

The Labor Market of Immigrants and  
Non-Immigrants Evidence from the  
Venezuelan Refugee Crisis

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**El mercado laboral de los inmigrantes y no inmigrantes. Evidencia de la crisis venezolana de refugiados.**

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**Resumen.**

Debido al colapso económico de Venezuela millones de personas han abandonado el país. Este artículo evalúa el impacto de este fenómeno sobre los indicadores del mercado laboral de los inmigrantes y no inmigrantes en Colombia, el mayor receptor de refugiados desde Venezuela. Abordamos los potenciales problemas de endogeneidad utilizando un enfoque que variables instrumentales, que aprovecha la variación regional de inmigrantes y el periodo e intensidad de la crisis económica de Venezuela. Los resultados sugieren que el flujo migratorio incrementa el desempleo entre los inmigrantes, pero no tiene efectos significativos sobre los no inmigrantes, en parte porque la inmigración reduce significativamente la participación laboral, compensando el efecto negativo sobre el empleo. Las pérdidas de empleo entre los no inmigrantes se deben, principalmente, a los trabajadores por cuenta propia y, en general, son más pronunciadas para las mujeres, los jóvenes y los individuos con baja calificación laboral. El efecto sobre los inmigrantes es impulsado, en gran medida, por los inmigrantes no retornados, el impacto en los retornados, por el contrario, es pequeño en magnitud y significancia. También encontramos un efecto negativo sobre los inmigrantes internos y cambios en los flujos migratorios internos de Colombia.

**Palabras claves.**

Migración internacional, mercados laborales, capital humano, Colombia.

**JEL.**

F22, R23, J0

# The Labor Market of Immigrants and Non-Immigrants

## Evidence from the Venezuelan Refugee Crisis

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### Abstract

Following Venezuela's economic collapse, millions have fled the country. This paper assesses the impact of this phenomenon on the labor market outcomes of immigrants and non-immigrants in Colombia, the major recipient of refugees. We address potential endogeneity problems using an instrumental variable approach that exploits the regional variation of migrant networks and the timing and intensity of the Venezuelan economic crisis. Migration flows increase unemployment among immigrants, but have no significant effect on non-immigrants, partly because immigration significantly reduces labor participation, offsetting the negative impact on employment. Employment losses among non-immigrants are mostly driven by self-employed workers and are consistently larger for female, young, and low-skill individuals. The effect on immigrants is mostly driven by foreign immigrants, as the impact on returnees is smaller in magnitude and significance. We also find sizeable negative effects on internal migrants' labor outcomes and changes in internal migration flows.

**Keywords:** International migration, labor markets, human capital, Colombia.

**JEL:** F22, R23, J0.

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## 1. Introduction

The number of international migrants reached 272 million in 2019, equivalent to 3.5% of the world's population (UN 2019). Among them, 25.9 million are refugees, and 3.5 million seek asylum (UNHCR, 2019a). One of the main concerns of the host countries is the impact that migrants and refugees might have on local labor markets. Most of the existing evidence, based on the US and Europe, suggests that international migration has small aggregate effects on employment and wages. However, some groups that compete directly with immigrants such as low-skill natives or previous migrants, are more affected than others in terms of employability and wages.<sup>5</sup>

Evidence on the effect of international migrations on developing countries is scarce. The refugee wave from Syria to Turkey is one of the most studied cases. Del Carpio et al. (2015), Tumen (2016), and Ceritoglu et al. (2017) find that migration has significant adverse effects on natives' informal employment and labor participation, and some positive, although smaller effects on formal employment. This difference in the effects of migration is partially explained by the fact that refugees were not allowed to work, which effectively excluded them from the formal labor market. Maystadt and Verwimp (2014) also find a heterogeneous response in the case of Burundi and Rwanda refugee camps in Tanzania. While immigration affects employment in agriculture, it has a positive effect on skilled jobs in non-agricultural sectors. Similarly, Carusso et al. (2019) find that Venezuelan immigration has had a negative effect on informal natives' wages and labor participation in Colombia.

This paper provides new evidence on the impact of Venezuelan refugees and migrants on the labor market outcomes of immigrants and non-immigrants. Venezuela's economic collapse led to a massive refugee and migration crisis, unparalleled in Latin America's history and comparable in magnitude to that of Afghanistan and Syria. Since 2015, approximately 4

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<sup>5</sup> There are multiple literature reviews and meta-analysis on the labor market effects of migration, most of which are based on high-income host countries (Friedberg and Hunt, 1995; Borjas, 1999; Gaston and Douglas, 2000; Longhi et al., 2005; Dustman, Glitz and Frattini, 2008; Kerr and Kerr, 2011; Blau and Mackie, 2016; and Clemens and Hunt, 2019). Papers finding no significant average effects include Mühleisen and Zimmermann (1994), Pischke and Velling (1997), Friedberg (2001), Angrist and Kugler (2003), Dustman, Fabbri and Preston (2005), Carrasco, Jimeno and Ortega (2008). Even in studies with negative and significant estimates on natives' employment or wages, such as Altonji and Card (1991), Card (2001), Glitz (2012), Ottaviano and Peri (2012), and Borjas (2003), the effects are economically small and mostly driven by competing workers.

million people have fled the country. We focus on the labor market of Colombia given that the country is the largest recipient of refugees and migrants from Venezuela, with approximately 1.2 million in December 2018 (DANE 2019). One key aspect of this case study is that the migrants are culturally close to the Colombian natives; Venezuela and Colombia share a common history and speak the same language. More so, approximately 28% of migrants are return migrants, i.e., Colombian-born citizens who migrated during the 80s and 90s to Venezuela attracted by the oil boom.<sup>6</sup> There are also meaningful differences in the migration policy of the host country. Colombia has kept an open-door policy and has granted work permits to all applying immigrants.

The migration wave from Venezuela coincided with an increase in unemployment in Colombia. We begin our analysis with a shift-share decomposition of the unemployment rate between immigrants and non-immigrants. An increase of non-immigrant unemployment explains approximately 80% of the expansion of unemployment between 2015 and 2018. The remaining 20% is mostly driven by the composition effect, reflecting the fact that immigrants have a considerably larger unemployment rate, and their share in the labor force is growing fast.

We estimate the causal effect of immigration on labor market outcomes of immigrants and non-immigrants using a Bartik-type instrumental variable approach that exploits the regional variation of migrant networks and the timing and intensity of the Venezuelan economic crisis. Our benchmark model instruments city-level migration with the interaction between the share of Venezuelans living in each city in 2005 and the contemporary and one-quarter lag of the Venezuelan CPI. Our models also include city and time fixed effects accounting for region time-invariant characteristics and common shocks. We argue that the instrument only affects local labor market through migration. In fact, migration networks were formed long before the crisis and there are no reasons to believe that the Colombia labor market has any effect on the Venezuelan economy. We also test the common trends assumption, finding that migrant networks have no persistent effects on local labor markets.

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<sup>6</sup> In contrast with previous literature, return migrants from Venezuela are less educated than the average non-immigrants and are more likely to participate in the labor market and work as self-employed (Ilahi, 1999; Dustmann and Kirchkamp, 2002; Piracha and Vadean, 2010).

While immigration has no significant effect on total and non-immigrant unemployment, we find a statistically significant and economically large effect on immigrants' unemployment. These results are driven by foreign immigrants, as the coefficient for return migrants is not statistically significant. These findings are robust to alternative specifications of the model and additional instruments including the share of Colombians from each municipality living in Venezuela in 2005, and the share of Venezuelan citizens living in each city in previous population censuses. We also control for potential alternative mechanisms through which the Venezuelan crisis could affect the Colombian labor market such as trade and local growth, finding similar results. As additional robustness checks, we estimate city-level regressions with unemployment and natural unemployment rates, and use imperfect instrument models *à la* Nevo and Rosen (2012), finding similar results.

We explore the effect of immigration on labor supply and demand. For non-immigrants, we find adverse and significant effects on labor participation and employment, particularly in the self-employment segment. The similar magnitude of these offsetting effects explains why we find no-results on non-immigrants' unemployment. Consistent with the results on employment, immigration also reduces self-employment wages. This previous evidence suggests that the discouragement effects are driven both by smaller probabilities of employment and lower expected wages in this segment. We also find negative and significant effects on immigrants' participation and employment rates. These effects are consistently smaller in magnitude and significance for return migrants.

We then assess the heterogeneous effects of immigration by gender, age, and educational levels. Overall, we find that non-migrant female, young, and low-skilled individuals are more vulnerable to this phenomenon. The effects on unemployment are positive and statistically significant for females and young adults, reflecting employment losses that are not offset by cuts in participation. Moreover, the effects on labor participation and employment are considerably larger for low-skill workers. In the case of immigrants, the effects on unemployment are more substantial for high-skill workers, reflecting larger reductions in employment and no changes in participation.

In our last set of results, we assess the impact of international migration on internal migrants. Colombia is one of the countries with more forcibly displaced population in the world, with

over 7 million in the last 30 years. We find relatively large effects, reflecting that international and internal immigrants are competing in the low-skill self-employment segment. International migration affects the internal migration flows. Our results indicate that international migration does deter internal migration, reducing the pressure on local labor markets.

This paper's contribution to the literature on international migration and local labor markets is threefold. First, we provide new evidence on the impact of migration on developing host countries. While there are no detectable effects on unemployment, migration does reduce the participation and employment of natives, particularly in the self-employment segment. This evidence is consistent with the fact that, even when immigrants have working permits, most of them work in self-employment segments, competing with low-skill natives.

Second, we assess the impact of immigration on both international and internal migrants. Our case study is particularly interesting given that, unlike most previous studies, immigrants are culturally close to natives, and a fraction of them are returned migrants. Moreover, Colombia has one of the largest internally displaced populations in the world, and this group is also competing with international migrants in the low-skill, self-employment segment. Our results show that foreign immigrants and internal immigrants are more affected than non-immigrants in almost every labor market outcome. The impact on returnees is smaller in magnitude and significance. These results are in line with previous evidence indicating that cultural proximity and networks play a vital role during the assimilation process (Bauer, Lofstrom and Klaus, 2000).

Third, we estimate the effect of international migration on internal migration flows. Our results are in line with Borjas (2006); those cities with more international migrations are receiving fewer internal migrants. Therefore we could expect more pressure on local labor markets in the absence of this adjustment mechanism.

The rest of the paper is organized as follows. The following section briefly describes the Venezuelan economic crisis, the migration crisis, and the Colombian labor market. Section 3 presents the data and the empirical strategy. Section 4 presents the results, and the last section concludes.

## **2. The Venezuelan Crisis and Unemployment in Colombia**

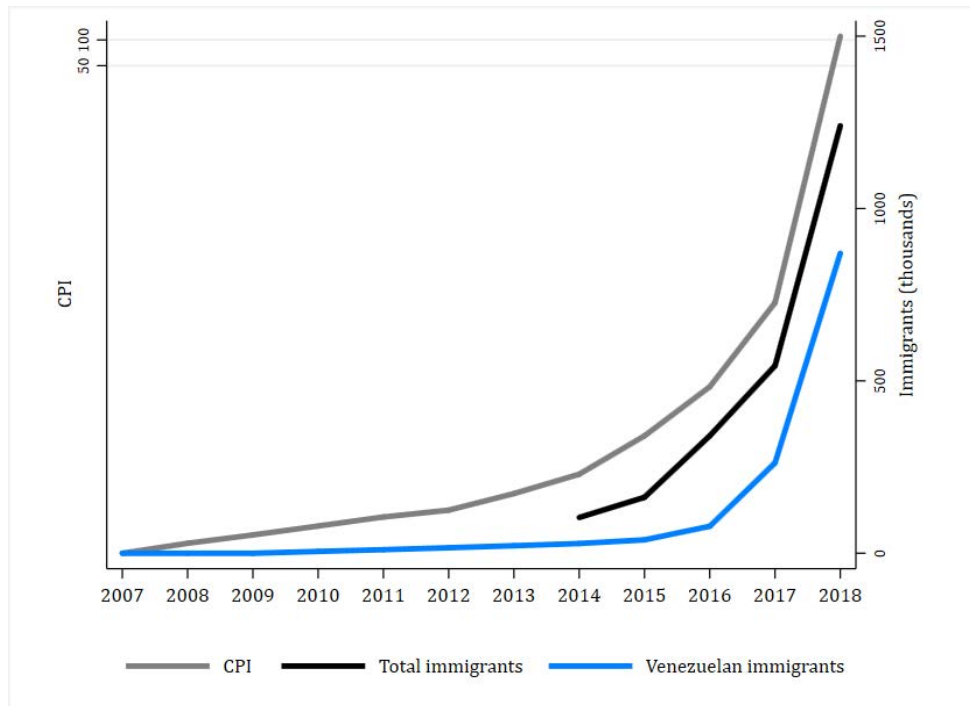
Venezuela has the largest proven oil reserves in the world (OPEC 2018), and the country's economy has historically depended on the exploitation of this commodity, even more since the socialist party rose to power in 1999 introducing numerous reforms that undermined property rights and private investment. This situation has resulted in a particularly high vulnerability to swings in international commodity prices (Rodríguez, 2015; Moreno-Brid and Garry, 2017).

Following a sharp decrease in oil prices from USD 100 /barrel in 2014 to USD 47 /barrel in 2016, government income and imports plummeted, leading to massive shortages and to an inflationary spiral. According to official statistics, inflation has surpassed 100% since 2015, and reached 130,000% in 2018, making it one of the worst episodes of hyperinflation in recent history (Figure 1). The economic consequences are dramatic. The IMF estimates suggest that the real GDP contracted by 95% since 2014 (IMF 2019). The country also finds itself embroiled in a deep political crisis in which several institutions no longer recognize each other. This crisis has led to a climate of instability, social mistrust, and loss of government legitimacy (Gamboa, 2017; González, 2019).

Given this economic and political crisis, over 4.5 million people have fled the country since 2014 (UNHCR 2019a). The largest recipient of refugees and immigrants is Colombia. According to official statistics, the country received approximately 1.2 million immigrants between 2014 and 2018, of which 28% are Colombian-born citizens who returned from Venezuela (Figure 1). This situation is not surprising; the two countries have a 1,378-mile border and share a common history and language. Moreover, during the 80s and 90s, thousands of Colombians migrated to Venezuela, most of them attracted by the oil boom. Unlike other countries facing a similar migration pressure, Colombia has decided to keep an open border policy. The government has implemented a comprehensive regularization program that provides temporary visas to nearly all immigrants who apply, thus allowing them to work and access healthcare and education benefits (Migración Colombia 2019). More recently, the government also granted citizenship to all children with Venezuelan parents who are born in Colombia (UNHCR 2019b).



**Figure 1: Inflation in Venezuela and Migration to Colombia**

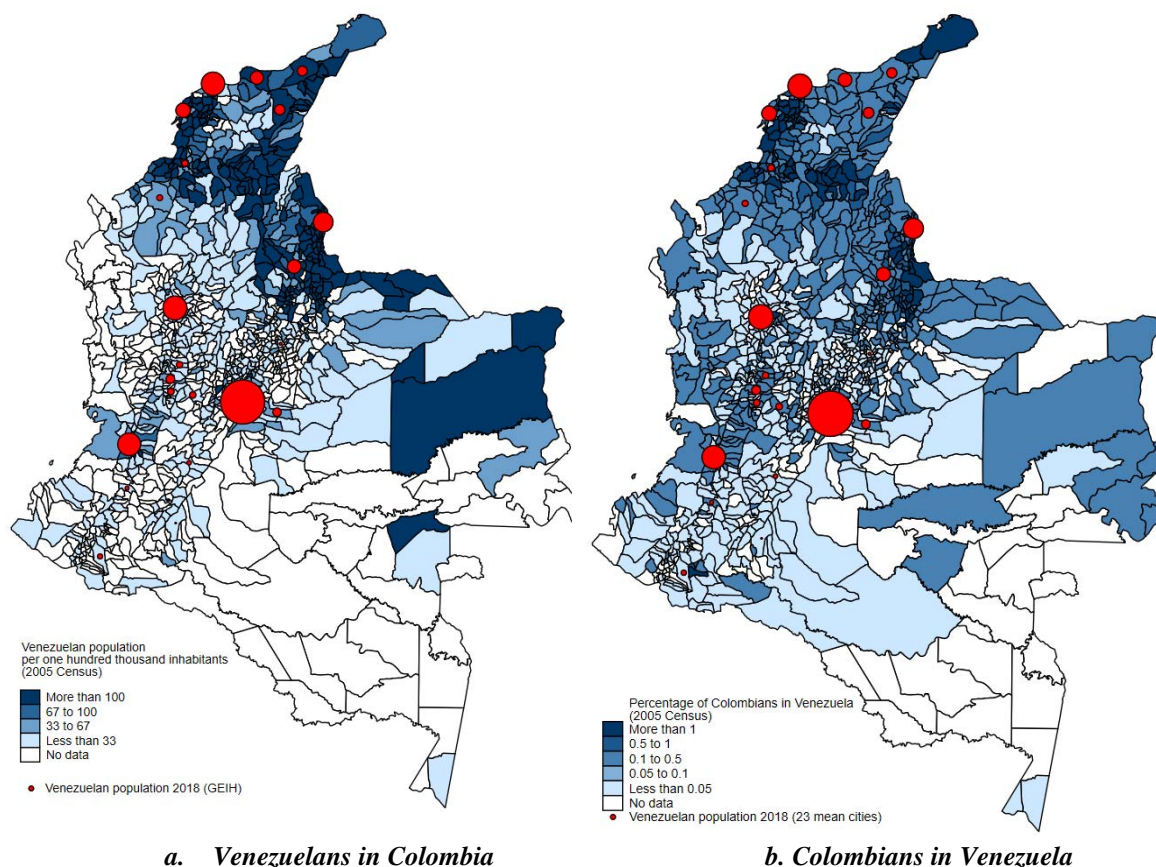


Note: The Venezuelan CPI (left axis) is expressed in millions and represented with a logarithmic scale. We estimate the number of migrants using self-reported information from GEIH. Venezuelan immigrants are estimated based on official records of migration flows from the Colombian Migration Office.

Source: Calculations by the authors based on data from the Central Bank of Venezuela, DANE, and Migración Colombia (the Colombian Migration Office).

Migration patterns tend to reflect two types of networks existing before the crisis: Venezuelans in Colombia and Colombians in Venezuela. The location of recent immigrants, mapped at the city level, is highly correlated with both of these measures. Immigrants accounted for a larger share of the population in the Caribbean Coast, border cities, and Bogotá, Medellín, and Cali, which are the three largest cities in Colombia (Figure 2).

**Figure 2. Migrant Networks and Post-Crisis Immigration Flow**



Note: Based on the 2005 population census, municipal migrant networks, are represented in blue: Venezuelans in Colombia (Panel A) and Colombians in Venezuela (Panel B). The diameter of the red dots represents the cumulative immigration from Venezuela in each city, based on the December 2018 GEIH.

Source: Calculations by the authors based on data from DANE.

The migration wave from Venezuela coincided with an increase in unemployment in Colombia. Between December 2015 and 2018, the urban unemployment rate raised from 9.8% to 10.9% (Figure 3).<sup>7</sup> In order to understand the relationship between these two phenomena, we decomposed the unemployment rate growth ( $u$ ) between immigrants and non-immigrants with a simple shift-share analysis. At any given period  $t$ , the total unemployment rate is the weighted average of non-immigrant and immigrant

<sup>7</sup> At the national level, unemployment rose from 8.9 % to 9.7 % in the same period.

unemployment:  $u_t = (1 - p_t)u_t^N + p_t u_t^I$ , where  $p_t$  is the share of immigrants in the labor force in  $t$ . Unemployment growth can be expressed as the sum of three factors<sup>8</sup>:

$$\Delta u_t = (1 - \bar{p}) \cdot \Delta u_t^N + \bar{p} \cdot \Delta u_t^I + (\bar{u}^I - \bar{u}^N) \cdot \Delta p_t \quad (1)$$

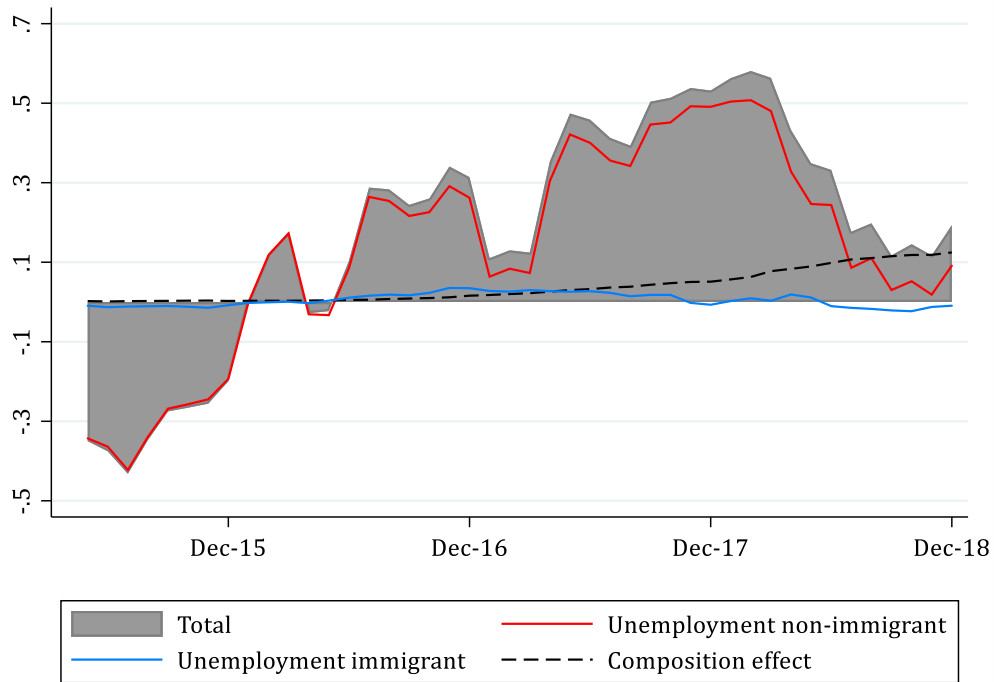
The first two terms on the right-hand side represent the contribution of the non-immigrant and immigrant unemployment rate growth, respectively. The third term is the composition effect, reflecting the change in the relative weight of each group. Given that immigrants have a higher unemployment rate, we should expect a mechanical increase in total unemployment driven by the relative expansion of this group.

The results are exhibited in Figure 3. Unemployment growth is mostly driven by changes in non-immigrant unemployment, accounting for approximately 80% of the total annual change between December 2015 and 2018. The contribution of the composition effect remains small, with only 16% of the 2015-2018 unemployment growth. However, its relative weight is growing fast. Since 2018, the contribution of the composition effect surpasses that of non-immigrant unemployment, reflecting the exponential growth of immigrants in the labor force during this period. In contrast, the contribution of immigrants' unemployment remains small and is even negative in 2018, reflecting small reductions in the unemployment rate of immigrants. Results are similar when we include smaller cities and rural areas (Appendix Figure A1). In the following sections, we estimate how much of the observed change in group-specific and total unemployment growth is actually due to immigration.

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<sup>8</sup> For simplicity, we assume that the relationship between the participation rate of immigrants and non-immigrants is constant over time.

**Figure 3. Shift-Share Decomposition of the Urban Unemployment Rate**



Notes: The grey area represents the annual change of the annual moving average of urban unemployment. The red and the blue lines account for the contribution of changes in non-immigrant unemployment, respectively. The dotted line represents the composition effect contribution.

Source: Calculations by the authors based on data from DANE.

### 3. Data and Empirical Strategy

#### 3.1. Data

Our main analysis is based on data from the Colombian Household Survey (GEIH) collected by the *Departamento Administrativo Nacional de Estadística*, DANE (National Department of Statistics). The survey is collected on a monthly basis and is representative nationwide and for the 23 main cities, which account for 51% of the population and 59.7% of the reported migrants.<sup>9</sup> The GEIH is the official source for the unemployment calculation in Colombia, and includes a comprehensive survey on the labor market. The Survey also includes

<sup>9</sup> Cities include contiguous municipalities that are part of the local labor market.

migration questions since April 2013. In order to consider return migrants, we classify all individuals who lived in Venezuela 5 years before the survey as immigrants, independently of their nationality. We restrict the sample to the working-age population (over age 12 in urban areas).

We measure migrant networks using the 2005 Colombian population Census, which includes questions on nationality and family members abroad. We calculate the share of Venezuelans living in each municipality in Colombia and the share of Colombians from each municipality living in Venezuela. In order to measure the intensity of the Venezuelan crisis, we collect information on the Venezuelan CPI from the Central Bank of Venezuela. Given the political crisis, we could expect serious problems with the measurement of the CPI. However, independent sources such as Cavallo and Rigobon (2016) confirm that Venezuela's official inflation statistics are reliable, in general. The correlation between official and unofficial inflation rates is relatively high during the period of study (Appendix Figure A2).

For some of our robustness checks, we also collect information on the share of Venezuelans in previous population censuses from IPUMS; on bilateral trade between Colombia and Venezuela from the United Nations International Trade Statistics Database (Comtrade); on the exchange rate (Venezuelan bolivar to US dollar) from the specialized website [dollartoday.com](http://dollartoday.com); and state-level GDP in Colombia from DANE.

Table 1 presents some basic statistics of the demographics and labor market outcomes of working-age non-immigrants and immigrants as observed in the 2018 GEIH urban sample. Immigrants are more likely to be male, younger, and more educated. Despite this, their unemployment rate is 5.5 pp above non-immigrants. This is the result of a particularly high participation rate (79.6%) that is not fully offset by employment (67.1%). Immigrants are also more likely to register as self-employed (34%).

**Table 1. Demographics and Labor Outcomes by Immigration Status (2018)**

	Non-immigrant			Immigrant					
	Mean	Sd	Obs	Return migrant (Colombian born)			Foreign migrant		
				Mean	Sd	Obs	Mean	Sd	Obs
Male	0.47	0.499	490,410	0.49	0.500	4,192	0.51	0.500	9,937
Age	39.61	18.482	490,410	39.95	15.938	4,192	28.89	10.588	9,937
Educational attainment (years)	10.02	4.477	490,410	8.52	3.955	4,191	10.75	3.621	9,930
Unemployment	0.11	0.309	304,668	0.16	0.365	3,128	0.16	0.364	7,610
Participation	0.65	0.476	490,410	0.77	0.420	4,192	0.80	0.396	9,937
Employment	0.58	0.493	490,410	0.65	0.477	4,192	0.68	0.467	9,937
Employee	0.33	0.471	490,410	0.29	0.454	4,192	0.35	0.476	9,937
Self-employed	0.24	0.428	490,410	0.346	0.476	4,192	0.32	0.465	9,937

Notes: All measures except unemployment are based on all working-age respondents of the 2018 Colombian household surveys (GEIH). The unemployment measure excludes individuals who are not actively searching for a job. Source: Calculations by the authors based on data from DANE.

### 3.2. Empirical Strategy

The impact of migration flows on unemployment can be decomposed in terms of natives and immigrants, by taking the partial derivative of equation (1) with respect to  $m_{ct}$ :

$$\frac{\partial u_t}{\partial m_t} = (1 - \bar{p}) \cdot \frac{\partial u_t^N}{\partial m_t} + \bar{p} \cdot \frac{\partial u_t^I}{\partial m_t} + (\bar{u}^I - \bar{u}^N) \cdot \frac{\partial p_t}{\partial m_t} \quad (2)$$

Where the first two terms on the right-hand side are the marginal effect of immigration on native and immigrants' unemployment rates weighted by the share of immigrants in the active population. The third term accounts for the composition effect, which reflects the growing number of immigrants and the average gap in the unemployment rate between groups.

The baseline model presented in equation 3 regresses the probability of unemployment (or any other labor market outcome) of an individual  $i$  living in city  $c$  in period  $t$  ( $u_{ict}$ ) on the monthly city-level measure of immigration ( $m_{ct}$ ). Regressions control for individual characteristics ( $X_{ict}$ ) such as age, age squared, gender, and educational attainment in years; and includes city ( $\alpha_c$ ) and time fixed ( $\delta_t$ ) effects, accounting for region time-invariant characteristics and common shocks. Errors are clustered at the city level.

$$u_{ict} = \phi m_{ct} + \beta X_{ict} + \alpha_c + \delta_t + u_{ict} \quad (3)$$

The main empirical challenge in estimating the effect of migration on local labor markets is that both location and timing decisions of immigrants are potentially endogenous. For instance, it seems natural to assume that immigrants prefer more favorable labor markets within the host country. The timing of the migration could also be determined by the relative economic performance of both countries. The selection into migration can also vary depending on the context. High-skill workers may choose to migrate earlier and be more attracted to large cities, where they are more likely to find higher-paying jobs. In addition to this, there are reasons to believe that household surveys measure migrations imperfectly. In fact, given the design of the survey, we are probably not observing immigrants who are living in camps.

We address the potential endogeneity and measurement error problems using a Bartik-type instrumental variable approach, which interacts the regional distribution of migrant networks in 2005 and the timing of the Venezuelan economic crisis.<sup>10</sup> Our main measure of migrant networks is the share of the native Venezuelan population registered in the 2005 Population Census, long before the crisis began. In our robustness analysis, we also use alternative measures based on the number of Colombians living in Venezuela in 2005 and the share of Venezuelans in Colombia in previous population censuses. The temporal variation of the Venezuelan economic crisis is measured with the consumer price index (CPI), which reflects both the country's loss of purchasing power and its economic instability. Given that migration decisions take time, we include a one-quarter lag of the instrument in our main specification. As robustness checks, we use different transformations and lag structures of Venezuela's CPI, as well as other variables reflecting the Venezuelan crisis such as the exchange rate and imports from Colombia.

Our identification strategy requires instruments to predict migration flows accurately. The first-stage regressions of our main specification confirm that this is the case (Appendix Table A1). The Kleibergen-Paap weak instrument test oscillates between 49.88 and 174.9,

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<sup>10</sup> Several papers have used this empirical strategy to assess the impact of trade. See, for instance, Card (2001); Autor, Dorn and Hanson (2013) and Kovak (2013).

depending on the specifications of the model. Moreover, in all specifications with multiple instruments, the Sargan-Hansen over-identification tests fail to reject the null, indicating that the instruments are suitable.

The exclusion restriction requires that the instruments only affect local labor markets through migrations. We argue that this is the case in our study. First, migrant networks were formed long before the crisis. Over 60% of Venezuelans living in Colombia in 2005 had been in the country for more than five years, and the location decisions are relatively stable over time. We illustrate this point by comparing the 2005 Population Census with previous censuses. As can be seen in the Appendix Figure A3, the share of Venezuelans in each municipality is highly persistent over time. Something similar happens with return migrants, most of whom migrated to Venezuela during the 80s and 90s (Crist, 1984; Gómez, 2008). Moreover, our estimated effects are similar when we use migration measures from previous censuses (Appendix Table A5).

Second, the time fixed-effects account for common shocks, notably oil prices. Moreover, there are no reasons to believe that the Colombian labor market has any effect on the Venezuelan economy. As described in Section 2, the crisis was rooted in Venezuela's endemic political and economic problems, and there are no reasons to believe that the Colombian labor market could have interfered. An alternative channel through which the Venezuelan crisis could affect the Colombian economy is trade. We control for state-level imports and exports and state GDP in Appendix Table A8, finding similar results.

Third, our measures of migrant networks reflect historical migrations that could have persistent effects on host labor markets (Jaeger, Ruist and Stuhler, 2018; Goldsmith-Pinkham, Sorkin and Swift, 2018). This would imply that the common trends assumption is violated. We test for this potential problem by using an event study design in which we regress migration flows on the interaction between the share of Venezuelans in Colombia in 2005 and quarterly dummies from the third quarter of 2013 onwards. As can be seen in the Appendix Figure A4, the effect of migrant networks is only statistically significant after June 2016, when the crisis began.



## **4. Results**

### **4.1. Unemployment**

The estimated effects of immigration from Venezuela on unemployment are presented in Table 2. In panels A and B, we present the OLS and 2SLS estimates, respectively. The first column presents estimated results for the full sample, which includes both immigrants and non-immigrants. In the case of the full sample, the estimated coefficients of the immigration rate are, in general, small and statistically insignificant, indicating that immigration has no impact on global unemployment. It is important to note that these estimates account for all possible mechanisms through which immigration can affect unemployment, including the composition effect described in Section 2.

In the second and third columns of table 2, we present results for non-immigrants and total immigrants, which include return immigrants (Colombian born) and foreign immigrants. The 2SLS estimates are positive for both groups; however, they are only statistically significant for total immigrants. Consistent with the estimated effects on the full sample, the coefficient is particularly small for non-immigrants (0.06 pp). In contrast, we find a significant and economically sizeable effect of immigration from Venezuela on immigrants' unemployment. A one-percentage point (pp) increase in the share of immigrants increases their own probability of unemployment by 1.15 pp. In columns four and five, we split the immigrants' sample between return and foreign immigrants. Our evidence suggests that this is the case, as the effect of immigration on returned immigrants' unemployment is null. The effect of immigration on foreign immigrants is sizeable and statistically significant: a one-percent increase in the share of immigrants increases this population's probability of unemployment by 2 pp. These results suggest that the labor market assimilation of return immigrants is faster and easier than that of foreigners.

**Table 2. Effect of Immigration on Unemployment**

	Total	Non-immigrant	Immigrant		
			Total	Return	Foreign
<b>A. OLS</b>					
Share of immigrants	0.0017 (0.0012)	0.0015 (0.0011)	-0.0007 (0.0028)	-0.0024 (0.0022)	0.0017 (0.0052)
Observations	1,819,427	1,797,683	21,744	10,245	11,499
<b>B. 2SLS</b>					
Share of immigrants	0.0012 (0.001)	0.0006 (0.0010)	0.0115*** (0.0028)	0.0077 (0.0098)	0.0202*** (0.0054)
Kleibergen-Paap F	48.89	46.48	169.1	138.7	144.6
Sargan-Hansen test	0.0145 (0.904)	0.0783 (0.780)	1.2180 (0.270)	1.3920 (0.238)	0.6350 (0.426)
Observations	1,738,107	1,716,586	21,521	10,058	11,463

Notes: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. Regressions include all working-age individuals who are working or actively searching for a job (unemployed). The endogenous regressor is the share of immigrants from Venezuela in the working-age population of each city in each month. The main instrument is the interaction between the share of Venezuelans in each Colombian city in 2005 and Venezuela's monthly consumer price index. Our main specification includes a one-quarter lag of the instrument as well. Standard errors are presented in parentheses and clustered at city level.

These findings are robust to several alternative specifications of the model. In the Appendix Table A2, we use two different lag structures of the instruments, including only the contemporary month and replacing the 1-quarter lag with the average of the last three months. While the first stage is less accurate, the 2SLS results are very close in magnitude and significance. In the Appendix Table A3, we estimate the baseline model with and without the city and time fixed effects. Results indicate that failing to control for both of these fixed effects could lead to overestimating the effect of immigration on unemployment.

We then combine our main migrant networks metric, the share of Venezuelans in Colombia in 2005, with the share of Colombians in Venezuela in the same year (Appendix Table A4) and the share of Venezuelans in previous population censuses (Appendix Table A5). Results are similar in magnitude and significance. In the Appendix Table A6, we use two alternative measures of the Venezuelan crisis: imports from Venezuela and the bolivar to USD exchange rate. While estimates are comparable, they are no longer statistically significant. In the

Appendix Table A7, we compute the monthly unemployment rate in each city for both immigrants and non-immigrants, and estimate a panel with a fixed-effects model at the city level. Results are once again similar in magnitude to the main specification.

One of the main threats to identification is that our instrument affects the Colombian labor market through alternative channels. We test for the potential role of trade in the Appendix Table A8 by controlling for bilateral trade with Venezuela measured at the state level in Colombia. Specifically, we include the sum of imports and exports as exogenous variable, finding almost identical results. Given that some of the trade between the two countries may be unreported, we also include the Colombian departments GDP. Once again, results are unchanged. In our last robustness check, we relax the exclusion restriction and estimate an imperfect instrument model following Nevo and Rosen (2012). This provides the bounds of the effect of immigration on total unemployment, assuming that the instrument is not completely orthogonal to the error term<sup>11</sup>; In general, we found that our results are the same even if there is a correlation of this type (Table A9).

Overall, our results consistently show that immigration from Venezuela does not affect the probability of unemployment for non-immigrants. There is a positive and economically large effect on immigrant unemployment, mostly explained by foreign immigrants. Seemingly, the increase in immigrant unemployment and the composition effect remain too small to reflect increases in total unemployment. In light of the above, we wonder if immigration has had any impact on the structural component of unemployment. For this purpose, we follow Shimer (2012) in order to compute the structural unemployment rate (SUR) for each city in

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<sup>11</sup> Nevo and Rosen (2012)'s model is based on two main assumptions. i) The correlation of instrument ( $z$ ) with the structural error ( $\varepsilon$ ) is of the same sign as the correlation of the endogenous variable ( $x$ ) with the error term. ii) The instrumental variable is less endogenous than the endogenous variable, which is a weaker assumption than the regular exogeneity of the traditional instrumental variable approach. Formally, assumptions can be summarized as  $\rho_{z\varepsilon}\rho_{x\varepsilon} > 0$  and  $|\rho_{x\varepsilon}| \geq |\rho_{z\varepsilon}|$ , thus, it is possible to define a new instrumental variable  $V = \sigma_x z - \gamma \sigma_z x$ , where  $\gamma = \frac{\rho_{z\varepsilon}}{\rho_{x\varepsilon}}$ . Bounds are computed by variations on  $\gamma$ , in particular if  $\rho_{zx} > 0$ , as in our case, and assuming that  $\rho_{x\varepsilon} > 0$ , only an upper bound for the parameter can be estimated;  $\beta \leq \min\{\beta_v, \beta_z\}$ , where  $\beta$ ,  $\beta_v$  and  $\beta_z$  are the real parameter. The parameter obtained through the new instrumental variable  $V$ , and the parameter computed through the instrumental variable  $Z$ , respectively. Conversely, assuming  $\rho_{x\varepsilon} < 0$  we can obtain a lower bound;  $\beta \geq \max\{\beta_v, \beta_z\}$ . Nevertheless, if there are at least two instruments, positively correlated with the endogenous variable, it is possible to obtain two-side bounds from the imperfect instrumental variables estimation. We exploit our multiple instrumental variables in order to obtain this two-side bounds. Results can be interpreted as non-significant when the bounds overlap zero. See more details in Nevo and Rosen (2012).

the sample<sup>12</sup>. After that, we incorporate SUR into our methodological framework. Thus, we could obtain aggregate estimates, at a city level, of immigration effects on SUR. The results, shown in the Appendix Table A7, suggest that immigration does not affect the structural component of unemployment, which can lead to the total probability of being unemployed to remain unchanged, as has been shown.

## 4.2. Labor Supply and Demand

Our main results show that immigration from Venezuela has no significant effects on non-immigrant and total unemployment. In this section, we dig a little deeper into the supply and demand determinants of these results. In order to do this, we assess the effect of immigration on participation and employment rates. Recall that the unemployment rate of any subgroup  $k$  (in this case, non-immigrants and immigrants) can be expressed as the difference between the participation rate  $p_t^k$  and the employment rate  $e_t^k$ :

$$u_t^k = \frac{p_t^k - e_t^k}{p_t^k} \quad (6)$$

If we take the partial derivative of unemployment with respect to immigration, we obtain:

$$\frac{\partial u_t^k}{\partial i_t} = \frac{1}{p_t^k} * \frac{\partial e_t^k}{\partial i_t} - \frac{e_t^k}{(p_t^k)^2} \frac{\partial p_t^k}{\partial i_t}$$

Where  $\frac{\partial p_t^k}{\partial i_t}$  and  $\frac{\partial e_t^k}{\partial i_t}$  are the marginal effects of immigration on the group-specific participation and employment rates. We estimate these parameters in Table 3 following the 2SLS identification strategy used for unemployment. Our sample includes all working-age individuals; therefore, our results can be interpreted as the effect of immigration on the probability of participating in the labor market and working, respectively.

We present results for the full sample (non-immigrants, and immigrants) and we split the later sample between return and foreign immigrants. Our full-sample estimates indicate that

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<sup>12</sup> Following Shimer (2012), we calculate the job-finding rate ( $f$ ) and separation rate ( $s$ ) for every city in each period. In a later stage, we compute SUR, at a city level, as  $\frac{s_t}{s_t + f_t}$ . Other works, as Arango and Flórez (2018), estimated SUR for the Colombian labor market using this approach.

immigration reduces the probability of participation and employment by 0.30 pp and 0.32 pp, respectively (Panels A and B). The results for non-immigrants, presented in Columns 2, are similar in magnitude and significance. Thus, the null effects on non-immigrant unemployment are the result of a decrease in employment, which is offset by a decrease in labor participation.

In the case of immigrants, we find negative and significant effects on both the probability of participation and employment, with considerably larger coefficients than for non-immigrants (Columns 3, 4, and 5). A one-percent increase in the share of immigrants reduces the probabilities of participation and employment by 1.65 pp and 2.21 pp, respectively. The increase in unemployment is mostly driven by the fact that immigration has a more substantial impact on employment than on participation among foreign immigrants. In contrast, return migrants have a negative and significant effect on participation, but not on employment.

**Table 3. Effect of Immigration on Labor Participation and Employment**

	Total	Non-immigrant	Immigrant		
			Total	Return	Foreign
<b>A. Participation</b>					
Share of immigrants	-0.0030 (0.0018)	-0.0033* (0.0019)	-0.0165*** (0.0036)	-0.0173* (0.0095)	-0.0184* (0.0089)
Kleibergen-Paap F	53	49.79	175.1	117.6	156.2
Sargan-Hansen test	0.150 (0.699)	0.499 (0.480)	1.35 (0.245)	0.749 (0.387)	1.818 (0.178)
<b>B. Employment</b>					
Share of immigrants	-0.0032* (0.0018)	-0.0030* (0.0017)	-0.0221*** (0.0037)	-0.022 (0.0168)	-0.0277** (0.0107)
Kleibergen-Paap F	53	49.79	175.1	117.6	156.2
Sargan-Hansen test	0.142 (0.707)	0.688 (0.407)	0.0982 (0.754)	0.00978 (0.921)	0.513 (0.474)
Observations	2,745,192	2,716,414	28,778	13,592	15,186

Notes: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. Regressions include all working-age individuals. The endogenous regressor is the share of immigrants from Venezuela in the working-age population of each city in each month. The main instrument is the interaction between the share of Venezuelans in each Colombian city in 2005 and Venezuela's monthly consumer price index. Our main specification includes

a one-quarter lag of the instrument as well. Standard errors are presented in parentheses and clustered at city level.

Discouragement from participating in the labor market could be the result of a negative shock in the probability of finding a job. While our main results consistently show that overall unemployment is unaffected, immigration does reduce the employment rates of both immigrants and non-immigrants. Immigration could also affect expected wages, influencing participation decisions by this means. We explore this mechanism in the following section.

### **4.3. Job Quality and Wages**

We explore which type of jobs are more affected by immigration by splitting the sample between employees and self-employed workers in Table 4 (Panels A and B). Results suggest that the negative effect of migration on employment is entirely driven by self-employed workers, with considerably larger coefficients for migrants (-0.0162) than non-migrants (-0.0035). In general, employees were unaffected. Job losses also concentrated in small firms, while no significant effects were detected for large firms (Appendix, Table A10). This situation is consistent with the fact that immigrants are overrepresented in the self-employment and small-firm segments, and therefore this is where we found larger job displacement effects. The negative effect on self-employment is more substantial for immigrants—particularly foreign immigrants—with an estimated coefficient that is close to 3.6 pp. The effect on returned migrants is also negative and significant. However, the magnitude of this effect is close to the one for non-immigrants.

**Table 4. Effect of Immigration on Employment by Employee/Self-Employed**

	Total	Non-immigrant	Immigrant		
			Total	Return	Foreign
<b>A. Employee</b>					
Share of immigrants	-0.0007 (0.0009)	0.0003 (0.0009)	-0.0031 (0.0066)	-0.017 (0.0167)	0.0141 (0.0149)
Kleibergen-Paap F	53.43	49.79	175.1	117.6	156.2
Sargan-Hansen test	2.989 (0.0838)	3.013 (0.0826)	1.415 (0.234)	1.86 (0.173)	1.371 (0.242)
<b>B. Self-employed</b>					
Share of immigrants	-0.0026** (0.0012)	-0.0035** (0.0013)	-0.0162*** (0.0053)	-0.0043** (0.002)	-0.0367*** (0.0064)
Kleibergen-Paap F	53	49.79	175.1	117.6	156.2
Sargan-Hansen test	4.053 (0.0441)	3.392 (0.0655)	1.832 (0.176)	1.207 (0.272)	1.934 (0.164)
Observations	2,745,192	2,716,414	28,778	13,592	15,186

Notes: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. Regressions include all working-age individuals. The endogenous regressor is the share of immigrants from Venezuela in the working-age population of each city in each month. The main instrument is the interaction between the share of Venezuelans in each Colombian city in 2005 and Venezuela's monthly consumer price index. Our main specification includes a one-quarter lag of the instrument as well. Standard errors are presented in parentheses and clustered at city level.

Immigration also has negative and significant effects on wages, on the overall sample as well as in the self-employed segment. As can be seen in Table 5 (Panel A), the estimated effect on hourly wages is negative and significant for the full sample. The estimated coefficient is also negative, although statistically insignificant for non-immigrants. Interestingly, there is a positive and significant effect on immigrant wages. This may result from very low initial wages and increasing reallocation of immigrant workers. This positive effect of immigration on total labor income is especially sizeable for foreign immigrants.

Self-employed workers drive the negative effect of immigration on total wages. In this case, there are significant effects in the full sample and the total immigrants' sample. In contrast, the estimated coefficients for employees are statistically insignificant for the full sample (non-immigrants and immigrants). This evidence is consistent with the fact that the most extensive job displacement is observed in this segment. These results also indicate that the

discouragement effect on non-immigrants is driven both by lower employment opportunities and lower expected wages.

**Table 5. Effect of Immigration on Wages by Employee/Self-Employed**

	Total	Non-immigrant	Immigrant		
			Total	Return	Foreign
<b>A. Total</b>					
Share of immigrants	-0.0074** (0.0032)	-0.0049 (0.0034)	0.0379*** (0.011)	-0,005 (0.0077)	0.0934*** (0.0161)
Kleibergen-Paap F	54.27	56.39	106,6	83.27	105.3
Sargan-Hansen test	2.446 (0.118)	2.243 (0.134)	0.275 (0.6)	0.563 (0.453)	0.478 (0.489)
Observations	1,306,920	1,291,847	15,073	6,963	8,110
<b>B. Employee</b>					
Share of immigrants	-0.0052 (0.0053)	-0.0047 (0.0055)	0.0328 (0.0208)	-0.0104 (0.0088)	0.0574** (0.0274)
Kleibergen-Paap F	28.42	28.39	38.24	44.98	74.55
Sargan-Hansen test	0.159 (0.690)	0.0548 (0.815)	0.771 (0.38)	2.34 (0.126)	0.59 (0.442)
Observations	686,240	680,034	6,206	2,847	3,356
<b>C. Self-employed</b>					
Share of immigrants	-0.0061** (0.0024)	-0.0036 (0.0026)	0.0437** (0.0156)	-0.0057 (0.0158)	0.1045** (0.0456)
Kleibergen-Paap F	87.19	97.34	36.95	50.49	27.08
Sargan-Hansen test	1.759 (0.185)	1.404 (0.236)	1.247 (0.264)	0.959 (0.328)	0.0638 (0.801)
Observations	620,680	611,813	8,867	4,116	4,749

Notes: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. Regressions include employed individuals reporting labor income. The endogenous regressor is the share of immigrants from Venezuela in the working-age population of each city in each month. The main instrument is the interaction between the share of Venezuelans in each Colombian city in 2005 and Venezuela's monthly consumer price index. Our main specification includes a one-quarter lag of the instrument as well. Standard errors are presented in parentheses and clustered at city level.



#### **4.4. Heterogeneous Effects by Demographics and Education**

Our last set of results explores the heterogeneous effects of immigration on our primary labor outcomes by demographic characteristics and educational level. In Table 6, we estimate the heterogeneous effects by gender. In the full sample, the impact on unemployment is only statistically significant for females. This result reflects that, in the case of women, drops in the participation rate do not offset employment losses. In contrast, males are more likely to opt-out of the labor market, which is why the net effect on unemployment is smaller and statistically insignificant. While female job losses are mostly driven by employee work, we found a negative and significant effect on self-employment for males.

Focusing on non-immigrants, we find that coefficients are similar in magnitude to those of Tables 2 and 3. Estimates are statistically significant for labor participation among males, and negative effects in the self-employment rate for both women and men. In contrast, the estimated effects on immigrants are significant and economically substantial for all outcomes. In most cases, there are only significant effects for women regarding the positive effects on unemployment and the negative effects on salaried and self-employed rates. The negative and significant effect on female unemployment is explained by a large reduction in employment probability, particularly in the self-employed segment. While female immigrants are also less likely to participate in the labor market, this is not enough to offset the employment effect. Finally, the negative effect of immigration on wages in the total sample is significant for both women and men.

Table 7 presents the heterogeneous effects of immigration by age, separating individuals under and over 25 years. In the full and non-immigrant samples, immigration exclusively affects young adults, with adverse and significant effects on unemployment, reflecting a sizable reduction in employment that is not fully offset by the reductions in participation. Employment losses among the youth are concentrated in the self-employment segment. The evidence in regards to wages is similar. Young adults mostly drive the negative effect of immigration on wages for the total and non-immigrant samples. In the case of immigrants, we find significant negative effects on participation and positive effects on employment for both age groups. However, the impact on all outcomes is considerably larger for young adults.

**Table 6. Heterogeneous Effect of Immigration by Gender**

	Total		Non-immigrant		Immigrant		Return		Foreign	
	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
<b>A. Unemployment</b>										
Share of immigrants	0.0024** (0.0011)	0.0003 (0.0011)	0.0011 (0.0015)	0.0003 (0.0012)	0.0179** (0.0076)	0.0090 (0.0084)	0.0072 (0.0121)	0.0137 (0.0118)	0.0321** (0.0136)	0.0123 (0.0083)
Kleibergen-Paap F	51.52	46.89	45.33	47.56	206.4	108.4	90.76	276.7	126	68.21
Sargan-Hansen test	1.604 (0.205)	0.789 (0.374)	1.497 (0.221)	0.786 (0.375)	2.249 (0.134)	0.561 (0.454)	1.220 (0.269)	1.256 (0.262)	0.676 (0.411)	0.755 (0.385)
Observations	837,624	900,483	828,167	888,419	9,457	12,064	4,477	5,581	4,980	6,483
<b>B. Participation</b>										
Share of immigrants	-0.0023 (0.0017)	-0.0037* (0.0020)	-0.0026 (0.0018)	-0.0039* (0.0020)	-0.0142*** (0.0057)	-0.0185*** (0.0051)	-0.0089 (0.0097)	-0.0229*** (0.0074)	-0.0159 (0.0107)	-0.0200** (0.0085)
Kleibergen-Paap F	53.42	52.55	47.30	52.60	247.8	99.07	88.37	172.7	130.9	80.78
Sargan-Hansen test	0.291 (0.590)	0.116 (0.733)	0.448 (0.503)	0.0471 (0.828)	0.676 (0.411)	1.893 (0.169)	0.142 (0.706)	1.214 (0.270)	1.026 (0.311)	2.202 (0.138)
Observations	1,494,226	1,250,966	1,479,615	1,236,799	14,611	14,167	6,970	6,622	7,641	7,545
<b>C. Employment</b>										
Share of immigrants	-0.0030* (0.0016)	-0.0032 (0.0021)	-0.0025 (0.0015)	-0.0033 (0.0023)	-0.0217*** (0.0057)	-0.0241*** (0.0051)	-0.0140 (0.0165)	-0.0318** (0.0150)	-0.0280* (0.0160)	-0.0285*** (0.0050)
Kleibergen-Paap F	53.42	52.55	47.30	52.60	247.8	99.07	88.37	172.7	130.9	80.78
Sargan-Hansen test	1.22 (0.269)	1.47 (0.225)	0.743 (0.389)	1.426 (0.232)	0.0139 (0.906)	0.0683 (0.794)	1.850 (0.174)	1.196 (0.274)	0.813 (0.367)	0.363 (0.547)
Observations	1,494,226	1,250,966	1,479,615	1,236,799	14,611	14,167	6,970	6,622	7,641	7,545
<b>D. Employee</b>										
Share of immigrants	-0.0009* (0.0005)	-0.0005 (0.0017)	0.0002 (0.0005)	0.0006 (0.0019)	-0.0026* (0.0015)	-0.0049 (0.0106)	-0.0173 (0.0242)	-0.0171** (0.0066)	0.0115 (0.0138)	0.0156 (0.0160)
Kleibergen-Paap F	53.42	52.55	47.30	52.60	247.8	99.07	88.37	172.7	130.9	80.78
Sargan-Hansen test	2.219 (0.136)	2.816 (0.0934)	1.896 (0.169)	2.724 (0.0989)	1.500 (0.221)	1.468 (0.226)	1.561 (0.212)	1.733 (0.188)	1.174 (0.279)	1.344 (0.246)
Observations	1,494,226	1,250,966	1,479,615	1,236,799	14,611	14,167	6,970	6,622	7,641	7,545
<b>E. Self-employed</b>										
Share of immigrants	-0.0023 (0.0015)	-0.0028** (0.0012)	-0.0029* (0.0015)	-0.0041*** (0.0014)	-0.0158*** (0.0037)	-0.0165 (0.0116)	0.0020 (0.0082)	-0.0111 (0.0101)	-0.0317*** (0.0036)	-0.0414** (0.0147)
Kleibergen-Paap F	53.42	52.55	47.30	52.60	247.8	99.07	88.37	172.7	130.9	80.78
Sargan-Hansen test	2.651 (0.103)	4.367 (0.0366)	2.213 (0.137)	4.207 (0.0403)	1.394 (0.238)	2.155 (0.142)	0.0651 (0.799)	1.635 (0.201)	1.161 (0.281)	1.738 (0.187)
Observations	1,494,226	1,250,966	1,479,615	1,236,799	14,611	14,167	6,970	6,622	7,641	7,545
<b>F. Wages</b>										
Share of immigrants	-0.0056* (0.0032)	-0.0088** (0.0034)	-0.0014 (0.0030)	-0.0076* (0.0037)	0.0170* (0.0085)	0.0473** (0.0173)	-0.0151 (0.0107)	-0.0052 (0.0064)	0.0262** (0.0115)	0.1346*** (0.0342)
Kleibergen-Paap F	46.01	60.66	44.21	67.03	156.8	81.37	56.64	358.5	149.4	36.55
Sargan-Hansen test	0.736 (0.391)	2.056 (0.152)	0.163 (0.687)	1.920 (0.166)	0.00533 (0.942)	0.624 (0.430)	2.242 (0.134)	0.646 (0.422)	0.706 (0.401)	0.629 (0.428)
Observations	614,398	692,522	608,258	683,589	6,140	8,933	2,927	4,036	3,210	4,896

Notes: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. Regressions in panel A include all working-age individuals who are working or unemployed, i.e. actively searching for a job. In panels B to E, regressions include all working-age individuals. Regressions in panel F include all working individuals. The endogenous regressor is the share of immigrants from Venezuela in the working-age population of each city in each month. The main instrument is the interaction between the share of Venezuelans in each Colombian city in 2005 and Venezuela's monthly consumer price index. Our main specification includes a one-quarter lag of the instrument as well. Standard errors are presented in parentheses and clustered at city level.

**Table 7. Heterogeneous Effect of Immigration by Age**

	Total		Non-immigrant		Total		Immigrant		Foreign	
	<=25	>25	<=25	>25	<=25	>25	Return		<=25	>25
							<=25	>25	<=25	>25
<b>A. Unemployment</b>										
Share of immigrants	0.0044** (0.0017)	0.0004 (0.0010)	0.0046** (0.0020)	-0.0003 (0.0010)	0.0263*** (0.0092)	0.0069* (0.0036)	0.0126 (0.0160)	0.0057 (0.0103)	0.0359** (0.0129)	0.0117 (0.0102)
Kleibergen-Paap F	47.12	49.42	36.70	49.26	65.11	134	20.15	124.6	69.41	149.1
Sargan-Hansen test	2.241 (0.134)	1.756 (0.185)	1.425 (0.233)	1.014 (0.314)	0.769 (0.381)	2.042 (0.153)	0.722 (0.396)	1.440 (0.230)	1.807 (0.179)	1.877 (0.171)
Observations	357,203	1,380,904	351,392	1,365,194	5,811	15,710	1,615	8,443	4,196	7,267
<b>B. Participation</b>										
Share of immigrants	-0.0052** (0.0018)	-0.0025 (0.0018)	-0.0054*** (0.0018)	-0.0018 (0.0018)	-0.0332*** (0.0028)	-0.0110*** (0.0016)	-0.0249*** (0.0081)	-0.0105 (0.0094)	-0.0342*** (0.0033)	-0.0182*** (0.0059)
Kleibergen-Paap F	51.87	53.15	44.40	52.17	81.43	141.6	106.9	93.84	72.73	156.4
Sargan-Hansen test	1.163 (0.281)	0.143 (0.705)	1.251 (0.263)	0.551 (0.458)	1.773 (0.183)	0.0192 (0.890)	1.428 (0.232)	0.106 (0.744)	1.632 (0.201)	0.285 (0.593)
Observations	844,019	1,901,173	833,944	1,882,470	10,075	18,703	3,200	10,392	6,875	8,311
<b>C. Employment</b>										
Share of immigrants	-0.0048* (0.0024)	-0.0026 (0.0017)	-0.0051** (0.0023)	-0.0024 (0.0019)	-0.0390*** (0.0068)	-0.0157*** (0.0037)	-0.0342** (0.0145)	-0.0147 (0.0173)	-0.0426*** (0.0089)	-0.0238* (0.0131)
Kleibergen-Paap F	51.87	53.15	44.40	52.17	81.43	141.6	106.9	93.84	72.73	156.4
Sargan-Hansen test	1.755 (0.185)	1.277 (0.258)	1.570 (0.210)	1.627 (0.202)	2.186 (0.139)	2.342 (0.126)	1.130 (0.288)	1.285 (0.257)	2.115 (0.146)	1.634 (0.201)
Observations	844,019	1,901,173	833,944	1,882,470	10,075	18,703	3,200	10,392	6,875	8,311
<b>D. Employee</b>										
Share of immigrants	-0.0009 (0.0016)	-0.0007 (0.0011)	-0.0006 (0.0017)	0.0009 (0.0011)	0.0040 (0.0047)	-0.0070 (0.0099)	-0.0133 (0.0233)	-0.0145 (0.0131)	0.0223** (0.0087)	0.0046 (0.0209)
Kleibergen-Paap F	51.87	53.15	44.40	52.17	81.43	141.6	106.9	93.84	72.73	156.4
Sargan-Hansen test	2.681 (0.102)	2.361 (0.124)	2.563 (0.109)	2.401 (0.121)	1.743 (0.187)	1.806 (0.179)	1.715 (0.190)	1.968 (0.161)	0.168 (0.682)	1.698 (0.193)
Observations	844,019	1,901,173	833,944	1,882,470	10,075	18,703	3,200	10,392	6,875	8,311
<b>E. Self-employed</b>										
Share of immigrants	-0.0054*** (0.0011)	-0.0015 (0.0016)	-0.0061*** (0.0012)	-0.0025 (0.0017)	-0.0386*** (0.0041)	-0.0069 (0.0079)	-0.0142 (0.0096)	-0.0015 (0.0055)	-0.0608*** (0.0085)	-0.0228** (0.0098)
Kleibergen-Paap F	51.87	53.15	44.40	52.17	81.43	141.6	106.9	93.84	72.73	156.4
Sargan-Hansen test	4.245 (0.0394)	2.905 (0.0883)	3.390 (0.0656)	2.405 (0.121)	2.853 (0.0912)	1.565 (0.211)	1.052 (0.305)	1.292 (0.256)	2.404 (0.121)	1.654 (0.198)
Observations	844,019	1,901,173	833,944	1,882,470	10,075	18,703	3,200	10,392	6,875	8,311
<b>F. Wages</b>										
Share of immigrants	-0.0117*** (0.0033)	-0.0069 (0.0041)	-0.0080** (0.0035)	-0.0048 (0.0041)	-0.0185 (0.0333)	0.0558** (0.0241)	-0.0327 (0.0191)	-0.0088 (0.0069)	-0.0142 (0.0613)	0.1384*** (0.0408)
Kleibergen-Paap F	48.68	55.68	54.73	56.82	63.80	97.12	20.20	70.59	68.39	108.5
Sargan-Hansen test	1.595 (0.207)	2.377 (0.123)	0.221 (0.638)	2.065 (0.151)	0.928 (0.335)	0.182 (0.670)	1.941 (0.164)	0.0152 (0.902)	0.765 (0.382)	0.185 (0.667)
Observations	235,296	1,071,624	231,427	1,060,420	3,869	11,204	1,060	5,903	2,803	5,301

Notes: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. Regressions in panel A include all working-age individuals who are working or unemployed, i.e. actively searching for a job. In panels B to E, regressions include all working-age individuals. Regressions in panel F include all working individuals. The endogenous regressor is the share of immigrants from Venezuela in the working-age population of each city in each month. The main instrument is the interaction between the share of Venezuelans in each Colombian city in 2005 and Venezuela's monthly consumer price index. Our main specification includes a one-quarter lag of the instrument as well. Standard errors are presented in parentheses and clustered at city level.

Finally, Table 8 presents the heterogeneous effects of immigration by educational level, splitting the sample between individuals with and without higher education. Low-skill individuals entirely drive the impact on participation and employment on the full and the non-immigrant sample. Similarly, mainly low educated workers drive the negative effects of immigration on wages. Employment losses among low-skill workers are concentrated in the self-employment segment; however, since employment and participation effects are similar in magnitude, overall unemployment in the group of young adults is unaffected. The estimated coefficients for immigrant employment are positive and statistically significant for both groups, although larger for individuals with higher education. This result is driven by self-employment. Moreover, the impact on participation is only significant for low-skill workers. The larger effects on employment combined with the insignificant effects on participation explain why high-skilled workers' unemployment is considerably more affected by immigration.

**Table 8. Heterogeneous Effect of Immigration by Educational Attainment**

	Total		Non-immigrant		Immigrant					
	Low	High	Low	High	Total		Return		Foreign	
					Low	High	Low	High	Low	High
<b>A. Unemployment</b>										
Share of immigrants	0.0010 (0.0010)	0.0018 (0.0016)	0.0006 (0.0009)	0.0006 (0.0018)	0.0067* (0.0034)	0.0311*** (0.0047)	0.0093 (0.0101)	-0.0062 (0.0241)	0.0091 (0.0081)	0.0442*** (0.0051)
Kleibergen-Paap F	52.96	40.20	53.02	30.97	98.61	133.5	145.1	37.10	61	117.5
Sargan-Hansen test	0.269 (0.604)	3004 (0.0831)	0.500 (0.480)	2754 (0.0970)	1.227 (0.268)	0.959 (0.327)	1.154 (0.283)	0.0509 (0.822)	0.981 (0.322)	1.295 (0.255)
Observations	1,111,764	626,343	1,095,307	621,279	16,457	5,064	8,448	1,610	8,009	3,453
<b>B. Participation</b>										
Share of immigrants	-0.0044** (0.0016)	0.0018 (0.0027)	-0.0046*** (0.0015)	0.0012 (0.0020)	-0.0187** (0.0058)	-0.0027 (0.0067)	-0.0181* (0.0100)	0.0036 (0.0089)	-0.0177 (0.0206)	0.0005 (0.0094)
Kleibergen-Paap F	53.89	47.93	51.67	40.38	96.45	111	119.9	35.17	57.72	109.8
Sargan-Hansen test	0.520 (0.471)	0.274 (0.600)	-1.172 (0.279)	0.359 (0.549)	1.475 (0.225)	0.348 (0.555)	0.953 (0.329)	2.073 (0.150)	1.739 (0.187)	0.882 (0.348)
Observations	1,942,373	802,819	1,919,390	797,024	22,983	5,795	11,715	1,877	11,268	3,918
<b>C. Employment</b>										
Share of immigrants	-0.0042** (0.0016)	0.0003 (0.0023)	-0.0041** (0.0015)	0.0007 (0.0025)	-0.0203*** (0.0058)	-0.0313*** (0.0071)	-0.0232 (0.0171)	0.0071 (0.0238)	-0.0187 (0.0200)	-0.0411*** (0.0075)
Kleibergen-Paap F	53.89	47.93	51.67	40.38	96.45	111	119.9	35.17	57.72	109.8
Sargan-Hansen test	0.654 (0.419)	1.075 (0.300)	1.094 (0.296)	1.007 (0.316)	0.00007 (0.993)	0.768 (0.381)	0.419 (0.518)	1.918 (0.166)	0.00158 (0.968)	1.383 (0.240)
Observations	1,942,373	802,819	1,919,390	797,024	22,983	5,795	11,715	1,877	11,268	3,918
<b>D. Employee</b>										
Share of immigrants	-0.0008 (0.0010)	-0.0012 (0.0016)	0.0002 (0.0010)	-0.0000 (0.0015)	-0.0039 (0.0065)	0.0022 (0.0076)	-0.0153 (0.0162)	-0.0059 (0.0428)	0.0167 (0.0176)	0.0150 (0.0139)
Kleibergen-Paap F	53.89	47.93	51.67	40.38	96.45	111	119.9	35.17	57.72	109.8
Sargan-Hansen test	2.699 (0.100)	0.838 (0.360)	2.820 (0.0931)	0.812 (0.368)	0.860 (0.354)	1.441 (0.230)	0.737 (0.391)	1.980 (0.159)	0.942 (0.332)	0.725 (0.394)
Observations	1,942,373	802,819	1,919,390	797,024	22,983	5,795	11,715	1,877	11,268	3,918
<b>E. Self-Employed</b>										
Share of immigrants	-0.0036** (0.0013)	0.0013 (0.0012)	-0.0046*** (0.0014)	0.0005 (0.0016)	-0.0132*** (0.0034)	-0.0326** (0.0132)	-0.0072** (0.0032)	0.0183 (0.0167)	-0.0282*** (0.0040)	-0.0579*** (0.0201)
Kleibergen-Paap F	53.89	47.93	51.67	40.38	96.45	111	119.9	35.17	57.72	109.8
Sargan-Hansen test	3.220 (0.0727)	0.00344 (0.953)	3.005 (0.0830)	0.00281 (0.958)	1.612 (0.204)	1.437 (0.231)	0.875 (0.349)	1.144 (0.285)	1.753 (0.185)	1.546 (0.214)
Observations	1,942,373	802,819	1,919,390	797,024	22,983	5,795	11,715	1,877	11,268	3,918
<b>F. Wages</b>										
Share of immigrants	-0.0069** (0.0026)	-0.0106 (0.0070)	-0.0041 (0.0030)	-0.0075 (0.0068)	0.0148 (0.0098)	0.0860*** (0.0189)	0.0015 (0.0094)	-0.1068*** (0.0267)	0.0514* (0.0299)	0.1666*** (0.0241)
Kleibergen-Paap F	60.57	38.33	66.29	33.16	90.28	204.5	89.17	48.40	93.03	167.5
Sargan-Hansen test	3.606 (0.0576)	1.098 (0.295)	3.105 (0.0780)	1 (0.317)	0.803 (0.370)	1.226 (0.268)	0.397 (0.528)	1.252 (0.263)	0.993 (0.319)	1.512 (0.219)
Observations	848,918	458,002	837,408	454,439	11,510	3,563	5,901	1,062	5,608	2,500

Notes: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. Regressions in panel A include all working-age individuals who are working or unemployed, i.e. actively searching for a job. In panels B to E, regressions include all working-age individuals. Regressions in panel F include all working individuals. The endogenous regressor is the share of immigrants from Venezuela in the working-age population of each city in each month. The main instrument is the interaction between the share of Venezuelans in each Colombian city in 2005 and Venezuela's monthly consumer price index. Our main specification includes a one-quarter lag of the instrument as well. Standard errors are presented in parentheses and clustered at city level.

#### **4.5. Internal Migration**

This last section assesses the impact of international immigrants on internal migrants. Given the prolonged conflict, Colombia is, in fact, one of the countries with more forcibly displaced population in the world (over 7 million in the last 30 years). Previous studies have found that forced displacement reduces the wages of non-migrants, particularly in the informal sector (Calderón-Mejía and Ibañez, 2016; Morales, 2017). Given that international and internal migrants are likely to compete in the low-skill self-employed sector, we should expect particularly sizeable effects of the Venezuelan refugee crisis on internal migrants.

We identified internal migrants as individuals who resided in a different municipality of Colombia five years ago. These include all internal migrants, independently of their reasons to migrate. The main estimates of the effects of immigration from Venezuela on internal migrants are presented in Table 9. As expected, international migration has a particularly negative and significant effect on unemployment, employment, and participation. The self-employment segment entirely drives employment losses. Likewise, our heterogeneous effect estimates reveal that males, young adults, and low-skill individuals are the most affected. Interestingly, we did not find significant effects on wages, which suggests that this market reacts mainly by adjusting labor quantities.

**Table 9: Effect of Immigration on Internal Migrants**

	Total	Gender		Age		Education	
		Female	Male	<=25	>25	Low	High
<b>A. Unemployment</b>							
Share of immigrants	0.0061*** (0.0015)	0.0021 (0.0066)	0.0092* (0.0046)	0.0046 (0.0052)	0.0073** (0.0030)	-0.0001 (0.0020)	0.0184*** (0.0042)
Kleibergen-Paap F	11.09	18.45	9.793	8.120	13.05	11.39	17.96
Sargan-Hansen test	2.173 (0.140)	0.321 (0.571)	2.483 (0.115)	0.920 (0.337)	3.755 (0.0527)	1.849 (0.174)	0.903 (0.342)
Observations	185,181	88,004	97,177	59,139	126,042	114,760	70,421
<b>B. Participation</b>							
Share of immigrants	-0.0046** (0.0018)	-0.0059*** (0.0018)	-0.0041 (0.0025)	-0.0137*** (0.0045)	-0.0028* (0.0016)	-0.0055** (0.0022)	-0.0038 (0.0052)
Kleibergen-Paap F	21.14	26.65	17.10	21.25	20.74	10.70	73.64
Sargan-Hansen test	1.025 (0.311)	0.840 (0.359)	0.535 (0.465)	2.068 (0.150)	1.082 (0.298)	0.131 (0.717)	0.552 (0.458)
Observations	283,864	153,497	130,367	121,145	162,719	188,135	95,729
<b>C. Employment</b>							
Share of immigrants	-0.0078*** (0.0023)	-0.0057 (0.0034)	-0.0107** (0.0049)	-0.0123*** (0.0022)	-0.0081*** (0.0024)	-0.0044** (0.0021)	-0.0162*** (0.0048)
Kleibergen-Paap F	21.14	26.65	17.10	21.25	20.74	10.70	73.64
Sargan-Hansen test	2.945 (0.0861)	0.964 (0.326)	2.139 (0.144)	1.932 (0.165)	2.606 (0.106)	3.511 (0.0609)	0.276 (0.599)
Observations	283,864	153,497	130,367	121,145	162,719	188,135	95,729
<b>D. Employee</b>							
Share of immigrants	-0.0021 (0.0027)	-0.0070** (0.0028)	0.0021 (0.0040)	-0.0125*** (0.0032)	0.0011 (0.0037)	0.0001 (0.0022)	-0.0078 (0.0047)
Kleibergen-Paap F	21.14	26.65	17.10	21.25	20.74	10.70	73.64
Sargan-Hansen test	0.176 (0.675)	0.00512 (0.943)	0.135 (0.713)	1.214 (0.271)	0.197 (0.657)	0.235 (0.628)	0.574 (0.449)
Observations	283,864	153,497	130,367	121,145	162,719	188,135	95,729
<b>E. Self-employed</b>							
Share of immigrants	-0.0045** (0.0019)	0.0034 (0.0022)	-0.0128*** (0.0038)	0.0009 (0.0021)	-0.0081*** (0.0027)	-0.0035 (0.0022)	-0.0071** (0.0031)
Kleibergen-Paap F	21.14	26.65	17.10	21.25	20.74	10.70	73.64
Sargan-Hansen test	5.421 (0.0199)	1.813 (0.178)	5.699 (0.0170)	0.00467 (0.946)	6.889 (0.00867)	4.307 (0.0379)	0.534 (0.465)
Observations	283,864	153,497	130,367	121,145	162,719	188,135	95,729
<b>F. Wages</b>							
Share of immigrants	-0.0017 (0.0043)	-0.0027 (0.0052)	-0.0032 (0.0055)	-0.0173 (0.0103)	0.0014 (0.0055)	-0.0029 (0.0073)	-0.0029 (0.0063)
Kleibergen-Paap F	8.951	8.262	9.663	11.65	10.23	12.97	13.62
Sargan-Hansen test	1.415 (0.234)	0.00517 (0.943)	2.407 (0.121)	2.258 (0.133)	0.0116 (0.914)	0.780 (0.377)	0.698 (0.403)
Observations	140,693	63,159	77,534	41,494	99,199	87,355	53,338

Notes: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. Regressions in panel A include all working-age individuals who are working or unemployed, i.e. actively searching for a job. In panels B to E, regressions include all working-age individuals. Regressions in panel F include all working individuals. The endogenous regressor is the share of immigrants from Venezuela in the working-age population of each city in each month. The main instrument is the interaction between the share of Venezuelans in each Colombian city in 2005 and Venezuela's monthly consumer price index. Our main specification includes a one-quarter lag of the instrument as well. Standard errors are presented in parentheses and clustered at city level.

International migration could also affect internal migration flows. Borjas (2006) found that international migrations can deter internal migrants, thus alleviating the pressure on local labor markets. In contrast, Card (2001) and Del Carpio et al. (2015) found positive and significant effects on net internal migration. We assessed the impact of international migration on internal migration flows in Table 10. We compute the recent internal in-migration and out-migration at the state level, as the logarithm of the number of individuals who changed state of residence during the last 12 months excluding Venezuelan immigrants. Results suggest that international migration does not affect out-migration; however, it does reduce in-migration significantly. Therefore, internal migrants are less likely to choose cities in which international migrants are abundant. In turn, this may reduce some of the pressure on labor supply.

**Table 10: Effect of Immigration on Recent Internal In and Out-Migration**

	In-migration	Out-migration
Share of immigrants	-0.0814*** (0.0177)	0.0095 (0.0135)
Kleibergen-Paap F	12.99	12.99
Sargan-Hansen test	2.142	0.267
	0.143	0.605
Observations	1,495	1,495

Notes: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. The unemployment rate is computed on a monthly basis for each population in each city. The endogenous regressor is the share of immigrants from Venezuela in the working-age population of each city (state capital) in each month. The main instrument is the interaction between the share of Venezuelans in each Colombian city in 2005 and Venezuela's monthly consumer price index. Our main specification includes a one-quarter lag of the instrument as well. Standard errors are presented in parentheses and clustered at city level.

## 5. Conclusions

Immigration flows from Venezuela have raised concern regarding their potential effects on host countries labor markets. The main host of these immigration flows is Colombia, with approximately 1.2 million new arrivals between 2014 and 2018. During these five years, the immigrant population from this neighbor country represent from 0 to 3.2% of its working-age population. To measure the impact of immigration on unemployment, labor participation,



employment, and wages; we used an instrumental variable approach that exploits the regional variation of migrant networks and the timing and intensity of the Venezuela economic crisis.

Our main results consistently show that immigration flows do not affect non-immigrant unemployment. While we find negative and significant effects on the employment rate, immigration also reduces the labor participation rate, offsetting the first effect. Therefore, the effects of immigration on unemployment are null for the non-immigrant population. We find negative effects of immigration on wages in the full sample. This negative effect is explained mostly by the negative impact of immigration on labor income in the self-employed segment. This evidence is consistent with the negative effect of immigration on the self-employment rate and the fact that the most extensive job displacement is observed in the self-employed segment. These findings suggest that the discouragement effect on non-immigrants is driven by both lower employment opportunities and lower expected wages. The undesirable effects of immigration on labor market results are consistently larger for female, young, and low-skilled individuals. For these sub-populations, we find positive effects of immigration on unemployment and negative effects on wages and employment rates.

The main effects of immigration from Venezuela take place on the immigrant population. For this population, we find a negative effect on labor participation and a more sizeable negative effect on the employment rate. Therefore, as expected, the effect on unemployment is positive for this population. The composition of immigration is relevant given that a significant part of the immigrants are Colombian-born citizens who return from Venezuela. The labor market assimilation of these returned migrants might be faster and easier than in the case of Venezuelan born immigrants. Our evidence suggests that this is the case, as the effect of immigration on returned immigrants' unemployment is null. The effect of immigration on foreign immigrants is sizeable and statistically significant. A one percent increase in the share of immigrants increases this population's probability of unemployment by 2 pp. These results are in line with previous findings in the literature suggesting that cultural similarities help to achieve a more efficient labor market assimilation of immigrants (Bauer, Lofstrom and Klaus, 2000).

We also assess the impact of international migrants on internal migrants. We find relatively large effects on labor outcomes, reflecting that international and internal immigrants compete

in the low-skill self-employment segment. Our results also indicate that international migrations does deter internal migration, reducing the pressure on local labor markets. Overall, findings suggest that immigration policies must consider the composition of immigration flows, and particularly the differences between return and foreign immigrants.

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**Online Appendix**  
(not for publication)

**Table A1. First-Stage Estimates**

	Total	Non-immigrant	Immigrant		
			Total	Return	Foreign
Migration network x CPI	-186.1434*** (54.8475)	-190.2417*** (57.0955)	-40.2907** (17.0458)	-44.4002* (25.1303)	-8.8036 (11.7238)
Migration network x lagged CPI	2.052*** (539.8142)	2.095*** (561.7760)	599.8786*** (170.3357)	703.8741*** (236.2504)	266.9345** (117.6234)
Observations	2,745,804	2,717,006	28,798	13,596	15,202
R-squared	0.8008	0.7983	0.8778	0.8630	0.9106
F statistic	53.11	49.88	174.9	120.2	154

Notes: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. The endogenous regressor is the share of immigrants from Venezuela in the working-age population of each city in each month. Our main specification includes interaction between the share of Venezuelans in each Colombian city in 2005 and Venezuela's monthly consumer price index, and a one-quarter lag of the instrument as well. Standard errors are presented in parentheses and clustered at city level.

**Table A2. Effect of Immigration on Unemployment (alternative lag structure)**

	Total	Non-immigrant	Immigrant		
			Total	Return	Foreign
<b>A. Only contemporary month</b>					
Share of immigrants	0.0013 (0.0010)	0.0006 (0.0011)	0.0134*** (0.0032)	0.0099 (0.0090)	0.0218*** (0.0048)
Kleibergen-Paap F	33.64	31.97	76.94	118.2	80.30
Sargan-Hansen test	.	.	.	.	.
Observations	1,819,427	1,797,683	21,744	10,245	11,499
<b>B. Contemporary month and average of the last three months</b>					
Share of immigrants	0.0012 (0.0010)	0.0006 (0.0011)	0.0134*** (0.0032)	0.0101 (0.0090)	0.0214*** (0.0049)
Kleibergen-Paap F	20.05	19.15	43.71	67.10	41.12
Sargan-Hansen test	0.0029 (0.957)	0.0468 (0.829)	0.508 (0.476)	0.364 (0.546)	0.0671 (0.796)
Observations	1,792,263	1,770,590	21,673	10,186	11,487

Notes: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. Regressions in panel A include all working-age individuals who are working or unemployed, i.e., actively searching for a job. The endogenous regressor is the share of immigrants from Venezuela in the working-age population of each city in each month. The main instrument is the interaction between the share of Venezuelans in each Colombian city in 2005 and Venezuela's monthly consumer price index. In columns 1 to 3, the specification includes only the contemporary instrument. In columns 4 to 6, the specification includes the contemporary instrument and the instrument's average of the last three months. Standard errors are presented in parentheses and clustered at city level.



**Table A3. Effect of Immigration on Unemployment (with and without the city and time fixed effects)**

	(1)	(2)	(3)	(4)
<b>A. Total</b>				
Share of immigrants	0.0029** (0.0013)	0.0017*** (0.0006)	0.0039* (0.0020)	0.0012 (0.0010)
Kleibergen-Paap F	8.885	12.55	43.96	48.89
Sargan-Hansen test	1.885 (0.170)	3.101 (0.0782)	0.204 (0.652)	0.0145 (0.904)
Observations	1,738,107	1,738,107	1,738,107	1,738,107
<b>B. Non-immigrant</b>				
Share of immigrants	0.0025** (0.0011)	0.0015** (0.0006)	0.0033 (0.0020)	0.0006 (0.0010)
Kleibergen-Paap F	8.761	12.45	41.38	46.48
Sargan-Hansen test	1.580 (0.209)	2.533 (0.111)	0.260 (0.610)	0.0783 (0.780)
Observations	1,716,586	1,716,586	1,716,586	1,716,586
<b>C. Immigrant (Total)</b>				
Share of immigrants	0.0027 (0.0028)	-0.0019 (0.0026)	0.0092*** (0.0023)	0.0115*** (0.0028)
Kleibergen-Paap F	25.44	26.48	42.61	169.1
Sargan-Hansen test	0.322 (0.571)	0.0151 (0.902)	1.087 (0.297)	1.218 (0.270)
Observations	21,521	21,521	21,521	21,521
<b>D. Immigrant (Return)</b>				
Share of immigrants	-0.0005 (0.0030)	-0.0065* (0.0034)	0.0109*** (0.0023)	0.0077 (0.0098)
Kleibergen-Paap F	46.82	17.84	60.71	138.7
Sargan-Hansen test	4.110 (0.0426)	3.908 (0.0481)	1.659 (0.198)	1.392 (0.238)
Observations	10,058	10,058	10,058	10,058
<b>E. Immigrant (Foreign)</b>				
Share of immigrants	0.0046 (0.0036)	0.0016 (0.0044)	0.0091** (0.0033)	0.0202*** (0.0054)
Kleibergen-Paap F	19.39	31.70	32.12	144.6
Sargan-Hansen test	0.426 (0.514)	0.562 (0.454)	0.815 (0.367)	0.635 (0.426)
Observations	11,463	11,463	11,463	11,463
City FE	No	Yes	No	Yes
Time FE	No	No	Yes	Yes

Notes: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. Regressions include all working-age individuals who are working or unemployed, i.e. actively searching for a job. The endogenous regressor is the share of immigrants from Venezuela in the working-age population of each city in each month. The main instrument is the interaction between the share of Venezuelans in each Colombian city in 2005 and Venezuela's monthly consumer price index. Our main specification includes a one-quarter lag of the instrument as well. Standard errors are presented in parentheses and clustered at city level.

**Table A4. Effect of Immigration on Unemployment (return migrants instrument)**

	Total	Non-immigrant	Immigrant		
			Total	Return	Foreign
<b>A. Percentage share of Colombians in Venezuela</b>					
Share of immigrants	0.0013 (0.0016)	0.0010 (0.0017)	0.0092** (0.0043)	0.0158 (0.0160)	0.0114 (0.0117)
Kleibergen-Paap F	40.90	37.50	124	59.92	82.65
Sargan-Hansen test	1.693 (0.193)	0.623 (0.430)	1.253 (0.263)	1.491 (0.222)	0.603 (0.437)
Observations	1,738,107	1,716,586	21,521	10,058	11,463
<b>B. Percentage share of Colombians in Venezuela and Venezuelans in Colombia</b>					
Share of immigrants	0.0012 (0.0010)	0.0006 (0.0010)	0.0115*** (0.0029)	0.0077 (0.0098)	0.0202*** (0.0054)
Kleibergen-Paap F	53.71	50.54	199.4	152.8	148.4
Sargan-Hansen test	0.0136 (0.907)	0.0720 (0.788)	1.181 (0.277)	1.394 (0.238)	0.596 (0.440)
Observations	1,738,107	1,716,586	21,521	10,058	11,463
<b>C. Sum of percentage shares of Colombians in Venezuela and Venezuelans in Colombia</b>					
Share of immigrants	0.0012 (0.0013)	0.0008 (0.0014)	0.0103*** (0.0035)	0.0120 (0.0133)	0.0155* (0.0086)
Kleibergen-Paap F	85.62	76.84	449.2	243.3	147.6
Sargan-Hansen test	0.761 (0.383)	0.117 (0.732)	1.264 (0.261)	1.473 (0.225)	0.634 (0.426)
Observations	1,738,107	1,716,586	21,521	10,058	11,463

Notes: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. Regressions include all working-age individuals who are working or unemployed, i.e., actively searching for a job. The endogenous regressor is the share of immigrants from Venezuela in the working-age population of each city in each month. In columns 1 to 3, the instrument is the interaction between the share of Colombians in Venezuela in 2005 and Venezuela's monthly consumer price index. In columns 4 to 6, the instrument includes only. In columns 7 to 9, the instrument is the interaction between the sums of percentages of Colombian in Venezuela and Venezuelan in Colombia. Standard errors are presented in parentheses and clustered at city level.

**Table A5. Effect of Immigration on Unemployment (previous censuses instrument)**

	Total	Non-immigrant	Immigrant		
			Total	Return	Foreign
<b>A. Venezuela's CPI: 2005 and 1993 census</b>					
Share of immigrants	0.0012 (0.0010)	0.0006 (0.0010)	0.0101*** (0.0032)	0.0045 (0.0086)	0.0180*** (0.0054)
Kleibergen-Paap F	18.44	17.89	73.01	50.21	78.35
Sargan-Hansen test	0.0442 (0.998)	0.250 (0.969)	2.286 (0.515)	3.526 (0.317)	1.183 (0.757)
Observations	1,738,107	1,716,586	21,521	10,058	11,463
<b>B. Venezuela's CPI: 2005 and 1973 census</b>					
Share of immigrants	0.0012 (0.0013)	0.0007 (0.0013)	0.0118*** (0.0031)	0.0106 (0.0117)	0.0202*** (0.0055)
Kleibergen-Paap F	91.85	95.21	93.31	635.4	48.85
Sargan-Hansen test	4.690 (0.196)	4.680 (0.197)	1.323 (0.724)	3.177 (0.365)	1.007 (0.800)
Observations	1,738,107	1,716,586	21,521	10,058	11,463
<b>C. Venezuela's CPI: 2005 and 1964 census</b>					
Share of immigrants	0.0010 (0.0013)	0.0004 (0.0013)	0.0123*** (0.0035)	0.0101 (0.0113)	0.0196*** (0.0066)
Kleibergen-Paap F	253.7	267.4	229.9	529.6	122.3
Sargan-Hansen test	5.124 (0.163)	5.110 (0.164)	1.641 (0.650)	3.309 (0.346)	0.652 (0.884)
Observations	1,738,107	1,716,586	21,521	10,058	11,463

Notes: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. Regressions include all working-age individuals who are working or unemployed, i.e. actively searching for a job. The endogenous regressor is the share of immigrants from Venezuela in the working-age population of each city in each month. The main instrument is the interaction between the share of Venezuelans in each Colombian city, in different censuses (1964, 1973, 1993 and 2005), and Venezuela's monthly consumer price index. Our main specification includes a one-quarter lag of the instrument as well. Standard errors are presented in parentheses and clustered at city level.

**Table A6. Effect of Immigration on Unemployment (alternative measures of Venezuelan crisis)**

	Total	Non-immigrant	Immigrant		
			Total	Return	Foreign
<b>A. Venezuelan imports</b>					
Share of immigrants	0.0007 (0.0013)	0.0004 (0.0013)	-0.0074 (0.0050)	-0.0109** (0.0049)	-0.0022 (0.0058)
Kleibergen-Paap F	16.91	15.23	43.38	46.29	73.62
Sargan-Hansen test	0.0373 (0.847)	0.000587 (0.981)	0.175 (0.676)	0.0113 (0.915)	0.252 (0.615)
Observations	1,738,107	1,716,586	21,521	10,058	11,463
<b>B. Exchange rate</b>					
Share of immigrants	0.0005 (0.0011)	0.0002 (0.0011)	-0.0028 (0.0027)	-0.0063*** (0.0019)	0.0018 (0.0038)
Kleibergen-Paap F	27.84	23.65	126.4	82.03	243.5
Sargan-Hansen test	1.505 (0.220)	1.781 (0.182)	1.148 (0.284)	1.164 (0.281)	1.019 (0.313)
Observations	1,738,107	1,716,586	21,521	10,058	11,463

Notes: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. Regressions include all working-age individuals who are working or unemployed, i.e., actively searching for a job. The endogenous regressor is the share of immigrants from Venezuela in the working-age population of each city in each month. In panel A, the instrument is the interaction between the share of Venezuelans in each Colombian city in 2005 and Venezuelan imports, in this case, data come from the United Nations International Trade Statistics Database (Comtrade) in order to calculate Venezuelan imports. In panel B, the exchange rate of Venezuela's currency to dollars is used; in this case, monthly data came from dolartoday.com. Standard errors are presented in parentheses and clustered at city level.

**Table A7. Effect of Immigration on the Unemployment Rate (city-level regression)**

			Immigrant			SUR
	Total	Non-immigrant	Total	Return	Foreign	
	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS
Share of immigrants	0.0010 (0.0007)	0.0002 (0.0008)	0.0123* (0.0066)	0.0158*** (0.0049)	0.0315*** (0.0071)	0.0005 (0.0007)
Kleibergen-Paap F	55.36	55.36	51.46	45.40	58.28	60.42
Sargan-Hansen test	2.803 (0.0941)	1.195 (0.274)	0.0328 (0.856)	0.824 (0.364)	1.742 (0.187)	6.717 (0.0348)
Observations	1.495	1.495	1.111	1,039	695	1.495

Notes: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. The unemployment rate is computed on a monthly basis for each population in each city. The endogenous regressor is the share of immigrants from Venezuela in the working-age population of each city in each month. SUR stands for an estimate on the structural unemployment rate, see footnote 7. The main instrument is the interaction between the share of Venezuelans in each Colombian city in 2005 and Venezuela's monthly consumer price index. Our main specification includes a one-quarter lag of the instrument as well. Standard errors are presented in parentheses and clustered at city level.

**Table A8. Effect of Immigration on Unemployment (controlling for GDP and trade)**

	Total	Non-immigrant	Immigrant		
			Total	Return	Foreign
<b>A. Controlling for GDP</b>					
Share of immigrants	0.0012 (0.0010)	0.0006 (0.0010)	0.0120*** (0.0026)	0.0082 (0.0102)	0.0205*** (0.0045)
Log gross domestic product	0.0015 (0.0389)	-0.0016 (0.0379)	0.8336 (0.5088)	0.6079 (0.4576)	1.6831** (0.7519)
Log Trade with Venezuela	.	.	.	.	.
Kleibergen-Paap F	48.31	45.89	166.9	145.2	136.8
Sargan-Hansen test	0.0145 (0.904)	0.0783 (0.780)	1.233 (0.267)	1.401 (0.237)	0.540 (0.463)
Observations	1,738,107	1,716,586	21,521	10,058	11,463
<b>B. Controlling for trade</b>					
Share of immigrants	0.0012 (0.0010)	0.0006 (0.0010)	0.0114*** (0.0028)	0.0077 (0.0098)	0.0196*** (0.0049)
Log gross domestic product	.	.	.	.	.
Log Trade with Venezuela	-0.0001 (0.0002)	-0.0000 (0.0002)	-0.0022** (0.0008)	-0.0004 (0.0011)	-0.0044*** (0.0010)
Kleibergen-Paap F	48.68	46.32	146.3	138.9	134.8
Sargan-Hansen test	0.0137 (0.907)	0.0790 (0.779)	1.216 (0.270)	1.390 (0.238)	0.662 (0.416)
Observations	1,738,107	1,716,586	21,521	10,058	11,463
<b>C. Controlling for GDP and trade</b>					
Share of immigrants	0.0012 (0.0010)	0.0006 (0.0010)	0.0118*** (0.0026)	0.0082 (0.0102)	0.0200*** (0.0042)
Log gross domestic product	0.0014 (0.0385)	-0.0016 (0.0376)	0.7924 (0.4916)	0.6062 (0.4564)	1.5191** (0.7220)
Log Trade with Venezuela	-0.0001 (0.0002)	-0.0000 (0.0002)	-0.0017* (0.0009)	-0.0001 (0.0011)	-0.0034*** (0.0011)
Kleibergen-Paap F	48.05	45.69	151.1	143.9	133
Sargan-Hansen test	0.0137 (0.907)	0.0790 (0.779)	1.232 (0.267)	1.401 (0.237)	0.574 (0.449)
Observations	1,738,107	1,716,586	21,521	10,058	11,463

Notes: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. Regressions include all working-age individuals who are working or unemployed, i.e., actively searching for a job. Trade is measured as the sum of imports and exports between Colombia (at the state level) and Venezuela. GDP stands for the department GDP. The endogenous regressor is the share of immigrants from Venezuela in the working-age population of each city in each month. The main instrument is the interaction between the share of Venezuelans in each Colombian city in 2005 and Venezuela's monthly consumer price index. Our main specification includes a one-quarter lag of the instrument as well. Standard errors are presented in parentheses and clustered at city level.

**Table A9. Imperfect Instruments Estimation**

Instrument and model	2SLS	2SLS-IV	
		Lower Bound	Upper Bound
Venezuelans in Colombia x CPI (a)	0.0013	-	0.0035]
Venezuelans in Colombia x CPI (b)	0.0013	[-0.001	-
Venezuelans in Colombia x CPI and lagged CPI (c)	0.0012	[-0.001	0.0035]
Sum of Venezuelans in Colombia and Colombians in Venezuela x CPI and lagged CPI (d)	0.0012	[-0.001	0.0040]
Observations	1,738,107	1,738,107	1,738,107

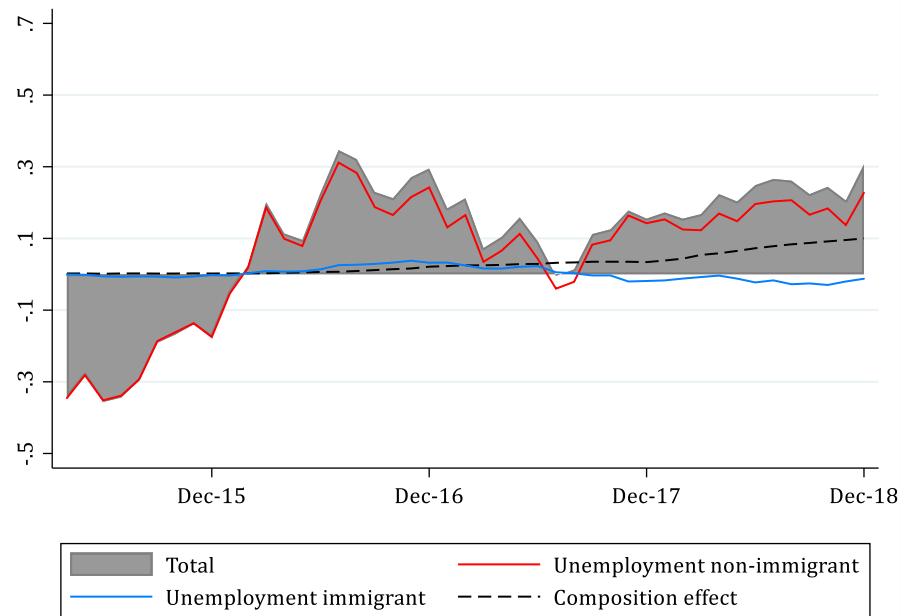
Notes: Regressions include all working-age individuals who are working or unemployed, i.e., actively searching for a job. Following Nevo and Rosen's (2012) approach, the numbers in brackets are the 95% confidence interval of the estimated parameter interval by imperfect instrumental estimation. In specification (a), we assume  $\rho_{x\varepsilon} > 0$ ; for that reason, we can obtain only a lower bound. Conversely, in the specification (b) we assume  $\rho_{x\varepsilon} < 0$ , in this case, we obtain only an upper bound. In model (c), we estimate our preferred specification in an imperfect instrumental variables framework assuming  $\rho_{x\varepsilon} > 0$ . In the specification (d), assuming  $\rho_{x\varepsilon} > 0$ , we use as instruments the sum of percentages associated with migration networks. See more details in footnote 5.

**Table A10. Effect of Immigration on Employment by Firm Size**

	Total	Non-immigrant	Immigrant		
			Total	Return	Foreign
<b>A. Large firms (<math>\geq 5</math>)</b>					
Share of immigrants	-0.0014 (0.0009)	-0.0007 (0.0008)	0.0100 (0.0076)	-0.0227* (0.0128)	0.0374** (0.0149)
Kleibergen-Paap F	53	49.79	175.1	117.6	156.2
Sargan-Hansen test	3.107 (0.0780)	2.904 (0.0883)	0.0406 (0.840)	1.501 (0.221)	0.455 (0.500)
Observations	2,745,192	2,716,414	28,778	13,592	15,186
<b>B. Small Firms (<math>&lt; 5</math>)</b>					
Share of immigrants	-0.0018 (0.0011)	-0.0023** (0.0011)	-0.0321*** (0.0052)	0.0007 (0.0050)	-0.0651*** (0.0062)
Kleibergen-Paap F	53	49.79	175.1	117.6	156.2
Sargan-Hansen test	3.471 (0.0625)	1.622 (0.203)	0.412 (0.521)	0.824 (0.364)	0.144 (0.704)
Observations	2,745,192	2,716,414	28,778	13,592	15,186

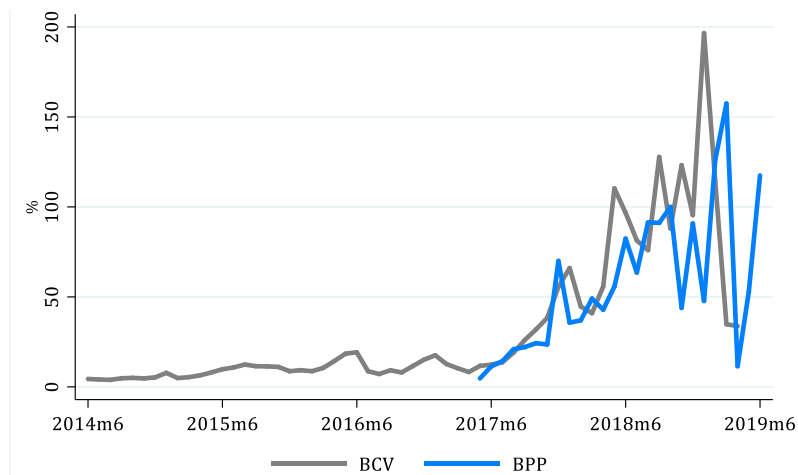
Notes: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. Regressions include all working-age individuals. The endogenous regressor is the share of immigrants from Venezuela in the working-age population of each city in each month. The main instrument is the interaction between the share of Venezuelans in each Colombian city in 2005 and Venezuela's monthly consumer price index. Our main specification includes a one-quarter lag of the instrument as well. Standard errors are presented in parentheses and clustered at city level.

**Figure A1. Shift-Share Decomposition of the National Unemployment Rate**



Notes: The grey area represents the annual change of the annual moving average of national unemployment. The red and the blue lines account for the contribution of changes in non-immigrant immigrant unemployment, respectively. The dotted line represents the composition effect contribution. Source: Calculations by the authors based on data from DANE.

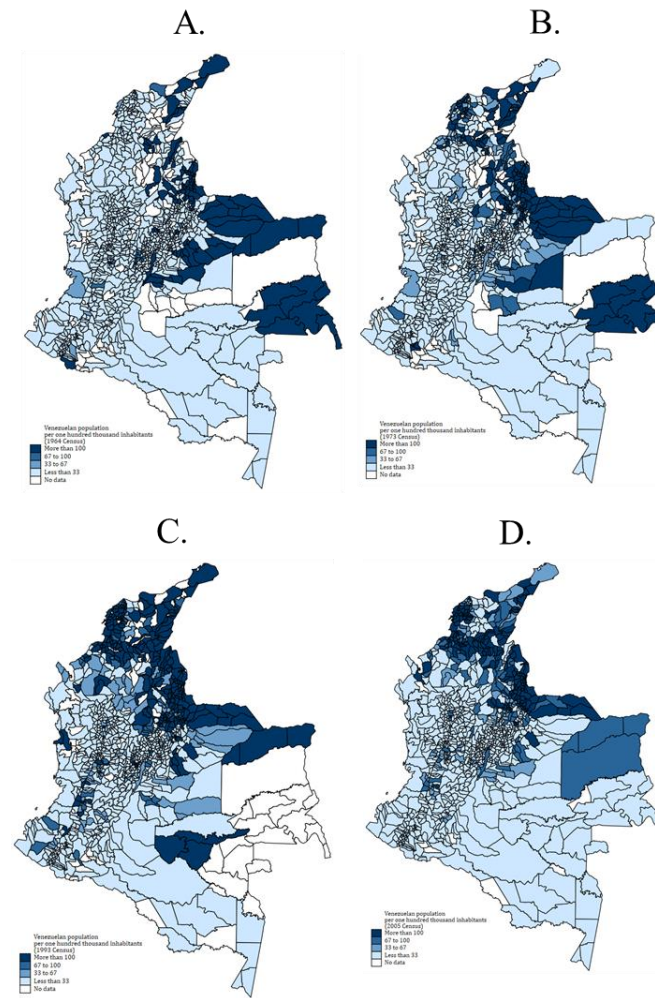
**Figure A2. Venezuela's Monthly Inflation: Official Statistics and Independent Sources**



Notes: The gray line is the official statistic from the Central Bank of Venezuela. The blue line comes from the Billion Price Project; in this case, inflation is measure following Cavallo y Rigobon (2016). Source: Central Bank of Venezuela (BCV). The Billion Price Project (BPP).

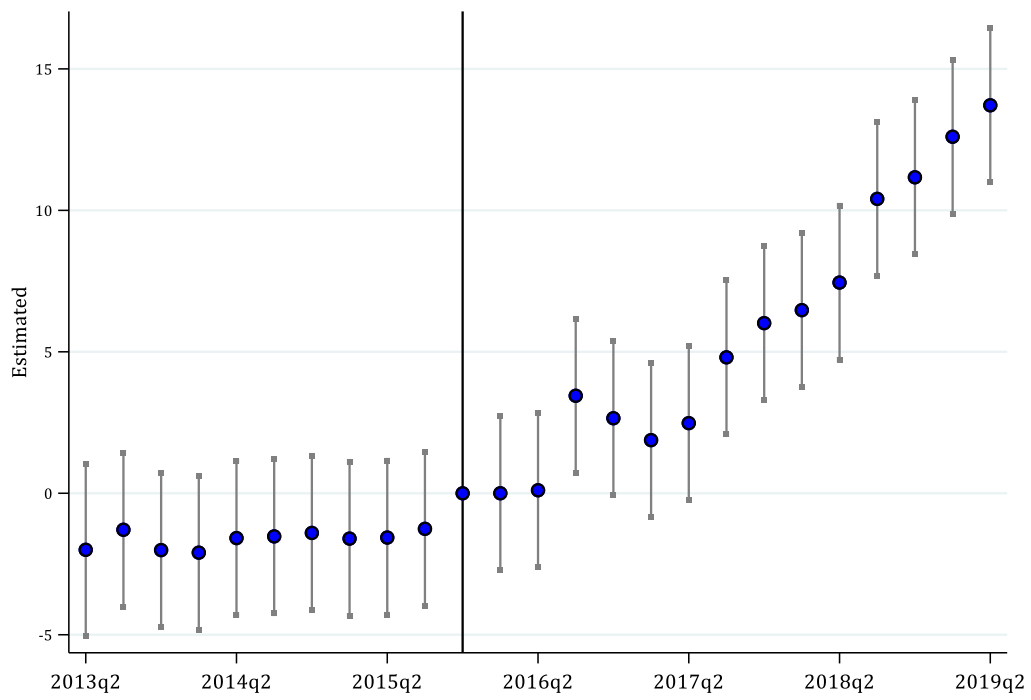


**Figure A3. Venezuelan Population in Different Censuses.**



Notes: Panels A, B, C, and D show Venezuelans in Colombia according to the 1964, 1973, 1993, and 2005 censuses, respectively. Source: Calculations by the authors based on data from DANE.

**Figure A4. Event Study**



Notes: Dots represent the results of regress migration flows on the interaction between the share of Venezuelans in Colombia in 2005 and quarterly dummies; the black line stands for the base level.

