

Venezuelan immigration to Peru: Macroeconomic characteristics and impacts

October 2019

Key messages

- As a country, Peru has received among the highest number of Venezuelan immigrants. There are currently more than 800,000 Venezuelan immigrants in Peru, with an annual influx that reached its peak in 2018. The majority of these Venezuelan immigrants are concentrated in Lima

- The Venezuelan immigrant population in Peru has the following characteristics:
 - The majority are of working age and have completed a higher number of years of studies than the average for the Peruvian population.
 - Their incorporation into the Peruvian labor market has not taken place under the best conditions: indicators of labor informality indicate that this level is very high (most immigrants do not have legal permission to work and have not validated their qualifications).
 - More than 65% of immigrants over the age of 14 send remittances mainly on a weekly or fortnightly basis.
 - Most people rent the house they live in and share a room with two or more people.
 - There are almost ninety thousand immigrants who are of elementary school age, of whom only 40% are attending schools. The pressure on basic education services provided by the State will increase.
 - It is healthier than the average Peruvian individual (as defined by chronic disease). However, Venezuelan immigrants who fall ill are not seeking health care because they have neither the necessary funds or insurance.

- The requirements for entry into Peru for Venezuelan immigrants were tightened in mid 2019 with the introduction of a visa requirement (tourist or humanitarian), which together with similar requirements in transit countries has led to a marked decrease in the influx of immigrants in recent months.

Key messages

- According to our estimates, the fiscal impact of Venezuelan immigration is positive, albeit low in relation to the size of the Peruvian economy. Thus, the average net impact for 2018 and 2019 is equivalent to 0.08% of GDP.
- Venezuelan immigration has altered the supply of production factors in the Peruvian economy. Taking into account the increased availability of labor and human capital generated by Venezuelan immigrants, we estimate that Peru's potential GDP has made a significant discrete leap in 2018. Similarly, the demand for goods and services from Venezuelan immigrants has had a positive impact on the observed GDP, although this effect has been less than the effect that the incorporation of this population has had on potential GDP. As a result of the differentiated impacts on potential and observed GDP, the (currently negative) output gap has widened.
- As such, we estimate that potential GDP grew by 4.4% in 2018, almost one percentage point more than it would have if the immigration of Venezuelan citizens had not occurred. Since immigrants were not employed in the most effective manner (in activities for which they were educated or in a formal manner), their positive impact was more limited in terms of observed GDP than on potential. Against this backdrop, the output gap was smaller in 2018 (by almost six tenths of a percentage point of potential GDP, according to our estimates) than in a scenario in which Venezuelan immigration had not taken place.
- The more negative output gap has implications for our inflation forecast (lower price pressures). Furthermore, we have updated our estimate of the neutral interest rate, and we find that its level is lower than the previous figure (the Central Bank also recently cut its estimate for this variable), and therefore the size of the monetary stimulus is less than previously contemplated. These elements suggest that, in the future, a more accommodative monetary policy cannot be ruled out.

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- Pressure on education services
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01

Characteristics of Venezuelan immigrants

General information

Creating Opportunities

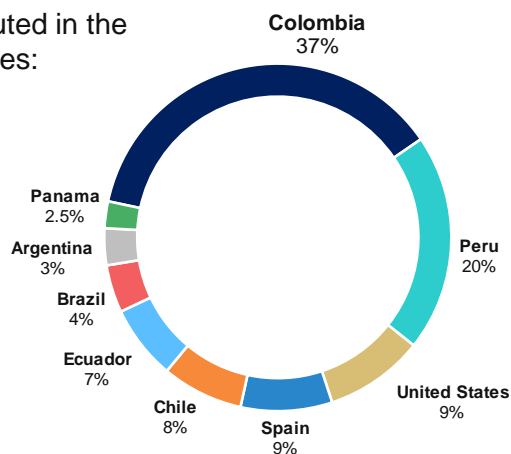


Peru has been one of the largest receivers of Venezuelan immigrants

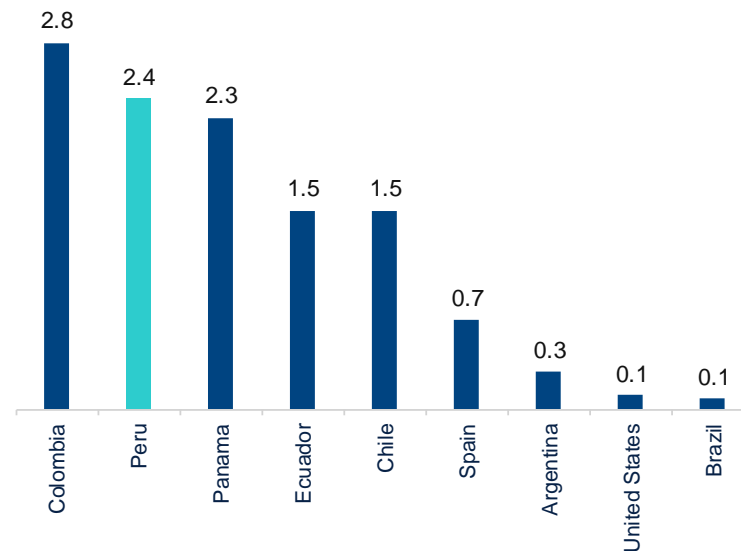
4.3 Million

Venezuelans have emigrated since 2015

They are distributed in the following countries:



VENEZUELAN IMMIGRANTS BY DESTINATION COUNTRY (% OF THE POPULATION OF THE RECIPIENT COUNTRY)

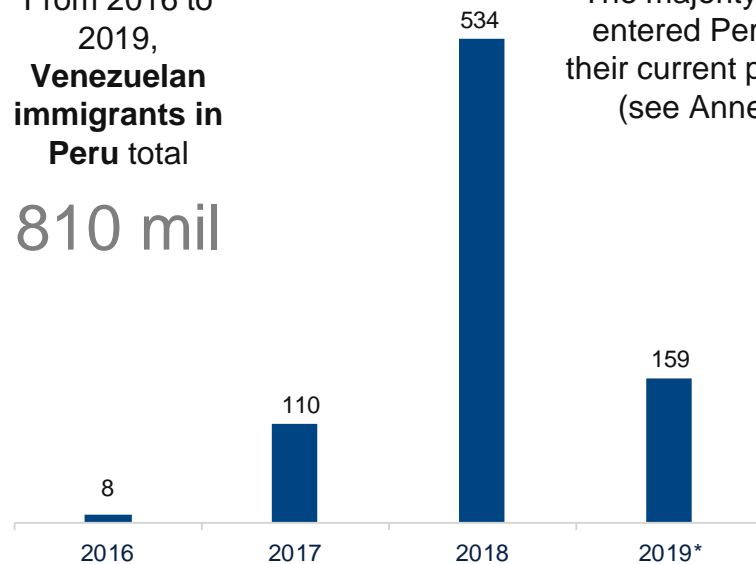


There are currently more than 800,000 Venezuelan immigrants in Peru, with an annual influx that reached its peak last year,...

ANNUAL MIGRATORY FLOW OF VENEZUELANs TO PERU (THOUSANDS OF PEOPLE, NET)

From 2016 to 2019,
Venezuelan
immigrants in
Peru total

810 mil

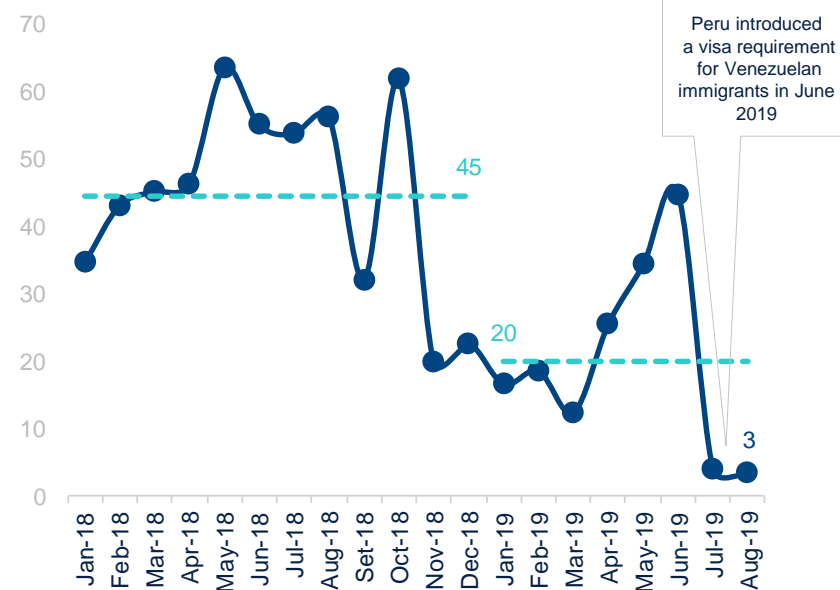


The majority (75%)
entered Peru with
their current passport
(see Annex 1)

* January-August, 2019.

Source: National Superintendence of Migration

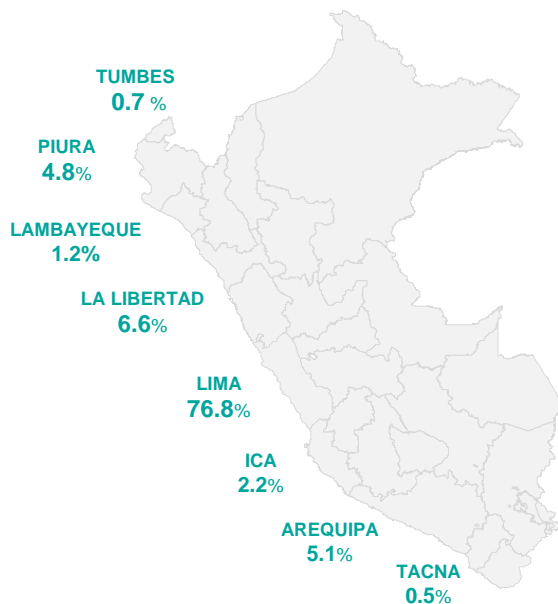
NET MONTHLY IMMIGRATION OF VENEZUELANs TO PERU (THOUSANDS OF PEOPLE)



... and they are concentrated in the city of Lima, mainly in its suburban areas

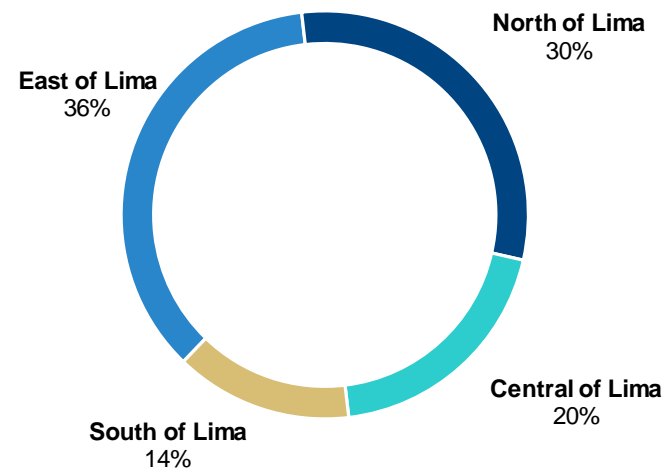
GEOGRAPHICAL DISTRIBUTION OF VENEZUELAN IMMIGRANTS IN PERU*

(% OF VENEZUELAN POPULATION IN PERU)



LOCATION OF VENEZUELAN IMMIGRANTS IN LIMA

(% OF VENEZUELAN POPULATION IN LIMA)



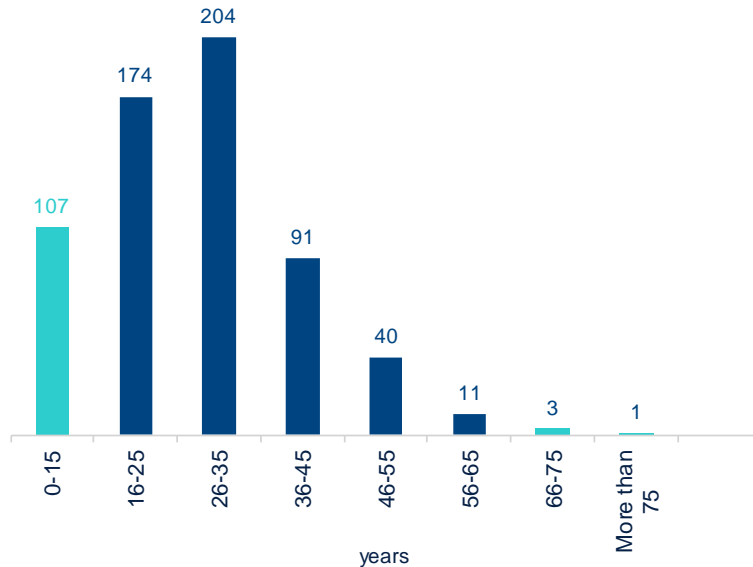
* Survey conducted from April 8 to May 5, 2019.

Source: Data from SJR (Venezuela), UCAT, UCAB, Centro Gumilla

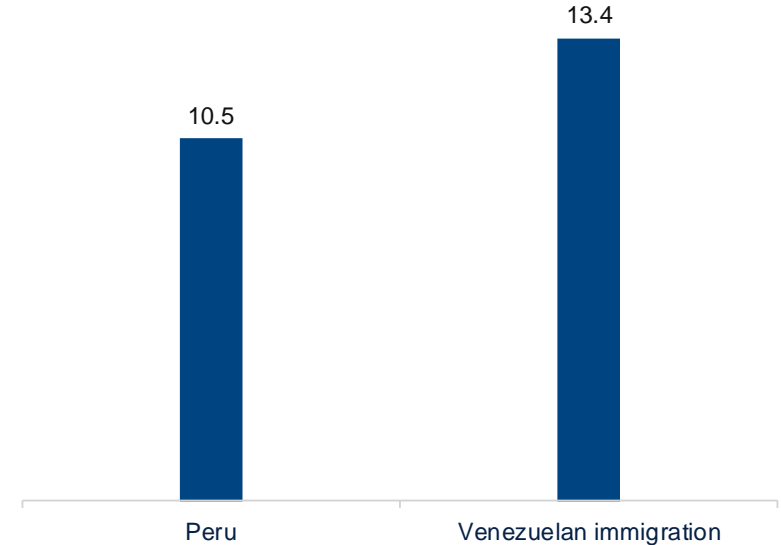
Source: ENPOVE (2018) - INEI. For details of this survey, see Annex 2

Most Venezuelan immigrants are of working age and have had more years of education than the average for the Peruvian population

VENEZUELAN IMMIGRANTS IN PERU: AGE DISTRIBUTION (THOUSANDS OF PEOPLE, 2018)



YEARS OF EDUCATION (AVERAGE, FOR PERSONS AGED 15 AND OVER)



Immigrants have entered the Peruvian labor market, but not under the best conditions...

VENEZUELAN IMMIGRANTS IN PERU*

(NUMBER OF PEOPLE AND % OF THE WAP, 2018)

WAP	531,956	100%
Inactive	45,216	8%
EAP	486,740	92%
Employed EAP	455,102	86%
Unemployed EAP	31,638	6%

WAP: Working age population (between 14 and 65 years).

Inactive: WAP, but not working or looking for a job.

EAP: WAP that is working or looking for a job.

Employed EAP: WAP in work.

Unemployed EAP: WAP not in work, but looking for a job.

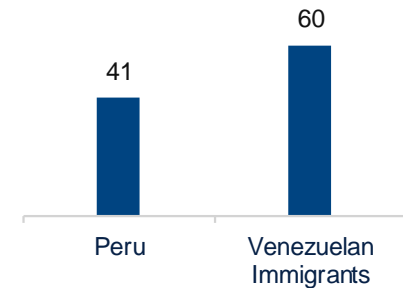
* For details of the activities they engage in and the nature of their higher education, see Annex 3 and Annex 4.

Source: ENPOVE (2018) - INEI

LABOR INFORMALITY INDICATORS FOR VENEZUELAN IMMIGRANTS

- 89% of dependent workers have no contract .
- 76% work in very small enterprises (1 to 10 workers), which tend to be less productive and more informal (91% informality).
- 97% do not have health insurance provided by the employer (insurance that companies must obligatorily provide to its formal workers).

HOURS WORKED PER WEEK

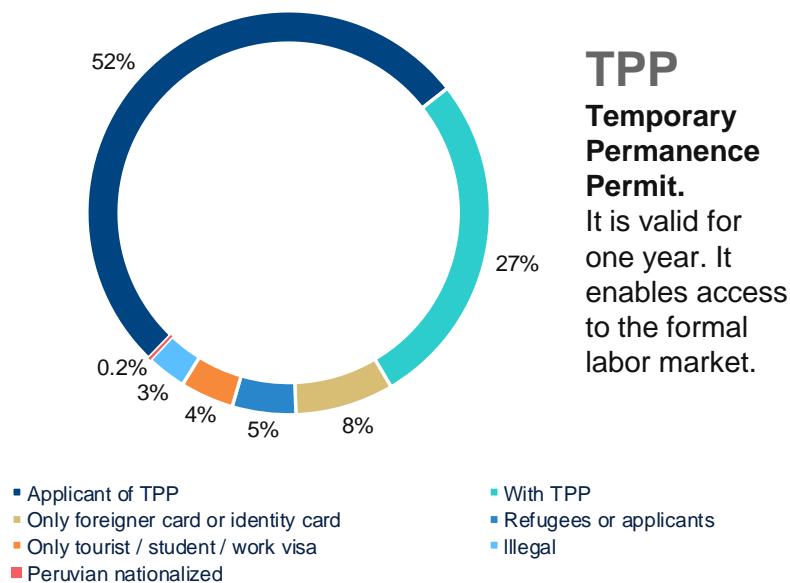


Monthly
avg.
income
number of Venezuelan
workers
S/ 1.116
(Peru: S/ 1.560)

... partly because they do not have legal permission to work or because they have not validated their qualifications

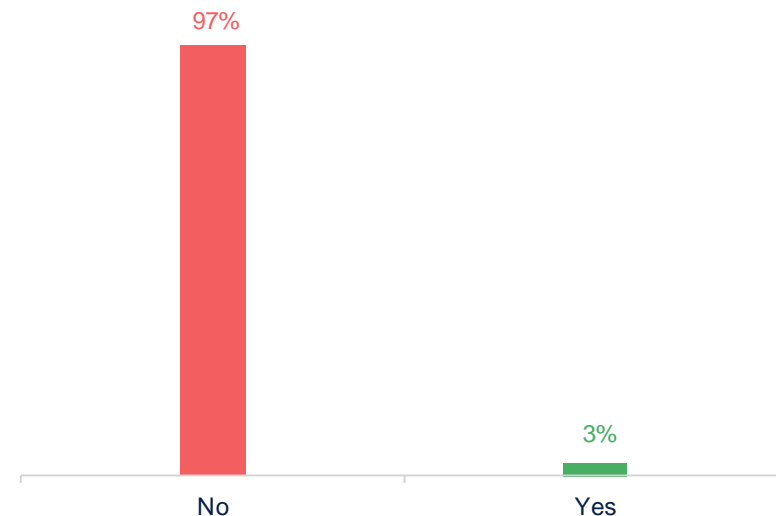
DOCUMENTATION SITUATION

(% OF VENEZUELAN POPULATION IN PERU, 2018)



HAVE YOU VALIDATED YOUR COLLEGE DEGREE?

(% OF THE VENEZUELAN POPULATION IN PERU WITH COMPLETED COLLEGE STUDIES)



In terms of remittances, the majority of Venezuelans do send them.

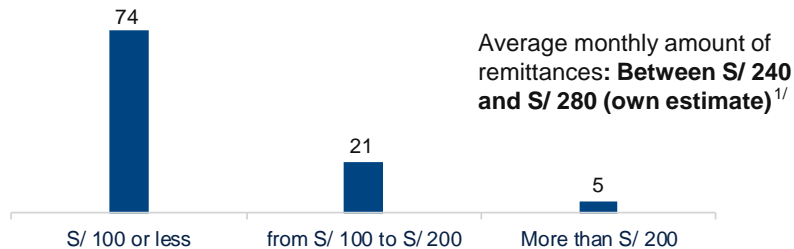
SENDS REMITTANCES?

(% OF VENEZUELAN OVER 14 YEARS OF AGE, 2018)



AMOUNT PER TRANSACTION

(% OF VENEZUELAN SENDING REMITTANCES)

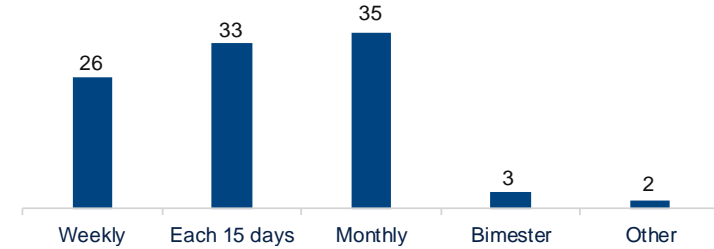


1/ See Annex 5

Source: ENPOVE (2018) - INEI

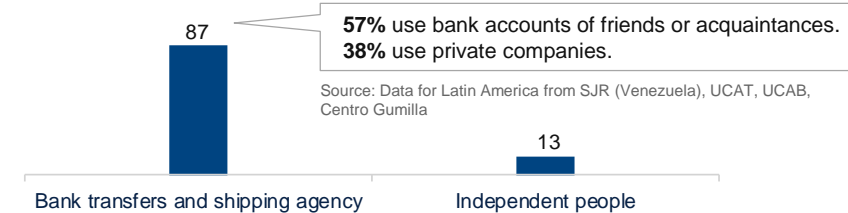
FREQUENCY

(% OF VENEZUELAN SENDING REMITTANCES)



WHAT METHOD IS USED FOR SENDING REMITTANCES?

(% OF VENEZUELAN SENDING REMITTANCES)



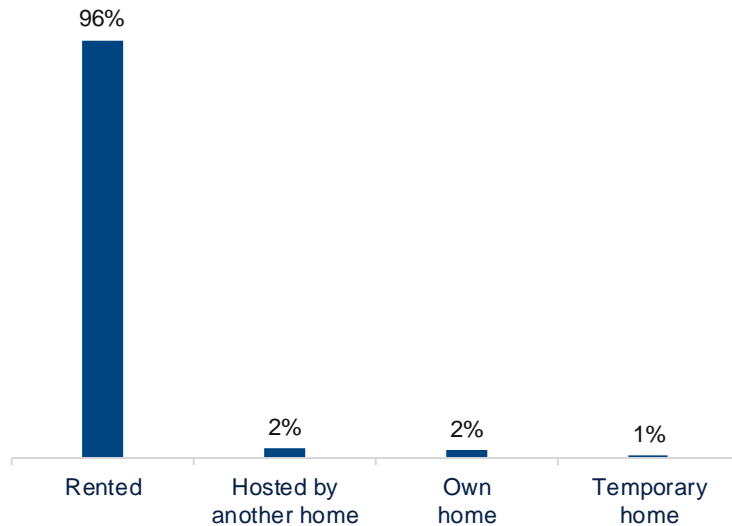
Housing situation

Creating Opportunities

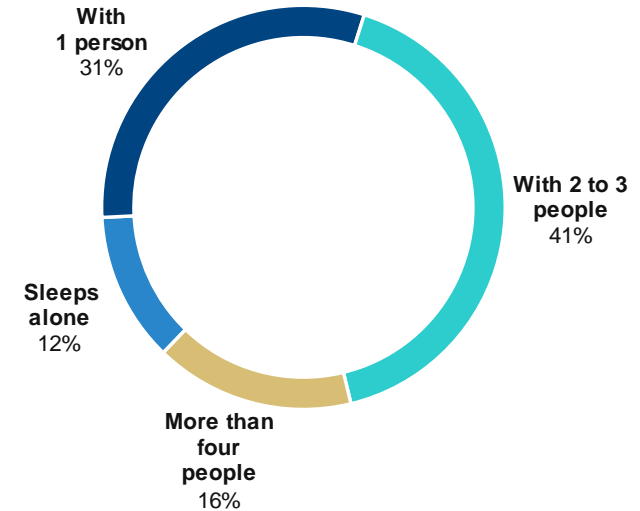


Rented housing and rooms with more than two people are generally observed

TYPE OF HOUSING IN WHICH VENEZUELAN IMMIGRANTS RESIDE
(% OF VENEZUELAN POPULATION IN PERU, 2018)



NUMBER OF PEOPLE WITH WHOM THE ROOM IS SHARED
(% OF VENEZUELAN POPULATION IN PERU, 2018)



Pressure on education services

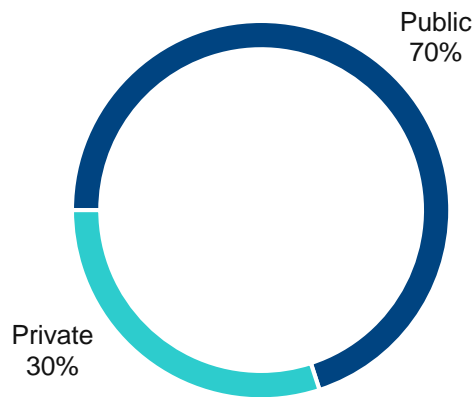
Creating Opportunities



The basic education needs of immigrants are beginning to put pressure on State services in this area...

33 Thousand

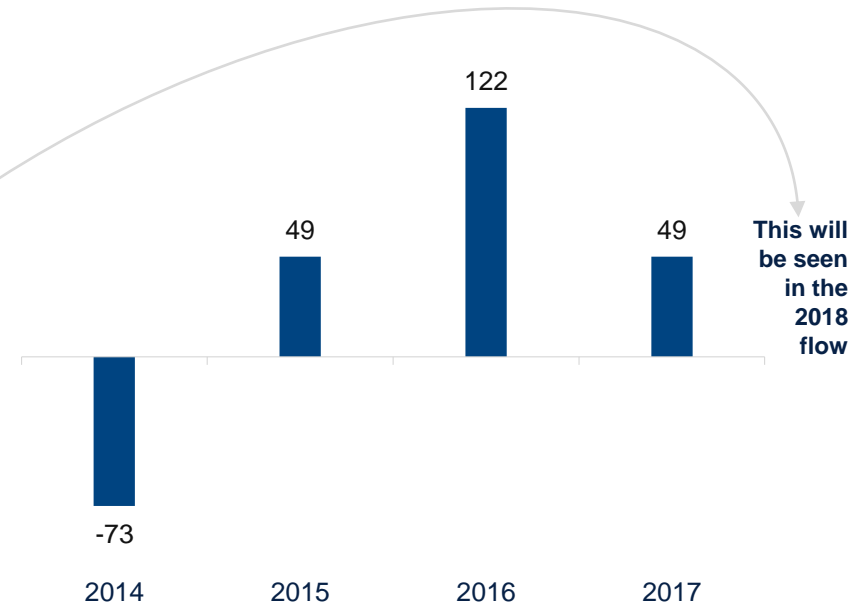
Venezuelan immigrants of basic education age (ages 3 to 16) attended an educational institution in 2018.



23 thousand

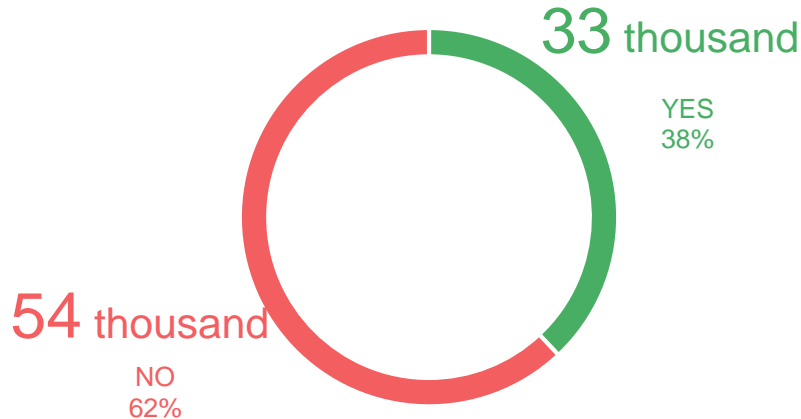
students of Venezuelan nationality in the public education system.

ANNUAL INCREASE OF BASIC EDUCATION STUDENTS IN THE PUBLIC SYSTEM (THOUSANDS OF PEOPLE)



... pressure that could increase...

ATTENDANCE AT AN EDUCATIONAL INSTITUTION (% OF VENEZUELAN IMMIGRANTS OF BASIC EDUCATION AGE)



Potential pressure on
the Peruvian education system

87 thousand Venezuelans
are of education age.

54 thousand are not currently educated.

Why not?

Financial problems (31%),
lack of knowledge of the education system (30%),
lack of documentation (22%).

Health situation

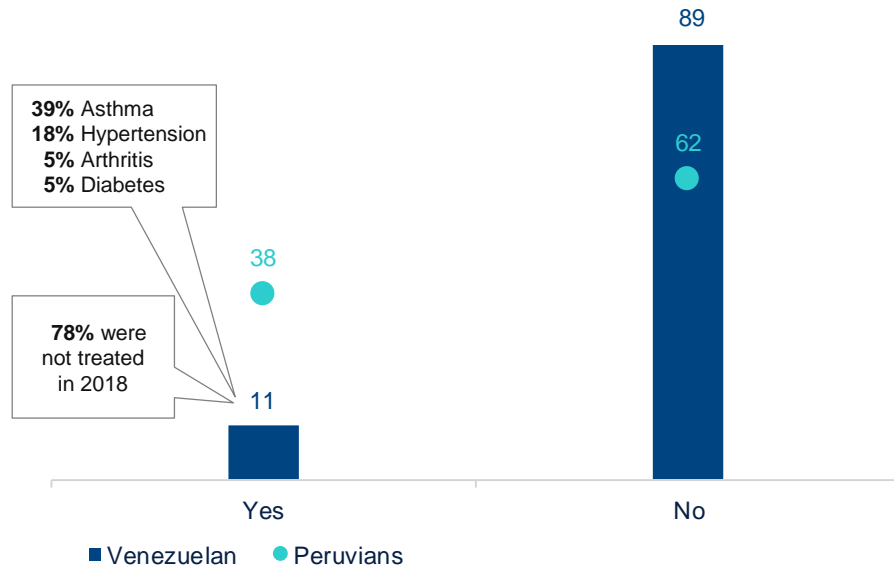
Creating Opportunities



Venezuelan immigrants are healthier than the average Peruvian individual, but...

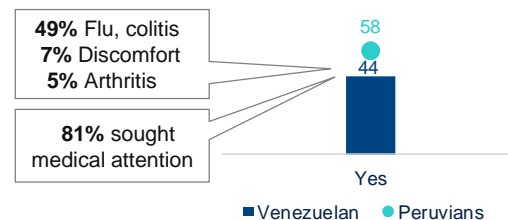
HAS CHRONIC DISEASES

(% OF THEIR RESPECTIVE POPULATION IN PERU, 2018)



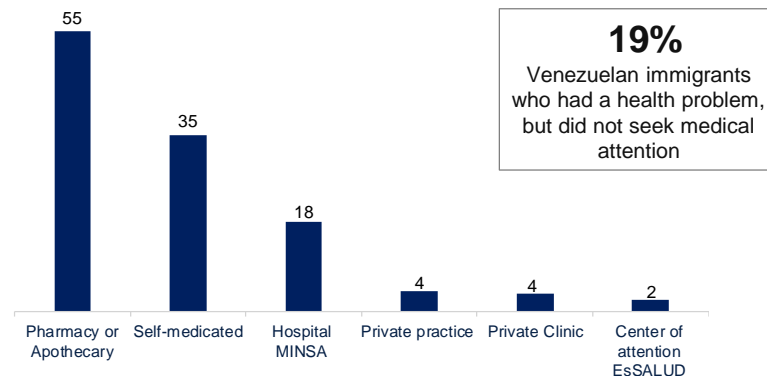
HAD A HEALTH PROBLEM

(% OF THEIR RESPECTIVE POPULATION IN PERU, 2018)



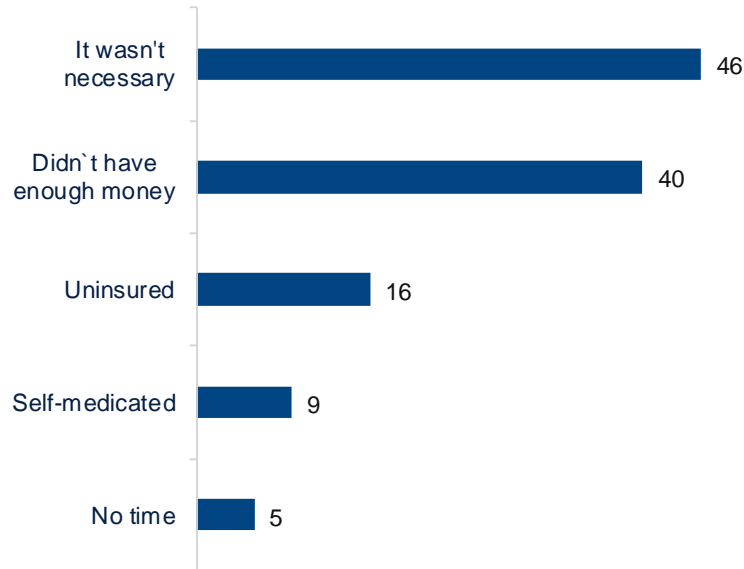
WHERE WAS HEALTH CARE SOUGHT?

(% OF VENEZUELAN IMMIGRANTS WHO HAD A HEALTH PROBLEM AND RECEIVED SOME FORM OF HEALTH CARE; MULTIPLE RESPONSE SURVEY)

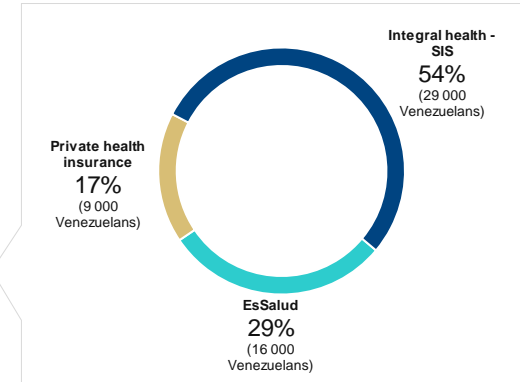
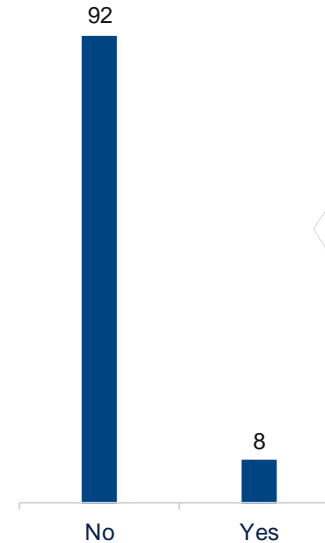


...when they fall ill they don't go to health centers because they don't have the money or because they don't have health insurance

REASONS FOR NOT GOING TO A HEALTH FACILITY (% OF VENEZUELAN IMMIGRANTS WHO HAD A HEALTH PROBLEM AND DID NOT GO TO A HEALTH FACILITY; MULTIPLE RESPONSE SURVEY)



HAS HEALTH INSURANCE (% OF VENEZUELAN POPULATION IN PERU, 2018)

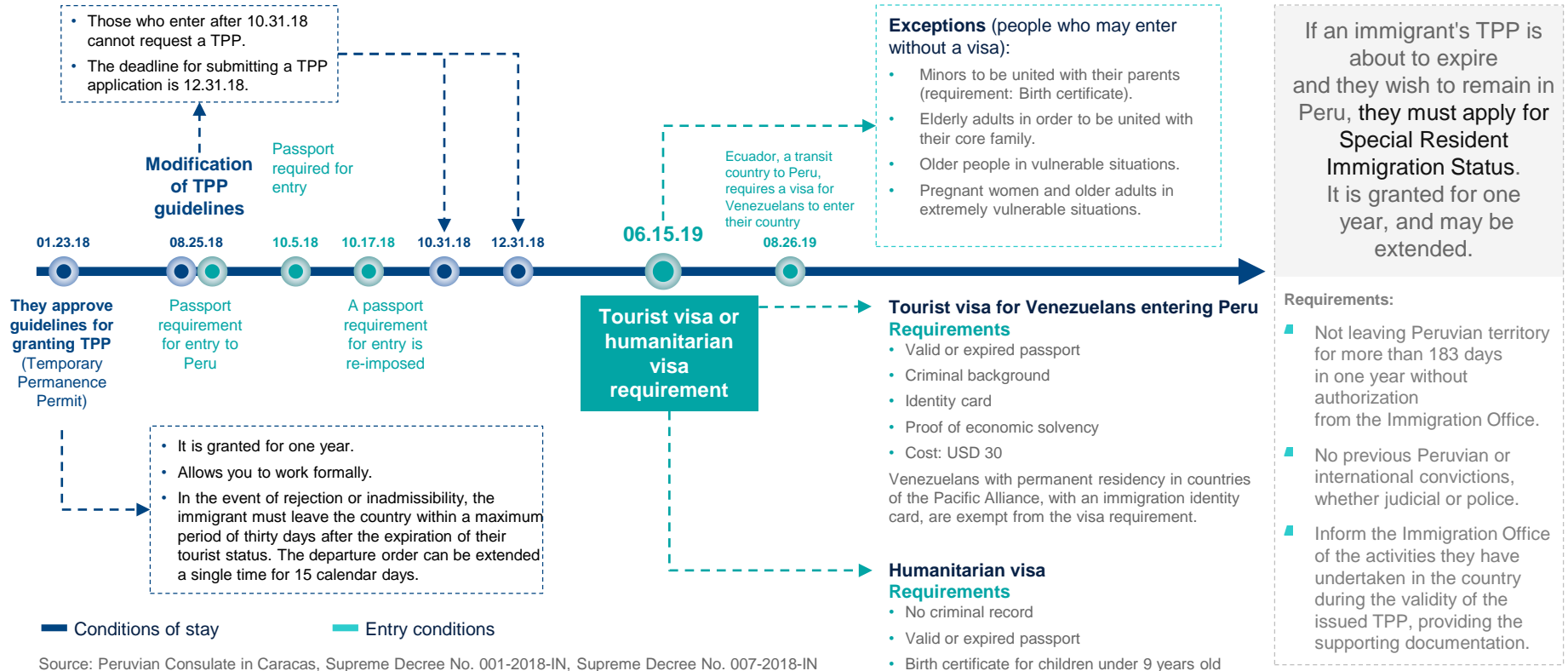


Entry restrictions for Venezuelan immigrants

Creating Opportunities



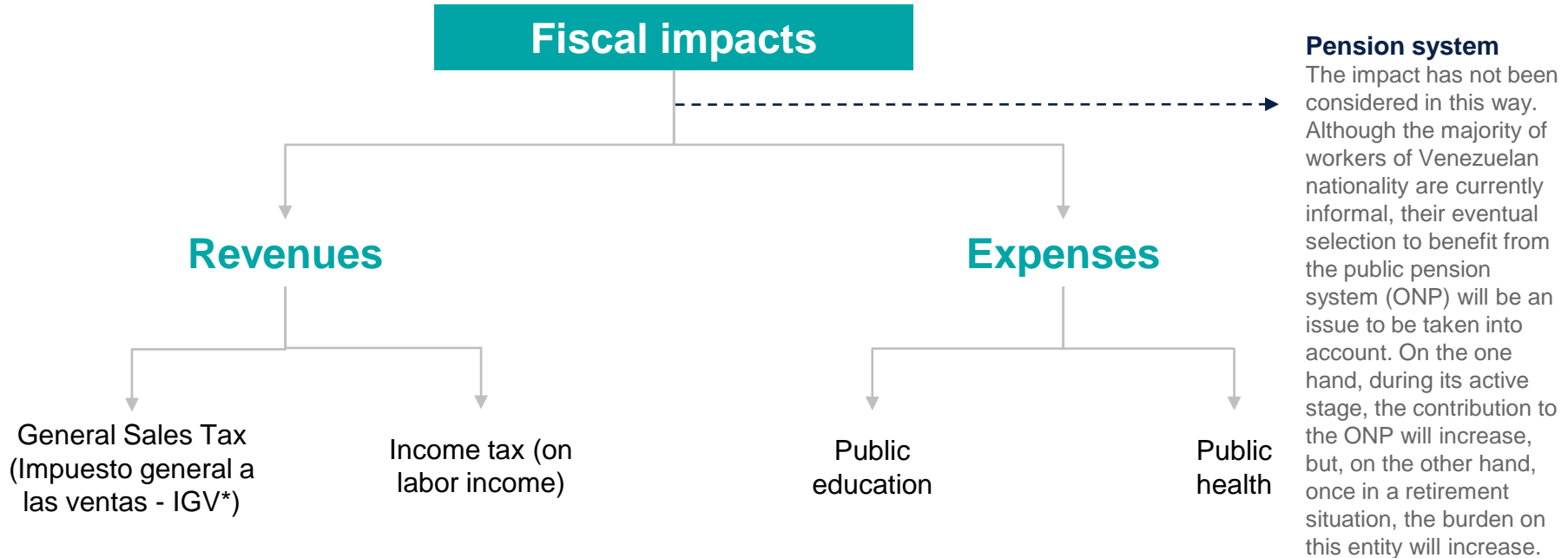
Entry restrictions and conditions of stay for Venezuelan immigrants in Peru



02

Fiscal impact of Venezuelan immigration

Fiscal impacts map



Tax revenue impact: General sales tax (IGV*)

Estimation of tax revenue by IGV

$$\left(\text{Immigrant's average annual earned income} - \text{Average annual remittances sent by immigrants} \right) \times \text{IGV rate } 18\% \times \left(1 - \text{IGV tax evasion rate } (36\%) \right) \times \text{Number of Venezuelan immigrants in work}$$

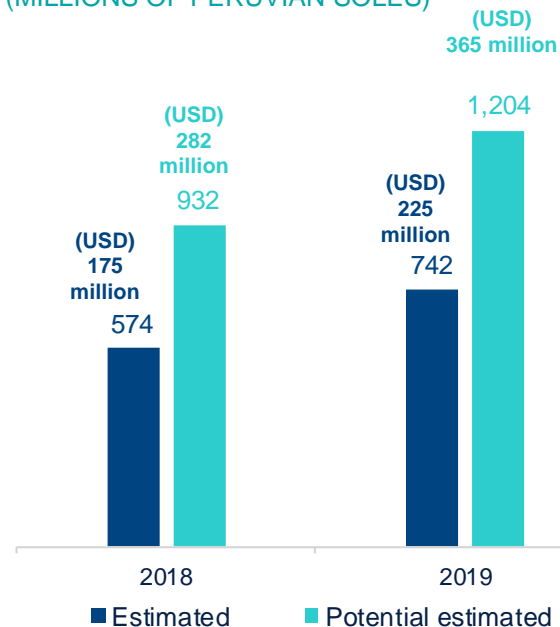
Premise:

the Venezuelan worker spends all of their labor income (net of remittances)

- For tax collection in...
 - 2018: ENPOVE data is used (2018).
 - 2019: considers (i) an estimate of the Venezuelan immigrant population in that year (base scenario projection on slide 40); (ii) that inactivity and unemployment rates remain unchanged; (iii) that the labor income of the Venezuelan immigrant grows at the same rate as that of a worker from Lima; and (iv) that the annual amount of remittances remains unchanged.
- For potential tax revenue collection it is assumed that a Venezuelan worker earns a labor income similar to that of a worker from Lima, both in 2018 and 2019.

* Equivalent to VAT in other countries.
Source: INEI, SUNAT and BBVA Research

TAX REVENUE FROM VENEZUELAN IMMIGRANTS (IGV) (MILLIONS OF PERUVIAN SOLES)



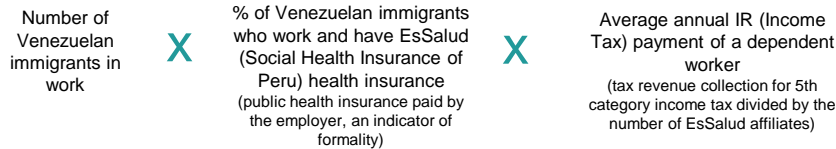
**Average
2018/19**

**Revenue
collection:**
0.09% of GDP

**Potential tax
revenue
collection:**
0.14% of GDP

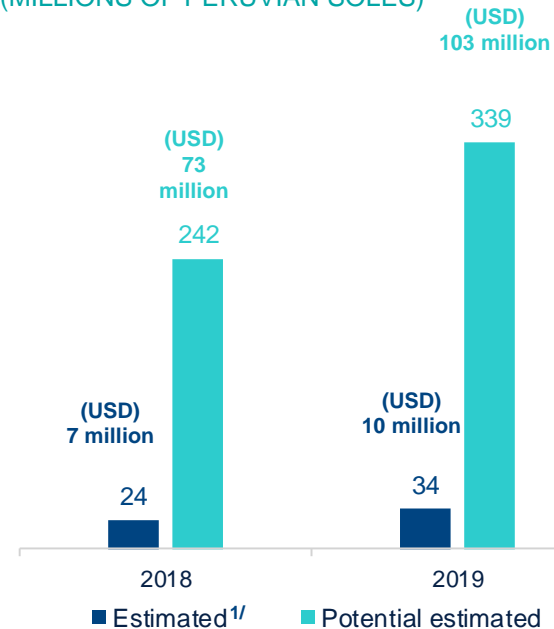
Impact on tax revenue: Income tax (IR)

Estimation of tax revenue by IR



- For tax collection in...
 - 2018: ENPOVE data is used (2018).
 - 2019: considers (i) an estimate of the Venezuelan immigrant population in that year (base scenario projection on slide 40); (ii) that the rates of inactivity, unemployment, and formality remain unchanged; and (iii) that the average annual IR payment of a dependent worker grows in the year at the same rate as it grew year on year in 1Q19.
- For potential tax revenue collection, it is assumed that Venezuelan workers enter the labor market with a similar level of formality as Peruvians (30%), both in 2018 and 2019.

VENEZUELAN IMMIGRANT INCOME TAX COLLECTION (MILLIONS OF PERUVIAN SOLES)



**Average
2018/19**

**Revenue
collection:**
0.004% of
GDP

**Potential tax
revenue
collection:**
0.04% of GDP

Impact on fiscal spending: Public education

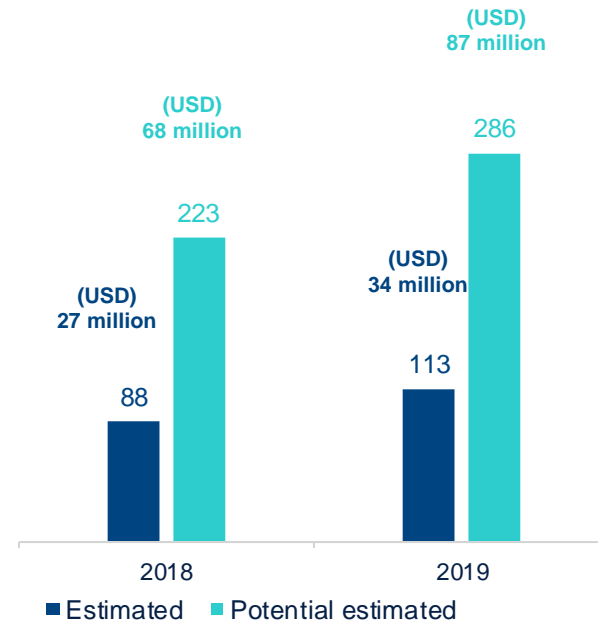
Calculation of fiscal expenditure for higher public education

$$\begin{array}{l} \text{Number of} \\ \text{Venezuelan} \\ \text{immigrants of basic} \\ \text{education age} \\ \text{(from 3 to 16 years old)} \end{array} \times \begin{array}{l} \% \text{ of Venezuelan immigrants} \\ \text{of basic education age who} \\ \text{attend a public school} \end{array} \times \begin{array}{l} \text{Fiscal cost per student in} \\ \text{the public system} \end{array}$$

- Fiscal cost per pupil age range difference: 3 to 5 years (preschool), 6 to 11 years (elementary), and 12 to 16 years (high school). Information provided by the Ministry of Education.
- For **fiscal spending** in 2019, we consider (i) an estimate of the population of Venezuelan immigrants in that year (base scenario projection on slide 40); and (ii) that we maintain the proportion of immigrants of basic education age and, of these, those who attend a public school.
- For **potential fiscal spending**, all Venezuelan immigrants of basic education age are counted as attending school, but the ratio between public and private education is maintained.

Source: INEI, Ministry of Education, and BBVA Research

FISCAL SPENDING ON PUBLIC EDUCATION FOR VENEZUELAN IMMIGRANTS (MILLIONS OF PERUVIAN SOLES)



**Average
2018/19**

Spending:
0.01% of GDP

**Potential
spending:**
0.03% of GDP

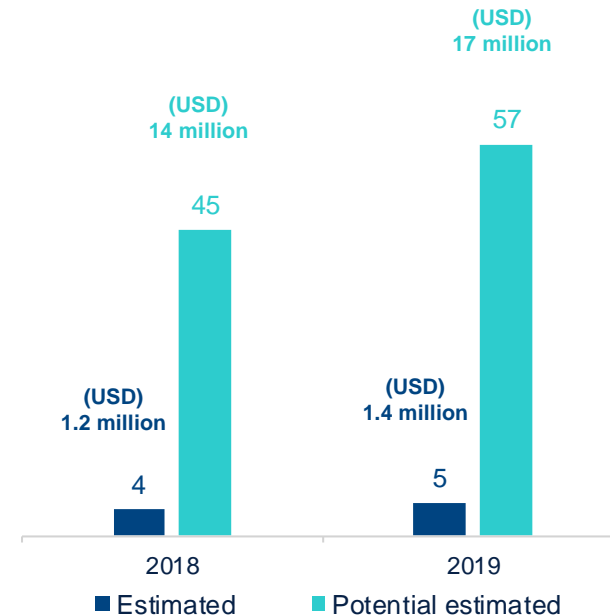
Impact on fiscal spending: Public health

Calculation of public health fiscal spending

$$\begin{array}{l}
 \text{Number of Venezuelan} \\
 \text{immigrants with any} \\
 \text{health insurance}
 \end{array}
 \times
 \begin{array}{l}
 \% \text{ of insured Venezuelan} \\
 \text{immigrants whose insurance} \\
 \text{is provided by the SIS} \\
 \text{(Sistema Integral de Salud,} \\
 \text{an almost free medical} \\
 \text{service offered by the State)}
 \end{array}
 \times
 \begin{array}{l}
 \text{Fiscal cost per person} \\
 \text{insured under the SIS}
 \end{array}$$

- For fiscal spending in...
 - 2018: ENPOVE data used (2018)
 - 2019: considers (i) an estimate of the Venezuelan immigrant population in that year (base scenario projection on slide 40); and (ii) that the proportion of immigrants with some type of health insurance remains unchanged, of these the proportion covered by SIS, and the fiscal cost per person insured under SIS (estimated as the budget allocated to SIS from the number of insured persons).
- For potential fiscal spending, it is assumed that all Venezuelan immigrants have some type of health insurance and the proportion of those covered by SIS and the fiscal cost per person insured under SIS remain unchanged.

VENEZUELAN IMMIGRANT PUBLIC HEALTH SPENDING (MILLIONS OF PERUVIAN SOLES)



**Average
2018/19**

Spending:
0.001% of
GDP

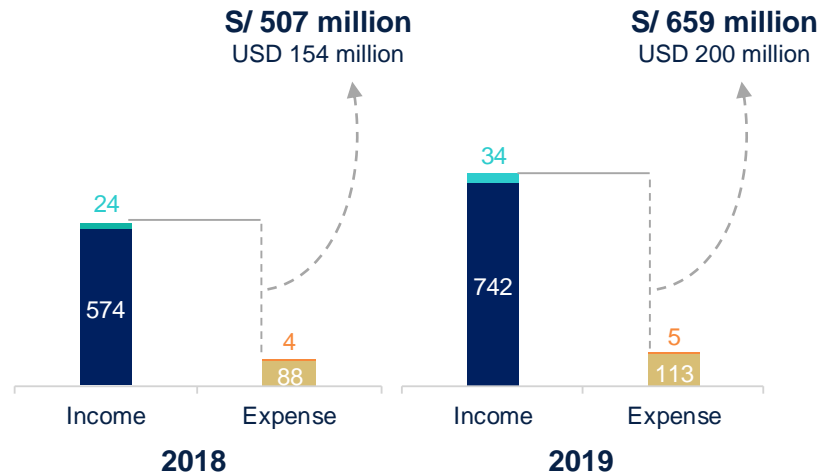
**Potential
spending:**
0.007% of
GDP

Based on these calculations, Venezuelan immigrants have had a positive fiscal impact, which could even be greater

FISCAL IMPACT* (MILLIONS OF PERUVIAN SOLES)

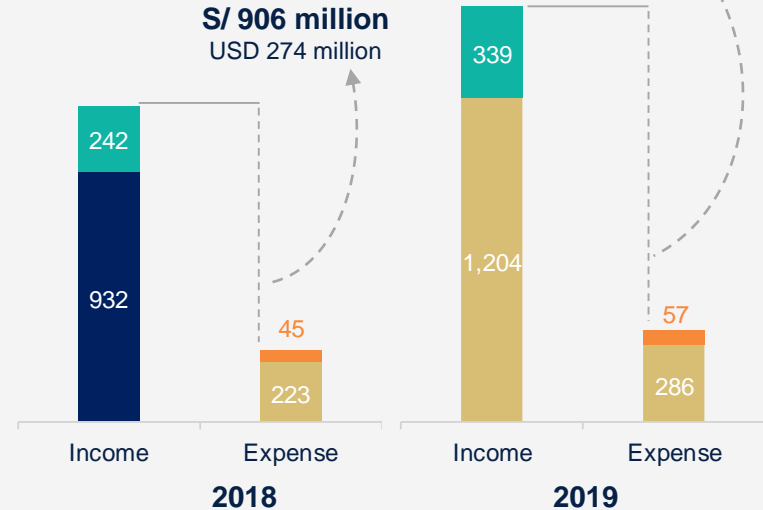
ESTIMATED

Average 2018/19
0.08% of GDP



ESTIMATED POTENTIAL

S/ 1.2 billion
USD 364 million



* Based on the data, assumptions, and calculations considered in the previous slides.
Source: BBVA Research

03

Impact of Venezuelan immigration on potential GDP and the output gap

Potential GDP is determined by the supply of production factors ^{1/}

$$Y = A K^{\alpha} (HL)^{1-\alpha}$$



Production (GDP)

The estimate takes into account the observed GDP in real terms

Productivity (TFP)

- R+D+i
- Institutions

This variable is not observed and is therefore obtained from the residue of the estimate

Capital

- Infrastructure
- Machinery and equipment

This is the *capital* stock

Work

- Education
- Labor

H: Human capital, approximated by the average number of years of education of the population over 14 years of age

L: Economically active population (EAP)

PRODUCTION FUNCTION METHOD

> Step 1

Considering $\alpha = 0.5$ (see Annex 6), we get A (Y, K, H, and L are data)

> Step 2

A, K, H, and L (Hodrick- Prescott) are filtered to obtain the trends for these variables: A^* , K^* , H^* , and L^*

> Step 3

Potential GDP is constructed:

$$Y^* = A^*(K^*)^{\alpha}(H^*L^*)^{1-\alpha}$$

Venezuelan immigration modified the supply of production factors in the Peruvian economy and, thus, the potential GDP

EFFECTS OF VENEZUELAN IMMIGRATION

↑ L

It increased labor availability.
The EAP increased, a jump that was more accentuated in 2018.

↑ H

It improved human capital.
Venezuelan immigrants have, on average, more years of schooling than the average Peruvian.

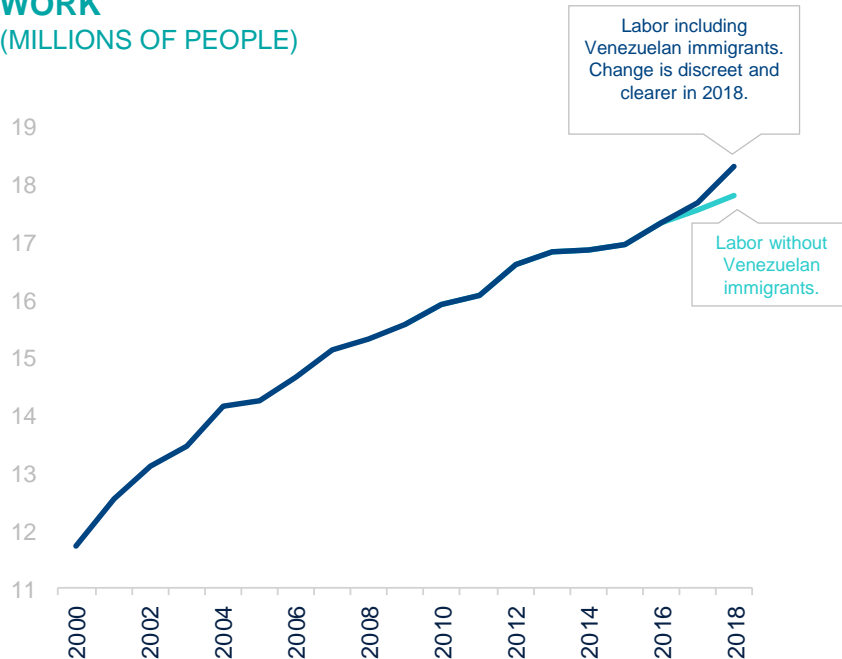
↑ Y^*

Therefore, **Venezuelan immigration must have increased the productive capacity of the Peruvian economy** (potential GDP level)

Venezuelan immigration has increased labor availability and, in a more limited sense, the stock of human capital

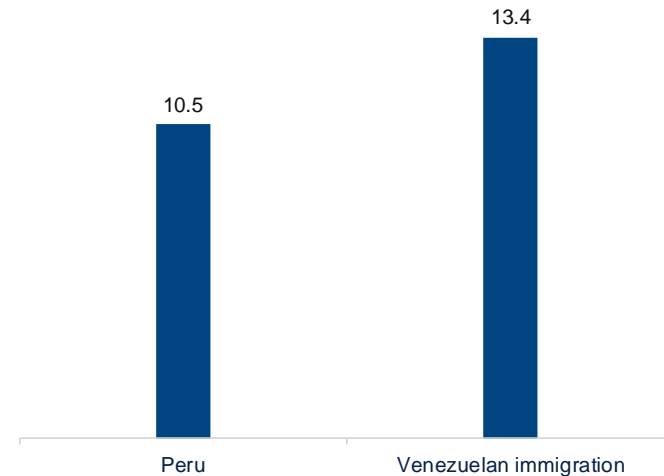
WORK*

(MILLIONS OF PEOPLE)



YEARS OF EDUCATION*

(AVERAGE, FOR PERSONS AGED 15 AND OVER)



* The inclusion of Venezuelan immigration raises the average years of education for Peru's population aged 15 and over from 10.5 to 10.6

* In the estimates (and in this graph) the EAP is considered and not the employed EAP (conceptually correct). The main reason is the limited availability of historical annual data for the employed EAP, which makes estimates difficult to generate. With $L = EAP$, *ceteris paribus*, the productivity level (TFP) is lower and perhaps more volatile. However, it is important to bear in mind that the unemployment rate in Peru does not vary much: in an environment of high informality and in the absence of unemployment insurance, the worker who loses their job must quickly find work in something else, even in activities for which they were not educated. Thus, the relevant factor in Peru is not so much unemployment, but the conditions of the employment. In this sense, the changes in the TFP obtained with the EAP do not differ much from what others obtain, such as, for example, The Conference Board. The use of employed EAP in the construction of the TFP could be considered in higher frequency calculations (e.g. quarterly).

Source: INEI, MTPE, MINEDU, and BBVA Research

Differentiated impacts of Venezuelan immigration on potential GDP and observed GDP

Comments

■ On potential GDP

- It is assumed that the impact is due to increased labor availability and, to a lesser extent, to the increase in the stock of human capital. These factors induce a one-time impact (mainly between 2017 and 2019). In addition, if it is assumed that: (i) there is no impact on the total factor productivity side, and (ii) going forward, the migratory influx normalizes and that labor force growth returns to its demographic trend, then potential GDP DOES NOT accelerate (we only have a discrete temporary jump between 2017-2019) in the following years (it returns to its previous growth trend).

■ On observed GDP

- The impact is caused by the contribution of Venezuelan immigrants to aggregate demand (consumption). This impact is lower than on potential GDP because the immigrant is not being employed according to their educational level and is mostly informal. Therefore, their income is lower than what they "potentially" could achieve.

■ On the output gap

- As a result of the above two points, the output gap would have widened between 2017 and 2019

Estimating the impact of immigration on potential GDP...

The construction assumes that the impact of Venezuelan immigration on potential GDP comes through labor availability and human capital

➤ Observed production (already includes the effect of Venezuelan immigration)

Y

➤ Observed capital

K

➤ Sets of labor and human capital that incorporate the impact of Venezuelan immigrants

H

L

$$Y = A K^\alpha (HL)^{1-\alpha}$$



A

Total factor productivity is constructed by residue using the production function method (see Annex 6)

Two versions of the variables labor and human capital are generated: One includes Venezuelan immigrants and the other does not. These are used to estimate potential GDP with (Y^*) and without (Y_{SV}^*) the impact of Venezuelan immigration. In both cases the production function method is used.

...and then the product output gaps are calculated with and without the effect of Venezuelan immigration

Product output gap that **includes** immigrants:

$$Y - Y^*$$

Product output gap that **excludes** immigrants:

$$Y_{SV} - Y_{SV}^*$$

How do we obtain a GDP that excludes Venezuelan immigrants (Y_{SV})?

They are obtained using the production function method

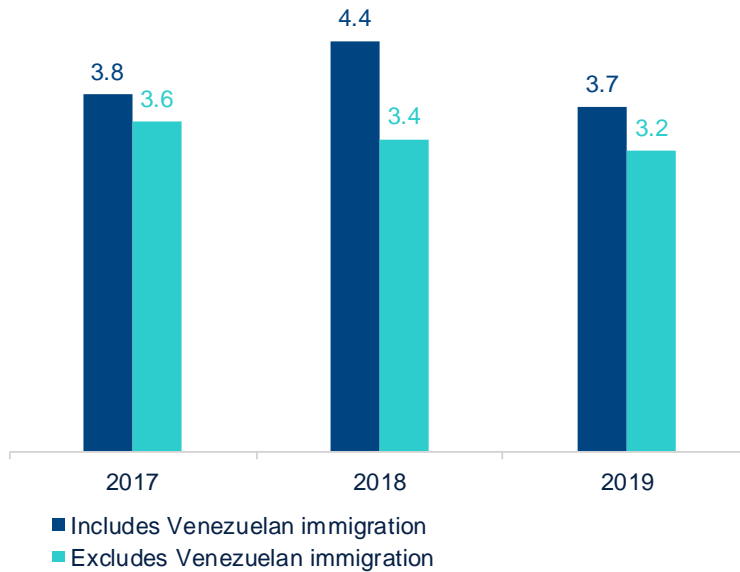
"Y" is subtracted from the consumption of Venezuelan immigrants. Our estimates suggest that this consumption amounts to between three and four tenths of a percentage point of GDP in 2018*. This estimate is not very different from that obtained, for example, by the Central Bank of Peru (three tenths of a percentage point of GDP).

$$\rightarrow Y_{SV}$$

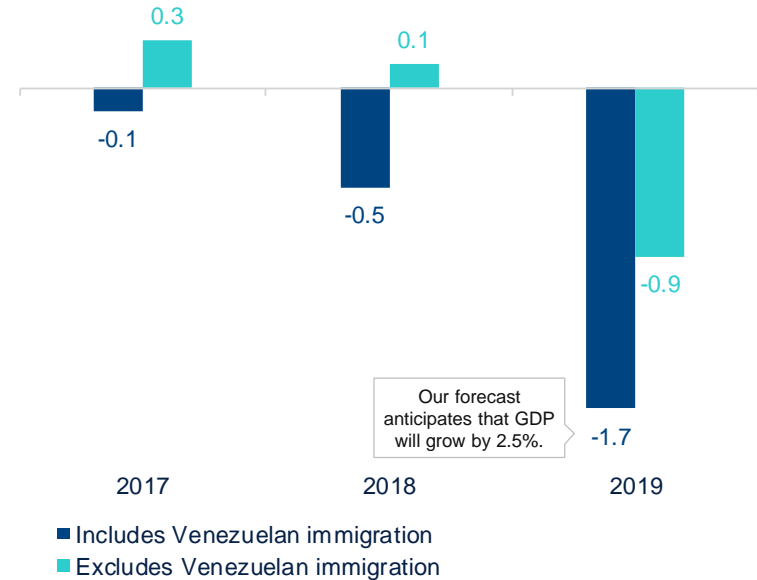
* The increase in consumption of Venezuelan immigrants was first identified in 2018. To this end, the income generated by immigrants who arrived in Peru in 2018 (net of remittances) was measured and it was assumed that everything was spent. Then, assuming also that all that expenditure was destined to locally manufactured products, the GDP increase was constructed in 2018 which, on the expenditure side, was due to the greater consumption of Venezuelan immigrants, an amount that was finally deducted from the GDP observed in 2018, obtaining the same year's GDP minus the impact of Venezuelan immigration.

Results*: With immigration, the potential GDP growth and output gap (negative) have widened

POTENTIAL GDP GROWTH (YEAR-ON-YEAR % VARIATION)



OUTPUT GAP (AS A % OF THE POTENTIAL LEVEL IN EACH SCENARIO)



* Conditional upon the assumptions used in the previous slides and BBVA Research's forecasts.
 Source: BBVA Research

The widening of the GDP gap (currently negative) shows that the cyclical weakness of the economy has increased... economic policy implications?

- The increased cyclical weakness of the economy has implications for inflation projections (downward bias) and suggests that stimuli are needed to stabilize the economy around its potential level.
- In this respect, it should be noted that the fiscal impulse estimates of the Ministry of Economy and Finance (MEF) and those of the Central Reserve Bank of Peru (BCRP) show that fiscal policy would be somewhat counter-active in 2019 and relatively neutral in 2020 ^{1/ 2/} .
- It is worth mentioning that BBVA Research recently updated its estimate of the neutral rate of interest on monetary policy for Peru and finds that, in real terms, it is about 30 basis points lower than the previous estimate ^{3/} (this is in line with the 25 basis points reduction in the estimate of this variable made by the Central Bank in its most recent Inflation Report).
- These factors suggest that a more accommodative monetary policy cannot be ruled out in the future.

1/ An approximation of the difference between the structural economic balances of two consecutive periods, a difference that would be similar to that obtained with the structural primary balance (which is what usually occurs) since interest is not cyclical and relatively stable as a % of GDP (it is canceled out when the difference is made between two periods). See Multiannual Macroeconomic Framework, August 2019, page 71.

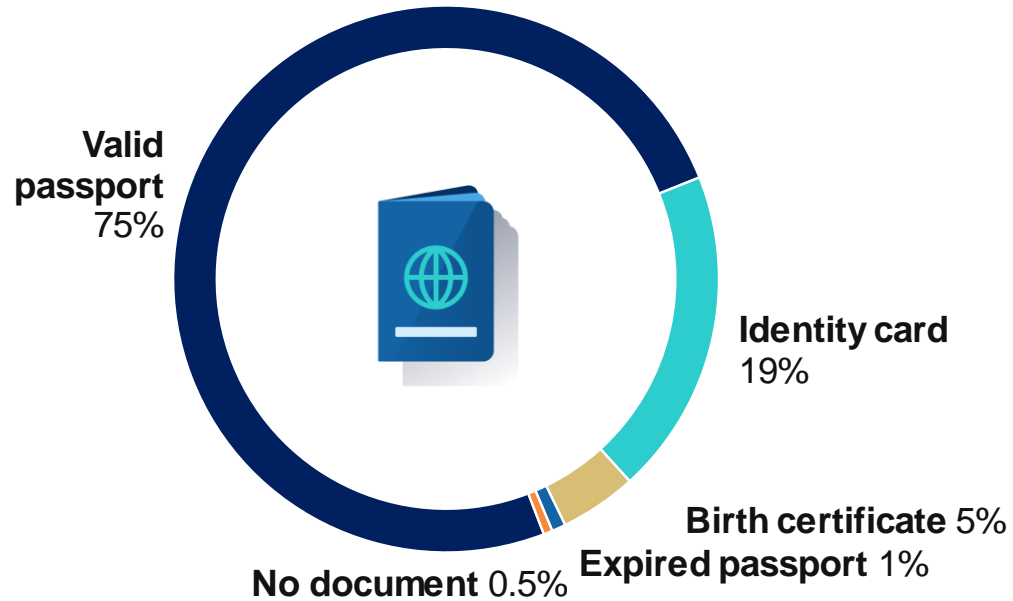
2/ Calculated by the BCRP, Inflation Report, September 2019, page 74.

3/ For a detailed methodology, see Annex 7.

APPENDICES

Annex 1. Most Venezuelan immigrants entered Peru with their current passport

DOCUMENT FOR ENTERING PERU (% OF VENEZUELAN POPULATION, 2018)



Annex 2. Methodological aspects of the survey focused on the Venezuelan population residing in Peru (ENPOVE 2018)

Objective: To provide information on the living conditions of the Venezuelan population living in the country, characterizing the demographic, social, immigration status, discrimination, and violence aspects. It also includes housing characteristics, access to basic services and household equipment.

1. POPULATION UNDER STUDY

The study consists of houses, homes and people arriving from Venezuela, residents in the urban area of the capital cities of the regions of Tumbes, La Libertad, Arequipa, Cusco, the province of Lima, and the Constitutional province of Callao.

2. SAMPLE FRAMEWORK

Constructed using information from the 2017 National Population and Housing Census and information from persons who requested the Temporary Permanence Permit (TPP), registered in the Venezuelan registry of the National Superintendence of Migration of the Ministry of the Interior.

3. SAMPLE TYPE

The sample is probabilistic, stratified, and independent in each city and the areas of Lima considered in the population under study.

4. COVERAGE

- Geography: cities of Arequipa, Cusco, Trujillo, Tumbes, Metropolitan Lima (Callao, Lima Central, Lima East, Lima North, and Lima South), and the Constitutional Province of Callao.
- Duration: From November 26 to December 31, 2018.

4. SAMPLE SIZE

Housing: 3,611
People: 9,487

5. INFERENCE OF RESULTS

Results will be statistically valid by city and survey application area.

6. TOPICS INVESTIGATED (117 questions)

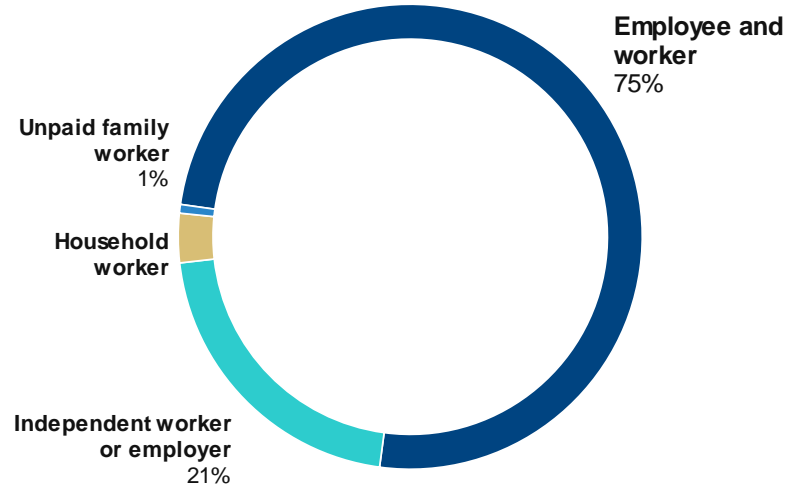
- Housing and Household Characteristics (13 questions).
- Household Member Characteristics (6 questions).
- Migration (all people - 19 questions).
- Health: (all people - 16 questions).
- Education (people aged 3 and over -13 questions).
- Employment (people aged 5 and over - 32 questions).
- Discrimination (people aged 5 years and over - 9 questions).
- Gender and victimization (people aged 18 years and over - 9 questions).

7. RESPONSE RATE

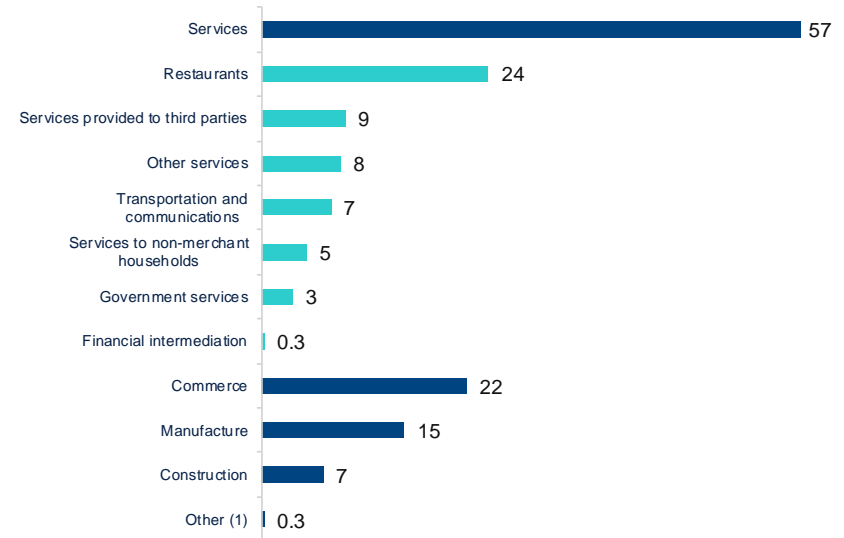
The response rate of the survey was 99.6%.

Annex 3. Most of the Venezuelan immigrants in work are dependent and engaged in services and commerce

VENEZUELAN EMPLOYED POPULATION BY OCCUPATIONAL CATEGORY
(EMPLOYED EAP, 2018)

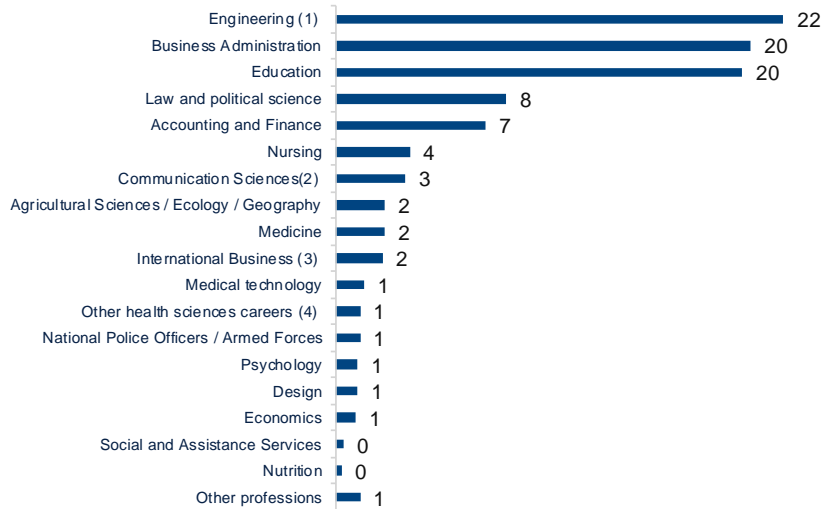


BRANCH OF ACTIVITY IN WHICH THEY ARE ENGAGED (% OF TOTAL, 2018)

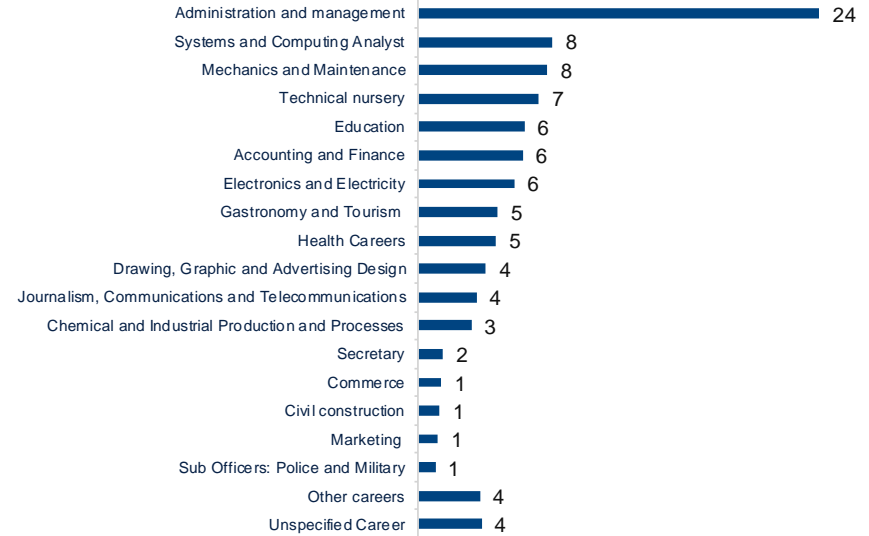


Annex 4. Engineering and Education are among the most studied degrees by Venezuelan immigrants

COLLEGE DEGREES STUDIED* (% OF TOTAL)



TECHNICAL DEGREES STUDIED* (% OF TOTAL)



1: Includes: Mathematics, Physics, Statistics, Computing, and Architecture.

2: Includes: Journalism and Broadcasting.

3: Includes Marketing.

4: Includes: Dentistry, Pharmacy and Biochemistry, Obstetrics, among others.

* Completed and incomplete degrees are included.

Source: ENPOVE (2018) - INEI

Annex 5. Estimate of the amount sent in the form of remittances from Venezuelan immigrants

INCLUDED

- Immigrants that do send remittances
- The frequency with which it is sent (weekly, fortnightly, monthly, and bimonthly), and
- Shipping amount, across ranges (less than s/100, between s/100 and s/200, and more than s/200)
- The average amount **per range is assumed to be** s/ 100 for the lowest, s/ 200 for the intermediate, and s/ 250 for the highest

MONTHLY ESTIMATE

Number of people who frequently send:

(Weekly	X	4)	X	Average amount of each remittance
	Fortnightly	X	2			
	Monthly	X	1			
	Bimonthly	/	2			

This results in an estimated average monthly remittance amount of S/ 260 (this value is subject to the assumption of **the average amount per range**)

Annex 6. Main definitions and estimation assumptions (i)

- **Potential GDP** is defined as the amount of goods and services that an economy can produce when all its resources (machinery, labor force, technology, and others) are being employed at its maximum capacity and without generating macroeconomic imbalances (such as inflationary processes or external imbalances) on a sustained basis. An economy that produces at this level is said to be in a situation of full use of resources. The difference between the observed GDP and potential GDP is known as **the output gap**; it tells us how far we are in terms of production from a situation of full use of resources. It should be noted that, since these two variables are "non-observable" directly in the data, there is always uncertainty in the estimates, which depends on the method used.
- The estimation of potential GDP and the output gap can be achieved by various methods which are generally classified as statistical and economic. **Statistical methods** mainly use filters to isolate the trend or long-term component (Hodrick and Prescott¹, Baxter and King², inter alia). More complex economic methods have a more intuitive interpretation when using an analytical framework in which the potential product is an endogenous variable that relates to other variables, such as prices or unemployment. For Peru, however, the data do not seem to support a close relationship between potential GDP (or the output gap) and prices (Phillips curve), unemployment (Okun's Law) or investment ratios³. In this study, the production function method is used, an economic method that allows for the estimation of potential GDP based on its determinants on the supply side: productivity, labor, and capital.
- The production function used is a Cobb-Douglas with constant yield on a scale and adjusted for human capital (Fuentes and Lynn, 2009⁴, Hofman and Tapia, 2003⁵):

$$Y_t = A_t K_t^\alpha (h_t L_t)^{1-\alpha}$$

1: Hodrick, R. and Prescott, E. (1997), "Postwar U. S. Business Cycles: An Empirical Investigation," Journal of Money, Credit And Banking, Vol. 29, No. 1.

2: Baxter, M. and King, R. (1995), "Measuring Business Cycles Approximate Band-Pass Filters For The Economic Time Series," National Bureau Of Economic Research, Working Paper No. 5022.

3. Rodriguez, G. (2009), "Estimating output gap, core inflation, and the NAIRU for Peru"

4: García-Fuentes, P. and Lynn, P. (2009), "Remittances and Economic Growth in Latin America and the Caribbean: The Impact of Human Capital Development."

5: Hofman, A. and Tapia, H (2003) "Potential output in Latin America: a standard approach for the 1950-2002 period," Serie Estudios estadísticos y prospectivos No. 25, CEPAL.

Annex 6. Main definitions and estimation assumptions (ii)

where, Y_t is GDP, A_t is productivity, K_t is the stock of physical capital, h_t is the factor of human capital, and L_t is the number of workers. All the variables have an annual frequency. The exponent is also α the participation of physical capital in the product, while $(1 - \alpha)$ it represents the participation of labor.

- **Stock of physical capital (K_t).** Because there is no direct measurement, K_t it was chosen to generate a series using the perpetual inventory method.
 - The conventional capital accumulation function is used $K_{t+1} = (1 - \delta)K_t + I_t$, where I_t is the investment level and δ is the depreciation rate. A straight-line depreciation function, with a 30-year useful life span for the capital, is assumed.
 - K_0) In order to define the initial capital stock (a steady state scenario is assumed in 1950): $K_0 = \frac{I^*}{g+d}$
 - where I^* is the average investment/GDP ratio between 1950-1980.
 - and, on the other hand, g is the average of the GDP growth rate between 1950-1980.
- **Human capital (h_t).** The following equation is used to generate this variable: $h_t = \exp\left[\left(\frac{\theta}{1-\psi}\right) s_t^{1-\psi}\right]$
 - where s_t represents the average years of schooling of the population aged over 15, while θ and ψ are sensitivity and curve parameters of the function which adopt values of 0.32 and 0.58, respectively, in accordance with the proposals of Bils and Klenow (1998)¹.
- **Capital-product elasticity.** The average $\alpha = 0,50$, of various estimates for Peru is taken:

Study / Publication

Vega-Centeno (1989) ²	0.55
Seminario and Beltrán (1998) ³	0.40
Carranza, Fernández-Baca and Morón (2002) ⁴	0.44
Peruvian Institute of Economics (2003) ⁵	0.64
Avg.	0.50

1: BILS, M., and Klenow, P (1998). "Does Schooling Cause Growth or the Other Way Around?"

2: Vega-Centeno, M. (1989), "Inversiones y cambio técnico en el crecimiento de la economía peruana."

3: Seminario, B. and Beltrán, A. (1998), "Crecimiento económico en el Perú 1896-1995: Nuevas evidencias estadísticas."

4: Carranza, E., Fernández-Baca, J. and Morón, E. (2002), "Peru: markets, governments and the sources of growth."

5: Instituto Peruano de Economía (2003), "La Brecha en Infraestructura, Servicios Públicos, Productividad y Crecimiento en Perú."

Annex 7. Natural rate estimation methodology (i)



Neutral real interest rate



The neutral interest rate is a structural variable used by the Central Bank for the assessment of the current state of the economy, and the calibration of monetary policy.

Maintaining an updated estimate of this neutral rate measurement is relevant to the implementation of monetary policy.



How do we calculate it?

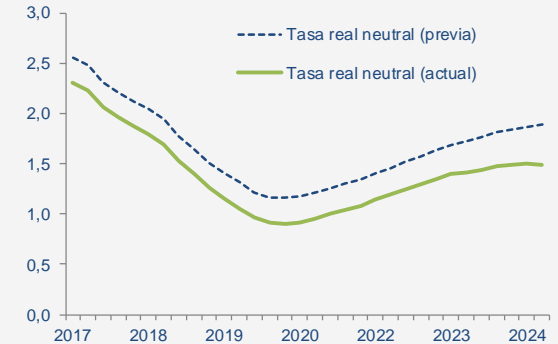
In recent years there have been several developments in the macroeconomic scenario that could have affected the level of the neutral rate.

In this context, a semi-structural model is used to estimate the neutral rate.

(Following the guidelines proposed by Laubach and Williams, 2001*)



Impacts on the neutral real rate



* Laubach, T; Williams (2001), "Measuring the natural rate of interest."
Source: BBVA Research

Annex 7. Natural rate estimation methodology (ii)

- As mentioned, the guidelines set out by Laubach and Williams are followed (2001)¹, and a semi-structural Neo-Keynesian model is used in a reduced fashion. The model contains the essential ingredients of a microbased model:

- IS Curve:
$$\tilde{y}_t = a_{y1}\tilde{y}_{t-1} + a_{y2}\tilde{y}_{t-2} + \frac{a_r}{2}\sum_{j=1}^2(r_{t-j} - r_{t-j}^*) + \varepsilon_{1t}$$

where,

$$\tilde{y}_t = y_t - y_t^* \text{ [Product gap]}$$

with, $y_t = \log(PIB)$

$$r_t = i_t - E_t\pi_{t+1} \text{ Real interest rate}$$

The inflation expectation (required to construct the real interest rate) is derived from the series of surveys of expectations of the BCRP (inflation expectation at 1 year ahead)

r_t^* is the real equilibrium interest rate which is variable in this model

- Phillips curve:
$$\pi_t = \sum_{i=1}^9 b_{\pi i}\pi_{t-i} + b_y\tilde{y}_{t-1} + b_l(\pi_t^l - \pi_t) + b_o(\pi_{t-1}^o - \pi_{t-1}) + \varepsilon_{2t}$$

where, $\tilde{y}_t = y_t - y_t^*$ [Output gap]

with,

π_t consumer price index inflation

π_t^l inflation of imported prices

π_t^o crude oil price inflation (WTI oil price growth)

1: Laubach, T; Williams (2001), "Measuring the natural rate of interest."

Annex 7. Natural rate estimation methodology (iii)

■ Model specification

- The real equilibrium interest rate r_t^* , varies over time in response to changes in potential GDP growth g and changes in temporary household preferences z :

$$r_t^* = c g_{t-1} + z_{t-1}$$

where

g_t is the growth rate of potential GDP

z_t follows a random path: $z_t = z_{t-1} + \varepsilon_{3t}$

- Potential GDP y_t^* evolves according to the following law of movement: $y_t^* = y_{t-1}^* + g_{t-1} + \varepsilon_{4t}$

where g_{t-1} is used to refer to the quarterly trend growth rate of the previous quarter, which also follows a random path, $g_t = g_{t-1} + \varepsilon_{5t}$. It is assumed that the innovations ε_{4t} and ε_{5t} are serially and mutually independent.

- A Kalman filter is applied to the state-space representation of the model described. This filter is a recursive algorithm that allows for the estimation of non-observable variables from a linear model that relates non-observable variables to a set of observed variables.

- In this way, we can define the state vector as: $S_t = (y_t^*, y_{t-1}^*, y_{t-2}^*, y_{t-2}^*, g_t, g_{t-1}, r_t^*, r_{t-1}^*, r_{t-2}^*, z_t, z_{t-1})'$

whose law of motion is specified thus, $S_t = \Gamma S_{t-1} + \Pi U_t$

- We now define the vector of observable variables:

$$X_t = (y_{t-1}, y_{t-2}, \pi_{t-1}, \pi_{t-2}, \pi_{t-3}, \pi_{t-4}, \pi_{t-5}, \pi_{t-6}, \pi_{t-7}, \pi_{t-8}, r_{t-1}, r_{t-2}, \pi_t^l, \pi_{t-1}^o)'$$

and the measurement equation can be expressed as,

$$Y_t = A' X_t + H' S_t + \epsilon_t$$

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