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**Working Paper**

## Free Trade Agreements and the Movement of Business People

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# Free Trade Agreements and the Movement of Business People

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## ABSTRACT

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# Free Trade Agreements and the Movement of Business People

Using provisions to ease the movement of business visitors in trade agreements, we show that removing barriers to the movement of business people promotes trade. We document the increasing complexity of Free Trade Agreements and develop an algorithm that combines machine learning and text analysis techniques to examine the content of FTAs. We use the algorithm to determine which FTAs include provisions to facilitate the movement of business people and whether these are included in dispute settlement mechanisms. We show that provisions facilitating business travel are effective in promoting them and eventually increase bilateral trade flows.

**JEL Classification:** F13, F22, F23

**Keywords:** free trade agreements, business travel, migration, machine learning, text analysis

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# 1 Introduction

Many of the measures to contain Covid-19 severely constrained the international mobility of people. Interestingly, the first exceptions made – and the first restrictions to be lifted – in the Spring of 2020 concerned business trips.<sup>1</sup> Maybe the most telling example of such relaxation is brought by Japan’s policy of reopening of its borders to foreign travelers “in stages, with business people at the head of the line and tourists at the very back.”<sup>2</sup> The lasting and substantial importance of face-to-face interactions when conducting business (Cristea, 2011; Startz, 2018; Umana-Dajud, 2019) is one possible explanation of why business people and governments took these risks despite the raging pandemic.

Comprehensive integration agreements such as the European Union or the Trans-Pacific Partnership reflect the importance of in-person interactions and include measures to facilitate the cross-border movement of business visitors and of people in general. We document here that this is also true for an increasing number of other trade agreements. In many cases, trade agreements include provisions facilitating short-term business trips or liberalizing permanent migration. We use these provisions to examine the impact of easing business travel on trade flows.

The number of trade agreements has steadily increased during the last forty years. As of October 1st 2019, the World Trade Organization reports that more than 300 Regional Trade Agreements are in force.<sup>3</sup> Identifying provisions in those agreements is therefore far from trivial. In order to examine this vast amount of text, we develop an algorithm that combines machine learning and text analysis techniques. The algorithm is able to identify whether a topic is covered or not and determine then if it is included in the dispute settlement mechanisms specified in the agreement. This tool allows us to show, in a systematized way, the increasing role of trade agreements in the regulation of the movement of business people across the globe.

The algorithm has wider applicability than just the movement of business people. To assess the algorithm’s accuracy, we apply it to identify all the topics covered by the hand-coded “Content of Deep Trade Agreements” World Bank’s database<sup>4</sup>. We determine if an agreement was identified by the WB as covering a given topic<sup>5</sup> and check then if the algorithm also identifies the agreement as covering that same topic. The results overlap in over 80% of cases. Of all 2012 international trade taking place between countries with an active FTA, the FTAs coded identically by the WB and the algorithm, for at least 20 different topics, accounted on average for 99% of trade under FTAs. Beyond 20 topics this percentage rate drops substantially (figure 7). This is mainly explained by topic definitions that could potentially be interpreted differently by multiple coders. Annex B illustrates this by focusing on the discrepancies arising from one of these topics (nuclear safety).

Using the output of the algorithm, we analyze the impact of business travel provisions on trade and migration flows. We show that facilitating the movement of business people highly correlates with increased trade flows. At the same time, these provisions increase the intensity of business travel while having no impact on long-term migration flows.

Our paper is related to other efforts to code the topics covered by trade agreements (Hofmann et al. (2017) and Dür et al. (2014)). The main difference is that these databases are hand-coded

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<sup>1</sup>See for example “Japan Maps out How to Begin Accepting Foreign Travelers.” *Nikkei Asia* 21 May 2020 and “Singapore, China to Launch ‘Fast Lane’ Arrangement with COVID-19 Measures for Essential Business, Official Travel.” *CNA, Channel News Asia*, 29 May 2020.

<sup>2</sup>“Japan Maps out How to Begin Accepting Foreign Travelers.” *Nikkei Asia, Nikkei Asia*, 21 May 2020.

<sup>3</sup><http://rtais.wto.org/UI/PublicMaintainRTAHome.aspx>, accessed on 16/11/2019.

<sup>4</sup>We use the database version published in February 2018. The WB has since published another comprehensive database containing nearly 900 provisions. The more circumscribed perimeter of the February 2018 version of the database provides an ideal benchmark to gauge the performance of our algorithm.

<sup>5</sup>From WB’s database, we use data on mentions of “obligations that are outside the current mandate of the WTO” (see sheet WTO-X AC in the original data).

whereas our algorithm provides a method to do the coding automatically. While the analysis and hand-coding of agreements by legal experts and economists remains obviously the best practice, it is very costly and time consuming. Our approach provides a fast and less costly alternative. As a result, any topic can efficiently be coded. Moreover, the algorithm can be applied to other international agreements beyond trade agreements.

In this respect, our paper relates to an increasing number of papers using text analysis in economics. In international trade, text analysis has been mostly limited to comparing the similarities between the texts of trade agreements [Allee et al. (2017b), Allee et al. (2017a), Alschner et al. (2017b), Alschner et al. (2017a)]. Our paper is however the first to develop an algorithm to automatically code trade agreements features. The output produced can then be incorporated into the analysis of the impact of trade agreements.<sup>6</sup> It also relates to a growing body of literature examining the effect of trade agreements' depth, in particular Hofmann et al. (2017) and Dür et al. (2014). These papers, however, focus on the assessment of the overall depth of trade agreements, whereas we focus on a single (yet unexamined) important dimension, namely, the movement of business people, while at the same time controlling for the overall depth of FTAs.

Finally, this paper is related to a lesser extent to papers studying the link between FTAs and migration [Figueiredo et al. (2016), Orefice (2015)]. While these papers focus on permanent migration, our paper studies provisions aiming to ease short business trips. Moreover, we show that these provisions have no impact on immigration flows.

The rest of the paper is organized as follows. The following section briefly describes the evolution of FTAs over time. Section 3 describes the algorithm used to analyze FTAs and evaluates its performance. Section 4 summarizes the results obtained when using the algorithm to determine which FTAs include provisions to ease business travel. Section 5 analyzes the impact of trade agreements that contain such provisions on trade flows. Section 6 concludes.

## 2 Evolution of FTAs 1950-2015

Three features have made the analysis of FTAs' landscape increasingly complex. First, their number has surged since 1950 (panels (a) and (b) of figure 1). Second, FTA texts have become considerably longer (panel (a) of figure 2). Third, these agreements cover an increasing number of topics (panel (b) of figure 2).

Panel (a) of figure 1 shows the total number of FTAs notified to the WTO, by signature year, that are in force today. In 2015, 275 FTAs were in force. Similarly, panel (b) of the same figure plots the number of FTAs, notified to the WTO, by signature year regardless of whether they are still in force or not. The progression is remarkable. While in the 80s, just 9 agreements were signed, the number increased to 116 between 2010 and 2018.

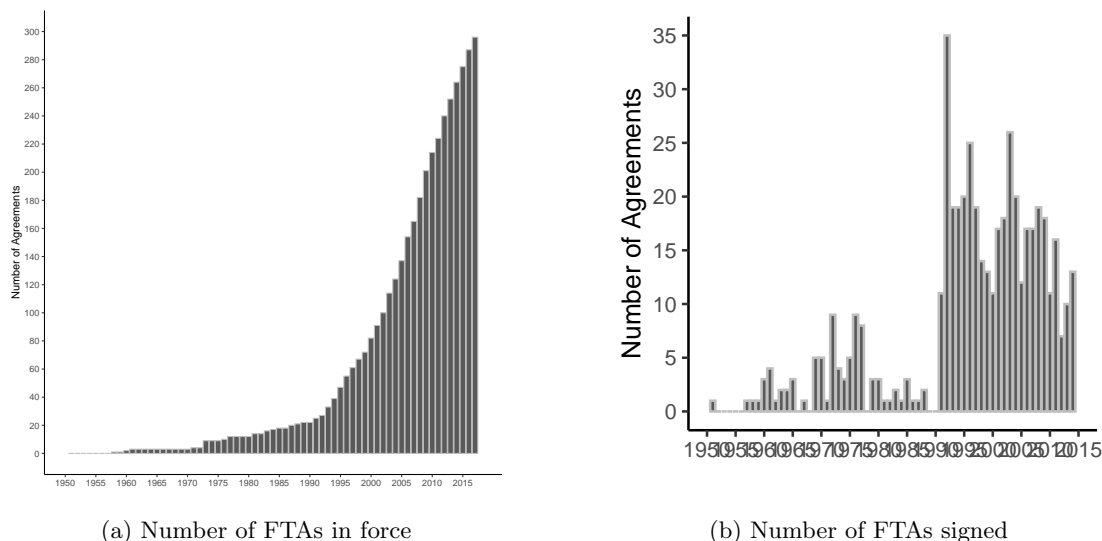
Accompanying the increasing number of signed and in force FTAs, the complexity of the agreements has increased too. Panel (a) of figure 2 shows the word count of FTAs' texts by signature year. While in the 60s signed trade agreements contained on average 4426 words, this number increased to almost 25000 for the agreements signed since 2000.

Panel (b) of this same figure highlights the main reason explaining FTAs' increasingly longer texts. It shows the number of different topics covered by FTAs, as coded in World's Bank's Content of Deep Trade Agreements database, by signature year. While FTAs signed in the 90s covered on average 11.1 topics, this number almost doubled for FTAs signed since the year 2000 (20.1 topics).

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<sup>6</sup>We have developed an accompanying and freely available Python package that can be used to automatically code any trade agreement: <https://github.com/camiloumanadajud/FtaCoder>.

Figure 1: Evolution of the number of FTAs over time



(a) Number of FTAs in force

(b) Number of FTAs signed

Note: panel (a) shows the total number of FTAs notified to the WTO and in force in 2015 by entry into force year. Based on WTO's RTA database.

Note: panel (b) shows the total number of FTAs notified to the WTO by signature year. Both currently active and inactive FTAs are included. Based on WTO's RTA database.

### 3 An automatization of FTAs' text analysis

There are a number of remarkable efforts currently carried out to make sense of the increasing complexity of FTAs. The Design of Trade Agreements (DESTA) project (Dür et al. (2014)) and World Bank's Content of Deep Trade Agreements database (Hofmann et al. (2017)) both manually code FTAs text for a large number of topics. In this paper, we propose a complementary approach that substitutes hand-coding procedures with text analysis and machine learning techniques.

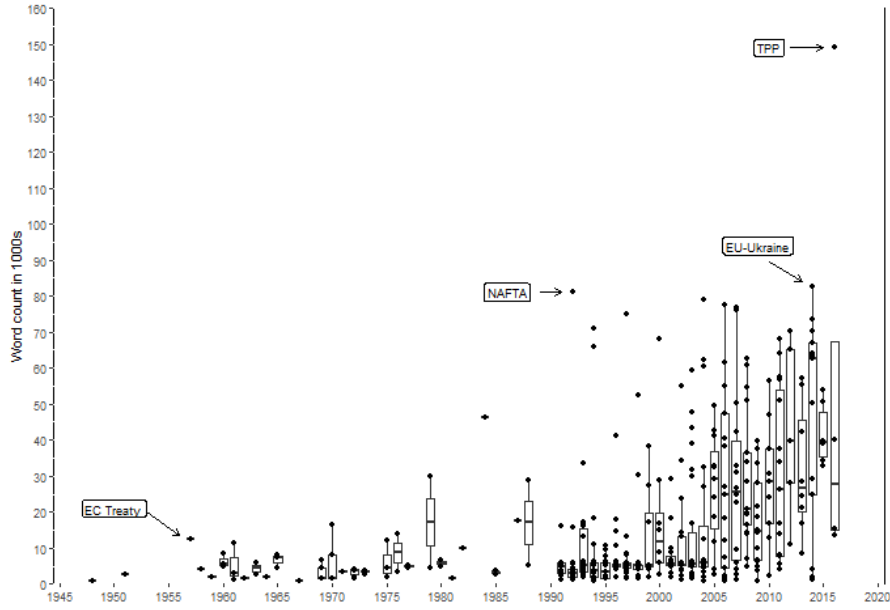
While hand-coding by legal experts and economists remains the best practice in many cases, the costs can be hefty and the time frame for delivering datasets considerable. This automatized approach can be particularly useful in a number of cases. Since hand-coding is a high cost activity, the most obvious case is when coding a topic, as in this paper, that has not been previously hand-coded. It can also be helpful to rapidly analyze a new trade agreement for many different topics. Finally, it could potentially act as a guide when hand-coding agreements.

#### 3.1 Description of the algorithm

To analyze, in a systematic way, the vast amount of data that the corpus of FTAs represents, we develop an algorithm that combines text analysis and machine learning techniques. The algorithm has two main objectives. First, to automatically determine whether a FTA covers a given topic. Second, when the topic is covered, to analyze if the topic is included in the agreement's dispute settlement mechanisms or not.

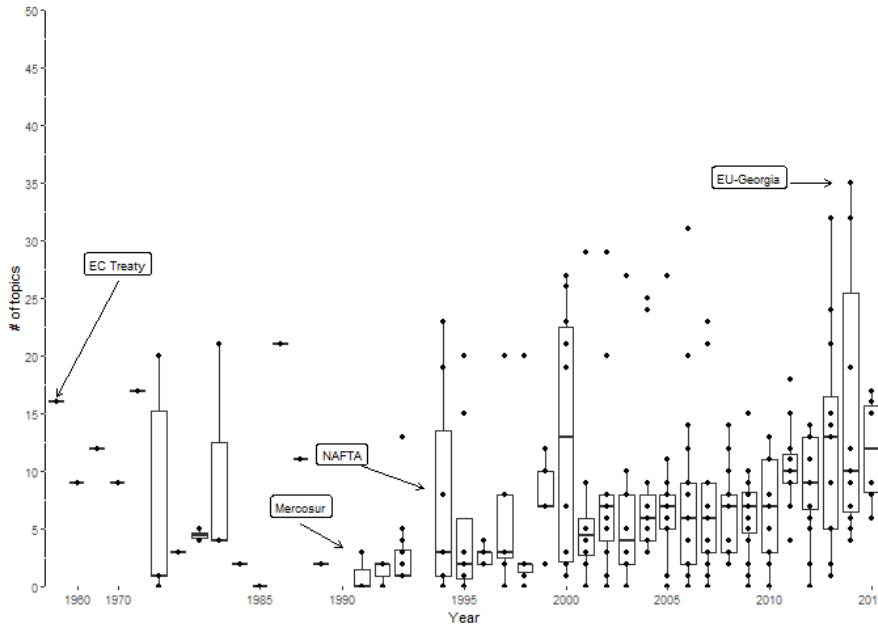
The algorithm needs two inputs. The first is the text of FTA or FTAs to be analyzed. In our case, we take advantage of the machine readable corpus of FTAs developed in Alschner et

Figure 2: Evolution of the depth of FTAs over time



(a) Word count of FTAs texts

Notes: panel (a) shows the total number of words in each FTA text. We compute these figures using the FTAs text corpus provided by Alschner et al. (2017b).



(b) Number of topics covered

Notes: panel(b) shows the number of different topics covered by each FTA. The figures were computed using the data provided by World Bank's Content of Deep Trade Agreements database (Hofmann et al. (2017)).



al. (2017b). The corpus sources FTAs from WTO’s Regional Trade Agreements Information System, applies OCR techniques to the texts and converts them into XML files that are easier to use in computational analysis than PDF files.

The second input, is a set of keywords or regular expressions that must be fed to the algorithm. For example, to identify if a FTA covers labor issues, we feed two keywords and one regular expression `labor; labour; and labora[a-zA-Z]*`.

The algorithm then proceeds as follows. First, it starts by identifying the structure of the agreement (i.e. chapters, articles, paragraphs...). Second, it then determines if a chapter’s title mentions the topic we would like to code. In a third step, if the topic is indeed covered by the agreement, it looks for sentences mentioning disputes in the relevant chapter. It then looks for a dispute settlement chapter. If the agreement includes such a chapter, the algorithm searches then for sentences covering the topic in this chapter.

There are cases where a whole chapter is not devoted to a particular subject but the topic is nonetheless covered by the agreement. Also, a number of agreements are not organized in chapters. In these two cases, the algorithm looks for the topic in every single article. If an article covering the topic is found, it then searches for articles covering disputes in the section where it was found.

This part of the procedure delivers two outputs. First, it produces a dummy variable indicating whether the topic is covered or not. If the dummy variable is equal to 1, signaling that the topic is covered, the algorithm delivers a collection of sentences referring to the dispute settlement of matters related to the topic. Note that the collection of sentences can be an empty set.

The algorithm proceeds then to analyze whether the collection of sentences includes or excludes the topic from dispute settlement mechanisms. For this purpose, the algorithm applies a Multinomial Bayes Classifier to the set of sentences. As suggested by its name, a Naive Bayes classifier applies Bayes theorem to perform the classification task. The ‘Naive’ part refers to the independence assumptions that are made to ease the estimation/training of the classifier. As it is explained in some more detail below, these are mainly about the relation between words.

To train our Naive Bayes Classifier, we define two classes of sentences:

$$Class = \begin{cases} \text{Includes a topic in dispute settlement mechanisms} \\ \text{Excludes a topic in dispute settlement mechanisms} \end{cases}$$

To determine to which class a sentence belongs to, the algorithm applies Bayes’ rule:

$$P(class|sentence) = \frac{P(sentence|class)P(class)}{P(sentence)} \quad (1)$$

The algorithm uses a maximum a posteriori (MAP) decision rule comparing the probability of belonging to each of the two classes. Note that the denominator (i.e. the probability of observing a sentence) is positive and fixed for any given sentence. As result, we do not need to compute  $P(sentence)$ . The most likely hypothesis is therefore given by:

$$class_{MAP} = \underset{class \in Class}{argmax} P(sentence|class)P(class) \quad (2)$$

By defining the words of each sentence as  $x_1, x_2, \dots, x_n$ , equation (2) can be written as:

$$class_{MAP} = \underset{class \in Class}{argmax} P(x_1, x_2, \dots, x_n|class)P(class) \quad (3)$$

To estimate equation (3), we work with two simplifying assumptions. First, we apply a *Bags of Words* hypothesis and assume that the relative position of words does not matter. Second, we assume that these words are independent.

Using these assumptions we can write the Naive Bayes Classifier as:

$$class_{NB} = \underset{class \in Class}{argmax} \left[ \prod_x P(x|class) \right] P(class) \quad (4)$$

To train this Naïve Bayes Classifier, we begin by gathering, from a broad range of trade agreements, a collection of sentences referring to disputes settlement. We manually code each sentence to indicate whether it excludes or includes a topic from dispute settlement mechanisms. We finally estimate equation (4) using the set of manually classified sentences. With the trained classifier in hand, the algorithm can now allocate any new sentence into one of the two defined classes.

The algorithm applies the classifier to the collection of sentences pertaining to dispute settlements for a given topic. In this way, it is able to analyze whether a sentence in the FTA text includes or excludes the topic from dispute settlement mechanisms. If in this collection any of the sentences is classified in the “Excludes a topic in dispute settlement mechanisms” class, the algorithm sets the topic as excluded from dispute settlement mechanisms. In this way, as a final result, it delivers a dummy variable indicating whether the topic is covered by the agreement’s dispute settlement mechanism or not.

In summary, the algorithm will deliver at the end a line of data containing the signatory countries of the FTA; a dummy variable indicating if the FTAs includes the studied topic; and, for cases where the topic is treated by the agreement, a dummy variable indicating whether the topic is included in dispute settlement mechanisms or not. To make the results more transparent the Python package implementing the algorithm generates an HTML file that shows where the topic is found in the agreement as well as the collection of dispute settlement sentences accompanied by their classification.

### 3.2 Assessment of the algorithm results

We evaluate the performance of the algorithm by comparing the results of the algorithm to World Bank’s Content of Deep Trade Agreements database. The database codes 52 provisions in 279 WTO notified FTAs and signed between 1958 and 2015.

We automatically code the provisions retained in World Bank’s database using the algorithm. We do this by running the algorithm on the corpus of machine readable trade agreements compiled in Alschner et al. (2017b). By doing this, we obtain a database containing 449 observations (i.e. the number of agreements’ texts compiled in Alschner et al. (2017b)). Among the 279 agreements currently covered by WB’s data, 217 agreements are matched successfully.

We base our comparison on whether an agreement has been identified by the WB and/or the algorithm as covering a topic. In other words, we determine if an agreement was identified by the WB as containing a given topic and check then if the algorithm also identified the agreement as covering that same topic.<sup>7</sup>

The algorithm’s results are very similar to WB’s database. Figure 3 plots the number of FTAs that the algorithm identifies as covering each topic against the same number taken from WB’s database. The overall correlation is 81.4%. On average, the algorithm identifies a larger number

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<sup>7</sup>WB’s database includes a dummy variable to indicate that the provisions on a given topic are legally enforceable. This is different to what is identified by our algorithm. The algorithm determines whether the topic is included or not in the agreement’s dispute settlement mechanism.

of FTAs as containing a given topic. This is likely explained by the fact that the algorithm never misses the mention of a topic whereas humans eyes could potentially miss some mentions when going through tens of thousands of text pages.

Similarly, figure 4 shows, for each topic, the percentage of agreements that the algorithm and WB's database coded identically. The average across topics is 85.61%. Figure 8 in the appendix presents the same results but restricted to those agreements that the WB's database identifies as covering a given topic. In other words, among the agreements that according to WB's database do cover a specific topic, how many agreements the algorithm also identifies as covering the topic. Across topics, on average, 69.33% of agreements identified by WB's database were also identified by the algorithm. Figure 9, also in the appendix, presents the results of a similar exercise but focusing on the agreements that WB's database classifies as not covering a topic. On average, across topics, 87.74% were also classified by the algorithm as not containing the topic.

Note that some of these discrepancies would arise also when hand-coding the agreements. Section B in the appendices details the discrepancies between the algorithm and WB's database for the Nuclear safety topic. These differences illustrate the advantages, but also the limitations, of the algorithm.

Figure 3: Number of Agreements identified by WB vs algorithm

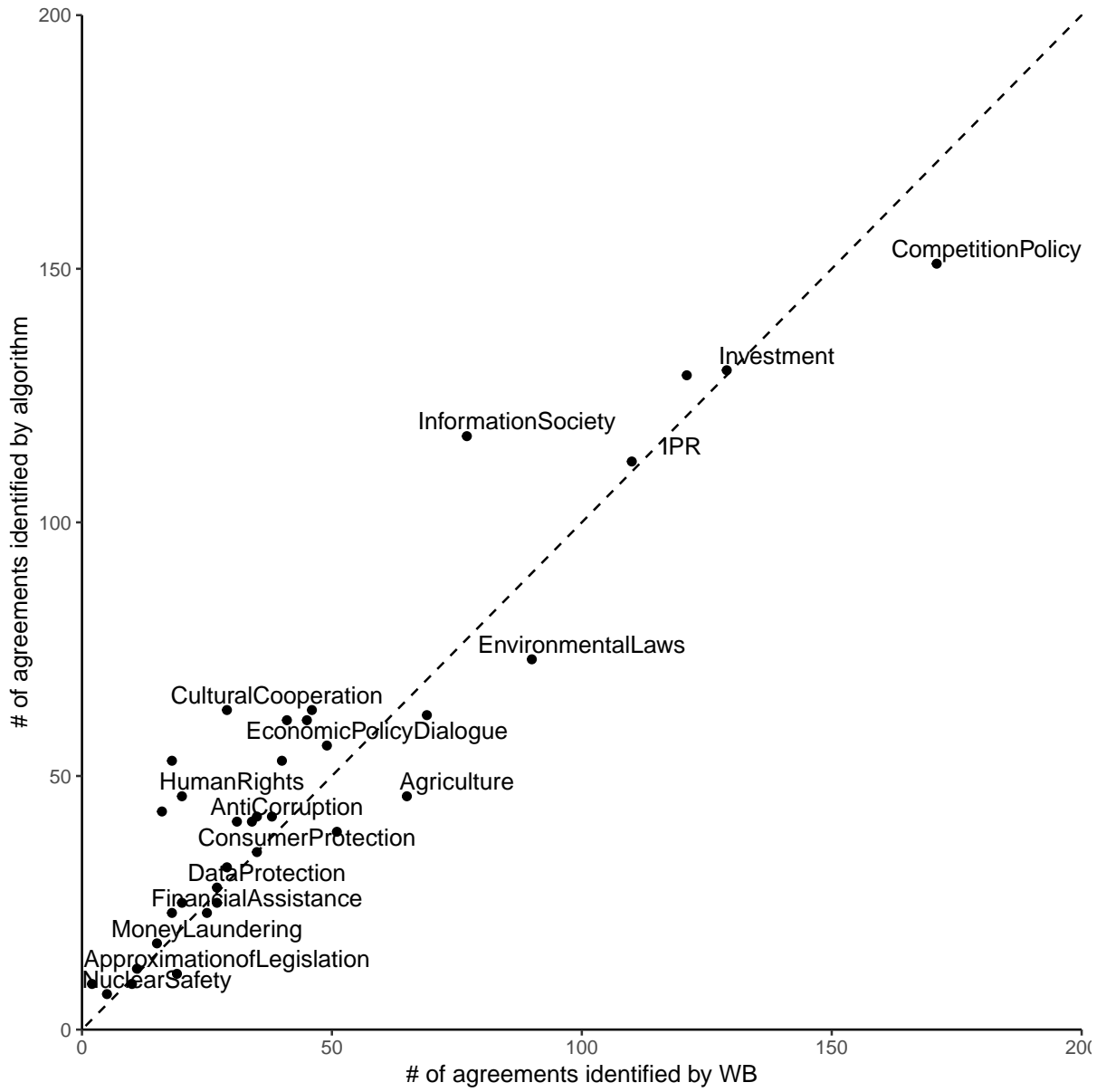
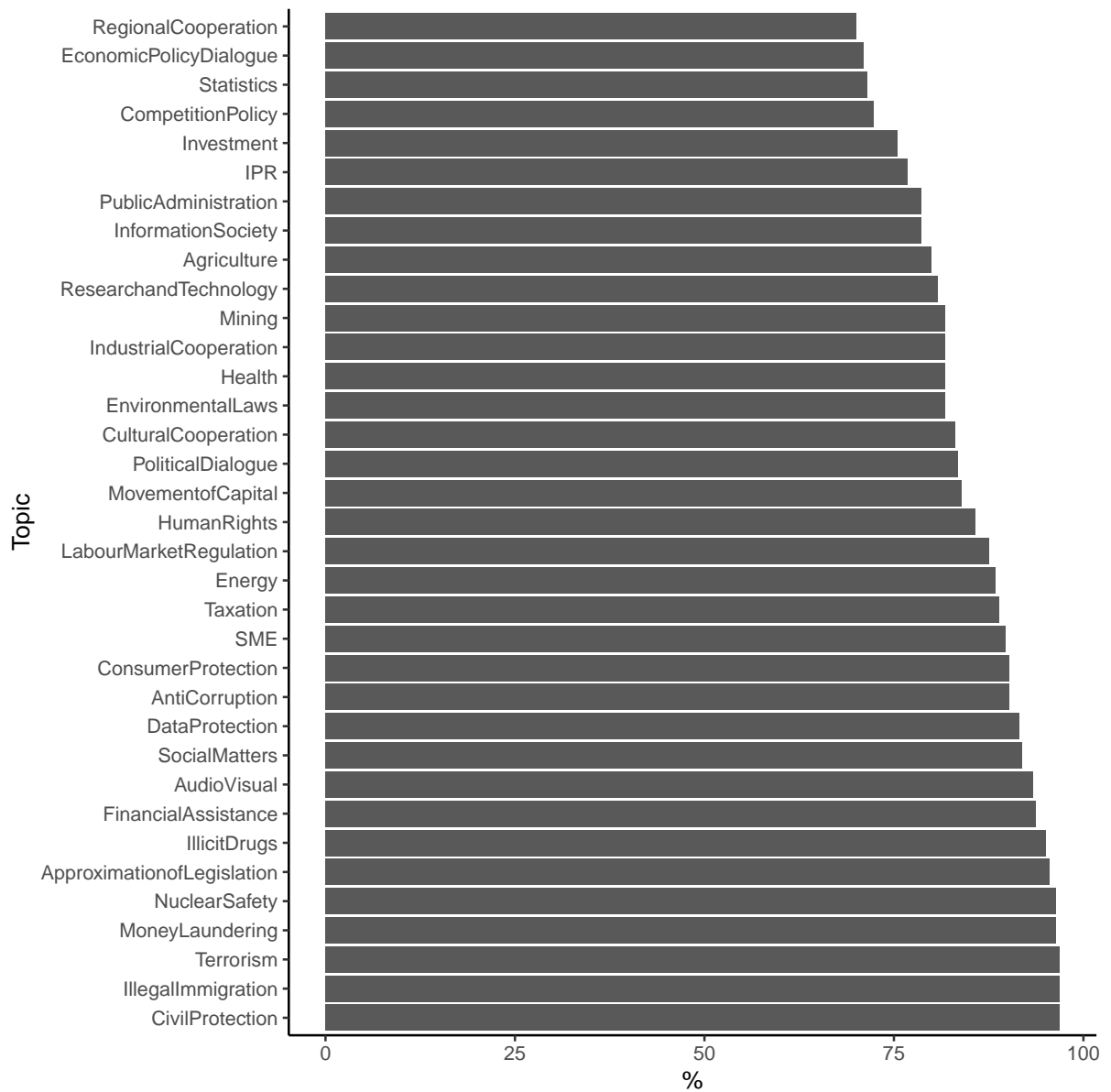


Figure 4: Percentage of FTAs coded identically for each topic



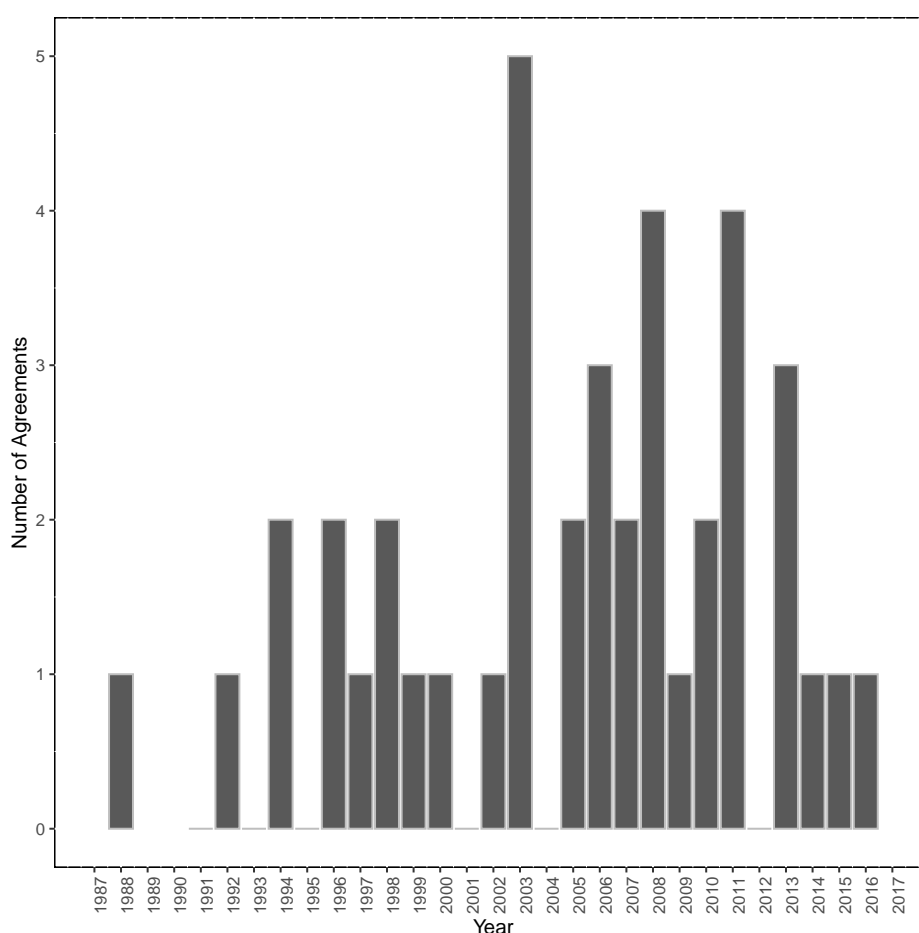
#### 4 Business mobility clauses in trade agreements

We then use the algorithm to determine which trade agreements include provisions to facilitate the movement of business people. Note that we restrict ourselves to provisions that directly relate to the category of business people and do not include clauses that liberalize permanent

migration for everyone (e.g. European Union) or to very broad categories (e.g. Caricom).<sup>8</sup> As is explained in more detail below, in order to account for agreements that liberalize migration in a broad sense, we include a dummy variable named ‘Free mobility of persons’. Of course, this broader liberalization of the movement of people includes business people. However, separating the effect of the facilitation of the movement of business people from the effect of dropping all migration restrictions is not possible using only data from these agreements.

The first trade agreement containing such provisions was signed in 1988 between Canada and the United States. Since that year and up to 2016, 1.5 agreements containing provisions on this topic were signed on average each year (figure 5). Most of these agreements involve countries in North and South America (figure 6). Some countries in Asia and Oceania have also signed trade agreements with such provisions.

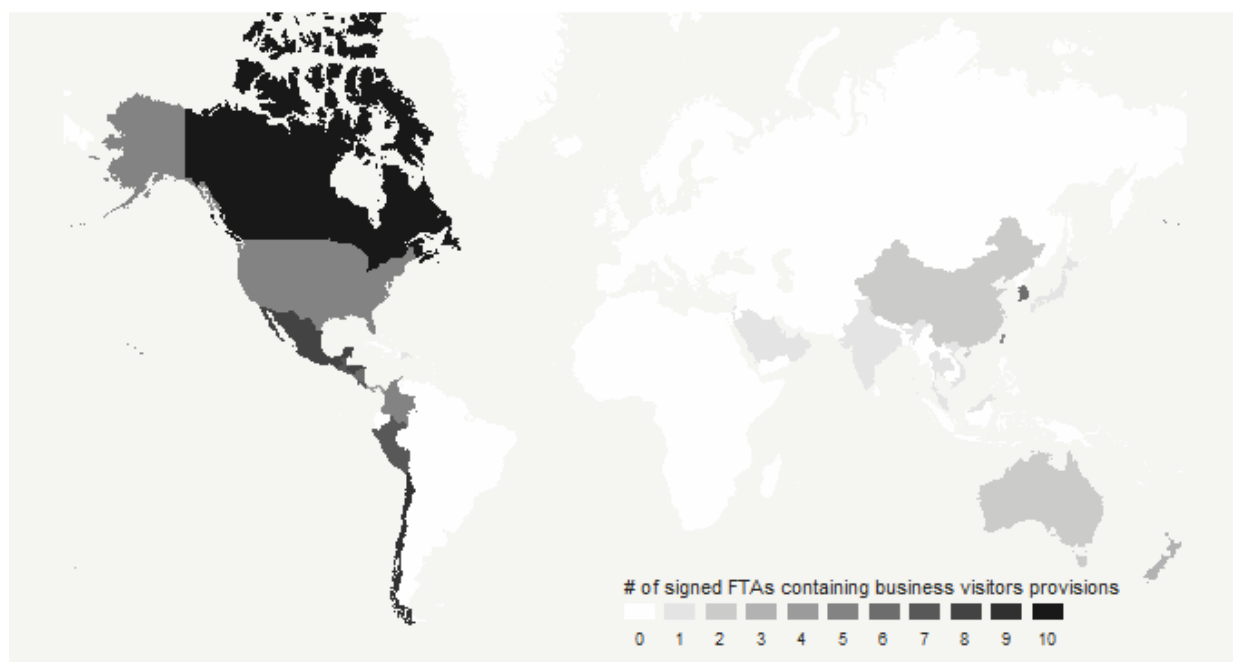
Figure 5: Number of FTAs signed each year containing business visitors provisions



Notes: this figure shows the number of FTAs that contain business visitor provisions that were signed each year. We use the algorithm to identify FTAs containing business visitors provisions.

<sup>8</sup>We feed into the algorithm the following words and regular expressions: ‘business vi[a-zA-Z]\*’, ‘Temporary Entry Of Business Persons’, ‘temporary entry of natural person’, ‘Movement Of Business Person’, ‘Temporary Entry For Business Persons’, ‘Entrada Temporal De Personas De Negocios’, ‘Entrada Temporal De Personas Naturales’.

Figure 6: Geographical distribution of FTAs with business visitors entry provisions



Notes: this map is based on the database obtained using the algorithm described in this paper. The EU is colored white because, despite the free mobility of EU citizens, it has not signed any FTAs including provisions to ease the movement of business people.

The provisions facilitating the movement of business visitors fall under four broad categories. The first involves clauses reducing the amount of paperwork business visitors need to include in their visa's applications. For example, NAFTA includes the following provision: "A Party shall normally **accept an oral declaration as to the principal place of business** and the actual place of accrual of profits. Where the Party requires further proof, it shall normally consider a letter from the employer attesting to these matters as sufficient proof."

The review of visa applications is generally subject to discretionary criteria by consular officials. The second type of clauses seek to establish clear requirements and procedures for business visitors. This provision from the agreement between Honk Kong and New Zealand is an example: "establish streamlined and transparent immigration procedures for applications made by business persons of the other Party."

The third category of clauses limits or eliminates visa application fees for business visitors. The Canada-Colombia FTA illustrates this: "Each Party **shall limit any fees** for processing applications for temporary entry of business persons so as to not unduly impair or **delay trade in goods...**"

Finally, a last type of provisions, forbids any caps in the number of business visitors that can be granted visas. In this matter, NAFTA includes this telling clause: "No Party may: (...) (b) impose or **maintain any numerical restriction** relating to temporary entry under paragraph 1 or 3."

## 5 Impact of facilitating business visitors entry

In this section, we evaluate whether facilitating business visitors' travel has an impact on trade flows. More precisely, we examine whether the provisions of FTAs easing business visitors entry increases trade flows between signatory countries.

### 5.1 Data

This section presents the data we use in order to assess the impact of FTA's business visitors entry provisions.

**Bilateral aggregate Trade Flows:** bilateral trade flows are taken from the IMF's Direction of Trade Statistics database (DOTS). The data we use covers the 1950-2015 period. Since its latest update, DOTs clearly distinguishes between zero trade and missing trade flows.

**Disaggregated bilateral trade data:** bilateral trade flows at the six digits level is taken from CEPII's BACI database (Gaulier and Zignago (2010)).

**Gravity controls:** Distance, common borders and shared official languages or currencies come from CEPII's Gravity data set (Head et al. (2010)).

**FTA data:** the Free Trade Dummy variable is created using World Bank's Content of Deep Trade Agreements Database (Hofmann et al. (2017)). We all use this data to control for FTAs' depth in table 4.

**Migration data:** migration flows are taken from OECD's International Migration database (OECD (2011)). Since this data only covers flows from and to OECD countries, as an alternative source we use World Bank's Global Bilateral Migration Data. World Bank's data covers almost all countries for the 1960-2010 period. Contrary to OECD's data, WB's flows are constructed using changes in stocks. This offers only an approximation of flows.

**Entry of business visitors provisions:** the data is generated by running the algorithm on the texts of trade agreements. The FTA's text corpus we use to generate this data is marginally augmented version of Alschner et al. (2017b).

**Free mobility of people:** this dummy variable groups together the few agreements that include the free mobility of persons or workers: the European Union; the European Economic Area; the European Free Trade Association; the Australia-New Zealand Free Trade Agreement; and the CARICOM. The European Economic Community of 1957 granted free mobility of nationals of member countries as employees or service providers. Then the Treaty of Maastricht, signed in 1992, established the right of EU citizens to live and work in any of the member states. In 1994, with the establishment of European Economic Area, nationals from Iceland, Liechtenstein and Norway gained the right to work and live in the EU. In return, EU citizens were granted the same rights in these three countries. In 1999, Switzerland and the EU signed the "Agreement on the Free Movement of Persons", giving Swiss citizens the right to live and work in the EU and the same right to EU citizens in Switzerland. Free mobility of persons has been in place between New Zealand and Australia since the signature of the Trans-Tasman Travel Arrangement signed in 1973. Since 1996, CARICOM nationals in the following categories are entitled to move and work freely among member states: "graduates of all recognized universities in the world; Artistes; Musicians; sportspersons; Media Workers; Nurses; Teachers; Artisans with a Caribbean Vocational Qualification; and holders of Associate Degrees or comparable qualification" (CARICOM (2001)).

**Number of business trips:** data on the number of business trips between two countries is taken from Coscia et al. (2020). The data is generated using confidential data on international expenditures through corporate payment cards. The number of business trips is measured by the count of the "number of cards that were issued in a country of origin and that made payments in



the country of destination”. A number of important characteristics of this data are worth mentioning. First, the authors also add to this count ATM withdrawals to avoid underrepresenting countries with less developed credit card networks. Second, the count of business trips includes only stays of more than one day to avoid counting countries where connecting flights take place as destination countries. Third, personal credit cards are excluded from the count. The data is available for 127 countries that appear both as origin and destination countries. Only the average value of the 2011-2016 period is available.

## 5.2 Trade Regressions

In this section we investigate the impact of easing the mobility of business visitors on bilateral trade flows. For this purpose we estimate the following gravity equation:

$$X_{i,j,t} = \exp(\lambda_{it} + \lambda_{jt} + \lambda_{ij} + \alpha' c_{ijt} + \beta' m_{ijt}) \times \chi_{ijt} \quad (5)$$

where  $\lambda_{it}$ ,  $\lambda_{jt}$ ,  $\lambda_{ij}$  are exporter-year, importer-year and exporter-importer fixed effects.  $c_{ijt}$  are the control variables: FTA, distance, shared border, common official language and common currency.  $m_{ijt}$  is the set of mobility variables:

- FTA contains provisions facilitating the entry of business visitors
- FTA contains provisions facilitating the entry of business visitors included in dispute settlement mechanisms.
- FTA grants free mobility to citizens of signatory countries.

## 5.3 Baseline results

Table 1 reports our baseline results. In this table, we estimate equation (5) using the Poisson Pseudo-Maximum-Likelihood estimator (PPML). Provisions to ease the movement of business visitors increase bilateral trade flows in all tested specifications of table 1. Including these provisions in dispute settlement mechanisms does not have a statistically significant impact on trade.

The coefficient of the FTA dummy variable is not statistically significant at the 10% level when country-year and country-pair fixed effects are included (columns (3) and (4) of table 1). While these results for the FTA coefficient are surprising, analogous results are found elsewhere in the trade literature. Recent estimates of the effect of FTAs that include three-way fixed effects and use the PPML estimator find similarly small coefficients (e.g. Heid et al., 2021; Weidner and Zylkin, 2021). For example Weidner and Zylkin (2021) find an estimate of 0,082 (between 0,086 and 0,088 after incidental parameter bias correction). The recent literature has also found statistically insignificant effects of FTAs, in some instances, when using the PPML estimator (e.g. Anderson and Yotov, 2020; Heid et al., 2021; Head and Mayer, 2021; Mayer et al., 2019). In some of these cases, the coefficients are also negative (e.g. Heid et al., 2021; Weidner and Zylkin, 2021). In Weidner and Zylkin (2021) the negative coefficients are obtained only for a number of specific sectors (e.g. forestry; communications equipment; paper and printed products).

Tables 2 and 3 confirm the baseline results using two alternative specifications. Table 2 shows the results of the estimation of equation (5) using OLS. OLS estimates of gravity equations are more vulnerable to bias arising from heteroskedasticity than PPML estimates. Also, using OLS implies dropping zero trade flows from the estimation sample, which are not randomly distributed among country pairs. However, contrary to PPML, OLS estimates do not suffer from incidental parameter bias (Weidner and Zylkin (2021)). With OLS, business visitors provisions have a

positive effect on trade in the specifications presented in the first three columns. In the last column, the coefficient for these provisions is negative when they are not included in disputes settlement mechanisms but positive when they are included. The overall impact in this case is largely positive.

Table 3 reports the results of using trade shares, instead of trade flows, as the dependent variable. As pointed out by Sotelo (2019), using shares and PPML amounts to assigning different weights to each importer country. The results in table 3 are very similar to the results of estimating equation (5) in levels (table 1). Business visitors provisions have a positive, in all specifications, and statistically significant effect in three of them at the 10% level. While the coefficient signaling the inclusion of these provisions in dispute settlement mechanisms is negative and statistically significant, the overall impact of these clauses remains positive.

Table 1: Effect of business visitors provisions: PPML

	(1)	(2)	(3)	(4)
Free Trade Agreement	0.236 <sup>a</sup> (0.055)	0.236 <sup>a</sup> (0.055)	-0.042 (0.050)	-0.042 (0.050)
Entry of Business Visitors	0.421 <sup>a</sup> (0.099)	0.576 <sup>a</sup> (0.121)	0.144 <sup>c</sup> (0.078)	0.201 <sup>c</sup> (0.113)
Entry of Business Visitors, disp. settlement		-0.172 (0.155)		-0.070 (0.132)
Free mobility of persons	0.176 <sup>b</sup> (0.079)	0.174 <sup>b</sup> (0.079)	0.347 <sup>a</sup> (0.049)	0.347 <sup>a</sup> (0.049)
Ln. Dist.	-0.751 <sup>a</sup> (0.032)	-0.752 <sup>a</sup> (0.032)		
Common border	0.370 <sup>a</sup> (0.061)	0.372 <sup>a</sup> (0.061)		
Common official language	0.216 <sup>a</sup> (0.052)	0.217 <sup>a</sup> (0.052)		
Common currency	-0.010 (0.067)	-0.011 (0.067)	0.111 <sup>b</sup> (0.046)	0.111 <sup>b</sup> (0.046)
Pair Fixed Effects	No	No	Yes	Yes
Country-Year Fixed Effects	Yes	Yes	Yes	Yes
R2	0.945	0.945	0.989	0.989
Observations	930321	930321	929943	929943

Note: The dependent variable is the trade flow between origin and destination. Standard errors in parentheses are robust and clustered at country pair level. Statistically significant at <sup>c</sup> 10% <sup>b</sup> 5% <sup>a</sup> 1%.

Table 9 in the appendix shows the results obtained when including dummy variables for the EU and CUSFTA/NAFTA. Whereas the statistical significance of free mobility of persons is impacted, to some extent, by the inclusion of the EU and CUSFTA/NAFTA dummies, the same is less the case for business visitors provisions. The business visitors dummy remains positive in all but one specification of panels A and B. In the only specification where the coefficient of the business visitors dummy is negative (column (4) of panel B), the business visitors dispute settlement dummy is positive and statistically significant at the 10% level.

In columns (2) and (4) of panel A, the business visitors dummy is not longer statistically significant at the 10% level. This is likely explained by the partial collinearity between CUSFTA/NAFTA and business visitors dummies. For this reason, panels C and D exclude NAFTA

Table 2: Effect of business visitors provisions: OLS

	(1)	(2)	(3)	(4)
Free Trade Agreement	0.684 <sup>a</sup> (0.036)	0.684 <sup>a</sup> (0.036)	0.283 <sup>a</sup> (0.025)	0.283 <sup>a</sup> (0.025)
Entry of Business Visitors	0.624 <sup>a</sup> (0.131)	0.607 <sup>b</sup> (0.262)	0.193 <sup>b</sup> (0.091)	-0.285 (0.176)
Entry of Business Visitors, disp. settlement		0.020 (0.296)		0.579 <sup>a</sup> (0.200)
Free mobility of persons	-0.844 <sup>a</sup> (0.072)	-0.844 <sup>a</sup> (0.072)	0.680 <sup>a</sup> (0.042)	0.680 <sup>a</sup> (0.042)
Ln. Dist.	-1.444 <sup>a</sup> (0.016)	-1.444 <sup>a</sup> (0.016)		
Common border	0.434 <sup>a</sup> (0.078)	0.434 <sup>a</sup> (0.078)		
Common official language	0.819 <sup>a</sup> (0.030)	0.819 <sup>a</sup> (0.030)		
Common currency	0.778 <sup>a</sup> (0.085)	0.778 <sup>a</sup> (0.085)	0.299 <sup>a</sup> (0.055)	0.299 <sup>a</sup> (0.055)
Pair Fixed Effects	No	No	Yes	Yes
Country-Year Fixed Effects	Yes	Yes	Yes	Yes
R2	0.734	0.734	0.866	0.866
Observations	758141	758141	756345	756345

Note: The dependent variable is the trade flow between origin and destination. Standard errors in parentheses are robust and clustered at country pair level. Statistically significant at <sup>c</sup> 10% <sup>b</sup> 5% <sup>a</sup> 1%.

Table 3: Effect of business visitors provisions: PPML in shares

	(1)	(2)	(3)	(4)
Free Trade Agreement	0.412 <sup>a</sup> (0.048)	0.412 <sup>a</sup> (0.048)	0.034 (0.028)	0.034 (0.028)
Entry of Business Visitors	0.157 (0.105)	0.590 <sup>a</sup> (0.173)	0.117 <sup>c</sup> (0.066)	0.346 <sup>a</sup> (0.122)
Entry of Business Visitors, disp. settlement		-0.483 <sup>b</sup> (0.194)		-0.260 <sup>b</sup> (0.132)
Free mobility of persons	-0.692 <sup>a</sup> (0.077)	-0.693 <sup>a</sup> (0.077)	0.524 <sup>a</sup> (0.046)	0.524 <sup>a</sup> (0.046)
Ln. Dist.	-1.060 <sup>a</sup> (0.027)	-1.060 <sup>a</sup> (0.027)		
Common border	0.256 <sup>a</sup> (0.061)	0.257 <sup>a</sup> (0.061)		
Common official language	0.891 <sup>a</sup> (0.065)	0.891 <sup>a</sup> (0.065)		
Common currency	0.717 <sup>a</sup> (0.154)	0.717 <sup>a</sup> (0.154)	0.308 <sup>a</sup> (0.043)	0.308 <sup>a</sup> (0.043)
Pair Fixed Effects	No	No	Yes	Yes
Country-Year Fixed Effects	Yes	Yes	Yes	Yes
R2	0.312	0.312	0.377	0.377
Observations	930321	930321	929943	929943

Note: The dependent variable is the trade flow share between origin and destination countries. Standard errors in parentheses are robust and clustered at country pair level. Statistically significant at <sup>c</sup> 10% <sup>b</sup> 5% <sup>a</sup> 1%.

countries (Canada, Mexico and United States) from the estimation sample. In these two panels, the business visitors dummy is always positive and statistically significant at the 10% level with the sole exception of column (4) of panel D. In this specification while the business visitors dummy is no longer statistically significant, the business visitors disputes settlement dummy is positive and significant at the 1% level.

#### 5.4 Controlling for FTA's depth

FTAs that include business visitors provisions might also include a broader range of other topics. To examine this possibility in this section, we add two different measures of the depth of FTAs. Table 4 reports these results. All estimations are performed using PPML.

In panel A, we use the length of FTAs' texts as a measure of depth. To do this we count the number of words of each text. The final variable we include in this panel is the length in tens of thousands words. The coefficient of the variable for the presence of business visitors provisions remains positive in all specifications. It is also statistically significant at the 10% level in three of them.

In Panel B, the depth measure is based on World Bank's "Content of Deep Trade Agreements" database. It corresponds to the sum of topics reported as included in each FTA by the WB's database. The coefficient for the business visitors provisions is positive and statistically significant at the 10% level in all specifications.

#### 5.5 Business travel intensity

In this section we examine the impact of business visitors provisions on business travel. For this purpose we use the bilateral count of business trips intensity developed in Coscia et al. (2020). Since data on business travel flows is not available, the authors estimate the number of business trips between two countries using credit cards data. More precisely, the authors count the number of corporate credit cards that were used in a different country from the issuing country. The data covers 127 countries. Only the average bilateral number of business trips during the 2011–2016 period is available. Using this data we estimate equation (6) below. For the other variables we take data from 2013.

$$BT_{ij} = \lambda_i + \lambda_j + \alpha' c_{ij} + \beta' m_{ij} + \epsilon_{ij} \quad (6)$$

where  $BTI_{ijt}$  is the average number of business trips originating in  $i$  and with destination  $j$  during the period 2011-2016. The other variables are the same as in the main gravity model (equation (5)).

Table 5 reports the results of estimating equation (6) using OLS. The table shows that the inclusion of provisions facilitating the entry of business visitors is positively correlated to the number of bilateral business trips. In all specifications the coefficient for business visitors provisions is positive and statistically significant at the 10% level.

In Appendix D, tables 10 and 11 display the results of the same analysis but this time using PPML instead of OLS. In table 10, the outcome variable is the number of business trips in levels whereas, in table 11, it is the share of business trips. Although the coefficient corresponding to business visitors loses its statistical significance at the 10% level, it consistently maintains a positive value across all specifications.

Table 4: Controlling for FTA's measures of depth

	(1)	(2)	(3)	(4)
<b>Panel A: Text's length</b>				
Free Trade Agreement	0.229 <sup>a</sup> (0.067)	0.221 <sup>a</sup> (0.069)	-0.080 (0.079)	-0.087 (0.081)
Entry of Business Visitors	0.403 <sup>a</sup> (0.149)	0.567 <sup>a</sup> (0.123)	0.088 (0.084)	0.193 <sup>c</sup> (0.110)
Entry of Business Visitors, disp. settlement		-0.208 (0.198)		-0.143 (0.146)
Free mobility of persons	0.178 <sup>b</sup> (0.079)	0.177 <sup>b</sup> (0.079)	0.388 <sup>a</sup> (0.056)	0.391 <sup>a</sup> (0.057)
Text length in 10000s words	0.003 (0.022)	0.008 (0.024)	0.016 (0.014)	0.020 (0.016)
Pseudo-R2	0.945	0.945	0.989	0.989
Observations	930321	930321	965276	965276
<b>Panel B: Number of covered topics</b>				
Free Trade Agreement	0.110 (0.090)	0.110 (0.090)	-0.136 (0.129)	-0.137 (0.129)
Entry of Business Visitors	0.401 <sup>a</sup> (0.100)	0.562 <sup>a</sup> (0.120)	0.150 <sup>c</sup> (0.079)	0.209 <sup>c</sup> (0.112)
Entry of Business Visitors, disp. settlement		-0.178 (0.155)		-0.072 (0.130)
Free mobility of persons	0.137 <sup>c</sup> (0.078)	0.134 <sup>c</sup> (0.078)	0.353 <sup>a</sup> (0.042)	0.353 <sup>a</sup> (0.042)
# of topics in FTA	0.007 <sup>b</sup> (0.003)	0.007 <sup>b</sup> (0.003)	0.005 (0.004)	0.005 (0.004)
Pseudo-R2	0.945	0.945	0.989	0.989
Observations	930321	930321	965276	965276
Pair Fixed Effects	No	No	Yes	Yes
Country-Year Fixed Effects	Yes	Yes	Yes	Yes

Note: The dependent variable is the trade flow between origin and destination. Standard errors in parentheses are robust and clustered at country pair level. Statistically significant at <sup>c</sup> 10% <sup>b</sup> 5% <sup>a</sup> 1%.

Table 5: Effect of business visitors provisions on Business Trips

	(1)	(2)	(3)	(4)
Free Trade Agreement	0.271 <sup>a</sup> (0.037)	0.263 <sup>a</sup> (0.038)	0.260 <sup>a</sup> (0.038)	0.265 <sup>a</sup> (0.038)
Entry of Business Visitors		0.160 <sup>c</sup> (0.087)	0.343 <sup>a</sup> (0.112)	0.344 <sup>a</sup> (0.112)
Entry of Business Visitors, disp. settlement			-0.265 <sup>c</sup> (0.153)	-0.271 <sup>c</sup> (0.153)
Ln. Dist.	-1.314 <sup>a</sup> (0.023)	-1.312 <sup>a</sup> (0.023)	-1.314 <sup>a</sup> (0.023)	-1.326 <sup>a</sup> (0.025)
Common border	0.213 <sup>b</sup> (0.089)	0.214 <sup>b</sup> (0.089)	0.215 <sup>b</sup> (0.089)	0.207 <sup>b</sup> (0.089)
Common official language	0.785 <sup>a</sup> (0.045)	0.782 <sup>a</sup> (0.045)	0.787 <sup>a</sup> (0.045)	0.784 <sup>a</sup> (0.045)
Common currency	-0.267 <sup>a</sup> (0.061)	-0.264 <sup>a</sup> (0.061)	-0.266 <sup>a</sup> (0.061)	-0.227 <sup>a</sup> (0.065)
Free mobility of persons				-0.091 (0.063)
R2	0.886	0.886	0.886	0.886
Observations	6617	6617	6617	6617

Note: The dependent variable is the log of the average number of business trips between 2011 and 2016 from country  $i$  to country  $j$  as computed in variable as computed in Coscia et al. (2020). All specifications include origin and destination fixed effects. Standard errors in parentheses are robust and clustered at country pair level. All columns include origin and destination fixed effects. Statistically significant at <sup>c</sup> 10% <sup>b</sup> 5% <sup>a</sup> 1%.

## 5.6 Export probability

In this section, we test whether including business visitors provisions impacts the probability of exporting a product. For this purpose we use CEPII’s BACI database. BACI reports bilateral trade flows at the six digit level of the Harmonized System nomenclature. Using this data we estimate the following equation:

$$ExportStatus_{ijkt} = \lambda + \alpha' c_{ijt} + \beta' m_{ijt} + \epsilon_{ijt} \quad (7)$$

where  $\lambda$  is a set of fixed effect that varies in different specifications,  $ExportStatus_{ijkt}$  is a dummy variable equal to 1 whenever the trade flow of product  $k$  between two countries is positive,  $c_{ijt}$  are the control variables, and  $m_{ijt}$  is the set of mobility variables.

Given the large number of observations, the variety of fixed effects, and the period covered by BACI, we keep only three years of data: 1996, 2005 and 2014. These three years yield more 600 millions of observations.

We estimate equation (7) with OLS. Table 6 reports the results. Note that we add a variety of additional fixed effects including country-pair-product and country-year-product fixed effects. In all seven tested specifications the coefficient for business visitors provisions is positive and statistically significant at the 5% level. The dummy for the inclusion of these provisions in dispute settlement mechanism is also always positive but statistically significant at the 10% level in only one specification. On average, across specifications, business mobility provisions increase the probability of exporting a given product by 7.8%.



Table 6: Effect of business visitors provisions on export probability

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Free Trade Agreement	0.02614*** (0.006375)	0.02621*** (0.006384)	0.02614*** (0.006375)	0.02621*** (0.006384)	0.02126*** (0.003455)	0.02129*** (0.003455)	0.02126*** (0.003455)
Entry of Business Visitors	0.1286*** (0.0349)	0.06818** (0.02142)	0.1286*** (0.0349)	0.06818** (0.02142)	0.06008*** (0.0104)	0.03268*** (0.01165)	0.06008*** (0.0104)
Entry of Business Visitors, disp. set.		0.07412 (0.04597)		0.07412 (0.04597)		0.0369* (0.01508)	
Ln. Dist.	-0.01589*** (0.002125)	-0.01585*** (0.002121)	-0.01589*** (0.002125)	-0.01585*** (0.002121)			
Common border	0.09795** (0.01295)	0.09778*** (0.01296)	0.09795*** (0.01295)	0.09778*** (0.01296)			
Common official language	0.01131*** (0.002621)	0.01122*** (0.002625)	0.01131*** (0.002621)	0.01122*** (0.002625)			
Free mobility of persons	0.2322*** (0.02942)	0.2323*** (0.02942)	0.2322*** (0.02942)	0.2323*** (0.02942)	0.06722*** (0.01458)	0.0672*** (0.01458)	0.06722*** (0.01458)
Pair Fixed Effects	No	No	No	No	Yes	Yes	Yes
Pair-HS6 Fixed Effects	No	No	No	No	No	No	No
Country-Year Fixed Effects	Yes	Yes	No	No	Yes	Yes	No
Country-Year-HS6 Fixed Effects	No	No	Yes	Yes	No	No	Yes
R2	0.21675	0.21678	0.36451	0.32852	0.32852	0.32853	0.47716
Observations	630,820,064	630,820,064	630,820,064	630,820,064	633,702,668	633,702,668	633,702,668

Note: The dependent variable is dummy variable equal to 1 whenever the trade flow of product  $k$  between two countries is positive. Standard errors in parentheses are robust and clustered at country pair level. Statistically significant at <sup>c</sup> 10% <sup>b</sup> 5% <sup>a</sup> 1%.

## 5.7 Permanent migration

Finally we test whether the observed increase in bilateral trade flows could be explained by an increase in permanent migration flows. Indeed, a vast literature has demonstrated the trade-creating effect of migration (e.g. Combes et al. (2005), Parsons and Vézina (2018), Bahar and Rapoport (2018), Bahar et al. (2022)). While the objective of business visitors provisions in FTAs is to facilitate short term visits for business purposes, these clauses could potentially be used to permanently migrate. To test this, we estimate again equation (5) but replacing trade flows with migration flows.

Table 7 reports the results when using OECD data for migration flows. These OECD data cover inflows and outflows of migrants in member countries for the 2000-2015 period. Table 8 shows the results when using World Bank's data instead. WB data cover a longer period, 1960 to 2010, and most countries in the world. However, migration flows are constructed as changes in migration stocks, which is an imperfect proxy for true flows. In any event, in none of the specifications, either the variable for business visitors provisions or for their inclusion in dispute settlement mechanisms, is statistically significant at the 10% level.

Table 7: Effect on business visitors provisions on migration flows (MigrationDataOecd)

	(1)	(2)	(3)	(4)
Free Trade Agreement	-0.025 (0.123)	-0.024 (0.123)	-0.084 (0.112)	-0.084 (0.112)
Entry of Business Visitors	-0.227 (0.399)	0.052 (0.493)	-0.156 (0.219)	-0.118 (0.171)
Entry of Business Visitors, disp. settlement		-0.293 (0.608)		-0.048 (0.319)
Free mobility of persons	0.229 (0.249)	0.227 (0.249)	0.910 <sup>a</sup> (0.197)	0.910 <sup>a</sup> (0.197)
Ln. Dist.	-1.040 <sup>a</sup> (0.065)	-1.041 <sup>a</sup> (0.065)		
Common border	0.327 <sup>c</sup> (0.171)	0.331 <sup>c</sup> (0.170)		
Common official language	1.307 <sup>a</sup> (0.115)	1.307 <sup>a</sup> (0.115)		
Common currency	-0.241 (0.168)	-0.242 (0.168)	-0.127 (0.149)	-0.127 (0.149)
Pair Fixed Effects	No	No	Yes	Yes
Country-Year Fixed Effects	Yes	Yes	Yes	Yes
R2	0.834	0.834	0.980	0.980
Observations	59991	59991	59612	59612

Note: The dependent variable is the migration flow between origin and destination. Standard errors in parentheses are robust and clustered at country pair level. Statistically significant at <sup>c</sup> 10% <sup>b</sup> 5% <sup>a</sup> 1%.

Table 8: Effect on business visitors provisions on migration flows (WBMigrationFlows)

	(1)	(2)	(3)	(4)
Free Trade Agreement	0.564 <sup>a</sup> (0.120)	0.565 <sup>a</sup> (0.120)	0.064 (0.071)	0.064 (0.071)
Entry of Business Visitors	0.371 (0.271)	-0.197 (0.684)	-0.002 (0.191)	0.138 (0.162)
Entry of Business Visitors, disp. settlement		0.588 (0.723)		-0.153 (0.249)
Free mobility of persons	-1.947 <sup>a</sup> (0.255)	-1.946 <sup>a</sup> (0.255)	0.436 <sup>b</sup> (0.173)	0.436 <sup>b</sup> (0.173)
Ln. Dist.	-1.299 <sup>a</sup> (0.057)	-1.299 <sup>a</sup> (0.057)		
Common border	0.769 <sup>a</sup> (0.113)	0.769 <sup>a</sup> (0.113)		
Common official language	0.995 <sup>a</sup> (0.099)	0.995 <sup>a</sup> (0.099)		
Common currency	0.954 <sup>a</sup> (0.157)	0.955 <sup>a</sup> (0.157)	-0.027 (0.139)	-0.027 (0.139)
Pair Fixed Effects	No	No	Yes	Yes
Country-Year Fixed Effects	Yes	Yes	Yes	Yes
R2	0.856	0.856	0.978	0.978
Observations	59808	59808	53168	53168

Note: The dependent variable is the migration flow between origin and destination. Standard errors in parentheses are robust and clustered at country pair level. Statistically significant at <sup>c</sup> 10% <sup>b</sup> 5% <sup>a</sup> 1%.

## 6 Conclusion

Many of the measures taken to control the Covid-19 pandemic severely reduced the movement of business people. We use provisions that ease business visitors entry in trade agreements to examine the importance of business travel for international trade.

We begin by documenting the increasing number and complexity of trade agreements. 116 trade agreements were signed in the past decade alone, the average length of the texts was multiplied by 5 and the number of included topics doubled since the 1960s.

To study this vast amount of text we develop an algorithm that combines machine learning and text analysis techniques. The algorithm identifies whether a topic is covered and determines then if it is included in dispute settlement mechanisms. This tool allows us to show, in a systematized way, the increasing role of trade agreements in the regulation of the movement of business people across the globe. To assess the algorithm's accuracy, we apply it to identify all the topics covered by the hand-coded "Content of Deep Trade Agreements" World Bank's database and compare the results. The results on whether an agreement contains a topic or not overlap in over 80% of cases.

We then show that provisions easing business travel increase the intensity of business travel without having any impact on permanent migration flows. We also show that easing business travel increases bilateral trade flows and the probability to export a product. The results are robust to controlling for the depth of the agreement measured as the number of topics covered or the length of the text. In our preferred specifications, these provisions increase trade flows by 11% and the probability to export a given product by 6%.

Improving our understanding of the channels that are at play during face-to-face meetings and why they are particularly important for international trade are interesting avenues for future research.

Finally, recall that we use the algorithm developed for this paper to identify topics related to the movement of people and demonstrate its usefulness. One could imagine using this algorithm to study other research questions. One could envision using it to study topics that have or have not been previously hand-coded in bilateral agreements (FTAs or else) as well as, most obviously, to analyze the content of new trade agreements. Of course, hand-coding by legal scholars remains the first best practice, however algorithmic coding can represent a cost-effective substitute in some instances.

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# Appendices

## A Percentage of agreements identically identified

Figure 7: Percentage of all international trade taking place between countries with a FTA, covered by FTAs identically coded by the WB and the algorithm for a given minimum number of topics in 2012

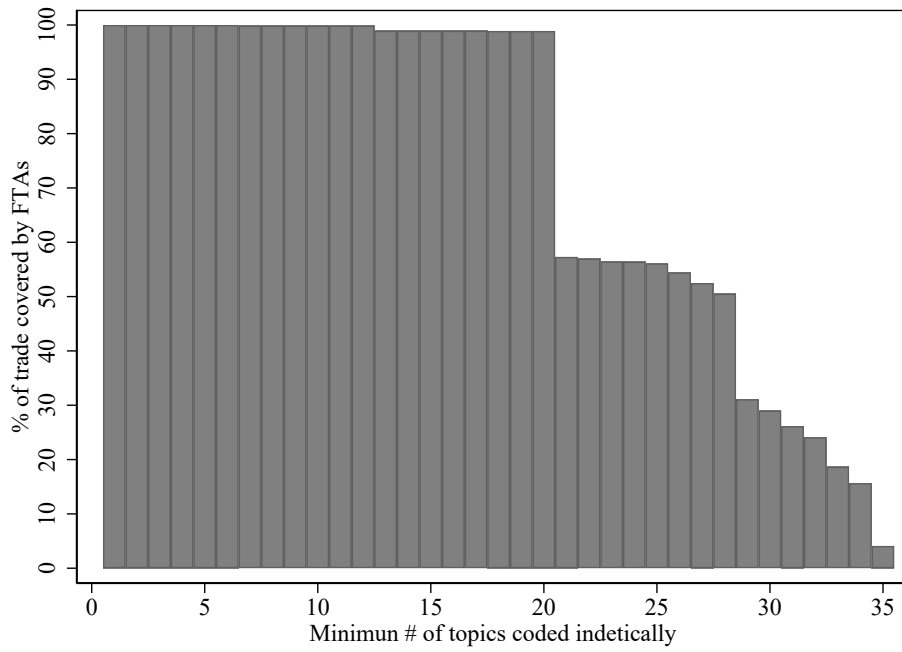


Figure 8: Percentage of agreements identified by FTA coder as treating a given topic among the agreements coded by WB as treating that same topic.

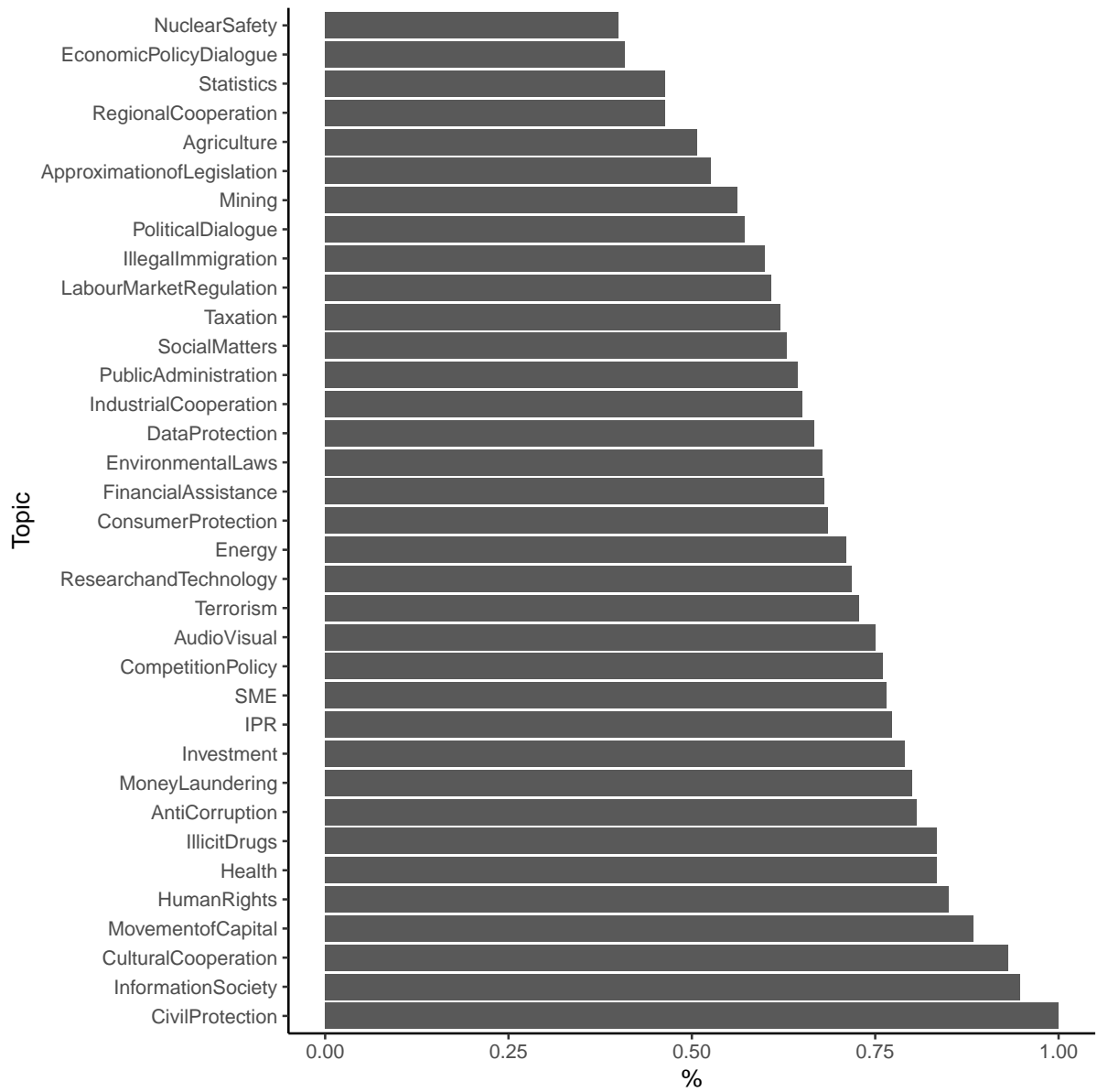
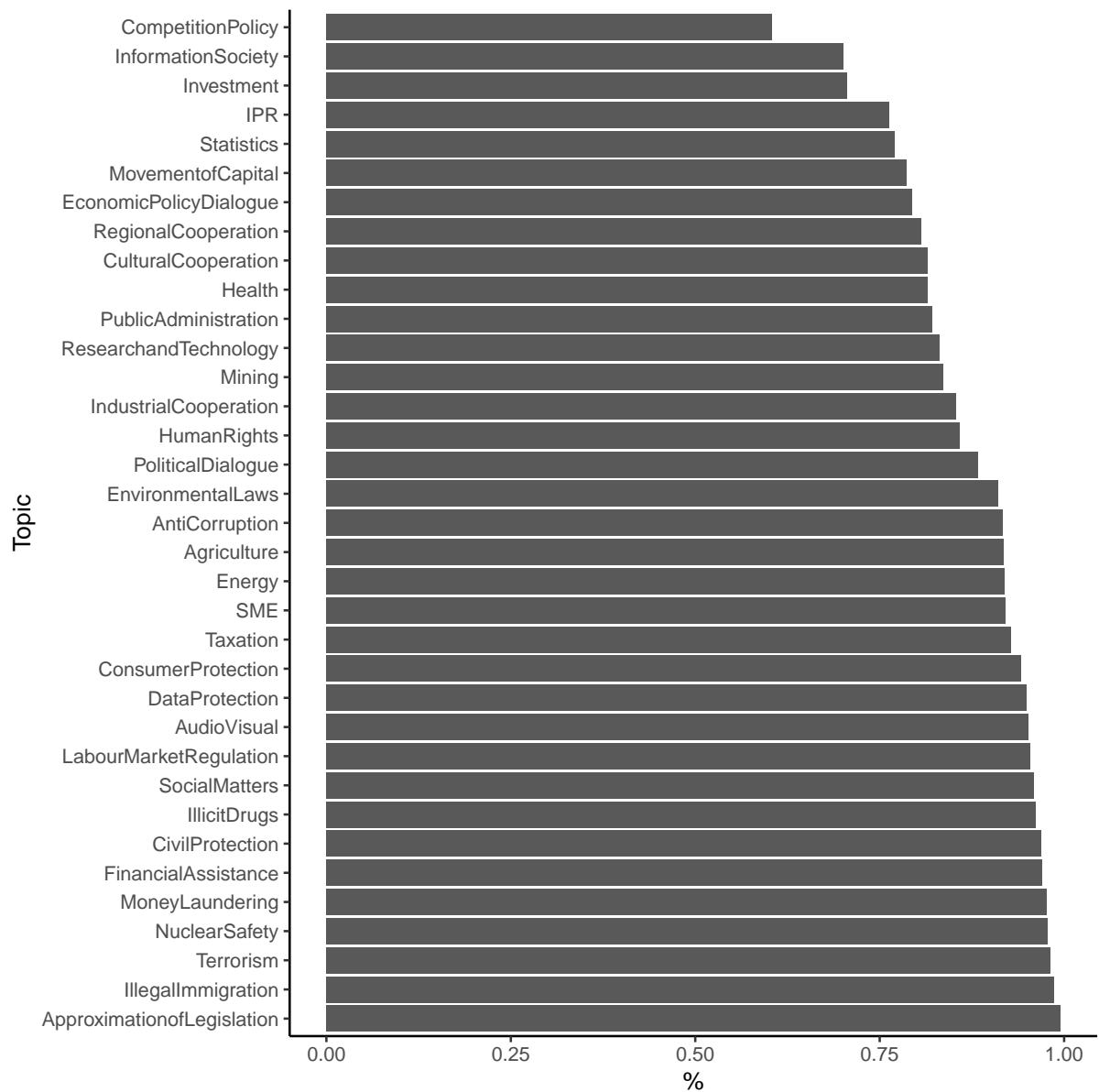




Figure 9: Percentage of agreements identified by FTA coder as not treating a given topic among the agreements coded by WB as not treating that same topic.



## B Differences between World Bank's database and the algorithm results for the Nuclear Safety topic

This section lists the differences between World Bank's database and the algorithm results for the Nuclear Safety topic. It illustrates the advantages but also the limitations of the algorithm.

The differences are divided into two categories: FTAs identified by the World Bank as covering the topic but not by the algorithm (subsection B.1) and; FTAs identified by the algorithm as covering the topic but not by the World Bank (subsection B.2). We briefly describe the reasons for these differences and provide the relevant text from the agreements.

#### B.1 FTAs identified by WB as covering the topic but not by the algorithm

##### 1. Canada - Chile

The agreement does mention nuclear weapons but only in the Exceptions chapter. Therefore, the mention is there only to state that nuclear weapons are not covered by the agreement (Chapter I Telecommunications, article O-02 National Security):

1. Nothing in this Agreement shall be construed: (...) (iii) relating to the implementation of national policies or international agreements respecting the non-proliferation of nuclear weapons or other nuclear explosive devices;

##### 2. Caricom

While CARICOM countries have been very active in advocating for nuclear disarmament and limiting the transport of nuclear materials through the Caribbean Sea, we find no mention of nuclear matters in the agreement.

##### 3. Chile - China

We do not find any mention of nuclear matters in the text of the agreement between Chile and China.

##### 4. EC - FYR Macedonia

The only mention of nuclear matters in the agreement excludes them from the scope of the agreement by specifying that these matters are covered by the Euratom Treaty European Atomic Energy Community. The relevant text is the following:

Chapter I (Industrial Products), article 3:

1. The provisions of this Chapter shall apply to products originating in the Community or the former Yugoslav Republic of Macedonia listed in chapters 25 to 97 of the combined nomenclature, with the exception of the products listed in Annex I paragraph 1, (ii) of the Agreement on agriculture (GATT 1994).
2. The provisions of Articles 4 and 5 shall neither apply to textile products nor to steel products, as specified in Articles 9 and 10.
3. Trade between the Parties in products covered by the Treaty establishing the European Atomic Energy Community shall be conducted in accordance with the provisions of that Treaty.

##### 5. NAFTA

In NAFTA, nuclear matters are mentioned in two different articles. However, these articles do not fall under the definition of nuclear safety:

Article 607: National Security Measures

Subject to Annex 607, no Party may adopt or maintain a measure restricting imports of an energy or basic petrochemical good from, or exports of an energy or basic petrochemical good to, another Party under Article XXI of the GATT or under Article 2102 (National Security), except to the extent necessary to:

- (...) c) implement national policies or international agreements relating to the nonproliferation of nuclear weapons or other nuclear explosive devices; or
- d) respond to direct threats of disruption in the supply of nuclear materials for defense purposes.

Or in the article 2102 (National Security) of the Exceptions chapter:

1. Subject to Articles 607 (Energy - National Security Measures) and 1018 (Government Procurement Exceptions), nothing in this Agreement shall be construed: (... (iii) relating to the implementation of national policies or international agreements respecting the non-proliferation of nuclear weapons or other nuclear explosive devices;

## B.2 FTAs identified by the the algorithm as covering the topic but not by WB

### 1. COMESA

The agreement mentions nuclear matters in two different articles: Chapter 17, article 128 and Chapter 16, article 122. The latter is the most relevant for the topic of nuclear safety. It states:

Chapter SIXTEEN Co-Operation In The Development Of Natural Resources, Environment And Wildlife, article 122 Scope And Principles Of Co-Operation:  
4. The Member States undertake to co-operate and adopt common policies for the control of hazardous waste, nuclear materials, radioactive materials and any other materials used in the development or exploitation of nuclear energy.

### 2. EU - Albania

The agreement explicitly mentions nuclear safety in the following article:

Article 107: Energy Cooperation shall focus on priority areas related to the Community acquis in the field of energy, including nuclear safety aspects as appropriate. It shall reflect the principles of the market economy and it shall be based on the signed regional Energy Community Treaty with a view to the gradual integration of Albania into Europe's energy markets.

### 3. EU - Bosnia and Herzegovina

The agreement includes the same article from the EU - Albania agreement:

Article 107 states: Energy Cooperation shall focus on priority areas related to the Community acquis in the field of energy, including nuclear safety aspects as appropriate. It shall reflect the principles of the market economy and it shall be based on the signed regional Energy Community Treaty with a view to the gradual integration of Albania into Europe's energy markets.s.

### 4. EU - Overseas Countries and Territories

The treaty acknowledges the importance of correctly managing nuclear waste

(21) The OCTs are fragile island environments requiring adequate protection, including in respect of waste management. In respect of radioactive waste, this is provided under Article 198 of the Euratom Treaty and legislation adopted thereunder, except for Greenland, to which the Euratom Treaty does not apply.

For other waste, it should be specified which Community rules are to apply in respect of the OCTs.

#### 5. EU - Central America

The agreement mentions nuclear matters in article 15 (Weapons Of Mass Destruction states) of PART II (Political Dialogue):

1. The Parties consider that the proliferation of nuclear, chemical and biological weapons of mass destruction and their means of delivery, both to State and non-State actors, represents one of the most serious threats to international stability and security.
2. The Parties therefore agree to cooperate and to contribute to countering the proliferation of weapons of mass destruction and their means of delivery, through full compliance with and national implementation of their existing obligations under international disarmament and non-proliferation treaties and agreements and other relevant international obligations.
3. The Parties agree that this provision constitutes an essential element of this Agreement.
4. The Parties furthermore agree to cooperate and to contribute to the objective of non-proliferation by:
  - (a) taking steps to sign, ratify or accede to, as appropriate, and fully implement and comply with all other relevant international instruments;
  - (b) establishing an effective system of national export controls controlling the export as well as transit of weapons of mass destruction related goods, including weapons of mass destruction end-use control on dual-use technologies and containing effective sanctions for breaches of export controls.
5. The Parties agree to establish a regular political dialogue that will accompany and consolidate their cooperation in this area.

It also covers the topic in article 76 (Scientific And Technological Cooperation) of TITLE IX (Knowledge Society):

TITLE IX Knowledge Society, : (j) promotion of training, research, development and applications of nuclear science and technology for medical applications enabling the transfer of technology to the Republics of the CA Party in areas such as health, particularly radiology and nuclear medicine for radiodiagnosis and radiotherapy treatment, and those areas that the Parties mutually agree to establish, in conformity with existing international conventions and regulations and submitting to the jurisdiction of the International Atomic Energy Agency.

#### 6. EU - Ukraine

Given Ukraine's status as a former nuclear power and the fact that it is still a major producer of nuclear energy, the EU-Ukraine agreement contains numerous provisions on nuclear safety and security.

For example, chapter 1 Energy Cooperation, Including Nuclear Issues, article 337, states:

1. The Parties agree to continue and intensify their current cooperation on energy matters for the enhancement of energy security, competitiveness and sustainability, which is crucial for the promotion of economic growth and to making

progress towards market integration, including through gradual approximation in the energy sector and through participation in regional energy cooperation. The regulatory cooperation shall take into account the need to ensure relevant public service obligations, including measures to inform and protect customers from unfair selling practices, and access to affordable energy for consumers, including for the most vulnerable citizens.

2. Such cooperation shall be based on a comprehensive partnership and shall be guided by the principles of mutual interest, reciprocity, transparency and predictability, consistent with the market economy, the Energy Charter Treaty of 1994, the Memorandum of Understanding on cooperation in the field of energy and other multilateral and related bilateral agreements.

#### 7. EU - Serbia

This agreement also includes several mentions of nuclear energy and nuclear safety in particular. Article 110 entitled Nuclear Safety from TITLE VIII (Cooperation Policies), covers the topic:

The Parties shall cooperate in the field of nuclear safety and safeguards. Cooperation could cover the following topics: (a) upgrading the laws and regulations of the Parties on radiation protection, nuclear safety and nuclear materials accountancy and control as well as strengthening the supervisory authorities and their resources; (b) encouraging the promotion of Agreements between Member States, or European Atomic Energy Community and Serbia on early notification and exchange of information in cases of nuclear accidents and on emergency preparedness and on nuclear safety issues in general, if appropriate; (c) promoting the implementation of the Convention on Nuclear Safety

#### 8. East African Community

Article 111 (Environmental Issues And Natural Resources) of chapter NINETEEN (Co-Operation In Environment And Natural Resources Management) explicitly covers the topic:

Chapter NINETEEN Co-Operation In Environment And Natural Resources Management, article 111 Environmental Issues And Natural Resources, states: (c) undertake to co-operate and adopt common policies for control of trans-boundary movement of toxic and hazardous waste including nuclear materials and any other undesirable materials;

## C EU and NAFTA/CUSFTA additional controls

Table 9: Controlling for EU/NAFTA

	(1)	(2)	(3)	(4)
<b>Panel A: PPML including EU and CUSFTA/NAFTA as controls</b>				
Free Trade Agreement	0.229 <sup>a</sup> (0.055)	0.227 <sup>a</sup> (0.055)	-0.073 (0.051)	-0.075 (0.051)
Entry of Business Visitors	0.203 (0.148)	0.553 <sup>a</sup> (0.123)	0.109 (0.089)	0.220 <sup>b</sup> (0.112)
Entry of Business Visitors, disp. settlement		-0.472 <sup>b</sup> (0.209)		-0.151 (0.149)
Free mobility of persons	0.062 (0.148)	0.061 (0.148)	0.047 (0.062)	0.049 (0.061)
European Union	0.162 (0.143)	0.163 (0.143)	0.433 <sup>a</sup> (0.083)	0.433 <sup>a</sup> (0.083)
CUSFTA/NAFTA	0.553 <sup>a</sup> (0.170)	0.663 <sup>a</sup> (0.195)	0.082 (0.105)	0.118 (0.116)
Pseudo-R2	0.945	0.945	0.989	0.989
Observations	930321	930321	929943	929943
<b>Panel B: OLS including EU and CUSFTA/NAFTA as controls</b>				
Free Trade Agreement	0.683 <sup>a</sup> (0.036)	0.683 <sup>a</sup> (0.036)	0.278 <sup>a</sup> (0.025)	0.279 <sup>a</sup> (0.025)
Entry of Business Visitors	0.782 <sup>a</sup> (0.116)	0.605 <sup>b</sup> (0.263)	0.242 <sup>b</sup> (0.096)	-0.283 (0.176)
Entry of Business Visitors, disp. settlement		0.213 (0.287)		0.649 <sup>a</sup> (0.204)
Free mobility of persons	-0.653 <sup>a</sup> (0.107)	-0.653 <sup>a</sup> (0.107)	0.542 <sup>a</sup> (0.069)	0.541 <sup>a</sup> (0.069)
European Union	-0.247 <sup>c</sup> (0.130)	-0.247 <sup>c</sup> (0.130)	0.197 <sup>b</sup> (0.079)	0.197 <sup>b</sup> (0.079)
CUSFTA/NAFTA	-0.513 (0.429)	-0.548 (0.429)	-0.146 (0.141)	-0.262 <sup>c</sup> (0.146)
R2	0.735	0.735	0.866	0.866
Observations	758141	758141	756345	756345
<b>Panel C: PMML excluding NAFTA countries from the sample</b>				
Free Trade Agreement	0.276 <sup>a</sup> (0.055)	0.276 <sup>a</sup> (0.055)	-0.078 (0.053)	-0.078 (0.053)
Entry of Business Visitors	0.630 <sup>a</sup> (0.131)	0.676 <sup>a</sup> (0.148)	0.209 <sup>b</sup> (0.102)	0.210 <sup>c</sup> (0.122)
Entry of Business Visitors, disp. settlement		-0.173 (0.277)		-0.007 (0.152)
Free mobility of persons	-0.096 (0.154)	-0.097 (0.154)	0.122 <sup>b</sup> (0.062)	0.123 <sup>b</sup> (0.062)
European Union	0.137 (0.153)	0.137 (0.153)	0.383 <sup>a</sup> (0.083)	0.383 <sup>a</sup> (0.083)
Pseudo-R2	0.935	0.935	0.987	0.987
Observations	883484	883484	883107	883107
<b>Panel D: Ols excluding NAFTA countries from the sample</b>				
Free Trade Agreement	0.679 <sup>a</sup> (0.037)	0.679 <sup>a</sup> (0.037)	0.288 <sup>a</sup> (0.026)	0.288 <sup>a</sup> (0.026)
Entry of Business Visitors	1.017 <sup>a</sup> (0.130)	0.901 <sup>a</sup> (0.342)	0.419 <sup>a</sup> (0.119)	-0.296 (0.240)
Entry of Business Visitors, disp. settlement		0.137 (0.365)		0.869 <sup>a</sup> (0.272)
Free mobility of persons	-0.639 <sup>a</sup> (0.108)	-0.639 <sup>a</sup> (0.108)	0.540 <sup>a</sup> (0.070)	0.540 <sup>a</sup> (0.070)
European Union	-0.244 <sup>c</sup> (0.131)	-0.244 <sup>c</sup> (0.131)	0.194 <sup>b</sup> (0.080)	0.194 <sup>b</sup> (0.080)
R2	0.723	0.723	0.860	0.860
Observations	714299	714299	712506	712506
Pair Fixed Effects	No	No	Yes	Yes
Country-Year Fixed Effects	Yes	Yes	Yes	Yes

Note: the dependent variable is the trade flow (panels A and C) or the ln of the trade flow (panels B and D) between origin and destination. Columns (1) and (2) include distance, common border, common official language and common currency controls but are not shown for clarity of the presentation. Similarly, columns (3) and (4) include common currency as a control. Statistically significant at <sup>c</sup> 10% <sup>b</sup> 5% <sup>a</sup> 1%.

## D PPML regressions for business trips

Table 10: Effect of business visitors provisions on Business Trips

	(1)	(2)	(3)	(4)
Free Trade Agreement	0.040 (0.087)	-0.013 (0.087)	-0.014 (0.086)	0.166 <sup>b</sup> (0.081)
Entry of Business Visitors		0.221 (0.153)	0.111 (0.171)	0.141 (0.175)
Entry of Business Visitors, disp. settlement			0.118 (0.206)	-0.022 (0.209)
Ln. Dist.	-0.950 <sup>a</sup> (0.053)	-0.944 <sup>a</sup> (0.053)	-0.944 <sup>a</sup> (0.053)	-1.071 <sup>a</sup> (0.065)
Common border	0.089 (0.104)	0.071 (0.109)	0.070 (0.109)	0.012 (0.111)
Common official language	0.545 <sup>a</sup> (0.110)	0.548 <sup>a</sup> (0.111)	0.547 <sup>a</sup> (0.111)	0.529 <sup>a</sup> (0.106)
Common currency	-0.008 (0.110)	0.007 (0.110)	0.007 (0.111)	0.085 (0.110)
Free mobility of persons				-0.678 <sup>a</sup> (0.186)
R2	0.974	0.974	0.974	0.974
Observations	13105	13105	13105	13105

Note: The dependent variable is the average number of business trips between 2011 and 2016 from country *i* to country *j* as computed in variable as computed in Coscia et al. (2020). All specifications include origin and destination fixed effects. Standard errors in parentheses are robust and clustered at country pair level. All columns include origin and destination fixed effects. Statistically significant at <sup>c</sup> 10% <sup>b</sup> 5% <sup>a</sup> 1%.

Table 11: Effect of business visitors provisions on Business Trips

	(1)	(2)	(3)	(4)
Free Trade Agreement	0.040 (0.087)	-0.013 (0.087)	-0.014 (0.086)	0.166 <sup>b</sup> (0.081)
Entry of Business Visitors		0.221 (0.153)	0.111 (0.171)	0.141 (0.175)
Entry of Business Visitors, disp. settlement			0.118 (0.206)	-0.022 (0.209)
Ln. Dist.	-0.950 <sup>a</sup> (0.053)	-0.944 <sup>a</sup> (0.053)	-0.944 <sup>a</sup> (0.053)	-1.071 <sup>a</sup> (0.065)
Common border	0.089 (0.104)	0.071 (0.109)	0.070 (0.109)	0.012 (0.111)
Common official language	0.545 <sup>a</sup> (0.110)	0.548 <sup>a</sup> (0.111)	0.547 <sup>a</sup> (0.111)	0.529 <sup>a</sup> (0.106)
Common currency	-0.008 (0.110)	0.007 (0.110)	0.007 (0.111)	0.085 (0.110)
Free mobility of persons				-0.678 <sup>a</sup> (0.186)
R2	0.386	0.386	0.386	0.386
Observations	13105	13105	13105	13105

Note: The dependent variable is the share of the average number of business trips between 2011 and 2016 from country  $i$  to country  $j$  as computed in variable as computed in Coscia et al. (2020). All specifications include origin and destination fixed effects. Standard errors in parentheses are robust and clustered at country pair level. All columns include origin and destination fixed effects. Statistically significant at <sup>c</sup> 10% <sup>b</sup> 5% <sup>a</sup> 1%.