Working Paper

CEPII

Free Trade Agreements and the Movement of Business People

Thierry Mayer, Hillel Rapoport & Camilo Umana-Dajud

Highlights

- Many of the measures to contain Covid-19 severely reduced business travel.

- We use provisions to ease the movement of business visitors in trade agreements to study the impact of barriers to the movement of business people.

- To analyze the large number of trade agreements, we develop an algorithm that combines machine learning and text analysis techniques.

- We show that provisions facilitating business travel indeed facilitate business travel (but not permanent migration).

- Easing business travel increases trade flows by11% and the probability to export a given product by 6%.

RESEARCH AND EXPERTISE
ON THE WORLD ECONOMY

▌Abstract

Many of the measures to contain Covid-19 severely reduced business travel. 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. To do this, we first document the increasing complexity of Free Trade Agreements. We then 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 those provisions are included in dispute settlement mechanisms. Using these data and accounting for the overall depth of FTAs, we show that provisions facilitating business travel indeed facilitate business travel (but not permanent migration) and, eventually, increase bilateral trade flows.

▌Keywords

Covid-19, Business Travel, Free Trade Agreements, Machine Learning, Text Analysis.

▌JEL

F10, F13, F14, F15, F20.

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RESEARCH AND EXPERTISE
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Free Trade Agreements and the movement of business people

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1   Introduction

Many of the measures to contain Covid-19 severely reduced the international mobility of people. Several exceptions were however put in place to allow for business trips (e.g. Japan, China, Singapore[1]). Nikkei Asia's May 2020 paper provides a telling example. The paper, which recounts Japan's plan to reopen its border, reports that "Japan intends to reopen to foreign travelers in stages, with businesspeople at the head of the line and tourists at the very back.[2]" The lasting and substantial importance of face-to-face interactions when conducting business (Cristea (2011), Umana-Dajud (2019), Startz (2018)) 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[3]. 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.

As said, we use the algorithm to identify topics related to the movement of people, however it could potentially be used for any other topic. To asses the algorithm's accuracy, we apply it

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to identify all the topics covered by the hand-coded "Content of Deep Trade Agreements" World Bank's database. We determine if an agreement was identified by the WB as covering a given topic and check then if the algorithm also identified the agreement as covering that same topic. The results overlap in over 80% of cases.

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 and with the intensity of business travel. At the same time, these provisions increase the intensity of business travel while having no impact on permanent 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 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 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 been incorporated into the analysis of the impact of trade agreements[4]. 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 migration 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 (figures 1 and 2). Second, FTA texts have become considerably longer (figure 3). Third, these agreements cover an increasing number of topics (figure 4).

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, figure 2 plots the number of FTAs, notified to the WTO, by signature year regardless of whether they are still in force or not. The

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[4]We have developed and accompanying and freely available Python package that can be used to automatically code any trade agreement.

progression is remarkable. While in the 80s, just 9 agreements were signed, the number increased to 116 between 2010 and 2019.

Accompannying the increasing number of signed and in force FTAs, the complexity of the agreements has increased too. Figure 3 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.

Figure 4 highlights the main reason explaining FTAs' increasingly longer texts. It shows the number of different topics covered by FTAs, as coded Worlds Bank's Content of Deep Trade Agreements database, by signature year. While FTAs signed in the 90s covered on average 5.3 topics, this number almost doubled for FTAs signed since the year 2000 (9.1 topics).

Figure 1: Number of FTAs in force by year.
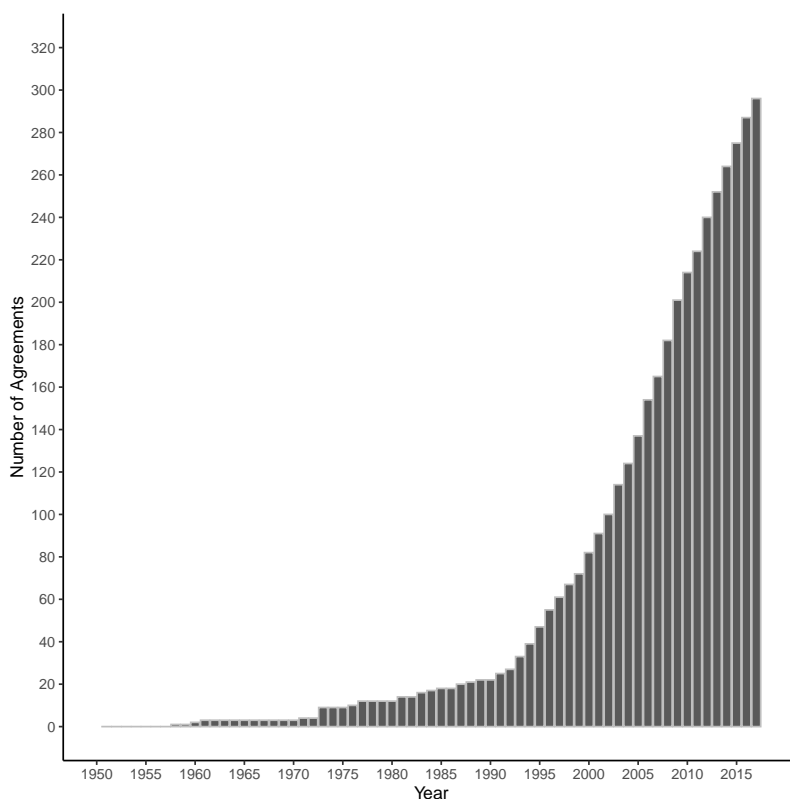
Note: this figure shows the total number of FTAs notified to the WTO and in force in 2015 by entry into force year. Based on WTO's RTA database.

Figure 2: Number of FTAs in force by year.
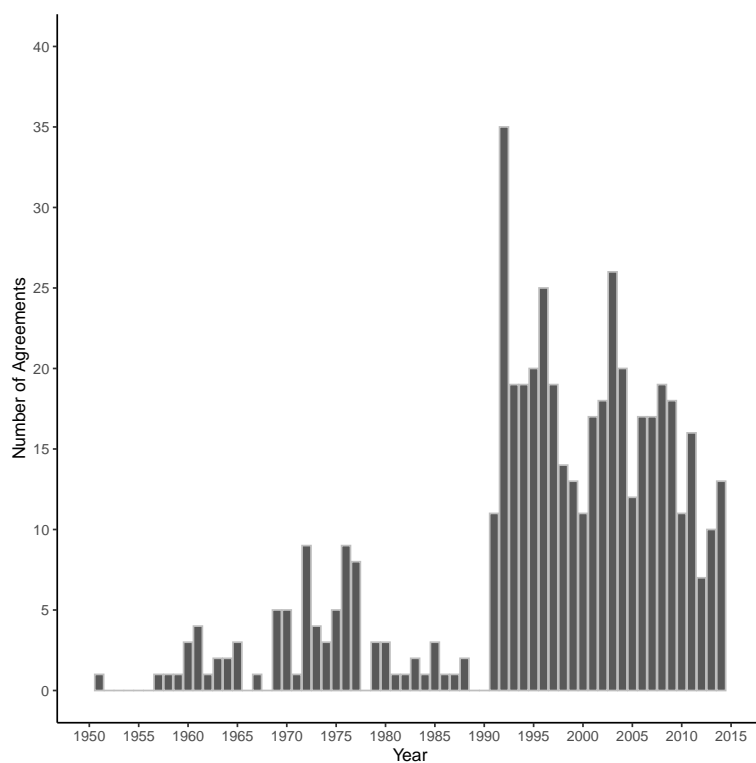
Note: this figure shows the total number of FTAs notified to the WTO by signature year. Both currently active and inactive FTAs are included. Based on WTO's RTA database.

Figure 3: Word count of FTAs texts
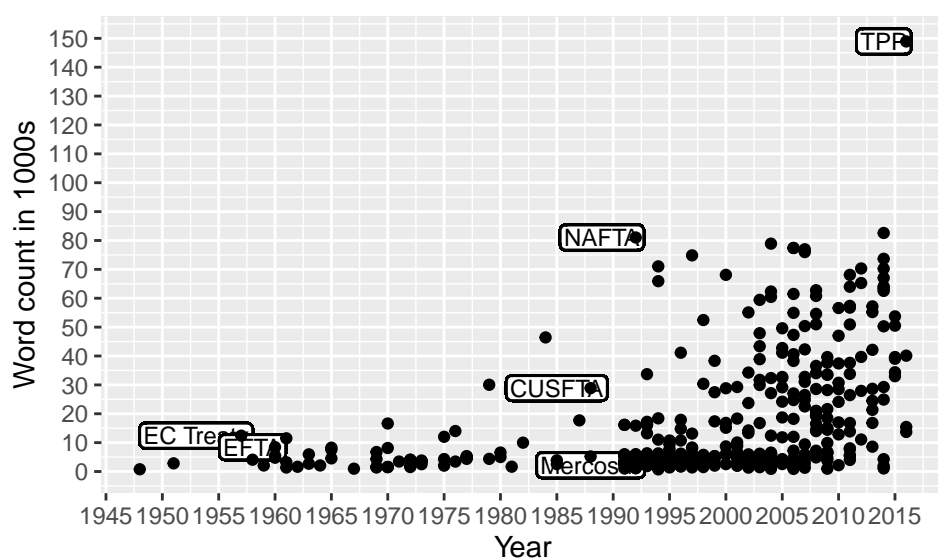
Notes: this figure shows the total number of words in each FTA text. We compute these figures using the FTAs text corpus provided by Alschner et al. (2017b).

Figure 4: Number of topics covered
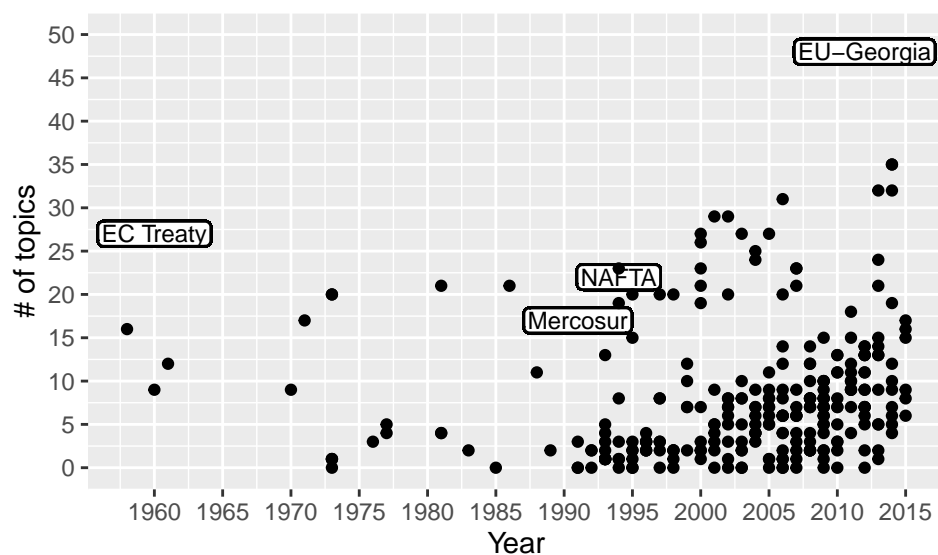
Notes: this figure shows the number of different topics covered by each FTA. The figures were computed using the data provided by Worlds Bank's Content of Deep Trade Agreements database (Hofmann et al. (2017)).

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 to Dür et al. (2014) and Hofmann et al. (2017). Our approach, substitutes hand-coding procedures with text analysis and machine learning procedures.

While hand-coding by legal experts and economists remains the best practice in many cases, the costs can be hefty and the time frame considerable. This automatized approach can be particularly useful in a number of cases. 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 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 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 phrases referring to the dispute settlement of matters related to the topic. Note that the collection of phrases can be an empty set.

The algorithm proceeds then to analyze whether the collection of phrases includes or excludes the topic from dispute settlement mechanisms. For this purpose, the algorithm applies a Multinomial Bayes Classifier to the set of phrases. To this end, we define two classes of phrases:

$$Class = \begin{cases} \text{Includes a topic in dispute settlement mechanisms} \\ \\ \text{Excludes a topic in dispute settlement mechanisms} \end{cases} \tag{1}$$

To determine to which class a phrase belongs to, the algorithm applies Bayes' rule:

$$P(class|phrase) = \frac{P(phrase|class)P(class)}{P(phrase)} \tag{2}$$

Using a maximum a posteriori decision rule, it chooses then the most likely hypothesis:

$$class_{MAP} = \underset{class \in Class}{argmax} \ P(phrase|class)P(class) \tag{3}$$

By defining the different features of each phrase as $x_1, x_2, ..., x_n$, equation (3) can be written as:

$$class_{MAP} = \underset{class \in Class}{argmax} \ P(x_1, x_2, ..., x_n|class)P(class) \tag{4}$$

To estimate equation (4), we work with two simplifying assumptions. First, we apply a *Bags of Words* hypothesis and assume that the relative position of features does not matter. Second, we assume that these features are independent.

Using these assumptions we can write equation (4) as:

$$class_{NB} = \underset{class \in Class}{argmax} \left[\prod_x P(x|class) \right] P(class) \tag{5}$$

To train this Naïve Bayes Classifier, we begin by gathering, from a broad range of trade agreements, a collection of phrases 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 (5) using the set of manually classified sentences.

Using this Naive Bayes Classifier, the algorithm can classify any new phrase into one of the two defined classes. As a final result it delivers a dummy variable indicating whether the topic is covered by the agreement's dispute settlement mechanism or not. Finally, we generate a dataset covering a large number of trade agreements by running the algorithm on the corpus of machine readable trade agreements compiled in Alschner et al. (2017b) (i.e. 449 agreements).

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. 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.

The algorithm's results are very similar to WB's database. Figure 5 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%. Similarly, figure 6 shows, for each topic, the percentage of agreements that the algorithm and WB's database coded identically. The average across topics is 82.2%. Figure 9 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, 74.2% of agreements identified by WB's database were also identified by the algorithm. Figure 10, 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, 81.4% were also classified by the algorithm as not containing the topic.

Figure 5: # of Agreements identified by WB vs FTA Coder
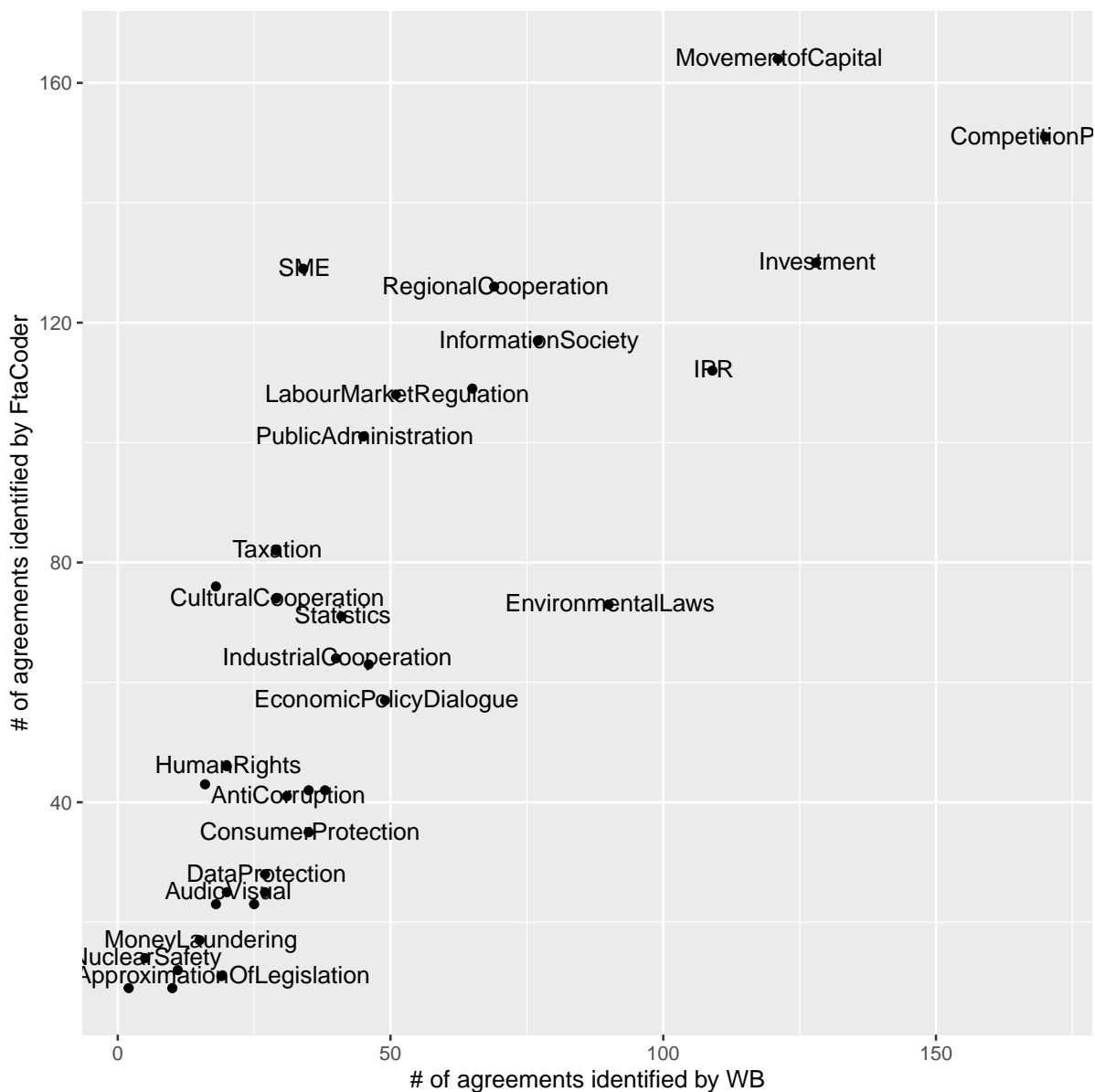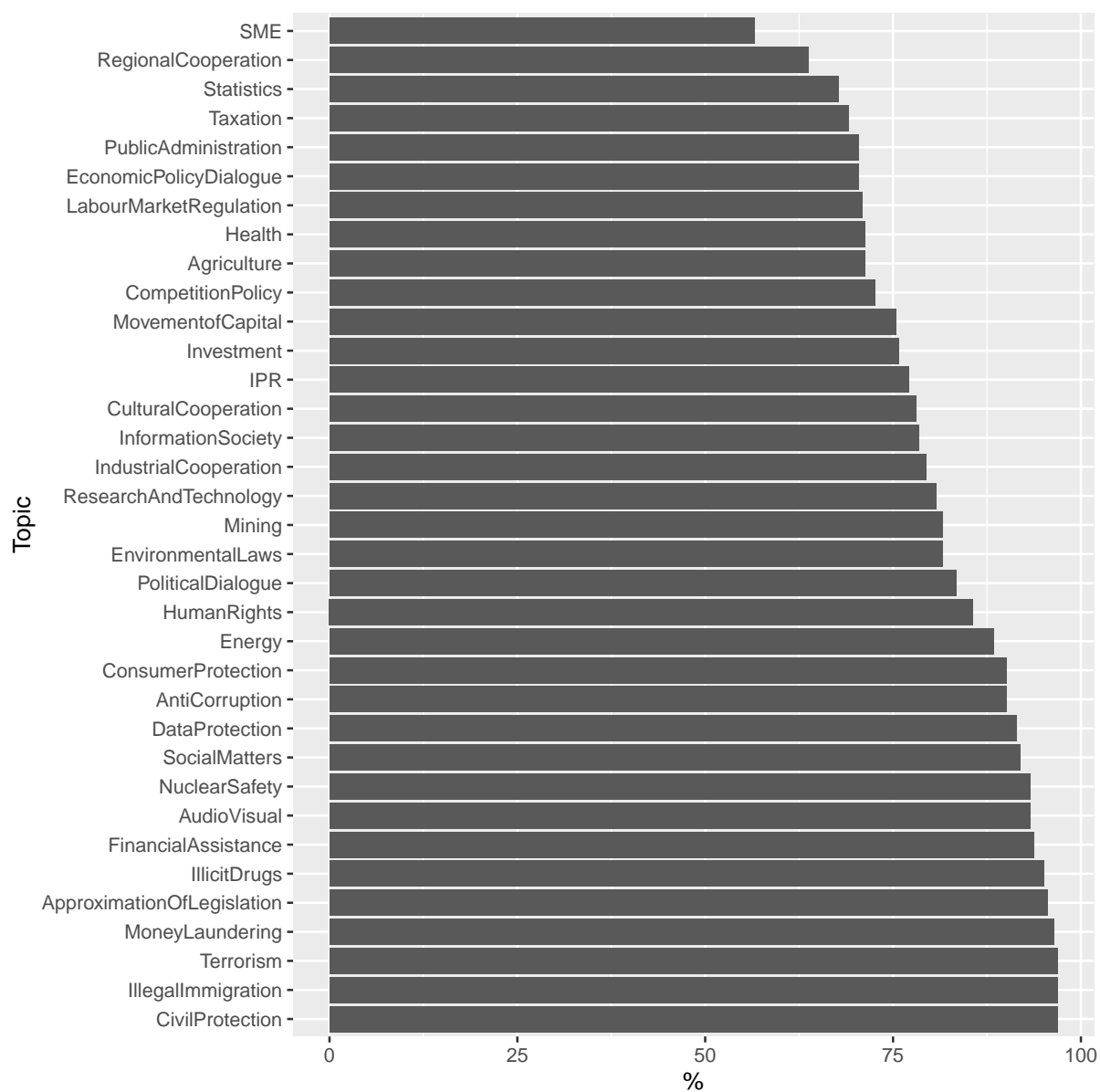
Figure 6: Percentage of FTAs coded identically for each topic

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. 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 7). Most of these agreements involve countries in North and South America (figure 8). Some countries in Asia and Oceania have also signed trade agreements with such provisions.

Figure 7: Number of FTAs signed each year containing business visitors provisions
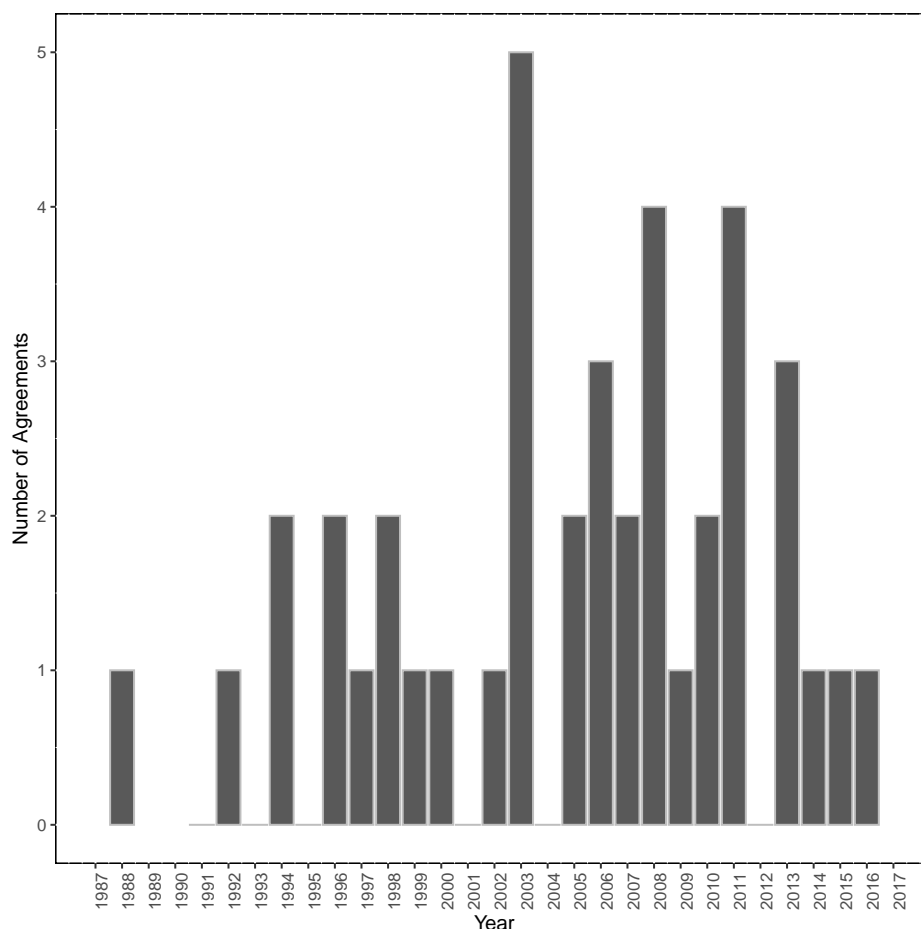
Notes: this figure shows the number of FTAs that contain business visitor provisions that were signed each year. We compute these figures using the algorithm results.

The provisions facilitating the movement of business visitors fall under three 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

Figure 8: Geographical distribution of FTAs with business visitors entry provisions
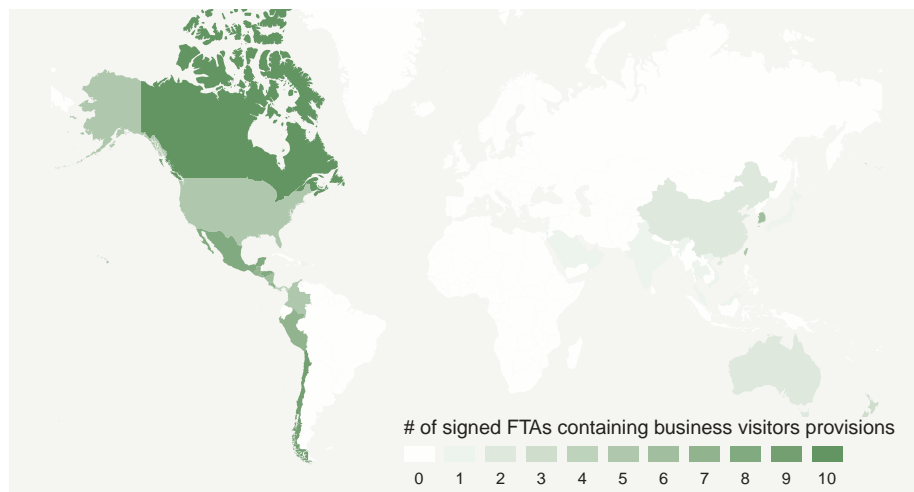
by business persons of the other Party."

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 very briefly the data we use in order to asses 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 Databaes (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 dummy variable groups together the few trade agreements that include the free mobility of persons or workers: the European Union, the European Economic Area, the European Free Trade Association and the Australia-New Zealand Free Trade Agreement[5].

Business Travel Index: data on the intensity of business travel between to countries is taken from Coscia et al. (2020). The Business Travel Index measures the intensity of business travel using confidential data on international expenditures through corporate payment cards. The data is available for a sample of more than 100 countries for the 2011-2016 period.

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[5]Free mobility of persons has been in place between the countries since the Trans-Tasman Travel Arrangement signed in 1973.

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:

$$X_{i,j,t} = exp(\lambda_{it} + \lambda_{jt} + \lambda_{ij} + \alpha' c_{ijt} + \beta' m_{ijt}) * \chi_{ijt} \tag{6}$$

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 6 using the Poisson Pseudo-Maximum-Likelihood estimator (PPML). Provisions to ease the movement of business visitors increase bilateral trade flows in all tested spefiicactions of table 1. Including these provisions in dispute settlement mechanisms does not have an statistically significant impact on trade. This seems consistent with the nature of theses clauses summarized in section 4.

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, similar results are found in other papers (Mayer et al. (2019) and Head and Mayer (2021)).

Tables 2 and 3 confirm the baseline results using two alternative specifications. Table 2 shows the results of the estimation of equation 6 using OLS. OLS estimates of gravity equations are more vulnerable to bias arising form heteroskedascticity 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 (2019)). With OLS, business visitors provisions have a positive effect on trade in the spefiications 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 6 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.

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.

Table 1: Effect of business visitors provisions: PPML

	(1)	(2)	(3)	(4)
Free Trade Agreement	0.236^a	0.236^a	-0.038	-0.038
	(0.055)	(0.055)	(0.049)	(0.049)
Entry of Business Visitors	0.421^a	0.576^a	0.147^c	0.200^c
	(0.099)	(0.121)	(0.078)	(0.113)
Entry of Business Visitors, disp. settlement		-0.172		-0.066
		(0.155)		(0.132)
Free mobility of persons	0.176^b	0.174^b	0.373^a	0.374^a
	(0.079)	(0.079)	(0.049)	(0.049)
Ln. Dist.	-0.751^a	-0.752^a		
	(0.032)	(0.032)		
Common border	0.370^a	0.372^a		
	(0.061)	(0.061)		
Common official language	0.216^a	0.217^a		
	(0.052)	(0.052)		
Common currency	-0.010	-0.011		
	(0.067)	(0.067)		
Pair Fixed Effects	No	No	Yes	Yes
Country-Year Fixed Effects	Yes	Yes	Yes	Yes
Pseudo-R2	0.945	0.945	0.989	0.989
Observations	930321	930321	965276	965276

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 ^{c} 10% ^{b} 5% ^{a} 1%.

Table 2: Effect of business visitors provisions: OLS

	(1)	(2)	(3)	(4)
Free Trade Agreement	0.684^a	0.684^a	0.295^a	0.295^a
	(0.036)	(0.036)	(0.025)	(0.025)
Entry of Business Visitors	0.624^a	0.607^b	0.187^b	-0.297^c
	(0.131)	(0.262)	(0.091)	(0.177)
Entry of Business Visitors, disp. settlement		0.020		0.585^a
		(0.296)		(0.201)
Free mobility of persons	-0.844^a	-0.844^a	0.776^a	0.776^a
	(0.072)	(0.072)	(0.040)	(0.040)
Ln. Dist.	-1.444^a	-1.444^a		
	(0.016)	(0.016)		
Common border	0.434^a	0.434^a		
	(0.078)	(0.078)		
Common official language	0.819^a	0.819^a		
	(0.030)	(0.030)		
Common currency	0.778^a	0.778^a		
	(0.085)	(0.085)		
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	784381	784381

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 ^{c} 10% ^{b} 5% ^{a} 1%.

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

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

Note: The dependent variable is the trade FlowShare between origin and destination. Standard errors in parentheses are robust and clustered at country pair level. Statistically significant at ^{c} 10% ^{b} 5% ^{a} 1%.

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 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% 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.

Table 4: Controlling for FTA's measures of depth

	(1)	(2)	(3)	(4)
Panel A: Text's lenght				
Free Trade Agreement	0.229^a	0.221^a	-0.080	-0.087
	(0.067)	(0.069)	(0.079)	(0.081)
Entry of Business Visitors	0.403^a	0.567^a	0.088	0.193^c
	(0.149)	(0.123)	(0.084)	(0.110)
Entry of Business Visitors, disp. settlement		-0.208		-0.143
		(0.198)		(0.146)
Free mobility of persons	0.178^b	0.177^b	0.388^a	0.391^a
	(0.079)	(0.079)	(0.056)	(0.057)
Text length in 10000s words	0.003	0.008	0.016	0.020
	(0.022)	(0.024)	(0.014)	(0.016)
Pseudo-R2	0.945	0.945	0.989	0.989
Observations	930321	930321	965276	965276
Panel B: Number of covered topics				
Free Trade Agreement	0.110	0.110	-0.136	-0.137
	(0.090)	(0.090)	(0.129)	(0.129)
Entry of Business Visitors	0.401^a	0.562^a	0.150^c	0.209^c
	(0.100)	(0.120)	(0.079)	(0.112)
Entry of Business Visitors, disp. settlement		-0.178		-0.072
		(0.155)		(0.130)
Free mobility of persons	0.137^c	0.134^c	0.353^a	0.353^a
	(0.078)	(0.078)	(0.042)	(0.042)
# of topics in FTA	0.007^b	0.007^b	0.005	0.005
	(0.003)	(0.003)	(0.004)	(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 ^{c} 10% ^{b} 5% ^{a} 1%.

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 Business Travel intensity index developed in Coscia et al. (2020). Since data on business travel flows is not available, the authors build an index capturing the size of business travel flows between two countries. The index is based on confidential anonymized data on international expenditures through corporate payment cards. Using this data we estimate the following equation:

$$BTI_{ijt} = \lambda_{it} + \lambda_{jt} + \lambda_{ij} + \alpha' c_{ijt} + \beta' m_{ijt} + \epsilon_{ijt} \tag{7}$$

where BTI_{ijt} is the intensity of business travel flows originating in i and with destination j in year t. The other variables are the same as in the main gravity model (equation 6).

Table 5 reports the results of estimating equation 7 using OLS. The table shows that the inclusion of provisions facilitating the entry of business visitors has a positive effect on the intensity of a business travel. In all specifications the coefficient for business visitors provisions is positive. It is also statistically significant at the 10% level in columns (1) and (3). When we add the dummy indicating whether the provisions are covered by dispute settlement mechanisms, it remains positive but is no longer statistically significant. This is possibly due to the reduced number of FTAs containing these provisions for the years covered by the Business Travel Index (2011-2016) and the extremely demanding set of fixed effects for a rather reduced number of observations.

Table 5: Effect of business visitors provisions on Business Travel Intensity

	(1)	(2)	(3)	(4)
Free Trade Agreement	0.042	0.043	-0.008	-0.008
	(0.029)	(0.029)	(0.026)	(0.026)
Entry of Business Visitors	0.204^c	0.167	0.360^b	0.181
	(0.109)	(0.240)	(0.171)	(0.174)
Entry of Business Visitors, disp. settlement		0.044		0.241
		(0.265)		(0.278)
Ln. Dist.	0.017	0.017		
	(0.016)	(0.016)		
Common border	0.012	0.012		
	(0.076)	(0.076)		
Common official language	0.041	0.041		
	(0.033)	(0.033)		
Common currency	0.125	0.125		
	(0.087)	(0.087)		
Pair Fixed Effects	No	No	Yes	Yes
Country-Year Fixed Effects	Yes	Yes	Yes	Yes
R2	0.265	0.265	0.897	0.897
Observations	33908	33908	33878	33878

Note: The dependent variable is the Business Travel Intensity between origin and destination. Standard errors in parentheses are robust and clustered at country pair level. Statistically significant at ^{c} 10% ^{b} 5% ^{a} 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:

$$ExportStatus_{ijkt} = \lambda + \alpha' c_{ijt} + \beta' m_{ijt} + \epsilon_{ijt} \tag{8}$$

where λ 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 8 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***	0.02621***	0.02614***	0.02621***	0.02126***	0.02129***	0.02126***
	(0.006375)	(0.006384)	(0.006375)	(0.006384)	(0.003455)	(0.003455)	(0.003455)
Entry of Business Visitors	0.1286***	0.06818**	0.1286***	0.06818**	0.06008***	0.03268**	0.06008***
	(0.0349)	(0.02142)	(0.0349)	(0.02142)	(0.0104)	(0.01165)	(0.0104)
Entry of Business Visitors, disp. set.		0.07412		0.07412		0.0369*	
		(0.04597)		(0.04597)		(0.01508)	
Ln. Dist.	-0.01589***	-0.01585***	-0.01589***	-0.01585***			
	(0.002125)	(0.002121)	(0.002125)	(0.002121)			
Common border	0.09795***	0.09778***	0.09795***	0.09778***			
	(0.01295)	(0.01296)	(0.01295)	(0.01296)			
Common official language	0.01131***	0.01122***	0.01131***	0.01122***			
	(0.002621)	(0.002625)	(0.002621)	(0.002625)			
Free mobility of persons	0.2322***	0.2323***	0.2322***	0.2323***	0.06722***	0.0672***	0.06722***
	(0.02942)	(0.02942)	(0.02942)	(0.02942)	(0.01458)	(0.01458)	(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 the trade flow between origin and destination. Standard errors in parentheses are robust and clustered at country pair level. Statistically significant at [c] 10% [b] 5% [a] 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. (2019)). 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 6 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	-0.024	-0.078	-0.078
	(0.123)	(0.123)	(0.112)	(0.112)
Entry of Business Visitors	-0.227	0.052	-0.168	-0.149
	(0.399)	(0.493)	(0.214)	(0.164)
Entry of Business Visitors, disp. settlement		-0.293		-0.024
		(0.608)		(0.315)
Free mobility of persons	0.229	0.227	1.066^a	1.066^a
	(0.249)	(0.249)	(0.175)	(0.175)
Ln. Dist.	-1.040^a	-1.041^a		
	(0.065)	(0.065)		
Common border	0.327^c	0.331^c		
	(0.171)	(0.170)		
Common official language	1.307^a	1.307^a		
	(0.115)	(0.115)		
Common currency	-0.241	-0.242		
	(0.168)	(0.168)		
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	61442	61442

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 ^{c} 10% ^{b} 5% ^{a} 1%.

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

	(1)	(2)	(3)	(4)
Free Trade Agreement	0.564^a	0.565^a	0.030	0.030
	(0.120)	(0.120)	(0.073)	(0.073)
Entry of Business Visitors	0.371	-0.197	-0.007	-0.024
	(0.271)	(0.684)	(0.195)	(0.259)
Entry of Business Visitors, disp. settlement		0.588		0.018
		(0.723)		(0.322)
Free mobility of persons	-1.947^a	-1.946^a	0.613^a	0.613^a
	(0.255)	(0.255)	(0.177)	(0.177)
Ln. Dist.	-1.299^a	-1.299^a		
	(0.057)	(0.057)		
Common border	0.769^a	0.769^a		
	(0.113)	(0.113)		
Common official language	0.995^a	0.995^a		
	(0.099)	(0.099)		
Common currency	0.954^a	0.955^a		
	(0.157)	(0.157)		
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	56586	56586

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 ^{c} 10% ^{b} 5% ^{a} 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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7   Appendix

7.1   Percentage of identically coded topics by algorithm and WB's database

Figure 9: Percentage of agreements identified by FTA coder as treating a given topic among the agreements coded by WB as treating that same topic.
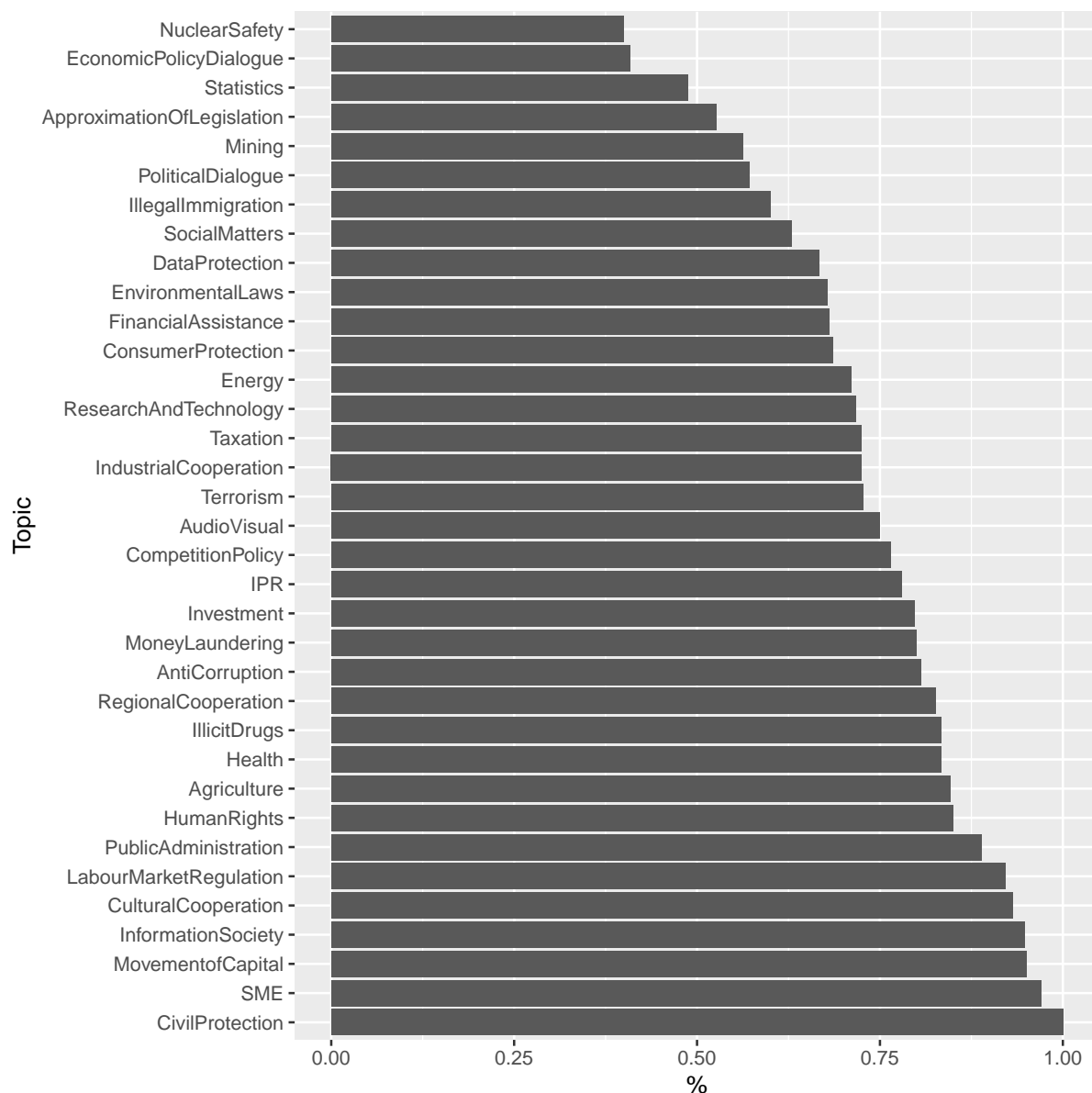
Figure 10: Percentage of agreements identified by FTA coder as not treating a given topic among the agreements coded by WB as not treating that same topic.