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Fernando Morales
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Venezuelan Migration in Peru: Short-term Adjustments in the Labor Market*

Fernando Morales and Martha Denisse Pierola†

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Abstract

The Venezuelan migration to Peru has been growing at fast speed since 2016 reaching a peak in 2018. Using a panel that allows us to control for individual effects, we study the heterogeneous short-term responses to the inflow of Venezuelan migrants in terms of employment, informality and earnings of Peruvian workers during 2008-2018. We find that a 1 pp increase in the share of Venezuelan migrants in Peru is associated with: a) a 1.5 pp increase in the probability of being employed for workers with tertiary education in the non-service sector; b) a 1 pp decrease in the probability of having an informal job for workers with tertiary education in the non-service sector; and c) a 3.2 percent decrease in real monthly earnings for workers with secondary education and a formal job in the service sector.

Keywords: Venezuelan migration, labor supply shock
JEL codes: F22, J21, J24, J30, J46, J61, R23

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†Inter-American Development Bank. E-mails: mpierola@iadb.org (corresponding author) fenriquem@iadb.org

1 Introduction

The exodus of Venezuelan citizens, which largely intensified since 2015, is on a path to become the largest refugee crisis globally (Bahar and Dooley, 2019). Massive flows of Venezuelan citizens have settled into other countries, most of them nearby, in an attempt to find better opportunities. Although Colombia is the country that has received the largest inflow of Venezuelan migrants (1.8 million as of July 2020), Peru is the second one with nearly 830,000.[1]

The presence of Venezuelan migrants in Peru is not a novelty. There has always been Venezuelan migrants in Peru, although traditionally in very low numbers. For instance, until 2010, there were only 4,800 Venezuelan migrants in Peru - equivalent to 1.3 percent of the migrant population that year. However, during the past 5 years, the population of Venezuelan migrants in Peru has grown at an increasingly fast pace. Particularly, since 2016, the number of Venezuelan migrants in Peru has been growing at annual rates above 100 and reached a peak in 2018 with over half a million migrants entering that year alone.[2]

The inflow of Venezuelan migrants in recent years was a shock to the Peruvian labor market. In terms of its sheer size, as Asencios and Castellares (2019) observe, the inflow of Venezuelan migrants in 2018 was as large as the inflow of Peruvian citizens that entered the working population at a national level. It was between two and three times the inflows observed in Lima and Callao, the geographical areas where the majority of Venezuelan migrants have settled.[3]

Although the Peruvian economy has grown at a slower pace since 2015, the domestic labor market has been able to absorb the supply shock represented by Venezuelan migrants almost in its full extent. Based on information collected by the Peruvian National Institute of Statistics (INEI), near 94 percent of the Venezuelan migrants in Peru are employed (INEI, 2018b). However, despite being a highly skilled population (at least relative to their Peruvian counterparts), the overwhelming majority of Venezuelan migrants are employed in the informal sector with lower earnings relative to the formal sector, and performing tasks disconnected from their skills (World Bank, 2019), mostly in the service and commerce sectors (INEI, 2018b). Thus, for

[1] Plataforma de coordinación para refugiados y migrantes de Venezuela (2020).

[2] Calculations based on data from *Superintendencia Nacional de Migraciones de Perú.*

[3] INEI (2018b)

instance, it is not uncommon to find Venezuelan engineers or lawyers driving Ubers in Lima or selling clothes, food, etc. in small establishments or even in the streets. Migrants' skill downgrading, which describes the situation of many migrants working in jobs for which they are overqualified, is common in many Latin American countries and Peru is no exception to this pattern (Blyde et al., 2020).[4]

The objective of this paper is to study the short-term effects of the presence of Venezuelan migrants in the Peruvian labor market. Using a panel of 91,266 individuals and exploiting the geographical variation in the exposure of domestic workers to Venezuelan migrants across Peruvian provinces, we focus on the short-term changes observed in three labor market outcomes: a) the probability of being employed, b) the probability of having an informal job (conditional to being employed), and c) the real monthly earnings of native workers. Given the features surrounding the labor market situation of Venezuelan migrants, we account for the difference in responses by the native workers' job type (formal or informal), the economic sector associated to their job (service vs non-service) and their educational attainment or skill level (primary, secondary or tertiary education).

We find evidence of heterogeneous effects. We find that a 1 pp increase in the share of Venezuelan migrants is associated with: a) a 1.5 pp increase in the probability of being employed for native workers with tertiary education in the non-service sector, b) a 1 pp decrease in the probability of having an informal job also for the most educated native workers in the non-service sector (although this evidence is weaker), and c) a 3.2 percent decrease in real monthly earnings of native workers with secondary education and an informal job in the service sector. Although our results suggest substitutability between Venezuelan workers (many of them educated and mostly with informal jobs) in the service sector, and some native workers (less educated and with formal jobs) in the service sector; our results also suggest that the presence of Venezuelan migrants may have also been complementary to other group of highly educated native workers in the non-service sector.

Our results are robust to several modifications to the Bartik instrument that measures the exposure to the Venezuelan migration. First, we estimate the main regressions using information on the shares of migrants from earlier

[4]This is related to several factors such as the lack of information surrounding job opportunities on the migrants' side and surrounding work authorizations on the employers' side; delays in obtaining the work permit, etc. (Selee and Bolter, 2020).

years (1993, as opposed to 2007). Second, we also reproduce the estimations using information on the shares and stocks of the 'rest of migrants' to observe whether we obtain similar results to those we obtain with the Venezuelan migration. Third, instead of using time variant estimated population by province to build the exposure measure, we set the population by province to a base year, 2007. In all cases, the results from these exercises support the evidence found in the main results.

Our results relate to different strands of the literature. First, the impact of migration supply shocks on domestic labor markets has been widely studied. There are different methodologies that exploit variation in the settlement of migrants at different levels. The 'spatial' approach explores variation in the geographical placement of migrants in the receiving country. It was first presented in Altonji and Card (1991). The 'skill-cell' approach exploits variation in groups categorized by education and experience (skills). This approach was pioneered by Borjas (2003). A third approach combines the two previous approaches and exploits the variation in migration flows by skill level and geographical settlement (Card, 2001). The evidence using all these approaches is mixed. While on average, the effects found tend to be small, there are heterogeneous effects that vary by group of individuals affected.[5] One limitation in some of the studies in this literature is that, given data availability constraints, their findings are based on average outcomes by region or a skill-cell built with repeated cross-sectional data. This produces results that confound effects as it combines the responses from incumbents with those from individuals that move into or out of a region/skill-cell. Our paper contributes to this literature by providing evidence based on a panel of individuals that spans over up to 5 years and is nationally representative. In this set up, we can control for individual effects, which is an improvement from previous studies, and we can distinguish responses of workers who had the same job type between periods (whether formal or informal) from those of workers who switched between types.[6]

Second, by studying the Peruvian experience, our paper also relates to the growing body of work on the impact of South-South migration flows. (Gindling (2009); Del Carpio et al. (2016); Biavaschi et al. (2018)) The majority of studies on the impact of migration are based on experiences in receiving

[5]See Lewis and Peri (2015) for a review of this literature.

[6]Foged and Peri (2016) do use longitudinal data for their analysis and control for individual effects, however their paper focuses on the experience of refugees in a developed nation and does not look at the informality of jobs.

developed nations. Developing nations normally have weaker labor markets and institutions; as such, studies focusing on receiving developing nations shed light on the different responses to migration shocks that may emerge in such contexts. For example, in the Peruvian context, the prominence of informality helps to understand migrants' skill downgrading in the labor market. It also helps us understand the significant effects that we find on earnings of native workers with secondary education, despite the fact that most Venezuelan migrants have tertiary education.[7]

Finally, the Venezuelan migration crisis is recent and as such, our study is, to the best of our knowledge, the first to exploit the spatial variation across Peruvian provinces to evaluate the short-term adjustments in the Peruvian labor market in response to such crisis. Asencios and Castellares (2019) also study the short-term effect of the Venezuelan migration on employment and salaries in Peru, however, there are differences between their work and ours. They use different data to produce their results–they use employment surveys that focus on Lima and Callao–and different estimation approach–they exploit annual variation in migration flows. Nonetheless, our results are partially consistent to theirs in that we both find negative effects on earnings.

This paper is organized as follows. Section 2 contains stylized facts that characterize both the flow of Venezuelan migrants in Peru and the trends and patterns in the Peruvian labor market. Section 3 presents the empirical methodology and data used. Section 4 discusses the main results. Section 5 presents a battery of robustness checks. Finally, section 6 concludes.

2 The Venezuelan migrants and the labor market in Peru

The Venezuelan population in Peru

Peru hosts the second largest population of Venezuelan migrants in the region. Although the presence of Venezuelan migrants in Peru is not new, the size of the inflow of Venezuelan migrants in recent years is unprecedented. As Figure 1 shows, the stock of Venezuelan migrants has increased considerably

[7]Calderón-Mejía and Ibáñez (2015) also study the effect of migration on domestic labor markets accounting for informality but in the context of forced migration (internal refugees) in Colombia.

since 2016 and reached a peak in 2018–534K, which was 44.5 times larger than the same number from two previous years (12K).[8]

Venezuelan migrants are heavily concentrated geographically. The majority of the Venezuelan migrants have settled in the capital city, the area of Lima and Callao (86.6 percent) followed by other locations mainly along the coast (INEI, 2018a) (see Figure 2).

Two outstanding characteristics distinguish the Venezuelan population in Peru. First, on average, they are a young population. 80 percent are in working age, between 18 and 59 years, and more than half of them are only between 18 and 29 years. Second, they are a highly educated population, at least more educated than their Peruvian counterparts. 57 percent of the Venezuelan population has completed tertiary education, 38 percent has an undergraduate degree and 19 percent a technical one (INEI, 2018a). In Peru, only over a third of the working population has a tertiary education degree.[9]

Most Venezuelan migrants in Peru are employed. 91.5 percent of working age Venezuelan migrants are effectively employed. However, also most of them (94.2 percent) are employed without any type of health insurance, which places them as workers in the informal sector.[10] As it can be expected, the quality of their jobs is not optimal. For example, 78.3 percent of the Venezuelan working population are salaried workers, yet, only 11.5 percent of them has a formal contract.

Venezuelan migrants' jobs are concentrated in the service and commerce sectors (78.2 percent), with a considerable share performing tasks as cook and assistant cooks, waiting staff, cleaners, domestic workers and retail sellers–the most common occupations among them. This information combined with the one on their education reveals that there is an important mismatch between the skills of these migrants and their occupations (World Bank, 2019). This situation–often referred to as "skill downgrading"–also means that, despite their qualifications, Venezuelan migrants often compete with more vulnerable Peruvian workers–those with lower levels of education.

[8]Calculations based on data from *Superintendencia Nacional de Migraciones de Perú.*

[9]In fact, it has been estimated that the investment involved in educating a similar amount of individuals to levels comparable to those in the Venezuelan migrants would have been equivalent to USD 3.3 billion, or a third of the Peruvian annual budget in education, World Bank (2019).

[10]We use a definition of formality such that only workers who contribute to the social security system are considered workers in the formal sector; otherwise, they are considered to be working in the informal sector. See Támola (2014) for more details on this definition.

The Peruvian labor market

The Peruvian labor market has grown steadily over the past decade. On average, the working population grew 1.5 percent yearly during 2008-2018. There were 16.8 million people working in 2018, most of them employed–96 percent. On average, the employment rate also increased–nearly 1 pp–between 2008 and 2018.

One outstanding feature of the Peruvian labor market, which explains the high share of Venezuelan migrants who have been able to find a job, is its high degree of informality. Peru is the third Latin American country with the highest rate of informality among the poorest quintile of the per capita family income distribution.[11] Informality permeates all economic activities and it is the most prominent type of employment in the economy.

Table 1 presents statistics on the employment and informality rates in Peru separated by the educational attainment of the working force (skill level) and the economic sector where they work.[12] Regarding skill level, we consider three groups: a) primary, b) secondary and c) tertiary education. Regarding economic sector, given the high concentration of migrants' jobs in the service sector, we consider two groups: a) service and b) non-service sector.[13]

While the employment rate has increased for all groups during the 2008-2018 period, it is negatively correlated with educational attainment: the employment rate is the highest for workers with primary education and the lowest for those with tertiary education. Similarly, there is a negative rela-

[11] Informality in Peru also ranks among the highest in all other quintiles based on the study "Taxing Wages in Latin America and the Caribbean", OECD (2016).

[12] To calculate the employment rate, we considered all the individuals in the economically active population, thus the rate represent the share of the employed individuals in the economically active population. The informality rate is calculated based on the sample of employed individuals. We do not take into account unemployed individuals that claim to be informal.

[13] For the purpose of our analysis, the "service" group includes the following 1-digit ISIC sectors; a) retail and wholesale trade and restaurants and hotels (includes occupations such as retail sellers, cooks and waiting staff), b) transportation and storage (includes occupations such as drivers), c) public and social services (includes occupations such as health professionals, primary and secondary teachers, domestic workers and cleaners). The "non-service" group includes all other economic sectors such as: a) agriculture (most of the workers in the sample), b) mining, c) manufacturing, d) construction, e) financial intermediation, and f) electricity, gas and water. We exclude the financial sector from the "service"group as only very few Venezuelans are working in this sector.

tionship between informality rate and skill level. This means that, although most of the least educated workers are employed, their jobs are most likely informal. On the other side, informality is less common among the most educated workers. Regarding economic sectors, informality is higher within the non-service group–mostly explained by jobs in agriculture (agricultural operators and farm laborers). In the service sector, a third of the informal jobs are in occupations such as retail sellers, drivers and cooks.

Regarding workers' monthly real earnings, Figure 3 shows that the average monthly earnings for both formal and informal jobs increased until 2015 for informal jobs and 2016 for formal jobs. Then, they remained stable in 2018, despite a short drop between 2016-2017. As expected, on average, earnings for formal jobs are higher than those for informal jobs. Figure 4 shows the evolution of monthly earnings by economic sector grouping, as defined in Table 1. While the earnings in the non-service sector have followed a downward trend during 2014-2018, earnings in the service sector increased during 2008-2016 following a similar pattern to the one observed in earnings by type of employment. Interestingly, earnings for formal jobs in the service sector dropped after 2016, when Venezuelan migration to Peru intensified. The next sections will shed light on whether the slow down after 2016 can be associated to the larger presence of Venezuelan migrants in Peru.

3 Empirical methodology and data

Empirical methodology

We study the adjustments in the domestic labor market in response to the Venezuelan migration in Peru using a spatial approach. Although a skill approach, which compares migrant and native workers with the same skill level, could seem more appealing given the geographical concentration of migrants in Lima; we still consider that pairing Venezuelan migrants and Peruvian workers working in the same geographical areas is a fairer comparison for two reasons. First, given Venezuelan migrants' skill downgrading in the Peruvian labor market, it is reasonable to assume that a non-trivial share of them do not compete with Peruvian counterparts with the same level of education or qualifications, as the skill approach would assume. Second, if the skill approach was used, we would need to know the yearly stock of migrants by skill level. To the best of our knowledge, such information is not available

in Peru, at least from public sources. Therefore, capturing the migration shock in the way required by the skill approach is not feasible.[14]

Nonetheless, given that concentration–or lack of variation in the distribution of Venezuelan migrants across geographical areas–may be a concern with the spatial approach, we add variation by analyzing the exposure of Peruvian workers to Venezuelan migrants at the most reasonably disaggregated geographical level possible: the province level. The Peruvian territory can be divided according to three administrative levels: departments (24), provinces (196) and municipalities (1655) (INEI, 2017). We chose to conduct the analysis at the province level considering that, on the one hand, municipalities are too narrowly defined and a *de facto* local labor market may include many of them; and on the other hand, departments are too aggregated and probably include more than one local labor market.[15]

Therefore, exploiting geographical variation in the settlement of Venezuelan migrants in Peru, we study the effects of their presence in the domestic labor market on three labor outcomes: a) the probability of being employed, b) the probability of having an informal job (conditional on being employed) and c) monthly real earnings.

The probability of being employed is estimated as follows:

$$Y_{i,p,t} = \beta VenSS_{p,t} + \gamma X' + \delta_1 F_r + \delta_2 F_i + \delta_3 F_t + \varepsilon_{i,p,t} \quad (1)$$

where $Y_{i,p,t}$, is a binary variable equal to 1 if the individual i is employed in province p and year t, and 0 otherwise. The main variable of interest, $VenSS_{p,t}$, captures the share of Venezuelan migrants in province p in year t; X' is a vector of time-variant individual characteristics such as education and marital status; F_r are departments fixed effects; and finally, F_i are individual and F_t year fixed effects.

Then, given that the other two labor outcomes are conditional on being employed, we estimate the effects on them using Equation 2.

[14]Using the information on the yearly number of Venezuelan migrants by geographical area from the National Household Surveys is not feasible as these surveys are not meant to be representative of the migrant population, and thus, any estimation using those numbers would yield biased results.

[15]Using provinces as the analytical spatial level does help to increase variation in the variable capturing the presence of Venezuelan migrants–the variation coefficient for this variable at the department level is 1.57 compared to 2.15 at the province level. Also, to test whether the spatial choice made much of a difference, we replicated the analysis at the department level and there was no qualitative difference in the results obtained. Consequently, we only present the results of the analysis at the province level.

$$Y_{i,p,s,t} = \beta VenSS_{p,t} + \gamma X' + \delta_1 F_r + \delta_2 F_i + \delta_3 F_t + \delta_4 F_s + \varepsilon_{i,p,s,t} \quad (2)$$

Where $Y_{i,p,s,t}$, represents either:

- the probability of having an informal job, which is a binary variable equal to 1 if the individual i in province p in sector s and year t has an informal job, and 0 if the job involved is formal,

- the monthly real earnings of individual i in province p in sector s and year t. We consider earnings, as opposed to just salaries, to include self-employed individuals who largely have informal jobs.[16]

The main variable of interest, $VenSS_{p,t}$, captures the share of Venezuelan migrants in province p in year t; X' is a vector of time-variant individual characteristics such as education and marital status; F_r are departments fixed effects; and finally, F_i are individual, F_t year and F_s ISIC 4-digit sector fixed effects.

Ideally, the variable capturing the exposure of Peruvian workers to Venezuelan migration should be calculated using the actual number of Venezuelan migrants in province p and year t, divided by the total population in province p and year t. Unfortunately, the number of Venezuelan migrants in each province by year cannot be effectively observed due to data limitations. Thus, to circumvent that limitation, we build the following Bartik instrument:

$$VenSS_{p,t} = \frac{1}{L_{p,t}} \frac{M_p}{\sum_r^R (M_p)} StockVen_t \quad (3)$$

The instrument includes the estimated population $L_{p,t}$ in province p in year t, the stock of Venezuelan migrants -the 'shift'- $StockVen_t$ in year t, and the 'share' of Venezuelan migrants by province in a base year $M_p / \sum_r^R (M_p)$, which we choose to be 2007. Precisely, a few remarks about some of the components of this variable are in order.

First, the shares of Venezuelan migrants by province are taken from the 2007 census. The last three censuses in Peru are from years 1993, 2007 and 2017. We consider the 2007 census data the most ideal to use, since the 2017 census data are too recent and, the 1993 census reflect trends from the past, when Peru was facing an economic crisis and as such, it was an

[16] We use Peru's annual Consumer Price Index (CPI) to deflate nominal wages to 2011 real prices. Also, we present the results using monthly earnings in real values for all working individuals, however, we also used hourly earnings getting qualitatively similar results.

unattractive destination for most migrants.[17] Second, we use the estimated annual population in each province from INEI for 2008-2016; for 2017, we use the census information to calculate the province population; and for 2018, we input the shares of population by province from the 2017 census into the predicted national population from INEI.[18]

We estimate a reduced form specification of (1) and (2) after replacing (3) into the previous equations.[19] Given the prominence of informality in Peru, and considering that most of the Venezuelan migrants have informal jobs, we estimate Equation (2) on earnings of all working individuals first, and then, we distinguish effects by job type–we interact the exposure variable with categorical variables indicating whether the individual's job is informal or formal.[20] Additionally, considering the features of the Venezuelan migration flow–highly skilled and concentrated in the service and commerce sectors–, we further explore the heterogeneity in the results accounting for differences by worker's education and by economic sector.[21]

Table 2 and Table 3 present summary statistics for the three outcome variables analyzed. Table 2 presents the distribution of employed workers and informality by skill level (of natives) and economic sector. It shows that the sample of employed individuals is evenly distributed between workers with primary and secondary education. Workers with tertiary education are fewer, but still a considerable number. In terms of economic sectors, however, the share of workers in the service sector is higher than in the rest of sectors. Regarding informality, the share of workers with informal jobs is negatively correlated with workers' educational attainment. Informality is more predominant among the least educated workers and far less common among the most educated workers in our sample. In terms of economic sectors, informality is more balanced between the two groups identified.

Table 3 presents the yearly average monthly earnings in our sample. As

[17] Nonetheless, given recent criticism about the exogeneity in past migration settlements in Bartik instruments, we also explore results using 1993 census shares later in the paper.

[18] We also explored the shares of migrants over just the working population in each year and it did not make any substantial difference in the results.

[19] The reduced form estimation in the context of migration has been previously used in other studies. See Calderón-Mejía and Ibáñez (2015).

[20] We define informality based on the individual's current status. This means that individuals switching from informal to formal jobs between periods, and vice versa, are included.

[21] Education is obtained for each individual from the Household survey used in our estimations. See Data section for further explanation on the data sources.

expected, earnings for formal jobs are, on average, 2.4 times higher than those for informal jobs. The gap in earnings between formal and informal jobs also varies considerably by skill level. The largest gap is for the group of workers with primary education. Earnings for formal jobs for these workers triple those for informal jobs for the same group. The same gap is only double for workers with secondary education, and slightly less than double for workers with tertiary education. We also identify an interesting pattern when we compare earnings in the service sector vs. the non-service sector. While earnings for informal jobs of workers in the service sector are higher than those for informal jobs of workers in the non-service sector, the opposite is true for formal jobs: earnings in the non-service sector are higher. This could be due to the fact that informal jobs in the non-service sector are more prominently in agriculture, highly represented in the sample and with the lowest earnings; while the formal jobs in the non-service sector are in financial services and manufacturing, which require more cognitive skills and thus, accrue higher earnings.

Data

The data we use in the study comes from three main sources.

- The National Household Survey (ENAHO) administered by the INEI provided us with information on labor outcomes and household conditions for the Peruvian population–employment, earnings and individual characteristics.[22] Two observations about this data. First, the survey has been implemented quarterly and annually since 1995, however, for this analysis, we use yearly information from 2008 to 2018. We start the sample in 2008 as it is the first year after the 2007 census, which we use as base year in the building of the variable capturing the presence of Venezuelan migrants by province. Second, we use a panel for our estimations which is a convenient feature of the ENAHO data. The panel in ENAHO is rotating and can cover up to 5 years.[23] The panel is constructed such that its sample is representative of the Peruvian population at the national level.

- We use the 2007 census data, also administered by the INEI, for the shares of Venezuelan migrants by province that are used to build the expo-

[22]We exclude all non-Peruvian individuals in the sample we use for the estimation of equations (1) and (2).

[23]Each year 20 percent of the panel sample is replaced by a new cohort. The households in the panel are followed between 2 and 5 years.

sure variable. There has been a few changes in the definition of provinces since 2007; however, we account for those differences and create concordances such that we keep the number of provinces constant throughout the period studied.[24]

- The information on the stock and yearly inflows of migrants in Peru was obtained from the *Superintendencia Nacional de Migraciones*.

We conduct a thorough processing of the data. Since monthly earnings can have measurement errors, we codify earnings below 1 sol per month as missing. Additionally, for each individual, we calculate earnings' annual growth and we keep only observations within the 1% and 99% of the distribution of annual growth–we drop the lower and upper tail of the growth distribution per year.

4 Results

Baseline

Table 4 has the baseline results from estimating equations (1) and (2). The first two columns show the results on the probability of being employed (1) and on the probability of having an informal job, conditional on being employed (2). Column (3) has the results on monthly earnings including all workers in the sample, and in column (4) we distinguish effects on workers by type of job (formal and informal).

The results in (1) and (2) reveal no significant adjustment either on employment or on informality. While there is no significant adjustments on overall earnings (column 3), we find that as the Venezuelan migration increased in 1 pp, earnings of native workers with formal jobs fell almost 1.66 percent (column 4).[25] This negative response could be due to movements of native workers who went from having an informal job to having a formal one, putting downward pressure on earnings for formal jobs (composition effect).[26] In fact, Figure 5 shows that the average earnings of workers with a

[24]For instance, Putumayo's province was created in 2010, after being separated from Maynas province. To keep consistency, we consider Maynas and Putumayo as a single province for the entire period studied.

[25]The change in the dependent variable associated to the change in the share of Venezuelan migrants is calculated using the expression: $(exp(\hat{\beta}) - 1) * 100$

[26]Del Carpio and Wagner (2016) explain that there are two ways in which an influx of migrants can affect the wages of native workers. The direct effect whereby migrants

formal job in t who had an informal job in $t-1$ are consistently lower than those of workers who had a formal job in both t and $t-1$ (21% percent lower during 2008-2018).

It is also important to note that the lack of significant results for workers with informal jobs shows that although the influx of Venezuelan workers was large, informality was elastic enough to absorb the labor supply shock without significant effect on earnings.

Results by sector

Given the high concentration of Venezuelan migrants in jobs in the service and commerce sectors, the results in Table 5 distinguish effects for the two groups previously identified: a) service, and b) non-service sector. The structure of the table is similar to Table 4, except that for the probability of being employed we further separate the samples by economic sector group.

Two important results are revealed. First, the result in column (2) shows that the probability of being employed in the non-service sector increased for native workers. As the Venezuelan migration increased in 1 pp, the probability of being employed in the non-service sector increased in 0.8 pp. Looking at individuals who moved from being unemployed to being employed in the non-service sector, we observe that several of them were employed in occupations related to agriculture and the food industry, which may have expanded in response to the higher demand from Venezuelan migrants.

Second, regarding the effect on earnings, the negative adjustment observed in earnings of individuals with formal jobs in Table 4, is only significant in a slightly larger magnitude (1.95 percent decrease) for workers in the service sector. This result is consistent with a) the largest presence of Venezuelan workers in the service sector, which puts a downward pressure on the earnings of the native workers in that sector (direct effect); and with b) workers moving from informal to formal jobs (composition or indirect effect). About the latter, when we look at the most common occupations of workers who move from informal to formal jobs in the service sector, we observe that several of them were working in jobs with an important presence of Venezuelan migrants such as cleaners and sellers. Other occupations involved in the

impact the marginal product of native workers with fixed characteristics; and the indirect (or composition) effect whereby migrants change the composition of native workers in a region and thus, alter the observed average wage

transition to the formal and service sectors were administrative workers and teachers.

It is also worth noting that again, we find no significant result regarding the probability of having an informal job.

Results by skill

In Table 6, we explore the results by the skill level (educational attainment) of domestic workers. We consider three groups: a) primary education, b) secondary education and c) tertiary education. The structure of the table follows the previous tables.

We find no significant effect on the probability of being employed (column 1). However, the results in column (2) provide evidence, albeit weak, that the probability of having an informal job, conditional on being employed, decreased for the most educated workers–0.54 pp decrease per 1 pp increase in the share of Venezuelan migrants. As we stated above, this result may be due to the higher demand from Venezuelan migrants, but it may also reveal a potential complementary role in the jobs held by Venezuelan migrants, which could favor the most educated individuals. For instance, if salaries of domestic workers are lower, some highly educated individual with dependents may be able to afford them, thus, allowing them to move into formal jobs.

Regarding monthly earnings, the previous negative results for workers with formal jobs seem to be concentrated in workers with secondary education. Earnings for these workers decreased 2.8 percent, as the share of Venezuelan migrants increased in 1 pp. This result would be consistent with migrants' skill downgrading to the extent that, despite being highly educated, the presence of Venezuelan migrants is significantly felt by a group of native workers with lower skills. Although the earnings of the most educated native workers also decreased 1.38 percent (as the share of Venezuelan migrants increased 1 pp), this evidence is barely significant.

Results by sector and skill

In Table 7, we separate the results by sector and skill simultaneously. The structure in this table follows the one in Table 6, but splitting the samples into service and non-service sectors.

The results are consistent with those in previous tables and allow us to identify the most affected groups more clearly. First, the increase in the

probability of being employed in the non-service sector is only significant for the most educated workers. As Venezuelan migration increased in 1 pp, the probability of being employed in the non-service sector increased 1.5 pp for the most educated workers. At the same time, despite being weak, the evidence of a decrease in the probability of having an informal job in the non-service sector still holds for the most educated native workers. These results are consistent with the fact that despite being highly educated, Venezuelan migrants have jobs that are complementary to the jobs of similarly educated native workers in the non-service sector, instead of being substitutes as it could be expected given their skill level. [27]

Regarding monthly earnings, we find that the negative response observed among workers with a formal job in the service sector only remains significant for workers with secondary education. The magnitude of the effect is higher than in previous tables–3.2 percent decrease per 1 pp increase in the share of Venezuelan migrants. This result would be consistent with the direct and the indirect (composition) channels discussed previously; and it will also be consistent with the evidence of migrants' skill downgrading, which implies that despite being highly educated, Venezuelan migrants compete with native workers with relatively lower skills.[28]

5 Robustness of main results

Our main variable of interest, the exposure of Peruvian workers to Venezuelan migration by province has been built using the distribution of Venezuelan migrants by provinces in 2007 (the share) and the yearly stocks of Venezuelan migrants at the national level (the shift). In this section we explore the robustness of our main results by introducing modifications to the different components of our variable of interest.

[27]The most common occupations among individuals with tertiary education who switched to a formal job in the non-service sector are: financial services employees, public work supervisors and administrative employees.

[28]The most common occupations among the domestic workers in the affected group are drivers, cleaners and security workers; occupations with a considerable presence of Venezuelan migrants.

Changes to the 'share': using shares from the 1993 census

Recent debate on the validity of the Bartik instrument focuses on the extent to which the shares in the instrument are really exogenous. Goldsmith-Pinkham et al. (2018) argue that the initial shares may be correlated with potential confounders prior to the sample period. Jaeger et al. (2018) point to the fact that migration is serially correlated and the results normally obtained with the standard instrument may be confounding short and long-term effects, biasing the results towards zero. To address these concerns, at least partially, we use the shares from the 1993 census (instead of the 2007's) to build our variable of interest. The early 1990s were years of strong economic crisis in Peru, Peruvians emigrated and in fact, just few migrants were settling in. In that sense, the shares from 1993 should be exogenous to any recent migration trends. Therefore, we combine the 1993 'share' with the same 'shift' as earlier for our variable of interest and proceed with the estimations.

The results are reported in Table 8. All the main results from Table 7 hold, even in similar magnitude. However, other effects also emerge. For instance, in column (2), we also observe weak evidence of an increase in the probability of being employed in the non-service sector among the least educated workers, and in column (3), we find weak evidence of an increase in the probability of having an informal job for the same group of workers in the service sector. Regarding earnings, in column (7), we find a positive effect for workers with primary education in the service sector and a negative effect in the informal non-service sector for tertiary workers (column 8). These results, although counter intuitive, could be reflecting the lack of variation in the shares of migrants at the province level using the 1993 census, which makes the effect in provinces to be underrepresented and Lima's effect to be over represented.[29] Nonetheless, the fact that all the main results (on employment, informality and earnings) hold, despite having an instrument with less variation, is reassuring in this context.

[29] In 1993, the shares of migrants were more concentrated in Lima, thus, many provinces that today have migrants, do not appear in 1993. This in turn means that the results using these shares may put less importance in many provinces.

Changes to the 'shift' and 'share': using rest of migrant flows

The robustness of the results in Table 7 is further tested by building an instrument using the 'shift' and the 'shares' corresponding to the presence of the 'rest of migrants' in Peru. If our results are accurate, the effect of the stock of the 'rest of migrants' should not be similar to the one we find in our main results. And that is exactly what we find in Table 9.

First, we find no evidence of effects from other migrant flows on the probability of being employed. Second, we find a positive effect on the probability of having an informal job in the non-service sector (contrary to our results). Finally, we observe effects on the earnings of workers in the non-service sector and which we do not find with the share for Venezuelan migrants. Finally, there is no negative effect for formal workers in the service sector.

In sum, the results from this exercise confirm that the main results studied above are inherent to the presence of Venezuelan migrants.

Changing the overall exposure variable: keeping the province population set to a given (previous) year

Considering that the Venezuelan migration could prompt the movement of some native workers to other geographical areas, the use of time-variant population figures to build the variable of interest could render the instrument endogenous. Given that there is certainly an internal movement of people in Peru–it is estimated around 20 percent of the population (Sánchez Aguilar, 2017)–, we address that concern by reproducing the main estimations using province-level population set in 2007–the same year used for the shares in the Bartik variable in the main regressions. The results are in Table 10. All the main results are similar in significance and magnitude.

6 Conclusions

In this paper we study the adjustments in the Peruvian labor market associated to the presence of the Venezuelan migrants during 2008-2018. Given some outstanding features of the Venezuelan migration–migrants' skill level and their concentration in the service sector–, we study the heterogeneous responses in different groups of native workers, based on these characteristics.

We use a panel of individuals, and exploit spatial variation in the exposure of native workers to the presence of Venezuelan migrants.

The results reveal heterogeneous short-term effects of the presence of Venezuelan migrants. We find a positive response in employment in the non-service sector and a negative response on earnings of workers in the service sector. The positive short-term response on the probability of being employed (1.5 pp increase), and the decrease in the probability of having an informal job (1 pp decrease), as the share of Venezuelan migrants increased 1 pp, are only significant for workers with tertiary education in the non-service sector. On the other hand, there is a non-trivial negative short-term effect on earnings of native workers with secondary education and a formal job in the service sector–3.2 percent decrease in earnings per 1 pp increase in the share of Venezuelan migrants. These results reveal substitutability between Venezuelan workers, many of them educated and with informal jobs, and some relatively less-educated native workers with formal jobs, in the service sector. At the same time, they also reveal a potential complementarity with highly educated native workers in the non-service sector.

Our results contribute to the literature by shedding light on the effects of a current migratory crisis, happening in the context of a receiving developing country, and using panel data which allows us to partially address endogeneity concerns in the estimations. The heterogeneity and size of our results are consistent with those found in the literature studying the effects of other migratory crises. However, our results also reveal other aspects that are important to account for in the study of the effects of migration in developing nations. In particular, they provide evidence of how high levels of informality among migrants and their skill downgrading could be detrimental to a group of less educated (more vulnerable) native workers.

From a policy perspective, our results point to the importance of designing policies aimed at mitigating the potential negative short-term effects of migration on vulnerable groups of workers. At the same time, regardless of the worker's nationality, informality and skill downgrading are sub-optimal situations, as individuals cannot produce at their full potential. In that sense, our results also highlight the importance of designing policies that address the skill downgrading of everyone, including migrants, in the economy.

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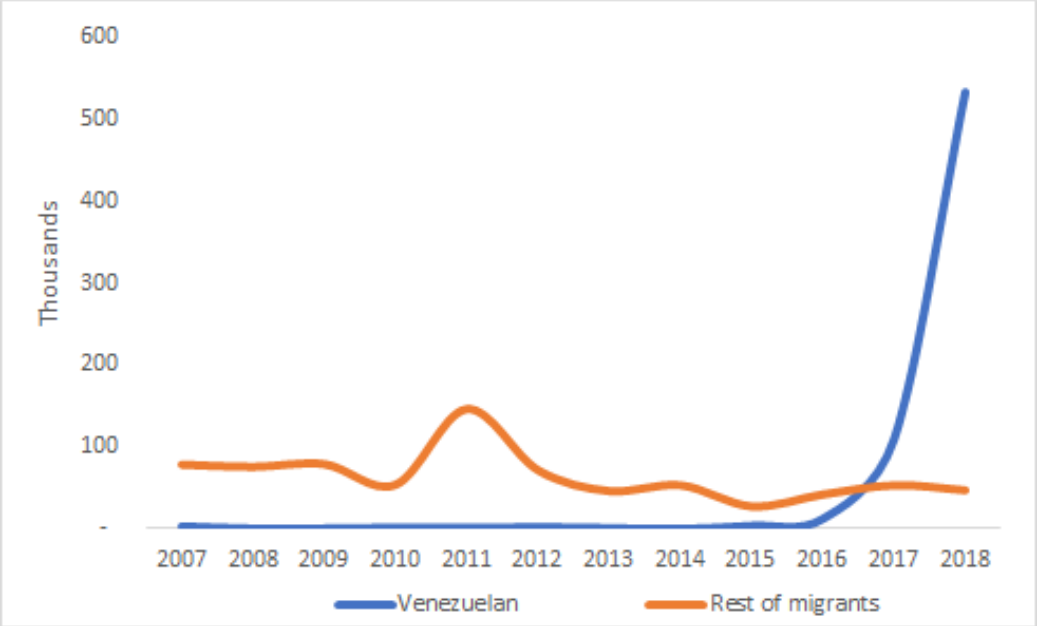
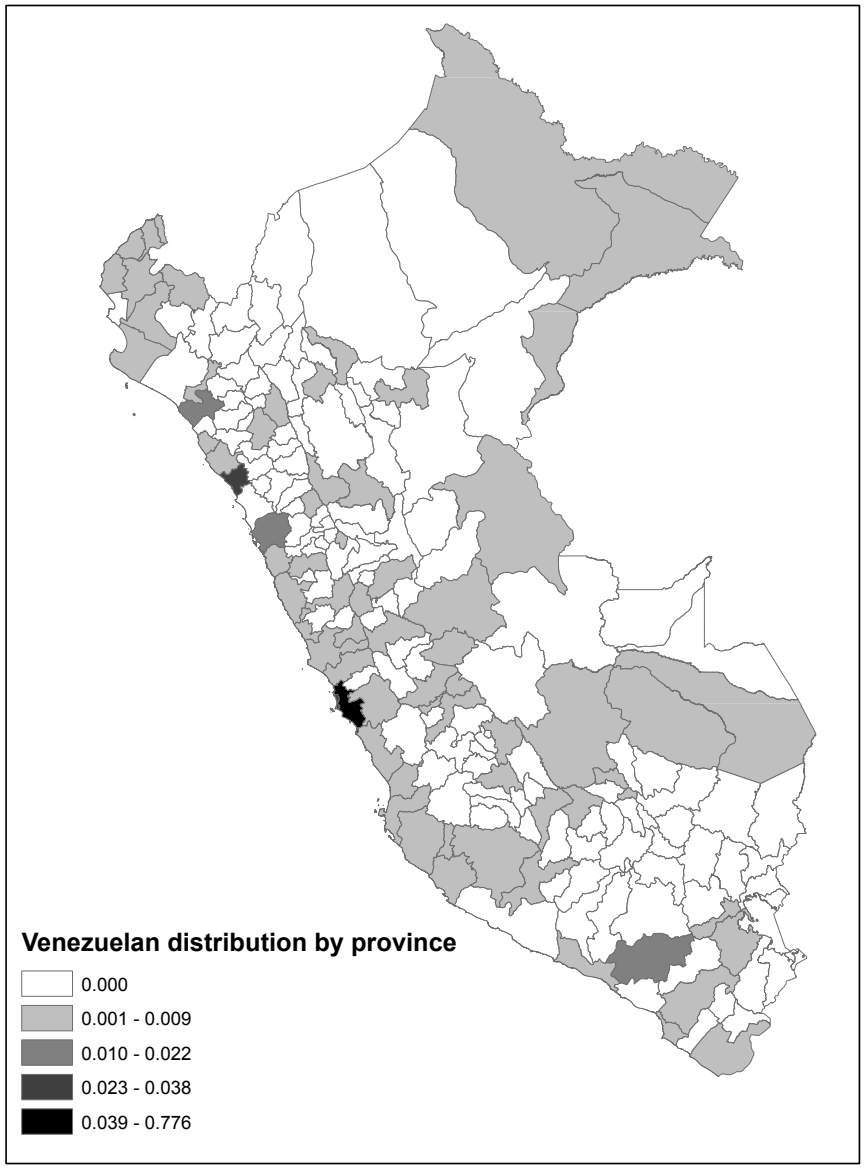
Figure 1: Yearly migrant stock in Peru



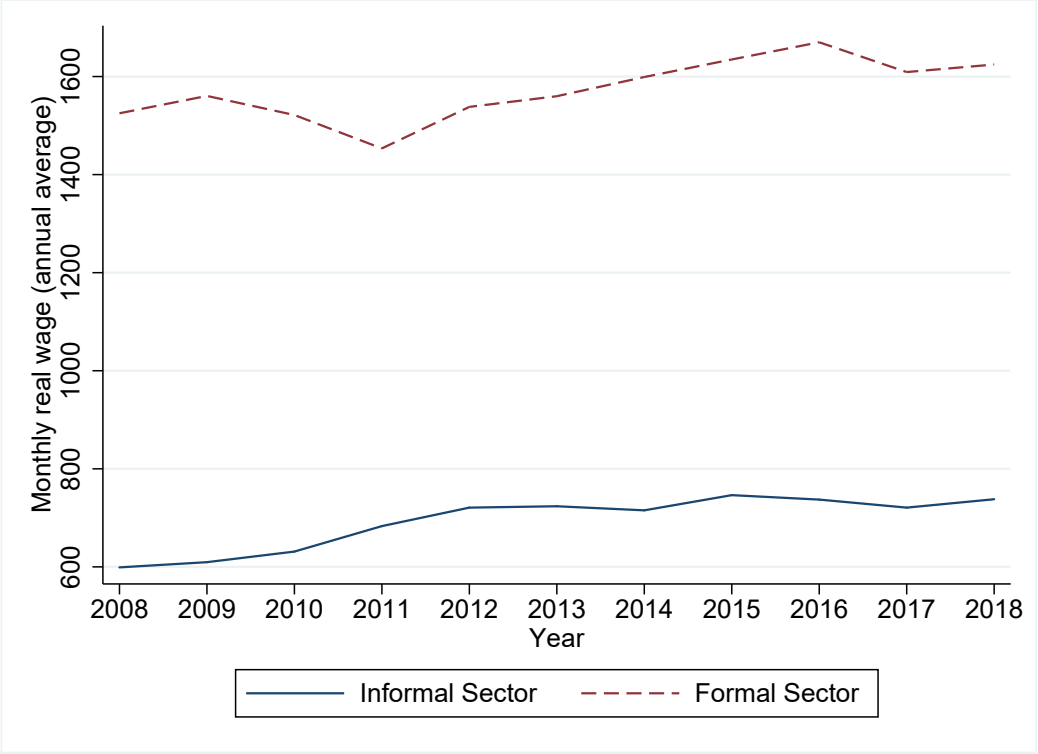
Source: Superintendencia Nacional de Migraciones

Figure 2: Distribution of Venezuelan migrants based on 2017 Census



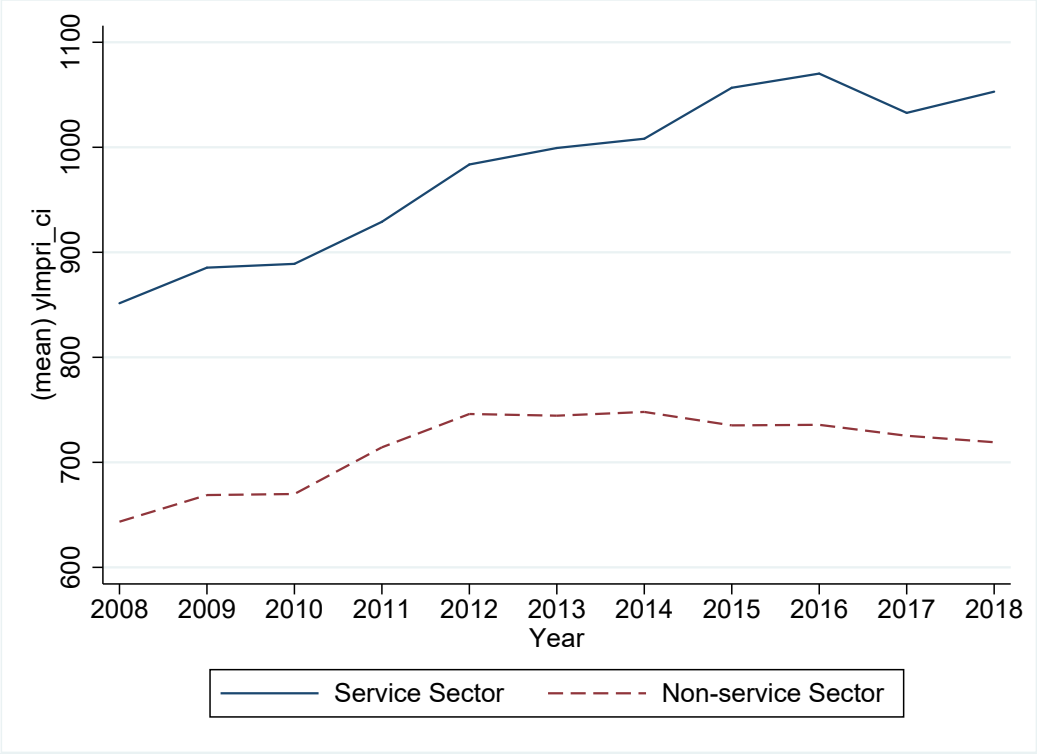
Source: INEI

Figure 3: Monthly real earnings, formal vs informal (in real soles)



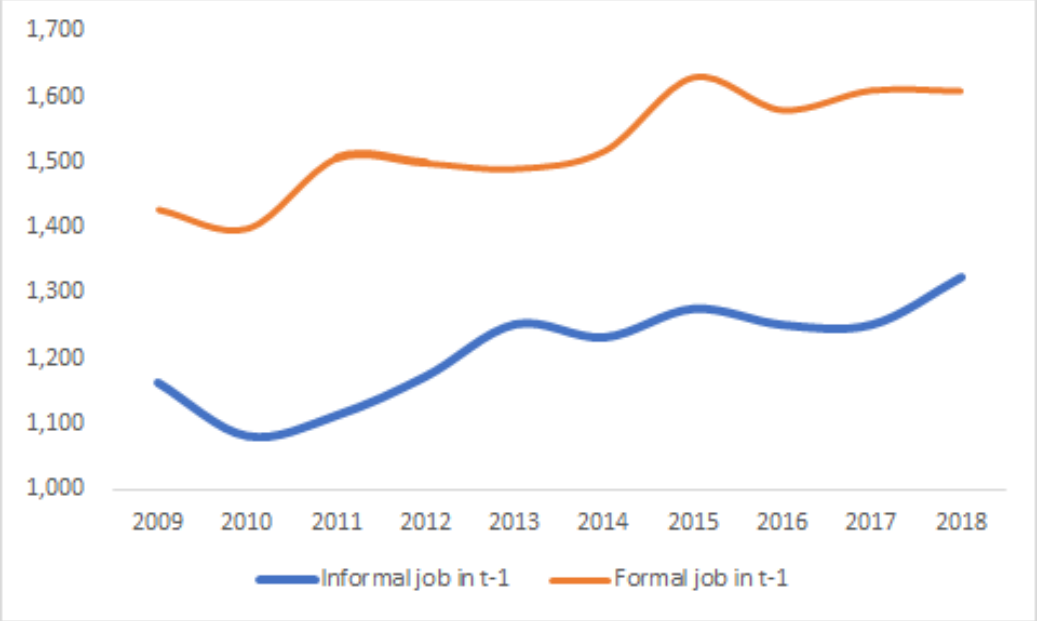
Source: Author's calculations based ENAHO data.

Figure 4: Monthly real earnings, service vs non-service (in real soles)



Source: Author's calculations based ENAHO data.

Figure 5: Average monthly real earnings of workers with formal jobs (in real soles)



Source: Author's calculations based ENAHO data.

Table 1: Employment and informality rates

	Employment rate (%)			**Informality rate (%)**		
	2008	*2013*	*2018*	*2008*	*2013*	*2018*
Prim. Educ.	98.72%	98.26%	98.81%	97.57%	96.52%	96.29%
Sec. Educ.	94.02%	95.84%	95.75%	88.05%	85.80%	86.19%
Ter. Educ.	93.93%	94.57%	94.54%	61.34%	57.82%	57.01%
Non-service sector	-	-	-	89.61%	87.32%	85.91%
Service sector	-	-	-	79.33%	75.58%	75.36%
Average	95.39%	96.08%	96.09%	83.60%	80.01%	79.21%

Source: Author's calculation using cross section yearly average data from ENAHO based on economically active population sample.

Table 2: Summary Statistics - Employment and informality distribution

	Number of Observations	**% Employed**	**% Informality**
Prim. Educ.	81,699	37.95%	43.24%
Sec. Educ.	81,734	37.13%	39.02%
Ter. Educ.	55,563	24.91%	17.73%
Non-service sector	100,274	46.78%	51.35%
Service sector	114,043	53.22%	48.65%
All sample	218,996	97.60%	84.20%

Source: Author's calculation. Yearly average calculations based on ENAHO panel data using economically active population sample.

Table 3: Summary Statistics - Earnings

	Number of Observations	Average real monthly earnings (2011 soles) *All*	*Informal*	*Formal*
Prim. Educ.	58,548	392.47	370.04	1,068.45
Sec. Educ.	63,746	762.99	674.39	1,270.86
Ter. Educ.	48,240	1,274.42	1,004.84	1,587.73
Non-service sector	69,427	570.67	417.12	1,812.26
Service sector	101,107	923.62	769.33	1,370.10
Agriculture	51,208	347.46	329.39	814.14
Mining	1,283	941.10	828.36	1,706.17
Manufacture	14,637	1,180.95	756.91	2,150.59
Electricity, gas, water	1,764	888.55	859.72	1,282.45
Construction	234	1,416.96	1,096.60	1,573.31
Retail and wholesale trade, restaurants and hotels	20,196	900.24	815.57	1,614.85
Transportation and storage	28,862	755.97	692.90	1,372.79
Financial intermediation	2,065	1,447.77	822.50	2,032.83
Public and community services	50,285	1,029.54	803.03	1,345.42
All Sample	170,534	779.91	610.46	1,470.77

Source: Author's calculation. Yearly average calculations based on ENAHO panel data using employed sample.

Table 4: Baseline Results

	Prob. of being employed	**Informality**	**Monthly Earnings**	
			All	*Interaction with formality*
	(1)	**(2)**	**(3)**	**(4)**
Venezuelan Migration Share	0.00106	-0.00130	-0.00585	
	(0.000956)	(0.00202)	(0.00533)	
Venezuelan Migration Share - Formal				-0.0168**
				(0.00697)
Venezuelan Migration Share - Informal				-0.000578
				(0.00595)
Observations	218,996	170,534	170,534	170,534
R-Squared	0.499	0.843	0.803	0.804

The dependent variable in (1) is a dummy equal to 1 if the individual is employed and 0 otherwise (unemployed). The dependent variable in (2) is a dummy equal to 1 if the individual is employed in an informal job and 0 otherwise (formal job). The dependent variable for columns (3)-(4) is the log of real monthly earnings of employed individuals. The difference between (3) and (4) is that in the last column the estimation includes an interaction of the main explanatory variable with the individual's job type (formal or informal). The main explanatory variable is the share of Venezuelans workers. Additional controls include individual's education, marital status and individual, year, region (departments) and ISIC 4-digit fixed effects. Standard errors adjusted for clustering at the region-year level are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 5: Sector Results

	Prob. of being employed		**Informality**	**Monthly Earnings**	
	Service sector	*Non-service sector*		*All*	*Interaction with formality*
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Ven. Mig. Share	0.000174	0.00798***			
	(0.00133)	(0.00223)			
Ven. Mig. Share - Service sector			-0.00185	-0.00537	
			(0.00196)	(0.00526)	
Ven. Mig. Share - Non-service sector			0.00127	-0.00812	
			(0.00492)	(0.00967)	
Ven. Mig. Share - Service sector - Formal					-0.0197***
					(0.00630)
Ven. Mig. Share - Non-service sector - Formal					-0.00636
					(0.0155)
Ven. Mig. Share - Service sector - Informal					0.00108
					(0.00573)
Ven. Mig. Share - Non-service sector - Informal					-0.00854
					(0.0142)
Observations	107,905	96,501	170,534	170,534	170,534
R-Squared	0.533	0.709	0.843	0.803	0.804

The dependent variable in (1) is a dummy equal to 1 if the individual is employed in the service sector and 0 otherwise (unemployed). The dependent variable in (2) is a dummy equal to 1 if the individual is employed in the non-service sector and 0 otherwise (unemployed). The dependent variable in (3) is a dummy equal to 1 if the individual is employed in an informal job and 0 otherwise (formal job). The dependent variable in columns (4)-(5) is the log of real monthly earnings of employed individuals. The difference between (4) and (5) is that in the last column the estimation includes an interaction of the main explanatory variable with the individual's job type (formal and informal). The main explanatory variable is the share of Venezuelans workers interacted with a dummy variable if the individual is working in a service sector (Service sector) or not (Non-service sector). Additional controls include individual's education, marital status and individual, year and region (departments) fixed effects. Standard errors adjusted for clustering at the region-year level are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 6: Skill Results

	Prob. of being employed	**Informality**	**Monthly Earnings**	
			All	*Interaction with formality*
	(1)	**(2)**	**(3)**	**(4)**
Ven. Mig. Share - Primary educ.	-0.00143	0.00262	-0.00714	
	(0.00183)	(0.00305)	(0.0160)	
Ven. Mig. Share - Secondary educ.	0.000667	0.00281	-0.00271	
	(0.00105)	(0.00352)	(0.00569)	
Ven. Mig. Share - Tertiary educ.	0.00186	-0.00543*	-0.00827	
	(0.00144)	(0.00298)	(0.00670)	
Ven. Mig. Share - Primary educ. - Formal				0.00794
				(0.0282)
Ven. Mig. Share - Secondary educ. - Formal				-0.0285***
				(0.0102)
Ven. Mig. Share - Tertiary educ. - Formal				-0.0139*
				(0.00760)
Ven. Mig. Share - Primary educ. - Informal				-0.00742
				(0.0171)
Ven. Mig. Share - Secondary educ. - Informal				0.00444
				(0.00626)
Ven. Mig. Share - Tertiary educ. - Informal				-0.00528
				(0.00977)
Observations	218,996	170,534	170,534	170,534
R-Squared	0.499	0.843	0.803	0.804

The dependent variable in (1) is a dummy equal to 1 if the individual is employed and 0 otherwise (unemployed). The dependent variable in (2) is a dummy equal to 1 if the individual is employed in an informal job and 0 otherwise. The dependent variable for columns (3)-(4) is the log of real monthly earnings of employed individuals. In both columns, the estimation includes an interaction of the share of Venezuelan migrants with the individual's skill level (primary, secondary and tertiary education). The difference between (3) and (4) is that in the last column the estimation includes an interaction of the main explanatory variable with the individual's job type (formal and informal). The main explanatory variable is the share of Venezuelans workers interacted with a dummy variable for each individual (native) skill level (primary, secondary and tertiary education). Additional controls include individual's education, marital status and individual, year and region (departments) fixed effects. Standard errors adjusted for clustering at the region-year level are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 7: By Skill and Sector

	Prob. of being employed		Informality		Monthly Earnings			
					All		*Interaction with formality*	
	Service	**Non-service**	**Service**	**Non-service**	**Service**	**Non-service**	**Service**	**Non-service**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Ven. Mig. Share - Primary educ.	-0.00303	0.00588	0.00700	-0.0107	0.00340	-0.0275		
	(0.00261)	(0.00451)	(0.00444)	(0.00840)	(0.0214)	(0.0513)		
Ven. Mig. Share - Secondary educ.	0.000598	0.00208	0.00437	-0.00534	-0.00462	-0.00528		
	(0.00134)	(0.00263)	(0.00318)	(0.00677)	(0.00550)	(0.0164)		
Ven. Mig. Share - Tertiary educ.	0.000411	0.0149***	-0.00559	-0.00997*	-0.000211	-0.0204		
	(0.00186)	(0.00271)	(0.00444)	(0.00518)	(0.00602)	(0.0147)		
Ven. Mig. Share - Primary educ. - Formal							0.0522	-0.0376
							(0.0424)	(0.0500)
Ven. Mig. Share - Secondary educ. - Formal							-0.0326***	-0.0272
							(0.00944)	(0.0284)
Ven. Mig. Share - Tertiary educ. - Formal							-0.00165	-0.0124
							(0.00780)	(0.0196)
Ven. Mig. Share - Primary educ. - Informal							0.00186	-0.0295
							(0.0218)	(0.0539)
Ven. Mig. Share - Secondary educ. - Informal							0.00199	0.00248
							(0.00590)	(0.0180)
Ven. Mig. Share - Tertiary educ. - Informal							-0.00127	-0.0363
							(0.00884)	(0.0295)
Observations	107,905	96,501	92,676	64,210	92,676	64,210	92,676	64,210
R-Squared	0.533	0.709	0.851	0.874	0.802	0.779	0.803	0.779

The dependent variable in (1)-(2) is a dummy equal to 1 if the individual is employed and 0 otherwise (unemployed). The dependent variable in (3)-(4) is a dummy equal to 1 if the individual is employed in an informal job and 0 otherwise (formal job). The dependent variable for columns (5)-(8) is the log of real monthly earnings of employed individuals. The difference between (5)-(6) and (7)-(8) is that in the last two columns the estimation includes an interaction of the main explanatory variable with the individual's job type (formal and informal). The main explanatory variable is the share of Venezuelans workers interacted with a dummy variable for each individual (native) skill level (primary, secondary and tertiary education). The results are also divided by service and non-service sector. The results for service sector are presented in columns (1)-(3)-(5)-(7) and for non-service sector in columns (2)-(4)-(6)-(8). Additional controls include individual's education, marital status and individual, year and region (departments) fixed effects. Standard errors adjusted for clustering at the region-year level are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 8: Using shares from the 1993 census

	Prob. of being employed		**Informality**		**Monthly Earnings**			
					All		*Interaction with formality*	
	Service	**Non-service**	**Service**	**Non-service**	**Service**	**Non-service**	**Service**	**Non-service**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Ven. Mig. Share - Primary educ.	-0.00137	0.00942*	0.00658*	-0.0120	0.000318	0.00524		
	(0.00312)	(0.00544)	(0.00351)	(0.00885)	(0.0190)	(0.0569)		
Ven. Mig. Share - Secondary educ.	-0.000410	0.00205	0.00450	-0.00580	-0.00250	0.00953		
	(0.00194)	(0.00259)	(0.00295)	(0.00807)	(0.00554)	(0.0166)		
Ven. Mig. Share - Tertiary educ.	0.000786	0.0149***	-0.00554	-0.00952*	-0.000823	-0.0226		
	(0.00171)	(0.00345)	(0.00412)	(0.00492)	(0.00565)	(0.0140)		
Ven. Mig. Share - Primary educ. - Formal							0.0766**	-0.0946
							(0.0356)	(0.0709)
Ven. Mig. Share - Secondary educ. - Formal							-0.0272***	-0.0233
							(0.00700)	(0.0285)
Ven. Mig. Share - Tertiary educ. - Formal							-0.00471	-0.00875
							(0.00574)	(0.0200)
Ven. Mig. Share - Primary educ. - Informal							-0.00217	0.0112
							(0.0199)	(0.0634)
Ven. Mig. Share - Secondary educ. - Informal							0.00372	0.0236
							(0.00652)	(0.0169)
Ven. Mig. Share - Tertiary educ. - Informal							0.000848	-0.0459**
							(0.00956)	(0.0198)
Observations	107,905	96,501	92,676	64,210	92,676	64,210	92,676	64,210
R-Squared	0.533	0.709	0.851	0.874	0.802	0.779	0.803	0.779

The dependent variable in (1)-(2) is a dummy equal to 1 if the individual is employed and 0 otherwise (unemployed). The dependent variable in (3)-(4) is a dummy equal to 1 if the individual is employed in an informal job and 0 otherwise (formal job). The dependent variable for columns (5)-(8) is the log of real monthly earnings of employed individuals. The difference between (5)-(6) and (7)-(8) is that in the last two columns the estimation includes an interaction of the main explanatory variable with the individual's job type (formal and informal). The main explanatory variable is the share of Venezuelans by province in 1993 interacted with a dummy variable for each individual (native) skill level (primary, secondary and tertiary education). The results are also divided by service and non-service sector. The results for service sector are presented in columns (1)-(3)-(5)-(7) and for non-service sector in columns (2)-(4)-(6)-(8). Additional controls include individual's education, marital status and individual, year and region (departments) fixed effects. Standard errors adjusted for clustering at the region-year level are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 9: Rest of migrants

	Prob. of being employed		Informality		Monthly Earnings			
					All		*Interaction with formality*	
	Service	**Non-service**	**Service**	**Non-service**	**Service**	**Non-service**	**Service**	**Non-service**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Ven. Mig. Share - Primary educ.	0.000643	0.00161	-0.0221	2.11e-05	0.168***	0.181**		
	(0.0146)	(0.00734)	(0.0141)	(0.00847)	(0.0606)	(0.0824)		
Ven. Mig. Share - Secondary educ.	-0.0127	-0.00900	-0.0220*	0.0175**	0.0206	0.141***		
	(0.0112)	(0.00742)	(0.0127)	(0.00842)	(0.0423)	(0.0502)		
Ven. Mig. Share - Tertiary educ.	0.00814	0.00680	-0.0188	0.0189	-0.0631*	-0.198***		
	(0.00919)	(0.0148)	(0.0146)	(0.0237)	(0.0375)	(0.0756)		
Ven. Mig. Share - Primary educ. - Formal							-0.0190	0.0143
							(0.0981)	(0.200)
Ven. Mig. Share - Secondary educ. - Formal							-0.0421	-0.0132
							(0.0495)	(0.0764)
Ven. Mig. Share - Tertiary educ. - Formal							-0.0600	-0.298***
							(0.0419)	(0.0888)
Ven. Mig. Share - Primary educ. - Informal							0.177***	0.183**
							(0.0614)	(0.0842)
Ven. Mig. Share - Secondary educ. - Informal							0.0314	0.167***
							(0.0447)	(0.0521)
Ven. Mig. Share - Tertiary educ. - Informal							-0.0753*	-0.144*
							(0.0441)	(0.0833)
Observations	107,905	96,501	92,676	64,210	92,676	64,210	92,676	64,210
R-Squared	0.533	0.709	0.851	0.874	0.802	0.779	0.803	0.779

The dependent variable in (1)-(2) is a dummy equal to 1 if the individual is employed and 0 otherwise (unemployed). The dependent variable in (3)-(4) is a dummy equal to 1 if the individual is employed in an informal job and 0 otherwise (formal job). The dependent variable for columns (5)-(8) is the log of real monthly earnings of employed individuals. The difference between (5)-(6) and (7)-(8) is that in the last two columns the estimation includes an interaction of the main explanatory variable with the the individual's job type (formal and informal). The main explanatory variable is the share of all migrants in Peru excluding Venezuelan nationals in the population interacted with a dummy variable for each individual (native) skill level (primary, secondary and tertiary education). The results are also divided by service and non-service sector. The results for service sector are presented in columns (1)-(3)-(5)-(7) and for non-service sector in columns (2)-(4)-(6)-(8). Additional controls include individual's education, marital status and individual, year and region (departments) fixed effects. Standard errors adjusted for clustering at the region-year level are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 10: Using 2007 census provinces population

	Prob. of being employed		Informality		Monthly Earnings			
					All		*Interaction with formality*	
	Service	**Non-service**	**Service**	**Non-service**	**Service**	**Non-service**	**Service**	**Non-service**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Ven. Mig. Share - Primary educ.	-0.00257	0.00528	0.00561	-0.00868	0.00424	-0.0133		
	(0.00207)	(0.00373)	(0.00358)	(0.00690)	(0.0166)	(0.0434)		
Ven. Mig. Share - Secondary educ.	0.000477	0.00172	0.00358	-0.00416	-0.00344	-0.00225		
	(0.00107)	(0.00211)	(0.00254)	(0.00539)	(0.00438)	(0.0130)		
Ven. Mig. Share - Tertiary educ.	0.000363	0.0119***	-0.00431	-0.00755*	-6.34e-05	-0.0159		
	(0.00149)	(0.00211)	(0.00357)	(0.00427)	(0.00486)	(0.0118)		
Ven. Mig. Share - Primary educ. - Formal							0.0430	-0.0307
							(0.0339)	(0.0406)
Ven. Mig. Share - Secondary educ. - Formal							-0.0261***	-0.0221
							(0.00757)	(0.0228)
Ven. Mig. Share - Tertiary educ. - Formal							-0.00138	-0.00996
							(0.00617)	(0.0158)
Ven. Mig. Share - Primary educ. - Informal							0.00307	-0.0141
							(0.0169)	(0.0457)
Ven. Mig. Share - Secondary educ. - Informal							0.00193	0.00513
							(0.00471)	(0.0142)
Ven. Mig. Share - Tertiary educ. - Informal							-0.000662	-0.0279
							(0.00713)	(0.0241)
Observations	107,905	96,501	92,676	64,210	92,676	64,210	92,676	64,210
R-Squared	0.533	0.709	0.851	0.874	0.802	0.779	0.803	0.779

The dependent variable in (1)-(2) is a dummy equal to 1 if the individual is employed and 0 otherwise (unemployed). The dependent variable in (3)-(4) is a dummy equal to 1 if the individual is employed in an informal job and 0 otherwise (formal job). The dependent variable for columns (5)-(8) is the log of real monthly earnings of employed individuals. The difference between (5)-(6) and (7)-(8) is that in the last two columns the estimation includes an interaction of the main explanatory variable with the individual's job type (formal and informal). The main explanatory variable is built using the share of Venezuelans by province in 2007 and the provinces population in year 2007 interacted with a dummy variable for each individual (native) skill level (primary, secondary and tertiary education). The results are also divided by service and non-service sector. The results for service sector are presented in columns (1)-(3)-(5)-(7) and for non-service sector in columns (2)-(4)-(6)-(8). Additional controls include individual's education, marital status and individual, year and region (departments) fixed effects. Standard errors adjusted for clustering at the region-year level are in parentheses *** p<0.01, ** p<0.05, * p<0.1.