to increasing criticisms. For instance, most countries report the sources of their inward FDI according to the immediate investors and therefore do not account for the complex financing structures employed by multinationals. This means that the presence of special purpose entities (SPEs)[7] in tax havens and offshore financial centres would lead to geographical distortions as well as double accounting in the FDI data[8]. Moreover, by definition the FDI data only record transnational relationships of capital movement between affiliate and parent firms. As a result, in countries with well-developed financial markets, domestic sourcing of capital might lead to underestimation of affiliates' economic activities. Although there have been recent efforts in separately distinguishing investments made by SPEs and reporting inward FDI according

[7]SPEs generally refers to enterprises with few employees or little activities, their main purpose is to serve as financial conduits for transmitting 'pass through capital' and 'transit-FDI'

[8]More detailed descriptions of the shortcomings of the FDI data can be found in (Beugelsdijk et al., 2010)

to their ultimate investors, these practices are only adopted by a few developed countries participating in the OECD and Eurostat database.

Consequently, we follow recent academic trend and adopt FATS as an alternative to FDI data. In comparison, FATS are survey-level data that records foreign affiliates' operation information, therefore they are direct measurements of multinationals' activities instead of relying on investment relationships as proxy. In addition, FATS are restricted to entities that are majority foreign controlled with more the 50% of the voting rights (as opposed to 10% of the voting right needed to qualify as FDI). Finally, entities covered in the inward and outward FATS are assigned according to their ultimate investors and destinations respectively.

The sectoral bilateral inward/outward FATS data are compiled by the WTO based on the Eurostat FATS database, the OECD FATS database and national sources such as the Bureau of Economic Analysis (BEA) for the US. The operational data in FATS are not a singular measurement but rather include a range of firm indicators such as turnover, output, operating surplus, and number of employees. Although output data would be the most appropriate in representing the activities of foreign affiliates, turnover data are much easier to collect from a surveying perspective and therefore there is much greater data availability. Conceptually, turnover and output are similar in most sectors and this is also reflected in the data[9]. As a result, in this paper we adopt turnover values for FATS. In the remainder of the text we use the terms output and turnover interchangeably.

Given the fact that the Eurostat is a regional database that mainly consists of data on European nations, we adopt mirrored values to expand our country coverage. This essentially treats outward FATS originated from the source country as inward FATS of the destination (host) country. However, the procedure would generate many overlapping observations whereby both mirrored values and inward data are available, and these overlapping values rarely match with each other with often large discrepancies. For reconciliation, we adopt a rather simple approach by giving preference to inward values and using mirror values to fill in the gaps since we believe the host countries have greater incentive to accurately measure inward FATS for tax and regulatory purposes. Furthermore, mirrored values are only adopted when there is no inward data for the entire time period within a given country-pair. This additional condition on data collection prevents volatility caused by mixing inward and mirrored values within time series.

Including mirrored values our dataset only contains 77 host countries and 55 source countries. The sample is relatively limited since there is currently no global FATS database available and the only sources with sectoral bilateral data are Eurostat, OECD and some national

[9]The main difference between turnover and sale concerns the changes in stocks of finished goods and work in progress, refer to the 'System of National Account 2008' for more details

sources such as BEA[10].

b) Construction of Domestic Sales

Following the estimation strategies outlined in the last section, we now proceed to construct the 'intra-national' component of the dependent variable. In Heid et al. (2017), the method was applied by distinguishing between international and intra-national trade flows, but in this paper the distinction lies crucially with the **ownership** of producers, the 'international' element hence refers to the sales of foreign affiliates while the 'intra-national' element refers to the sales of domestic firms. Indeed, despite the close relationships between multinational production and international trade, we are not concerned with the final destinations of sales. In other words, for foreign affiliates we do not make separate distinctions between output sold domestically and output exported back to the source country or third countries (related to the theoretical concepts of horizontal vs vertical FDI), and vice versa for domestic firms[11].

Given that the concept of gross output generally refers to the total production value of goods and services from all agents/units located in a given country, output from domestic firms (i.e. domestic sales[12]) in each sector can simply be calculated as follows:

$$\text{Domestic Sales}_{itk} = \text{Gross Output}_{itk} - \text{Total Foreign Affiliate Sales}_{itk} \tag{2}$$

The data on sectoral gross output at basic prices are collected from the United Nations Statistics Division (UNSD). To ensure consistency at the sectoral level, we only adopt output data under the 4th Revision of the International Standard Industrial Classification (ISIC). In addition, some countries are still reporting output data under the 1993 System of National Account (SNA) conceptual framework while most other countries are reporting under the 2008 version or both. We give preference to the 2008 framework when data under both versions are available. However, we also allow reporting under the 1993 framework in order to maximise the coverage.

Regarding the construction of total FATS, while it is tempting to simply aggregated the

[10]Note that Fukui and Lakatos (2012) had sought to extrapolate and construct a complete, global FATS database, we refrain from using values from their datasets but instead adopt actual reported FATS data since the extrapolated values are themselves based on a gravity estimation

[11]For further intuition, it is useful to compare the above concept with Mode 3 services trade which is restricted to output sold by foreign affiliates to domestic consumers only, the affiliates' services export is considered as Mode 1 services trade

[12]As discussed above, due to data availability, in this paper we treat output and turnover as two interchangeable terms

sectoral bilateral FATS data for each sector, we prefer to use actual reporting of aggregated FATS as it is more accurate due to values not being reported in the sectoral bilateral dataset for confidentiality reasons. These aggregated data are not just available from the Eurostat and BEA, but also from the OECD database and the national sources (e.g. Central Banks) of a few countries[13]. It is only for countries whose information on aggregate FATS is not available that we adopt the manual aggregates of the sectoral bilateral dataset as total FATS.

Finally, it is important to note that domestic sales can only be derived when information is available for **both** gross output and total FATS. This necessarily means that even if we possess sectoral gross output data for every country, we can at most calculate domestic sales for the 77 host countries from the sectoral bilateral database. In the end, we acquire domestic sales data for 56 out of the 77 countries, they are subsequently appended to the bilateral, by sector FATS dataset and indicated as a domestic country-pair ($i = j$). It is also at this point that we can construct the border dummy (See Section 3).

4.2 Interest Variable

The Investment Facilitation Index (IFI) created by Berger et al. (2019) from the German Development Institute is a pioneering project in quantifying and comparing countries' investment environment. The index is comprised of five sub-indices representing five policy areas: (1) Transparency & Predictability, (2) Electronic Governance, Cooperation, (3) Application Process, (4) Focal Point & Review, and (5) Outward Investment. There are a total of 117 measures spread across the five policy area, and for each of them the scores are assigned based on a multiple binary strategy with 0 for no implementation, 1 for partial/planned implementation, and 2 for full implementation. With an expert survey, the scores are further adjusted by a set of weights based on their relative importance, and the overall index score for each country is acquired through simple addition of the 5 sub-indices. Finally, the index covers 66 out of the 70 WTO Members that have signed the first Joint Ministerial Statement on investment facilitation plus the US and India.

Upon closer inspection of the five policy areas, we observe that while the first four areas concern a country's attractiveness for inward investment and are therefore host-specific (importer-specific), policies concerning 'Outward Investment' is, as the name indicates, source-specific (exporter-specific). The index's composition thus suggests that it is not unilateral but affects both inward and outward investment of a given country. The implications for the estimation strategy are revealed in a recent study by Beverelli et al. (2018) in which

[13]Aggregate FATS data from the OECD is additionally available (aside from those already covered in the Eurostat database) for Japan and Canada, national FATS data is available for North Macedonia, Serbia, Thailand and Zambia

they applied the novel methodology from Heid et al. (2017) to investigate the effect of institutions, a variable that similarly affects both import and export capacities, on trade flows. However, regarding the identification the authors had found that it is not possible to 'identify simultaneously the differential effects on trade of importer versus exporter institutions'. Consequently, we have decided to focus on the source-country scores and adjusted the IFI with the scoring on 'Outward Investment' subtracted from the total score. This renders the index a unilateral policy variable that can be correctly identified.

4.3 Control Variables

a) Country-Specific Variables

The control variables can be largely separated into two groups, the first group contains a list of additional country-specific policy indices that are similarly identified by interacting with the border dummy. The rational for their inclusion is, as discussed in Section 3, to control for all investment barriers other than those relating to investment facilitation which is covered by the IFI .

We have select four such variables from the literature, they are the OECD FDI Restrictiveness Index[14] which ranges from 0 (open) to 1 (closed); the World Bank Doing Business Score ranging from 0 (worst outcome) to 100 (best outcome); the World Bank Regulatory Governance Index (RGI) ranging from 0 (worst outcome) to 5 (best outcome); and finally the Worldwide Governance Indicators (WGI)[15] ranging from -2.5 (worst outcome) to 2.5 (best outcome).

The four policy indices above are all country-specific. Only the FDI Restrictiveness Index contains a sector dimension, and the RGI is only available for the year 2018 while other indices all have a time dimension. Additionally, we follow van der Marel and Shepherd (2020) and made several adjustments to the Doing Business and WGI whereby policy areas or sub-indices that are most relevant for representing country's investment regimes are extracted from the total score, and we calculate the new total score as simple averages of these components[16].

b) Bilateral Variables

The second group of control variables is comprised of bilateral variables that can be identified directly. We have chosen a standard set of indicators sourced from the CEPII database to

[14](Kalinová et al., 2010)

[15](Kaufmann et al., 2010)

[16]For the World Bank Doing Business Score, the relevant policy areas are 'Protecting Minority Investor', 'Enforcing Contract', and 'Resolving Insolvency'. As for the WGI, they are 'Government Effectiveness' and 'Regulatory Quality'

Table 1: Overview of variables in the dataset

Variables	Type	Country Coverage	Format	Year
Foreign Affiliates Sales	Dependent	77*	-	2016-2018
IFI	Interest	68	Country-Specific	2019
Border Dummy	Control	-	Bilateral Dummy	-
FDI Restrictiveness Index	Control	77	Country-Specific	2016-2018
Doing Business Score	Control	167	Country-Specific	2016-2018
Regulatory Governance Index	Control	185	Country-Specific	2018
Worldwide Governance Index	Control	209	Country-Specific	2016-2018
Log of Distance (CEPII)	Control	224	Bilateral	time-invariant
Colonial Relationship (CEPII)	Control	224	Bilateral Dummy	time-invariant
Common Language (CEPII)	Control	224	Bilateral Dummy	time-invariant
Religious Proximity Index (CEPII)	Control	224	Bilateral	time-invariant
Common Legal Origin (CEPII)	Control	224	Bilateral Dummy	time-invariant
Free Trade Agreement	Control	Full	Bilateral Dummy	2016-2018**
European Economic Area	Control	Full	Bilateral Dummy	time-invariant***

*After adopting mirrored values

**The FTA Dummy is not time-invariant as there were more than a dozen of treaties went into force between 2016-2018

***The EEA Dummy is time-invariant in our dataset (2016-2018), Croatia was the last country to join the EU in 2013 and the exit of the United Kingdom from the EEA took place in 2020

control for various geographic, cultural, and historical bilateral relationships. More specifically, these are bilateral distance (taken in logs), the religious proximity index and three other dummy variables taking the value of 1 if a country-pair (1) has been in a colonial relationship, (2) adopts a common legal origins (post-transition), or (3) has a common language as measured on an ethnographic basis. Finally, we have constructed a FTA dummy from the Design of Trade Agreements (DESTA) Database[17] as well as an European Economic Area (EEA) dummy[18] to reflect the uniquely deep integration within the Single Market.

4.4 Year, Country, and Sector Coverage

Table 1 displays a list of all the variables introduced above as well as other relevant informations such as their year and country coverage. Given that our key interest variable, the IFI, is only created in 2019 and does not have a time dimension, we resort to a cross-sectional analysis for this study. Instead of estimating on a single year, we take averages from 2016 to 2018, the 3 most recent year for which FATS data is available. This allows us to retain as much information as possible while also mitigating volatility and potential

[17]The FTA dummy in the CEPII database is only updated to 2015, meanwhile the DESTA database from Dür et al. (2014) is updated to 2019 and covers all treaties that were notified to the WTO

[18]The dummy variable takes the value of 1 only when both the host and source country are EEA Members

measurement errors in the data. Note that this also applies to other control variables with a time dimensional such as the FDI Restrictiveness Index and the WGI.

Even though the CEPII database and most policy variables have near universal coverage, as shown in the table the country coverage of our study is limited by the availability of the FATS, the IFI and the FDI Restrictiveness Index. Although these three variables each covers around 60 to 80 countries, they do not necessarily overlap with each other, and hence when we retain the 'common denominator', the country coverage of our gravity dataset is reduced to just 59 reporting (host) countries and 64 source countries. While 59 countries are far from universal, they covers more than two thirds of the original 70 Members in the first joint declaration and more than half of the 100 participating Members in the current structured discussions. We observe that AVEs can also be calculated for countries not in the estimation by combining the estimated set of IFI coefficients with changes in IFI scores in different scenarios.

The sectoral coverage in this study limited by the availability of gross output data from UNSD which is only available at the ISIC one-digit level. Similarly the sectoral dimension in the OECD's FDI Restrictiveness Index is also rather limited which prevent us from further disaggregating the data at this stage. In the end, we have selected 8 sectors for estimation, they are (1) A – Agriculture, forestry and fishing; (2) B – Mining and quarrying; (3) C – Manufacturing; (4) G – Wholesale and retail trade; repair of motor vehicles and motorcycles; (5) H – Transportation and Storage; (6) J – information and communication; (7) K – Financial and insurance activities; and (8) M – Professional, scientific and technical activities. The detailed equation estimated is specified as follows:

$$\begin{aligned} FATS_{ij,k} = \exp(&\beta_1 + \beta_2 Border_{ij} + \beta_3 IFI_i \times Border_{ij} + \beta_4 FDIR_{i,k} \times Border_{ij} \\ &+ \beta_5 WBDB_i \times Border_{ij} + \beta_6 RGI_i \times Border_{ij} + \beta_7 WGI_i \times Border_{ij} \\ &+ \beta_8 \ln(DIST_{ij}) + \beta_9 Colony_{ij} + \beta_{10} Religion_{ij} + \beta_{11} ComLang_{ij} \\ &+ \beta_{12} ComLegal_{ij} + \beta_{13} FTA_{ij} + \beta_{14} EEA_{ij} + \eta_{i,k} + \mu_{j,k} + \epsilon_{ij,k}) \end{aligned} \tag{3}$$

5 Main Results

The main results of our analysis are shown in Table 2. Before discussing the sector-specific estimations, as an overview we begin in column (1) with a pooled estimation that controls for industry heterogeneity with host/source-industry fixed effects. Overall, the results are largely in line with our expectation. The coefficient of the main interest variable, the IFI, is both significant and displaying the expected sign, thus supporting the hypothesis that better investment facilitation policies lead to higher foreign affiliate sales, and by extension FDI.

Table 2: Main Regression Table (PPML Estimator)

VARIABLES	(1) Pool	(2) A - AGRI	(3) B - MINE	(4) C - MANU	(5) G - WHOREP	(6) H - TPST	(7) J - INFCOM	(8) K - FIN	(9) M - PROF
Investment Facilitation Index	4.816***	1.494	-0.495	4.813***	6.126***	5.182***	1.238	3.466*	3.474***
	(0.987)	(13.79)	(3.185)	(1.582)	(1.819)	(1.363)	(1.968)	(1.872)	(1.324)
FDI Restrictiveness Index	-6.658***	-435.8	-16.95***	-15.13***	-28.47**	-4.623***	-5.354***	4.007	0.120
	(0.732)	(269.7)	(6.200)	(4.460)	(11.81)	(1.038)	(1.170)	(4.256)	(1.260)
Doing Business Score	0.00546	-0.235	0.315***	-0.00132	-0.0363	-0.0396	0.0985***	-0.0285	-0.0865**
	(0.0254)	(0.183)	(0.121)	(0.0417)	(0.0785)	(0.0287)	(0.0358)	(0.0389)	(0.0345)
Regulatory Governance Index	0.579***	0.173	4.394***	0.374	0.304	1.511***	1.279***	1.587***	0.459
	(0.208)	(5.523)	(1.266)	(0.343)	(0.385)	(0.228)	(0.402)	(0.456)	(0.291)
Worldwide Governance Index	0.719***	9.074	2.255**	0.984***	1.438**	1.692***	1.040**	1.100***	0.819***
	(0.220)	(6.857)	(1.075)	(0.369)	(0.589)	(0.396)	(0.425)	(0.407)	(0.302)
Border Dummy	-12.71***	3.794	-49.41***	-11.70***	-10.82***	-14.88***	-18.94***	-14.23***	-4.762**
	(1.378)	(45.79)	(7.084)	(1.795)	(3.592)	(2.097)	(2.896)	(3.121)	(2.102)
Log of Distance	-0.773***	-5.107*	-1.045***	-0.711***	-0.581***	-1.255***	-0.635***	-0.688***	-0.788***
	(0.0675)	(3.069)	(0.293)	(0.0918)	(0.0921)	(0.104)	(0.119)	(0.143)	(0.144)
Colonial Relationships	-0.181	0.791	0.210	-0.128	0.0134	-0.0557	-0.715**	0.321	0.417
	(0.151)	(1.204)	(0.450)	(0.221)	(0.127)	(0.206)	(0.278)	(0.256)	(0.337)
Common Language	0.470***	1.563	0.452	0.990***	-0.182	0.215	0.732***	-0.0579	0.848***
	(0.141)	(1.239)	(0.571)	(0.221)	(0.172)	(0.203)	(0.216)	(0.257)	(0.249)
Religious Proximity Index	0.730***	-1.289	1.105*	0.822***	1.090***	0.637**	0.659	0.0387	-0.754*
	(0.199)	(3.149)	(0.632)	(0.284)	(0.330)	(0.298)	(0.454)	(0.507)	(0.412)
Common Legal Origin	0.339***	-0.587	0.192	0.203**	0.476***	0.336**	0.535***	0.464**	0.184
	(0.0695)	(1.057)	(0.520)	(0.0933)	(0.113)	(0.158)	(0.150)	(0.215)	(0.135)
Free Trade Agreement	-1.407***	2.921	-0.211	-1.366***	-0.616**	-2.098***	-1.364***	-1.490***	-1.645***
	(0.184)	(2.844)	(0.622)	(0.229)	(0.257)	(0.326)	(0.283)	(0.309)	(0.376)
European Economic Area	-0.605***	-8.261	0.0719	-0.855***	0.575**	-1.286***	-0.689*	-0.0422	-0.769**
	(0.163)	(5.897)	(0.515)	(0.247)	(0.245)	(0.270)	(0.354)	(0.298)	(0.303)
Observations	8,988	556	1,165	1,296	1,270	1,305	1,299	787	1,310
Host-sector F.E.	Yes	No	No	No	No	No	No	No	No
Source-sector F.E.	Yes	No	No	No	No	No	No	No	No
Host F.E.	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Source F.E.	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The four policy indices as controls are similarly identified by interacting with the border dummy and they are also displaying the expected sign and are highly significant with the only exception being the Doing Business score which is positive but not significant.

Regarding the bilateral control variables, the coefficients of the border dummy and log of distance are both crucially negative and significant at the 1% level. The coefficients of other historical and cultural variables from the CEPII database are also mostly as expected. On the other hand, the coefficients of the FTA and EEA dummy are both negative and significant which is somewhat counter-intuitive. A potential explanation from the horizontal FDI literature is that multinational production and international trade are two competing forces in serving the domestic market, since one of the main outcomes of FTAs and the Single Market is trade liberalisation through cutting tariffs and eliminating non-tariff barriers. The

resulting reduction in trade costs would promote the trade of goods and services while making the establishment of a foreign affiliate to avoid trade costs (horizontal FDI) less attractive (Helpman et al., 2004). However, it must be noted that empirical studies on the relationship between trade and FDI are mixed. Meanwhile recent modelling and calibration exercise from Ramondo and Rodríguez-Clare (2013) suggests an overall complementary relationship between the two.

Moving on to the sector-specific estimation, the results of the eight individual sectors are shown in column (2) to (9). When comparing the interest variable against the pooled estimation, the IFI coefficients remain positive and significant in only 5 out of 8 sectors. This heterogeneity in the significance level and magnitude of the coefficients highlights the differences in the relative importance of investment facilitation measures across sectors. Such sector variation is not unique to the IFI: for instance, we observe that the mining, manufacturing and wholesale sectors are highly sensitive to changes in the FDI Restrictiveness Index which measures formal/legal barriers such as equity limitation and investment screening. This is not surprising since those three sectors require a strong physical presence or heavy investment in capital. Nevertheless, we do not observe large heterogeneity across sectors in every variable, for example, the coefficients of distance and the WGI are relatively consistent across all eight sectors. Generally speaking, the results of the pooled estimation from column (1) are largely reflected in the sector-specification estimation. Although the coefficients of different variables in different sectors would at times turn insignificant, this is always expected and we rarely find cases that are counter-intuitive (statistically significant but with opposite sign).

Finally, the agriculture sector displayed in column (2) constitutes an outlier as only the distance variable is statically significant at the 10%. During our estimations, we have frequently run into convergence issues for the sector and we believe that this is a result of the lack of observations in general as well as a lack of non-zero observations[19]. Despite this, for the other sectors our estimation has yielded convincing coefficients for the IFI that can be employed to calculate sectoral AVEs.

6 Robustness Checks

Our robustness checks are mainly serving two purposes: first, as standard sensitivity analysis they are included to test the validity of our main estimation model. Second, these alternative gravity specifications also provide us with different sets of IFI coefficients and could be used as upper and lower bounds in the subsequent AVE calculation. In particular, for the five service sectors, we re-estimate the IFI with two separate services trade restrictiveness indices

[19]Excluding domestic sales, there are only 29 non-zero observations out of a total of 819

from the OECD and the WTO/World Bank. In addition, we test the sensitivity of the IFI by reducing and removing the four country-specific policy indices that were included in the main regression as controls.

6.1 Services Trade Restrictiveness Index

a) Introducing STRI

The Services Trade Restrictiveness Index (STRI) is designed to identify and quantify all potential barriers that specifically affect services trade which is primarily impacted by various 'behind-the-border' regulatory measures[20]. Unlike the trade in goods that most are familiar with, services trade is much more complex and takes place through 4 different Modes of supply. This is relevant since the sales of foreign affiliates in the service sectors are not a separate concept but rather part of services trade through the Mode 3 of supply which involves the 'establishment of commercial presence'. As a result, aside from being a popular tool in analysing services trade, we are also interested in exploring its application in our estimation of the IFI as an addition control variable.

Currently, there exists two such indices, one is the OECD STRI from Grosso et al. (2015) which was official launched in 2014 and is updated annually. The index covers five types of services trade restriction[21] and the overall score ranges from 0 (least restrictive) to 1 (most restrictive). In addition, in order to account for deeper integration within the EEA, accompanying the STRI is an auxiliary index called the Intra-EEA STRI which measures services trade barriers within the single market (Benz and Gonzales, 2019).

Comparing to the OECD's STRI, there was actually an earlier effort undertaken by the World Bank through its Services Trade Restrictions Database which was released in 2012 (Borchert et al., 2012), however the database is outdated as it was constructed for the year 2008 only. Nonetheless, through a joint project between the World Bank and the WTO, in recent years the database was updated by Borchert et al. (2019) for the year 2016 and it was renamed as the Services Trade Policy Database (STPD). The updated index covers 4 main areas of restriction[22] and the overall score ranges from 0 (least restrictive) to 100 (most restrictive).

In terms of country coverage, the two indices both provide information for exactly 48 countries, however the OECD STRI mainly covers OECD Members which are mostly developed

[20] An early classification of the different barriers affecting services trade can be found in Hoekman and Primo Braga (1997)

[21] These are (1) restrictions on market entry conditions; 2) restrictions on the movement of people; 3) other discriminatory measures; 4) barriers to competition; and 5) regulatory transparency

[22] These are (1) conditions on market entry; (2) conditions on operations; (3) measures affecting competition; and (4) administrative procedures & regulatory transparency

European nations while the STPD database is geographically more dispersed and has a large share of developing countries. At the sectoral level, the five sectors in the main estimation is covered by both indices, note that the OECD STRI is based on a disaggregated set of 22 service sectors and therefore some aggregation is involved, we present the concordance in Table A1 of the Annex Section. Finally, the two indices differ in many other aspects such as the scoring mechanisms and the expert weighting, they are discussed in greater details in their respective methodology paper.

b) Identification Strategy

Both the OECD STRI and STPD are sector- and country-specific variables, therefore they are similarly identified through interaction with the border dummy. Since the OECD STRI is avaialble for multiple years, we take the average from 2016 to 2018. In addition, for EEA country-pairs we follow Benz and Jaax (2020) and replace the OECD STRI scores with the ones from the Intra-EEA STRI. The use of Intra-EEA STRI reflects the lower trade cost within the Single Market and it replaces the need for a separate EEA dummy (hence dropped from the regression). Note that the above does not apply to the STPD index which is only available for the year 2016 and does not contain separate scoring for country-pairs within the EEA. Finally, for better comparison, the OECD STRI is scale up by a factor of 100 so that it has the same range (0 to 100) as the STPD index.

Regarding the estimation specification, there are two approaches which we can adopt: first, since the STRI should encompass all formal barriers to services trade, the index can be used to replace the four country-specific policy variables (See Section 4.3) that were included as controls in the main regression. The resulting specification will be almost identical to the one adopted in Benz and Jaax (2020)'s study on services barriers with the obvious difference being the inclusion of the IFI. Alternatively, the STRI can be inserted as an additional control variable beside the four original policy indices, however it must cautioned the many overlapping policy areas between all these indices would likely lead to weaker performance as a result of multicollinearity in the regression. In the end, with 4 different gravity estimations, we explored both options separately for the two STRI indices.

c) Estimation Results

For ease of comparison, the results are presented in a summary table which displays the coefficients for the IFI and two STRI indices, the full estimation results are instead listed in Table A2, A3, A4 and A5 of the Annex Section. As shown in Table 3, we adopt the *Replace* subscript to indicate regression equations in which we replaced the four original policy indices with one of the two STRI variables. The *Full* subscript therefore corresponds to specifications where we have added the STRI indices simply as an additional control.

Table 3: Comparisons of IFI and STRI Coefficients

VARIABLES	(1) G - WHOREP	(2) H - TPST	(3) J - INFCOM	(4) K - FIN	(5) M - PROF
IFI_Main	6.126***	5.182***	1.238	3.466*	3.474***
	(1.819)	(1.363)	(1.968)	(1.872)	(1.324)
IFI_OECD_STRI_Replace	7.260***	7.582***	6.878***	6.497***	3.921***
	(0.711)	(0.974)	(1.438)	(0.962)	(0.811)
IFI_STPD_Replace	7.999***	6.365***	5.734***	6.159***	3.838***
	(1.186)	(1.083)	(1.304)	(1.045)	(0.712)
IFI_OECD_STRI_Full	5.286***	5.253***	1.932	3.903**	4.088***
	(1.824)	(1.366)	(1.995)	(1.940)	(1.440)
IFI_STPD_Full	6.491***	5.241***	0.401	4.723**	3.646***
	(1.582)	(1.502)	(2.165)	(2.130)	(1.316)
OECD STRI_Replace	-0.0717***	-0.0145	0.00472	0.00138	0.0254**
	(0.0248)	(0.0140)	(0.0187)	(0.00956)	(0.0100)
STPD_Replace	-0.0121	0.0762*	-0.0557*	-0.0626***	0.0340***
	(0.0259)	(0.0460)	(0.0304)	(0.0231)	(0.0128)
OECD STRI_Full	-0.0286	0.0737***	0.0248	0.000494	0.0285***
	(0.0259)	(0.0177)	(0.0201)	(0.0176)	(0.00956)
STPD_Full	0.0679**	-0.00145	-0.0494	-0.0653**	0.0358***
	(0.0285)	(0.0350)	(0.0446)	(0.0278)	(0.0132)

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Beginning with our interest variable, we can observe that for the *Replace* specification, the magnitude of the IFI coefficients clearly increased for all service sectors when compared with those acquired under the main specification. In addition, the coefficients for the 'Information and Communication' sector have also turned significant. The result suggests that the two STRI indices on their own are unable to capture the full range of factors affecting the sales of foreign affiliates, especially those concerning the institutional quality of the host country which are arguably better reflected by the Worldwide Governance or Regulatory Governance index. On the other hand, in the *Full* specification where the STRI is included as an additional control, the IFI coefficients remained largely the same with little changes in both the magnitude and the significance level.

Moving on to the coefficients of the two STRI indices and the results are not as expected: both the OECD STRI and the STPD index performed poorly, very often they are not significant and even counter-intuitive – the two indices in the 'Professional' sector are always positive and significant which somehow indicates that higher barriers would lead to greater presence of foreign affiliates. This is perhaps most surprising in the *Replace* specification since the STRI is the only policy index beside the IFI. Given that we have tested both

Table 4: With/Without Policy Indices Comparison

VARIABLES	(1) A - AGRI	(2) B - MINE	(3) C - MANU	(4) G - WHOREP	(5) H - TPST	(6) J - INFCOM	(7) K - FIN	(8) M - PROF
IFI_Main	1.494	-0.495	4.813***	6.126***	5.182***	1.238	3.466*	3.474***
	(13.79)	(3.185)	(1.582)	(1.819)	(1.363)	(1.968)	(1.872)	(1.324)
IFI_Paritial	-3.449	8.832***	5.000***	5.763***	6.307***	4.773***	2.753**	0.997
	(15.29)	(2.016)	(0.765)	(1.058)	(1.207)	(1.578)	(1.379)	(0.915)
IFI_Without	22.02***	9.345***	7.134***	8.262***	7.433***	6.188***	6.236***	2.976***
	(6.516)	(1.639)	(0.615)	(0.900)	(0.932)	(1.229)	(1.001)	(0.908)

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

indices and that there are numerous studies attesting their significance[23], the only plausible explanation may lie with the fact that there are multiple overlaps in the measures between the IFI and the STRI, specifically in the policy areas concerning procedural rules and regulatory transparency.

6.2 Policy Indices

As discussed in Section 3, the inclusion of additional policy indices on top of the IFI is meant to control for all the barriers that affect the operation and entry of foreign affiliates other than policies relating to investment facilitation. Given that our exploration of the STRI above has also alluded to their importance, in this second robustness check we aim to validate our identification strategy with a rather straightforward exercise in which we re-estimate the IFI through gradual removal of the four policy indices.

Upon closer examination, the four policy indices can be largely separated into two groups: the FDI Restrictiveness Index and the Doing Business Score both capture barriers or specific regulatory burdens that multinationals face in the entry, establishment, and operation of a foreign subsidiary. Whereas the WGI and the RGI mainly reflect institutional quality of the host country in areas such as government efficiency and transparency in the lawmaking process. With that in mind, we first re-ran the estimation by taking away one variable from each group and in this instance, we have selected the Doing Business Score and the RGI. Similar to the first robustness check, we focus on changes in the IFI coefficients only and they are shown in Table 4 with the *Partial* subscript. Subsequently, we stripped out all four policy indices which meant that the only controls left are the set of standard bilateral gravity variables, and we denote this set of IFI coefficients with the *Without* subscript. As a final note, the full estimation tables can be found in Table A6 and A7 of the Annex Section.

[23]See, for example, (Marel and Shepherd, 2013), (Nordås and Rouzet, 2017) and as already mentioned, (Benz and Jaax, 2020)

The results in Table 4 show that in almost every sector, the IFI coefficients are largest in the *Without* specifications which is in turn followed by the *Partial* specifications and finally those acquired in the main regression. The magnitude of changes is significant, especially for the 'agriculture, forestry & fishing' and the 'mining & quarrying' sector which have turned significant for the first time. This is in line with the expectation that as we remove the policy variables, the IFI coefficients across different sectors would increase as they pick up other types of investment barriers. With 12 control variables, our main specification seems to be distinct from parsimonious approach. However, the robustness check in this section highlights the importance of these policy indices as controls and therefore lends credibility to the identification strategy that we have adopted. Finally, the different sets of IFI coefficients obtained above can also serve as the upper- and lower-bound for the AVE calculation in the next section.

7 Calculating AVEs

7.1 Liberalisation Scenario

So far, the IFI scores employed in the estimations measure countries' current practices. In order to calculate the AVE cost reduction from a potential IFA, we would need information on a new set of IFI scores representing values if an IFA were implemented. Berger et al. (2019) have not only calculated IFI scores reflecting current policies, but they have also came up with a range of liberalisation scenarios built on several publicly available proposals submitted by different WTO Members to the structured discussion. Based on the text of these proposals, Berger et al. (2019) have subsequently mapped out a detailed list of measures in their index that would be impacted. Finally, the scores are updated for each of the 68 countries, generating realistic changes in the IFI under different IFA scenarios, fully reflecting heterogeneity at the country level.

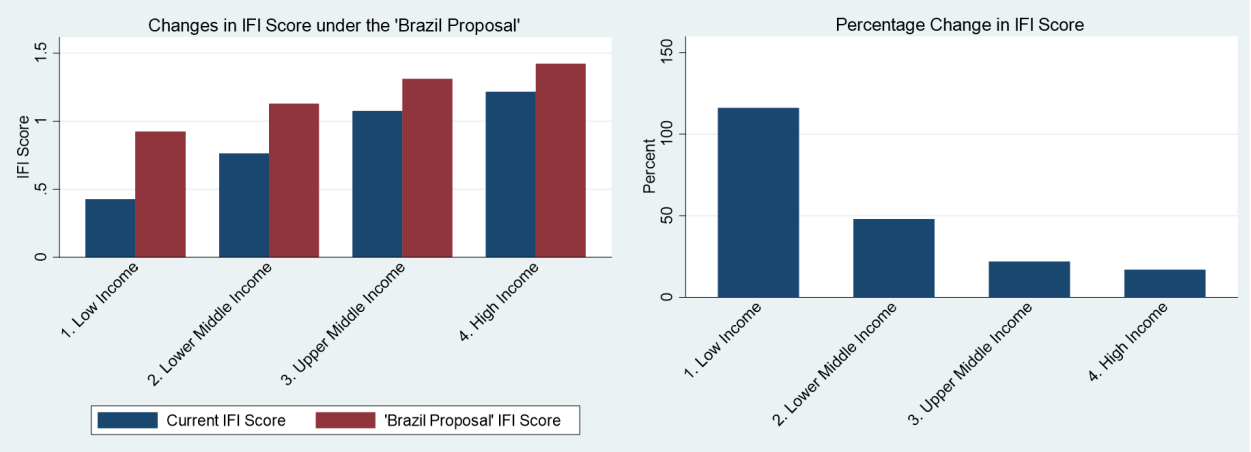
Berger et al. (2019) designed three different liberalisation scenarios and in this study we adopt their 'Middle Range' option which is based on the proposal submitted by Brazil[24] in early 2018 (referred in the rest of this paper as the 'Brazil Proposal'). The proposal made several substantive commitments in policy areas such as regulatory transparency, national focal points and a single electronic window, and in total it affects 38 out of 117 measures tracked by the index[25].

We compiled a list of the 68 countries covered by the IFI as well as each of their before-and-after score based on the 'Brazil Proposal' in Table A8 of the Annex Section. As an overview,

[24]Structured Discussions on Investment Facilitation – Communication from Brazil (JOB/GC/169)

[25]Refer to the original paper for the full list of measures covered in IFI and the list of measures affect by the Brazil Proposal

Figure 1: Average IFI Score by Income Group



we have separated the countries into different income group as defined by the World Bank and they are made up of 42 high-income countries, 12 upper-middle-income countries, 11 lower-middle-income countries, and just 4 low-income countries. Next, by income group we take separate averages for the current IFI scores and the new scores under the 'Brazil Proposal', and they are subsequently compared side-by-side in Figure 1. Overall, we observe that higher income countries have higher IFI scores and thus better investment facilitation policies, and they remain so even after the implementation of the 'Brazil Proposal'. However, most of the improvements would come from lower income countries: as shown in the right-hand panel of Figure 1, the 4 low-income countries will on average see their IFI score increase by over 100%, meanwhile the scores for the lower-middle-income group would increase by around 50%. This is expected since wealthier countries tend to be more open to foreign investment and very often would already have adequate facilitation policies in place. Therefore, there is relatively less scope for further improvements.

7.2 Elasticity of Substitution & IFI Coefficients

The calculation of AVE is a fairly straightforward exercise as it is based on a formula derived from the structural gravity model which is as follows (Bekkers and Rojas-Romagosa, 2019):

$$\text{AVE}_{ik}^{\Delta IFI} = \exp\left(\frac{(\text{IFI}_{ik}^{new} - \text{IFI}_{ik}^{old}) * \beta_{\text{IFI},k}}{(1-\sigma)}\right) - 1 \tag{4}$$

More specifically, the equation above shows that the calculation of AVE would require 3 elements: (1) changes in IFI score, (2) estimated coefficients of the impact of the IFI, and (3) the elasticity of substitution σ. The changes in IFI score are based on the 'Brazil Proposal'

Table 5: List of IFI Coefficients & Elasticity of Substitution

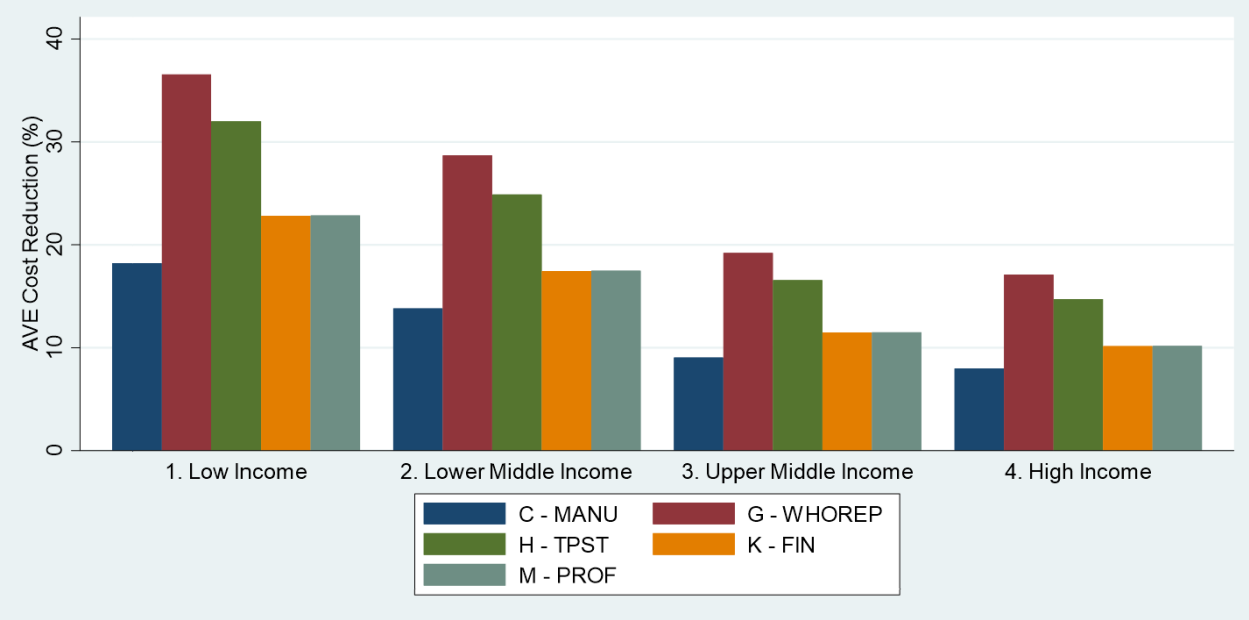
INPUTS	(1) A - AGRI	(2) B - MINE	(3) C - MANU	(4) G - WHOREP	(5) H - TPST	(6) J - INFCOM	(7) K - FIN	(8) M - PROF
IFI_Main	-	-	4.813	6.126	5.182	-	3.466	3.474
IFI_Min	-	8.832	4.813	5.286	5.182	4.773	2.753	0.997
IFI_Max	-	9.345	7.134	8.262	7.582	6.878	6.497	4.088
Elas_Trade	4.76	11.83	6.41	3.8	3.8	3.8	3.8	3.8
Elas_FATS	9.52	23.66	12.82	7.6	7.6	7.6	7.6	7.6

liberalisation scenario discussed above and the IFI coefficients are obtained through various gravity estimations presented earlier. The different sets of IFI coefficients are shown in the first three rows of Table 5, denoted with the *Main* subscript. Our preferred option is those acquired under the main specification in which the IFI coefficients are significant in 5 sectors. Additionally, we have taken the results from the two robustness checks and based on these created a lower-bound and upper-bound of IFI coefficients indicated with the *Min* and *Max* subscript. However, it must be cautioned that the upper-bound is mostly likely an overestimation of the IFI while some of the lower-bounds acquired with the STRI may not be convincing given the indices' poor performance (See Section 6). Finally, we refrain from calculating AVEs for the agricultural sector due to convergence issues in the estimation (See Section 5).

The final input in the calculation of the AVE cost reduction of multinational activity is the elasticity of substitution σ which reflects the responsiveness of demand to changes in prices. In this study, we build on the sector-specific values of the GTAP Data Base. They are shown in Table 5 labelling as *Elas_Trade*[26]. However, the values refer to the substitution elasticities between domestic and imported goods and services whereas our distinction is between domestic goods and services produced by domestically owned firms and those produced by foreign affiliates. This study is therefore focused on the sub-division of domestic products which in modelling terms is referred to as a lower nest Armington elasticity. As a result, we build on CGE models which specifically incorporate FDI and foreign affiliates. These models set the substitution elasticity **twice** as large as the value of the elasticities for imported products (Petri, 1997; Dee and Hanslow, 2000; Lakatos and Fukui, 2014). The rationale for this assumption is that 'higher elasticities accord better with notions of firm level product differentiation'. In the end, the final elasticities for our calculation of AVEs are shown in the

[26]Note that the GTAP sectors are more disaggregated for the 'manufacturing' and 'mining & quarrying' sector with 21 and 4 sub-sectors respectively, therefore the elasticities are acquired by taking trade-weighted averages, meanwhile the elasticities for all service sectors is set at 3.8 in the GTAP model

Figure 2: Average AVE Cost Reduction by Income Group (Main Regression)



last row of Table 5 with the *FATS* subscript.

Finally, it is also common practice to adopt values of substitution elasticities that were estimated econometrically. However, to the best of our knowledge, there seems to be no econometric work estimating the within-country substitution elasticities between products of domestic firms and foreign affiliates.

7.3 Results

Detailed results of the AVE cost reduction by country and by sector are presented in Table A9. In this sub-section, we provide a brief summary by once again grouping the results according to country's income group. The relevant information is displayed in Figure 2 where in this instance, we are only focusing on the 5 sectors under the main regression with significant IFI coefficients. Generally speaking, at the sectoral level, the AVE cost reduction in the four service sectors is consistently higher than those calculated for the manufacturing sector. This is primarily a result of manufacturing's higher substitution elasticity given that the magnitude of its IFI coefficients is similar to the coefficients in the services sectors (See Table 2). At the country level, it is clear that the biggest gain will be found in low-income countries with average reductions of 20% to 30% across all sectors. On the other hand, cost reductions are fairly modest for high-income countries: our calculation suggests that the manufacturing, finance and professional sectors display only single-digit reductions in AVE costs of multinational activity.

8 Conclusion

By exploiting the new Investment Facilitation Index, we are able to capture the effect of investment facilitation polices in attracting FDI through a structural gravity estimation. Not only have we found significant results, but our estimations have also revealed heterogeneous effect across sectors. Subsequently, the IFI coefficients are used to derive AVEs of cost reduction of multinational activity which is built on detailed mapping based on the 'Brazil Proposal'. Our AVE calculations are both country- and sector-specific and we find that most of the cost reductions will be concentrated in the services sectors. In addition, lower income countries will see the biggest cost reductions across all sectors. Hence, they have the biggest potential in attracting FDI through the implementation of the IFA. As a result, this papers seems to suggest that developing Members of the WTO can benefit from more active involvement in the IFA's structured discussions, as they are currently under-represented in the negotiations.

The current work will be extended in various directions. First, the German Development Institute and the WTO are cooperating on expanding the country coverage of IFI to reflect the growing number of Members participating in the current structured discussion. This will enable us to both include more countries in the econometric estimation and in the post-estimation calculation of AVE cost reductions. Second, this work will also extend and refine the investment measures covered by the IFI as well as explore more up-to-date liberalisation scenarios reflecting the actual negotiations on a potential IFA. Third, in terms of data coverage, we are also working on expanding the sectoral coverage of our study with more detailed FATS and gross output data, particularly at the ISIC two-digit level of the manufacturing sector with as ultimate goal to cover 15 to 20 sectors.

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Annex

Table A1: OECD – ISIC Sector Concordance

OECD STRI Services Sector	**Corresponding ISIC Rev.4 Sector***
Logistic: Cargo-handling Logistic: Storage and warehouse Logistic: Freight forwarding Logistic: Customs brokerage Air transport Maritime transport Road freight transport Rail freight transport Courier	H - TPST
Professional: Accounting Professional: Architecture Professional: Engineering Professional: Legal	M - PROF
Audio visual: Motion pictures Audio visual: Broadcasting Audio visual: Sound recording Computer Telecommunications	J - INFCOM
Distribution	G - WHOREP
Financial: Commercial Banking Financial: Insurance	K - FIN
Construction	F - CONST**

*The concordance above are not perfect matches, generally speaking the OECD STRI sectors does not cover the full range of economic activities at the ISIC one-digit level

**Sector F (Construction) is not covered in this study

Table A2: Robustness Check – OECD STRI with Policy Indices

VARIABLES	(1) G - WHOREP	(2) H - TPST	(3) J - INFCOM	(4) K - FIN	(5) M - PROF
Investment Facilitation Index	5.286***	5.253***	1.932	3.903**	4.088***
	(1.824)	(1.366)	(1.995)	(1.940)	(1.440)
OECD STRI	-0.0286	0.0737***	0.0248	0.000494	0.0285***
	(0.0259)	(0.0177)	(0.0201)	(0.0176)	(0.00956)
FDI Restrictiveness Index	-27.97**	-5.294***	-5.107***	4.623	-0.269
	(11.90)	(1.214)	(1.194)	(5.193)	(1.200)
Doing Business Score	-0.0107	-0.0282	0.109***	-0.0355	-0.0763**
	(0.0832)	(0.0273)	(0.0378)	(0.0379)	(0.0319)
Regulatory Governance Index	-0.0456	1.586***	1.465***	1.661***	0.592**
	(0.437)	(0.233)	(0.410)	(0.479)	(0.285)
Worldwide Governance Index	1.319**	1.828***	1.028**	1.056**	0.854***
	(0.655)	(0.396)	(0.425)	(0.431)	(0.306)
Border Dummy	-8.928**	-18.09***	-22.48***	-14.62***	-8.028***
	(4.017)	(1.940)	(3.062)	(3.002)	(1.483)
Log of Distance	-0.683***	-1.185***	-0.508***	-0.713***	-0.711***
	(0.0870)	(0.0981)	(0.108)	(0.141)	(0.0911)
Colonial Relationships	-0.0567	-0.0278	-0.741**	0.332	0.462
	(0.127)	(0.220)	(0.298)	(0.258)	(0.343)
Common Language	-0.253	0.173	0.757***	-0.0788	0.850***
	(0.183)	(0.204)	(0.231)	(0.257)	(0.241)
Religious Proximity Index	1.065***	0.585*	0.745	0.0461	-0.657
	(0.350)	(0.306)	(0.477)	(0.515)	(0.412)
Common Legal Origin	0.489***	0.363**	0.545***	0.480**	0.206
	(0.119)	(0.163)	(0.160)	(0.216)	(0.142)
Free Trade Agreement	-0.726***	-2.018***	-1.273***	-1.574***	-1.530***
	(0.279)	(0.323)	(0.287)	(0.306)	(0.280)
Observations	1,180	1,214	1,210	710	1,214
Host F.E.	Yes	Yes	Yes	Yes	Yes
Source F.E.	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A3: Robustness Check – OECD STRI without Policy Indices

VARIABLES	(1) G - WHOREP	(2) H - TPST	(3) J - INFCOM	(4) K - FIN	(5) M - PROF
Investment Facilitation Index	7.260***	7.582***	6.878***	6.497***	3.921***
	(0.711)	(0.974)	(1.438)	(0.962)	(0.811)
OECD STRI	-0.0717***	-0.0145	0.00472	0.00138	0.0254**
	(0.0248)	(0.0140)	(0.0187)	(0.00956)	(0.0100)
Border Dummy	-10.61***	-13.96***	-12.92***	-11.32***	-9.399***
	(0.963)	(1.266)	(2.068)	(1.309)	(1.171)
Log of Distance	-0.634***	-0.791***	-0.585***	-0.735***	-0.675***
	(0.0899)	(0.0963)	(0.101)	(0.103)	(0.0917)
Colonial Relationships	0.00655	0.217	-0.219	0.377	0.412
	(0.154)	(0.209)	(0.240)	(0.237)	(0.292)
Common Language	-0.155	0.152	0.671***	-0.0549	0.836***
	(0.188)	(0.230)	(0.201)	(0.255)	(0.220)
Religious Proximity Index	0.864**	0.519*	0.644	-0.173	-0.488
	(0.336)	(0.304)	(0.516)	(0.590)	(0.392)
Common Legal Origin	0.490***	0.319*	0.522***	0.522**	0.161
	(0.116)	(0.188)	(0.171)	(0.229)	(0.149)
Free Trade Agreement	-1.151***	-0.584	-1.999***	-1.385***	-1.178***
	(0.253)	(0.462)	(0.396)	(0.298)	(0.280)
Observations	1,180	1,214	1,210	710	1,214
Host F.E.	Yes	Yes	Yes	Yes	Yes
Source F.E.	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A4: Robustness Check – STPD with Policy Indices

VARIABLES	(1) G - WHOREP	(2) H - TPST	(3) J - INFCOM	(4) K - FIN	(5) M - PROF
Investment Facilitation Index	6.491***	5.241***	0.401	4.723**	3.646***
	(1.582)	(1.502)	(2.165)	(2.130)	(1.316)
STPD	0.0679**	-0.00145	-0.0494	-0.0653**	0.0358***
	(0.0285)	(0.0350)	(0.0446)	(0.0278)	(0.0132)
FDI Restrictiveness Index	-26.61***	-4.776***	-4.763***	7.726*	-0.756
	(8.105)	(1.078)	(1.519)	(4.223)	(1.118)
Doing Business Score	-0.0490	-0.0391	0.108***	-0.0235	-0.0618*
	(0.0736)	(0.0297)	(0.0375)	(0.0393)	(0.0352)
Regulatory Governance Index	1.277**	1.536***	1.465***	1.874***	0.454
	(0.529)	(0.229)	(0.434)	(0.439)	(0.314)
Worldwide Governance Index	1.651**	1.671***	1.353***	0.813	0.792***
	(0.656)	(0.404)	(0.520)	(0.499)	(0.296)
Border Dummy	-17.29***	-14.96***	-18.21***	-14.62***	-7.997***
	(3.580)	(2.268)	(3.651)	(3.193)	(1.892)
Log of Distance	-0.532***	-1.260***	-0.634***	-0.652***	-0.857***
	(0.0928)	(0.108)	(0.120)	(0.130)	(0.145)
Colonial Relationships	-0.105	-0.0692	-0.701**	0.306	0.335
	(0.133)	(0.212)	(0.283)	(0.250)	(0.329)
Common Language	-0.138	0.219	0.805***	0.156	0.815***
	(0.165)	(0.202)	(0.231)	(0.279)	(0.239)
Religious Proximity Index	0.846**	0.665**	0.803*	-0.140	-0.733*
	(0.359)	(0.305)	(0.470)	(0.496)	(0.388)
Common Legal Origin	0.497***	0.327**	0.478***	0.434**	0.201
	(0.116)	(0.157)	(0.156)	(0.212)	(0.137)
Free Trade Agreement	-0.614**	-2.116***	-1.226***	-1.697***	-1.667***
	(0.258)	(0.330)	(0.290)	(0.319)	(0.340)
European Economic Area	0.506**	-1.328***	-0.607*	-0.0464	-1.024***
	(0.247)	(0.305)	(0.367)	(0.294)	(0.318)
Observations	1,203	1,239	1,235	732	1,241
Host F.E.	Yes	Yes	Yes	Yes	Yes
Source F.E.	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A5: Robustness Check – STPD without Policy Indices

VARIABLES	(1) G - WHOREP	(2) H - TPST	(3) J - INFCOM	(4) K - FIN	(5) M - PROF
Investment Facilitation Index	7.999***	6.365***	5.734***	6.159***	3.838***
	(1.186)	(1.083)	(1.304)	(1.045)	(0.712)
STPD	-0.0121	0.0762*	-0.0557*	-0.0626***	0.0340***
	(0.0259)	(0.0460)	(0.0304)	(0.0231)	(0.0128)
Border Dummy	-12.59***	-14.93***	-8.923***	-7.643***	-9.604***
	(2.352)	(1.432)	(2.288)	(1.976)	(1.186)
Log of Distance	-0.590***	-0.947***	-0.705***	-0.812***	-0.818***
	(0.104)	(0.112)	(0.109)	(0.109)	(0.130)
Colonial Relationships	0.0473	0.118	-0.215	0.318	0.325
	(0.157)	(0.219)	(0.232)	(0.243)	(0.274)
Common Language	-0.138	0.0511	0.777***	0.152	0.793***
	(0.179)	(0.230)	(0.207)	(0.259)	(0.210)
Religious Proximity Index	0.897**	0.392	0.662	-0.509	-0.554
	(0.356)	(0.305)	(0.516)	(0.568)	(0.371)
Common Legal Origin	0.496***	0.364*	0.462***	0.482**	0.154
	(0.117)	(0.188)	(0.164)	(0.223)	(0.144)
Free Trade Agreement	-1.130***	-0.879**	-1.914***	-1.599***	-1.325***
	(0.250)	(0.374)	(0.375)	(0.314)	(0.299)
European Economic Area	0.762***	-0.272	-0.381	-0.522*	-0.937***
	(0.265)	(0.328)	(0.332)	(0.282)	(0.291)
Observations	1,203	1,239	1,235	732	1,241
Host F.E.	Yes	Yes	Yes	Yes	Yes
Source F.E.	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A6: Robustness Check – Dropping Doing Business Score & WGI

VARIABLES	(1) A - AGRI	(2) B - MINE	(3) C - MANU	(4) G - WHOREP	(5) H - TPST	(6) J - INFCOM	(7) K - FIN	(8) M - PROF
Investment Facilitation Index	-3.449	8.832***	5.000***	5.763***	6.307***	4.773***	2.753**	0.997
	(15.29)	(2.016)	(0.765)	(1.058)	(1.207)	(1.578)	(1.379)	(0.915)
FDI Restrictiveness Index	-420.4*	-6.742	-16.85***	-29.49***	-5.240***	-4.719***	-2.464	-0.197
	(234.0)	(6.275)	(3.595)	(8.700)	(1.050)	(1.093)	(3.347)	(1.812)
Worldwide Governance Index	9.258	0.795	0.996***	1.238***	1.250***	0.773**	1.279***	0.949***
	(8.282)	(0.806)	(0.343)	(0.385)	(0.402)	(0.383)	(0.489)	(0.361)
Border Dummy	-6.398	-16.00***	-10.20***	-11.19***	-11.26***	-9.903***	-7.287***	-5.464***
	(19.96)	(2.600)	(0.935)	(1.358)	(1.366)	(1.743)	(1.618)	(1.423)
Log of Distance	-5.003*	-1.088***	-0.739***	-0.597***	-1.293***	-0.756***	-0.840***	-0.824***
	(2.955)	(0.182)	(0.0809)	(0.0894)	(0.101)	(0.103)	(0.103)	(0.136)
Colonial Relationships	0.694	0.888**	-0.0979	-0.00978	0.0612	-0.367	0.359	0.278
	(0.940)	(0.420)	(0.189)	(0.122)	(0.203)	(0.239)	(0.246)	(0.329)
Common Language	1.716	0.857**	0.950***	-0.192	0.0307	0.589***	-0.134	0.804***
	(1.397)	(0.416)	(0.214)	(0.172)	(0.214)	(0.188)	(0.258)	(0.262)
Religious Proximity Index	-0.580	-0.554	0.747***	1.007***	0.409	0.240	-0.230	-0.617
	(2.100)	(0.772)	(0.272)	(0.308)	(0.291)	(0.487)	(0.533)	(0.448)
Common Legal Origin	-0.871	0.0472	0.214**	0.486***	0.371**	0.610***	0.510**	0.194
	(1.165)	(0.443)	(0.0944)	(0.111)	(0.167)	(0.154)	(0.228)	(0.144)
Free Trade Agreement	2.790	-0.469	-1.323***	-0.662***	-1.604***	-1.582***	-1.394***	-1.519***
	(2.646)	(0.517)	(0.232)	(0.225)	(0.313)	(0.289)	(0.279)	(0.370)
European Economic Area	-8.173	0.172	-0.941***	0.526**	-1.478***	-0.888***	-0.612**	-0.992***
	(5.684)	(0.502)	(0.194)	(0.236)	(0.288)	(0.310)	(0.271)	(0.329)
Observations	556	1,165	1,296	1,270	1,305	1,299	787	1,310
Host F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Source F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A7: Robustness Check – Dropping All Policy Indices

VARIABLES	(1) A - AGRI	(2) B - MINE	(3) C - MANU	(4) G - WHOREP	(5) H - TPST	(6) J - INFCOM	(7) K - FIN	(8) M - PROF
Investment Facilitation Index	22.02***	9.345***	7.134***	8.262***	7.433***	6.188***	6.236***	2.976***
	(6.516)	(1.639)	(0.615)	(0.900)	(0.932)	(1.229)	(1.001)	(0.908)
Border Dummy	-34.89***	-16.26***	-12.15***	-13.27***	-13.93***	-11.54***	-10.82***	-7.214***
	(11.09)	(2.455)	(1.002)	(1.445)	(1.442)	(1.647)	(1.448)	(1.506)
Log of Distance	-3.497***	-0.983***	-0.660***	-0.605***	-0.836***	-0.689***	-0.759***	-0.731***
	(1.295)	(0.195)	(0.0884)	(0.107)	(0.112)	(0.106)	(0.103)	(0.124)
Colonial Relationships	0.672	0.959**	-0.0450	0.0460	0.197	-0.217	0.349	0.305
	(0.731)	(0.389)	(0.193)	(0.153)	(0.209)	(0.237)	(0.241)	(0.309)
Common Language	1.882	0.949**	0.983***	-0.156	0.146	0.668***	-0.0432	0.879***
	(1.165)	(0.429)	(0.213)	(0.176)	(0.230)	(0.194)	(0.256)	(0.244)
Religious Proximity Index	1.514	-0.552	0.846***	0.817**	0.486	0.714	-0.192	-0.511
	(1.761)	(0.751)	(0.302)	(0.379)	(0.304)	(0.512)	(0.587)	(0.400)
Common Legal Origin	-0.797	0.00789	0.176*	0.503***	0.333*	0.512***	0.513**	0.136
	(0.845)	(0.451)	(0.0996)	(0.113)	(0.185)	(0.161)	(0.229)	(0.145)
Free Trade Agreement	-1.448	-0.557	-1.493***	-1.151***	-0.709	-2.143***	-1.412***	-1.285***
	(1.943)	(0.523)	(0.219)	(0.259)	(0.493)	(0.372)	(0.302)	(0.345)
European Economic Area	-3.853*	0.667**	-0.640***	0.732***	0.127	-0.380	-0.156	-0.714**
	(2.305)	(0.319)	(0.189)	(0.280)	(0.256)	(0.335)	(0.241)	(0.300)
Observations	556	1,165	1,296	1,270	1,305	1,299	787	1,310
Host F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Source F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A8: Full Country List & IFI Score

Country	ISO3	Income Group	Current IFI	'Brazil' IFI	ΔIFI
Argentina	ARG	High Income	1.222	1.437	0.215
Australia	AUS	High Income	1.576	1.654	0.078
Austria	AUT	High Income	1.434	1.518	0.084
Belgium	BEL	High Income	1.253	1.39	0.137
Benin	BEN	Low Income	0.196	0.805	0.609
Brazil	BRA	Upper Middle Income	1.163	1.366	0.203
Bulgaria	BGR	Upper Middle Income	1.133	1.368	0.235
Cambodia	KHM	Lower Middle Income	0.936	1.222	0.286
Canada	CAN	High Income	1.412	1.504	0.092
Chile	CHL	High Income	1.243	1.369	0.126
China	CHN	Upper Middle Income	1.414	1.518	0.104
Colombia	COL	Upper Middle Income	1.124	1.313	0.189
Costa Rica	CRI	Upper Middle Income	1.415	1.546	0.131
Croatia	HRV	High Income	1.06	1.336	0.276
Cyprus	CYP	High Income	1.247	1.493	0.246
Czechia	CZE	High Income	1.15	1.386	0.236
Denmark	DNK	High Income	1.39	1.525	0.135
El Salvador	SLV	Lower Middle Income	1.017	1.256	0.239
Estonia	EST	High Income	1.306	1.484	0.178
Finland	FIN	High Income	1.261	1.478	0.217
France	FRA	High Income	1.302	1.51	0.208
Germany	DEU	High Income	1.515	1.564	0.049
Greece	GRC	High Income	1.091	1.322	0.231
Guatemala	GTM	Upper Middle Income	0.905	1.149	0.244
Guinea	GIN	Low Income	0.793	1.12	0.327

Honduras	HND	Lower Middle Income	0.582	0.989	0.407
Hong Kong, China	HKG	High Income	1.397	1.592	0.195
Hungary	HUN	High Income	0.863	1.199	0.336
India	IND	Lower Middle Income	0.865	1.234	0.369
Ireland	IRL	High Income	1.136	1.377	0.241
Italy	ITA	High Income	1.167	1.452	0.285
Japan	JPN	High Income	1.37	1.468	0.098
Kazakhstan	KAZ	Upper Middle Income	1.19	1.325	0.135
Korea	KOR	High Income	1.574	1.615	0.041
Kuwait	KWT	High Income	0.62	1.024	0.404
Kyrgyz Republic	KGZ	Lower Middle Income	0.702	1.102	0.4
Lao PDR	LAO	Lower Middle Income	0.603	1.01	0.407
Latvia	LVA	High Income	0.887	1.236	0.349
Liberia	LBR	Low Income	0.231	0.818	0.587
Lithuania	LTU	High Income	1.018	1.346	0.328
Luxembourg	LUX	High Income	1.274	1.453	0.179
Malaysia	MYS	Upper Middle Income	0.914	1.176	0.262
Malta	MLT	High Income	0.744	1.136	0.392
Mexico	MEX	Upper Middle Income	1.367	1.49	0.123
Moldova	MDA	Lower Middle Income	0.702	1.071	0.369
Myanmar	MMR	Lower Middle Income	0.59	1.031	0.441
Netherlands	NLD	High Income	1.43	1.539	0.109
New Zealand	NZL	High Income	1.377	1.479	0.102
Nicaragua	NIC	Lower Middle Income	0.836	1.182	0.346
Nigeria	NGA	Lower Middle Income	0.775	1.127	0.352
Pakistan	PAK	Lower Middle Income	0.787	1.197	0.41
Panama	PAN	High Income	0.81	1.147	0.337

Poland	POL	High Income	1.237	1.431	0.194
Portugal	PRT	High Income	1.202	1.468	0.266
Qatar	QAT	High Income	0.745	1.11	0.365
Romania	ROU	Upper Middle Income	0.851	1.216	0.365
Russia	RUS	Upper Middle Income	0.936	1.291	0.355
Singapore	SGP	High Income	1.29	1.472	0.182
Slovak	SVK	High Income	1.144	1.415	0.271
Slovenia	SVN	High Income	1.257	1.452	0.195
Spain	ESP	High Income	1.219	1.454	0.235
Sweden	SWE	High Income	1.395	1.538	0.143
Switzerland	CHE	High Income	1.282	1.469	0.187
Tajikistan	TJK	Upper Middle Income	0.503	0.982	0.479
Togo	TGO	Low Income	0.491	0.954	0.463
United Kingdom	GBR	High Income	1.424	1.517	0.093
Uruguay	URY	High Income	0.997	1.277	0.28
United States	USA	High Income	1.595	1.734	0.139

Table A9: AVE of Cost Reduction by Country & by Sector (Brazil Proposal)

Country	Sector	AVEs_Main	AVEs_Minimum	AVEs_Maximum
Argentina	A - Agri			
	B - MINE		8.03	8.48
	C - MANU	8.39	8.39	12.17
	G - WHOREP	18.09	15.82	23.60
	H - TPST	15.53	15.53	21.89
	J - INFCOM		14.40	20.07
	K - FIN	10.68	8.58	19.07
	M - PROF	10.70	3.20	12.47
Australia	A - Agri			
	B - MINE		2.99	3.16
	C - MANU	3.13	3.13	4.60
	G - WHOREP	6.98	6.06	9.30
	H - TPST	5.94	5.94	8.57
	J - INFCOM		5.48	7.81
	K - FIN	4.01	3.20	7.39
	M - PROF	4.02	1.17	4.72
Austria	A - Agri			
	B - MINE		3.22	3.40
	C - MANU	3.36	3.36	4.95
	G - WHOREP	7.50	6.51	9.98
	H - TPST	6.38	6.38	9.20
	J - INFCOM		5.89	8.38
	K - FIN	4.32	3.44	7.94
	M - PROF	4.33	1.26	5.07
Belgium	A - Agri			
	B - MINE		5.20	5.49
	C - MANU	5.43	5.43	7.94
	G - WHOREP	11.94	10.39	15.76
	H - TPST	10.20	10.20	14.56
	J - INFCOM		9.43	13.30
	K - FIN	6.94	5.55	12.62
	M - PROF	6.96	2.05	8.14
Benin	A - Agri			
	B - MINE		21.12	22.20
	C - MANU	21.97	21.97	30.77
	G - WHOREP	43.18	38.60	53.34
	H - TPST	38.01	38.01	50.32
	J - INFCOM		35.62	46.99
	K - FIN	27.37	22.43	45.09
	M - PROF	27.43	8.79	31.42

Brazil	A - Agri			
	B - MINE		7.60	8.03
	C - MANU	7.94	7.94	11.54
	G - WHOREP	17.17	15.01	22.44
	H - TPST	14.73	14.73	20.80
	J - INFCOM		13.65	19.07
	K - FIN	10.11	8.12	18.11
	M - PROF	10.13	3.02	11.82
Bulgaria	A - Agri			
	B - MINE		8.75	9.23
	C - MANU	9.13	9.13	13.23
	G - WHOREP	19.60	17.16	25.49
	H - TPST	16.85	16.85	23.66
	J - INFCOM		15.63	21.72
	K - FIN	11.61	9.34	20.65
	M - PROF	11.64	3.49	13.55
Cambodia	A - Agri			
	B - MINE		10.54	11.12
	C - MANU	11.00	11.00	15.86
	G - WHOREP	23.31	20.47	30.09
	H - TPST	20.11	20.11	28.00
	J - INFCOM		18.68	25.77
	K - FIN	13.95	11.25	24.54
	M - PROF	13.98	4.23	16.23
Canada	A - Agri			
	B - MINE		3.52	3.72
	C - MANU	3.68	3.68	5.40
	G - WHOREP	8.18	7.10	10.88
	H - TPST	6.97	6.97	10.03
	J - INFCOM		6.44	9.14
	K - FIN	4.72	3.76	8.66
	M - PROF	4.73	1.38	5.54
Chile	A - Agri			
	B - MINE		4.79	5.06
	C - MANU	5.00	5.00	7.33
	G - WHOREP	11.04	9.60	14.59
	H - TPST	9.42	9.42	13.48
	J - INFCOM		8.71	12.31
	K - FIN	6.40	5.12	11.66
	M - PROF	6.42	1.89	7.51
China	A - Agri			
	B - MINE		3.97	4.20
	C - MANU	4.15	4.15	6.09
	G - WHOREP	9.20	7.99	12.21

	H - TPST	7.84	7.84	11.26
	J - INFCOM		7.25	10.27
	K - FIN	5.32	4.25	9.73
	M - PROF	5.33	1.56	6.24
Colombia	A - Agri			
	B - MINE		7.10	7.49
	C - MANU	7.41	7.41	10.79
	G - WHOREP	16.09	14.05	21.07
	H - TPST	13.79	13.79	19.52
	J - INFCOM		12.78	17.88
	K - FIN	9.45	7.58	16.98
	M - PROF	9.47	2.81	11.05
Costa Rica	A - Agri			
	B - MINE		4.98	5.26
	C - MANU	5.20	5.20	7.61
	G - WHOREP	11.45	9.96	15.12
	H - TPST	9.77	9.77	13.97
	J - INFCOM		9.04	12.76
	K - FIN	6.65	5.32	12.10
	M - PROF	6.66	1.96	7.79
Croatia	A - Agri			
	B - MINE		10.19	10.75
	C - MANU	10.63	10.63	15.35
	G - WHOREP	22.60	19.83	29.21
	H - TPST	19.48	19.48	27.17
	J - INFCOM		18.09	25.00
	K - FIN	13.49	10.87	23.79
	M - PROF	13.52	4.08	15.71
Cyprus	A - Agri			
	B - MINE		9.14	9.64
	C - MANU	9.54	9.54	13.80
	G - WHOREP	20.41	17.88	26.50
	H - TPST	17.56	17.56	24.62
	J - INFCOM		16.30	22.61
	K - FIN	12.12	9.75	21.51
	M - PROF	12.15	3.65	14.13
Czechia	A - Agri			
	B - MINE		8.78	9.27
	C - MANU	9.17	9.17	13.28
	G - WHOREP	19.67	17.22	25.58
	H - TPST	16.91	16.91	23.75
	J - INFCOM		15.69	21.80
	K - FIN	11.66	9.38	20.73

	M - PROF	11.68	3.50	13.60
Denmark	A - Agri			
	B - MINE		5.12	5.41
	C - MANU	5.35	5.35	7.83
	G - WHOREP	11.78	10.25	15.55
	H - TPST	10.06	10.06	14.37
	J - INFCOM		9.30	13.12
	K - FIN	6.84	5.48	12.44
	M - PROF	6.86	2.02	8.02
El Salvador	A - Agri			
	B - MINE		8.89	9.38
	C - MANU	9.28	9.28	13.44
	G - WHOREP	19.90	17.42	25.86
	H - TPST	17.11	17.11	24.01
	J - INFCOM		15.87	22.05
	K - FIN	11.80	9.49	20.96
	M - PROF	11.82	3.55	13.76
Estonia	A - Agri			
	B - MINE		6.70	7.07
	C - MANU	6.99	6.99	10.19
	G - WHOREP	15.23	13.29	19.97
	H - TPST	13.04	13.04	18.49
	J - INFCOM		12.08	16.93
	K - FIN	8.92	7.16	16.07
	M - PROF	8.94	2.65	10.44
Finland	A - Agri			
	B - MINE		8.11	8.56
	C - MANU	8.46	8.46	12.28
	G - WHOREP	18.24	15.95	23.79
	H - TPST	15.67	15.67	22.06
	J - INFCOM		14.52	20.24
	K - FIN	10.77	8.65	19.23
	M - PROF	10.79	3.22	12.58
France	A - Agri			
	B - MINE		7.78	8.22
	C - MANU	8.12	8.12	11.80
	G - WHOREP	17.56	15.35	22.92
	H - TPST	15.07	15.07	21.25
	J - INFCOM		13.97	19.49
	K - FIN	10.35	8.31	18.52
	M - PROF	10.37	3.09	12.09
Germany	A - Agri			
	B - MINE		1.89	2.00

	C - MANU	1.98	1.98	2.92
	G - WHOREP	4.45	3.85	5.95
	H - TPST	3.77	3.77	5.47
	J - INFCOM		3.48	4.98
	K - FIN	2.54	2.02	4.71
	M - PROF	2.55	0.74	2.99
Greece	A - Agri			
	B - MINE		8.61	9.08
	C - MANU	8.98	8.98	13.02
	G - WHOREP	19.30	16.89	25.11
	H - TPST	16.59	16.59	23.31
	J - INFCOM		15.38	21.39
	K - FIN	11.42	9.19	20.34
	M - PROF	11.45	3.43	13.33
Guatemala	A - Agri			
	B - MINE		9.07	9.57
	C - MANU	9.46	9.46	13.70
	G - WHOREP	20.27	17.75	26.32
	H - TPST	17.43	17.43	24.44
	J - INFCOM		16.18	22.45
	K - FIN	12.03	9.68	21.35
	M - PROF	12.05	3.62	14.03
Guinea	A - Agri			
	B - MINE		11.96	12.61
	C - MANU	12.47	12.47	17.92
	G - WHOREP	26.18	23.04	33.59
	H - TPST	22.64	22.64	31.32
	J - INFCOM		21.06	28.88
	K - FIN	15.78	12.75	27.52
	M - PROF	15.81	4.82	18.33
Honduras	A - Agri			
	B - MINE		14.66	15.44
	C - MANU	15.28	15.28	21.79
	G - WHOREP	31.46	27.82	39.92
	H - TPST	27.35	27.35	37.35
	J - INFCOM		25.50	34.57
	K - FIN	19.24	15.61	33.01
	M - PROF	19.28	5.96	22.28
Hong Kong	A - Agri			
	B - MINE		7.32	7.72
	C - MANU	7.64	7.64	11.11
	G - WHOREP	16.56	14.46	21.66
	H - TPST	14.20	14.20	20.07
	J - INFCOM		13.15	18.39

	K - FIN	9.73	7.81	17.47
	M - PROF	9.75	2.90	11.38
Hungary	A - Agri			
	B - MINE		12.27	12.93
	C - MANU	12.79	12.79	18.36
	G - WHOREP	26.79	23.59	34.34
	H - TPST	23.19	23.19	32.02
	J - INFCOM		21.57	29.54
	K - FIN	16.18	13.08	28.16
	M - PROF	16.21	4.95	18.79
India	A - Agri			
	B - MINE		13.39	14.11
	C - MANU	13.96	13.96	19.97
	G - WHOREP	29.00	25.59	36.99
	H - TPST	25.15	25.15	34.55
	J - INFCOM		23.42	31.92
	K - FIN	17.62	14.27	30.46
	M - PROF	17.65	5.42	20.43
Ireland	A - Agri			
	B - MINE		8.96	9.46
	C - MANU	9.35	9.35	13.54
	G - WHOREP	20.04	17.55	26.04
	H - TPST	17.24	17.24	24.18
	J - INFCOM		15.99	22.21
	K - FIN	11.89	9.56	21.12
	M - PROF	11.91	3.58	13.87
Italy	A - Agri			
	B - MINE		10.51	11.08
	C - MANU	10.96	10.96	15.81
	G - WHOREP	23.24	20.41	30.01
	H - TPST	20.05	20.05	27.92
	J - INFCOM		18.63	25.70
	K - FIN	13.90	11.21	24.46
	M - PROF	13.93	4.21	16.18
Japan	A - Agri			
	B - MINE		3.75	3.96
	C - MANU	3.91	3.91	5.75
	G - WHOREP	8.69	7.55	11.55
	H - TPST	7.41	7.41	10.65
	J - INFCOM		6.84	9.71
	K - FIN	5.02	4.01	9.20
	M - PROF	5.03	1.47	5.89
Kazakhstan	A - Agri			

	B - MINE		5.12	5.41
	C - MANU	5.35	5.35	7.83
	G - WHOREP	11.78	10.25	15.55
	H - TPST	10.06	10.06	14.37
	J - INFCOM		9.30	13.12
	K - FIN	6.84	5.48	12.44
	M - PROF	6.86	2.02	8.02
Korea	A - Agri			
	B - MINE		1.58	1.68
	C - MANU	1.66	1.66	2.45
	G - WHOREP	3.73	3.23	5.00
	H - TPST	3.17	3.17	4.60
	J - INFCOM		2.92	4.18
	K - FIN	2.13	1.70	3.96
	M - PROF	2.13	0.62	2.51
Kuwait	A - Agri			
	B - MINE		14.56	15.34
	C - MANU	15.17	15.17	21.65
	G - WHOREP	31.27	27.64	39.69
	H - TPST	27.18	27.18	37.13
	J - INFCOM		25.34	34.36
	K - FIN	19.12	15.51	32.81
	M - PROF	19.16	5.92	22.14
Kyrgyz Republic	A - Agri			
	B - MINE		14.43	15.20
	C - MANU	15.04	15.04	21.46
	G - WHOREP	31.01	27.41	39.39
	H - TPST	26.95	26.95	36.84
	J - INFCOM		25.12	34.09
	K - FIN	18.95	15.37	32.55
	M - PROF	18.99	5.86	21.95
Lao PDR	A - Agri			
	B - MINE		14.66	15.44
	C - MANU	15.28	15.28	21.79
	G - WHOREP	31.46	27.82	39.92
	H - TPST	27.35	27.35	37.35
	J - INFCOM		25.50	34.57
	K - FIN	19.24	15.61	33.01
	M - PROF	19.28	5.96	22.28
Latvia	A - Agri			
	B - MINE		12.71	13.40
	C - MANU	13.25	13.25	19.00
	G - WHOREP	27.67	24.39	35.40
	H - TPST	23.97	23.97	33.03

	J - INFCOM		22.31	30.49
	K - FIN	16.75	13.55	29.08
	M - PROF	16.78	5.14	19.44
Liberia	A - Agri			
	B - MINE		20.44	21.49
	C - MANU	21.27	21.27	29.84
	G - WHOREP	42.01	37.51	52.04
	H - TPST	36.93	36.93	49.05
	J - INFCOM		34.59	45.76
	K - FIN	26.53	21.72	43.89
	M - PROF	26.58	8.49	30.48
Lithuania	A - Agri			
	B - MINE		12.00	12.65
	C - MANU	12.51	12.51	17.97
	G - WHOREP	26.25	23.10	33.67
	H - TPST	22.70	22.70	31.39
	J - INFCOM		21.12	28.95
	K - FIN	15.82	12.79	27.59
	M - PROF	15.86	4.83	18.39
Luxembourg	A - Agri			
	B - MINE		6.74	7.11
	C - MANU	7.03	7.03	10.24
	G - WHOREP	15.31	13.36	20.07
	H - TPST	13.11	13.11	18.59
	J - INFCOM		12.14	17.02
	K - FIN	8.97	7.19	16.16
	M - PROF	8.99	2.67	10.49
Malaysia	A - Agri			
	B - MINE		9.70	10.24
	C - MANU	10.12	10.12	14.63
	G - WHOREP	21.59	18.93	27.96
	H - TPST	18.59	18.59	25.99
	J - INFCOM		17.26	23.89
	K - FIN	12.85	10.35	22.73
	M - PROF	12.88	3.88	14.98
Malta	A - Agri			
	B - MINE		14.16	14.92
	C - MANU	14.76	14.76	21.08
	G - WHOREP	30.50	26.94	38.78
	H - TPST	26.49	26.49	36.26
	J - INFCOM		24.68	33.54
	K - FIN	18.61	15.08	32.01
	M - PROF	18.64	5.75	21.56

Mexico	A - Agri			
	B - MINE		4.68	4.94
	C - MANU	4.89	4.89	7.16
	G - WHOREP	10.79	9.38	14.27
	H - TPST	9.21	9.21	13.18
	J - INFCOM		8.51	12.03
	K - FIN	6.26	5.00	11.40
	M - PROF	6.27	1.84	7.34
Moldova	A - Agri			
	B - MINE		13.39	14.11
	C - MANU	13.96	13.96	19.97
	G - WHOREP	29.00	25.59	36.99
	H - TPST	25.15	25.15	34.55
	J - INFCOM		23.42	31.92
	K - FIN	17.62	14.27	30.46
	M - PROF	17.65	5.42	20.43
Myanmar	A - Agri			
	B - MINE		15.79	16.62
	C - MANU	16.44	16.44	23.38
	G - WHOREP	33.59	29.76	42.42
	H - TPST	29.27	29.27	39.75
	J - INFCOM		27.31	36.84
	K - FIN	20.67	16.80	35.22
	M - PROF	20.72	6.44	23.90
Netherlands	A - Agri			
	B - MINE		4.16	4.39
	C - MANU	4.34	4.34	6.37
	G - WHOREP	9.62	8.36	12.75
	H - TPST	8.20	8.20	11.77
	J - INFCOM		7.58	10.74
	K - FIN	5.56	4.44	10.17
	M - PROF	5.58	1.63	6.53
New Zealand	A - Agri			
	B - MINE		3.90	4.12
	C - MANU	4.07	4.07	5.97
	G - WHOREP	9.03	7.84	11.99
	H - TPST	7.70	7.70	11.06
	J - INFCOM		7.11	10.08
	K - FIN	5.22	4.17	9.55
	M - PROF	5.23	1.53	6.12
Nicaragua	A - Agri			
	B - MINE		12.61	13.29
	C - MANU	13.15	13.15	18.85
	G - WHOREP	27.47	24.20	35.15

	H - TPST	23.79	23.79	32.80
	J - INFCOM		22.14	30.27
	K - FIN	16.62	13.44	28.87
	M - PROF	16.65	5.09	19.29
Nigeria	A - Agri			
	B - MINE		12.81	13.51
	C - MANU	13.36	13.36	19.15
	G - WHOREP	27.87	24.57	35.64
	H - TPST	24.15	24.15	33.26
	J - INFCOM		22.47	30.71
	K - FIN	16.88	13.66	29.28
	M - PROF	16.91	5.18	19.59
Pakistan	A - Agri			
	B - MINE		14.76	15.55
	C - MANU	15.38	15.38	21.93
	G - WHOREP	31.65	27.99	40.15
	H - TPST	27.52	27.52	37.56
	J - INFCOM		25.66	34.77
	K - FIN	19.37	15.72	33.21
	M - PROF	19.41	6.01	22.43
Panama	A - Agri			
	B - MINE		12.30	12.97
	C - MANU	12.83	12.83	18.41
	G - WHOREP	26.86	23.65	34.42
	H - TPST	23.25	23.25	32.10
	J - INFCOM		21.63	29.62
	K - FIN	16.22	13.11	28.23
	M - PROF	16.25	4.96	18.84
Poland	A - Agri			
	B - MINE		7.28	7.69
	C - MANU	7.60	7.60	11.05
	G - WHOREP	16.48	14.39	21.56
	H - TPST	14.13	14.13	19.98
	J - INFCOM		13.09	18.30
	K - FIN	9.69	7.77	17.38
	M - PROF	9.71	2.89	11.32
Portugal	A - Agri			
	B - MINE		9.84	10.38
	C - MANU	10.27	10.27	14.84
	G - WHOREP	21.88	19.19	28.32
	H - TPST	18.85	18.85	26.33
	J - INFCOM		17.50	24.21
	K - FIN	13.04	10.50	23.04

	M - PROF	13.07	3.94	15.19
Qatar	A - Agri			
	B - MINE		13.25	13.97
	C - MANU	13.82	13.82	19.78
	G - WHOREP	28.74	25.35	36.68
	H - TPST	24.92	24.92	34.25
	J - INFCOM		23.20	31.64
	K - FIN	17.44	14.12	30.18
	M - PROF	17.48	5.36	20.23
Romania	A - Agri			
	B - MINE		13.25	13.97
	C - MANU	13.82	13.82	19.78
	G - WHOREP	28.74	25.35	36.68
	H - TPST	24.92	24.92	34.25
	J - INFCOM		23.20	31.64
	K - FIN	17.44	14.12	30.18
	M - PROF	17.48	5.36	20.23
Russia	A - Agri			
	B - MINE		12.92	13.61
	C - MANU	13.46	13.46	19.29
	G - WHOREP	28.07	24.75	35.88
	H - TPST	24.33	24.33	33.49
	J - INFCOM		22.64	30.92
	K - FIN	17.01	13.76	29.49
	M - PROF	17.04	5.22	19.74
Singapore	A - Agri			
	B - MINE		6.84	7.23
	C - MANU	7.15	7.15	10.41
	G - WHOREP	15.54	13.56	20.37
	H - TPST	13.32	13.32	18.87
	J - INFCOM		12.33	17.28
	K - FIN	9.12	7.31	16.40
	M - PROF	9.14	2.71	10.66
Slovak	A - Agri			
	B - MINE		10.02	10.57
	C - MANU	10.45	10.45	15.09
	G - WHOREP	22.24	19.51	28.77
	H - TPST	19.17	19.17	26.75
	J - INFCOM		17.80	24.60
	K - FIN	13.27	10.69	23.42
	M - PROF	13.29	4.01	15.45
Slovenia	A - Agri			
	B - MINE		7.32	7.72

	C - MANU	7.64	7.64	11.11
	G - WHOREP	16.56	14.46	21.66
	H - TPST	14.20	14.20	20.07
	J - INFCOM		13.15	18.39
	K - FIN	9.73	7.81	17.47
	M - PROF	9.75	2.90	11.38
Spain	A - Agri			
	B - MINE		8.75	9.23
	C - MANU	9.13	9.13	13.23
	G - WHOREP	19.60	17.16	25.49
	H - TPST	16.85	16.85	23.66
	J - INFCOM		15.63	21.72
	K - FIN	11.61	9.34	20.65
	M - PROF	11.64	3.49	13.55
Sweden	A - Agri			
	B - MINE		5.42	5.72
	C - MANU	5.66	5.66	8.27
	G - WHOREP	12.43	10.82	16.39
	H - TPST	10.62	10.62	15.15
	J - INFCOM		9.82	13.85
	K - FIN	7.23	5.79	13.13
	M - PROF	7.25	2.14	8.48
Switzerland	A - Agri			
	B - MINE		7.03	7.42
	C - MANU	7.33	7.33	10.68
	G - WHOREP	15.93	13.91	20.87
	H - TPST	13.66	13.66	19.33
	J - INFCOM		12.65	17.71
	K - FIN	9.35	7.50	16.81
	M - PROF	9.37	2.79	10.94
Tajikistan	A - Agri			
	B - MINE		17.02	17.92
	C - MANU	17.73	17.73	25.12
	G - WHOREP	35.89	31.86	45.10
	H - TPST	31.35	31.35	42.32
	J - INFCOM		29.28	39.30
	K - FIN	22.24	18.11	37.59
	M - PROF	22.29	6.98	25.67
Togo	A - Agri			
	B - MINE		16.50	17.37
	C - MANU	17.19	17.19	24.39
	G - WHOREP	34.93	30.98	43.99
	H - TPST	30.48	30.48	41.25
	J - INFCOM		28.45	38.28

	K - FIN	21.58	17.56	36.60
	M - PROF	21.63	6.76	24.93
United Kingdom	A - Agri			
	B - MINE		3.56	3.76
	C - MANU	3.72	3.72	5.46
	G - WHOREP	8.27	7.18	10.99
	H - TPST	7.04	7.04	10.13
	J - INFCOM		6.50	9.24
	K - FIN	4.77	3.80	8.75
	M - PROF	4.78	1.40	5.60
United States	A - Agri			
	B - MINE		5.27	5.57
	C - MANU	5.51	5.51	8.05
	G - WHOREP	12.10	10.54	15.97
	H - TPST	10.34	10.34	14.76
	J - INFCOM		9.56	13.49
	K - FIN	7.04	5.63	12.79
	M - PROF	7.06	2.08	8.25
Uruguay	A - Agri			
	B - MINE		10.33	10.90
	C - MANU	10.78	10.78	15.56
	G - WHOREP	22.89	20.09	29.57
	H - TPST	19.74	19.74	27.51
	J - INFCOM		18.33	25.31
	K - FIN	13.67	11.02	24.09
	M - PROF	13.70	4.14	15.92