Remittances and employment patterns in Ecuador

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Abstract

Migration is a relevant phenomenon in Ecuador. Since 1999, large waves of migration have been recorded due to the stringent economic conditions of the country. After the dollarization that took place at the beginning of 2000, remittances were the first source of external flows into the economy, contributing to rebuild what was left of Ecuador's financial situation. This study attempts to analyze the effect of remittances at a micro level, specifically on labor supply of Ecuadorian workers. The identification strategy relies on instrumental variables together with TOBIT models (IVTOBIT). We follow this approach due to the possible endogeneity of remittances with respect to labor supply, and the limited nature of the main dependent variable, monthly hours worked. The findings suggest negative and significant effects of remittances on labor supply, especially in the formal sector for females and males, and in the informal sector for women, providing evidence of an income effect. Some positive effects are found among women in rural areas within non–paid activities, supporting the argument that remittances might alleviate budget constraints and, therefore, allow households members to allocate more time at home.

Keywords: Remittances, Labor Supply, Instrumental Variables, Tobit models.

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1   Introduction

Remittances have been one of the fundamental pillars in the economic sustainability of Ecuador since 1999. A trend of deregulation of financial markets in the 90s, together with natural disasters and political instability, resulted in the dollarization of the economy in 2000. One of the main costs of this process was a large wave of migration. It is accounted —yet not with precision—, that more than 2 out of 14 million Ecuadorians migrated mainly to the US, Spain and Italy with the hope to help their relatives left behind. In 2006, the year in which the highest peak of remittances is registered, they represented about 6.26% of GDP, 23% of total exports, 56% of non–oil exports, 11% of households' consumption, and of particular attention, more than 10 times the level of foreign direct investment (BCE, 2015). Consequently, some scholars argue that these transfers were the first source of structural balance of the country after the crisis (Acosta et al., 2006). In recent times, however, the international financial crisis in the US and in the Eurozone has had notorious effects in the number of migrants who have returned home, and additionally, on the overall level of remittances. For instance, among the period 2008–2014, registered inflows decreased at an average rate of 3.01% each year.

In global terms, studying remittances is of major relevance because it represents a high inflow from rich countries to poor countries. According to the World Bank (2015), remittances amounted to USD 583 billion, which is more than double the world Official Development Assistance (ODA). Understanding the effect of these transfers on individuals or households decisions might give some insight about migration, banking or social mobility policies. For instance, if negative or no significant effects of remittances are found, policies to attract migrants back to the country may indeed be beneficial for households' well–being. On the other hand, if somehow remittances have positive effects, policies directed to lower transaction costs can provide an enhanced framework for recipient households.

The main aim of this study is to estimate the effect of remittances on labor supply decisions. The empirical approach followed is the use of instrumental variables within Tobit models (IVTOBIT). Regarding the instruments used, a common tendency in the current literature (See Section 2) is to ex-

ploit the exogenous variation of local Western Union offices, and information about the country source of remittances. In the samples used in this study, these instruments have proven to be strong yielding consistent estimates of the impact of remittances. It is important to highlight that this evaluation leaves aside the analysis of the effect of migration per se. Therefore, we focus entirely on the effect of the transnational transfers produced by this phenomenon.

The results suggest that remittances have negative and significant effects on overall labor supplies of males and females. Additionally, remittances lower the allocation of hours worked of males and females in the formal sector, whereas in the informal sector only females labor supply is decreased. Finally, positive and significant effects are found among women in rural areas working in non–paid activities.

As a contribution to the literature, this study is the first attempt to estimate the effect of remittances on labor supply in Ecuadorian households. Using information of 2006, previous literature has focused on other indicators such as health and educational expenditure, school performance and enrollment, prevalence of diseases and child work (Calero et al., 2009; Guerrero, 2007; Pacheco, 2007; Ponce et al., 2008). Additionally, on top of the 2006's sample, this study relies on information of 2014. Accordingly, this study is the first empirical effort to make use of the latest data set available in Ecuador.

The remaining of this paper is structured as follows. Section 2 introduces some previous studies in the field. Section 3 explains the empirical strategy, whereas section 4 describes the data. The main estimation results can be found in section 5. Section 6 provides the results of some sensitivity analyses, and finally, section 7 concludes introducing some future research challenges.

2   Previous Studies

Some attention has been focused on disentangling the impact of remittances in recent times. Nevertheless, it is difficult to encounter an unambiguous

picture either at the macro or the micro level. Turning back to the basics of consumption theory, one might say that remittances represent an increase in total household income. This income effect can either increase the reservation wage of those who remain in the source country, as well as lift certain financial constraints off. It may be a positive contribution as long as remittances compensate for the production lost in the sending area (Taylor, 1999). On the other hand, the absence of one family member in the household might also have consequences on well–being (see McKenzie (2006)). For self–employed, remittances may provide higher capital to encourage new companies or reinforce those on–going businesses, which would afterwards translate in increases of labor supplied (Taylor, 1992). In addition, remittances might be used as insurance against risk associated with negative events that affect crops or businesses.

In a seminal paper by Russell (1986), she lists some possible benefits and associated costs of international migration. Remittances might ease foreign exchange constraints and improve the balance of payments, but at the same time, this effect is difficult to predict or control from a policy perspective. They can also be —though not necessary— a potential source of savings and investment for development. Besides, inequality might be alleviated if the migrants are those worse–off in the income distribution, and the recipients use the money in production or development purposes. Furthermore, there are also some scholars who refer to migration as a "Dutch Disease" (see Taylor (1999)), because it might crowd out labor and capital from the sending countries.

Several empirical studies have analyzed the impact of remittances on growth, poverty and inequality, enrollment and school performance, healthcare and labor supply. Adams & Page (2005), in a study of 71 developing countries, find that a 10% increase in the share of international migration in a country's population, leads to a 2.1% decline in the share of people living in extreme poverty. In the same study, a 10% increase in per capita remittances leads to a 3.5% decrease in the share of poor population. In Nigeria, Chukwuone et al. (2012) found that internal remittances reduce poverty by more than 11%, while international remittances make poverty indicators disappear in specific regions. Regarding schooling, enrollment rates were found to increase by 54% for girls in migrant households in Pakistan, whereas for boys

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the increase was 7% (Mansuri, 2006)[1]. After instrumenting for remittances, Petreski et al. (2014) found that youth in remittance recipient households in Macedonia are more likely to establish their own businesses. Moreover, with respect to expenditure shares, a particular study done for the Philippines, found no significant influence of remittances on medical expenditure, education or durable goods spending (Ang et al., 2009). This goes in line with the findings of Tabuga (2007).

With respect to labor supply of non–migrants, Rodriguez & Tiongson (2001) found that participation rates and hours worked decline due to a substitution effect of income for leisure. Their estimates suggest that participation decreases by up to 18.5 percentage points for men but only 5.7 percentage points for women if the migrants of the households have tertiary education. In a relatively recent study, Amuedo-Dorantes & Pozo (2012) isolate the effects of remittance income and remittance income uncertainty. After instrumenting both variables, they find that labor supply of both genders solely reacts to the uncertainty variable by increasing hours worked. Within this effect, the labor supply responsiveness of women is larger than the estimate for men.

Another important finding is the one by Funkhouser (1992) with data from Nicaragua. He found that remittances lower the probability of labor participation by 2.1 and 5 percentage points for men and women, respectively. In the same study, he shows that remittances increase the probability of self–employment by 1.2 percentage points for men and 1 percentage points for women. In contrast, Cox-Edwards & Oreggia (2009) present evidence in favor of remittances having a neutral effect. They suggest as possible reason the fact that migrants remit money in order to only compensate for their missing contribution. The only significant and positive effect was found for women in urban areas with relatively low migration tradition. The estimated impact was a 5–point higher participation rate, perhaps explained by new family entrepreneurial initiatives. In the Dominican Republic, findings suggest a negative income effect, demonstrating that recipient households are less likely to be business owners (Amuedo-Dorantes & Pozo, 2006b).

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[1]For more empirical evidence about the effect of remittances on schooling, see Amuedo-Dorantes & Pozo (2010) or Amuedo-Dorantes et al. (2008)

This study contributes to the existing evidence found in Ecuador about the impact of remittances. At a macro level, Acosta et al. (2006) argues that migration and remittances have helped 5% of Ecuador's population out of poverty between 2001 and 2002. Using micro–data, Guerrero (2007) finds no significant effect on health expenditure of recipient households. He argues that this behavior might be explained by the migrants profiles that do not necessarily belong to the poorest sector of the population. Following up this last result, Pacheco (2007) finds no significant effect of migration in the school performance of children affected by this phenomenon in rural areas.

More recently, Ponce et al. (2008) found that remittances do not have significant impacts on school enrollment, child malnutrition or prevalence of diseases. However, positive and significant effects are found regarding consumption, where an increase of remittances by USD 10.00 each month increases per capita consumption by 9%. The same increase in remittances leads to an increase of education spending by 18% and health spending by 25%. Finally, Calero et al. (2009), after instrumenting remittances and controlling for several demographic characteristics, find that remittances increase school enrollment rates and decrease the incidence of child work, being the effect for girls higher than for boys.

3   Empirical Strategy

The main aim of this study is to examine the effect of remittances on labor supply. In order to do so, we could simply regress monthly hours worked on monthly per capita remittances, controlling for some household and individual characteristics. Hence, the equation would look like the following:

$$Y_i = \beta_0 + \beta_1 R_i + \beta_2 X_i + \varepsilon_i \tag{1}$$

Where Y is monthly hours worked by individual i, R are the monthly per capita remittances, X is a vector of control variables, and ε is the error term. The coefficient β_1 would provide an unbiased estimate of the effect of remittances if there would be no problems of endogeneity or omitted variables bias. Yet, in this case, reverse causality can be present if hours worked determine the amount of remittances that migrants send home. In the same

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context, if remittances are correlated with wealth or income, and these influence monthly hours worked, our estimator would suffer from an omitted variables problem. An important reminder is that we are estimating a reduced form model because labor income is not included as an explanatory variable (Wooldridge (2002, 527)).

In addition, the main variable of interest, hours worked, is a zero–inflated continuous variable, which means that there are individuals with positive hours worked, but there are also people who do not work whatsoever (the dependent variable takes values of zero). A solution for this type of problem is to employ a **Tobit** model (Verbeek, 2012), which first accounts for the decision to work, and secondly evaluates the positive numbers of the dependent variable. To account for the problem of endogeneity aforementioned, this study relies on Amemiya's Generalized Least Squares estimator (Amemiya, 1979) which has been proven to be asymptotically more efficient than others estimators in these circumstances. This methodology calculates estimators of the reduced forms for the dependent variable and the endogenous explanatory variable, in order to find the structural parameter δ which minimizes the difference of the reduced form parameters (See Newey (1987) for a complete discussion about estimation with limited dependent variables).

Mathematically,
$$\min_{\delta}(\hat{\alpha} - \hat{D}\delta)'\hat{W}(\hat{\alpha} - \hat{D}\delta) \tag{2}$$
Where $\hat{\alpha}$ is the Tobit estimate of the reduced form of the dependent variable and $\hat{D}$ is the least squares estimates of the reduced form of the endogenous variable. $\hat{W} = \hat{\Omega}^{-1}$, where $\hat{\Omega}$ is a consistent estimator of the asymptotic covariance matriz Ω of $\sqrt{n}(\hat{\alpha} - \hat{D}\delta_0)$ (Newey (1987, 237)). Then, the AGLS estimator is:
$$\hat{\delta}_A = (\hat{D}'\hat{\Omega}^{-1}\hat{D})^{-1}\hat{D}'\hat{\Omega}^{-1}\hat{\alpha} \tag{3}$$
With this generalized technical preamble, we can write down the simultaneous system equation that will be solved (IVTOBIT). A quick reminder worth pointing is that $\hat{\alpha}$ and $\hat{D}$ are functions of the $\hat{\beta}_i$ and $\hat{\Pi}_i$ parameters in the following regressions:

$$Y_i = \beta_0 + \beta_1 R_i + \beta_2 X_i + \varepsilon_i \tag{4}$$
$$R_i = \Pi_0 + \Pi_1 Z_i + \Pi_2 X_i + \mu_i \tag{5}$$

$$(\varepsilon_i, \mu_i) \sim N(0, \Sigma) \tag{6}$$

$$Y_i = max(0, Y_i^*) \quad \text{for} \quad i = 1, ..., n \text{ individuals} \tag{7}$$

Where equation (6) assumes that the disturbances are multivariate normal. In order to identify the causal effect of remittances (R), we employ similar instrumental variables (Z) as those used in previous studies in the same field (Amuedo-Dorantes & Pozo (2006a), Amuedo-Dorantes & Pozo (2012) and, for Ecuador, Calero et al. (2009)). These are the quantity of Western Union offices in the province and the country source of remittances. These account for exogenous transaction costs and channels of transmission that might influence the amount that migrants remit to those left–behind. We might say that households living in regions with more offices, facilitating the process of international transfers, receive higher or more frequent remittances. Moreover, we do not expect that the exogenous number of Wester Union offices is correlated with hours worked. In the same vein, the various source countries might also influence the amount of remittances received while being uncorrelated with out main dependent variable. These two variables are also interacted to ensure more variability and reinforce identification.

In order to assess the validity of the instruments, two assumptions must hold. Firstly, the instruments must have a clear correlation with the causal variable of interest and, secondly, the instruments must not be correlated with any other determinant of the outcome variable. This latter is the so–called *exclusion restriction* (Angrist & Pischke, 2009). The first assumption can be tested by inspecting the F–statistic of the excluded instruments which depends on each specification and sample. In a regression of remittances upon the control variables and the instruments, this F–test refers to the null hypothesis that the coefficients of the instruments are all zero (Verbeek, 2012, Chapter 5). For instance, with a linear approach, the lowest F-statistic of this test is 163 in the subsample for men working in rural areas in 2006, while the highest is 613 obtained in the subsample for women in urban areas in 2014. As Stock & Watson (2007, Chapter 12) suggest, if this F-statistic exceeds 10 we can dismiss the possibility of weak instruments' problem.

The second assumption, as Verbeek (2012) argues, cannot be tested completely. Nevertheless, since this study employs more instruments than en-

dogenous variables, it is partially testable by a so–called *Sargan test* or test for *over–identifying restrictions*. If the statistic computed by this test is low enough, it is not possible to reject the null hypothesis of joint validity of the instruments. In the case of our data, and under a linear approach, we obtained statistics around 6,78 to 35, depending on the particular subsamples. We reject the null hypothesis of the joint validity of the instruments in two cases: women and men in rural areas in 2006 and 2014, respectively. Nonetheless, this conclusion is highly sensitive to the choice of subsample. Thus, given that this statistic does not reject the null hypothesis of the validity of the instruments in most of the cases, and the limited power of this test, we decide to rely on the instrumental approach, based on the F-statistics for the excluded instruments aforementioned.

Finally, work patterns have been divided by sectors so as to acquire a deeper understanding of the diversity of the effect of remittances. Formal sector is defined as the existence of a contract or a legal dependency relationship between employer and employee. In the absence of these latter conditions, workers are labeled as working in the informal sector. Self–employment, agricultural and non–paid sector clasifications' are simply based on each individual's response. The analysis henceforth will be separated for men and women as well as by rural or urban areas.

4   Data

This study relies on information obtained and analyzed from the Encuesta de Condiciones de Vida(ECV)–Quinta Ronda and the Encuesta de Condiciones de Vida(ECV)–Sexta Ronda, which were conducted in Ecuador in 2005/2006 and 2013/2014, respectively. These surveys are nationally representative and focused on living conditions, providing several socioeconomic indicators at the individual and household level. For the 2006's survey, the data contain 27750 individuals aged 16 to 65, whereas for the 2014's survey, the data include 49671 individuals considering the same age as before. In the following sections, pooled and separated descriptions will be used to understand the possible different effects over time.

The outcome variable

The dependent variable in this analysis is the number of hours worked. The survey directly asked individuals "How many hours did you work last week?" which provided the necessary information to build a variable for monthly hours worked. In addition, the dataset provides various categories about the work sector in which the individual performs his/her job. With this information, five work sectors were formed as mentioned earlier: formal, informal, self–employment, agricultural and non–paid activities. Consequently, we have six different dependent variables Y_j which are set to zero if the individual did not engage in the j–specific sector or the number of hours within the j–specific sector. The first j–sector is set to be the overall labor supply.

Nonetheless, provided it is based on individuals' responses rather than an actual register of hours worked, it is important to acknowledge the measurement error that this variable might have. Although the extrapolation of last week's hours worked into a monthly variable might hide some important weekly heterogeneity, this is the best information one could have within these surveys.

The endogenous causal variable of interest and its instruments

The information provided contains the amount of remittances received, its frequency, the country source and the final use that households give to this income. In 2006, 45 percent of individuals received the money from Spain, 40 percent from the US, 8.9 percent from Italy, 1.33 percent from Andean countries, and the rest from other countries. For 2014, the distribution of countries did not change greatly. About 30 percent of individuals received remittances from Spain, 55 percent from the US, about 6 percent from Italy, more than 2 percent from Andean countries and about 7 percent from other countries.

Respondents were asked whether they receive money from relatives living abroad. Among all the respondents who answered *"yes"* to the previous question, 43% and 50% were households' head in 2006 and 2014, respectively. The frequency of remittances varies from daily through yearly; hence, the variable was harmonized taking into account the frequencies and quantities to obtain monthly values. Finally, under the assumption that these inflows

affect proportionally every member of the household, a per capita variable was obtained bearing in mind the number of members and the total amount of remittances received by the household.

Regarding the instruments used, the official website to search for offices is only available with updated information, hence, the number of Wester Union offices in 2006 is taken from Calero et al. (2009). For 2014, this information was taken from the official Western Union's website[2].

Control Variables

This study tries to control for various factors at different levels. At the individual level, we use the age of the individual and its square. There is also a control for the gender and the marital status of the household's head, and following Calero et al. (2009), we include controls for the highest educated females and males within the household. To design these variables, the highest educational attainment in the household was recorded as a dummy for the various possibilities, such as primary, secondary or higher education for both males and females. Besides, other characteristics of the household include the size (number of people), home ownership, whether the house has dirt floor or not, in–house toilets, access to electricity, telephone and access to water through public networks. The reason behind the choice of these controls, is that they might offer a proxy of wealth differentials. At the provincial level, we account for the poverty headcount and the unemployment rate in 2006 and 2014, respectively (SIISE, 2015). Finally, the average age in the province and the proportion of people living in rural areas is employed.

Moreover, although not used as controls in the specifications, various income sources are reported by respondents, such as bonus, wages, salaries, financial aid from NGOs, etc. These were used to get a good framework of how much do remittances represent in households and individuals budgets.

Sample 2006

In 2005/2006, 15.30% of households in Ecuador received remittances. The monthly per capita remittance inflow amounted to USD 36.25, which repre-

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[2]http://locations.westernunion.com/

sents approximately 85.27% of the non–labor income and 25% of the total income for recipient households. An interesting factor is that the amount of remittance perceived increases sharply with the overall level of income per capita. Dividing total income per capita by quintiles, the average remitted amount per capita is 8.5 times larger for the richest quintile compared to the poorest.

In order to give some context of how the effect of remittances might be presented, we first present some descriptions of the recipient households characteristics. In 2006, the average size of recipient households was 4.19 people. This is slightly higher than the average size in non–recipient household which is 4.08. Yet, this small difference is statistically significant at a 5 percent level.

It would be in our interest to know what the story behind migration in terms of households composition is. However, the data about people who migrated is not accurate. In some cases there is a missing member, whereas there are cases where the household is complete but receives remittances from a relative who was not part of the household. We will try to describe the different decomposition of recipient households compared to non–recipients by gender in table 1. We can observe that 39.79 percent of men were the head of non–recipient households, whereas only 33.87 percent of men were the head of recipient households. This difference might –although not entirely accurate– represent to some extent migrant males absent in the households. In the same vein, males who are son represent 41.57 percent of recipient households compared to 47 percent when compared to non–recipient households. Another important difference worth noting refers to the portion of grandsons in the overall composition within recipient and non–recipient households. Accordingly, within non–recipient households, grandsons represent a little bit more than 6.14 percent, whereas within recipient households, they represent more than 13 percent of the composition.

Table 1: General decomposition of households' members by gender.
Comparison between non–recipient and recipient households – Sample 2006

	Men		Women	
	No Remittances	Remittances	No Remittances	Remittances
Head of Household	39.79	33.87	9.22	15.00
Husband/Wife	0.56	0.50	34.69	25.63
Son/Daughter	47.00	41.57	42.94	36.05
Grandson/daughter	6.14	13.03	5.33	10.59
Others	6.51	11.03	7.82	12.73

Notes: 'Others' include son/daugther–in–law, grandparents, brothers/sisters of the household's head or wife's, brothers/sisters–in–law, other relatives and non–relatives. They are omitted for convenience and no large difference is found between these categories

Source: Author's analysis of Encuesta de Condiciones de Vida 2005/2006

As probably expected a priori, the analysis for women provides even more differences in terms of households composition. For instance, within recipient households 15 percent of the females in our sample were the head of the household, whereas only 9.22 percent of females were head of non–recipient households. Once again, this might give some insight about the story behind migration which lies in consonance with what we found in the case of males: it seems that mostly males are migrants while females are the ones who rest to take charge of the household. We might expect these women to work more or fewer hours depending on the size of the remittance, or substitute paid sectors for activities at home in the case where the size of remittances lifts up financial constraints.

In congruence with the fact that more women are households head when they receive remittances, the proportion of wives gets diminished (25.63 percent) in receiving households compared to non–recipient households (34.69 percent). In addition, females who are daughters represent only about 36 percent within recipient households, whereas in non–recipient households daughters represent about 43 percent. Ultimately, more females in recipient households are granddaughters (10.59 percent) compared to females being granddaughters in non–recipient households (5.33 percent). This same find-

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ing for females may suggest a higher incidence of children (boys and girls) in recipient households compared to non–recipient.

Finally, from this overview, we might expect beforehand to observe some variation in labor supplies, especially in the case of women. The impacts can be directed either way. In the one hand, employment in paid activities might increase provided the new financial burden or, assuming the size of the remittance received is high enough, labor supply may diminish either to consume more leisure time or to substitute paid activities for non–paid activities at home.

Work patterns also vary significantly among individuals, yet some general trends can be deducted from Table 2. For instance, there are more men than women working in the formal and agricultural sectors, whereas women seem to be self–employed or non–paid workers more often than men. Moreover, a great proportion of the population works in the agricultural sector, especially in rural areas (56.57% of men and 31.25% women). Finally, the incidence of non–paid work in rural areas is considerably high, especially for women (49.20%).

Table 2: Type of work as a percentage of the working population by Gender and area of Residence – Sample 2006

	Men		Women	
	Urban	Rural	Urban	Rural
Formal sector	25.35	6.23	21.05	4.09
Informal sector	6.19	7.41	8.32	3.50
Self–employment	29.44	7.74	33.61	11.95
Agricultural	31.40	56.57	20.01	31.25
Non–paid work	7.63	22.05	17.01	49.20

Source: Author's analysis of Encuesta de Condiciones de Vida 2005/2006

Since the aim of this study is to analyze the impact of remittances on labor supply, Table 3 illustrates the distribution of hours worked by gender, type of work and remittance recipients. Men of recipient households, both in urban or rural areas, tend to work, on average, fewer hours per month

than non–recipient men. On the other hand, there is no general trend in the case of women. Only females working in the agricultural and non–paid sector seem to allocate fewer hours.

Table 3: Average monthly hours worked by Gender, Work–sector, Remittances Recipiency and Area of Residence – Sample 2006

	Urban		Rural	
	No Remittances	Remittances	No Remittances	Remittances
Men				
All sectors	188	176	160	152
Formal sector	205	204	214	211
Informal sector	170	173	184	176
Self–employment	192	181	187	171
Agricultural	190	182	169	164
Non–paid work	110	88	103	88
Women				
All sectors	138	148	124	114
Formal sector	163	167	169	159
Informal sector	180	181	171	205
Self–employment	131	123	135	147
Agricultural	164	156	134	114
Non–paid work	124	106	108	94

Source: Author's analysis of Encuesta de Condiciones de Vida 2005/2006

Sample 2014

In the newer sample, only a 6.37% of households received remittances, which might be explained due to migrants who came home obligated by the deterioration of international conditions, and the enhanced opportunities in Ecuador. Monthly per capita remittance income amounted to USD 52.93, which in turn represented 76.16% of the non–labor income and 22% of the total income for recipient households. As in the 2006 survey, there is still a positive association between the amount of remittances received and the level

of income per capita. In this case, the average per capita remitted amount is 5.4 times larger for the richest quintile compared to the poorest.

By 2014, the average household size for non–recipient households was about 3.78 people, whereas recipient households size was 3.75 people. Contrary to what was observed in 2006, this difference is not statistically significant. Regarding the decomposition of households' members by gender, we can observe in table 4 that patterns have not changed substantially over time. Once again in 2014, we find that men are less likely to be the head of a recipient household compared to a non–recipient household. Accordingly, females are more likely to be head of recipient households compared to non–recipient household. This would reinforce our previous argument that mostly men are migrants conditioning women to stay behind and take responsibility for the household. In addition, we still observe a higher incidence of children in remittance recipient households compared to non–recipient households.

Table 4: General decomposition of households' members by gender. Comparison between non–recipient and recipient households – Sample 2014

	Men		Women	
	No Remittances	Remittances	No Remittances	Remittances
Head of Household	40.78	32.53	12.19	21.48
Husband/Wife	1.23	1.72	34.74	23.27
Son/Daughter	47.29	41.39	42.11	33.51
Grandson/daughter	5.47	13.41	4.86	11.21
Others	5.23	10.95	6.1	10.53

Notes: 'Others' include son/daugther–in–law, grandparents, brothers/sisters of the household's head or wife's, brothers/sisters–in–law, other relatives and non–relatives. They are omitted for convenience and no large difference is found between these categories

Source: Author's analysis of Encuesta de Condiciones de Vida 2005/2006

In this sample, work patterns are also distributed differently by gender. Table 5 illustrates, once again, the higher incidence of men in the formal and agricultural sector and, in contrast, the higher incidence of women self–

employed and in the non–paid sector. Roughly speaking, work patterns in Ecuador have not varied substantially since 2006.

Table 5: Type of work as a percentage of the working population by Gender and area of Residence – Sample 2014

	Men		Women	
	Urban	Rural	Urban	Rural
Formal sector	34.97	14.04	28.93	7.11
Informal sector	7.02	7.00	6.85	2.91
Self–employment	27.56	7.90	33.49	11.48
Agricultural	25.76	53.08	17.80	36.31
Non–paid work	4.69	17.99	12.93	42.20

Source: Author's analysis of Encuesta de Condiciones de Vida 2013/2014

Table 6 illustrates labor supplied for men and women in this new sample. In contrast with the former survey, the evidence observed is mixed. In urban areas, recipients work on average fewer hours than non–recipients, with the exception of men in the non–paid sector and women in the formal sector. In contrast, in rural areas the common denominator is that recipients work, on average, more hours than non–recipients, with the exception of men in the formal and agricultural sector and women in the formal sector.

Table 6: Average monthly hours worked by Gender, Work–sector,
Remittances Recipiency and Area of Residence – Sample 2014

	Urban		Rural	
	No Remittances	Remittances	No Remittances	Remittances
Men				
All sectors	184	175	156	152
Formal sector	200	193	205	194
Informal sector	180	163	179	188
Self–employment	185	176	179	191
Agricultural	176	168	160	154
Non–paid work	107	116	87	92
Women				
All sectors	145	136	112	120
Formal sector	171	177	175	165
Informal sector	146	133	146	161
Self–employment	132	127	134	150
Agricultural	142	128	110	119
Non–paid work	121	104	95	101

Source: Author's analysis of Encuesta de Condiciones de Vida 2013/2014

With these previous remarks, we can now continue to analyze the isolated effect that remittances have on hours worked. It is important to highlight that differences in average hours worked as observed before might be explained by other confounders; this is why it is crucial to follow the regression analysis.

5   Main estimation results

This section will be devoted to illustrate the main findings of remittances altering labor supply. As explained previously, we use six different dependent variables Y_j for each sector. Therefore, in general, the dependent variable

in column (1) will be hours worked in all sectors, column (2) will be hours worked in the formal sector, column (3) will be hours worked in the informal sector, and so on. As mentioned earlier, the instruments were shown to be highly correlated with remittances. This is confirmed by the F–statistics in section 3. Moreover, standard errors are clustered at the household level in every specification, and other controls are not shown in tables for convenience. Simple OLS estimations are shown first in order to understand the direction of the possible bias.

Sample 2006

First, table 7 illustrates the results of a simple OLS regression. Remittances are not instrumented and the fact that labor supply equals zero for a great number of people has not been taken into account, thus, the estimates are most likely biased. However, they may give some preview about the possible effects. As such, remittances seem to have a negative effect in overall labor supply (column 1) in the entire sample for both genders in different areas.

We also observe that negative relationships are found for men in urban areas within the formal, informal and self–employment sector, whereas for women, the only sector where remittances do not have a significant effect would be the informal sector; all the rest are negative effects. Moreover, in rural areas men are only affected negatively within the non–paid activities, whereas women are significantly impacted in the informal and agricultural sector.

Table 7: OLS estimates of the effect of Remittances on Labor Supply by
Gender and Area of Residence – Sample 2006

Monthly hours worked	(1) All	(2) Formal Sector	(3) Informal Sector	(4) Self– employment	(5) Agricultural	(6) Non–paid work
			Urban			
Men						
Remittances	-0.189***	-0.0772**	-0.0140*	-0.0484*	-0.0451	-0.00470
	(0.0413)	(0.0370)	(0.00780)	(0.0282)	(0.0280)	(0.0115)
R^2	0.193	0.091	0.040	0.100	0.076	0.017
Observations				8,693		
Women						
Remittances	-0.205***	-0.0671***	-0.0165	-0.0415**	-0.0559***	-0.0243**
	(0.0358)	(0.0214)	(0.0153)	(0.0179)	(0.0129)	(0.0118)
R^2	0.083	0.121	0.017	0.064	0.030	0.016
Observations				9,676		
			Rural			
Men						
Remittances	-0.251**	-0.113	0.0573	-0.0609	-0.0351	-0.0990***
	(0.101)	(0.0742)	(0.0751)	(0.0755)	(0.125)	(0.0329)
R^2	0.137	0.085	0.048	0.069	0.112	0.107
Observations				4,668		
Women						
Remittances	-0.219**	-0.0389	-0.0325**	-0.0254	-0.114***	-0.00887
	(0.0872)	(0.0273)	(0.0152)	(0.0450)	(0.0346)	(0.0299)
R^2	0.198	0.099	0.012	0.042	0.092	0.133
Observations				4,713		

Notes: All columns control for age and age squared at the individual level, household's head characteristics such as gender and marital status, household's characteristics such as number of people, higher level of education in the household, home ownership, dirt floor, access to water through public network, house inside the house, access to electricity and access to telephone. Province controls include the poverty and unemployment incidence, the proportion of rural population and average age. Regional dummies are also included. Standard errors are clustered at the household level and shown in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Provided the lack of trust of the simple OLS results, table 8 presents estimates obtained from IVTOBIT models. It is important to remind that within these models, the relevant coefficients in terms of interpretation are the average marginal effects. The first one —our main interest— refers to the effect of remittances on labor supply given that people are already working $(\partial E(Y/X, R, Y > 0)/\partial R)$, and the second one provides the effect of remittances on the probability of labor participation $(\partial P(Y > 0/X, R)/\partial R)$. In the tables that follow, if the main coefficient is significant at some level of confidence, the average marginal effects are also significant, but the symbols have been excluded for space convenience. Hence, specially with regards to the effect of remittances on labor participation, although they may seem to be close to zero, they are still significant effects in concordance with the main coefficient.

The significant results of this specification are as follows. First, overall labor supply is negatively affected by remittances, except for women in rural areas. Regarding different sectors, if we focus the attention for the moment only in urban areas, an increase of USD 10.00 of per capita remittances (a 27 percent increase with respect to the average monthly per capita remittance) leads to a decrease in monthly hours worked of 2.5 hours for males and 2.3 for females in the formal sector. These represent a decrease of 1.21 and 1.40 percent of labor supply of men and women, respectively.

Still with the analysis concentrated in urban areas, for men working in the agricultural sector, an equal increase of remittances is followed by a decrease of 1.55 hours per month, amounting to a decrease of 80 percentage points with respect to the average hours worked in that sector. Moreover, for men working in non–paid activities, in contrast, a positive and slightly significant effect of remittances is found. Within this group, a USD 10.00 increase of remittances implies an increase of 1.38 hours per month (1.14 percent increase).

The last noteworthy result in urban areas is a negative and significant effect on the allocation of hours worked in the informal sector for women. As such, an increase in remittances represents a decrease of 2.46 hours per month, accounting for a 1.35 percent drop with respect to the average allocation of hours worked among females in that sector.

Table 8: IVTOBIT estimates of the effect of Remittances on Labor Supply
by Work–sector – Sample 2006

Monthly hours worked	(1) All	(2) Formal Sector	(3) Informal Sector	(4) Self– employment	(5) Agricultural	(6) Non–paid work
			Urban			
Men						
Coefficient	-0.469***	-1.055***	0.143	0.259	-0.600*	1.082*
	(0.109)	(0.371)	(0.835)	(0.315)	(0.350)	(0.650)
$\partial E(Y/X,R,Y>0)/\partial R$	-0.368	-0.257	0.0192	0.0648	-0.155	0.138
$\partial P(Y>0/X,Z)/\partial R$	-0.000599	-0.00113	4.22e-05	0.000304	-0.000745	0.000330
Model Wald χ^2	1719	1119	422.8	1113	799.1	600.4
Observations				8,693		
Women						
Coefficient	-0.566***	-1.254***	-1.803**	0.288	-0.411	-0.337
	(0.122)	(0.310)	(0.708)	(0.216)	(0.367)	(0.406)
$\partial E(Y/X,R,Y>0)/\partial R$	-0.267	-0.234	0.246	0.0648	-0.0756	-0.0543
$\partial P(Y>0/X,Z)/\partial R$	-0.00143	-0.00102	-0.000480	0.000384	-0.000295	-0.000196
Model Wald χ^2	1023	1590	183.3	859.5	259.4	224
Observations				9,676		
			Rural			
Men						
Coefficient	-0.573***	-2.822*	1.086	0.461	-0.215	0.423
	(0.205)	(1.635)	(1.451)	(1.307)	(0.471)	(0.959)
$\partial E(Y/X,R,Y>0)/\partial R$	-0.518	-0.445	0.167	0.0762	-0.0951	0.0724
$\partial P(Y>0/X,Z)/\partial R$	-0.000356	-0.00114	0.000471	0.000232	-0.000491	0.000353
Model Wald χ^2	645.1	543	226.3	324.1	625.3	720.4
Observations				4,668		
Women						
Coefficient	-0.244	-2.095*	-1.064	0.176	-1.083**	0.259
	(0.166)	(1.171)	(1.755)	(0.130)	(0.458)	(0.208)
$\partial E(Y/X,R,Y>0)/\partial R$	-0.141	-0.261	-0.129	0.0306	-0.264	0.0696
$\partial P(Y>0/X,Z)/\partial R$	-0.000655	-0.000576	-0.000194	0.000127	-0.00168	0.000526
Model Wald χ^2	1048	643.3	55.71	255.7	482.8	596.8
Observations				4,713		

Notes: Same controls as in table 7. Standard errors are clustered at the household level and shown in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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Overall, the effects in rural areas are higher. Men would work 4.45 less hours per month in the formal sector if remittances were to increase, which represents a decrease of about 2 percent. While for women, remittances imply an equal reduction of about 2.6 hours per month in the informal and agricultural sector, which implies a relative decline of about 1.48 percent in the informal sector and 1.91 percent in the agricultural sector. Consequently, when it comes to responsiveness, it seems that within rural areas, men in the formal sector and women in the agricultural sector present the highest significant effect from remittances in this period.

Although there can be several explanations for such different allocations of hours worked, all the negative impacts might be regarded as income effects. As such, the additional inflow at home makes leisure activities less expensive, yielding a final effect where leisure demand increases (because it is a normal good) and, consequently, labor supply decreases. In contrast, regarding the positive effect of men in non–paid activities, it might be evidence in favor of a compensation effect for the missing member in the household. Additionally, it also empowers the argument that remittances are resources that provide financial backup, freeing up time to spend at home.

We also illustrate the first stage of this outcome to provide some insight of how the instruments are explaining our main causal variable of interest. Table 9 illustrates separately the first stage results of table 8 only for overall labor supply divided by gender and area of residence. Other estimates are similar and not shown for space convenience. As can be observed, countries source appear to be stronger instruments than Wester Union offices and the interaction between them. Other interesting result is that age is negatively related with the amount of remittances. Moreover, as expected, females who are head of the household receive more remittances. The non-significance of the instruments related with Werster Union offices is also shown in the sensitivity analysis (see section 6), where no significant change in the estimates is found when they are excluded from the specifications.

Table 9: IVTOBIT–First stage estimates of monthly per capita remittances
by Gender and Area of Residence – Sample: Overall labor supply in 2006

	Urban		Rural	
	Men	Women	Men	Women
Spain	25.05***	32.21***	19.47***	21.76***
	(2.862)	(3.306)	(2.645)	(3.332)
Usa	35.10***	41.13***	19.69***	28.95***
	(5.399)	(5.697)	(4.238)	(5.895)
Italy	37.14***	33.84***	10.46***	9.052***
	(10.54)	(8.157)	(2.894)	(2.627)
Andean countries	26.58*	16.58	3.661	-221.8***
	(14.28)	(13.55)	(3.430)	(75.80)
Other countries	37.89***	28.09***	11.25	21.74
	(11.19)	(7.316)	(13.06)	(19.21)
Wester Union	-0.0258	0.00355	-0.0160	-0.0657*
	(0.0373)	(0.0398)	(0.0177)	(0.0353)
Interaction1	0.182	-0.0843	-0.0436	-0.183
	(0.168)	(0.173)	(0.162)	(0.193)
Interaction2	-0.205	-0.0818	0.0547	-0.119
	(0.230)	(0.253)	(0.325)	(0.443)
Interaction3	-0.466	-0.316	0.131	0.107
	(0.331)	(0.278)	(0.212)	(0.179)
Interaction4	0.145	1.242	0.211	29.51***
	(0.586)	(0.898)	(0.287)	(3.777)
Interaction5	0.0310	0.379	2.876	0.496
	(0.681)	(0.743)	(1.853)	(1.123)
Age	-0.533***	-0.298***	-0.0811	0.102
	(0.137)	(0.107)	(0.0574)	(0.108)
age squared	0.00699***	0.00326**	0.000775	-0.00160
	(0.00183)	(0.00146)	(0.000693)	(0.00143)
Female household's head	3.828***	7.456***	2.697**	8.104***
	(1.314)	(1.298)	(1.057)	(1.652)
Observations	8693	9676	4668	4713

Notes: Same controls as in table 7. There is one important outlier within the sample for women in rural areas which explains the difference in the magnitude of some coefficients. Standard errors are clustered at the household level and shown in parentheses

*** p<0.01, ** p<0.05, * p<0.1

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Results 2014

Following the same procedure as before, we first take a look of the simple OLS estimates with the caveats aforementioned. In urban areas, labor supply of women and men get diminished because of remittances. Men in the formal sector are also negatively affected either in rural or urban areas. Moreover, women in several sectors seem to be influenced as well; they seem to work less within the formal, the informal and the self–employment sector, and work more in non–paid activities in rural areas.

Table 10: OLS Estimates of the effect of Remittances on Labor Supply by
Work–sector - Sample 2014

Monthly hours worked	(1) All	(2) Formal Sector	(3) Informal Sector	(4) Self– employment	(5) Agricultural	(6) Non–paid work
Urban						
Men						
Remittances	-0.128***	-0.136***	-0.00644	0.00872	0.0217	-0.0159*
	(0.0472)	(0.0382)	(0.00706)	(0.0376)	(0.0312)	(0.00823)
R^2	0.252	0.133	0.052	0.084	0.075	0.011
Observations				9,116		
Women						
Remittances	-0.243***	-0.153***	-0.0301***	-0.0402**	-0.0105	-0.00954
	(0.0245)	(0.0146)	(0.00453)	(0.0168)	(0.0130)	(0.00648)
R^2	0.138	0.151	0.025	0.061	0.027	0.022
Observations				16,849		
Rural						
Men						
Remittances	-0.0292	-0.0879***	0.00132	-0.00500	0.0358	0.0266
	(0.0402)	(0.0276)	(0.0151)	(0.0296)	(0.0351)	(0.0223)
R^2	0.198	0.103	0.057	0.038	0.144	0.083
Observations				9,812		
Women						
Remittances	-0.0951**	-0.0679***	-0.0201**	-0.0556***	0.00691	0.0416**
	(0.0463)	(0.0156)	(0.00962)	(0.0207)	(0.0243)	(0.0190)
R^2	0.187	0.120	0.017	0.038	0.113	0.100
Observations				13,894		

Notes: Same controls as in table 7. Standard errors are clustered at the household level and shown in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Continuing on to the results of the IVTOBIT model presented in table 11, we can observe that within urban areas, overall labor supply of both genders is negatively altered by remittances. In the same vein, labor supply of women and men in the formal sector are negatively influenced. A USD 10.00 increase in per capita remittances (18.9 percent increase) leads to a drop of 1.58 hours per month (a decrease of 79 percentage points) for men. For women the effect is about 2.19 hours less (1.27 percent decline).

Moreover, men working in the formal sector in rural areas are also negatively affected by remittances. An increase in these inflows implies a 2.73 monthly hours decline (1.33 percent decrease), while within the agricultural sector, a similar increment in remittances is tied to an increase of 1.3 hours per month (a 0.78 percentage points increase). The results for women in rural areas are particularly interesting. Overall labor supply is diminished by remittances by less than an hour per month. Moreover, hours worked decline significantly in the formal sector by 2.88 (a decline of 1.65 percent), in the informal sector by 1.89 (about 1.40 percent decrease) and within the self–employed by 1.58 hours (a decline of 1.16 percent). In contrast, within the agricultural and non–paid sector, remittances seem to have a positive effect on labor supply, accounting for an increment of 0.75 hours in the agricultural sector (65 percentage points increase) and 1.11 hours in non–paid activities (about 1 percent increase).

The positive effects of remittances in the agricultural sector in this sample are noteworthy. In this case, seasonal patterns may influence the effects obtained, specially if the questionnaires were conducted coincidentally during the harvest period (mainly June). The survey collected balanced information for about 8% of the population each month since November 2013 till October 2014. However, if we check the timing of the respondents in rural areas who received remittances, it turns out that almost 15 percent of this subsample was visited in June 2014, explaining why this positive effect might have appeared. Although this latter might be quite a strong explanation, non–migrants may increase labor supply in cases where the migration decision has implied other expenditure spilled over to those left–behind (i.e. airplane tickets, visa fees or even coyote payments).

Table 11: IVTOBIT estimates of the effect of Remittances on Labor Supply
by Work–sector – Sample 2014

Monthly hours worked	(1) All	(2) Formal Sector	(3) Informal Sector	(4) Self– employment	(5) Agricultural	(6) Non–paid work
Urban						
Men						
Coefficient	-0.303***	-0.563*	-0.342	-0.174	0.475	-1.086
	(0.110)	(0.289)	(0.806)	(0.386)	(0.355)	(0.703)
$\partial E(Y/X,R,Y>0)/\partial R$	-0.225	-0.158	-0.0466	-0.0389	0.107	-0.128
$\partial P(Y>0/X,Z)/\partial R$	-0.000503	-0.000808	-0.000110	-0.000179	0.000516	-0.000257
Model Wald χ^2	2590	1734	421.4	1043	818.5	205.1
Observations			9,116			
Women						
Coefficient	-0.339***	-1.063***	-0.897	0.137	-0.0116	0.389
	(0.0884)	(0.225)	(0.661)	(0.184)	(0.270)	(0.309)
$\partial E(Y/X,R,Y>0)/\partial R$	-0.152	-0.219	-0.111	0.0293	-0.00194	0.0572
$\partial P(Y>0/X,Z)/\partial R$	-0.000893	-0.00104	-0.000233	0.000169	-7.42e-06	0.000185
Model Wald χ^2	2926	3709	416.3	1393	513.4	319.8
Observations			16,849			
Rural						
Men						
Coefficient	-0.0305	-1.501***	0.823	-0.180	0.311*	-0.0227
	(0.0766)	(0.575)	(0.706)	(0.786)	(0.173)	(0.299)
$\partial E(Y/X,R,Y>0)/\partial R$	-0.0267	-0.273	0.126	-0.0273	0.130	-0.00379
$\partial P(Y>0/X,Z)/\partial R$	-2.79e-05	-0.000928	0.000368	-7.37e-05	0.000734	-1.91e-05
Model Wald χ^2	1889	1405	623.4	385.3	1665	1513
Observations			9,812			
Women						
Coefficient	-0.164*	-2.113***	-1.686*	-0.970**	0.291*	0.429**
	(0.0908)	(0.598)	(0.952)	(0.410)	(0.167)	(0.194)
$\partial E(Y/X,R,Y>0)/\partial R$	-0.0950	-0.288	-0.189	-0.158	0.0755	0.111
$\partial P(Y>0/X,Z)/\partial R$	-0.000487	-0.000766	-0.000273	-0.000619	0.000587	0.000912
Model Wald χ^2	3294	2517	265.1	597.7	1722	1540
Observations			13,894			

Notes: Same controls as in table 7. Standard errors are clustered at the household level and shown in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Pooled Cross Sectional estimates

Finally, we obtained cross sectional pooled estimates which are presented in table 12. These last results will provide a really good overview of the main effects of remittances on labor supply, because as the sample increase, the efficiency and consistency of the estimates improve, even though some heterogeneity observed before might be overlooked. The general picture is similar to the results provided by tables 8 and 11. In urban areas, remittances have a negative effect on overall labor supply for men and women. In the formal sector, an increase of USD 10.00, which represents an increase of 22% of the average in the pooled sample (USD 44,02 per capita monthly remittance), implies a decrease of 1.86 hours per month for men and 2.11 hours for women, representing a decrease of 92 percentage points and 1.24 percentage points for men and women, respectively. An increase in remittances is also tied to a decrease of 1.51 monthly hours (a 94 percentage points decrease) in the informal sector for women living in urban areas.

In rural areas, males labor supply is only significantly affected in the formal sector where an increase in remittances implies a 3.52 monthly hours drop (1.93 percent decline). Besides, as it was already observed before, female behavioral responses in the rural sector are curious. Overall labor supply is diminished by remittances by 1.87 hours per month. Moreover, hours worked decline significantly in the formal sector by 3.11 (a decline of 1.79 percent) and in the informal sector by 2.55 (about a 1.62 percent decrease). In contrast, as observed previously, within the non–paid sector, remittances account for an increment of 1.64 hours in non–paid activities (about 1.48 percent increase).

Table 12: IVTOBIT estimates of the effect of Remittances on Labor Supply
by Work–sector – Pooled Sample

Monthly hours worked	(1) All	(2) Formal Sector	(3) Informal Sector	(4) Self– employment	(5) Agricultural	(6) Non–paid work
			Urban			
Men						
Coefficient	-0.389***	-0.708***	-0.157	0.118	-0.222	0.201
	(0.0781)	(0.229)	(0.583)	(0.237)	(0.247)	(0.456)
$\partial E(Y/X,R,Y>0)/\partial R$	-0.296	-0.186	-0.0213	0.0279	-0.0536	0.0247
$\partial P(Y>0/X,Z)/\partial R$	-0.000573	-0.000892	-4.83e-05	0.000130	-0.000258	5.37e-05
Model Wald χ^2	4270	2883	805.8	2162	1630	1721
Observations			17,809			
Women						
Coefficient	-0.434***	-1.060***	-1.165***	0.210	-0.129	0.104
	(0.0730)	(0.182)	(0.433)	(0.138)	(0.220)	(0.251)
$\partial E(Y/X,R,Y>0)/\partial R$	-0.197	-0.211	-0.151	0.0457	-0.0225	0.0158
$\partial P(Y>0/X,Z)/\partial R$	-0.00113	-0.000975	-0.000300	0.000267	-8.61e-05	5.34e-05
Model Wald χ^2	3849	5250	501.5	2249	768.7	548.9
Observations			26,525			
			Rural			
Men						
Coefficient	-0.108	-2.015***	0.944	-0.0207	0.261	0.178
	(0.0974)	(0.546)	(0.603)	(0.591)	(0.177)	(0.361)
$\partial E(Y/X,R,Y>0)/\partial R$	-0.0957	-0.352	0.145	-0.00323	0.111	0.0299
$\partial P(Y>0/X,Z)/\partial R$	-8.83e-05	-0.00111	0.000419	-9.09e-06	0.000609	0.000148
Model Wald χ^2	2426	1785	797.8	682.5	2277	2163
Observations			14,480			
Women						
Coefficient	-0.323***	-2.314***	-2.209***	-0.593	-0.116	0.629***
	(0.0953)	(0.631)	(0.850)	(0.365)	(0.185)	(0.168)
$\partial E(Y/X,R,Y>0)/\partial R$	-0.187	-0.311	-0.255	-0.0984	-0.0297	0.164
$\partial P(Y>0/X,Z)/\partial R$	-0.000937	-0.000794	-0.000370	-0.000391	-0.000220	0.00132
Model Wald χ^2	4175	2830	302.2	817.5	2040	2023
Observations			18,607			

Notes: Same controls as in table 7. Standard errors are clustered at the household level and shown in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Summary of main results

To summarize (see table 13), overall labor supply, regardless of the area, is negatively affected by remittances, being the effect in the order of 2–3 less hours per month (1.2–1.8 percent decrease). Similar effects are found in the formal sector for both males and females. Moreover, women working in the informal sector also respond by decreasing labor supply. Another curious finding is that by 2006, the agricultural sector experienced a negative effect, whereas by 2014, this effect turned out to be positive. Furthermore, there is a positive effect of remittances on non–paid activities among women in rural areas. Overall, the findings suggest that labor supply responsiveness to remittances in Ecuador are not substantially large.

Table 13: Summary of significant effects by Gender, Area of residence, Work–sector and Sample

	Men		Women	
	Urban	Rural	Urban	Rural
2006				
All sectors	(−)	(−)		
Formal sector	(−)	(−)		
Informal sector			(−)	(−)
Agricultural	(−)			(−)
Non–paid work	(+)			
2014				
All sectors	(−)		(−)	(−)
Formal sector	(−)	(−)	(−)	(−)
Informal sector				(−)
Self–employment				(−)
Agricultural		(+)		(+)
Non–paid work				(+)
Pooled				
All sectors	(−)		(−)	(−)
Formal sector	(−)	(−)	(−)	(−)
Informal sector			(−)	(−)
Non–paid work				(+)

Source: Author's analysis of Encuesta de Condiciones de Vida 2005/2006 and 2013/2014

6 Sensitivity analysis

In this section, we perform a sensitivity analysis with respect to the choice of controls used. Specifically, we investigate the robustness of the findings with respect to the inclusion or exclusion of regional dummies, educational level of the household and, finally, we include in the analysis two more controls referred as natural and individual shocks. The former regards to droughts, plagues, frosts or other natural–related shocks, and the latter refers to personal accidents, injuries or negative events. Only the pooled sample will be analyzed and we forget the gender's division for this part[3].

In Table 14, column (1) is the baseline scenario whereas columns (2) to (6) have implemented specific changes as denoted at the bottom. As can be observed, the main effect of remittances (2.3 hours per month) is robust to a specification when we exclude all the educational variables, though slightly lower standard errors might provide evidence in favor of more efficiency in the estimation. This may be explained by the fact that the number of observations increases by 15% when dropping these variables. Excluding regional dummies has a really small effect (2.28 hours compared to 2.3) and adding the two shocks variables to the main specification does not lower the estimated effects by much, from 2.3 to 2.22 hours. In the same vein, the decision about what instruments to use does not seem to be of much relevance for the robustness of the findings. Whether we exclude the interaction between the two main instruments, or we keep only the source country dummies, produces the same effect and the change is small, from 2.3 hours to 2.9 hours.

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[3]The results showed that, in urban areas, trends between women and men are similar, hence this analysis is harmless for these areas. However, in rural areas, the results suggest there are gender differences that we are not accounting for in this part of the study

Table 14: Sensitivity analysis of IVTOBIT estimates of the effect of
Remittances on overall labor supply – Pooled data

Monthly hours worked	Controls choice				Instruments choice	
	(1)	(2)	(3)	(4)	(5)	(6)
Urban						
Coefficient	-0.405***	-0.386***	-0.401***	-0.390***	-0.402***	-0.402***
	(0.0546)	(0.0524)	(0.0545)	(0.0544)	(0.0550)	(0.0550)
$\partial E(Y/X,R,Y>0)/\partial R$	-0.230	-0.230	-0.228	-0.222	-0.229	-0.229
$\partial P(Y>0/X,Z)/\partial R$	-0.000942	-0.000862	-0.000933	-0.000908	-0.000937	-0.000937
Rural						
Coefficient	-0.203***	-0.195***	-0.153**	-0.194***	-0.260***	-0.260***
	(0.0752)	(0.0664)	(0.0748)	(0.0746)	(0.0680)	(0.0681)
$\partial E(Y/X,R,Y>0)/\partial R$	-0.143	-0.141	-0.107	-0.137	-0.183	-0.183
$\partial P(Y>0/X,Z)/\partial R$	-0.000441	-0.000398	-0.000331	-0.000421	-0.000563	-0.000563
Controls						
Regional Dummies	Yes	Yes	No	Yes	Yes	Yes
Education variables	Yes	No	Yes	Yes	Yes	Yes
Shocks	No	No	Yes	Yes	No	No
Instruments						
Western Union Offices					Yes	No
Source country			Yes		Yes	Yes
Interaction					No	No

Notes: Same controls as in table 7 except those under analysis which are explicitly changed in this table. Standard errors are clustered at the household level and shown in parentheses

*** p<0.01, ** p<0.05, * p<0.1

With respect to rural areas, the main effect of 1.43 hours is slightly lowered to 1.41 hours when educational variables are excluded. Again, because of the increase in the number of observations, standard errors are lower. When including shocks and excluding regional dummies, the effect seems to change significantly, from 0.143 to 0.107. Nonetheless, in real terms a change of 1.44 hours per month to 1.07 hours per month is not large. Including shocks to the main specification provides a marginally smaller effect (0.137) while improving efficiency (lower standard errors). Regarding the decision

about instruments, the findings in rural areas keep being robust as it was observed in urban areas.

In conclusion, for the specific changes proposed within the unique sample examined, the findings seem to be robust. There are small changes in the coefficients which are not significant when computing a relative change with respect to the overall labor supply. Additionally, the change of instruments does not affect the estimates.

7   Conclusions

When referring to Ecuador, migration and remittances are relevant phenomena. Since 1999, large waves of people have left the country in search of better economic opportunities abroad, regardless of the deteriorating effects that this might have on households' well–being. Given its high incidence among Ecuadorian citizens, all the studies trying to evaluate the variety of effects of these phenomena are empirically justified; they can give insights on which are the most relevant behavioral responses. This study fills the previous non–existent literature about labor supply in the Ecuadorian case and represents the first empirical effort using the latest data set availale in Ecuador.

The identification strategy relied on IVTOBIT models rather than simple OLS estimations for two reasons. First, due to the limited nature of the main dependent variable, monthly hours worked, which takes the value of zero for people who do not participate in the labor force, and positive for those who do; and second, due to the possible reverse causality and omitted variable bias of the main causal variable of interest, monthly per capita remittances. In this context, the instrumental variable used were mainly two: 1) the number of Western Union offices at the provincial level as a proxy of exogenous transaction costs and transnational networks, and 2) the information about countries source. The interaction between these two variables was also employed to improve identification, but the sensitivity analysis showed it has no effect on the estimates. These instruments were tested to be statistically strong and correlated with remittances, while keeping no relationship with

hours worked.

Overall, the main findings suggest that remittances have a negative effect on labor supply and labor participation. The effects show to be higher for the 2006's sample which is explained by the higher incidence of the first wave of migration. By 2014, international conditions (the US's and European's crisis), together with improved conditions in Ecuador, have influenced migrants to either come home, or reduce the amount of remittances, decreasing the dependency that those left–behind might have on these non–labor inflows. The estimated effects are roughly a decrease of 2–3 hours per month, which represents a relative decline of 1.2–1.8 percent with respect to overall monthly hours worked.

As general trends (see table 13), it can be observed that men and women in the formal sector are responsive to increases in remittances, being significant over time. The allocation of hours worked by women in the informal sector also drops due to remittances. Interestingly, hours worked in the agricultural sector were negatively affected by 2006, whereas positive effects were found by 2014. In this regard, one possible explanation is an unbalanced sample of respondents in the harvest period (June 2014). Moreover, by 2006 men in urban areas allocated more hours to non–paid activities due to remittances. This same effect is found for women in rural areas in 2014 and the pooled sample, suggesting that maybe remittances provide the financial backup to spend more time at home.

It is crucial to acknowledge that this study is not able to distinguish the differentiated effects of migration per se and remittances, mainly due to data limitations and the difficulty of measuring the possible disruptive effects of the former. Equally, there are other important questions that remain unanswered, such as the separate effect of the level of remittances and its uncertainty, the heterogeneity in terms of working–ages and, specially, the different effects that these inflows can have depending on households' level of wealth. Future research can certainly provide more insights into these differentiated effects.

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