

The Impact of Migration on Trade: Evidence from Brazil

Diala Al Masri
Carlos Vargas-Silva

Migration Unit

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The Impact of Migration on Trade: Evidence from Brazil

Abstract¹

We use 2010-2017 data to explore the impact of migration on trade in Brazil. In order to account for the endogeneity of migrant location within the country and timing of migration, we use an instrument based on linguistic proximity among migrant groups and shocks that led to migration outflows from countries with a strong Brazilian connection, such as Haiti's 2010 earthquake. The migrant population of Brazil remains small, but has increased considerably over the last decade. Our results suggest that overall immigration to Brazil had a positive impact on imports, with doubling the average migrant share of the population across municipalities (0.18 percentage points) increasing total imports by 35%. These results were driven by an increase in both differentiated and homogenous imports. The presence of migrants had no significant effect on total exports. The results for Haitian migrants are different and indicate that doubling the average population share of Haitians across municipalities (0.01 percentage points) leads to an increase of 6% in total exports to Haiti. This effect is driven by differentiated exports. The presence of Haitians had no statistically impact on imports from Haiti or homogeneous exports. While the effects are moderate in terms of size, the result for Haitians suggests that there is scope for new diasporas to contribute to the recovery from a natural disaster.

JEL Classification: F14; F22; F18

Keywords: Trade, Imports, Exports, Migration, Brazil, Haiti

Diala Al Masri
Doctoral Student
Oxford Department of International Development
University of Oxford
diala.almasri@qeh.ox.ac.uk

Carlos Vargas-Silva
Director and Associate Professor
Centre on Migration, Policy and Society
University of Oxford
carlos.vargas-silva@compas.ox.ac.uk

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1. Introduction

There is a substantial body of evidence on the impact of migration on trade, with most studies indicating that migration has a positive impact on trade flows (Parsons and Winters, 2014). The explanations for this positive impact include that migrants can increase the level of information about the country of origin and reduce the costs involved with trade, demand products from the home country for their own consumption and affect the preferences of other host country residents. A common feature of the large majority of papers in this topic is that the focus is on South-North or North-North migration, that is, between low/middle-income and high-income countries or between high-income countries. In this study we depart from that focus and explore the impact of migration on trade in the context of a middle-income country. We ask: *what is the impact of migration on imports and exports in a middle-income economy?* Exploring this question is important because, among other reasons, South-South migration outnumbers South-North migration at global levels (OECD, 2011).

The impact of migration on trade can be different in this context for a variety of reasons. For instance, there could be differences in the nature of comparative advantage and endowments, two traditional drivers of trade (Rauch, 1999). Second, many countries in the Global South do not have policies to integrate migrants (e.g. language courses, recognition of qualifications, employment assistance) and this could affect the economic integration of newcomers and their interaction with countries of origin (OECD, 2011). Third, the main reasons for migration are different. In the context of South-South migration, flows often are of a forced nature, because of natural disasters, conflict or political crises, in contrast to the more organised and gradual economic migrant inflows typically experienced by the North (Ruiz and Vargas-Silva, 2018).

In order to explore the impact of migration on trade from a middle-income country perspective we focus on the case of Brazil, the largest economy in Latin America. Immigration to Brazil has historically been small and diverse without any single country accounting for a substantial share of the inflow. This started to change in the late 2000s, as the country's economy expanded. Brazil's global standing also increased during this period with the award of the 2014 FIFA World Cup and the 2016 Summer Olympics. Examples of considerable recent migration waves to Brazil include the substantial inflows from Haiti following the devastating 2010 earthquake (Cavalcanti et al., 2017) and the inflow of Venezuelans escaping the political and economic crisis in their country (Simões, 2017).

Brazil is a good context to explore questions related to trade and migration for several reasons. First, the regions of the country had different exposure to migrants. Some municipalities did not experience much growth in the migrant population in the sample period, while the share of the migrant population increased substantially in others. This variation in exposure to migration shocks across regions will have an impact on the choices that firms undertake including import and export decisions. Second, while the change in the number of migrants over the sample period is common to a given municipality, industries may respond differently to their presence and we have detailed information about imports and exports of different products. Third, Brazil receives a diverse set of

migrants that differ in terms of their cultural proximity to Brazilians and other residents of the country. We use this fact in order to create a novel instrumental variable approach using language proximity to address the endogeneity of migrants' locations. Fourth, some exogenous factors in countries of origin of key migrant groups in Brazil (e.g. Haiti's 2010 earthquake) allow us to take advantage of quasi-natural experiments that led to an exogenous increase in the migrant population of Brazil. Finally, migration to Brazil provides a good opportunity for research as the effect of migration on trade should be greater for the first large migrant waves into a country (Strozzi, 2017). Moreover, migrants still account for a small share of the country's population and our analysis can inform future policymaking in the country as the migrant population increases.

Our analysis is divided into two parts: the impact of overall migration to Brazil and the impact of Haitian migration after the earthquake as a case study. Exploring the impact of post-earthquake Haitian migration on trade is important as it can provide insights into the potential role of diasporas in assisting recovery efforts. There is evidence suggesting that diasporas assist recovery efforts by sending remittances and medical supplies (Migration Policy Institute, 2010) and lobbying for additional support in their countries of residence (Esnard and Sapat, 2011; Sewordor et al., 2019). However, there is less evidence about the role of new diasporas (i.e. displaced by the natural disaster) in assisting the recovery by, for instance, increasing trade flows with the country of origin.

Our results suggest that overall immigration to Brazil had a positive impact on imports. In particular, doubling the average migrant share of the population across municipalities (0.18 percentage points) increases imports by 35%. These results were driven by an increase in differentiated imports. The presence of migrants had no significant effect on exports or imports of homogenous goods. The results for Haitian migrants are different and indicate that doubling the average share of Haitians across locations (0.01 percentage points) leads to an increase of 6% in total exports to Haiti. This effect is driven by differentiated exports. The presence of Haitians had no statistically impact on imports from Haiti or homogeneous exports.

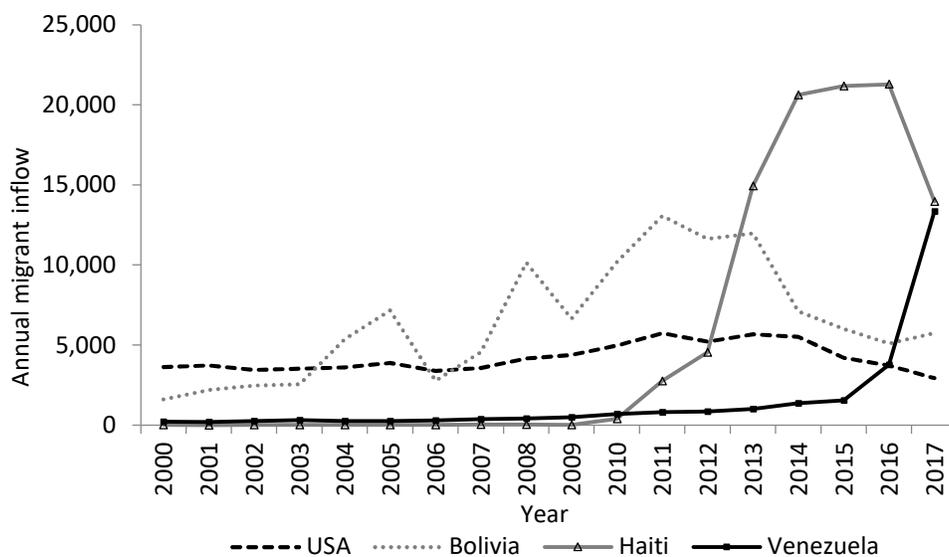
2. Background

2.1 Migration to Brazil

Brazil is not a traditional destination for Latin American migrants. This has started to change in recent years, particularly because of the country receiving new migrant inflows from countries such as Haiti and Venezuela. In these cases, the inflows responded mainly to exogenous events in the countries of origin and, as shown in Figure 1, inflows from these countries increase from a few hundred to over 10,000 per year relatively quickly. Also, there has been a steady migrant inflow from other countries such as Bolivia and the United States. The first part of our analysis studies the impact of the overall migrant inflow during 2010-2017 on trade. Hundreds of thousands migrants came to Brazil from most countries around the world during that period. While the number is large overall, it is fairly small (less than 1%) relatively to the overall population of the country (over 200 million).

The second part of the analysis in this paper studies Haitian migrants as a case study. This analysis is interesting because of the forced push factor for this migration into a new destination country, Brazil. There was little connection between Brazil and Haiti until 2004. In that year, Haiti experienced a major internal conflict that resulted in the removal of President Jean-Bertrand Aristide from power. Following these events, the United Nations sent a peacekeeping mission to stabilise the country, this mission was known in French as *Mission des Nations Unies pour la stabilisation en Haïti* (MINUSTAH). Brazil aspired to become a global power in that period and agreed to lead the military component of MINUSTAH (i.e. led by the Brazilian Army with a Brazilian force commander) in order to support those ambitions (Müller and Steinke, 2018). MINUSTAH set a precedent as the first mission in the region to be led by another Latin American country.

Figure 1. Annual Migrant Inflows to Brazil from Top 4 Countries of Origin



Note: Authors' analysis of the SINCRE data.

Haiti has been traditionally a country of emigration. According to some analysis, Haiti has the world's highest high-skilled emigration rate (Jadotte, 2012). However, there were few Haitians living in Brazil until 2010. In that year, after a long period of the Brazilian Army leading MINUSTAH, Haiti experienced a devastating earthquake. Death toll estimates are in the hundreds of thousands and included a large number of UN personnel, such as the civilian leaders of MINUSTAH (Braga, 2010). The earthquake also had a major impact on Haiti's economy with estimated impacts at above 10% of GDP (Best and Burke, 2019; Cavallo et al., 2010).

The existing link between Brazil and Haiti because of MINUSTAH together with the devastating economic and social consequences of the 2010 Earthquake led to a large inflow of Haitians to Brazil. Haitians typically had to travel to the Dominican Republic (land or air), fly to Ecuador and then travel by land across Peru to enter Brazil in one of the land borders with this country (see Figure 2). While it was common for Haitians to enter Brazil via

the Peruvian border, most eventually settled in other regions of the country (Cavalcanti et al., 2017). Importantly, as shown in Figure 2, these crossing points into Brazil are far away from large cities such as Rio de Janeiro and Sao Paulo.

Figure 2. Route and main entry points of Haitian migrants into Brazil



Note: Map generated by authors.

As show in Figure 1, the annual inflow of Haitians to Brazil was negligible in 2009 but it increased to over 20,000 in 2013. Initially, many Haitians crossing the border into Brazil applied for asylum. However, these migrants did not qualify for asylum under Brazilian law and given the impossibility of return to Haiti, Brazil decided to give arriving Haitians humanitarian visas and a later point starting issuing these visas abroad. Close to 100,000 Haitians arrived in Brazil during 2010-2017.

2.2 Migration and Trade

There are two key direct channels by which migrants affect trade between their home and host countries. The first channel relates to information and its impact on costs. It includes the migrants' impacts on language, culture and other barriers to foreign trade, their supply of new information, and their ability to connect businesses and suppliers across countries (Combes et al., 2005, Dunlevy, 2006, Felbermayr and Jung, 2009, Felbermayr et al., 2010, Herander and Saavedra, 2005, Rauch and Trindade, 2002). The effect of this channel is magnified when the two countries have significant differences in culture, customs, institutions and languages. Moreover, the

information supplied by migrants becomes more important for trade with low- and middle-income countries, as in our context, since experience and knowledge play a greater role in assessing the trustworthiness of potential trading parties (Strozzi, 2017).

The second channel relates to preferences about different products. It embodies the enhancement of trade caused by the migrants' knowledge of different products from their home country (Girma and Yu, 2000, Gould, 1994, Head and Ries, 1998, Wagner et al., 2002). This difference could relate to factors such as quality or to new products. The preference channel also includes the increase of the host country imports caused by the migrants' demand of goods produced in their home country and a possible shift in the taste of the host country's residents. However, this increase could be dampened because, as the number of migrants increases, local firms could start manufacturing these goods, including firms led by migrants (Chiara Strozz, 2017).

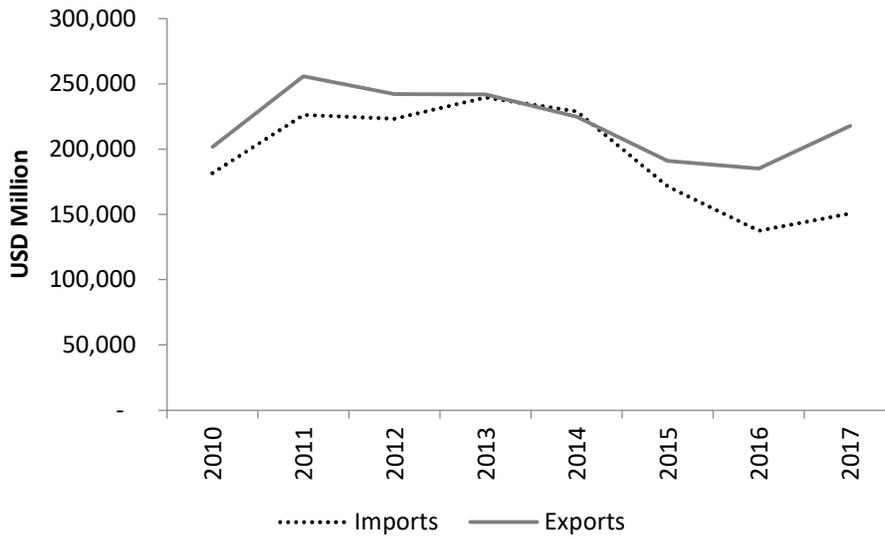
The evidence suggests that migration affects homogenous and differentiated goods differently (Peri and Requena-Silvente, 2010). Homogeneous goods are those for which consumers may neither know nor care about the source of the product they are purchasing. Differentiated goods are products with many characteristics that vary across suppliers and may even be specifically tailored to the end-user's needs. For products which are homogenous the preferences channel is unlikely to play a major role. In that case the story is likely to be mainly about cost reduction. On the other hand, these preference effects can increase demand and imports for differentiated goods (Rauch and Trindade, 2002).

Finally, it is important to highlight that an important link between migration and trade is the one established across diasporas from the same country of origin present in two or more different countries. Diasporas can inform one another of trade opportunities present in either host country or help natives to establish business connections in both countries (Metulini et al. 2018; Strozzi, 2017). For instance, the presence of Haitians or Venezuelans does not only affect trade with Haiti or Venezuela, but also with other countries hosting large Haitian/Venezuelan communities. This point is important as often migrant sending countries are experiencing major economic, political or natural disaster crises that limit the capacity of migration to increase trade with that particular country.

2.3 Trade in Brazil

As shown in Figure 3, for most of the period under consideration in the analysis of this paper, Brazil had a substantial trade surplus. However, imports and exports decreased during the period under consideration, particularly imports after 2014 when the country experienced an economic downturn (Holland, 2019). Our initial analysis suggests that this decrease was mainly concentrated in homogenous imports.

Figure 3. Total imports and exports to/from Brazil



Note: Authors' analysis of the COMEX STAT data.

3. Data and methods

3.1 Data

Our analysis covers the period 2010-2017 and relies on three different datasets. First, the migration data comes from the *Sistema Nacional de Cadastro e Registro de Estrangeiros* (SINCARE). SINCARE registers all foreigners entering Brazil with a visa, except those with tourist visas. It includes information on country of birth and municipality of destination. Second, for Brazilian foreign trade statistics we use COMEX STAT, which contains information on state and city tax domicile of exporters and importers, as well as trading flows with different countries. As part of the analysis we classify traded products as homogenous and differentiated, using the approach suggested by Rauch (1999). Finally, we obtained municipal characteristics from the *Instituto Brasileiro de Geografia e Estatística* (IBGE) datasets. The municipal characteristics available for the period of interest include GDP, taxes, number of companies and salaries, among others.

The Appendix includes all details related to the construction of the sample. In the main analysis (i.e. full sample of migrants), we remove municipalities without a trade or migration history. For the main analysis, we include 1,090 municipalities for the period 2010-2017, for a total of 8,720 observations. In the case of the Haitian sample we cannot remove municipalities in the same way given the small number of Haitians in Brazil. Hence, we conduct the main analysis with the full sample of municipalities.

3.2 Estimation

In the analysis we are interested in exploring the impact that migration has on imports and exports to/from Brazil. We focus on the impact of the overall migrant population on trade, as well as the impact of Haitian migration in

order to take advantage of the exogenous timing of the increase in immigration. In order to do this, we estimate a series of regressions along the following lines:

$$y_{k,t} = \alpha_t + \gamma_k + \delta M_{k,t} + \beta X_{k,t} + \mu_{k,t}$$

Where $y_{k,t}$ is the log of exports or imports, α_t controls for year, γ_k is the federative unit (i.e. state) fixed effect, $M_{k,t}$ measures the number of migrants as a share of the population, $X_{k,t}$ are a series of municipality controls and $\mu_{k,t}$ is the error term. Exports and imports are originally US dollars. We add one to the dependent variable in order to deal with the zeroes and the logarithm transformation (i.e. locations with no exports or imports for a given year). The definition of all variables included in the estimations is provided in the Appendix. The Appendix also includes descriptive statistics for all the control variables (i.e. $X_{k,t}$).

We use three types of measures of imports and exports: total, homogeneous and differentiated. In Table 1 we provide the summary statistics for the two different samples. The first represents the full sample of countries that have migrants in Brazil, whereas the other represents trade with Haiti. Exports are much higher than imports across municipalities, both for the overall sample and for Haiti.

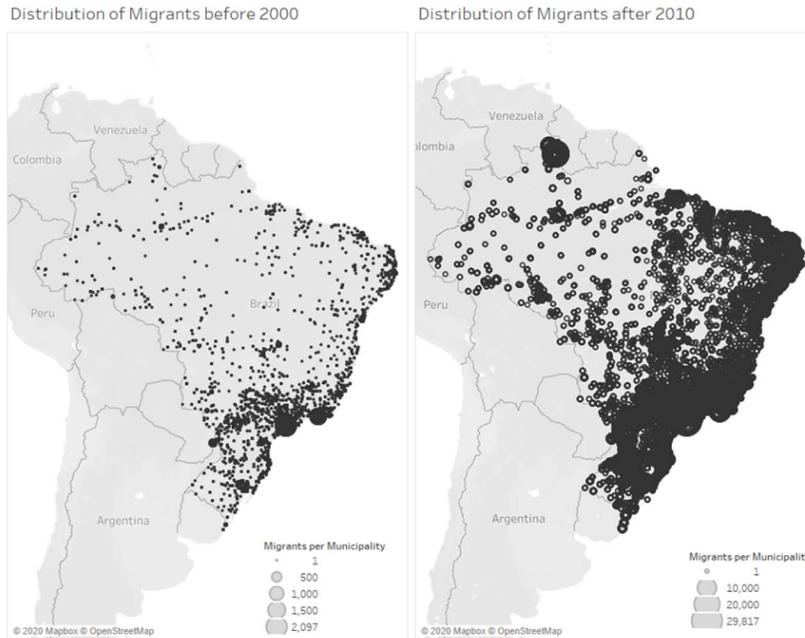
Table 1. Summary Statistics of Dependent Variables

Dependent variables (logs)	Mean	Standard Deviation
Panel A: All countries		
Total Imports	4.70	41.03
Differentiated Imports	1.99	13.33
Homogeneous Imports	0.95	33.90
Total Exports	12.55	49.85
Differentiated Exports	2.49	13.96
Homogeneous Exports	3.13	40.12
Panel B: Haiti		
Total Imports from Haiti	0.02	0.46
Differentiated Imports from Haiti	0.02	0.43
Homogeneous Imports from Haiti	0.00	0.15
Total Exports to Haiti	0.29	1.81
Differentiated Exports	0.13	1.21
Homogeneous Exports	0.01	0.39

Note: Authors' analysis of COMEX STAT data.

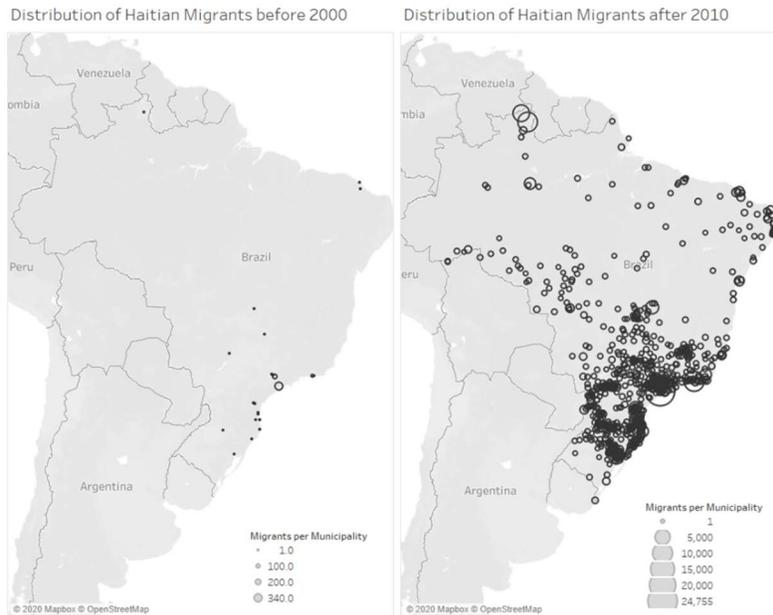
Figures 4 and 5 present the distribution of all migrants and Haitians in Brazil before 2000 and after 2010. As shown in Figure 4, there were few migrants in Brazil before 2000. The overall migrant population was spread across the country, with large concentrations in the Brazilian Atlantic coastline, particularly in Sao Paulo and Rio de Janeiro. The distribution of Haitian migrants (Figure 5) follows similar patterns.

Figure 4. Distribution of migrants in Brazil.



Note: Authors' analysis.

Figure 5. Distribution of Haitian migrants in Brazil.



Note: Authors' analysis.

3.3 Identification

In the analysis we take advantage of the inflow of migrants to Brazil which was largely driven by conditions in the countries of origin (e.g. Haitian Earthquake, Venezuelan Crisis). However, one challenge of our analysis is that the location of migrants across municipalities of Brazil is not necessarily random. If the unobserved factors that attract migrants to a given location, also relate to trade then our estimates could be biased. The most common way to

address this problem in the migration literature is to use a shift-share type of instrument. Typically the shares are constructed using information on the historical location of migrants from the same country of origin and the shifts refer to the new migrants' inflows from these countries (Jaeger et al., 2018). The necessary assumption is that the factors that determined the historical location of migrants do not affect current dynamics. This traditional approach does not work well for Brazil. As discussed above, migration to Brazil has been in waves and there was a very small population of most particular countries of origin before the mid-2000s. For instance, only about 200 Haitians migrated to Brazil between 1980 and 2009.

In order to address these challenges, we use a modified version of the shift-share instrument which relies on linguistic proximity. The idea is that having more individuals with a common or similar language in a location can affect the location decisions of new migrants. For instance, most Haitians speak a French-based creole language (i.e. Haitian Creole) and could be more likely to settle in locations with a larger number of French speakers. In that sense, we replace country of origin as the common factor across migrants with language similarity based on the main language spoken in the country of origin.

The idea that linguistic factors affect the location choices of migrants is not new. Bredtmann et al. (2020) show that linguistic distance is an important determinant of the regional location choice of migrants to the EU. Bauer et al. (2005) find that English proficiency, a proxy for language proximity of one migrant group, of Mexicans determines their location choices in the United States. Moreover, there is a substantial literature highlighting the role of language as a key factor in the cultural and economic integration of migrants (e.g. Lazear, 1999).

The specification that we follow is broadly similar to the ones used in classical papers such as Card (2001) and Altonji and Card (1991). The validity of our instrument requires the location of new migrants to be influenced by the past stock of migrants based on the degree of linguistic proximity. Importantly, our instrument still has the limitations of shift-share instruments identified in recent research (e.g. Jaeger et al., 2018).

In order to measure linguistic proximity, we employ the Automated Similarity Judgment Program (ASJP) that aims to establish relationships between languages on the basis of standardized word lists. The recent list from June 2015 covers over 6,000 languages and dialects. The algorithm makes use of the Levenshtein (1966) distance. In short, the Levenshtein distance is the minimum number of insertions, deletions, or substitutions of a single character to transform a word in one language into a word in another language (Serva and Petroni, 2008). We standardized this measure and subtracted it from 1 in order to create a measure of linguistic proximity between two languages. We will then use the linguistic proximity vector to construct the shift share instrument.

In particular, we create a municipality share for each language pair ($L_{n,f,k}$) as in:

$$L_{n,f,k} = \lambda_{n,f} \left(\frac{MIG_{f,k}}{MIG_k} \right)_{\{t=0\}}$$

In this case $\lambda_{n,f}$ is the language proximity between language n (e.g. Haitian Creole) and f (e.g. French), $MIG_{f,k}$ is the number of speakers of language f based on their country of origin (e.g. number of migrants from Japan provides number of Japanese speakers) in location k at time 0 (i.e. year 2000), and MIG_k is the number of migrants in location k at time 0. In order to get our instrument ($Z_{k,t}$) for each municipality we sum:

$$Z_{k,t} = \sum_{n=1}^N \sum_{f=1}^F L_{n,f,k} * \Delta Mig_{n,t}$$

Where $\Delta Mig_{n,t}$ is the annual inflow of migrants from a country who speak a given language to Brazil (i.e. majority language of the country) in a given year. For the Haitian sample we simply used a vector relating Haitian Creole to all other languages.

Tables 2 and 3 report the first stage estimations. In both cases the instrument has a strong predictive power over the location of migrant inflows and the F statistic is above the ‘10’ threshold.

Table 2. First Stage Estimates for All Migrants

	(1)	(2)
	Migrants	Migrants
IV	0.00001*** (0.000)	0.00001*** (0.000)
Observations	8,720	8,720
Municipalities	1,090	1,090
Controls	YES	YES
Year dummies	NO	YES
UF region F.E.	YES	YES
F-stat	58.62	57.48

*Note: Authors' analysis. Robust standard errors in parentheses: *** $p < 0.01$.*

Table 3. First Stage Estimates for Haitians

	(1)	(2)
	Haitians	Haitians
IV	0.00001*** (0.000)	0.00001*** (0.000)
Observations	44,523	44,523
Municipalities	5,566	5,566
Controls	YES	YES
Year dummies	NO	YES
UF region F.E.	YES	YES
F-stat	62.15	47.75

*Note: Authors' analysis. Robust standard errors in parentheses: *** $p < 0.01$.*

5. Results

Impact of all migrants

Table 4 reports the results for the full sample of migrants. As shown in Panel A, the results suggest that the presence of migrants has a positive, but for the most part not statistically significant, effect on exports. This is particularly the case in column 4 which is our main specification for exports.

On the other hand, as suggested by Panel B, the migrant share of the population in a municipality has a positive impact on municipal imports. In particular, increasing the migrant share of the population by 0.18 percentage points, which would mean doubling the average value of this variable across municipalities, leads to an increase in total imports of 35%. While this impact seems large, it is important to note that this would be the implication of doubling the migrant share of the population across localities which is also a very large increase.

Table 4. Regression results for total exports and imports, all migrants

	(1)	(2)	(3)	(4)
Panel A: Total Exports				
Migrants	0.0809	0.0303	0.776**	0.481
	(0.051)	(0.055)	(0.353)	(0.353)
Panel B: Total Imports				
Migrants	0.213***	0.213***	2.109***	1.964***
	(0.049)	(0.048)	(0.412)	(0.407)
Observations	8,720	8,720	8,720	8,720
Municipalities	1,090	1,090	1,090	1,090
Controls	YES	YES	YES	YES
UF region F.E.	YES	YES	YES	YES
Year dummies	NO	YES	NO	YES
IV	NO	NO	YES	YES

*Notes: This table shows the results from a OLS estimation and a 2SLS estimation that exploits the variations in the linguistic proximity for migrants. Exports and Imports are of the form $\log(\$ \text{value} + 1)$. Migrants refers to their share of the population. Controls at the municipality level include gross value added to industry, agriculture and services, taxes, GDP, total and paid employment, number of companies and salaries. Robust standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$.*

Table 5 provides the result separately for homogenous and differentiated products. There is no evidence that the presence of migrants has an impact on homogenous exports (column 6). However, as suggested by column 8 it does have an impact on differentiated exports.

In the case of imports, the results suggest that the impact of the presence of migrants has an impact on both differentiated and homogenous imports with the coefficient being larger for homogenous imports. In this case, increasing the average migrant share of the population by 0.18 percentage points, would increase homogenous imports by 37%, and differentiated imports by 33%.

Table 5. Regression results for homogeneous and heterogeneous products, all migrants

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
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	Homogeneous		Differentiated		Homogeneous		Differentiated	
Panel A: Exports								
Migrants	0.404*** (0.066)	0.362*** (0.065)	0.219*** (0.048)	0.185*** (0.049)	0.877** (0.388)	0.675 (0.394)	2.155*** (0.474)	2.025*** (0.476)
Panel B: Imports								
Migrants	0.0468 (0.043)	0.0345 (0.042)	0.255*** (0.048)	2.465*** (0.489)	2.490*** (0.499)	2.490*** (0.499)	1.978*** (0.422)	1.808*** (0.416)
Observations	8,720	8,720	8,720	8,720	8,720	8,720	8,720	8,720
Municipalities	1,090	1,090	1,090	1,090	1,090	1,090	1,090	1,090
Controls	YES							
UF region F.E.	YES							
Year dummies	NO	YES	NO	YES	NO	YES	NO	YES
IV	NO	NO	NO	NO	YES	YES	YES	YES

Notes: This table shows the results from a OLS estimation and a 2SLS estimation that exploits the variations in the linguistic proximity for migrants. Exports and Imports are of the form $\log(\$ \text{value} + 1)$. Migrants refers to their share of the population. Controls at the municipality level include gross value added to industry, agriculture and services, taxes, GDP, total and paid employment, number of companies and salaries. Robust standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$.

Impact of Haitians

Table 6 presents the results when we use imports from and exports to Haiti as the dependent variable and the Haitian share of the population as the main independent variable of interest. As shown in Table 6, the presence of Haitians has a positive impact on exports to Haiti. In particular, increasing the Haitian share of the population by 0.01 (i.e. doubling the average across locations) leads to an increase in exports to Haiti of 6%. There is no statistically significant impact of the presence of Haitians on municipal imports from Haiti. Hence, while the overall result regarding the main migrant population was concentrated in imports, in the case of Haitians the main result is about exports.

These results are expected to some degree. Studies of the economic impact of the earthquake suggest that it was a major blow for Haiti's export capacity, but that it led to higher imports, at least in the short-term, given the loss of productive capacity and increased demand for construction supplies (Best and Burke, 2019).

Table 6. Regression results for total exports and imports to Haiti

	(1)	(2)	(3)	(4)
Panel A: Exports				
Haitians	1.208*** (0.284)	1.187*** (0.283)	5.598*** (1.145)	5.947*** (1.306)
Panel B: Imports				
Haitians	0.0420 (0.029)	0.0376 (0.028)	0.149 (0.136)	0.0677 (0.127)
Observations	44,523	44,523	44,523	44,523
Municipalities	5,566	5,566	5,566	5,566
Cluster Municipality	YES	YES	YES	YES

Controls	YES	YES	YES	YES
Municipality F.E	YES	YES	YES	YES
Year dummies	NO	YES	NO	YES
IV	NO	NO	YES	YES

Notes: This table shows the results from a OLS estimation and a 2SLS estimation that exploits the variations in the linguistic proximity for migrants. Haitians refers to their share of the population. Controls at the municipality level include gross value added to industry, agriculture and services, taxes, GDP, total and paid employment, number of companies and salaries. Robust standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$.

Table 7 separates the results among homogenous and differentiated exports and imports. The results suggest that the result for exports is driven by differentiated exports. In this case, increasing the Haitian share of the population by 0.01 increases differentiated exports to Haiti by 3%.

Table 7. Regression results for homogeneous and differentiated products, Haitian migrants

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Homogeneous		Differentiated		Homogeneous		Differentiated	
Panel A: Exports								
Migrants	-0.00221	-0.00239	0.447***	0.432***	0.135	0.195	2.406***	2.569***
	(0.010)	(0.010)	(0.128)	(0.127)	(0.159)	(0.160)	(0.668)	(0.747)
Panel B: Imports								
Migrants	-0.00252**	-0.00316**	0.0486	0.0445	0.101	0.0930	0.0658	-0.0150
	(0.001)	(0.002)	(0.029)	(0.029)	(0.060)	(0.051)	(0.120)	(0.116)
Observations	44,523	44,523	44,523	44,523	44,523	44,523	44,523	44,523
Municipalities	5,566	5,566	5,566	5,566	5,566	5,566	5,566	5,566
Controls	YES	YES	YES	YES	YES	YES	YES	YES
UF region F.E.	YES	YES	YES	YES	YES	YES	YES	YES
Year dummies	NO	YES	NO	YES	NO	YES	NO	YES
IV	NO	NO	NO	NO	YES	YES	YES	YES

Notes: This table shows the results from a OLS estimation and a 2SLS estimation that exploits the variations in the linguistic proximity for migrants. Exports and Imports are of the form $\log(\$ \text{value} + 1)$. Haitians refers to their share of the population. Controls at the municipality level include gross value added to industry, agriculture and services, taxes, GDP, total and paid employment, number of companies and salaries. Robust standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$.

6. Robustness

Analysis at the Mesoregion

In the analysis we use fixed effects at the Federative Unit (i.e. state) level. However, it is also possible to use fixed effects at the lower geographical level of the mesoregion. There are 26 Federative Units and over 100 mesoregions which are groupings of neighbouring municipalities. While we prefer the comparison at the Federative Unit level given the nature of trade flows and the importance of geography, in Table 8 we present the results using mesoregion fixed effects. The results are broadly similar with the exception that now the migrant coefficient is also significant in the total exports regressions. This seems to be driven by an increase in the differentiated exports coefficient.

Table 8. Regression results using mesoregion fixed effects.

	(1)	(2)	(3)	(4)	(5)	(6)
	All migrants	Haitians	All migrants	Haitians	All migrants	Haitians
	Total		Differentiated		Homogeneous	
Panel A: Exports						
Migrants	1.625** (0.636)	4.419*** (1.151)	4.029*** (0.843)	2.102*** (0.696)	0.238 (0.627)	-0.0734 (0.173)
Panel B: Imports						
Migrants	1.883*** (0.586)	0.00120 (0.113)	2.089*** (0.630)	-0.0726 (0.104)	2.432*** (0.677)	0.0789 (0.047)
Observations	8,720	44,523	8,720	44,523	8,720	44,523
Municipalities	1,090	5,566	1,090	5,566	1,090	5,566
Controls	YES	YES	YES	YES	YES	YES
UF region F.E.	NO	NO	NO	NO	NO	NO
Mesoregion F.E.	YES	YES	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES	YES	YES
IV	YES	YES	YES	YES	YES	YES

Notes: This table shows the results from a OLS estimation and a 2SLS estimation that exploits the variations in the linguistic proximity for migrants. Exports and Imports are of the form $\log(\$ \text{value} + 1)$. Haitians refers to their share of the population. Controls at the municipality level include gross value added to industry, agriculture and services, taxes, GDP, total and paid employment, number of companies and salaries. Robust standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$.

7. Conclusion

We examined the impact of migration to Brazil on trade patterns using municipality level data. We also focus on the relatively new episode of Haitian immigration to Brazil that increased considerably after the Haitian earthquake in 2010. Locations of migrants in Brazil are likely to be endogenous to local labour demand factors. In order to account for that, we employ a novel variation of the shift share instrument to predict exogenous variation in migrant locations based on earlier settlements of migrant groups in Brazil that share a level of linguistic proximity to new migrants.

In our analysis, we find that migrants affect total imports, a result that is reflected in increases in both homogenous and differentiated imports. While we cannot provide conclusive evidence of the channels at play, the fact that the result holds for differentiated imports suggest that the preference channel plays a key role (i.e. migrants affecting the preferences of other hosts country residents and/or demanding country of origin specific products). There is a substantial body of evidence suggesting that the presence of migrants lead to increases in trade (e.g. Peri and Requena-Silvente, 2010), but there is scarce evidence of this dynamic in a middle income country such as Brazil.

In the case of Haitians there is no impact on imports, but there is positive impact on exports, a result which is driven by differentiated exports. This result is not surprising as Haitian migration to Brazil resulted from a major

earthquake that reduced the exporting capacity of the country. However, the fact that the presence of Haitians in a location relates to trade with Brazil, suggests that there is a possibility for new diasporas resulting from a natural disaster to contribute to the recovery of the country via the trade channel. Finally, previous research suggests that the trade effect of diasporic groups who left the country following disasters and conflict sometimes take many years to manifest fully (Parsons and Vezina, 2018). Hence, it is important to keep tracking the trade impact of post-earthquake Haitian migration to Brazil and other Latin American countries over the following years.

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Appendix

Construction of the sample

For the main analysis we start with the full sample and eliminated municipalities over the 90th percentile in terms of total trade, those who had not received migrants for at least 5 consecutive years and those which have not traded for 7 consecutive years. In the case of Haitians it is not possible to do a similar sample reduction in the sample as there would have been too few municipalities left for the estimation.

Summary Statistics of Independent Variables

	Mean	Standard deviation	Variable description
Salary	43.45	95.9	Total salary per municipality (million \$)
Total employment	6.36	8.91	Number of employed personnel per municipality (thousands)
Paid Employment	5.27	7.85	Number of paid personnel per municipality
Number of Companies	837.01	921.25	Number of Companies per municipality
Value Added	65.37	204.4	Gross value added at total current prices (million \$)
GDP	274.97	415.59	Municipality GDP (million \$)
Taxes	24.04	34.29	Taxes, net of subsidies, on products (million \$)
Value Added Agriculture	26.76	31.27	Gross value added at current agricultural prices (in million \$)
Value Added Industry	65.37	204.4	Gross added value at current industry (million \$)
Value Added Services	65.37	204.4	Gross value added at current services prices, including administration, defense, public education and health and social security (million \$)
All Migrants	.18	.83	% ratio of the number of migrants to the population per municipality
Haitian Migrants	.01	.09	% ratio of the number of Haitian migrants to the population per municipality

Description of Dependent Variables

Variable	Description
Total Imports	Log of imports per municipality (million \$) + 1
Differentiated Imports	Log of differentiated imports per municipality as per Rauch (1999) classification (million \$) + 1

Homogeneous Imports	Log of homogenous imports per municipality as per Rauch (1999) classification (million \$) + 1
Total Exports	Log of exports per municipality (million \$) + 1
Differentiated Exports	Log of differentiated exports per municipality as per Rauch (1999) classification (million \$) + 1
Homogeneous Exports	Log of homogenous exports per municipality as per Rauch (1999) classification (million \$) + 1
