

Local Labor Market Impacts of Immigration: The Case of Venezuela and Brazil

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Abstract

This paper estimates the impact of immigrant influges on local labor markets, exploiting a natural experiment generated by a massive wave of forced migration of Venezuelans to Roraima, a state in northern Brazil, from 2016 onward. In 2018 alone, Venezuelan immigrants increased Roraima's population by at least 8%. Estimates indicate that a 1% increase in the population due to this immigration resulted in 1.6% lower effective monthly earnings for workers there, mostly explained by reductions in normal wages likely due to the intensification of competition for low and middle skilled jobs. However, impacts varied by gender, ethnicity, occupation and education level, with Pardos, Indigenous, men and laborers in construction and food services experiencing larger reductions in wages.

Keywords: *Natural Experiment; Venezuela; Brazil; Migration; Labor Market.*

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1 Introduction

The topics of immigration and forced migration have received increasing focus in the academic and policymaker communities in recent years. War and economic hardship have displaced millions of individuals around the world; according to the “Independent”, 44,500 refugees seek asylum daily, and the total number of people planning to immigrate has reached 68.5 million (Sommerlad, 2018). The impacts of immigration have been most heavily studied in the United States and Europe, due to their status as major immigrant destinations. However, many immigrants choose to settle in other nations, especially those nearby to their home countries, possibly constrained by limited resources and lack of knowledge of opportunities further afield. The present study examines the impacts of a recent massive influx in immigration from Venezuela to northern Brazil.

One key area of study in the immigration literature focuses on the effects on native labor markets. Economists have debated these impacts since the 1990s. Effects may vary according to the skill and educational composition of migrants in comparison to the native population, although it is not obvious that the two groups will compete for the same jobs (Altonji and Card, 1991). Short run impacts may also differ from long-run impacts, as over time population changes increase the demand for food, services and other economic activities, pushing local business and industries to increase their demand for labor (Altonji and Card, 1991; Jaeger, 1996).

Early studies of the impacts of immigration on labor markets relied on spatial variation in immigrant inflows as a source of identification. However, this approach suffers from endogeneity, as migrants tend to go to places with better job opportunities and higher wages. One attempt to alleviate this problem is to use past share of immigrants as an instrumental variable for current immigration (Altonji and Card, 1991). Yet the biggest disadvantage of this method is that the share of historical immigrants is fixed, preventing the inclusion of controls to address potential sources of local heterogeneity (e.g. city fixed effects). An alternative method is known as the “shift-share IV”. The main goal of this strategy is to generate variation at the local level by exploiting variation in national inflows (Card, 2001, 2009). The basic idea is to predict the inflow of immigrants based on two things: a) the current inflow of immigrants from the countries of origin at the national level (*shift*); and b) the previous share of population from each country of origin in a given city (*share*). However, the use of this instrument has been criticized due to likelihood of producing less negative results as compared to other approaches (David A. Jaeger and Stuhler, 2018) and changing directions of impact across different time periods within the same country (Borjas, 1999). Additionally, there exists concern that a general equilibrium effect could invalidate the exogeneity assumption of the “shift-share” IV (David A. Jaeger and Stuhler, 2018).

A recent set of studies use natural experiments to estimate the effect of immigration on native labor markets. One of the most famous events studied is the Mariel boatlift, a mass emigration of Cubans who traveled from Cuba’s Mariel Harbor to the United States between April 15th and October 31st of 1980. “The Mariel immigrants increased the Miami

labor force by 7%, and the percentage increase in labor supply to less-skilled occupations and industries was even greater because most of the immigrants were relatively unskilled.” (Card, 1990, p. 245). Card (1990)’s study finds that the city of Miami was able to rapidly absorb the increase in labor supply, and hence there was no impact on native wages or on unemployment rates. However, later work revisiting this natural experiment provides evidence that the wage of high school dropouts in Miami in fact dropped by 10% to 30% (Borjas, 2017).

This paper builds on the existing literature by exploiting a natural experiment to estimate the impacts of the recent forced migration of Venezuelans on labor market outcomes in Roraima, a state just across the border in northern Brazil. To my knowledge, this is the only work that examines the impacts of Venezuelan immigration on a Brazilian labor market, and one of the few examining immigration impacts within South America¹. From 2016 to 2018, over 62,000 Venezuelans sought refugee status in Roraima², increasing the population of the state by more than 8% in 2018 alone. This massive inflow of immigrants to northern Brazil is a consequence of recent deep political and economic crisis in Venezuela. The quasi-experimental estimation strategy provides credible results that can be easily interpreted as elasticities. Remaining concerns of endogeneity are alleviated by using two groups as placebos in order to confirm the findings. The analysis is conducted using the “Pesquisa Nacional por Amostra de Domicílios” (PNAD) micro-data for the period from 2010 to 2018.

I find that a 1% increase in population caused by the massive influx of Venezuelans to Roraima decreased effective monthly earnings by 1.6%. This reduction is driven by both decreases in normal weekly hours worked (0.7%) and by decreases in normal wages (1.1%). Upon disaggregating effects by level of education and occupation, I find evidence of heterogeneous responses across groups, with lower skilled workers driving this decrease in effective monthly earnings. Estimates also suggest that Venezuelans with a higher level of education may compete for low-skilled jobs in northern Brazil.

These findings are confirmed by two trends analyzed when desegregating data by sector of the economy: first a reduction in sectors with low-skilled jobs and informal activities; second, the fact that the main reason behind these reductions seems to be decreases in wages and not only weekly worked hours. Besides, *Pardos*, indigenous and men seem to be the ethnic and gender groups most affected by the massive entry of migrants, with respectively 1.5%, 3.7% and 1.8% decreases in effectively monthly earnings in the main job.

¹By employing an instrumental variable approach, a recent study on the impacts of the Venezuelan migration on Colombian labor market finds that a 1 percentage point increase in immigration from Venezuela reduces informal sector wages in the country by 10 percentage points in urban areas (Caruso et al., 2019). In addition, newly studies finds that not only young, low-educated Ecuadorian workers in high-inflow regions have experienced increases in informality (5%) and a 13% decrease in earnings if compared to native workers with similar characteristics located areas with low or non-Influxes of Venezuelans (Olivieri et al., 2020a), but that Venezuelans are experiencing significant occupational downgrading relative to their employment prior to emigration to Ecuador (Olivieri et al., 2020b).

²This is likely a lower bound on the actual number of people who migrated to northern Brazil at this time. According to "Ministério da Casa Civil", at least 199,365 Venezuelans passed through the area in 2017 and 2018, but not all of them remained in northern Brazil, and others entered the country without being detected.

This research attempts to put South America in the spotlight in the immigration literature by providing evidence on how the forced migration crisis in Venezuela affects the local labor market of another less-developed country. The rest of the paper is organized as follows: Section 2 provides a historical background of the events in Venezuela that generated the conditions for immigration to Brazil, Section 3 presents the data and the estimation strategy; Section 4 discusses the main results, and Section 5 concludes.

2 Venezuelan Migration to Brazil

The twenty-first century did not start peacefully in Venezuela. Coming from a series of coup attempts in the 1990's, the country elected Hugo Chavez as president in 1998, who was himself the leader of a 1992 coup attempt. Chavez was elected on a platform of bringing a “Bolivarian Revolution” to the country, with the implementation of a new constitution that aimed to implement socialist and populist economic and social policies. To bring this about, the president would take advantage of high oil prices³. In 2001, Chavez was able to pass 49 laws in Congress aimed at redistributing land and wealth.

Yet, in response to a 2003 coup attempt, Chavez increased controls on media⁴, and expropriated companies (including Exxon Mobil and ConocoPhillips), among other political actions, raising local and international concern. As oil prices dropped in 2010, the country's economic problems intensified. In an attempt to control high inflation (21.07% monthly), in 2012 he promoted a control on prices of basic goods such as fruit juice, toothpaste, disposable diapers, beef, milk, and corn (Neuman, 2012), and suggested that companies that did not follow the controls would be expropriated.

In April 2013, Nicolas Maduro was elected as successor following Chavez's death from cancer. The inflation rate was reaching 43% monthly, the price of oil again started to drop significantly⁵, and political opposition grew. By the end of 2014, inflation had reached more than 50%. The government announced cuts in public spending, and the social programs started by Chavez were put at risk. In 2016, the government increased petrol prices for the first time in 20 years. Unrest and discontent gave way to violent protests that killed several Venezuelans in the latter half of 2016 and in 2017⁶.

In 2018, “the UN warned of a migration ‘crisis’, estimating that economic woes and food and medical shortages [had] caused more than two million Venezuelans to leave their country

³According to OPEC website, Venezuela's oil revenues account for about 98% of export earnings (OPEC, 2018).

⁴In 2007, the government refused to renew the terrestrial broadcasting license of RCTV channel, a news channel critical of the President, causing massive protests and strong international condemnation.

⁵See Figure A1 for the relationship between oil prices and Venezuelan seeking refugee status in Brazil.

⁶In September 2016, hundreds of thousands of people participated in a protest in Caracas calling for the removal of President Maduro, accusing him of responsibility for the economic crisis. In 2017, several people died in confrontations with security forces during mass protests demanding early presidential elections and the revoking of a planned constituent assembly to replace the National Assembly.

since 2014. Most [were] settling in nearby Peru, Ecuador, Colombia and Brazil, leading to tensions in the region” (BBC, 2018). Venezuelans living close to the Brazilian border were migrating to the neighboring country largely on foot (Governo do Brasil, 2020). On the other side of the country, Venezuelans were migrating to neighboring Colombia. Nearly 1.3 million Venezuelan migrants were registered in Colombia by June of 2019, as well as 768,000 in Peru, 288,000 in Chile, 263,000 in Ecuador, and 130,000 in Argentina (IOM, 2019)⁷. However, the latter countries do not share borders with Venezuela (see Figure 1) and migrants go to these destinations either by plane or by first entering either Colombia or Brazil. Other countries, including Mexico, the United States, and Spain, also host significant numbers of refugees and migrants from Venezuela.



Figure 1: South American Countries Receiving Venezuelan Migrants

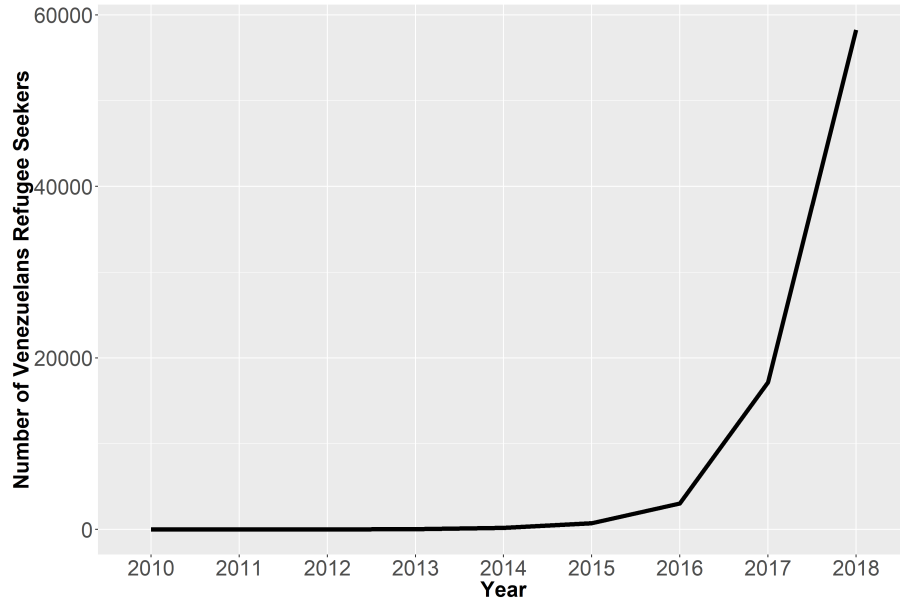
Figure 2 reports the number of refugee requests by Venezuelans in Brazil over time (Federal Police, 2019). These figures are likely a lower bound on the total number of people crossing the border, since some do not register their presence or request refugee status. Still, Figure 2 shows that, although there is some evidence of an increase in 2015 and 2016⁸, there is a clear massive influx of Venezuelan refugees starting in 2017.

The northern state of Roraima is by far the main destination of Venezuelans who enter Brazil (see Figure 3), especially for those traveling on foot (Jornal Nacional, 2019; Marchao,

⁷Although Guyana also shares a border with Venezuela, “populated areas in Venezuela are far removed from urban centers in Guyana, saving the country from a mass invasion of people seeking help. (Caribbean Life, 2019).”

⁸It is hard to identify the “tipping point” for more intense migration in 2016. In that year, the petrol barrel reached its lowest price in more than a decade, at \$34.7. See Figure A2 in the Appendix.

2019; Governo do Brasil, 2018). A considerable number of Venezuelans eventually go on to settle in the state of Amazonas, one of the main industrial centers of the country; however, they are first entering the country through Roraima and only then (often after some delay) trying to reach Amazonas⁹.



Source: Brazilian Federal Police (2019) (Unpublished Data on Refugee Requests by Venezuelans, 2010 - 2018)

Figure 2: Number of Refugee Requests by Venezuelans, 2010-2018

According to the 2010 Census, Roraima is the 13th, among 27 states plus the Federal District, in the Human Development Index ranking in Brazil. With a population of 576,568 inhabitants in 2018, it averaged a nominal household income per capita of approximately \$310.71 monthly¹⁰ (IBGE, 2020). Venezuelans are crossing the border at the city of Pacaraima (see Figure 4), with a population of 15,580 inhabitants in 2018. Monthly earnings in the city average \$411.07¹¹ (1.7 the minimum salary in Brazil) and 46.5% of the population earn up to half the minimum salary (\$120.90 monthly)¹².

From 2017 through October 2018, 176,259 Venezuelans migrated to Brazil through Pacaraima (Ministério da Casa Civil, 2018). This number accounts for 14.78% of the population of Roraima, 22.7% of the population of the capital city of Boa Vista, and incredibly 1,131.32% of the population of Pacaraima town. More than half of these immigrants stayed in Brazil, many in Pacaraima or Boa Vista. According to a survey conducted with Venezuelan immigrants in Boa Vista and Pacaraima cities between January 25th and March 8th

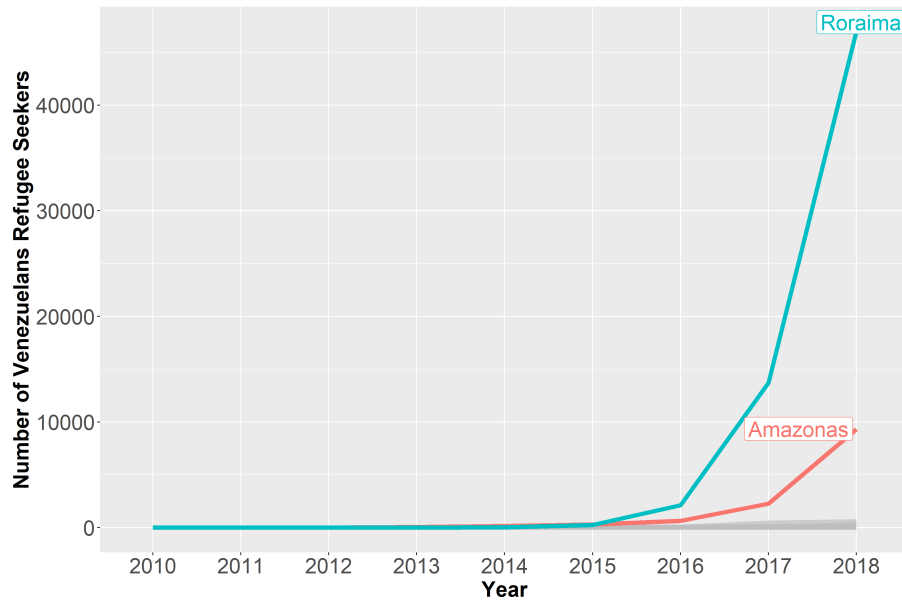
⁹Although Amazonas also borders Venezuela, the Amazon Forest makes crossing this part of the border an almost impossible task. The only road (Troncal 10 in Venezuela and BR-174 in Brazil) connecting both countries is the one that goes from Santa Elena de Uairén (Venezuela) to Pacaraima (Roraima, Brazil).

¹⁰2018 values.

¹¹2017 values.

¹²*Ibidem.*

of 2018 (DTM, 2018), 23% of them came from Bolívar, the nearest Venezuelan state to the Brazilian border, 24% from Monagas, and 28% came from Anzoátegui¹³ (see Figure 4). These three states account for 75% of the Venezuelan migrants surveyed. From the sample of 3,516 interviews (2,420 in Boa Vista and 1,096 in Pacaraima), the primary reasons reported for migration from Venezuela to Brazil were economic (job) reasons (67%), lack of access to food and medical services (22%), and escaping violence (7%). Moreover, 42% reported that they would face hunger if they went back to Venezuela, 32% said they would have no employment, and about 1% feared persecution.



Source: Brazilian Federal Police (2019) (Unpublished Data on Refugee Requests by Venezuelans, 2010 - 2018)

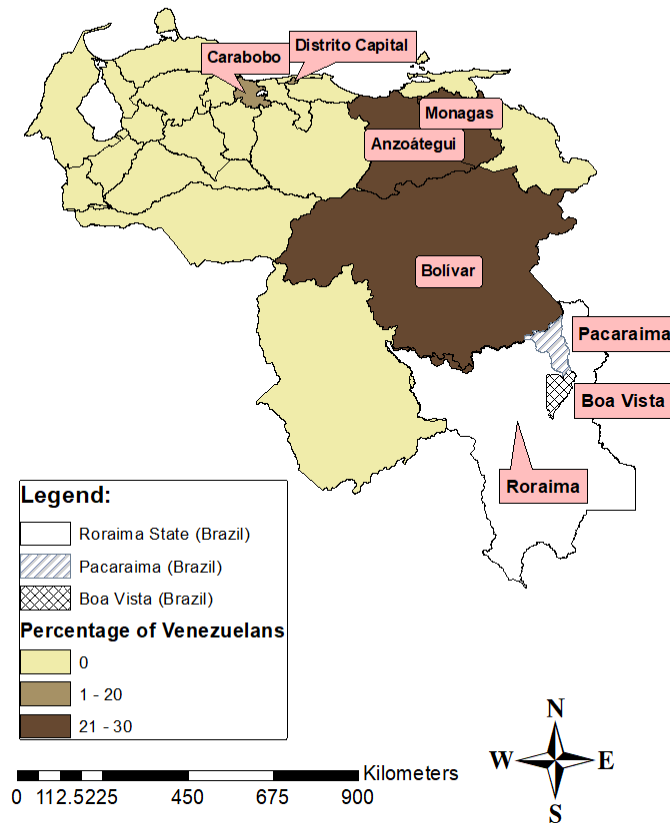
Figure 3: Number of Venezuelans Refugee Requests by State, 2010-2018

The Venezuelan immigrants look either to stay in Brazil, or use the country as a route to go elsewhere. The same survey conducted by DTM reported that 48% of the interviewees wanted to stay in Brazil, while 52% sought to eventually continue to another country (primarily Argentina). Among those who desired to stay, 22% wanted to stay in Roraima, while 59% aimed to go to the state of Amazonas. Among migrants, 12% had only primary education, 50% had a secondary level education, 28% had a college degree, and 1% had a post-graduate degree¹⁴. From the sample, 58% of interviewees were men, while 41% were women. Approximately 57% reported being unemployed¹⁵. Among the employed, 33% were working in the service sector, 31% in commerce, and 13% in construction. Finally, 83% earned less than the Brazilian minimum salary at the time of survey.

¹³Although another Venezuelan state also borders the west of Roraima, the Amazon Forest makes crossing this part of the border an almost impossible task. See footnote 9 for more information.

¹⁴Fewer than 1% reported no schooling.

¹⁵Note that the distribution of schooling levels among the unemployed is extremely similar to the full sample.



Source: DTM (2018) (DTM, 2018)

Figure 4: States of Origin of Venezuelans Who Migrate to Roraima through Pacaraima

Given the forced nature of the migration of Venezuelans to Roraima starting in 2017, as evidenced by their origins relatively close to the Venezuela-Brazilian border, their method of crossing the border often on foot, and their stated reasons for immigration, it is possible to argue that most of the Venezuelans migrating to Roraima are doing so because they do not see any other alternative. Thus, I treat this phenomenon as a natural experiment in my analysis.

3 Data and Estimation Strategy

3.1 Data

Two main sources of data were used in this research: data on the labor market outcomes and social characteristics of individuals living in Brazil, and data related to the migration of Venezuelans to Brazil. I explain both data sources in detail here.

3.1.1 Brazilian Labor Market Outcomes and Population Characteristics

Data describing the socioeconomic characteristics of the population in Brazil was extracted from the *Pesquisa Nacional por Amostra de Domicílios* (PNAD), or National Household Sample Survey. This survey has been conducted by the Brazilian Institute of Geography and Statistics since 1967, and is meant to be representative of individuals living in Brazil. The survey includes individual-level demographic and socioeconomic information, including measures of education, labor, housing, social security, migration, fertility, marriage, health, and nutrition.

The PNAD’s target population is individuals living in permanent private households (DPPs)¹⁶ in the survey’s area of coverage¹⁷. Within each state and urban/rural location, primary sampling units were constructed as follows. An area with 60 or more DPPs constituted a Primary Sample Unit (UPA). Areas with fewer than 60 DPPs were grouped, respecting territorial contiguity, type and situation, until the formed group had at least 60 DPPs. Then, in the first stage of selection to the survey sample, primary sampling units were selected with probability proportional to the number of households within each defined stratum. Then, selected units were divided in groups of 15 households, and 5 of them were interviewed each month of the quarter. Finally, from the *Cadastro Nacional de Endereços para Fins Estatísticos*¹⁸ (CNEFE) - National Registry of Addresses for Statistical Purposes - occupied DPPs were selected by simple random sampling.

The survey is carried out quarterly through a rotational panel, so that selected households are in the sample for 5 consecutive quarters. Thus, from one quarter to the other, there is an overlap of 80% of households and, from one quarter to same quarter of next year, the overlap is only 20% (Instituto Brasileiro de Geografia e Estatística, 2014). The analysis in this paper extracts data on working-age individuals (aged 14 or above) from the last quarter of each year (2012 - 2018).

Table 1 provides summary statistics from individual-level PNAD data for the years 2012-2016 (before the migration of Venezuelans to Brazil intensified). The first three columns present mean values for the entire country (1), the North region (2) and Roraima State only (3). Column (4) presents the difference between means for Roraima State and Brazil, and the p-value on this difference is presented in column (5). Similarly, column (6) presents the difference between means for Roraima State and the North region, and the p-value on this difference is presented in column (7). Individuals living in Roraima look slightly different than individuals living elsewhere in Brazil, and even nearby to them. They are younger, more educated, and earn more money, despite working slightly fewer hours on average.¹⁹

¹⁶These are defined as structures built exclusively for housing and that, at the reference date, served as residence for at least one person.

¹⁷The survey frame excludes indigenous villages and territories, military barracks and bases, shelters, camps, boats, ships, prisons, nursing homes, orphanages, monasteries, hospitals, and villages in rural settlements.

¹⁸Updated every Census year.

¹⁹Note that “main job” is defined as the only job a person had in the reference week. If a person has more

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Brazil	North	Roraima	Roraima - Brazil	p-value (4)	Roraima - North	p-value (6)
Age	33.32	29.19	28.06	-5.26	0.00	-1.13	0.00
People Living in the Household	3.91	4.58	4.56	0.65	0.00	-0.02	0.30
Years of Schooling	6.61	6.17	7.09	0.49	0.00	0.92	0.00
Number of Jobs	1.03	1.03	1.05	0.01	0.00	0.01	0.00
Normal Monthly Earnings Main Job (in R\$)	1,474.15	1305.25	1,553.07	78.92	0.00	247.82	0.00
Normal Monthly Earnings All Jobs (in R\$)	1516.92	1343.69	1,635.05	118.13	0.00	291.36	0.00
Normal Weekly Weekly Hours Worked Main Job	39.08	38.24	37.79	-1.29	0.00	-0.45	0.00
Normal Weekly Weekly Hours Worked All Jobs	39.66	38.86	38.76	-0.90	0.00	-0.10	0.47
Effective Monthly Earnings Main Job (in R\$)	1479.56	1302.30	1,545.54	65.97	0.00	243.23	0.00
Effective Monthly Earnings All Jobs (in R\$)	1521.40	1339.97	1,627.30	105.90	0.00	287.33	0.00
Effective Weekly Hours Worked All Jobs	38.28	37.70	37.72	-0.55	0.00	-0.03	0.86
Normal Wage Main Job (in R\$/h)	9.86	9.15	11.23	1.37	0.00	2.27	0.00
Individuals	2,263,035	312,752	24,253	-	-	-	-

Notes: The means presented in columns (1)-(3) are drawn from individual-level PNAD data from 2012-2016 using survey’s weights. Labor market outcomes are measured among working-age individuals (aged 14 or above). The number of observations shown is the highest across the variables in the column. Column (4) indicates the difference between the column (3) (Roraima) and column (1) (Brazil) averages, and column (5) indicates the p-value on that difference. Column (6) indicates the difference between the column (3) (Roraima) and column (2) (Northern Region, Brazil) averages, and column (7) indicates the p-value on that difference. “Main job” is defined as the only job a person had in the reference week, or if a person has more than one job, information is summarized for the job in which they worked more weekly hours (or higher monthly earnings longer period of time employed).

Table 1: Descriptive Statistics for the Population of Brazil, 2012-2016

Table 2 provides additional summary statistics on social, educational and labor market characteristics of the population of the three regions, and potentially some clues as to why labor market outcomes for those living in Roraima are a bit better than elsewhere in Brazil.²⁰ Panel A summarizes demographic information. The majority of the population self-reports as either “Parda”²¹ or white. This trend repeats itself for every region, but is particularly strong in the North and in Roraima, with more than 70% of the population self-reporting being *Parda*.

Panel B shows that Roraima, although not being among the richest states in Brazil, has slightly higher education rates than the country as a whole, with more individuals have some or completed college, and some or completed high school, as compared to the northern region and Brazil as a whole. Finally, Panel C shows that Roraima has a bigger share of the population in the sectors of Public Administration, Defense or Social Security, government types of jobs that require a higher level of education. Roraima also presents the lowest rate of people working in rural jobs (5.99% compared to 7.49% in the entire country and 9.69% in the northern region) and in manufacturing (2.61% compared to 5.19% in Brazil and 4.03% in the North).

than one job, information is summarized for the job in which they worked more weekly hours. If worked hours are the same, the job summarized is the the one with higher monthly earnings. In the case again of equality, the job summarized is the one with longer period of time employed.

²⁰This table contains averages among non-missing data. Measures in Panel C in particular were missing at rates approaching 60% in all regions in both occupational sector and number of hours worked weekly. Linear regressions of an indicator for “Not Applicable” (missing) answers on individual characteristics does not show any significant correlation between this answer and any other specific characteristic of respondents (for all three different regions).

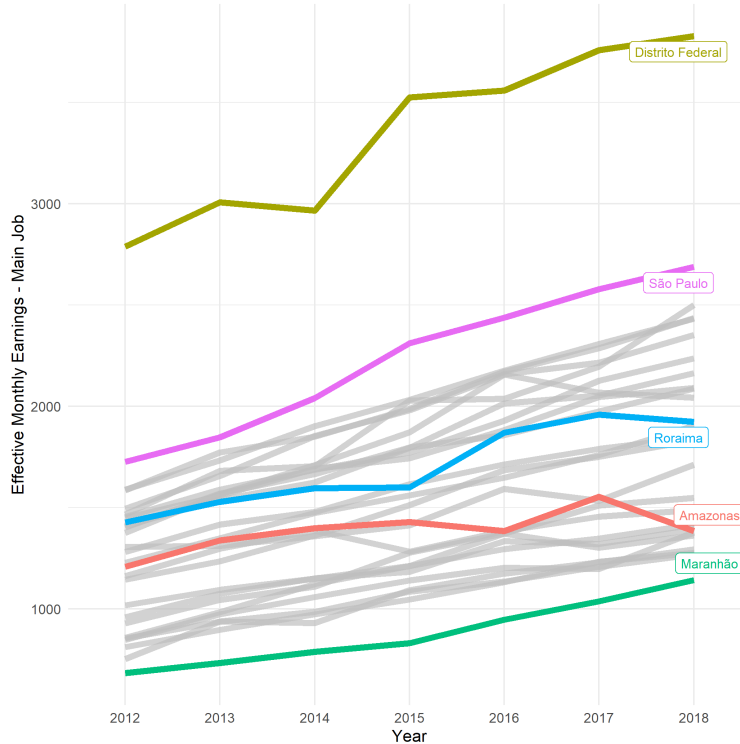
²¹“Parda” represents mixed-race, in particular a descent from black and white, black and indigenous or white and indigenous parents.

Characteristics	Brazil	North	Roraima
<i>Panel A: Social</i>			
<i>Gender:</i>			
Female	51.06%	49.67%	49.69%
<i>Ethnicity:</i>			
Black	7.24%	5.40%	6.55%
White	39.80%	19.02%	19.28%
<i>Parda</i>	52.31%	74.80%	70.49%
Asian	0.36%	0.19%	0.04%
Indigenous	0.26%	0.56%	3.64%
Ignored	0.03%	0.03%	0.00%
<i>Panel B: Education</i>			
College Degree	7.87%	5.26%	7.82%
Some College	3.28%	2.84%	4.33%
Complete High School	18.94%	17.01%	19.73%
Incomplete High School	6.01%	6.13%	6.68%
Complete Elementary School	8.25%	7.75%	7.85%
Incomplete Elementary School	35.44%	35.89%	30.54%
None/Less than 1 year	13.64%	16.67%	13.87%
N/A	6.57%	8.45%	9.19%
<i>Panel C: Labor Market</i>			
<i>Occupational Sectors:</i>			
Any Agricultural Job	7.49%	9.69%	5.99%
Commerce/Vehicle Repair	7.78%	7.51%	8.12%
Construction	3.42%	3.43%	3.95%
Education/Health/Social Services	4.40%	3.87%	5.25%
Food Services	2.01%	1.64%	2.19%
House work	2.85%	2.35%	2.71%
Manufacturing	5.19%	4.03%	2.61%
Information/Communication/Financial Activities	3.73%	2.30%	3.54%
Public Administration/Defense/Social Security	2.61%	3.59%	5.86%
Transportation	1.85%	1.65%	1.28%
Other Services	1.80%	1.46%	1.65%
Non defined activities	0.01%	0.01%	0.00%
N/A	56.84%	58.46%	56.86%
<i>Level of Weekly Worked Hours</i>			
49 or more	4.65%	4.34%	4.48%
45-48	5.30%	6.15%	5.05%
40-44	18.36%	15.12%	16.20%
15-39	11.65%	12.92%	14.51%
Up to 14	3.19%	3.02%	2.90%
N/A	56.84%	58.46%	56.86%
Observations	3,949,090	548,440	24,253

Notes: Frequencies depicted in the table are drawn from individual-level PNAD data from 2012-2016 using survey's weights. Labor market indicators in Panel C refer to working-age individuals (14 age or above) in their main job. This table contains averages among non-missing data. Linear regressions of an indicator for "Not Applicable" (missing) answers on household characteristics do not show any significant correlation between this type of answer and any other specific characteristic of respondents (for all three different regions).

Table 2: Characteristics of Brazilian Households, 2012-2016

Figures 5 and 6 depict the evolution of effective²² monthly earnings, in main job of workers for each state over the period 2012-2018, first for all states within Brazil, and then just among states within the northern region. Figure 5 shows that, while main job earnings grew over the period across Brazil, Roraima is middling in terms of earnings as compared to other states in the country. The Brazilian capital, “Distrito Federal”, far exceeds every other state in earnings, likely due to the concentration of higher-earning public jobs there.



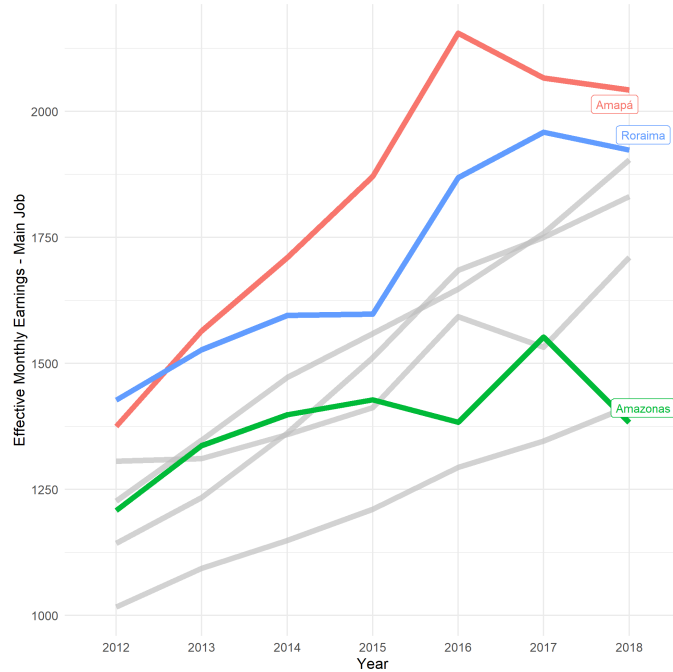
Notes: Figure created using individual-level PNAD data from 2012-2018.

Figure 5: Average Monthly Earnings in Main Job, by State

Figure 6 shows the evolution of main job earnings for states only within the northern region of Brazil, where Roraima is located. Workers in Roraima earn more than workers in other parts of the region, other than those in Amapá²³. Focusing on Roraima, we see a generally positive trend in earnings from 2012 to 2017, and some evidence of a decrease in earnings by 2018. Amazonas, a state well known for its vast natural resources and one of the most important industrial centers in Brazil, also suffered with a decrease in earnings between 2017 and 2018.

²²What the worker actually earned that month instead of what s/he is used to earn, from this point on referred simply by “earnings”.

²³The explanation to higher earnings seems to be that, due to being one of the last states incorporated in the Brazilian Federation, in 1988, while salaries in public jobs were decreasing in the southeast and the south of the country, in Amapá state, the opposite was happening. Thus, public jobs surged in the state already with higher salaries. Because of that, private jobs now have to compete with high paid public jobs in the state, what pushes up the average of earnings (Lima, 2016)



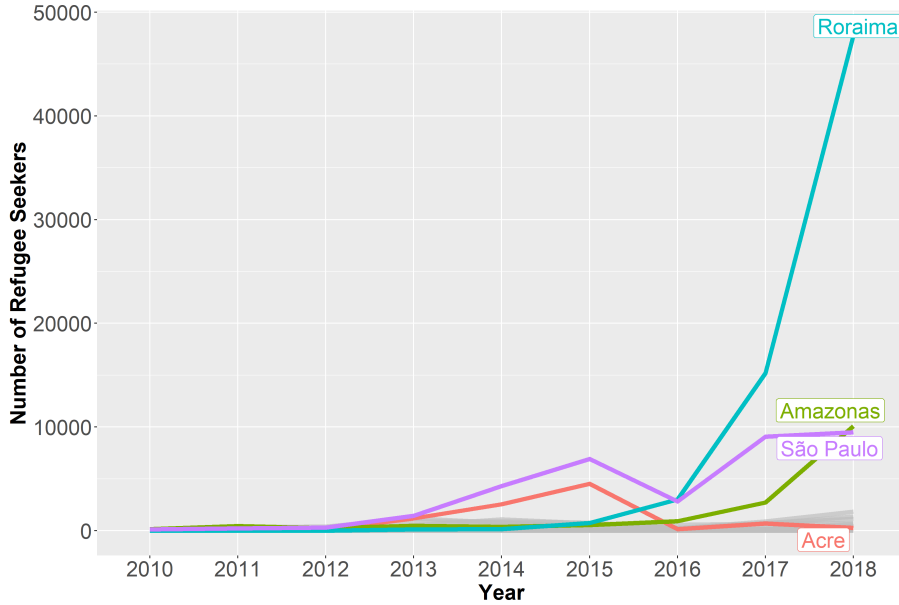
Notes: Figure created using individual-level PNAD data from 2012-2018.

Figure 6: Average Monthly Earnings in Main Job, by State, Northern Region Only

3.1.2 Venezuelan Migrants

Data on the number of Venezuelans crossing the border into Brazil is drawn from reports published by the Brazilian Federal Police and the “Ministério da Casa Civil”. These two institutions are responsible for registering every person who enters the country, including details on their location, date of entry, nationality and many other characteristics²⁴. Yet, despite all this effort by local authorities, it is still difficult to measure the exact number of people who migrate to the country, and who stay in Brazil, given the long border and the several ways in which people are able to cross it. I use the number of migrants who requested refugee status in each state during 2010-2018 as a proxy measure of the number of Venezuelans migrating to Brazil. This measure is likely a good proxy for migration levels; with the humanitarian crisis, Brazil has created mechanisms to facilitate the new life of migrants, including allowance for temporary residence of Venezuelans. Indeed, “under Brazilian law, while their asylum requests are being processed, [Venezuelans] cannot be deported, are entitled to a work permit, and are allowed to enroll children in school” (Human Rights Watch, 2011).

²⁴For more information, see “Operação Acolhida” at Ministério da Casa Civil’s website.



Source: Federal Police

Figure 7: Number of Refugee Requests by State Over Time

Figure 7 shows the number of migrants who requested a refugee status in Brazil from all nationalities. If we compare these numbers with Figure 3, it is clear that most of migrants requesting a refugee status in Brazil (if not all of them, particularly in 2017 and 2018) are Venezuelans, and are located in either Roraima, Amazonas or São Paulo. Still, Roraima receives by far the highest number of Venezuelan migrants as compared to the rest of the country.

3.2 Estimation Strategy

The natural experiment created by the massive inflow of migrants from Venezuela to Brazil lends itself to straightforward estimation strategy. Regressions are run on individual-level data, appropriately weighted to maintain population representativeness. The regression equation is as follows:

$$\ln(outcome)_{isy} = \beta_0 + \beta_1 Immigrants_{sy} + \beta_2 time + \beta_3 X_{isy} + \theta_y + \theta_s + \xi_{isy}$$

where the dependent variable is either log monthly earnings, log weekly hours worked, or log wages²⁵ of individual i in state s , and year y .²⁶ $time$ is a time trend that captures the evolution of the outcomes over time; $Immigrants_{sy}$ is the increase, in percentage points,

²⁵This variable is constructed by multiplying the number of weekly hours worked in the main job (all jobs) by 4 and dividing monthly earnings in the main job (all jobs) by this number.

²⁶Recall that earnings and hours worked information are drawn for the PNAD data from the fourth-quarter of each year only.

of the population of state s as a result of the migration of Venezuelans; X_{isy} is a set of individual-level control variables including age, household size, level of weekly hours worked in the main job (for earnings regressions only), number of jobs, and indicators for female, race, level of education, occupation, formal job, social security contribution in the main job²⁷, currently attending school and earnings paid in cash²⁸; θ_y , and θ_s are respectively year and state fixed effects and ξ_{isy} is the error term. The coefficient of interest is β_1 , which depicts the elasticity of the labor market outcome with respect to the increase in the population. In other words, β_1 is the percentage of change in the outcome of interest as a result of a 1% increase in the population of the state as a consequence of the Venezuelan migration.

In what follows, I use this regression specification to provide estimates of the relationship between Venezuelan immigration and labor market outcomes of individuals living in Brazil, including estimation among individuals living in all states in Brazil, all states in the northern region of Brazil (except for Amazonas, see below), and for those living in Roraima state only. Although it seems to be simple, it is important to highlight some of the features of this approach. While migration into Roraima can be considered a natural experiment due to the bordering location of Roraima and the push factors from Venezuela previously described, migration further into Brazil is likely to be much more selected. As described above, a share of Venezuelans who migrated to Roraima, when asked about their final destination, answered that they ultimately desired to settle in Amazonas, a state that shares a border with Roraima and which is a manufacturing center in Brazil. Because of the selected nature of migration to Amazonas, in primary estimation presented below that focuses on the northern region states only, I exclude households living in Amazonas. Regression results including Amazonas are presented in the analyses for the entire country.

It should also be noted that the Brazilian government, together with the army, started an operation named “Operação Acolhida” - *Operation Welcome* - as an answer to the massive migration of Venezuelans in the country. This program included the provision of financial aid to Roraima, as well as resettlement plans for some immigrants to other states in Brazil; together these suggest that estimates from this analysis may be in fact a lower bound of the true effect of the Venezuelan migration. In addition, this operation did not choose randomly the ones who would be moved, nor their destination. It only moved those who wanted to and to the states/cities they chose to go. This would also create a non-randomness factor when dealing with the estimation in the entire country. However, the number of people taken to other states reached only 5,482 (OIM, 2019), which would likely lead to a much more diffuse impact on these other states.

On the other hand, besides the selection problem with Venezuelans settling in Amazonas, migrants coming from countries other than Venezuela to states with better economic opportunities than Roraima, like São Paulo (See Figure 7), can also play an important role in results for the entire country. Thus, estimators for the entire country, where every single state is included in the sample are depicted only as a matter of comparison. For the

²⁷In Brazil, formal workers have to contribute to social security, but this is an option for informal workers.

²⁸Workers in both informal and formal jobs can be paid in cash. Venezuelans entering the country could pressure either natives or/and themselves to work for food, housing, or other things rather than cash.

estimations for the North region, Amazonas is dropped out the sample. Nonetheless, only the specification for Roraima should be consistent and unbiased, given the observed forced migration from Venezuela.

4 Results

This section is subdivided into four. First, primary results are presented. The remaining subsections explore heterogeneity in these results by education level, occupation group, gender, and ethnicity of individual.

4.1 Aggregate Results

Table 3 reports results from regressions using the specification described above for the entire country (columns (1), (4) and (7)), the North Region (excluding the state of Amazonas; columns (2), (5) and (8)) and only the state of Roraima (columns (3), (6) and (9)). The coefficient of interest (β_1) is depicted in the first row of the table.

Columns (1)-(3) show the results for monthly earnings in the main job. Interestingly, as seen in Figures 5 and 6, these earnings are increasing over time across regions, but the massive influx of Venezuelans, especially when Roraima is isolated from the rest of the country, leads to a drop in earnings. The coefficient of interest in column (3) indicates that a 1% increase in the population caused by entry of Venezuelans decreases monthly earnings in the main job for individuals living in Roraima by 1.6% (significant at the 5% level). For the North region excluding Amazonas, presented in column (2), the effect is positive and marginally statistically significant, with monthly earnings increasing by 0.7%. For the entirety of Brazil (column 1), results suggest a similar but less intense effect compared to Roraima²⁹, a 1% decrease in monthly earnings.

Therefore, if we consider that during 2018 alone 46,974 Venezuelans requested refugee status in Roraima³⁰, which represents a 8.14% increase in the population of the state, monthly earnings in the main job (and in all jobs, see A1) decreased by 13% due to Venezuelan immigration in that year. This represents a reduction of R\$ 201 on average for workers in the state³¹.

²⁹Similar results are observed when replacing the dependent variable to monthly earnings in all jobs (see in Appendix Table A1)

³⁰These are the official numbers of people who actually requested the refugee status, rather than the total number who entered the country. As already highlighted, it is hard to measure with precision the exact number of people who crossed the border and actually stayed in the country or in Roraima. Because of that, these results are likely a lower bound on the true effect.

³¹This calculation takes into account the average of R\$ 1,546 for monthly earnings in the main job as shown in Table 1.

	Dependent variable: Log Monthly Earnings in Main Job			Dependent variable: Log Weekly Hours Worked in Main Job			Dependent variable: Log Wage Main Job		
	Brazil	North Region	Roraima	Brazil	North Region	Roraima	Brazil	North Region	Roraima
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Immigrants	-0.010*** (0.003)	0.007* (0.003)	-0.016** (0.005)	-0.002 (0.002)	0.003 (0.002)	-0.007* (0.003)	-0.007** (0.003)	0.003 (0.003)	-0.011* (0.004)
Time Trend	0.056*** (0.001)	0.039*** (0.002)	0.065*** (0.006)	-0.004*** (0.000)	-0.006*** (0.001)	0.006 (0.004)	0.055*** (0.001)	0.044*** (0.002)	0.059*** (0.006)
Female	-0.304*** (0.002)	-0.299*** (0.007)	-0.250*** (0.013)	-0.107*** (0.001)	-0.157*** (0.005)	-0.129*** (0.009)	-0.234*** (0.002)	-0.195*** (0.006)	-0.159*** (0.013)
Indigenous	-0.001 (0.016)	-0.044 (0.034)	-0.010 (0.045)	0.004 (0.009)	0.010 (0.017)	-0.004 (0.023)	-0.012 (0.014)	-0.057 (0.036)	-0.002 (0.040)
Parda	0.011*** (0.003)	-0.005 (0.008)	-0.004 (0.021)	-0.002 (0.002)	0.006 (0.006)	0.007 (0.012)	0.012*** (0.003)	-0.009 (0.008)	-0.012 (0.020)
White	0.114*** (0.003)	0.111*** (0.010)	0.131*** (0.027)	0.003 (0.002)	0.013 (0.007)	0.034* (0.015)	0.113*** (0.003)	0.098*** (0.011)	0.107*** (0.027)
Asian	0.188*** (0.017)	0.093* (0.038)	0.139 (0.120)	0.012 (0.007)	0.026 (0.021)	-0.004 (0.075)	0.175*** (0.017)	0.094** (0.036)	0.198 (0.108)
Number of Jobs	0.061*** (0.005)	0.062*** (0.014)	0.053 (0.027)	-0.120*** (0.003)	-0.080*** (0.007)	-0.112*** (0.015)	0.120*** (0.005)	0.086*** (0.015)	0.139*** (0.026)
Individuals	1,584,880	162,502	17,288	1,703,822	178,625	18,551	1,624,422	167,254	17,781
Adjusted-R ²	0.557	0.517	0.531	0.203	0.188	0.184	0.482	0.422	0.490

Notes: The labor market outcomes consist of observations from the fourth quarter of each year in the study period (2012 - 2018) of individuals in each state from the PNAD data. Separate models are run for the three different samples. The set of control variables included in the estimation, but not depicted on the table, are age, household size, level of worked hours weekly in the main job (for the monthly earnings regressions only), and indicators for level of education, sector of the economy, occupation, formal job, social security contribution in the main job, currently attending school and type of earnings (if the worker earns his/her earnings in cash or not). All specifications include year fixed effects, and state fixed effects are included regressions that include all of Brazil or the North Region as the sample. The state of Amazonas is excluded from the estimation in columns (2), (5), and (8), given concerns with sample selection. Robust standard errors, clustered at the UPA level are depicted in parenthesis. Superscripts *, **, and *** represent significance at 10%, 5% and 1% respectively.

Table 3: The Effect of Venezuelan Migration on Brazilian Labor Market Outcomes

Columns (4)-(6) of Table 3 estimate the impact of the Venezuelan immigration on weekly hours worked in the main job. No significant effect is found neither for the entire country nor the North. In Roraima, a 1% increase in the population due to Venezuelan migration reduces weekly worked hours in the main job by 0.7% (significant at the 10% level). Similar results are found for weekly worked hours in all jobs (see Appendix Table A1).

Finally, columns (7)-(9) depict the results when the dependent variable is log wages. In Roraima, wages decrease by about 1.1% (significant at the 10% level,) while in the entire country wages are reduced by 0.7% in response to a 1% increase in the population resulted from the Venezuelan migration. These results suggest that most of the drop in earnings due to Venezuelan immigration is a result of wage decreases rather than fewer hours worked. Using average wages in the state, this finding implies that wages in Roraima decreased by about R\$ 1 per hour due to Venezuelan immigration in 2018 alone³². No significant effect on wages are found for the North.

Although relevant and highly significant, these results may mask important heterogeneity across subgroups of the population. The next sections analyze heterogeneity across groups by education, occupation, gender, and ethnicity.

4.2 Results by Level of Education

Table 4 presents results from separate regressions for each education level. Columns (1)-(3) suggest that individuals who have completed high school have lower earnings as a result of Venezuelan immigration³³. In Roraima, workers with a complete high school degree see earnings in their main job reduced by 2.4% (significant at the 5% level), and those across Brazil as a whole see earnings in their main job reduced by 1.1% (significant at the 5% level).

Columns (4)-(6) provide estimates disaggregated by education level for weekly hours worked in the main job. In contrast to the findings for Roraima, workers with a college degree are positively impacted by Venezuelan migration in Brazil and in the North. This group of workers are working respectively 0.9% and 1.1% more (significant at the 1% level), while those in Roraima are working 0.8% fewer hours weekly in the main job in response to a 1% increase in the population of the state. In addition, workers with a complete high school degree, the group more negatively affected in monthly earnings, also seem to be working fewer weekly hours due to Venezuelan immigration. The same conclusions can be derived from analyses on hours worked in all jobs³⁴.

Furthermore, columns (7)-(9), shed light on what seems to be the main reason behind the decrease in earnings for low educated workers in Roraima. Wages in the main job decrease by 1.7% and 4.4% for workers who have completed high school or elementary school,

³²This calculation takes into account the average of R\$ 11.23 for wage in the main job shown in Table 1 for Roraima.

³³Appendix Table A2 reports similar results measuring earnings across all jobs.

³⁴See columns (4)-(6) in Table A2 in the Appendix

respectively³⁵, with both results significant at the 10% level. Together, these results provide evidence of an increase in competition especially for low and middle skilled jobs, likely as a consequence of a higher supply of workers in the labor market that creates a pressure to lower wages of such workers. Even Venezuelans with higher education could be competing for these types of jobs given necessity, xenophobia, difficulty with the language, and other factors that make settling in a new country difficult.

4.3 Results by Occupation and Sector

This subsection presents results disaggregated by occupation and, subsequently, by sector of the economy. Columns (1)-(3) in Table 5 report the estimates for monthly earnings in the main job. Column (3), the preferred specification, suggests that, in Roraima, workers in the fields of “Educ./Health/Social Services”, “Manufacturing” and “Public Admin/Defense/Social Sec” experience significant decreases in earnings due to Venezuelan migration (by 2%, 4.4% and 2.6%, respectively). Similar trends are found for outcomes in all jobs³⁶. In the country as a whole, lower-skilled occupations such as “Any Agricultural Job” (2.5%), “Construction” (2.1%), “Food Service” (2.7%), “Manufacturing” (2.9) and “Transportation” (2.1) are also suffering with decreases in monthly earnings, while no significant result is found for the North except for a gain of 2.1% for “Info/Communication/Financial Activities” workers, mostly explained by increases in wages by 1.9%.

However, while the reason for lower earnings in Roraima for “Educ./Health/Social Services” and “Public Admin/Defense/Social Sec” workers seems to be divided among lower worked hours weekly (1.2% for both groups) and lower wages (non significant results for “Educ./Health/Social Services” and 1.9% for “Public Admin/Defense/Social Sec”, significant at the 10% level), although not presenting significant decreases in earnings, workers in the Construction sector are experiencing a 3.7% decrease in wages as a response of a 1% increase in the population due to the Venezuelan migration (significant at the 5% level). Wage reductions for this sector are also evident in Brazil as a whole, as well as in the northern region. Lower wages also account for the main reason behind reductions in earnings for “Any Agricultural Job” and “Food Services”, two of the sectors most affected in the country.

These results confirm the ones presented in Table 4. It seems that Venezuelans are pressuring the job market for low/middle-skilled occupations by decreasing monthly earnings specially through decreases in wages in occupations that do not require any kind of specialization, such as Construction and Food Services.

In a similar vein, Table 6 suggests that, in Roraima (column (3)), the sectors of the economy mostly affected by migrants in terms of monthly earnings are the workers in the informal sector and in the army, with reductions respectively by 1.9% and 2.6%. However the reason behind the decrease in monthly earnings for the army in Roraima seems to be

³⁵Significant results for this group of workers are also found for the estimation for the entire country.

³⁶Marginal decrease of 4.7% for earnings in all jobs are found in Roraima if the worker’s main job is in the “Manufacturing” sector. See column (3) of Appendix Table A3.

	Dependent variable: Log Monthly Earnings in Main Job			Dependent variable: Log Weekly Hours Worked in Main Job			Dependent variable: Log Wage Main Job		
	Brazil	North Region	Roraima	Brazil	North Region	Roraima	Brazil	North Region	Roraima
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
College Degree	-0.002 (0.006)	0.003 (0.007)	-0.017 (0.010)	0.009*** (0.002)	0.011*** (0.002)	-0.008* (0.004)	-0.011 (0.007)	-0.008 (0.007)	-0.005 (0.009)
Some College	-0.003 (0.006)	0.012 (0.007)	-0.015 (0.013)	-0.000 (0.004)	0.002 (0.005)	-0.008 (0.007)	0.002 (0.007)	0.011 (0.007)	-0.007 (0.013)
Complete high school	-0.011** (0.004)	0.003 (0.004)	-0.024** (0.008)	-0.005 (0.003)	-0.002 (0.003)	-0.007* (0.004)	-0.004 (0.003)	0.005 (0.003)	-0.017* (0.007)
Incomplete High School	-0.009 (0.007)	0.009 (0.008)	0.013 (0.014)	-0.008 (0.005)	-0.006 (0.006)	-0.009 (0.011)	-0.011 (0.009)	0.001 (0.009)	0.002 (0.018)
Complete Elementary School	-0.012 (0.008)	0.005 (0.009)	0.003 (0.017)	0.005 (0.006)	0.011 (0.002)	0.001 (0.004)	-0.017* (0.009)	-0.010 (0.009)	-0.044* (0.017)
Incomplete Elementary School	-0.010* (0.005)	0.012* (0.005)	-0.013 (0.009)	-0.006 (0.004)	0.002 (0.004)	-0.005 (0.008)	-0.005 (0.005)	0.009 (0.005)	-0.007 (0.008)
None/Less than 1 year	-0.013 (0.017)	0.003 (0.016)	-0.003 (0.027)	-0.005 (0.006)	0.003 (0.006)	-0.006 (0.012)	-0.005 (0.010)	-0.000 (0.011)	-0.021 (0.022)

Notes: See the notes below Table 3 for a description of data, sample, control variables, and notation used. Separate regressions a run for each level of education.

Table 4: Desegregated Effect of Venezuelan Migration on Brazilian Labor Market Outcomes by Level of Education

	Dependent variable: Log Monthly Earnings in Main Job						Dependent variable: Log Weekly Hours Worked in Main Job						Dependent variable: Log Wage Main Job						
	Brazil		North Region		Roraima		Brazil		North Region		Roraima		Brazil		North Region		Roraima		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	
Any Agricultural Job	-0.025* (0.010)	-0.005 (0.010)	-0.003 (0.016)	-0.002 (0.005)	0.007 (0.005)	-0.001 (0.009)	-0.021* (0.009)	-0.010 (0.009)	-0.012 (0.015)	Commerce/Veh. Repair	-0.007 (0.005)	0.010 (0.006)	-0.009 (0.010)	-0.005 (0.003)	-0.001 (0.003)	0.006 (0.006)	-0.000 (0.005)	0.008 (0.005)	-0.012 (0.009)
Construction	-0.021** (0.007)	-0.003 (0.008)	-0.027 (0.014)	-0.003 (0.004)	0.001 (0.001)	-0.002 (0.010)	-0.028** (0.007)	-0.014* (0.007)	-0.037** (0.012)	Educ./Health/Social Services	0.001 (0.005)	0.008 (0.005)	-0.020* (0.009)	0.008*** (0.002)	0.008** (0.003)	-0.012** (0.004)	-0.005 (0.005)	0.000 (0.006)	-0.010 (0.009)
Food Service	-0.027* (0.014)	-0.002 (0.015)	0.011 (0.025)	-0.007 (0.006)	0.003 (0.003)	-0.014 (0.011)	-0.030** (0.010)	-0.019 (0.010)	0.003 (0.018)	House work	-0.010 (0.006)	0.008 (0.007)	-0.009 (0.011)	0.004 (0.007)	0.009 (0.008)	0.000 (0.012)	-0.015 (0.008)	-0.005 (0.009)	-0.020 (0.011)
Manufacturing	-0.029** (0.010)	0.003 (0.011)	-0.044* (0.020)	-0.014 (0.007)	-0.005 (0.007)	-0.014 (0.014)	-0.010 (0.010)	0.014 (0.011)	-0.019 (0.020)	Info/Communication/Financial Activities	-0.000 (0.006)	0.021** (0.007)	0.003 (0.014)	-0.006 (0.004)	-0.001 (0.004)	-0.004 (0.007)	0.009 (0.006)	0.019** (0.007)	0.015 (0.013)
Public Admin./Defense/Social Sec.	0.008 (0.006)	0.012 (0.007)	-0.026** (0.009)	0.005* (0.002)	0.005* (0.002)	-0.012*** (0.003)	0.005 (0.006)	0.008 (0.007)	-0.019* (0.009)	Transportation	-0.021* (0.011)	0.007 (0.011)	-0.046 (0.026)	-0.009 (0.008)	-0.000 (0.003)	-0.011 (0.013)	-0.012 (0.011)	0.003 (0.012)	-0.029 (0.026)

Notes: See the notes below Table 3 for a description of data, sample, control variables, and notation used. Separate Regressions are run for each occupational group.

Table 5: Desegregated Effect of Venezuelan Migration on Brazilian Labor Market Outcomes by Occupation

	Dependent variable: Log Monthly Earnings in Main Job			Dependent variable: Log Weekly Hours Worked in Main Job			Dependent variable: Log Wage Main Job		
	Brazil	North Region	Roraima	Brazil	North Region	Roraima	Brazil	North Region	Roraima
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Formal Workers	-0.007** (0.003)	0.000 (0.003)	-0.009 (0.006)	-0.000 (0.001)	0.003** (0.001)	0.000 (0.003)	-0.004 (0.003)	-0.003 (0.003)	-0.008 (0.006)
Informal Workers	-0.005 (0.004)	0.009* (0.004)	-0.019* (0.008)	0.005 (0.003)	0.007* (0.003)	-0.000 (0.005)	-0.012** (0.004)	-0.002 (0.005)	-0.024** (0.009)
Employer	-0.002 (0.016)	0.012 (0.016)	0.037 (0.031)	-0.006 (0.005)	0.001 (0.006)	0.002 (0.015)	0.005 (0.014)	0.015 (0.015)	0.039 (0.029)
Self-Employed	-0.023*** (0.005)	-0.004 (0.005)	-0.015 (0.010)	-0.013*** (0.001)	-0.008* (0.004)	-0.011 (0.007)	-0.013** (0.004)	-0.000 (0.005)	-0.010 (0.010)
Army	0.004 (0.005)	0.012* (0.006)	-0.026** (0.009)	0.005** (0.002)	0.007*** (0.002)	-0.014*** (0.003)	0.001 (0.005)	0.007 (0.006)	-0.015 (0.010)
Family Auxiliary Worker	-	-	-	-0.013 (0.013)	0.003 (0.011)	-0.012 (0.028)	-	-	-

Notes: See the notes below Table 3 for a description of data, sample, control variables, and notation used. Separate Regressions are run for each sector of economy.

Table 6: Desegregated Effect of Venezuelan Migration on Brazilian Labor Market Outcomes by Sector of Economy

	Dependent variable: Log Monthly Earnings in Main Job			Dependent variable: Log Weekly Hours Worked in Main Job			Dependent variable: Log Wage Main Job		
	Brazil (1)	North Region (2)	Roraima (3)	Brazil (4)	North Region (5)	Roraima (6)	Brazil (7)	North Region (8)	Roraima (9)
Panel A: By Gender									
Male	-0.010** (0.003)	0.007* (0.003)	-0.018*** (0.005)	-0.003 (0.002)	0.003 (0.002)	-0.003 (0.003)	-0.007* (0.003)	0.002 (0.003)	-0.018*** (0.005)
Female	-0.009* (0.004)	0.007 (0.004)	-0.014* (0.007)	-0.000 (0.003)	0.003 (0.003)	-0.011* (0.004)	-0.007* (0.003)	0.004 (0.004)	-0.004 (0.007)
Panel B: By Ethnicity									
Black	-0.005 (0.009)	0.014 (0.009)	-0.013 (0.014)	-0.002 (0.005)	0.005 (0.006)	-0.008 (0.010)	-0.004 (0.009)	0.004 (0.010)	-0.013 (0.015)
White	-0.008 (0.005)	0.003 (0.006)	-0.011 (0.011)	0.002 (0.002)	0.003 (0.003)	-0.012* (0.005)	-0.010* (0.005)	-0.003 (0.005)	-0.001 (0.010)
Parda	-0.008** (0.003)	0.008** (0.003)	-0.015** (0.005)	-0.002 (0.002)	0.003 (0.002)	-0.005 (0.004)	-0.006* (0.003)	0.005 (0.003)	-0.013** (0.005)
Asian	-0.067 (0.040)	-0.074 (0.048)	-0.141 (.)	-0.020 (0.019)	-0.028 (0.022)	-0.435 (.)	-0.057 (0.043)	-0.061 (0.045)	0.216 (.)
Indigenous	-0.007 (0.009)	-0.003 (0.014)	-0.037* (0.018)	-0.009 (0.007)	-0.004 (0.009)	-0.008 (0.013)	0.000 (0.009)	-0.001 (0.014)	-0.020 (0.019)

Notes: See the notes below Table 3 for a description of data, sample, control variables, and notation used. Separate Regressions are run for each gender in Panel A and ethnicity in Panel B.

Table 7: Desegregated Effect of Venezuelan Migration on Brazilian Labor Market Outcomes by Gender and Ethnicity

decreases in hours worked weekly (1.4%) - column (6) -, while decreases in wages by 2.4% (column (9)) seem to be the key factor pushing down monthly earnings for informal workers.

For the entire country (column (1)), formal (0.7%) and self-employed³⁷ (2.3%) workers are the groups most affected by the massive entry of Venezuelans on the matter of monthly earnings. However, as observed for Roraima, informal workers are also experiencing decreases in wages by about 1.2% on average, while the reduction reaches 1.3% for self-employed. Thus, it seems that indeed workers in more vulnerable sectors of the economy are experiencing competition for jobs, earning less in the main job monthly specially due to reductions in wages both for Roraima and the entire country.

Appendix Table A5 provides analysis of the relationship between Venezuelan immigration and the probability of having an informal job and working for cash payments. The first panel of Appendix Table A5 indicates a statistically significant relationship, although small in magnitude, for reductions in the probability of having a formal job in Roraima. No significant effects are found neither for the probabilities of working for money nor of being out of the work force. However, results suggest an increase of 0.5% in the probability of not being occupied³⁸ in the state of Roraima (significant at 1% level). Together this suggests that Venezuelan migrants are affecting the native labor market specifically by increasing the supply of workers and intensifying competition, thereby decreasing earnings through reductions in wages for middle/lower-skilled workers, particularly those in Construction, Manufacturing and Food Services.

4.4 Results by Gender and Ethnicity

Table 7 disaggregates results by gender. Panel A shows that men earn 1.8% less monthly in the main job in Roraima due to the arrival of migrants, while in the entire country the decrease reaches 1% (significant at the 5% level) and in the North there is an increase in earnings by 0.7% (significant at the 10% level). Similarly, female earnings drop by 1.4% in the state of Roraima and 0.9% in the country as a whole, while no significant effects are found in the North.

Although both genders are being negatively affected by the massive entry of Venezuelans in terms of monthly earnings, columns (4)-(9) suggest different reasons for this by gender. While women in Roraima seem to be earning less monthly due to working fewer weekly hours (a 1.1% decrease), men appear to be earning less due to a decrease in wages (1.8%, significant at the 1% level). Thus, while men are being pushed to accept lower wages, women

³⁷Defined as the person who worked exploring his/her own business, alone or with business partner, without any employee and counting with, or not, the help of a family auxiliary.

³⁸sayNot occupied includes those who, at the reference week, did not report having a job that generates income for the household, were looking for a job in the last 30 days and were ready to take the position at the reference week. This group also includes those who did not have a job at the reference week, and who were not looking for a job in the last 30 days because they already had a job and would take the position after the reference week.

seem to be pushed to work less hours due to competition.

Panel B of the same table reports results across different ethnicities in Brazil. Although there is suggestive evidence that every ethnic group experiences decreases in monthly earnings in the main job, the most affected ones in Roraima appear to be *Parda* and Indigenous, earning respectively about 1.5 and 3.7% less for every 1% increase in the population as a result of Venezuelan migrants. For *Parda*, the reason behind this reduction seems to be a decrease in wages, that reaches 1.3% in the state (significant at the 5% level).

5 Conclusion

This paper contributes to the literature on the impacts of labor supply shocks on local labor markets by studying a natural experiment in a less-developed country in South America. The increase in population in the state of Roraima, Brazil, caused by the massive migration of Venezuelans into the country as a result of a deep economic and political crisis in Venezuela, generates significant effects on local labor markets. On aggregate, a 1% increase in the population of Roraima per year reduces monthly earnings by 1.6%. This effect is explained primarily by reductions in wages (1.1% on average), although weekly hours worked are also reduced (0.7%).

“The effect of immigration on the wage structure depends crucially on the differences between the skill distributions of immigrants and natives. The direct effect of immigration is most likely to be felt by those workers who had similar capabilities” (Borjas, 2017). Recent surveys suggest that the wave of Venezuelan migrants arriving in Brazil is composed primarily of people with up to secondary education (62%), and hence the main direct effects of the massive increase in the labor force should be expected to come from this specific group in the population. Yet, careful attention should be given to the fact that even high-skilled migrants could be working in low-skilled jobs due to several reasons, such as not speaking the language, xenophobia, etc. Therefore, dividing the results by level of education, occupations and sectors of the economy proved to be more informative to understand what has been happening in the labor market in Roraima regarding monthly earnings and wages in the main job.

Thus, this research adds to the literature in suggesting that effects indeed differ across groups, but are better seen, in this case, across different social and economic groups. Estimates suggest that in fact workers with lower levels of education, particularly those with complete high school and elementary school are earning less due to a decrease in hourly wages. Results disaggregated by occupation and sector of the economy provide a more in depth analysis on how migration has affected Roraima’s labor market. Lower wages, likely resulting from more intense competition for jobs, seem to explain the biggest part of the observed reduction in earnings for those categories of lower/middle-skilled workers, particularly construction workers in Roraima and the entire country, and those in food services and agriculture in the country as a whole. Respectively, the elasticities of wages in the main job

with respect to the increase in population in these sectors are 3.7%, 3% and 2.1%.

In addition, informal workers are the ones mostly affected by the massive entry of Venezuelans in Roraima, with an elasticity of wages with respect to the increase in population of -2.4%, suggesting that the most vulnerable sectors of the economy are also the ones that suffer the most due to higher competition generated by the increase in supply of workers. Finally, by looking at heterogeneity across gender and ethnic groups, I find that, although both genders and all ethnic groups are being affected, with female workers' earnings being negatively affected especially through reduced weekly worked hours, men, *Parda* and Indigenous workers see larger reductions in monthly earnings in the main job, due to decreased wages.

Building on the literature studying the effects of migration on developed countries, this paper redirects the focus to the importance of impacts in less-developed countries. This is important not only due to their global economic and political importance, but also to shed light on an important phenomenon happening in the developing world.

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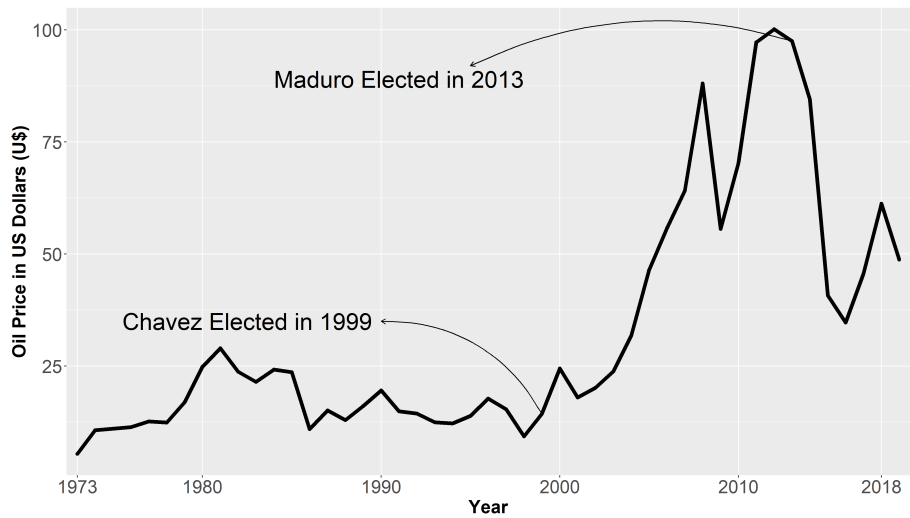
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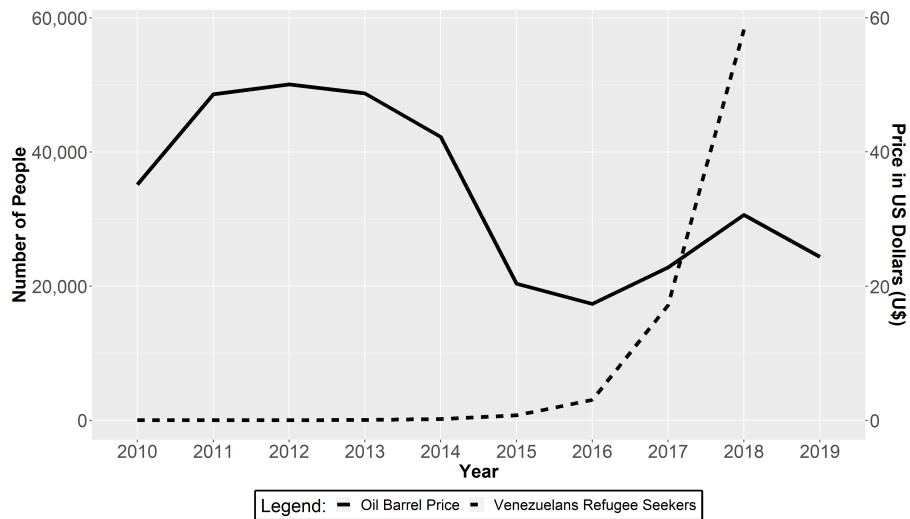
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Appendix



Source: U.S Energy Information Administration

Figure A1: Costs of Venezuela Crude Oil (Dollars per Barrel)



Source: Brazilian Federal Police and U.S Energy Information Administration

Figure A2: Venezuela's Crude Oil Prices and Venezuelans Migrating to Brazil

	Dependent variable: Log Monthly Earnings All Jobs			Dependent variable: Log Weekly Worked Hours in All Jobs			Dependent variable: Log Wage All Jobs		
	Brazil	North Region	Roraima	Brazil	North Region	Roraima	Brazil	North Region	Roraima
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Immigrants	-0.010*** (0.003)	0.006* (0.003)	-0.016** (0.005)	-0.002 (0.002)	0.003 (0.002)	-0.007* (0.003)	-0.007** (0.003)	0.003 (0.003)	-0.014** (0.005)
Time Trend	0.055*** (0.001)	0.039*** (0.002)	0.064*** (0.006)	-0.004*** (0.000)	-0.006*** (0.001)	0.005 (0.004)	0.055*** (0.001)	0.044*** (0.002)	0.059*** (0.006)
Female	-0.305*** (0.002)	-0.299*** (0.007)	-0.252*** (0.013)	-0.107*** (0.001)	-0.157*** (0.005)	-0.130*** (0.009)	-0.235*** (0.002)	-0.195*** (0.006)	-0.225*** (0.012)
Indigenous	-0.000 (0.016)	-0.041 (0.034)	-0.011 (0.045)	0.004 (0.009)	0.009 (0.017)	-0.001 (0.023)	-0.013 (0.014)	-0.056 (0.035)	-0.013 (0.041)
Parda	0.011*** (0.003)	-0.005 (0.008)	-0.003 (0.021)	-0.002 (0.002)	0.006 (0.006)	0.008 (0.012)	0.012*** (0.003)	-0.009 (0.008)	-0.012 (0.019)
White	0.114*** (0.003)	0.111*** (0.010)	0.131*** (0.026)	0.003 (0.002)	0.013 (0.007)	0.034* (0.015)	0.113*** (0.003)	0.098*** (0.011)	0.123*** (0.026)
Asian	0.187*** (0.017)	0.079* (0.040)	0.149 (0.120)	0.012 (0.007)	0.024 (0.022)	-0.001 (0.075)	0.174*** (0.017)	0.090* (0.035)	0.211 (0.108)
Number of Jobs	0.358*** (0.005)	0.339*** (0.015)	0.369*** (0.029)	0.282*** (0.002)	0.337*** (0.007)	0.381*** (0.013)	0.202*** (0.005)	0.171*** (0.014)	0.106*** (0.025)
Individuals	1,586,820	162,731	17,302	1,703,822	178,625	18,551	1,625,118	167,313	17,783
Adjusted-R ²	0.566	0.526	0.551	0.210	0.203	0.205	0.485	0.425	0.534

Notes: See Table 3. Year fixed effects are included in all specifications, and state fixed-effects are included for those other than for Roraima. Robust standard errors are in parenthesis. Superscripts *, ** and *** represent significance at 10%, 5% and 1% respectively.

Table A1: Effect of Venezuelan Migration on Brazilian Labor Market Outcomes

	Dependent variable: Log Monthly Earnings in All Jobs			Dependent variable: Log Weekly Hours Worked in All Jobs			Dependent variable: Log Wage All Jobs		
	Brazil	North Region	Roraima	Brazil	North Region	Roraima	Brazil	North Region	Roraima
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
College Degree	-0.007 (0.006)	-0.000 (0.007)	-0.017 (0.010)	0.009*** (0.002)	0.010*** (0.002)	-0.008* (0.004)	-0.012 (0.007)	-0.008 (0.007)	-0.006 (0.009)
Some College	-0.002 (0.006)	0.011 (0.007)	-0.014 (0.013)	-0.001 (0.004)	0.001 (0.005)	-0.009 (0.007)	0.003 (0.007)	0.011 (0.007)	-0.007 (0.013)
Complete High School	-0.012** (0.004)	0.003 (0.004)	-0.023** (0.008)	-0.005 (0.003)	-0.001 (0.003)	-0.007 (0.004)	-0.005 (0.003)	0.005 (0.003)	-0.017* (0.007)
Incomplete High School	-0.009 (0.007)	0.009 (0.008)	0.013 (0.014)	-0.009 (0.005)	-0.006 (0.006)	-0.010 (0.011)	-0.010 (0.009)	0.002 (0.009)	0.002 (0.018)
Complete Elementary School	-0.013 (0.008)	0.004 (0.009)	-0.035* (0.016)	0.005 (0.006)	0.011 (0.006)	0.004 (0.011)	-0.018* (0.009)	-0.010 (0.009)	-0.045** (0.017)
Incomplete Elementary School	-0.011* (0.005)	0.011* (0.005)	-0.012 (0.009)	-0.006 (0.004)	0.002 (0.004)	-0.005 (0.008)	-0.005 (0.005)	0.009 (0.005)	-0.007 (0.008)
None/Less than 1 year	-0.013 (0.017)	0.004 (0.016)	-0.003 (0.027)	-0.005 (0.006)	0.003 (0.006)	-0.006 (0.012)	-0.005 (0.010)	0.000 (0.011)	-0.021 (0.022)

Notes: See Table 4. Year fixed effects are included in all specifications, and state fixed-effects are included for those other than for Roraima. Robust standard errors are in parenthesis. Superscripts *, **, and *** represent significance at 10%, 5% and 1% respectively.

Table A2: Desegregated Effect of Venezuelan Migration on Brazilian Labor Market Outcomes by Level of Education

	Dependent variable: Log Monthly Earnings in All Jobs			Dependent variable: Log Weekly Hours Worked in All Jobs			Dependent variable: Log Wage All Jobs		
	North Region		Roraima	North Region		Roraima	North Region		Roraima
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Any Agricultural Job	-0.025* (0.010)	-0.005 (0.011)	-0.005 (0.016)	-0.002 (0.005)	0.007 (0.005)	-0.001 (0.009)	-0.021* (0.009)	-0.009 (0.009)	-0.013 (0.015)
Commerce/Veh. Repair	-0.008 (0.005)	0.009 (0.006)	-0.010 (0.010)	-0.005 (0.003)	-0.002 (0.003)	0.006 (0.006)	-0.001 (0.005)	0.008 (0.005)	-0.013 (0.009)
Construction	-0.022** (0.008)	-0.004 (0.008)	-0.024 (0.014)	-0.003 (0.004)	0.001 (0.004)	-0.003 (0.010)	-0.028*** (0.007)	-0.015* (0.007)	-0.036** (0.012)
Educ./Health/Social Services	-0.001 (0.005)	0.005 (0.005)	-0.019* (0.009)	0.008*** (0.002)	0.008** (0.003)	-0.011** (0.004)	-0.005 (0.005)	-0.001 (0.006)	-0.010 (0.009)
Food Service	-0.029* (0.014)	-0.003 (0.015)	0.012 (0.025)	-0.007 (0.006)	0.003 (0.007)	-0.014 (0.011)	-0.031** (0.010)	-0.019 (0.010)	0.004 (0.018)
House work	-0.010 (0.006)	0.008 (0.007)	-0.009 (0.011)	0.004 (0.007)	0.009 (0.008)	0.001 (0.012)	-0.015 (0.008)	-0.005 (0.009)	-0.021 (0.011)
Manufacturing	-0.030** (0.010)	0.002 (0.011)	-0.047* (0.020)	0.004 (0.007)	-0.004 (0.007)	-0.013 (0.014)	-0.010 (0.010)	0.015 (0.011)	-0.022 (0.020)
Info/Communication/Financial Activities	-0.000 (0.006)	0.020** (0.007)	0.003 (0.014)	-0.007 (0.004)	-0.001 (0.004)	-0.005 (0.007)	0.010 (0.006)	0.020** (0.007)	0.016 (0.014)
Public Admin/Defense/Social Security	0.007 (0.006)	0.011 (0.007)	-0.026** (0.009)	0.005* (0.002)	0.005* (0.002)	-0.012*** (0.003)	0.005 (0.006)	0.008 (0.007)	-0.017 (0.009)
Transportation	-0.022* (0.011)	0.006 (0.011)	-0.046 (0.026)	-0.009 (0.008)	0.000 (0.008)	-0.011 (0.013)	-0.013 (0.011)	0.001 (0.012)	-0.032 (0.026)

Notes: See Table 5. Year fixed effects are included in all specifications, and state fixed-effects are included for those other than for Roraima. Robust standard errors are in parenthesis. Superscripts *, ** and *** represent significance at 10%, 5% and 1% respectively.

Table A3: Desegregated Effect of Venezuelan Migration on Brazilian Labor Market Outcomes by Occupation

	Dependent variable: Log Monthly Earnings in All Jobs			Dependent variable: Log Weekly Hours Worked in All Jobs			Dependent variable: Log Wage All Jobs		
	Brazil	North Region	Roraima	Brazil	North Region	Roraima	Brazil	North Region	Roraima
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Formal Workers	-0.007** (0.003)	0.000 (0.003)	-0.010 (0.006)	-0.000 (0.001)	0.003* (0.001)	-0.000 (0.003)	-0.004 (0.003)	-0.003 (0.003)	-0.008 (0.006)
Informal Workers	-0.006 (0.004)	0.008 (0.004)	-0.019* (0.009)	0.005 (0.003)	0.007* (0.003)	0.000 (0.005)	-0.012** (0.004)	-0.002 (0.005)	-0.024** (0.008)
Self-Employed	-0.024*** (0.005)	-0.005 (0.005)	-0.015 (0.011)	-0.013** (0.004)	-0.008 (0.004)	-0.011 (0.007)	-0.014** (0.005)	-0.001 (0.005)	-0.011 (0.010)
Employer	-0.005 (0.016)	0.010 (0.016)	0.033 (0.032)	-0.007 (0.005)	-0.001 (0.006)	-0.003 (0.013)	0.004 (0.015)	0.014 (0.015)	0.040 (0.029)
Army	0.002 (0.005)	0.010 (0.006)	-0.026** (0.010)	0.005** (0.002)	0.006*** (0.002)	-0.014*** (0.003)	0.001 (0.005)	0.006 (0.006)	-0.014 (0.010)
Family Auxiliary Worker	-	-	-	-0.013 (0.013)	0.002 (0.011)	-0.012 (0.028)	-	-	-

Notes: See Table 6. Year fixed effects are included in all specifications, and state fixed-effects are included for those other than for Roraima. Robust standard errors are in parenthesis. Superscripts *, ** and *** represent significance at 10%, 5% and 1% respectively.

Table A4: Desegregated Effect of Venezuelan Migration on Brazilian Labor Market Outcomes by Sector of Economy

	Brazil (1)	North (2)	Roraima (3)
<i>Dependent Variable: Formal Job = 1</i>			
<i>Immigrants</i>	0.000** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)
Individuals	1,703,822	178,625	18,551
Adjusted-R ²	1.000	1.000	1.000
<i>Dependent Variable: Working for Money = 1</i>			
<i>Immigrants</i>	-0.001 (0.001)	-0.002* (0.001)	-0.003 (0.002)
Individuals	1,703,822	178,625	18,551
Adjusted-R ²	0.496	0.608	0.483
<i>Dependent Variable: Out of Work Force = 1</i>			
<i>Immigrants</i>	0.006*** (0.001)	0.002 (0.001)	-0.001 (0.002)
Individuals	3,140,628	324,739	32,556
Adjusted-R ²	0.264	0.244	0.253
<i>Dependent variable: Not Occupied = 1</i>			
<i>Immigrants</i>	-0.000 (0.001)	0.001* (0.001)	0.005*** (0.002)
Individuals	3,140,628	324,739	32,556
Adjusted-R ²	0.061	0.066	0.064

Notes: Different linear models are ran for the three different regions. The set of control variables in the last two panels include age, number of jobs, number of people living in the household and indicators for gender, ethnicity, level of education, situation of household (urban/rural), situation of individual within the household and currently attending school. Indicators for type of occupation and activity in the main job, level of worked hours weekly normally in the main job, formal main job, social security contribution in the main job are added in the control set for the three first panels. An indicator for N/As in each dependent variable is also included. In column (2), the state of Amazonas is dropped given concerns with sample selection. Year fixed effects are included in all specifications, and state fixed-effects are included for those other than for Roraima. Robust standard errors are in parenthesis. Superscripts *, ** and *** represent significance at 10%, 5% and 1% respectively.

Table A5: The Effect of Venezuelan Migration on Job Conditions