

GENDER DIFFERENCES BETWEEN REMITTANCES AND LABOR PARTICIPATION IN DEVELOPING COUNTRIES: A CROSS-SECTION ANALYSIS OF COLOMBIA IN YEAR 2008

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Abstract: This article discusses the effects of remittances on labor force participation. Remittances reduce the probability of participation in the labor market because they increase the relative price of leisure. Using data from the national household survey held in Colombia in 2008, we found that remittances reduce the probability of participation in the Colombian labor market. An interesting result of the article is the gender characteristic of remittances. Results show substantial gender-based differences of the effect of remittances on labor participation. Finally, the endogeneity of remittances is a particular phenomenon for females but not for males.

Keywords: Colombia, Labor force participation, remittances, endogeneity, censored variables.

JEL Classification: J21, C33.

1. Introduction

Colombia is the third country in Latin America (preceded by Brazil and Mexico) in total remittances received (Vargas-Silva 2009). In the first half of 2008 the amount of remittances accounted approximately for 2% of the GDP (from January to March 2008 this amount doubled the exports of coffee, coal, and iron-nickel). After the drop of remittances in the second half of 2008 due to the effects of the global economic crisis, the future now looks less promising for Colombia where remittances went down by 31% with respect to the same period in 2007. Colombian households spend a little more than 60% of the funds from these remittances in groceries and utilities. They spend the remaining 40% in education, healthcare, rent payments, or installments to pay for their own homes and, to a lesser extent, in leisure, entertainment, home appliances, and furniture (Garay and Rodríguez, 2005). In 2008, a little more than 37% of the remittances came from Spain followed by United States (36%), and to a lesser extent from Venezuela (9.1%) [Banco de la Republica 2008].

The literature available reports that remittances have an effect on economic growth (Catrinescu et-al 2009), human capital (Adams 2009, Acosta 2006, Cox Edwards and Ureta 2003), poverty (Gupta et-al 2009, Adams 2006), criminality (Vargas-Silva 2009), and labor force participation (Funkhouser 1995, Rodriguez and Tiongson 2001, Kim 2007, Bussolo and Medvedev 2008).

Although there are a few studies that explicitly analyze the relationship between labor supply and remittances (Kim 2007), the main results show that remittances reduce labor force participation by increasing the recipients' reservation

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wages (Amuedo-Dorantes and Pozo 2006, Kim 2007, Bussolo and Medvedev 2008). In fact, the results of a survey conducted among beneficiaries of remittances from workers at currency exchange agencies in Colombia in 2004, together with a high percentage of funds allocated to cover recurring home expenses, revealed that there is a lesser participation of beneficiaries in the labor market - only 44% is active in the labor market, while the remaining 56% is inactive (Garay and Rodríguez 2005, Asobancaria 2005).

Other than quantifying the impact of remittances on the labor participation rate, none of the studies conducted in Colombia has discussed to what extent remittances reduce the likelihood of participating in the labor market in this country. This is the purpose of this article which is based on information about thirteen metropolitan areas from the National Household Survey (NHS) conducted by the *Departamento Nacional de Estadística* (National Department of Statistics). Information was taken from march of the year 2008 regarding whether families in Colombia have permanently received remittances from individuals who live abroad. According to the survey, the percentage of individuals who receive these kinds of remittances is 1.4%. With 36.14% Pereira and Manizales or “The eje cafetero” (coffee growing region) is the Colombian region that receives the most remittances. This information is relevant because “The Eje Cafetero” has had the most important migration process in Colombia in recent years.

The main contribution of this article is a discussion of the effects of remittances on the labor market participation in two main aspects. First, using participation in the labor market as a discrete choice enables us to investigate the transition from inactivity to activity in the labor market as a result of remittances. This aspect is crucial in the case of female because, unlike male, female spend remittances in education of their families, thus affecting participation in the labor market. Second, the use of Internet as an instrument to model endogeneity of remittances allows more individual heterogeneity than other instruments such as intermediate transfers.

This article is organized in the following manner: The second section presents a standard labor participation model and discusses the effects of remittances on labor participation. The third section explains the data and the construction of the variables. The fourth section discusses the econometric approach that considers the endogeneity of remittances. We present two approaches in this section: a linear approach and a censored approach to the endogeneity of remittances. Section five deals with gender differences of the relationship between remittances and labor market participation. The last section presents the conclusions. The findings of this study are consistent with the theory and show that receiving remittances decreases the probability of participating in the labor force in Colombia. They also show that there are gender differences with respect to the endogeneity of the remittances.

2.- Theoretical approach

There is extensive literature available on participation in the labor market, i.e. about the decision of seeking employment or being occupied. Individuals typically maximize their utility over consumption and leisure subject to budget constraints and dependent upon the time available for these activities (Gronau 1973, Deaton and

Muellbauer 1980, Pencavel 1986, Killingsworth 1986 and Brue and Macpherson 2003). The maximization problem is defined as follows:

$$\text{Max } U(C,O) \tag{1}$$

$$\text{Subject to } P_c C \leq W(T - O) + \eta + r \tag{2}$$

Whereas, C stands for consumption; O stands for leisure; W is the hourly wage; T means total time, and P_c is the price of consumer goods. Labor income is WH_w , whereas H_w is the number of working hours of an individual ($T - O$), non-labor income will be equal to η , and remittances is r.

The solution to this problem shows the number of hours allocated by an individual to work and leisure. Point C_0 in Figure 1 implies actual consumption when any given non-labor income is available. On the right hand of H'_w an individual does not offer hours of work, and on the left hand of H'_w an individual will offer a positive number of hours of work. At this point, the market wage (W) equals the reservation wages (W^r), and that individual will be indifferent about participating in the labor market. Let us now assume that an individual who participates in the labor market with H_w hours, consumes C_1 , and receives remittances from an emigrant who continuously sends money from abroad. It is clear that this does not only change the budget constraints because non-labor income increases, but also has an impact on the decision of participating in the labor market.

The actual consumption associated with new non-labor earnings will be greater than at the baseline. Hence, common conjecture shows that remittances reduce labor force participation (Funkhouser 1995, Rodriguez and Tiongson 2001, Amuedo-Dorantes and Pozo 2006, Kim 2007, Bussolo and Medvedev 2008). Similar results were obtained by Holtz-Eakin, D., D. Joulfaian, H.S. Rosen. (1993) and Mora (2007) with regards to inheritances, gifts, and lottery winnings.

Figure 1. Effects of remittances on labor force participation

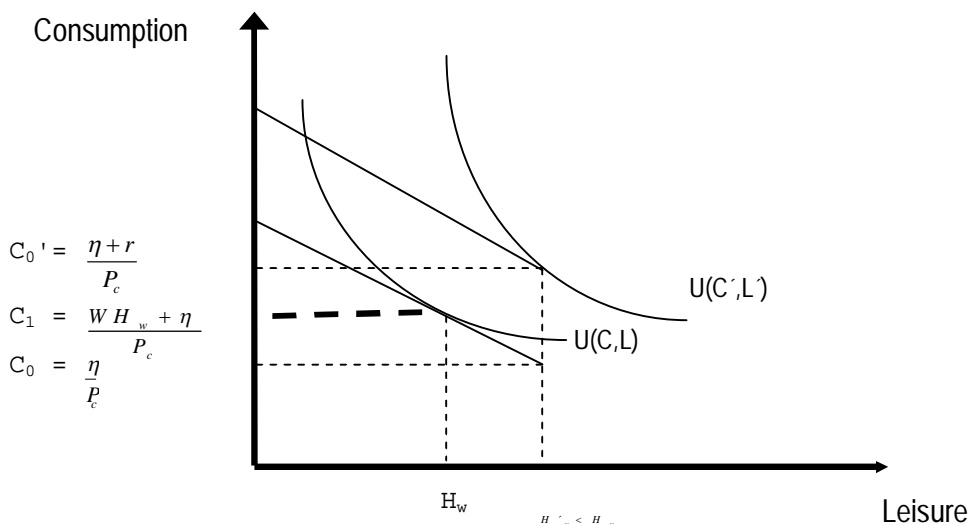


Figure 1 above shows that receiving remittances modifies the allocation of time to leisure and work. The number of hours allocated to leisure increases as the amount of time allocated to work decreases, thus modifying the decision of participating in the labor market. The consumption which can be associated with non-labor earnings will increase from C_0 to C_0' . Figure 1 also shows that the existence of remittances does not change the slope of the budget restraint.

Let us now assume that there are random differences in the market salaries (W) and reserve salaries (W^*) of individuals with similar age and education characteristics. The reservation wage is determined by a mean reservation wage for all individuals with similar non-market characteristics (head of household, sex, etc.), x_i , the existence of remittances, r_i , and a random component, e_i (Gronau 1973, 1977):

$$W^* = x_i + r_i + e_i \tag{3}$$

An individual decides to participate only if $W > W^*$ or $W - x_i - r_i > e_i$. If the standard deviation of W^* is now defined as \hat{e} , then this individual will decide to participate if:

$$\frac{1}{\hat{\sigma}_e} [\beta_0 - (\beta_i x_i + \alpha_1 r_i)] > \hat{e} \tag{4}$$

Whereas, \hat{e} equals $\frac{e}{\hat{\sigma}_e}$. Assuming that there is a normal distribution, the following probit model is achieved:

$$\text{Prob (participates =1)} = \Phi(x_i, r_i; \beta, \alpha) \tag{5}$$

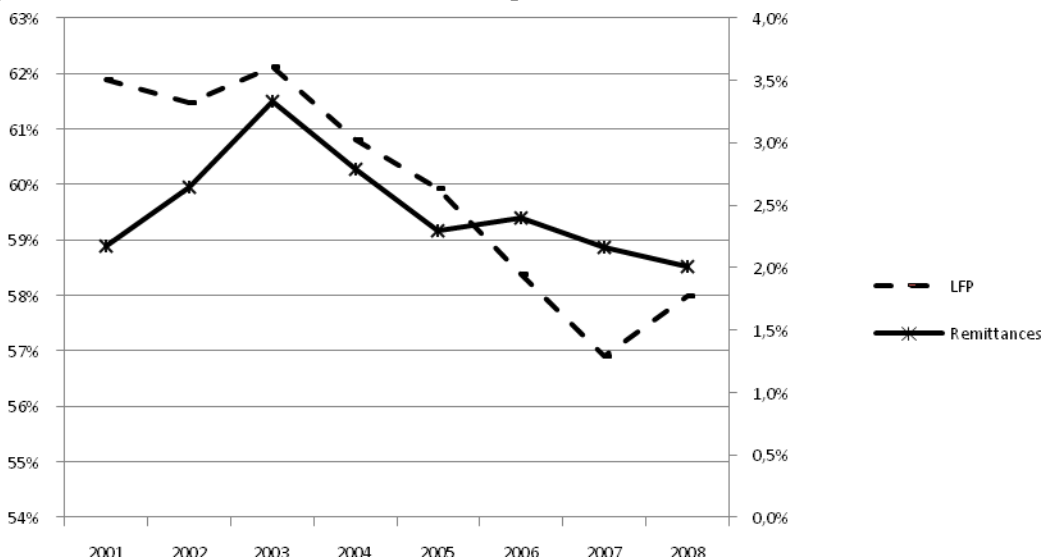
$$\text{Prob (participates =0)} = 1 - \Phi(x_i, r_i; \beta, \alpha)$$

The estimates are made based on the maximum likelihood, and an individual will participate if he/she is a part of the economically active population. Otherwise, he/she will not participate.

3.- Data

Remittances in Colombia totaled USD 4.842 billion in 2008, which represents a 7.8% increase vs. 2007. Considering the increasing number of Colombians abroad, the decline in the cost of transferring money, and the modernization of telecommunications and the bank system, it is reasonable to believe that there is a permanent flow of remittances to Colombia, which is affected only by exogenous shocks such as the recent global crisis.

Figure 2. Remittances and Labor Force Participation in Colombia



Source: Author’s calculations using the NHS and DNP.

Figure 2 above shows labor force participation (LFP) in Colombia in thirteen major cities and remittances as a percentage of the GDP in the period from 2002 to 2008. Last year there was a clear negative relationship between LFP and remittances.

In order to analyze the effect of remittances on the labor market participation in Colombia, it is necessary to define the variables that account for labor participation. Education, sex, and head of household (Castañeda 1981, Macnac 1991, Uribe, Ortiz and Correa 2006, Arango and Posada 2007, Aldana and Arango 2008), age (Castañeda 1981, Arango and Posada 2007, Aldana and Arango 2008), experience and experience square (Macnac 1991, Uribe, Ortiz and Correa 2006) have been used as variables to account for labor participation in Colombia.

Education, sex, experience and experience square, position in the household, and remittances were selected in this study to be the variables that account for labor participation. Education becomes a continuous variable, and we consider the number of years of education. Sex is constructed as a dummy variable which equals one if the individual is a male or zero otherwise. Experience is constructed as potential experience ($age - S - 6$). Remittances is a continuous variable, and individuals report the value in Colombian pesos of 2008. Finally, labor participation is constructed as a dummy variable that equals one if an individual is working or seeking employment, or otherwise zero.

The data were taken from the NHS in March of the 2008. 71, 696 individuals in the age range from 12 to 65 years were selected for the survey, i.e. individuals who are part of the population at working age. The means of the variables were as follows:

Table 1. Means of the variables for labor participation

Variable	Means	Don't Receive	Receive
Education	9.60	9.58	10.60
Remittances	1.439%	0	1
Sex	45.63%	45.85%	30.91%
Head of Household	31.26%	31.04%	46.41%
Experience	18.49	18.44	22.14
Squared to experience	590.28	587.80	759.8
Labor force participation	64.24%	64.36%	56%
Internet	18.04%	17.86%	30.62%
N	71,696	70,664	1,032

Source: Author’s calculations using the NHS.

Table 1 shows that mean education is 9.6 years, and the number of years of education is higher in the households that receive remittances on a regular basis. Garay and Rodríguez (2005) established that recipients of remittances have a lower educational level than those of senders.

The percentage of male is lower than that of female, and it is smaller in the case of families who receive remittances. 31% of these individuals are heads of households, and this percentage slightly increases in families who receive remittances. The mean potential experience is close to 19 years and is slightly higher in families who receive remittances (this can be accounted for by the lower educational level if the age profiles of both kinds of individuals are similar).

The labor participation rate of those who are beneficiaries of remittances is 56%. Meanwhile, the labor participation of those who do not receive remittances is 64%, which is consistent with the results obtained by Garay and Rodríguez (2005) in that the labor participation of beneficiaries of remittances is low and, when compared to individuals who do not receive remittances, is 8% lower. The percentage of received remittances is 1.4% and the mean value is \$59,000 Colombian pesos; i.e. USD 29 (average \$1,968 per USD 1 in 2008).²

4.-Econometric Approach

Remittances received by households are potentially endogenous to labor participation. For example, it is more likely to remit to someone who is unemployed. Many articles discuss the endogenous nature of remittances. Migration variables (Hanson and Woodruff 2003, Acosta et.al. 2006), the transactional cost of intermediate transfers (Amuedo-Dorantes and Pozo 2006, Calero et-al 2009), geographic distance from the household to the United States (Barraz 2005), Rainfall shocks (Choi and Yang 2007); and perceived safety (Vargas-Silva 2009).

² If we consider that poverty in Colombia is around 45%, and that 60% of workers earn less than the minimum wage (USD 250)[Lopez 2010], then USD 29 per month is an important amount.

This article is aimed at identifying the causal effects of remittances by instrument with information about the use of Internet in the households. Colombia ranks sixty-second on the list of telecommunications users (International Communications Union 2008). International connectivity had a high increase in 2008 (93.5%) with the operation of the SAM-1 and CFX submarine cable, and the number of Internet users increased by 7% in 2008(CRT 2009).

In this way, we suppose that the use of Internet is correlated with remittances but not with labor participation. Using Internet at home reduces communications cost, i.e. via SKYPE. It increases the transfer amount and assigns remittances via the bank system more efficiently. 31% of the individuals who receive remittances have Internet access in their households, meanwhile 18% of the individuals who do not receive remittances have Internet access.

The econometric model is defined as follows:

$$Pea_i^* = \beta_0 Remittances_i + \beta_1 Sex_i + \beta_2 Education_i + \beta_3 Experience_i + \beta_4 Experience_i^2 + \varepsilon_i$$

$$Remittances_i^* = \alpha_0 Internet_i + \alpha_1 Sex_i + \alpha_2 Education_i + \alpha_3 Experience_i + \alpha_4 Experience_i^2 + \xi_i$$

$$Remittances_i = Remittances_i^* \text{ if } Remittances_i^* > 0$$

$$Remittances_i = 0 \text{ otherwise}$$

$$Pea_i = 1 \text{ if } Pea_i^* > 0$$

$$Pea_i = 0 \text{ otherwise}$$

Table 2 shows the results of the estimation of the model.

The results of the probit labor participation in Table 2 are consistent with the theory and the previous work in Colombia. Hence, an increase in the number of years of education, potential experience or being the household head will increase the probability of participating in the labor market. A USD29 increase in remittances per month leads to a 0.03 percent decrease in labor participation.

In order to test exogeneity of remittances, the last lines in the probit estimation show the results of included to probit the residuals of the regression of remittances – as a linear and as a censored variable – over Internet, sex, education, head of household, and potential experience (Rivers and Young 1998, Wooldridge 2002). The idea is simple: if the correlation between ε_i and ξ_i is zero, then under the null hypothesis the t-statistical is equal to zero and remittances are exogenous. All of the results reject the exogeneity of remittances.

Table 2. Marginal Effects on Labor Participation in Colombia

Variable	Probit	S.E.	Model I	S.E.	Model II	S.E.	Model III	S.E.
Remittances	-0.00345**	0.00037	-0.07793**	0.00151	-0.00219**	0.00048	-0.002481**	0.00048
Education	0.02484**	0.00048	0.01390**	0.00093	0.02481*	0.00048	0.02482*	0.00048
Sex	0.19049**	0.00385	0.06424*	0.00827	0.19088*	0.00385	0.19079*	0.00385
Head of household	0.19720**	0.00443	0.13330*	0.00752	0.19664*	0.00444	0.19677*	0.00444
Experience	0.03973**	0.00041	0.01831*	0.00148	0.03973*	0.00041	0.0397318**	0.00041
Squared to experience	-0.00074**	0.00001	-0.00033*	0.00003	-0.00074*	0.00001	-0.00074**	0.00001
Remittances equation								
Internet			0.20375*	0.01496	0.24154*	0.03493	0.19760*	0.03044
Eje Cafetero							0.57411*	0.04874
First Stage (F/LR)			72.24		485.85		803.02	
Weakness (F-test)					75.98		168.57	
ρ			0.90660*	0.0159328	-0.08650*	0.02117	-0.06827*	0.02158
Exogeneity test (OLS)	0.46408**	0.02579						
Exogeneity test (Tobit)	0.01574**	0.00875						
Exogeneity test (Smith-Blundell)	323.76**							
LR χ^2	21560.57							
Probability predicted at mean	68.78%		58.18%		68.78%		68.78%	
Percentage of hits	76.39%		76.91%		76.39%		76.39%	
N	71696		71696		71696		71696	

Source: Author’s calculations using data from the NHS. ** p<0.01. *p<0.05 . S.E. Standard Error

Model I and model II in Table 2 present the result of the IV-probit estimation. In model I, the nature of remittances is continuous, and in model II the nature of remittances is censored. Meanwhile Model I show a 0.07% less of the remittance effects on the reduction of the probability of participation in the labor market in Model II the reduction in 0.02%. Also Table II shows the results of the remittance estimation for the instrumental variables, that is, the marginal effects of the Internet for the unconditional expected value of remittances.³ In this way, the results show that in households that receive remittances, the use of the Internet increases the probability of receiving remittances to 24% in model II. Finally, the results also show a positive correlation in the continuous case and a negative correlation in the censored expression of the remittances.

Model III incorporates a dummy variable for “*The Eje Cafetero*” (Pereira and Manizales cities) as an instrument in the estimation of remittances. The importance of “*The Eje Cafetero*” is discussed by Garcia Dominguez (2007): “If we specifically focus on comparing the amount of remittances from Spain in different regions in Colombia, we find that recipients in the coffee growing region receive, on average, higher amounts from senders in Spain than what is received in other regions. The average amount they receive is 30.7% greater than the mean amount of remittances from Spain to Colombia overall. Additionally, the coffee growing region is one of the regions with the largest number of senders.”

In order to test the weakness of remittances and “The Eje Cafetero” as instruments, we ran an F-test. Results suggest that the instruments are not weak with a 5% confidence level and a 10% maximal IV size (Stock and Yogo 2005).^{4,5} The coefficient of correlation ρ in Table 2 between the labor participation equation and remittances is positive and highly significant in model I and negative and highly significant in model II and model III. Of course, in case exogeneity of remittances ρ is equal to zero, then ε_i and ξ_i are uncorrelated (Cameron and Trivedi 2009; Wooldridge 2002). With respect to the sign of ρ , the results in model II and model III are more plausible because we expected a negative correlation between labor participation and remittances.

The marginal effects of remittances on labor participation change dramatically when we compare the results in Probit and IV-Probit with respect to the marginal effects in Model II and Model III with censored and uncensored remittances.⁶ Consistent with theoretical approach all estimations shows that remittances reduce

³ Table 2 does not show other marginal effects for exogenous covariates, but it is clear that all exogenous covariates in the main regression are also included in the estimation of remittances.

⁴ Critical values for the weak instrument based on maximal IV size are 16.38 and 19.93 for one and two instruments, respectively, at 5% of the significance level (Stock and Yogo 2005).

⁵ The overidentification J-Test is equal to 115.85, and the chi-squared with 1% confidence level is equal to 10.83.

⁶ Carter (2009) also found that the marginal effects with censored endogenous variables are smaller than with continuous endogenous variables.

labor participation. The results also show that Internet and “The Eje Cafetero” increase the probability of receiving remittances in Colombia.

5.- Gender differences

There are important reasons to investigate gender differences between the relationship of labor participation and remittances. For example, in the case of The Dominican Republic, female migrants send their remittances to other females for them to be spent on household necessities and family well-being. In most cases, female who migrate to a foreign country leave their households in charge of other female (mothers or sisters). In the hands of female, remittances tend to be channeled towards family well-being, including basic needs, household improvements, health, and education (INSTRAW 2010)⁷.

With respect to the use of remittances in education, Colombian households spend more remittances on this item in comparison to other countries in the region (Guatemala 7%, Honduras 10%, El Salvador 4%, Mexico 6%, Ecuador 2%, and Colombia 12%) [Garcia Dominguez 2007]. Additionally, in Colombia there are substantial gender differences with respect to investment in education. The results of the survey in “The Eje Cafetero” reveal that in the case of households that receive remittances if a male is the head of household, then 4.9% of remittances are invested in education and 7.7% is invested in education if a female is the head of household [Garcia Dominguez 2007]. The same survey also shows that monthly remittances are more frequently sent to females (54.6%) than males (36.8%). The phenomenon has multiple explanations. “The causes of this predominance of female as recipients of remittances are not related to distrust of the management of remittance funds on the part of male, but rather to the kind of family structure left behind, the position of the migrant in the family, and the kind of migration project associated with the remittance (García Domínguez 2007).”

Results for remittances and labor participation relations by gender are showed in the table 3.

The results in Table 3 corroborate the negative relationship between labor participation and remittances. For females, the reduction of the probability as a result of remittances is more remarkable than for male if we consider the *Eje Cafetero* in the remittance equation. “The Eje Cafetero” has a greater impact on the remittance equation in the case of females (71% versus 41%). On the other hand, the head of household is more important for females in labor participation (18% versus 11%). Ch6 is a dummy variable which equals one for children under 6 years old, and we expect the sign to be negative for females and positive for males. The results show that children reduce the

⁷ In Mexico Amuedo-Dorantes and Pozo (2006) found that male labor supply does not vary because the changes in remittances are associated with a variation in the allocation of male labor supply across various types of employment. Unlike men, the female labor supply decreases due to changes in remittance income.

probability of participation in the labor market in females by 1.8% and increase the probability for males by 3.2%.

Table 3. Gender differences between labor participation and remittances

Variable	FEMALE				MALE			
	Model IV	(Stand errs.)	Model V	(Stand errs.)	Model VI	(Stand errs.)	Model VII	(Stand errs.)
Remittances	-0.0021*	0.0006	-0.0256*	0.00063	-0.0165*	0.0006	-0.0016*	0.0006
Education	0.0275*	0.0006	0.0275*	0.0006	0.0179*	0.0005	0.0179*	0.0005
Head of household	0.1833*	0.0067	0.1837*	0.0067	0.1185*	0.0062	0.1185*	0.0062
Experience	0.0345*	0.0005	0.0345*	0.0005	0.0407*	0.0005	0.0407*	0.0005
Squared to experience	-0.0006*	0.0000	-0.0006*	0.0000	-0.0007*	0.0000	-0.0007*	0.0000
Ch6	-0.0187*	0.0069	-0.0187*	0.0069	0.0326*	0.0060	0.0326*	0.0060
Remittance equation								
Internet	0.3443*	0.0573	0.2868*	0.0508	0.1256*	0.0369	0.0971*	0.0310
Eje Cafetero			0.7181*	0.0768			0.4052*	0.0569
First Stage (LR)	366.69		560.33		115.00		235.75	
Weakness (F-test)	57.14		109.80		17.72		57.26	
ρ	-0.0932*	0.0265	-0.0663*	0.0270	-0.0422	0.0378	-0.0406	0.0384
Probability predicted at mean	56.78%		56.78%		68.29%		82.96%	
Percentage of hits	69.72%		69.73%		86.28%		86.28%	
N	38,977		38,977		32,719		32,719	

Source: Author's calculations using data from the NHS. ** p<0.01. *p<0.05.

The negative correlation between labor participation and remittances, ρ , is corroborated but the correlation is not statistically significant in the case of males. What does this mean? The above results show that it is more likely to remit to unemployed female from abroad. All considerations at the beginning of this section explain these results.

5.- Conclusions

The findings of this article are consistent with those of previous papers about labor force participation in Colombia with regard to the positive effect of education, experience, and household heads. On other hand, we found that experience square show a negative impact on labor participation in Colombia.

These findings also show that remittances decrease the probability of participating in the labor market. In particular, an increase of remittances reduces the probability of labor participation by 0.0021. If we consider other instruments, such as “The Eje Cafetero” in the remittance equations, then the reduction of the probability is 0.0024. Incorporating “The Eje Cafetero” enables us to model the geographic characteristics of remittances and explain why in some particular regions of Colombia unemployment is more marked than in others (e.g. the unemployment rate in Pereira in 2009 was 20% while the national unemployment rate was 13%).

An interesting result of this article is the gender characteristic of remittances. Our results show substantial differences in the effect of remittances on labor participation. For females the reduction is greater than for males. And the effects on the remittance equation of “The Eje Cafetero” variable are twice as large for females than for males. Finally, the endogeneity of remittances is a particular phenomenon for females but not for males. The characteristics of migrating families and the importance of female as heads of household explain in part these results.

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