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# International Remittances and the Labour Market in Peru

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**Abstract**

International remittances are a relevant source of income in developing countries, with important implications for the labour market of recipient countries. Peruvian international migration is a particular case of Latin America, since it tends to be concentrated in middle-and high-income households and in highly educated people, who display particular preferences in relation to the labour market. Using data from 2004 to 2019, we analysed the impact of remittances on employment, hours worked, and wages of Peruvian workers. Our results show that remittances reduce labour participation by 9.8 percentage points (pp). On average, the effect is greater among dependent workers than self-employed workers (-7.5 pp versus -3 pp). Similarly, we observed an increase in hourly income in both types of work (10.1% and 65%, respectively). In this sense, the Peruvian case offers a new perspective on the effect of remittances on the labour market, where despite having most of its labour force in informal jobs and self-employment, it does not encourage employment in those sectors, as occurred in previous studies.

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## 1. Introduction

According to Ratha et al. (2020), in 2019 the estimated flow of remittances to low-and middle-income countries reached US$ 717 billion, which represented an increase of 3.2% compared to the previous year and an average growth of 2.6% in the last ten years. In the particular case of Latin America and the Caribbean, remittances reached US$ 96 billion, making it the region with the highest growth (8.2% compared to 2018) followed by South Asia (6.1%) and the region of Europe and Central Asia (4%). In the case of Peru, the Central Reserve Bank of Peru (hereinafter BCRP, for its acronym in Spanish) shows that in 2019 remittances reached a record figure of US$ 3,326 million (1.4% of GDP), which meant a growth of 3.1% compared to the previous year, with the main countries sending remittances to Peru being: United States, Spain, Argentina and Chile (BCRP, 2019). According to the National Institute of Statistics and Informatics (hereinafter INEI, for its acronym in Spanish), 38% of Peruvians living abroad send remittances to their households of origin; of this group, 64% do so on a monthly basis. Regarding the use of remittances, it is observed that 74.7% of them are used for household expenses, 16.3% for education expenses, 5.5% for housing and 3.5% for savings (INEI, 2020).

The Peruvian migration phenomenon, as in most developing countries, is mainly the result of social, demographic and economic factors. In particular, long periods of economic instability, hyperinflationary processes and social conflicts have marked the departure of Peruvians (De los Ríos and Rueda, 2005). From 1990 to 1992 the emigration rate increased by 16% on average annually as a consequence of the self-coup and the terrorist attacks on the capital in 1992 (Cameron, 1998). While the process of economic recovery and reintegration into the international community, which began in 1994, is consistent with a drop in the departure of Peruvians (-14% between 1993 and 1995). During the following years and up to the present day, not only did the Peruvian economy stabilise, but it also began to show sustained growth figures. Similarly, emigration rates remained at around an annual average of 8% (INEI et al., 2018).

For Altamirano (2004), the relationship between emigrants and their families in the cities of origin is mainly focused on sending remittances, which are used to acquire land, houses in the capital and the main cities in the interior of the country, instead of being invested in the development of their hometowns. The greatest benefit received by the cities of origin of the emigrants —particularly those who come from the central region of the country— is reflected in the flow of resources that are destined to finance religious celebrations. On the other hand, Paerregaard (2014) and Paerregaard (2015) shows that, in the case of Peru, remittances can reinforce gender and class relationships in society, as well as amplify inequalities between people who receive remittances and those who do not, whereas the short-term effects are more related to altruism.

Few studies in Peru have analysed the migratory phenomenon from an economic point of view. This is explained not only by the scarce information, but also because in the Peruvian case —unlike in Central American countries and Mexico— the migration process is concentrated in the population with secondary and higher education and in urban areas, generally belonging to the middle-income population. Therefore, remittance transfers only represent on average no

more than 15.5% of household income (Torres-Zorrilla, 2008; Takenaka and Pren, 2010; Céspedes et al., 2011; Salas, 2014). In this sense, Peruvian remittances —in comparison to the rest of Latin America— are more unequal among its population (Fajnzylber and López, 2008) and may reinforce class distinctions (Paerregaard, 2014).

In addition, given that around 70% of the labour force is in the informal sector, which is mainly constituted by self-employment and micro-enterprises with credit constraints (INEI, 2021b), the relationship between migration and sending of remittances may change the behaviour of recipients in the labour market.

The current article seeks to estimate the effect of international remittances on employment, working hours and wages of the remittance receivers in Peru, considering both the selection in the labour market and in migration as well as the receipt of remittances. These effects were studied previously by Céspedes et al. (2011) and Göbel (2012), who sought to evaluate the effect of remittances on hours worked and employment. In the first study, the author used the 2000-2010 Encuesta Nacional de Hogares – ENAHO (National Household Survey) and estimated a supply equation of hours worked. The results showed that, on average, hours worked in the main occupation were reduced by 16.2%. In the second study, the author used the 2002-2006 ENAHO panel sample, where a fixed effects model is estimated. In general, the results showed that remittances had no effect on employment; however, there was a reduction in men's wages and an increase in self-employment. In particular, the poor were 16 percentage points (pp.) more likely to be self-employed.

Nevertheless, these findings do not take into consideration the main characteristics of Peruvian migration, or the data used. For example, the supply equation of working hours for recipients of remittances does not control by simultaneity in the estimation process (Dermendzhieva, 2009), this fact may bias the model, so in most cases, the use of instrumental variables is proposed[1]. Unfortunately, finding an adequate instrument in the Peruvian case is quite difficult. Göbel (2012) faces this problem through a panel data model with fixed effects. However, a recurring concern with this strategy is that the data used does not come from a survey aimed at migratory or remittance issues, and, since the sample attrition increases as periods advance, this may be reflected in the estimated parameters. In addition, and as we mentioned before, most of the emigrants and their relatives are concentrated in middle and high-income households (Torres-Zorrilla, 2008), where the dropout of the panel may not be random.

In this sense, we consider the propensity score matching (PSM) method to compute the average treatment effect on the treated (ATET) of receiving remittances on the labour market outcomes. Since remittances are not randomly assigned, confounding variables may bias the results, so it is important to ensure that the study groups are comparable under a set of observable characteristics. PSM may guarantee a balance between control and treatment groups under observed covariates. For this purpose, we use the 2004-2019 ENAHO.

Our main results show that the receipt of remittances reduces labour force participation by

[1]Examples of instrumental variables are ATMs (Amuedo-Dorantes and Pozo, 2006), migrant population in the destination place (Vogler and Rotte, 2000; Hanson and Woodruff, 2003; Hildebrandt and McKenzie, 2012; McKenzie, 2006; Acosta et al., 2006) and the distance to the destination country (Karemera et al., 2000; Adams and Page, 2005; López, 2006).

9.8 pp on average. This is due to both the drop in the employment rate (-13.9 pp) and the increase in unemployment (2.8 pp). According to employment type, the reduction is greater in wage work than in self-employment (-7.5 pp compared to -3 pp); while the hours worked per week as a wage or self-employed worker are reduced by 4 and 12 hours, respectively. These findings show that income from remittances replaces the time spent at work with leisure time, even in the case of independent work, where an incentive for this activity could be expected.

These results were significant to various specifications and held true for different subgroups. In comparison with previous literature, the results were smaller but more robust, showing a clear reduction in various types of employment. On the other hand, we observed an increase in the real hourly income for both types of work (10.1% and 65%, respectively), which gives us an idea of their demand elasticities, where the demand for self-employed or informal workers responds much more to changes in wages compared to dependent work.

These results bring us a new perspective on sending remittances to the labour market of the country of origin, since, in most studies, the effects are concentrated in a particular population group (women or men in rural areas) or in some type of work (reduction of formal employment and/or increase of informal work). In the case of Peru, the effect is sustained and, despite the high rates of labour informality, there is no evidence that remittances encourage this type of employment, as is the case of Rapoport and Docquier (2006), Amuedo-Dorantes and Pozo (2006) and Woodruff and Zenteno (2007), where remittances may serve as collateral for new entrepreneurship.

This paper makes it possible to cover the existing gap on the subject for the Peruvian case, as well as to re-analyse the importance of migration and the sending of remittances in the recipient countries. The Peruvian case is interesting, since as we mentioned previously, the country's migratory characteristics make it different from the case of Mexico and Central America, where migration to the United States is a natural step, and the emigrant mainly comes from rural and poor areas with low levels of education (Göbel, 2012; Torres-Zorrilla, 2008). In addition, the economic growth of the last decade and the increase in the number of trade agreements leads us to think of a greater flow of remittances and, therefore, of alternative options to substitute labour income for other sources of earnings.

The rest of the document is made up of six sections. A brief review of international findings on the subject, descriptive statistics, the identification strategy used in the study, the main results, results in subgroups and the conclusions.

## 2. International evidence

The neoclassical model of labour supply[2] considers that any increase in non-labour income translates into a reduction in the labour supply, given that the extra income could be used both for leisure activities and for the consumption of goods and services. In this sense, if we consider international remittances as non-work income, the theory tells us that people will reduce both their working hours and their participation in the labour market. In addition to the above, in so-

[2]See Borjas and Van Ours (2010).

cieties with restrictions on the financial system, remittances can serve as collateral and increase self-employment and informal work. In summary, the net effect of remittances on the labour supply will depend both on the income effect of remittances and on their ability to generate self-employment. Most studies on the effects of sending remittances on the labour market in the destination country find a reduction in employment both in its intensive and extensive margins; that is, they support the first statement about the use of remittances, considering that the demand for labour does not vary. Similarly, evidence regarding the effects of remittances on wages is scarce.

Drinkwater et al. (2003), analyse the effect of sending remittances on the labour market for a group of 20 countries where remittances represent at least 1% of GDP. Their results show that when the country of origin has financial restrictions, remittances can reduce the unemployment rate. In the same vein, Ivlevs (2016), Azizi (2018) and Chami et al. (2018) find for different groups of developing countries that remittances have a strong impact on the labour market of families receiving remittances, where formal labour participation reduces and informal work increases.

Similar results were found by Dermendzhieva (2009), Murakami et al. (2021), Petreski et al. (2019), Al-Assaf (2016), Dey (2022) , Arouri and Nguyen (2018), and Rodriguez and Tiongson (2001) for countries such as Albania, Tajikistan, Macedonia, Jordan, India, Egypt and Philippines, respectively, where the labour supply of the members left behind was reduced. In some countries, the effect is concentrated in men (Albania and rural India) while in others it is more common in women (Macedonia and Philippines). Likewise, a preference for self-employment was observed.

Mexico is one of the Latin American countries where this phenomenon has been studied in greater detail. Amuedo-Dorantes and Pozo (2006) find that the effect of sending remittances varies among recipients according to sex, sector of the economy (formal-informal) and area of residence (urban-rural). Thus, an increase of 100 Mexican pesos in remittances is associated with a 15% reduction in employment in the formal sector for men and a reduction of 5% in self-employment in the urban sector. Similarly, there is an increase in working hours in the informal sector. In the case of women, employment is reduced only in rural areas. An explanation of these findings is due to the profile of the Mexican migrant and their families of origin, which leads them to use the extra money to generate income sources other than wage labour or to replace formal work with a more flexible way of employment. Likewise, in the case of women in rural areas, the income from remittances offsets the poor income obtained from their jobs.

A similar result is observed in Airola (2008), where working hours are reduced as a result of the increase in remittances. In this way, an increase of 100 pesos in remittances reduces men's working hours by 1.7 hours a week. On the contrary, Cox-Edwards and Rodríguez-Oreggia (2009), do not find conclusive results regarding negative effects on labour participation, since, as we mentioned previously, it will depend on the characteristics of the households and the management of income from remittances. Lastly, Hanson (2005) finds that those states of the Mexican Republic with a strong exposure to migration —larger migratory networks— tend to have higher incomes compared to the less exposed states; while Mishra (2007) shows that the

migration of Mexican workers had a positive effect on the country's wages (8% higher) between 1970 and 2000.

## 3. Descriptive statistics

We used ENAHO data for the period 2004-2019. This survey has national coverage and is representative at both urban and rural levels and in each of the 24 departments of the country and the constitutional province of Callao[3]. The ENAHO is carried out annually by the INEI in order to have indicators on poverty, well-being and living conditions of households in Peru. For the period under study, the initial sample was 1,232,658 observations, of which we only took into consideration those individuals who are part of the working-age population and are between 14 and 65 years old. Similarly, the subsample of workers only considers those who reported a positive wage[4]. Therefore, the final sample was 999,440 observations[5].

Table 1 presents the main descriptive statistics for the group of people who receive remittances (treated) and those who do not (controls), as well as their mean differences. It is important to mention that the person who indicated the amount of money received in remittances and the frequency with which they are received was considered to be a remittance recipient. Thus, of the sample used, only 0.6% received remittances during the period under study; of that amount, 68.1% were women. The average age of remittance recipients is older than that of the control group (40 versus 36 years old); however, the percentage of married people is higher among non-remittance recipients (55.8% versus 48.5%).

Remittance recipients have, on average, 1.6 years of schooling more than non-recipients. With regard to speaking an indigenous language, living in a rural area or being in conditions of poverty, it can be noted that these characteristics are concentrated in the control group. In particular, what stands out is the difference in rurality and poverty (27 and 20 pp), which indicates that remittance recipients tend to be located in the most developed areas of the country.

Regarding the labour market indicators, it is interesting to note that non-remittance recipients have more work experience (23 more months on average). A similar result is observed in the labour force participation rate and the employment rate, where the difference between the two groups is 14 and 18 pp, respectively. Similarly, the unemployment rate is 4 pp higher in the treatment group[6]; while in accordance with the type of employment, a greater presence of wage and self-employed workers is observed among non-remittance recipients.[7] Despite this, formal work is more concentrated among workers who receive remittances. With respect to the hours

[3]Departments are the highest level political and administrative divisions in Peru, which in turn are divided into provinces and districts at the same time. Each of them has its own regional, municipal government and local authorities.

[4]See Table 5 in the Appendix.

[5]It is important to mention that although ENAHO has a panel sample, given the limited number of people who receive remittances and the sample attrition, this component was not considered.

[6]It is important to mention that this value expresses the relationship between the unemployed and the working-age population, since we consider that the receipt of remittances can alter not only the search for employment but also participation.

[7]In all cases, we only consider the main occupation of the people surveyed.

worked per week, both in wage and self-employment, the control group works an average of 5 more hours per week.

With regard to wages and income from self-employment, it is interesting to see that the wage (from dependent work) is higher among non-remittance recipients; while the opposite occurs with income from self-employment. On the other hand, hourly wages and income show a slight advantage in favour of the treatment group.[8] Finally, the last column of Table 1 presents the probability associated with the equality of means hypothesis. In general, it can be seen that this hypothesis is rejected in most cases, which shows us that a direct comparison between both groups would not be correct as long as there are characteristics that determine inclusion in one group or another.

## 4. Identification strategy

As previously mentioned, we use the PSM method to compute the ATET of receiving remittances on the labour market outcomes[9]. This method seeks to relate each participant in the treatment group with those who are not treated and have similar characteristics[10]. The advantage of this method is that it does not require strict parameterisation or assumptions about the residuals. The technique assumes that any bias occurs only in observable variables, so it does not ensure balance in unobservable variables. However, following Altonji et al. (2005), controlling a large set of observable attributes, can help to control the selection of unobservable ones.

We define the following variables: $Y_1$ variable of interest, $Y_0$ given that it was exposed to the treatment, variable of interest, given that it was not exposed to the treatment, $D$ dummy variable that indicates having received $(D = 1)$ or not $(D = 0)$ the treatment and $X$ set of pre-defined characteristics[11]. In the case of a random experiment, the results are independent of whether or not they belong to the treatment, so a counterfactual is not necessary (that is, $Y_1, Y_0 \perp D$), and therefore the ATET estimator is defined as $E[Y_1 - Y_0|D = 1]$ . However, when randomisation is not feasible, and the decision to receive or not receive the treatment is made on a set of observable variables, we can use the matching method. This method assumes that the differences between treatment and control groups only occur in observable variables; that is, the assignment is not random, but is done according to observable characteristics $(X)$.

Thus, to obtain the ATET estimator, we need to calculate the difference -for each individual- between treatment and control groups conditioned on and then calculate the average of these differences with respect to the distribution of $X$. However, this matching method is complicated if the number of explanatory variables is very large, so finding matches is difficult. This problem is known as "the curse of dimensionality." A solution to this problem is the use of propensity score matching, which reduces the vector of characteristics to one dimension. The propensity

[8] One possible explanation for the higher hourly wage in the control group is that they work fewer hours per week in comparison to the treatment group.

[9] Namely, the labour force, employment rate, unemployment-to-population rate, wage worker, self-employment, formal employment, working hours, real monthly wage and income, and real hourly wage and income.

[10] For more details on this method see: Cameron and Trivedi (2005) and Caliendo and Kopeinig (2008).

[11] It contains the variables: age, marital status, rural area, sex, poverty levels, dummy variables per year, and linear interactions between them.

**Table 1**
Descriptive statistics

| | Total | Treated | Control | Difference | (p-value) |
|---|---|---|---|---|---|
| N | 999,440 | 6,150 | 993,290 | | |
| Female | 0.511 | 0.681 | 0.510 | 0.172 | 0.000 |
| Age | 36.410 | 40.208 | 36.387 | 3.821 | 0.000 |
| Married | 0.558 | 0.485 | 0.558 | -0.074 | 0.000 |
| Years of schooling | 9.550 | 11.103 | 9.540 | 1.563 | 0.000 |
| Speaks an indigenous language | 0.209 | 0.060 | 0.210 | -0.150 | 0.000 |
| Rural | 0.353 | 0.082 | 0.355 | -0.273 | 0.000 |
| Poverty | 0.280 | 0.077 | 0.281 | -0.204 | 0.000 |
| Work experience (months) | 70.594 | 47.311 | 70.738 | -23.427 | 0.000 |
| Labour force participation rate | 0.775 | 0.635 | 0.776 | -0.141 | 0.000 |
| Employment rate | 0.731 | 0.554 | 0.732 | -0.178 | 0.000 |
| Unemployment-to-population rate | 0.044 | 0.081 | 0.044 | 0.037 | 0.000 |
| Wage worker | 0.286 | 0.226 | 0.286 | -0.060 | 0.000 |
| Self-employment | 0.288 | 0.251 | 0.288 | -0.037 | 0.000 |
| Formal employment | 0.234 | 0.266 | 0.234 | 0.032 | 0.000 |
| Working hours per week | | | | | |
| Wage worker | 45.617 | 41.400 | 45.638 | -4.238 | 0.000 |
| Self-employment | 44.071 | 37.138 | 44.099 | -6.961 | 0.078 |
| Real monthly wage (log) | 7.025 | 6.983 | 7.025 | -0.043 | 0.018 |
| Real monthly income (log) | 6.427 | 6.730 | 6.425 | 0.305 | 0.083 |
| Real hourly wage (log) | 1.807 | 1.893 | 1.806 | 0.087 | 0.000 |
| Real hourly income (log) | 1.374 | 1.924 | 1.372 | 0.552 | 0.002 |

*Notes*: Authors' calculations, using data from the ENAHO 2004-2019. Marriage includes cohabitation. Rural areas consider villages with less than 500 inhabitants. Poverty variables include extreme and moderate poverty. Experience refers to the number of working months. Formal work is defined as work with access to health care services and a pension. Wages and incomes given in 2019 constant Peruvian soles.

score is defined as the probability of receiving treatment conditioned to a set of observed variables before treatment. That is to say: $p(X) = p(D = 1) = E_x(D|X)$

The previous expression has two implications on obtaining the ATET estimators. If $p(X)$ is the propensity score; then, for individuals with the same $p(X)$, the assignment to the treatment and control group is random and they must appear identical in . This assumption is known as the balancing condition, and it is a testable hypothesis.

If there is independence between the variable of interest and the treatment assignment, conditioned to , then there is also conditional independence on $p(X)$[12].

$$Y_1, Y_0 \perp D|X \Rightarrow Y_1, Y_0 \perp D|p(X) \tag{1}$$

This useful result allows us to match the individuals in the treatment and control groups based $p(X)$ on instead of $X$. Therefore, we define the average effect of the treatment on the treated conditioned to $p(X)$ as: $\delta_{ATET} = E_{p(X)}\{E[\,Y_1|D = 1, p(X)] - E[\,Y_0|D = 0, p(X)]\}$.

## 5. Results

Given that the calculation of the ATET estimators can vary according to the method used, we estimated two types of matching: (i) matching with one and three close neighbours and radii of 0.025 and 0.01; and (ii) exact matching in the variables of geographic area, sex, and poverty levels. Since the objective of our study is to analyse the impact of remittances on the labour market, our variables of interest seek to capture the changes in labour force participation (both in the intensive and extensive margin), as well as the effects on wages and income from self-employment. The propensity score was calculated using a logistic regression of the variables: age, marital status, rural area, sex, poverty levels, dummy variables per year, and linear interactions between the aforementioned variables.

### 5.1 Balance tests

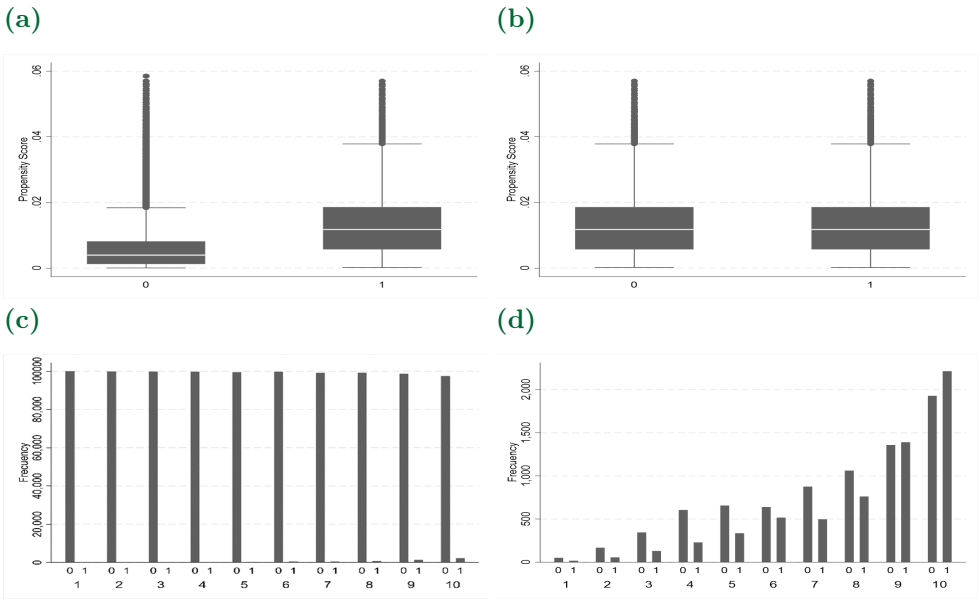
One of the main assumptions of propensity score matching is that the observable characteristics are balanced between treated and controls. That is, there are no differences in observable characteristics between both groups. If this assumption is not fulfilled, it is possible that there are also differences between unobservable variables and therefore the ATET estimator is biased.

Following the work of Dehejia and Wahba (1999, 2002), Figure 1 shows a graphical test, with data before and after matching, which allows us to observe the balance and common support of the sample. It can be noted that before matching, the mean of the treatment group is greater than that of the control group, as is the dispersion of the data (Panel A). After matching, it is seen that the mean and dispersion between both groups is the same (Panel B). Similarly, the number of observations in the treatment and control by deciles of the propensity score was calculated (Panels C and D). In general, it can be found that both before and after matching, the

[12]This result on conditional independence is from Rosenbaum and Rubin (1983).

number of observations in the control group is higher than that of the treatment group; however, this difference is reduced in the upper deciles.

**Figure 1.** Balance in the propensity score




*Source*: Figure made by the authors using data from ENAHO 2004-2019. Figures A and C show calculations before matching. We use the method of 3 nearest neighbours within a radius of 0.01. In all cases, 0 refers to control observations and 1 to treatment observations. In the histogram, the x-axis, second row, refers to deciles of the estimated propensity score. We include 39 variables: age, married, rural, sex, poverty, dummy variables for years, and their linear interactions.

Tables 2 and 3 show various balance tests for the proposed types of matching[13]. Columns 2 and 3 present the results of the stratified test proposed by Dehejia and Wahba (1999, 2002) in order to analyse the differences in mean between each stratum. It is observed that, before matching, 11.3% of variables were not balanced. Columns 4 and 5 show the median of the standardised bias test proposed by Rosenbaum and Rubin (1983) to evaluate the distance in the marginal distributions of the explanatory variables[14]. Columns 6 and 7 present the Sianesi (2004) test of joint significance of the propensity score model, before and after matching. The null hypothesis of this test is that all the regressors of the logit model are not significant. Columns 8 and 9 report a test for mean differences, which collects the percentage of variables that reject the null hypothesis of equality of means. As can be seen, in all cases we have sufficient evidence in favour of the balance and common support of the sample.

[13]Table 2 carries out the balance on the entire labour force, while Table 3 restricts the sample to those who work as wage workers or self-employed. It is important to mention that the number of observations (N) in the treatment and control is considerably reduced in the sample of self-employed workers, so the external validity of the results must be taken with care.

[14]According to Caliendo and Kopeinig (2008), a standardised bias measure of less than 3% or 5% is sufficient.

**Table 2**

Balance in the propensity score (Labour Force)

| | DW test | | Median test | | LR test | | Diff means | | N | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Before | After | Before | After | Before | After | Before | After | Treat | Control |
| NN1+R 0.025 | 0.113 | 0.000 | 12.596 | 0.000 | 0.000 | 1.000 | 1.000 | 0.000 | 6150 | 2564 |
| NN3+R 0.025 | 0.113 | 0.000 | 12.596 | 0.000 | 0.000 | 1.000 | 1.000 | 0.000 | 6150 | 7692 |
| NN1+R 0.01 | 0.113 | 0.000 | 12.596 | 0.000 | 0.000 | 1.000 | 1.000 | 0.000 | 6150 | 2564 |
| NN3+R 0.01 | 0.113 | 0.000 | 12.596 | 0.000 | 0.000 | 1.000 | 1.000 | 0.000 | 6150 | 7692 |
| Exact match | | | | | | | | | | |
| NN3+R 0.025 | 0.113 | 0.000 | 12.596 | 0.000 | 0.000 | 1.000 | 1.000 | 0.000 | 6150 | 8949 |

*Notes*: Authors' calculations, using data from the ENAHO 2004-2019. Balance tests on the population in the labour force. The first column indicates the matching method. NN refers to nearest neighbour matching. The exact matching method restricts the sample to individuals with the same rural, sex and poverty variables. DW test refers to the **?** stratification test using quintiles of the estimated propensity score. The Median Bias column shows the median standardized bias. The LR test column shows the p-value of the likelihood ratio test that all coefficients in the regression are equal to zero. The column Diff Means shows the percentage of tests out of total possible tests in which the null hypothesis of equal means between treatment and control is rejected. The last two columns indicate the number of observations in treatment and control after matching.

**Table 3**

Balance in the propensity score (Employed population)

| | DW test | | Median test | | LR test | | Diff means | | N | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Before | After | Before | After | Before | After | Before | After | Treat | Control |
| Panel A: Wage worker | | | | | | | | | | |
| NN1+R 0.025 | 0.087 | 0.000 | 11.326 | 0.000 | 0.000 | 1.000 | 0.872 | 0.026 | 1353 | 996 |
| NN3+R 0.025 | 0.087 | 0.000 | 11.326 | 0.003 | 0.000 | 1.000 | 0.872 | 0.026 | 1353 | 2988 |
| NN1+R 0.01 | 0.087 | 0.000 | 11.326 | 0.000 | 0.000 | 1.000 | 0.872 | 0.026 | 1353 | 996 |
| NN3+R 0.01 | 0.087 | 0.000 | 11.326 | 0.003 | 0.000 | 1.000 | 0.872 | 0.026 | 1353 | 2988 |
| Exact match | | | | | | | | | | |
| NN3+R 0.025 | 0.087 | 0.000 | 11.628 | 0.261 | 0.000 | 1.000 | 0.872 | 0.026 | 1353 | 3267 |
| Panel B: Self-employment | | | | | | | | | | |
| NN1+R 0.025 | 0.005 | 0.000 | 21.726 | 17.486 | 0.000 | 0.957 | 0.462 | 0.462 | 29 | 28 |
| NN3+R 0.025 | 0.005 | 0.000 | 21.726 | 9.810 | 0.000 | 0.999 | 0.462 | 0.462 | 29 | 83 |
| NN1+R 0.01 | 0.005 | 0.000 | 21.726 | 17.486 | 0.000 | 0.957 | 0.462 | 0.462 | 29 | 28 |
| NN3+R 0.01 | 0.005 | 0.000 | 21.726 | 13.590 | 0.000 | 0.999 | 0.462 | 0.462 | 29 | 81 |
| Exact match | | | | | | | | | | |
| NN3+R 0.025 | 0.005 | 0.000 | 21.279 | 9.761 | 0.000 | 1.000 | 0.462 | 0.462 | 29 | 79 |

*Notes*: Authors' calculations, using data from the ENAHO 2004-2019. Balance tests on the employed population. The first column indicates the matching method. NN refers to nearest neighbour matching. The exact matching method restricts the sample to individuals with the same rural, sex and poverty variables. DW test refers to the **?** stratification test using quintiles of the estimated propensity score. The Median Bias column shows the median standardized bias. The LR test column shows the p-value of the likelihood ratio test that all coefficients in the regression are equal to zero. The column Diff Means shows the percentage of tests out of total possible tests in which the null hypothesis of equal means between treatment and control is rejected. The last two columns indicate the number of observations in treatment and control after matching.

## 5.2 Main results

Table 4 presents the main results of the propensity score matching. The upper part shows the impact of receiving international remittances on employment. In the case of labour force participation (column 2), we observed that the effect is negative and significant under various specifications; that is, remittances reduce labour participation by 9.8 pp. This effect is mainly explained by the fall in the employment rate (-13.9 pp) and the increase in unemployment (2.8 pp). According to employment type, it can be seen that the decrease in employment occurs both among wage workers and self-employment (-7.5 and -3.0, respectively); while formal work is reduced by -2.2 pp[15]. These findings provide evidence that remittances encourage leisure time (activities other than work), even if independent and informal employment were considered an opportunity. This gives us an idea of the profile of remittance recipients in Peru, who would not be using the remittances for entrepreneurship activities.

The fall in wage employment is higher than that observed by Göbel (2012), which shows a reduction between 3.7 and 5.2 pp., for the Peruvian case. Similarly, the effect on employment is much greater than that found in the Philippine and Albanian cases, where a reduction is mainly observed in women (-0.2 and -1.03 pp., respectively). On the contrary, in the Mexican case, the effect is positive, but only among women who live in urban areas and belong to states with a low incidence of migration (4.5 pp).

The lower part of Table 4 shows the effects of remittances on hours worked, wages and income from self-employment. Columns 2 and 3 indicate that remittances have a negative and significant impact on hours worked per week. It is interesting to observe that the negative effect is greater on self-employment (-11.9 hours or -27%) than on wage labour (-3.9 hours or -9%). These results are in line with but higher than what was found by Céspedes et al. (2011) for the general case of hours worked in Peru (-16.2% or -6 hours in the main job). Likewise, this result is much higher than that observed in Mexico, where the increase of 100 Mexican pesos in remittances reduces the hours worked per week by 1.7 (Airola, 2008). Thus, remittances have a greater impact on self-employment in the intensive margin than in the extensive margin (decision to participate in the labour market).

The next two columns present the effects on wages and income from self-employment in real terms. Remittances reduce real wages by 7.6% (US$ 30 on average), while they increase self-employment income by 40.7% (about an additional US$ 111). It is worth mentioning that while in the case of wages all the estimators are significant, the same does not occur with income from self-employment, where only the use of matching with a close neighbour (radii of 0.025 and 0.01) and exact matching are significant. Finally, columns 6 and 7 at the bottom of Table 4 show the effects on hourly wages and income. It is interesting to appreciate that in both cases the results are positive and significant; In other words, sending remittances increases hourly wages by 10.1% (US$ 0.2) and hourly income of self-employed workers by 65% (US$ 1.2).

These results are in line with the idea that the income effect of remittances reduces the supply

[15]In Peru, the informal sector represents 70% of the employed population; that is, workers who do not have access to a formal health system and a pension. The present study considers self-employment as a good proxy for Peruvian informal work.

of wage labour in favour of leisure time. In that sense, if we consider that the labour demands of wage workers and the self-employed do not change, these findings are consistent with a shift to the left of the labour supply, resulting in a reduction in hours worked and an increase in earnings per hour; where the differences in the magnitude of the change are explained by the elasticities of the demand for each type of work.

In comparison to what is observed in the international evidence, where remittances promote informal jobs (Amuedo-Dorantes and Pozo, 2006), Peruvian remittances cause the opposite effect. Thus, in the case of Peru, given the particular characteristics of migrants and their family's preferences, there are no incentives for job creation, even in the self-employment sector, since many of them use international remittances as a way to maintain their privileged position in Peruvian society (Takenaka and Pren, 2010). This feature is maintained even when nearly 70% of the country's population is informal and where only half of the population has access to the financial system (INEI, 2021a).

**Table 4**

Main results

| | Labour force | Empl. rate | Unemp. | Wage worker | Self-empl. | Formal empl. |
|---|---|---|---|---|---|---|
| NN1+R 0.025 | -0.098*** | -0.139*** | 0.028*** | -0.075*** | -0.030*** | -0.022** |
| | (0.011) | (0.012) | (0.006) | (0.011) | (0.010) | (0.009) |
| NN3+R 0.025 | -0.104*** | -0.133*** | 0.026*** | -0.069*** | -0.023*** | -0.017*** |
| | (0.007) | (0.007) | (0.004) | (0.006) | (0.006) | (0.006) |
| NN1+R 0.01 | -0.098*** | -0.139*** | 0.028*** | -0.075*** | -0.030*** | -0.022** |
| | (0.011) | (0.012) | (0.006) | (0.011) | (0.010) | (0.009) |
| NN3+R 0.01 | -0.104*** | -0.133*** | 0.026*** | -0.069*** | -0.023*** | -0.017*** |
| | (0.007) | (0.007) | (0.004) | (0.006) | (0.006) | (0.006) |
| Exact match | | | | | | |
| NN3+R 0.025 | -0.103*** | -0.122*** | 0.025*** | -0.064*** | -0.022*** | -0.010** |
| | (0.005) | (0.006) | (0.003) | (0.005) | (0.005) | (0.005) |

| | Working hrs. | | Real monthly | | Real hourly | |
|---|---|---|---|---|---|---|
| | wage worker | self-employed | wage (log.) | income (log.) | wage (log.) | income (log.) |
| NN1+R 0.025 | -3.942*** | -11.897*** | -0.076*** | 0.407*** | 0.101*** | 0.650*** |
| | (0.551) | (2.762) | (0.021) | (0.115) | (0.023) | (0.109) |
| NN3+R 0.025 | -3.805*** | -9.598*** | -0.064*** | 0.042 | 0.054*** | 0.382*** |
| | (0.311) | (1.209) | (0.012) | (0.049) | (0.014) | (0.045) |
| NN1+R 0.01 | -3.942*** | -11.897*** | -0.076*** | 0.407*** | 0.101*** | 0.650*** |
| | (0.551) | (2.762) | (0.021) | (0.115) | (0.023) | (0.109) |
| NN3+R 0.01 | -3.805*** | -9.943*** | -0.064*** | 0.074 | 0.054*** | 0.421*** |
| | (0.311) | (1.209) | (0.012) | (0.049) | (0.014) | (0.045) |
| Exact match | | | | | | |
| NN3+R 0.025 | -3.686*** | -7.437*** | -0.038*** | 0.178*** | 0.056*** | 0.370*** |
| | (0.282) | (1.233) | (0.011) | (0.044) | (0.012) | (0.039) |

*Notes*: Authors' calculations, using data from the ENAHO 2004-2019. We include 39 variables: age, married, rural, sex, poverty, dummy variables for years, and their linear interactions. Unemployment measures the ratio to the working-age population. Exact matching method restricts the sample to individuals with the same rural, sex and poverty variables. Standard errors in parenthesis are estimated using 500 bootstrap replications. *** p<0.01, ** p<0.05, * p<0.1.

### 5.3 Results in subgroups

Figure 2 shows the impact of remittances on the labour market and wages by sex[16]. We can see that the negative and statistically significant effect found in general labour force participation is maintained, with the reduction being greater in women (- 11.6 pp) than in men (-5.1 pp). These results are explained both by the fall in the employment rate and by the increase in the number of unemployed. According to employment type, wage labour for men and women decreased by 6.1 and 7.4 pp, respectively, while self-employment increased by 1 pp for men and decreased by 1.8 pp for women. However, this last result is only statistically significant in the case of women and for some ATET estimators. Regarding formal employment, negative and significant results are only observed in women (-1.7 pp).

Regarding the hours worked per week (see Appendix 6 and 7), the receipt of remittances reduced wage labour for men by 4.8 hours and for women by 2.1 hours; while the hours worked by the self-employed decreased by 8.9 and 9.8 hours, respectively. In this sense, we can see that the receipt of international remittances has negative effects on employment and hours worked by men and women. However, the effect is differentiated, while the fall in the labour force is almost double in the case of women, in the intensive margin, the opposite effect is observed, where men reduce their hours of wage labour to a greater extent.

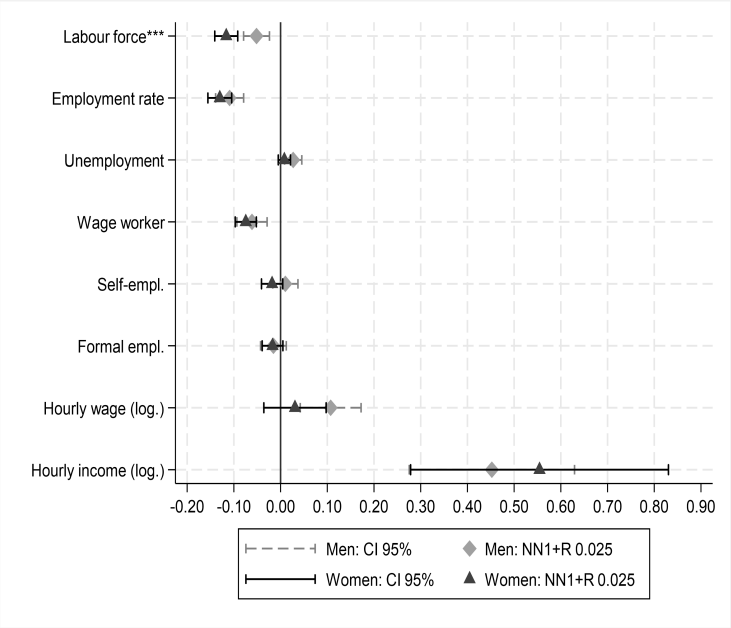
Similarly, Figure 2 shows the impact of remittances on wages and income from self-employment. Hourly wages increased by 10.7% in men, while in women the increase was 7%, being significant only for some estimators in the case of women. On the other hand, hourly income in self-employment increased by 45.2% and 55.4% in men and women, respectively. In both cases, the results were statistically significant at various specifications of the estimator. In addition to the above, we can observe that only the difference between men and women were statistically significant in the labour force variable.

According to marital status, Figure 3 shows that the receipt of remittances reduces the participation in the labour force of married and single people by 11.8 and 8.9 pp, respectively[17]. In the case of married people, this reduction in employment is observed both in wage labour and in self-employment (-5.3 and -4.1 pp); while in the case of single people, the results were only significant for wage employment (-9.8 pp). Regarding participation in formal employment, statistically significant reductions are only observed in formal employment of single workers (-2.9 pp). With respect to hourly wages, increases of 3.2% and 10.3% are observed for married and single people, respectively. However, these values were only significant for single people. Similarly, hourly income from self-employment increased by 46.8% and 44.5%. In both cases the values were significant. In the same way as Figure 2, the differences between the ATET of married and single people were statistically significant in the variables wage worker, self-employment, and formal employment.

Finally, Figure 4 presents the results by rural or urban area[18]. The labour force participation rate decreased in both groups (-6.3 and -9.4 pp). The bigger drop in urban employment is

[16] See Appendix 6 and 7 for more details on the results in men and women.
[17] For more details see Tables 8 and 9 in the Appendix.
[18] For more details see Tables 10 and 11 in the Appendix.

**Figure 2.** ATET. Labour force results by sex




*Source*: Figure made by the authors using data from ENAHO 2004-2019. Unemployment measures the ratio to the working-age population. We use the method of 1 nearest neighbour within a radius of 0.025. We include the variables: age, married, rural, poverty, dummy variables for years, and their linear interactions. *** p<0.01, ** p<0.05, * p<0.1.

explained by the greater reduction in wage employment (-8.3 pp) than in self-employment (-1.6 pp) which was only significant for some specifications. Regarding the hourly wage and hourly income in self-employment, it can be seen that the receipt of remittances has a positive and significant effect only in the urban area (7% and 52.4%, respectively). The differences between the ATET of rural and urban areas were only statistically significant in the variables employment rate, wage worker, and real hourly income.

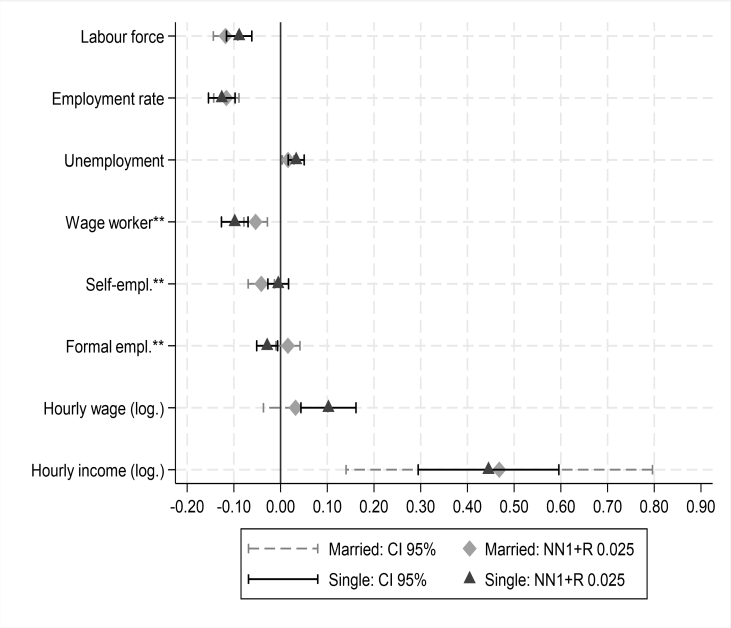
Overall, these results show that the main findings still remain in subgroups of the Peruvian population, which state a clear difference from other countries, where the effects on the labour market are concentrated in a particular gender and/or a specific geographical area.

## 6. Conclusions

The receipt of international remittances is an important source of income in developing countries. The neoclassical theory of labour economics considers remittances as non-labour income, so an increase in the sending of them can discourage the labour supply in favour of leisure. However, under conditions of credit constraints, remittances can be used to finance the development of entrepreneurship and encourage self-employment. The previous evidence in developing countries sheds light in favour of this last argument.

The study of the effect of remittances on the labour market in Peru is an interesting case, since, unlike most studies of this type, Peruvian migration and families receiving remittances

**Figure 3.** ATET. Labour force results by marital status



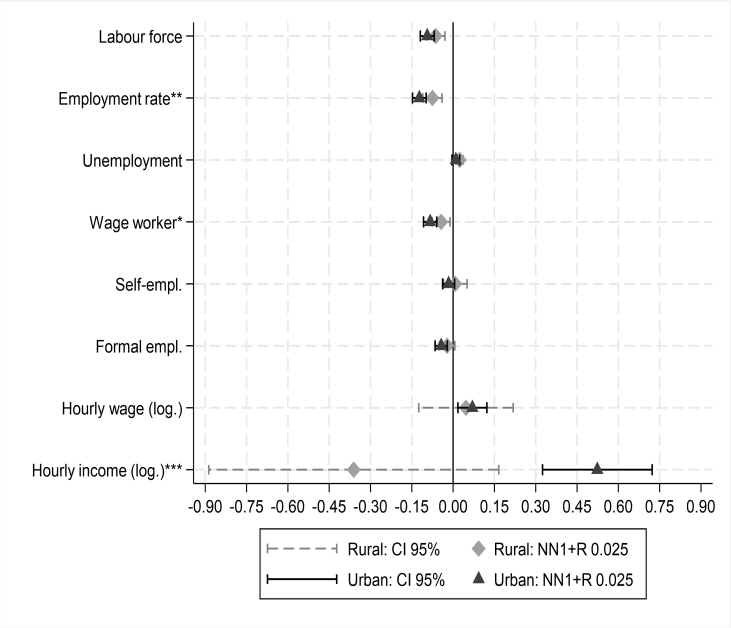

*Source*: Figure made by the authors using data from ENAHO 2004-2019. Unemployment measures the ratio to the working-age population. We use the method of 1 nearest neighbour within a radius of 0.025. We include the variables: age, rural, sex, poverty, dummy variables for years, and their linear interactions. *** p<0.01, ** p<0.05, * p<0.1.

come from households in the upper quintiles in the income distribution (Torres-Zorrilla, 2008; Takenaka and Pren, 2010; Salas, 2014). In addition, Peruvian remittances —in comparison to the rest of Latin America— are more unequal and may reinforce class distinctions (Fajnzylber and López, 2008; Paerregaard, 2014). In the same vein, the economic growth of the last decade has contributed to a more significant number of trade agreements and increased the flow of people abroad, which has encouraged the flow of international remittances to a particular group of families that have the ability to take advantage of trade openness.

Our results show that remittances reduce labour participation by 9.8 pp on average, the effect being greater in dependent workers than in self-employed workers (-7.5 pp versus -3 pp). The hours worked per week were reduced both in self-employment (-11.9 hours) and in wage labour (-3.9 hours). Despite this, the receipt of remittances increases hourly income in both types of work (10.1% and 65%, respectively). These results are maintained when analysing different sub-samples of remittance recipients.

Our findings show that when migration and remittance recipients are concentrated in a particular group of the population, as is the case in Peru, the results are more accentuated. Likewise, when migration comes from high socioeconomic strata, remittances do not promote self-employment, as would be expected in countries with high levels of credit constraints and informality rates. On the contrary, it may reinforce social distinctions between recipients and non-recipients, since the remittance recipients obtain higher wages for working and extra income

**Figure 4.** ATET. Labour force results by area




*Source*: Figure made by the authors using data from ENAHO 2004-2019. Unemployment measures the ratio to the working-age population. We use the method of 1 nearest neighbour within a radius of 0.025. We include the variables: age, married, sex, poverty, dummy variables for years, and their linear interactions. *** p<0.01, ** p<0.05, * p<0.1.

from abroad. These findings lead us to think that, in this context, remittances do not help social mobility, on the contrary, they may widen the gap among the population.

In this sense, the Peruvian case seeks to open the debate on the true importance of migration and remittances in developing countries, their real contribution to the development of countries, and to the reduction of inequality. If the concentration of wealth and the migration-remittance binomial belong to the same population group, public policies in favour of migration and the productive use of remittances may have unexpected results in the remittance-receiving country.

# Appendix

## Appendix A: Tables

**Table 5**
Sample Restriction

| | Full Sample | Treated | Control |
|---|---|---|---|
| Initial sample | 1,232,658 | 8,732 | 1,223,926 |
| Aged 14-65 | 1,051,640 | 6,383 | 1,045,257 |
| Monthly wage > 250 Peruvian soles | 1,002,135 | 6,160 | 995,975 |
| Monthly income > 100 Peruvian soles | 999,440 | 6,150 | 993,290 |

*Notes*: Authors' calculations, using data from the ENAHO 2004-2019. Wages and incomes given in 2019 constant Peruvian soles.

**Table 6**

Results for men

| | Labour force | Empl. rate | Unemp. | Wage worker | Self-empl. | Formal empl. |
|---|---|---|---|---|---|---|
| NN1+R 0.025 | -0.051*** | -0.109*** | 0.027*** | -0.061*** | 0.010 | -0.015 |
| | (0.014) | (0.015) | (0.009) | (0.016) | (0.014) | (0.014) |
| NN3+R 0.025 | -0.073*** | -0.109*** | 0.030*** | -0.058*** | 0.011 | -0.003 |
| | (0.008) | (0.009) | (0.006) | (0.010) | (0.008) | (0.008) |
| NN1+R 0.01 | -0.051*** | -0.109*** | 0.027*** | -0.061*** | 0.010 | -0.015 |
| | (0.014) | (0.015) | (0.009) | (0.016) | (0.014) | (0.014) |
| NN3+R 0.01 | -0.073*** | -0.109*** | 0.030*** | -0.058*** | 0.011 | -0.003 |
| | (0.008) | (0.009) | (0.006) | (0.010) | (0.008) | (0.008) |
| Exact match | | | | | | |
| NN3+R 0.025 | -0.073*** | -0.109*** | 0.030*** | -0.058*** | 0.011 | -0.003 |
| | (0.008) | (0.009) | (0.006) | (0.010) | (0.008) | (0.008) |

| | Working hrs. | | Real monthly | | Real hourly income | |
|---|---|---|---|---|---|---|
| | wage worker | self-employed | wage (log.) | income (log.) | wage (log.) | income (log.) |
| NN1+R 0.025 | -4.835*** | 0.133 | -0.045 | 0.340*** | 0.107*** | 0.452*** |
| | (0.743) | (3.703) | (0.028) | (0.092) | (0.033) | (0.090) |
| NN3+R 0.025 | -4.627*** | -8.911*** | -0.059*** | 0.286*** | 0.111*** | 0.363*** |
| | (0.416) | (1.945) | (0.016) | (0.044) | (0.019) | (0.042) |
| NN1+R 0.01 | -4.835*** | 0.133 | -0.045 | 0.228** | 0.107*** | 0.364*** |
| | (0.743) | (3.703) | (0.028) | (0.099) | (0.033) | (0.097) |
| NN3+R 0.01 | -4.627*** | -8.911*** | -0.059*** | 0.170*** | 0.111*** | 0.268*** |
| | (0.416) | (1.945) | (0.016) | (0.048) | (0.019) | (0.045) |
| Exact match | | | | | | |
| NN3+R 0.025 | -4.642*** | -10.600*** | -0.059*** | 0.362*** | 0.110*** | 0.365*** |
| | (0.417) | (1.613) | (0.016) | (0.044) | (0.019) | (0.042) |

*Notes*: Authors' calculations, using data from the ENAHO 2004-2019. We include the variables: age, married, rural, poverty, dummy variables for years, and their linear interactions. Unemployment measures the ratio to the working-age population. The exact matching method restricts the sample to individuals with the same rural, sex and poverty variables. Standard errors in parenthesis are estimated using 500 bootstrap replications. *** p<0.01, ** p<0.05, * p<0.1.

**Table 7**
Results for women

| | Labour force | Empl. rate | Unemp. | Wage worker | Self-empl. | Formal empl. |
|---|---|---|---|---|---|---|
| NN1+R 0.025 | -0.116*** | -0.130*** | 0.008 | -0.074*** | -0.018 | -0.017 |
| | (0.013) | (0.013) | (0.007) | (0.012) | (0.012) | (0.011) |
| NN3+R 0.025 | -0.119*** | -0.137*** | 0.017*** | -0.071*** | -0.022*** | -0.017** |
| | (0.007) | (0.008) | (0.004) | (0.006) | (0.007) | (0.007) |
| NN1+R 0.01 | -0.116*** | -0.130*** | 0.008 | -0.074*** | -0.018 | -0.017 |
| | (0.013) | (0.013) | (0.007) | (0.012) | (0.012) | (0.011) |
| NN3+R 0.01 | -0.119*** | -0.137*** | 0.017*** | -0.071*** | -0.022*** | -0.017** |
| | (0.007) | (0.008) | (0.004) | (0.006) | (0.007) | (0.007) |
| Exact match | | | | | | |
| NN3+R 0.025 | -0.119*** | -0.137*** | 0.017*** | -0.071*** | -0.022*** | -0.017** |
| | (0.007) | (0.008) | (0.004) | (0.006) | (0.007) | (0.007) |

| | Working hrs. | | Real monthly | | Real hourly income | |
|---|---|---|---|---|---|---|
| | wage worker | self-employed | wage (log.) | income (log.) | wage (log.) | income (log.) |
| NN1+R 0.025 | -2.134*** | -2.400 | -0.012 | 0.211 | 0.031 | 0.554*** |
| | (0.688) | (3.950) | (0.027) | (0.133) | (0.034) | (0.141) |
| NN3+R 0.025 | -2.747*** | -9.800*** | -0.032** | 0.050 | 0.070*** | 0.631*** |
| | (0.375) | (2.050) | (0.014) | (0.067) | (0.018) | (0.065) |
| NN1+R 0.01 | -2.134*** | -2.400 | -0.012 | 0.211 | 0.031 | 0.554*** |
| | (0.688) | (3.950) | (0.027) | (0.133) | (0.034) | (0.141) |
| NN3+R 0.01 | -2.747*** | -9.800*** | -0.032** | 0.073 | 0.070*** | 0.638*** |
| | (0.375) | (2.050) | (0.014) | (0.067) | (0.018) | (0.065) |
| Exact match | | | | | | |
| NN3+R 0.025 | -2.776*** | -11.133*** | -0.032** | -0.247*** | 0.070*** | 0.368*** |
| | (0.373) | (1.705) | (0.014) | (0.067) | (0.018) | (0.065) |

*Notes*: Authors' calculations, using data from the ENAHO 2004-2019. We include the variables: age, married, rural, poverty, dummy variables for years, and their linear interactions. Unemployment measures the ratio to the working-age population. The exact matching method restricts the sample to individuals with the same rural, sex and poverty variables. Standard errors in parenthesis are estimated using 500 bootstrap replications. *** p<0.01, ** p<0.05, * p<0.1.

**Table 8**

Results for married people

| | Labour force | Empl. rate | Unemp. | Wage worker | Self-empl. | Formal empl. |
|---|---|---|---|---|---|---|
| NN1+R 0.025 | -0.118*** | -0.116*** | 0.016*** | -0.053*** | -0.041*** | 0.016 |
| | (0.013) | (0.014) | (0.006) | (0.013) | (0.014) | (0.013) |
| NN3+R 0.025 | -0.115*** | -0.114*** | 0.008 | -0.052*** | -0.021*** | -0.002 |
| | (0.008) | (0.008) | (0.004) | (0.008) | (0.008) | (0.008) |
| NN1+R 0.01 | -0.118*** | -0.116*** | 0.016*** | -0.053*** | -0.041*** | 0.016 |
| | (0.013) | (0.014) | (0.006) | (0.013) | (0.014) | (0.013) |
| NN3+R 0.01 | -0.115*** | -0.114*** | 0.008** | -0.052*** | -0.021*** | -0.002 |
| | (0.008) | (0.008) | (0.004) | (0.008) | (0.008) | (0.008) |
| Exact match | | | | | | |
| NN3+R 0.025 | -0.115*** | -0.114*** | 0.008** | -0.052*** | -0.021*** | -0.002 |
| | (0.008) | (0.008) | (0.004) | (0.008) | (0.008) | (0.008) |
| | Working hrs. | | Real monthly | | Real hourly income | |
| | wage worker | self-employed | wage (log.) | income (log.) | wage (log.) | income (log.) |
| NN1+R 0.025 | -1.278* | 2.308 | -0.070** | 0.166 | 0.032 | 0.468*** |
| | (0.735) | (4.249) | (0.029) | (0.143) | (0.035) | (0.167) |
| NN3+R 0.025 | -1.855*** | -4.103** | -0.083*** | 0.199*** | 0.017 | 0.516*** |
| | (0.388) | (1.881) | (0.016) | (0.066) | (0.019) | (0.069) |
| NN1+R 0.01 | -1.278* | 2.308 | -0.070** | 0.166 | 0.032 | 0.468*** |
| | (0.735) | (4.249) | (0.029) | (0.143) | (0.035) | (0.167) |
| NN3+R 0.01 | -1.855*** | -4.103** | -0.083*** | 0.199*** | 0.017 | 0.516*** |
| | (0.388) | (1.881) | (0.016) | (0.066) | (0.019) | (0.069) |
| Exact match | | | | | | |
| NN3+R 0.025 | -1.890*** | -7.718*** | -0.083*** | 0.264*** | 0.017 | 0.666*** |
| | (0.389) | (1.727) | (0.016) | (0.067) | (0.019) | (0.070) |

*Notes*: Authors' calculations, using data from the ENAHO 2004-2019. We include the variables: age, rural, sex, poverty, dummy variables for years, and their linear interactions. Unemployment measures the ratio to the working-age population. The exact matching method restricts the sample to individuals with the same rural, sex and poverty variables. Standard errors in parenthesis are estimated using 500 bootstrap replications. *** p<0.01, ** p<0.05, * p<0.1.

**Table 9**

Results for single people

| | Labour force | Empl. rate | Unemp. | Wage worker | Self-empl. | Formal empl. |
|---|---|---|---|---|---|---|
| NN1+R 0.025 | -0.089*** | -0.126*** | 0.033*** | -0.098 | -0.005 | -0.029*** |
| | (0.014) | (0.015) | (0.009) | (0.015) | (0.011) | (0.011) |
| NN3+R 0.025 | -0.096*** | -0.138*** | 0.030*** | -0.103 | -0.011 | -0.018** |
| | (0.008) | (0.008) | (0.005) | (0.008) | (0.007) | (0.007) |
| NN1+R 0.01 | -0.089*** | -0.126*** | 0.033*** | -0.098 | -0.005 | -0.029*** |
| | (0.014) | (0.015) | (0.009) | (0.015) | (0.011) | (0.011) |
| NN3+R 0.01 | -0.096*** | -0.138*** | 0.030*** | -0.103 | -0.011 | -0.018** |
| | (0.008) | (0.008) | (0.005) | (0.008) | (0.007) | (0.007) |
| Exact match | | | | | | |
| NN3+R 0.025 | -0.096*** | -0.138*** | 0.029*** | -0.103 | -0.011 | -0.017** |
| | (0.008) | (0.008) | (0.005) | (0.008) | (0.007) | (0.007) |
| | Working hrs. | | Real monthly | | Real hourly income | |
| | wage worker | self-employed | wage (log.) | income (log.) | wage (log.) | income (log.) |
| NN1+R 0.025 | -4.887*** | -7.563** | -0.020 | 0.077 | 0.103*** | 0.445*** |
| | (0.720) | (3.111) | (0.025) | (0.089) | (0.030) | (0.077) |
| NN3+R 0.025 | -5.100*** | -4.792*** | -0.035** | -0.128*** | 0.111*** | 0.325*** |
| | (0.395) | (1.619) | (0.015) | (0.049) | (0.017) | (0.040) |
| NN1+R 0.01 | -4.887*** | -7.563** | -0.020 | 0.077 | 0.103*** | 0.325*** |
| | (0.720) | (3.111) | (0.025) | (0.089) | (0.030) | (0.077) |
| NN3+R 0.01 | -5.100*** | -4.792*** | -0.035** | -0.128*** | 0.111*** | 0.325*** |
| | (0.395) | (1.619) | (0.015) | (0.049) | (0.017) | (0.040) |
| Exact match | | | | | | |
| NN3+R 0.025 | -5.128*** | -5.938*** | -0.033** | 0.004 | 0.112*** | 0.320*** |
| | (0.393) | (1.572) | (0.014) | (0.054) | (0.017) | (0.050) |

*Notes*: Authors' calculations, using data from the ENAHO 2004-2019. We include the variables: age, rural, sex, poverty, dummy variables for years, and their linear interactions. Unemployment measures the ratio to the working-age population. The exact matching method restricts the sample to individuals with the same rural, sex and poverty variables. Standard errors in parenthesis are estimated using 500 bootstrap replications. *** p<0.01, ** p<0.05, * p<0.1.

**Table 10**

Results for people in rural areas

| | Labour force | Empl. rate | Unemp. | Wage worker | Self-empl. | Formal empl. |
|---|---|---|---|---|---|---|
| NN1+R 0.025 | -0.063*** | -0.075*** | 0.024*** | -0.043** | 0.008 | -0.022 |
| | (0.017) | (0.018) | (0.007) | (0.017) | (0.022) | (0.014) |
| NN3+R 0.025 | -0.069*** | -0.084*** | 0.016*** | -0.043*** | 0.013 | -0.007 |
| | (0.010) | (0.011) | (0.004) | (0.009) | (0.012) | (0.008) |
| NN1+R 0.01 | -0.063*** | -0.075*** | 0.024*** | -0.043** | 0.008 | -0.022 |
| | (0.017) | (0.018) | (0.007) | (0.017) | (0.022) | (0.014) |
| NN3+R 0.01 | -0.069*** | -0.084*** | 0.016*** | -0.043*** | 0.013 | -0.007 |
| | (0.010) | (0.011) | (0.004) | (0.009) | (0.012) | (0.008) |
| Exact match | | | | | | |
| NN3+R 0.025 | -0.048*** | -0.065*** | 0.010** | -0.028*** | 0.013 | -0.001 |
| | (0.010) | (0.010) | (0.004) | (0.008) | (0.011) | (0.008) |

| | Working hrs. | | Real monthly | | Real hourly income | |
|---|---|---|---|---|---|---|
| | wage worker | self-employed | wage (log.) | income (log.) | wage (log.) | income (log.) |
| NN1+R 0.025 | -4.130** | -20.125* | -0.139* | 0.217 | 0.047 | -0.361 |
| | (1.966) | (11.232) | (0.071) | (0.222) | (0.087) | (0.269) |
| NN3+R 0.025 | -2.383** | -10.917 | -0.118*** | -0.063 | 0.056 | -0.018 |
| | (1.030) | (8.471) | (0.038) | (0.118) | (0.043) | (0.127) |
| NN1+R 0.01 | -4.130** | -20.125* | -0.139* | 0.217 | 0.047 | -0.361 |
| | (1.966) | (11.232) | (0.071) | (0.222) | (0.087) | (0.269) |
| NN3+R 0.01 | -2.383** | -10.917 | -0.118*** | -0.063 | 0.056 | -0.018 |
| | (1.030) | (8.471) | (0.038) | (0.118) | (0.043) | (0.127) |
| Exact match | | | | | | |
| NN3+R 0.025 | -2.265** | | -0.104*** | 0.129* | 0.108*** | 0.174** |
| | (0.901) | | (0.033) | (0.070) | (0.036) | (0.084) |

*Notes*: Authors' calculations, using data from the ENAHO 2004-2019. We include the variables: age, married, sex, poverty, dummy variables for years, and their linear interactions. Unemployment measures the ratio to the working-age population. The exact matching method restricts the sample to individuals with the same sex and poverty variables. Standard errors in parenthesis are estimated using 500 bootstrap replications. *** p<0.01, ** p<0.05, * p<0.1.

**Table 11**

Results for people in urban areas

| | Labour force | Empl. rate | Unemp. | Wage worker | Self-empl. | Formal empl. |
|---|---|---|---|---|---|---|
| NN1+R 0.025 | -0.094*** | -0.123*** | 0.010 | -0.083*** | -0.016 | -0.043*** |
| | (0.013) | (0.013) | (0.007) | (0.012) | (0.011) | (0.011) |
| NN3+R 0.025 | -0.110*** | -0.134*** | 0.016*** | -0.076*** | -0.028*** | -0.024*** |
| | (0.007) | (0.008) | (0.004) | (0.007) | (0.007) | (0.006) |
| NN1+R 0.01 | -0.094*** | -0.123*** | 0.010 | -0.083*** | -0.016 | -0.043*** |
| | (0.013) | (0.013) | (0.007) | (0.012) | (0.011) | (0.011) |
| NN3+R 0.01 | -0.110*** | -0.134*** | 0.016*** | -0.076*** | -0.028*** | -0.024*** |
| | (0.007) | (0.008) | (0.004) | (0.007) | (0.007) | (0.006) |
| Exact match | | | | | | |
| NN3+R 0.025 | -0.105*** | -0.132*** | 0.021*** | -0.079*** | -0.026*** | -0.015*** |
| | (0.006) | (0.007) | (0.003) | (0.006) | (0.006) | (0.005) |

| | Working hrs. | | Real monthly | | Real hourly income | |
|---|---|---|---|---|---|---|
| | wage worker | self-employed | wage (log.) | income (log.) | wage (log.) | income (log.) |
| NN1+R 0.025 | -3.960*** | -4.476 | -0.108*** | 0.451*** | 0.070*** | 0.524*** |
| | (0.590) | (3.434) | (0.021) | (0.099) | (0.027) | (0.102) |
| NN3+R 0.025 | -3.631*** | -8.222*** | -0.075*** | 0.419*** | 0.073*** | 0.747*** |
| | (0.332) | (1.863) | (0.012) | (0.056) | (0.015) | (0.051) |
| NN1+R 0.01 | -3.960*** | -4.476 | -0.108*** | 0.384*** | 0.070*** | 0.470*** |
| | (0.590) | (3.434) | (0.021) | (0.104) | (0.027) | (0.107) |
| NN3+R 0.01 | -3.631*** | -8.222*** | -0.075*** | 0.324*** | 0.073*** | 0.726*** |
| | (0.332) | (1.863) | (0.012) | (0.059) | (0.015) | (0.054) |
| Exact match | | | | | | |
| NN3+R 0.025 | -3.607*** | -7.587*** | -0.068*** | 0.474*** | 0.068*** | 0.758*** |
| | (0.294) | (1.414) | (0.011) | (0.049) | (0.013) | (0.049) |

*Notes*: Authors' calculations, using data from the ENAHO 2004-2019. We include the variables: age, married, sex, poverty, dummy variables for years, and their linear interactions. Unemployment measures the ratio to the working-age population. The exact matching method restricts the sample to individuals with the same sex and poverty variables. Standard errors in parenthesis are estimated using 500 bootstrap replications. *** p<0.01, ** p<0.05, * p<0.1.

**Table 12**
Test of equal ATET coefficients

| | Sex | | Marital status | | Region | |
|---|---|---|---|---|---|---|
| | Male | Female | Married | Single | Rural | Urban |
| Labour force | -0.051*** | -0.116*** | -0.118 | -0.089 | -0.063 | -0.094 |
| | (0.014) | (0.013) | (0.013) | (0.014) | (0.017) | (0.013) |
| Employment rate | -0.109 | -0.130 | -0.116 | -0.126 | -0.075** | -0.123** |
| | (0.015) | (0.013) | (0.014) | (0.015) | (0.018) | (0.013) |
| Unemployment | 0.027 | 0.008 | 0.016 | 0.033 | 0.024 | 0.010 |
| | (0.009) | (0.007) | (0.006) | (0.009) | (0.007) | (0.007) |
| Wage worker | -0.061 | -0.074 | -0.053** | -0.098** | -0.043* | -0.083* |
| | (0.016) | (0.012) | (0.013) | (0.015) | (0.017) | (0.012) |
| Self-empl. | 0.010 | -0.018 | -0.041** | -0.005** | 0.008 | -0.016 |
| | (0.014) | (0.012) | (0.014) | (0.011) | (0.022) | (0.011) |
| Formal empl. | -0.015 | -0.017 | 0.016** | -0.029** | -0.022 | -0.043 |
| | (0.014) | (0.011) | (0.013) | (0.011) | (0.014) | (0.011) |
| Real monthly: Wage (log.) | -0.045 | -0.012 | -0.070 | -0.020 | -0.139 | -0.108 |
| | (0.028) | (0.027) | (0.029) | (0.025) | (0.071) | (0.021) |
| Real monthly: Income (log.) | 0.340 | 0.211 | 0.166 | 0.077 | 0.217 | 0.451 |
| | (0.092) | (0.133) | (0.143) | (0.089) | (0.222) | (0.099) |
| Real hourly: Wage (log.) | 0.107 | 0.031 | 0.032 | 0.103 | 0.047 | 0.070 |
| | (0.033) | (0.034) | (0.035) | (0.030) | (0.087) | (0.027) |
| Real hourly: Income (log.) | 0.452 | 0.554 | 0.468 | 0.445 | -0.361*** | 0.524*** |
| | (0.090) | (0.141) | (0.167) | (0.077) | (0.269) | (0.102) |

Notes: Authors' calculations, using data from the ENAHO 2004-2019. Unemployment measures the ratio to the working-age population. We estimated the difference between two regression coefficients based on the work of Clogg et al. (1995).

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