# The Labor Market Effects of Venezuelan Migration in Ecuador

Sergio Olivieri, Francesc Ortega, Eliana Carranza & Ana Rivadeneira *

*The World Bank Group & CUNY, Queens College*

April 15, 2021

**Abstract**

As of 2019, more than 1.2 million Venezuelans passed through Ecuador and more than 400,000 settled (almost 3 percent of Ecuador's population). This paper analyzes the location choices of Venezuelan migrants in Ecuador and the labor market consequences of these choices, using data from Ecuador's labor force survey and mobile phone records on the geographic distribution of Venezuelan migrants. Around half of the migrants live in four cantons (of 221). Their location is primarily driven by local economic conditions, rather than point of entry. Overall, the regions with the largest inflows of Venezuelans have not seen any effects on labor market participation or employment, compared with regions with fewer inflows. However, our difference-in-difference estimates clearly indicate that young, low-educated Ecuadoran workers in high-inflow regions have been adversely affected. Specifically, the estimates that these workers have experienced reductions in employment quality, a 5 percentage-point increase in the rate of informality, and a 13 percentage-point reduction in earnings, relative to workers with similar characteristics living in areas with very low or non-existent inflows of Venezuelans.

*We thank Carlos Vayas and José Muñoz from *Telefonica Ecuador* and Juan Muñoz and Ana Aguilera for their advice and knowledge on sampling design. We also thank Leticia Arroyo Abad, Marianne Fay, Jesus Fernandez-Huertas and Tanja Goodwin for their helpful comments. All errors are our own. The affiliation for Eliana Carranza, Sergio Olivieri and Ana Rivadeneira is *The World Bank Group*. Francesc Ortega is the *Dina A. Perry Professor of Economics* at CUNY's Queens College. Contact e-mails: solivieri@worldbank.org and francesc.ortega@qc.cuny.edu. Data and codes are available upon request by contacting Francesc Ortega.

# 1 Introduction

According to the *United Nations Refugee Agency (UNHCR, 2019)*, 71 million people are currently forcibly displaced worldwide, due to a variety of reasons including armed conflict, economic deprivation and environmental disasters.[1] These events entail the loss of many lives and huge human suffering among those directly affected. In addition, neighboring countries are also affected because, willingly or not, they end up hosting a large part of the displaced populations.

It is important to study the economic consequences of receiving large inflows of forcibly displaced migrants. Identifying which groups in the hosting regions are bearing the largest economic burden, and adopting policies to alleviate it, is crucial in order to avoid backlash and foster integration. One of the first stages of this process requires obtaining and analyzing data in a timely fashion. This poses an important challenge to researchers and policy makers because the typical sources, population censuses and labor force surveys, are ill-suited to collect information pertaining to recently arrived migrants that are still in the process of settling down. As a result, researchers have to turn to new approaches to data collection and analysis.[2]

Our focus in this paper is on the Venezuelan exodus that started around year 2015. Between 2015 and 2020, it is estimated that over 4.3 million Venezuelans left their country. About 80% of these migrants have settled in Latin America and the Caribbean, with Colombia (about 1.5 million) and Peru (about 1 million) as the main destinations. Our analysis focuses on Ecuador, which started receiving significant inflows of Venezuelans around 2016 and is currently hosting around 400,000 Venezuelan migrants.

Our main goals are to analyze the determinants of the location choices of Venezuelan migrants within Ecuador and how they might affect the labor markets of the host regions. Crucially, we employ novel data based on mobile phone records to measure the geographical distribution of Venezuelan migrants across Ecuador's regions (*cantons*), which we merge with Ecuador's household labor force survey (*ENEMDU*). Methodologically, we create a wide range of regional labor market indicators, including participation and employment rates, along with measures of employment quality, informality and earnings. We also classify these regions (*cantons*) according to the density of Venezuelans in the corresponding population, and adopt a difference-in-difference estimation strategy that compares the evolution of our labor market indicators in regions that received immigrant inflows to regions that did not around the time of arrival of Venezuelan migrants. Additionally, we provide estimates for a variety of sub-samples that differ on the age,

gender and education levels of the native workers included in each case.

The main findings of the study are the following. First, based on our data, over 400,000 Venezuelans were living in Ecuador in the first quarter of 2019, which amounts to almost 3% of Ecuador's population. We also observe that four *cantons* (out of a total of 221) host 52% of Venezuelan migrants.[3] Secondly, Venezuelan migrants are highly geographically mobile, mainly choosing to locate in higher income regions, with the point of entry into Ecuador explaining only a small part of the regional distribution of Venezuelan workers. Third, our difference-in-difference estimates show a deterioration of the labor market conditions for some vulnerable groups of workers in the cantons that received the highest influx of Venezuelans (relative to population). In particular, we uncover a reduction in female labor force participation and a worsening of the quality of employment among young, low-educated native workers.

The rest of the paper is structured as follows. Section 2 reviews the recent literature. Section 3 describes the events that led to the Venezuelan crisis, the economic situation in Ecuador at the time of their arrival and the challenges arising from their integration. Section 4 discusses our main data sources. Section 5 presents the analysis of the location choices of Venezuelan migrants within Ecuador. Section 6 contains our main findings along with robustness checks, and Section 7 concludes.

## 2 Contribution to the Literature

Our study contributes to the growing literature on the economic consequences of forced migration for host countries (Becker and Ferrara (2019)). Despite its enormous policy interest, this topic has remained understudied due to the scarcity of high quality data. Another challenge in the quantification of the effects on receiving communities is that the average impact on host communities is mixed because some native workers win while others lose (Ruiz and Vargas-Silva (2013)). As a result, studies based on methods that do not recognize this fail to uncover the differential impact on workers of different skill levels.

The main contribution of our paper is to provide the first analysis of the labor-market effects of Venezuelan migration to Ecuador, one of the main receivers of Venezuelans over the last few years. Our analysis makes use of new data based on cell phone contracts and usage that allow us to measure with a high degree of accuracy the density of Venezuelan migrants across Ecuador's geography.[4] In addition, we merge these data with Ecuador's household labor force survey, which allows us to analyze the labor market impact of the

influx of Venezuelans on different groups of native workers.

Over the last decade, the literature on the labor-market effects of forced migration has concentrated heavily on the analysis of the effects of Syrian refugees on Turkey's local labor markets. This research was pioneered by two related papers, Ceritoglu et al. (2017) and Tumen (2016). Using a difference-in-difference estimation strategy applied to labor market outcomes for natives, these studies find moderately negative effects on the employment rates of natives employed in the informal sector, though no effects on wages. The study by DelCarpio and Wagner (2015) extends the previous analyses by adopting an instrumental-variables estimation approach that controls for distance to the Syrian border, which helps purge confounding geographic factors. Their analysis largely corroborates the findings of the previously discussed studies, but also documents employment creation in the formal sector for native males with relatively high educational attainment, and negative wage effects mostly affecting low-educated and native female workers. Additional evidence of negative wage effects on these demographic groups is also provided by Balkan and Tumen (2016), Tumen (2018) and Loayza et al. (2018).

More recently, some research has emerged that analyzes the economic effects of the arrival of Venezuelans to Colombia, the main receiver of Venezuelan migrants. Specifically, Caruso et al. (2019) and Penaloza-Pacheco (2019) find evidence of negative effects in the informal sector that disproportionately affect low-skilled workers.

Our own findings in the context of Ecuador, together with the evidence emerging from the analysis of Syrian refugees in Ecuador and Venezuelans in Colombia, reveal a more general pattern: in large-scale episodes of forced migration, the most vulnerable workers in the host regions (such as low-educated youth) end up shouldering the burden of the adjustment due to increased labor-market competition. From a policymaking standpoint, it is therefore crucial to devise targeted interventions to alleviate the negative effects on these groups of workers in order to reduce the likelihood of conflict, facilitate the integration of the migrants, and reap the positive effects of migration that may materialize in the long run.

# 3 Context

The progressive deterioration of Venezuela's institutions and democracy has triggered one of the most severe crises in the Western Hemisphere in recent times. Between 2013 and 2018, Venezuela's GDP per capita fell by about 50% in real terms, and the country has been experiencing hyperinflation since 2017. As a result, poverty rates, crime and

child mortality have skyrocketed. Not surprisingly, Venezuela's economic and political collapse has given rise to a large exodus, mainly to other countries in Latin America and the Caribbean. As a result, over 4.3 million people have left the country (over 13% of the 2016 population), which has produced a refugee crisis of similar magnitude as those observed in Syria, Afghanistan, Somalia and South Sudan (OEA (2019)).

At the beginning of the Venezuelan crisis, Ecuador provided a sort of *humanitarian corridor* for Venezuelan migrants in transit from Colombia to Peru and other countries in the Southern Cone. However, increasing numbers of Venezuelans have chosen to settle in Ecuador, particularly from 2017 onward.[5] As a result, Ecuador has become the third largest receiver of Venezuelan migrants, following Colombia and Peru.[6]

The arrival of Venezuelan migrants coincided with an unfavorable economic context in Ecuador. The sharp fall in oil prices since 2014 drastically decreased government revenue and led to severe cuts in public spending. In this context, labor market conditions worsened rapidly: the level of employment fell and informality reached its highest level in over a decade. The economic downturn has also created challenging situations in the context of education and healthcare due to the clash between rising demand and reduced funding.

In this context, the arrival of Venezuelans was ill timed as it increased the pressure on public services at a time when Ecuadorans were experiencing service cuts and congestion. The influx of Venezuelans increased school enrollment (particularly in primary education) and the use of public health services, increasing healthcare and education costs of 39 million and 21 million dollars per year, respectively (WorldBank (2020)).[7] It is not surprising that instances of backlash against Venezuelan migrants cropped up in some of the main host regions. Specifically, WorldBank (2020) reports that in 2019 a large majority of Ecuadorans believe that Venezuelans negatively affect the economy and society in general. Likewise, the vast majority of Venezuelans in Ecuador report that they feel discriminated against in the labor market as well as in their access to housing and health services.

At the beginning of the Venezuelan exodus, several countries in the region (mainly Colombia, Chile, Ecuador and Peru) adopted policies to facilitate the legal entry of Venezuelan migrants into their countries. However, from the end of 2017 onward, these countries adopted increasingly restrictive measures aimed at reducing the inflow of Venezuelans into their countries. Partly in response to the adoption of similar restrictions in Colombia and Peru and partly because of the rise in anti-immigrant sentiment among Ecuadorans, in August 2018 Ecuador required valid passports with validity of

at least 6 months to Venezuelans applying for a residence permit and, one year later, moved on to require a humanitarian visa.

Our analysis in this paper contributes to the understanding of the social and political dynamics in Ecuador toward Venezuelan migrants by quantifying the labor market impact of Venezuelan immigration exploiting the regional variation in the concentration of Venezuelans. Our analysis also investigates the potentially divergent effects on different groups of native workers, defined on the basis of age, gender and education. Equipped with our findings, the Conclusions section will discuss what policy interventions might help mitigate the short-run costs associated with the massive incorporation of Venezuelan workers to Ecuador's labor market.

# 4 Data

We merge data from two sources: Ecuador's Quarterly Labor Force Survey (known as ENEMDU), which provides the data for the labor market outcomes at the regional level, and novel data on the geographical distribution of the Venezuelan population in Ecuador based on mobile phone records by *Telefonica Ecuador*.

## 4.1 Household Survey Data: ENEMDU

Our descriptive analysis uses data for the fourth quarter of the ENEMDU for years 2008-2019, restricted to the working-age population (age 15 or above) and aggregated to the *canton* level, but our regression analysis focuses on the period 2013-2019, which provides a tighter window around the onset of the arrival of Venezuelans into Ecuador. We analyze a wide range of canton-level labor market indicators: the participation rate, the employment-to-population ratio, and two indicators of the quality of employment (the rate of adequate employment and the rate of Informality). In addition, we also examine effects on monthly earnings and on hourly wages.[8] Since 2014 the data show increases in the participation rate (Figure 1), which is known to be countercyclical, and employment-to-population ratios. The data also show a clear deterioration of the quality of employment. This can be seen in terms of a falling rate of *adequate* employment among the working-age population (Figure 2, top), and the sharp increase in informality (bottom). Last, the data also shows a reduction in monthly earnings since 2015 (Figure 3, top) and stagnating hourly wages in 2015-2017 followed by a sharp reduction in 2017-2019 (bottom).

## 4.2 Mobile Phone Records: *Telefonica Ecuador*

The main challenge to carry out the analysis was the need to obtain accurate information on the size and geographic distribution of the Venezuelan immigrants in Ecuador. Prior to our study, the existing information regarding the size of the Venezuelan population in Ecuador was mainly based on official records of net migration flows. These data undercount, or miss altogether, individuals that entered the country without registration at an official point of entry. Furthermore, the existing data provide a very incomplete picture of the geographic distribution of Venezuelans within Ecuador. It is worth noting that characterizing this distribution is complicated by the high geographic mobility of recent migrants and the lack of baseline information in the traditional datasets, such as the Population Census or the ENEMDU.

Our approach to address these challenges has been to rely on mobile phone records. More specifically, the *World Bank* engaged in a collaboration with *Telefonica Ecuador*, one of the largest providers of mobile phone services in Ecuador that also has a large presence in Venezuela. Thus, it probably attracted as customers the majority of Venezuelans seeking to obtain cell phone service in Ecuador. As we explain in more detail in Appendix A, *Telefonica* used information on the nationality of the contract holder and the destination of calls and text messages to identify recent Venezuelan migrants, along with their area of residence in Ecuador.

In the present study we utilize these data for two purposes. First, we analyze the main factors that explain the location of Venezuelan migrants across Ecuador's 221 *cantons* (which, in turn, are grouped into 24 provinces). Second, we use the data to classify *cantons* according to the estimated density of Venezuelan migrants in the canton population. This allows us to compare the within-canton changes in labor market outcomes for *cantons* with varying densities of Venezuelans in their population.

At the country level, we estimate that about 470,095 Venezuelans were living in Ecuador in the first quarter of 2019. This amounts to about 3.7% of the working-age population. Table 1 presents the top 10 *cantons* by the estimated number of Venezuelan migrants. The data show high regional variation, ranging from *cantons* hosting over 80,000 Venezuelan migrants (Guayaquil and Quito) to others having virtually none. In fact, four *cantons* concentrate 52% of the 470,095 Venezuelan migrants estimated in the *Telefonica* data: Guayaquil (87,505), Quito (86,386), Manta (32,405), and Santo Domingo de los Tsachilas (26,721).[9]

# 5 Location Choices of Venezuelans in Ecuador

The goal of this section is to employ regression analysis to quantify the role played by a variety of geographic and economic factors in determining Venezuelans' choice of region (defined as a canton) in the vein of Beine et al. (2019).

The geographic factors we consider are the distances from each canton to the main gateways into Ecuador for Venezuelans. According to the Ecuador's official entry records, the majority of Venezuelans entered Ecuador by land from Colombia, through the Rumichaca bridge (82%) and, to a much lesser extent, through the points of entry of San Miguel (5%) and Huaquillas (7%). Almost all other Venezuelans arrived by air through the airports of Quito and Guayaquil (5%). In our analysis, we focus on 3 gateways: the Rumichaca bridge and the airports of Quito and Guayaquil. The second set of factors we consider measure local economic conditions. Specifically, we compute aggregate earnings at the canton level using the ENEMDU data.

The empirical model we estimate is the following: $Vz_c$ denotes the number of Venezuelans who settled in canton $c$ (though we also consider a logarithmic transformation of this variable). The right-hand side contains the (logs) of the distance to the three gateways (denoted by a single regressor $\ln Dist_c$ for simplicity) and the economic indicators of the region ($X_c$), which also help control for the economic size of the destination region, along with a disturbance term:

$$Vz_c = \alpha + \beta \ln Income_c + \gamma_1 \ln Dist_c + \gamma_2 \ln X_c + \varepsilon_c. \tag{1}$$

We estimate this model using data on the geographic distribution of Venezuelans in 2019 and ENEMDU data for that same year. Table 2 collects the estimates. In columns 1-3 the dependent variable is the number of Venezuelans settled in the canton in 2019 (in thousands). Column 1 includes only our measure of regional income, based on the wage bill in each canton.[10] The estimates show a positive and significant coefficient, suggesting that Venezuelans were attracted to higher-income cantons. Column 2 adds the logs of the distance from the canton to the three main gateways. We expected negative coefficients, indicating that migrants tend to remain close to the points of entry. However, this is only the case regarding the airports, although the coefficients are not statistically significant at conventional levels. In both specifications, the coefficient for the log of the wage bill is around 3, implying that regions with 1% higher income receive about 3,000 more Venezuelan migrants than otherwise similar cantons. In column 3, we decompose the wage bill into two components: employment and average wage per worker. In both cases

the coefficients are highly significant and are close to 3. Thus Venezuelan migrants are equally attracted to regions with higher levels of employment (largely because of their larger economic size) and higher wages per worker.

Columns 4-6 estimate the elasticity of migration to regional income, by employing logarithmic transformations of the dependent variable. Column 4 employs the log transformation and is our preferred specification. The estimates imply that *cantons* with 10% higher income receive approximately 7% more Venezuelan migrants than otherwise similar cantons. In addition, distance to the Rumichaca bridge and to Guayaquil's airport is found to be a significant determinant of the number of Venezuelans in the canton in year 2019. The latter observation will be exploited later on in the robustness section. Lastly, in columns 5 and 6 we use the inverse hyperbolic sine transformation of the dependent variable, which is defined at zero and thus preserves all the cantons in the sample. These estimates confirm the large role of a canton's size in an economic sense in explaining the location choices of Venezuelan migrants.

In conclusion, the estimates suggest that Venezuelan migrants are geographically mobile and that their location choices are fundamentally driven by the economy of the receiving region, even though there is some inertia with respect to their gateway of entry into Ecuador. It is interesting to note that our findings differ from those reported in Beine et al. (2019) in their analysis of the location choices of Syrian refugees across provinces in Turkey, which revealed a large and highly significant effect of distance to the border (and the occurrence of local boycotts and availability of economic aid). However, these authors did not find that economic activity at destination (measured by night-lights intensity) shaped migrants' location decisions. Thus, our findings underscore that forced migrants and refugees are also geographically mobile within the host country, particularly when they speak the language of the host country and do not face legal restrictions to their mobility.

# 6 Labor Market Effects

We now turn to our main goal in this paper, the estimation of the effects of Venezuelan migration on Ecuador's regional labor markets. Our analysis relies on the comparison of the changes in local labor market conditions in areas that received large inflows of Venezuelans relative to areas that did not. Importantly, we also examine whether the effects of immigration differ across different groups of workers, defined by education, age and gender.

## 6.1 Summary Statistics

We focus on the working-age population (age 15 and higher) and construct a variety of canton-year labor market outcomes: participation rate, employment-to-population ratio, the rate of adequate employment (relative to the working-age population), the rate of informality (defined as employment over working-age population), the log of earnings and the log of hourly wages.

Table 3 presents summary statistics for the 1,413 canton-year observations.[11] The (simple) mean working-age population across years and *cantons* is almost 58,000 individuals, corresponding to a 68% participation rate. Mean employment across *cantons* and years is slightly over 36,000 individuals, entailing an employment-to-population ratio of 66%. In addition, for the average canton-year cell, 21% of the working-age population have adequate employment and 44% are employed informally. Last, average monthly earnings were $331 and average hourly wages stood at $2.6 (at current prices). The table also reports our estimates of the number of Venezuelan migrants in each canton as of the summer of 2019. The average across *cantons* is 2,312 individuals, with a wide range of variation. As a percent of the population in the canton, the average share of Venezuelans across *cantons* is 3.8% but also displays large variability. As a percent of the population in Ecuador, our mobile records data imply that Venezuelan migrants make up 2.8% of the overall population and 3.7% of the working-age population.

## 6.2 Estimation Labor-Market Effects

Our analysis relies on the comparison of the changes in labor market outcomes (for different socio-demographic groups) across *cantons* that differ in the *density* of Venezuelan migrants relative to the canton's population. More specifically, we classify all *cantons* into three groups: low density ($< 2.5\%$), medium density (between 2.5% and 5%) and high density of Venezuelans ($> 5\%$). Our regression analysis will compare the evolution of several labor market indicators in the medium and high density groups relative to the low-density group before and after 2016, which we take as the first year with important inflows of Venezuelan migrants.[12] The low-density group contains 96 cantons, the medium density group contains 51 cantons and the high density group contains 31 cantons. In terms of working-age population, the low, medium and high groups account for 33%, 53% and 14%, respectively.

In all cases, our main specification is as follows. Outcome $y$ pertaining to canton $c$ (located in province $r$) and year $t$ is assumed to evolve according to

$$y_{c,r,t} = \alpha_c + \lambda_{r,t} + Post_t \times (\beta_1 T1_c + \beta_2 T2_c) + u_{c,r,t}, \quad (2)$$

where the dependent variable will be one of the labor market outcomes. The right-hand side of the model includes canton dummies so that the identifying variation is based on within-canton changes over time. In addition, $\lambda_{r,t}$ is a set of province-year fixed-effects that allows for diverging economic fluctuations, such as differences in the timing and intensity of the downturn affecting Ecuador in 2014 and the years that followed.

$Post_t$ is an indicator taking a value of one for years 2016-2019 and zero prior to that (2013-2015). The key explanatory variables are $T1_c$ and $T2_c$. These indicator variables identify *cantons* with, respectively, a medium ($2.5\% - 5.0\%$) and high ($> 5\%$) density of Venezuelan migrants in the canton's population in year 2019. The omitted category are *cantons* with the lowest density of Venezuelans ($< 2.5\%$). In our estimation we cluster standard errors at the canton levels, which allows for unrestricted correlation in the disturbance terms within cantons over time and across cantons located in the same province across arbitrary combinations of years.

Table 4 presents the estimates, which are based on the sample of working-age Ecuadorans.[13] The top panel estimates the models using the labor market indicators constructed using the whole working-age population. The estimates do not indicate any effects of Venezuelan migration on participation or employment rates, that is, we do not detect deviations in these labor market indicators of the high-Venezuelan-density regions in the post-2016 period relative to the low-density regions. Next, we turn to the labor-market indicators for the female population, which the literature has often shown to be adversely affected by inflows of refugees. The second panel in Table 4 presents estimates for the sample of females. The estimates suggest negative effects on participation and employment (columns 1 and 2). Thus, Venezuelan migrants appear to have displaced female natives out of the labor market.

The third panel in Table 4 focuses on the labor market indicators referring to young workers (ages 15-40) with low educational attainment, defined as having completed at most primary education. The estimates suggest a substantial worsening of the quality of employment and earnings for this group of workers in the regions with a high density of Venezuelan migrants, although the effects on earnings are estimated with much lower precision than the effects on the quality of employment. More specifically, the estimates imply that the rate of adequate employment fell by 5 percentage points and the rate of informality increased by 8 percentage points in the regions with the highest density of

Venezuelan migrants. These results echo the findings of the studies analyzing the effects of the inflows of Syrian refugees on regional labor markets in Turkey (Ceritoglu et al. (2017), Tumen (2016), DelCarpio and Wagner (2015)) and of the arrivals of Venezuelans in Colombia (Caruso et al. (2019)). Last, we also note that the pattern of the estimated coefficients is similar for the regions with medium levels of Venezuelan migration relative to their population ($T1$), but the magnitudes are much smaller and we cannot reject the zero null hypotheses.

It is interesting to compare the effects on the indicators for low-educated workers to those for workers with tertiary education (and ages 15-40), presented in the bottom panel. The estimates suggest substantial reductions in participation and employment (of about 11 log points) for these workers in the regions with high concentrations of Venezuelans, but no evidence of worsening in the quality of employment or reductions in wages. In fact, the estimates show a large *reduction* in informality (relative to the working-age population) for these workers after 2016 in the regions with high density of Venezuelans. A plausible interpretation for these findings is that, in regions receiving large inflows of Venezuelans, young Ecuadoran workers with at least some college education may have responded to the inflows by extending their educational investments.

In sum, the above estimates suggest that high concentrations of Venezuelan migrants relative to the canton's population are associated with displacement of women out of the labor market and a worsening of the quality of employment and wages for young, low-educated workers. This finding is a bit puzzling with the evidence reported in our companion paper Olivieri et al. (2020), which shows that Venezuelans migrants are, on average, substantially more educated than the average Ecuadoran worker. However, the same study shows that Venezuelan workers are heavily concentrated in low-skilled jobs in the informal sector, thus competing head-to-head with inexperienced, low-skilled natives.

## 6.3 Robustness

### 6.3.1 Parallel trends in pre-treatment period

It is well known that causal interpretations of difference-in-difference estimates require assuming that the treatment group would have evolved along a parallel trend with respect to the control group in the absence of the treatment. Naturally, this assumption is not testable. To assess the credibility of this assumption we conduct a test of parallel trends in the pre-treatment period. Specifically, we consider the two years (2011 and 2015) that

define the beginning and end of the pre-treatment period – recall that the acceleration in the arrivals of Venezuelan workers into Ecuador started in 2016. For each canton, we compute the change in all outcomes between the two years, which delivers a cross-section of changes at the canton level. In essence, we test whether the coefficients for the indicators of the treatment groups (T1 and T2) are different from zero. Rejection of the zero null hypothesis for the coefficients of either treatment variable provides evidence of differential pre-treatment trends relative to the control group (cantons with low density of Venezuelans).

We focus on our main sample, composed of low-educated youth (age 15-40) born in Ecuador. As can be seen in Table 5, we do not reject the zero null hypotheses at 5% significant levels in any of the columns, and only once at the 10% significance level in Column 2. Thus, these tests do not uncover any evidence of differential pre-trends in the treatment group of cantons.

### 6.3.2 Endogenous location decisions

Before embracing a causal interpretation of our estimates, it is important to note that this relationship might be spurious. This would be the case if Venezuelans had chosen to settle in regions that were already experiencing a worsening of economic conditions among female or low-educated workers. However, this seems implausible in light of our analysis of the determinants of the geographic distribution of Venezuelans. As we discussed earlier, Venezuelan migrants gravitated toward the higher-income regions in Ecuador. Hence, they probably chose to locate disproportionately in the regions with *faster* growing economies.

Nonetheless, we now adopt an instrumental-variables approach to obtain estimates that may arguably be robust to migrants' endogenous location choices. Specifically, we now consider our main regressors (interaction terms $Post_t \times T1_c$ and $Post_t \times T2_c$) as potentially endogenous. Building on our earlier analysis in Section 5, our instruments are based on the distance between each canton and the main entry points of Venezuelans into Ecuador. We then interact each of the distance variables with the $Post_t$ indicator. Intuitively, when inflows of Venezuelans into Ecuador accelerated (from 2016 onward) we expect that a disproportionate number of them will locate in cantons closer to the main points of entry.

Table 6 collects the results. We begin by testing the relevance of the instrument by means of the first-stage regressions. Columns 1 and 2 show that our instruments are

unable to predict which cantons will host moderate amounts of Venezuelans relative to overall population (indicator $T1$), but are more successful in predicting which cantons end up with a high density of Venezuelans (indicator $T2$). In particular, these cantons tend to be close to the Guayaquil airport and to the Rumichaca bridge. Because our instruments are only successful in predicting the high-intensity treatment, we restrict the estimation to this single treatment and drop canton-year observations corresponding to the low-intensity treatment ($T1_c = 1$). As seen in Column 3, when we do this the F test for the relevance of the instruments increases substantially, though it is still below the usual values and will likely deliver noisy second-stage estimates.

Turning now to the instrumental-variables estimates of the labor market effects of immigration, Columns 4-9 paint a similar picture as in our main estimates (in Table 4): a worsening of the quality of the employment of young, low-educated workers and a potentially negative effect on the earnings of these workers. As expected, the precision of these estimates is much lower than in our (non-IV) difference-in-difference estimation. In any case, the instrumental-variables estimates provide additional support for our main findings.

# 7 Conclusions

Our analysis has shown that Venezuelans' location choices have been fundamentally driven by the size of regional economies, although distance to the point of entry into the country also helps explain these choices. In addition, we have found a worsening of labor market conditions for some groups of the native population in cantons with a high density of Venezuelan workers (relative to population). In particular, we found evidence of a reduction in female labor force participation and a worsening in the quality of employment for young, low-educated Ecuadoran workers. Our findings are in line with recent studies analyzing the labor market effects of Syrian refugee inflows into Turkey, which also find that the burden of the adjustment to the influx of migrants is disproportionately borne by the more vulnerable workers in the host regions.

It is also important to highlight that the influx of migrants can lead to a long-run increase in economic prosperity, both for the migrants and the host regions, due to increased investment and the creation of new businesses. With this in mind, the Ecuadoran government should adopt policies to reduce the short-run costs of migration and to speed up the transition to the new steady state. In particular, the government should devote resources to alleviate the burden on the most vulnerable workers in the affected areas.

Additionally, the government should help Venezuelan migrants gain access to jobs in the formal market (as advocated by Clemens et al. (2018)) and facilitate the transfer of educational credentials. These measures would help shift competition away from the most disadvantaged workers and also increase the productivity of Venezuelan migrants.

# Notes

1. In the years prior to 2017, about 2.4 million people fled South Sudan. Likewise, it is estimated that 6.3 million people were displaced from the Syrian Arab Republic (Syria) between 2011 and 2017.

2. For instance, Hausmann et al. (2018) used *Twitter* data to estimate that close to 3 million Venezuelans left the country in year 2017.

3. The cantons containing Quito and Guayaquil host over 85,000 Venezuelan migrants each.

4. Beine et al. (2019) have also used cell phone records in the context of Syrian refugees in Turkey, but their analysis is limited to refugees' location choices and they do not analyze labor market outcomes.

5. At the time, less than 1% of Ecuador's population was foreign-born and Colombia was the main origin country. The influx of Ecuadorans doubled or tripled the foreign-born population in the country within just a few years.

6. The World Bank estimates that 1.4 million Venezuelan migrants are hosted by Colombia (WorldBank (2018)) and 0.9 million by Peru (WorldBank (2019)). Correspondingly, the shares of Venezuelan migrants in these two countries (relative to their populations) are 2.8 and 2.6 percent, respectively.

7. In year 2019, 3.5% of the births in Ecuador corresponded to Venezuelan mothers.

8. Our definition of the rates of adequate employment and informality use the working-age population in the corresponding denominators.

9. The highest concentrations of Venezuelans, relative to the canton's population, are found in a few sparsely populated cantons. The ENEMDU survey is not representative of those populations and we omit those cantons from our regression analysis.

10. Recall that, in many contexts, overall GDP is close to proportional to the wage bill. From a theoretical viewpoint, this is exactly the case in a competitive economy when the aggregate production function is Cobb-Douglas.

11. After excluding the cantons with very low population, our sample is left with 200 out of the total of 221 cantons in Ecuador.

12. It is worth noting that the two *cantons* with the largest numbers of Venezuelan migrants (Quito and Guayaquil) are in the medium-density group. We estimate the density of Venezuelan migrants in the

working-age population of these two cantons at 4.3% (Table 1). The cantons of Quito and Guayaquil together make up 32% of the working-age population in Ecuador.

13. In all specifications, observations are weighted by the population in the canton in the initial year.

# References


Balkan, Binnur and Semih Tumen, "Immigration and prices: quasi-experimental evidence from Syrian refugees in Turkey," *Journal of Population Economics*, July 2016, *29* (3), 657–686.

Becker, Sascha O. and Andreas Ferrara, "Consequences of forced migration: A survey of recent findings," *Labour Economics*, 2019, *59* (C), 1–16.

Beine, Michel, Luisito Bertinelli, rana Comertpay, Anastasia Litina, Jean-Franois Maystadt, and Benteng Zou, "Refugee Mobility: Evidence from Phone Data in Turkey," CREA Discussion Paper Series 19-01, Center for Research in Economic Analysis, University of Luxembourg 2019.

Caruso, German, Christian Gomez Canon, and Valerie Mueller, "Spillover effects of the Venezuelan crisis: migration impacts in Colombia," *Oxford Economic Papers*, 11 2019. gpz072.

Ceritoglu, Evren, H. Burcu Gurcihan Yunculer, Huzeyfe Torun, and Semih Tumen, "The impact of Syrian refugees on natives labor market outcomes in Turkey: evidence from a quasi-experimental design," *IZA Journal of Labor Policy*, December 2017, *6* (1), 1–28.

Clemens, Michael, Cindy Huang, and Jimmy Graham, "The Economic and Fiscal Effects of Granting Refugees Formal Labor Market Access," Working Papers 496, Center for Global Development October 2018.

DelCarpio, Ximena Vanessa and Mathis Christoph Wagner, "The impact of Syrian refugees on the Turkish labor market," Policy Research Working Paper Series 7402, The World Bank August 2015.

Hausmann, Ricardo, Julian Hinz, and Muhammed A. Yildirim, "Measuring Venezuelan Emigration with Twitter," CID Working Papers 342, Center for International Development at Harvard University May 2018.

Loayza, Norman V., Gabriel Ulyssea, and Tomoko Utsumi, "Informality and the Labor Market Effects of Mass Migration: Theory and Evidence from Syrian Refugees in Turkey," Technical Report, Manuscript 2018.

OEA, "Report Venezuela Working Group," Technical Report, OEA 2019.

Olivieri, Sergio Daniel, Francesc Ortega, Ana Mercedes Rivadeneira Alava, and Eliana Carranza, "Shoring Up Economic Refugees : Venezuelan Migrants in the Ecuadoran Labor Market," Policy Research Working Paper Series 9332, The World Bank July 2020.

Penaloza-Pacheco, Leonardo, "Living with the Neighbors: The Effect of Venezuelan Forced Migration on Wages in Colombia," CEDLAS, Working Papers 0248, CEDLAS, Universidad Nacional de La Plata July 2019.

Ruiz, Isabel and Carlos Vargas-Silva, "The Economics of Forced Migration," *Journal of Development Studies*, June 2013, *49* (6), 772–784.

Tumen, Semih, "The Economic Impact of Syrian Refugees on Host Countries: Quasi-experimental Evidence from Turkey," *American Economic Review*, May 2016, *106* (5), 456–460.

_ , "The Impact of Low-Skill Refugees on Youth Education," IZA Discussion Papers 11869, Institute of Labor Economics (IZA) October 2018.

WorldBank, "Migracion desde Venezuela a Colombia," Technical Report, Washington, DC: World Bank Group 2018.

_ , "Una Oportunidad para Todos : Los Migrantes y Refugiados Venezolanos y el Desarrollo del Peru," Technical Report, Washington, DC: World Bank Vol. 2 2019.

_ , "Retos y oportunidades de la migracin venezolana en Ecuador," Technical Report, Quito, Ecuador. Washington, DC: World Bank Group 2020.

Table 1: Estimated Venezuelan Population (2019Q1) by *canton*

| Canton | Canton Name | Province | Venezuelans | Venez/WAP % |
|---|---|---|---|---|
| Top 10 cantons | | | | |
| 901 | GUAYAQUIL | GUAYAS | 87,505 | 4.3 |
| 1701 | QUITO | PICHINCHA | 86,386 | 4.3 |
| 1308 | MANTA | MANABI | 32,405 | 3.6 |
| 2301 | STO. DOMINGO TSACHILAS | STO. DOMINGO | 26,721 | 7.0 |
| 101 | CUENCA | AZUAY | 14,055 | 3.1 |
| 701 | MACHALA | EL ORO | 11,344 | 5.2 |
| 1301 | PORTOVIEJO | MANABI | 9,663 | 4.5 |
| 801 | ESMERALDAS | ESMERALDAS | 7,805 | 3.5 |
| 1001 | IBARRA | IMBABURA | 7,524 | 7.8 |
| 2403 | SALINAS | SANTA ELENA | 7,460 | 24.4 |
| All cantons | | | | |
| Mean | | | 2,103 | 3.7 |
| Min | | | 0 | 0 |
| Max | | | 87,505 | 78.3 |
| Std. dev. | | | 8,734 | 4.9 |

Notes: Data from *Telefonica Ecuador*, first quarter 2019. The last column is the ratio between the estimated number of Venezuelans in the canton and the working-age population in December 2018 (ENEMDU). The top panel reports on the top 10 cantons by overall number of Venezuelans living in the canton. The bottom panel of the table presents summary statistics on the 221 cantons in Ecuador.

Table 2: Geographic distribution Venezuelan population 2019 across *cantons* in Ecuador

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Dep. Var. | Vz2019 | Vz2019 | Vz2019 | ln Vz2019 | ln2 Vz2019 | ln2 Vz2019 |
| ln wage bill | 3.17*** | 2.85*** | | 0.67*** | 0.46*** | |
| | [1.18] | [0.96] | | [0.06] | [0.04] | |
| ln emp | | | 2.84*** | | | 0.48*** |
| | | | [1.00] | | | [0.05] |
| ln avg wage | | | 2.85** | | | 0.44*** |
| | | | [1.19] | | | [0.09] |
| ln dist Rumichaca | | 0.93 | 0.93 | -0.35*** | -0.13 | -0.14 |
| | | [2.81] | [2.83] | [0.13] | [0.10] | [0.10] |
| ln dist Airport Quito | | -2.50 | -2.50 | 0.04 | -0.01 | 0.00 |
| | | [4.07] | [4.12] | [0.15] | [0.14] | [0.14] |
| ln dist Airport Guayaquil | | -1.45 | -1.45 | -0.20* | -0.12 | -0.11 |
| | | [2.40] | [2.38] | [0.10] | [0.08] | [0.08] |
| Constant | -53.38*** | -32.34*** | -5.65 | -9.36*** | -6.01*** | -2.05** |
| | [20.40] | [9.85] | [8.89] | [1.62] | [1.12] | [0.95] |
| Observations | 182 | 182 | 182 | 158 | 182 | 182 |
| R-squared | 0.26 | 0.28 | 0.28 | 0.58 | 0.60 | 0.61 |

Notes: The unit of observation are cantons. Out of the 221 *cantons* in Ecuador, 21 were discarded because of their small population size. Out of the remaining 200, only 182 could be matched both in ENEMDU and in *Telefonica* data. The canton aggregates (e.g. wage bill) are computed using the survey weights. In columns 1-3 the dependent variable is the count of Venezuelans in the canton in 2019 (in thousands). In column 4 the dependent variable is the log of the number of Venezuelans in 2019. Because some *cantons* have zero Venezuelan migrants the number of observations is lower. In columns 5-6 we employ a different logarithmic transformation, the inverse hyperbolic transformation, which has the advantage of being well defined at zero. The interpretation of the coefficient as an elasticity is the same as in the usual log transformation. In columns 4-5 the explanatory variables are also transformed in the same way as the corresponding dependent variable. The inverse hyperbolic transformation is defined by $f(x) = \ln(x + \sqrt{1 + x^2})$ and we denote it by *ln2*. Standard errors are heteroskedasticity-robust. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 3: Summary statistics ENEMDU 2013-2019

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| Year | 1,413 | 2016.006 | 1.987 | 2013 | 2019 |
| Working-age population (WAP) | 1,413 | 57885.42 | 187275.8 | 234.465 | 2028898 |
| Labor-market participants | 1,413 | 38051.45 | 120467.4 | 174.699 | 1289999 |
| Employment | 1,413 | 36377.61 | 114060.5 | 174.699 | 1248643 |
| Employment - Adequate | 1,413 | 16547.62 | 69000.53 | 0 | 783017.6 |
| Employment -Informal | 1,413 | 20555.01 | 54680.81 | 124.128 | 673030.9 |
| Venezuelans 2019 | 1,413 | 2311.8 | 9160.554 | 0 | 87505 |
| Vz2019/WAP | 1,413 | .038 | .054 | 0 | .783 |
| Monthly earnings | 1,413 | 331.58 | 169.28 | 35.2 | 2576.43 |
| Hourly wages | 1,413 | 2.59 | .988 | .304 | 16.538 |
| Participation rate (PR) | 1,413 | .685 | .106 | .36 | 1 |
| Employment rate (EPR) | 1,413 | .664 | .111 | .36 | 1 |
| Emp. Adequate / WAP (AER) | 1,413 | .213 | .108 | 0 | .711 |
| Emp. Informal / WAP (Infor) | 1,413 | .444 | .164 | .065 | 1 |

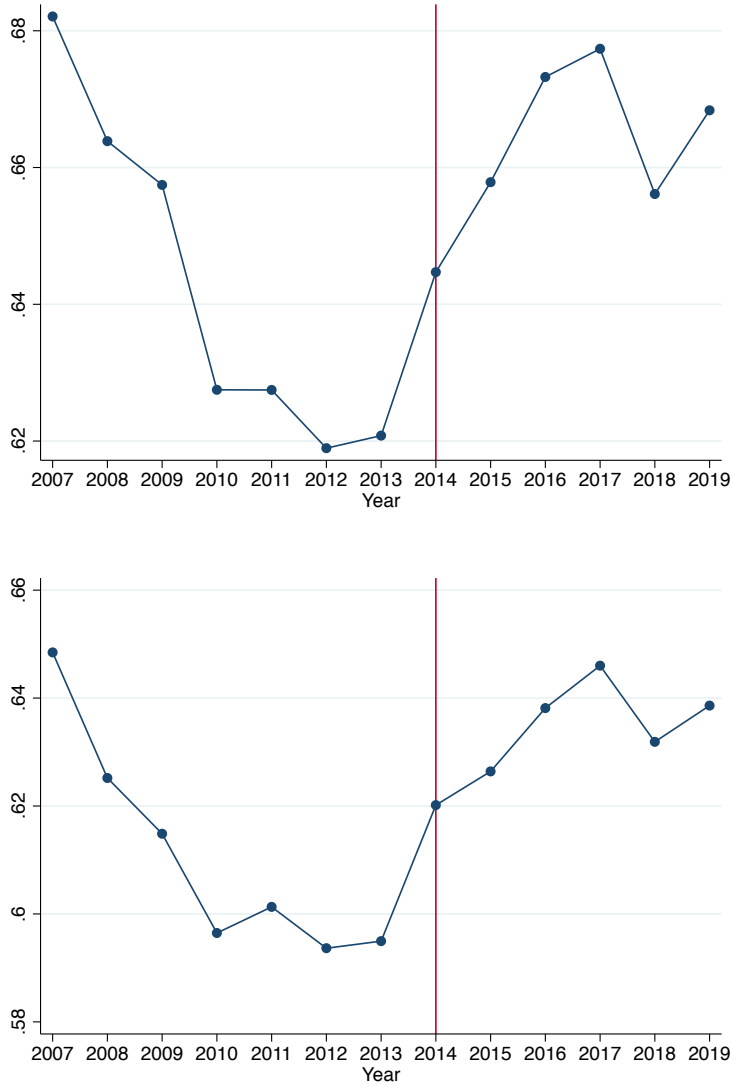
Notes: ENEMDU 2013-2019, for all the 221 cantons. Participation rate = Participants/WAP, Employment rate = Employment/WAP. Earnings are in USD.

Table 4: Difference-in-Difference Estimates, 2013-2019. Only Natives

| Dep. Var. | (1) PR LF/WAP | (2) ER Emp/WAP | (3) AER AdeEmp/WAP | (4) Inform Inf/WAP | (5) Ln Earnings | (6) Ln wh Ln Earning/Hours |
|---|---|---|---|---|---|---|
| All workers | | | | | | |
| Post × T1 | -0.01 | -0.01 | -0.00 | -0.00 | 0.02 | 0.01 |
| | [0.008] | [0.008] | [0.006] | [0.011] | [0.029] | [0.028] |
| Post × T2 | -0.01 | -0.02 | -0.01 | -0.02 | -0.01 | 0.00 |
| | [0.010] | [0.012] | [0.008] | [0.016] | [0.043] | [0.043] |
| Females | | | | | | |
| Post × T1 | -0.02** | -0.02* | -0.01 | -0.01 | -0.00 | 0.03 |
| | [0.011] | [0.013] | [0.009] | [0.013] | [0.068] | [0.046] |
| Post × T2 | -0.04*** | -0.04*** | -0.00 | -0.02 | 0.12 | 0.07 |
| | [0.013] | [0.014] | [0.009] | [0.015] | [0.076] | [0.053] |
| Primary1540 | | | | | | |
| Post × T1 | 0.03 | 0.03 | -0.01 | 0.06 | -0.05 | -0.04 |
| | [0.034] | [0.033] | [0.020] | [0.043] | [0.128] | [0.104] |
| Post × T2 | 0.03 | 0.03 | -0.05*** | 0.08** | -0.17* | -0.12* |
| | [0.026] | [0.026] | [0.016] | [0.031] | [0.090] | [0.071] |
| Tertiary1540 | | | | | | |
| Post × T1 | 0.10* | -0.01 | 0.04 | -0.10 | -0.02 | -0.03 |
| | [0.062] | [0.058] | [0.095] | [0.076] | [0.247] | [0.126] |
| Post × T2 | -0.11*** | -0.11*** | 0.03 | -0.14*** | 0.14 | 0.05 |
| | [0.041] | [0.038] | [0.058] | [0.047] | [0.122] | [0.085] |
| Observations | 1,292 | 1,292 | 1,292 | 1,292 | 1,292 | 1,292 |
| Number of canton | 200 | 200 | 200 | 200 | 200 | 200 |

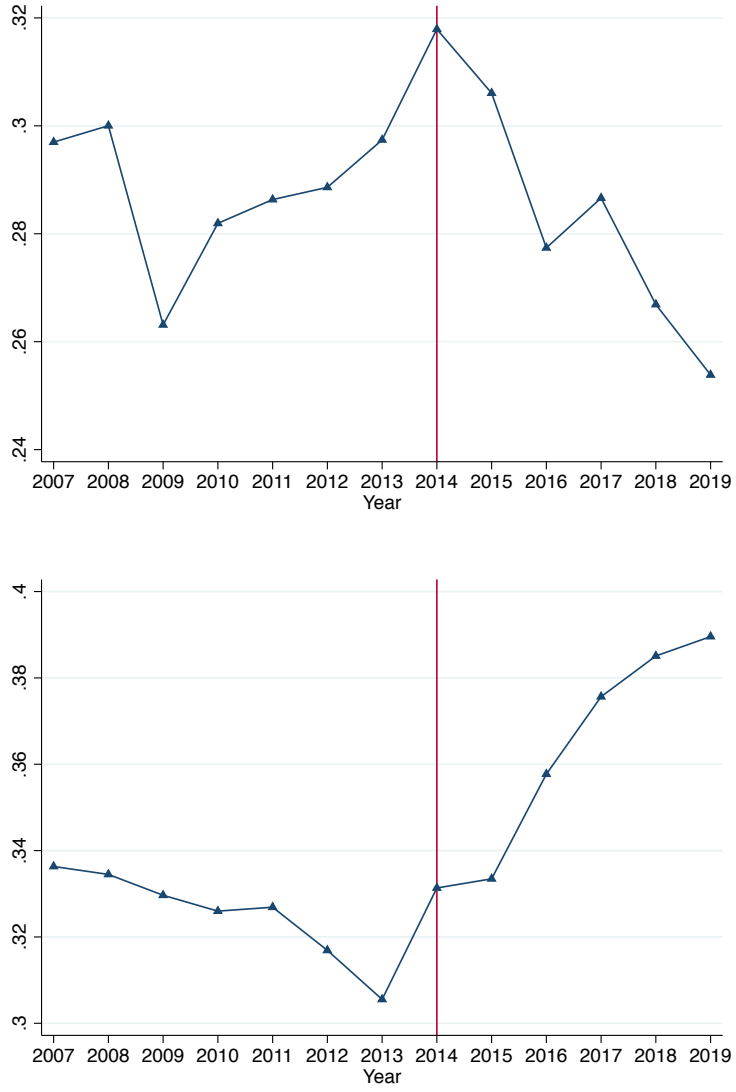
Notes: All specifications include province-year trends (fixed effects) and observations are weighted by average population in the canton. The dependent variables are (1) Participation rate, (2) Employment rate, (3) Adequate Employment rate, (4) Informality rate, (5) Log earnings and (6) Log earnings per hour. The data source is *ENEMDU* 2013-2019 (population age 15 or above and born in Ecuador) merged with the canton-level density of Venezuelans in 2019 (*Telefonica Ecuador* dataset). *Post* indicator takes value of one for years 2016-2019. We have excluded the bottom 10% of *cantons* with the lowest population. Standard errors are clustered at the canton level.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Figure 1: Participation rate (top) and Employment-to-Population ratio (bottom)



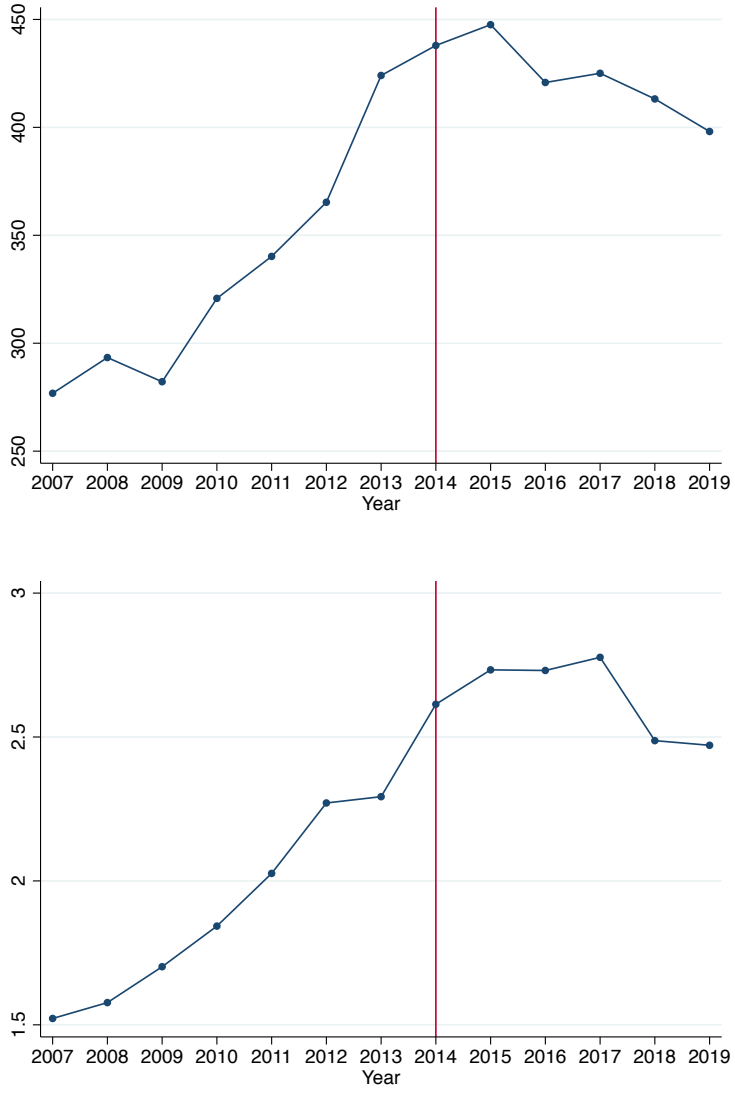

Notes: The figures plot the participation rate (top) and employment-to-population rate for Ecuador as a whole. In both cases, the denominator is the working-age population. The data is ENEMDU 2007-2019.

Figure 2: Adequate Employment rate (top) and Informality rate (bottom)




Notes: The figures plot the ratio of adequate employment to working-age population (top) and the ratio of informal employment to working-age population (bottom) for Ecuador as a whole. In both cases, the denominator is the working-age population. The data is ENEMDU 2007-2019.

Figure 3: Monthly earnings (top) and Hourly wages (bottom) in US $




Notes: The figures plot the average monthly earnings (top) and the average hourly wage (bottom) for Ecuador as a whole. The data is ENEMDU 2007-2019.

# Appendix

## A Data Sources

### A.1 Labor market data: ENEMDU

ENEMDU is the official labor market survey for Ecuador.[14] It is a nationally representative household survey that collects information on individual characteristics, employment status and sources of income for individuals living in Ecuador.

Our regression analysis is conducted at the canton level. All canton-year aggregates have been computed using the survey weights. For our estimation sample, we eliminate the 21 smallest *cantons* in terms of population. Specifically, we drop cantons with fewer than 4,000 individual observations in the ENEMDU. As a result, our analysis is based on 200 of the 221 overall number of *cantons*. The data for 2019 corresponds to the second quarter, which was the most recent one available at the time of conducting the analysis.

### A.2 Geographical distribution of Venezuelans in Ecuador: *Telefonica Ecuador*

*Telefonica Ecuador* keeps millions of geocoded records of phone calls and data use on a daily basis (known as CDRs). These data were the basis for the estimation of the number of cell phone lines pertaining to Venezuelan nationals along with their geographic distribution (at the level of Census tracts). This procedure had three separate stages:

1. **Activated mobile phones.** Specifically, a mobile phone was considered activated if it was used at least 60 times in 30 different days over the last 90 days. The uses considered were: turned on/off, received/initiated a call, received/sent a text message, or transferred data over the internet.

2. **Activated mobile phones belonging to Venezuelan nationals.** Activated mobile phones were considered as likely belonging to Venezuelan users if they were registered to a Venezuelan citizen or if was used at least 30 times over the previous 30 days to initiate/receive a call to/from Venezuela; to send/receive a text message to/from Venezuela; web searches or visits to websites considered of interest to the Venezuelan population (such as "visa for Venezuelans" or "job opportunity").

3. **Assignment to a Census tract.** Each Activated Venezuelan mobile phone was assigned to the Census tract with the highest probability of containing the user's residence. This assignment was based on the events generated during the night time (8pm to 6am) since most users are likely to be in their homes during these hours.

This method determines the number of *Telefonica Ecuador* users residing in each Census tract, together with how many of those are likely to be Venezuelan. These counts were later adjusted using canton-level weights on the basis of *Telefonica*'s market share in order to estimate the total counts of mobile phones pertaining to Venezuelans and to the overall population in the canton across all companies. We adjusted these figures further in order to account for the share of the population owning mobile phones on the basis of the overall number of households in the 2010 Population Census.

# B Additional Tables

Table 5: Pre-treatment Trends. Natives with primary education (age 15-40)

| Primary1540 Changes | (1) PR | (2) ER | (3) AER | (4) Inform | (5) Ln Earnings | (6) Ln Earnings/Hours |
|---|---|---|---|---|---|---|
| T1 | -0.05 | -0.11* | -0.11 | -0.01 | -0.17 | -0.04 |
| | [0.059] | [0.060] | [0.124] | [0.073] | [0.238] | [0.150] |
| T2 | 0.01 | -0.04 | -0.09 | 0.03 | -0.25 | 0.02 |
| | [0.040] | [0.043] | [0.117] | [0.046] | [0.221] | [0.106] |
| Observations | 165 | 165 | 165 | 165 | 161 | 161 |

Notes: The dependent variables are the changes between 2011 and 2015 of the corresponding variable. Thus, the sample is simply a cross-section of changes between the two years at the canton level. All specifications include province fixed-effects, which amounts to province-level trends. Observations are weighted by average population in the canton. The dependent variables are the changes of (1) Participation rate, (2) Employment rate, (3) Adequate Employment rate, (4) Informality rate, (5) Log earnings and (6) Log earnings per hour. The data source is *ENEMDU* 2011 and 2015 (population age 15-40, born in Ecuador, with at most primary education) merged with the canton-level density of Venezuelans in 2019 (*Telefonica Ecuador* dataset). We have excluded the bottom 10% of *cantons* with the lowest population and cantons with missing data in at least one of the years (resulting in 165 cantons in columns 1-4 and 161 in columns 5-6). Standard errors are heteroskedasticity-robust. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 6: Instrumental-variables Estimates, 2013-2019. Young natives with low educational attainment.

| | (1) Post × T1 | (2) Post × T2 | (3) Post × T2 | (4) PR | (5) ER | (6) AER | (7) Inform | (8) Ln Earnings | (9) Ln Earnings/Hours |
|---|---|---|---|---|---|---|---|---|---|
| Post × AirGuayaquil | 0.33 | -2.17** | -2.00*** | | | | | | |
| | [0.797] | [1.024] | [0.640] | | | | | | |
| Post × AirQuito | -1.22 | 0.98 | -0.25 | | | | | | |
| | [1.039] | [1.292] | [0.840] | | | | | | |
| Post × BridgeRumichaca | 0.45 | -1.65 | -1.16 | | | | | | |
| | [1.007] | [1.395] | [1.109] | | | | | | |
| Post × T2 | | | | 0.20 | 0.29* | -0.18* | 0.38* | -0.35 | -0.29 |
| | | | | [0.169] | [0.173] | [0.100] | [0.198] | [0.319] | [0.296] |
| Observations | 1,275 | 1,275 | 1,196 | 1,196 | 1,196 | 1,196 | 1,196 | 1,182 | 1,182 |
| F test | 1.15 | 1.51 | 3.72 | | | | | | |

Notes: All specifications include province-year trends (fixed effects) and observations are weighted by average population in the canton. We consider three instrumental variables based on distance (in km) from the centroid of each canton to the Guayaquil airport, the Quito airport and the Rumichaca bridge. These variables are interacted with the *Post* indicator, which takes a value of one for years 2016-2019. Columns 3-9 exclude the canton-year observations pertaining to cantons with a medium presence of Venezuelans in 2019 ($T1 = 1$) so that the control group is composed of cantons with below-average density of Venezuelans. The F test reported at the bottom of the table refers to the joint test of zero coefficients for the three instruments. The dependent variables are (1) Post×T1, (2,3) Post×T2, (4) Participation rate, (5) Employment rate, (6) Adequate Employment rate, (7) Informality rate, (8) Log earnings and (9) Log earnings per hour. The data source is *ENEMDU* 2013-2019 (population age 15 or above and born in Ecuador) merged with the canton-level density of Venezuelans in 2019 (*Telefonica Ecuador* dataset). We have excluded the bottom 10% of *cantons* with the lowest population because of high measurement error in the treatment variable. Standard errors are clustered at the canton level.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.