2008

Labor supply in response to remittance income: the case of Mexico

Airola, Jim

LABOR SUPPLY IN RESPONSE TO REMITTANCE INCOME: THE CASE OF MEXICO

Jim Airola
Naval Postgraduate School, USA

ABSTRACT

Abstract: The growth in the flow of international remittance income in many developing countries has increased attention towards remittances as a development mechanism. This study attempts to understand to what degree labor patterns are affected by the receipt of remittances. Using nationally representative household income and expenditure data for Mexico, I analyze the effect of remittance income on labor supply decisions. I find that household labor supply in response to remittance income is consistent with findings which measure labor supply behavior in the presence of other forms of unearned income in different settings. That is, remittance receipts are associated with fewer hours of work and income elasticities are estimated in the range of -.006 to -.03. This finding attenuates to some degree the measure of the impact of remittances in the receiving country's aggregate output.

INTRODUCTION

International remittances, partly because of their rapid growth in measured flows, have begun to be an important focus of development strategists. Recent studies highlight the importance of remittances both at the aggregate and household levels and most studies anticipate that remittances will persist as important factors in the development of low and middle-income countries. Of importance in understanding their effect in the development process is the way in which remittance income is utilized at the household level. In this context, the present study investigates the effects of migrant-remitted transfers on labor supply decisions within remittance-receiving households in Mexico.

International remittances have gained recent attention because they are a stable source of external finance as well as a type of social insurance. Particularly in an environment of skepticism toward the effectiveness of private capital flows for development, remittance inflows have become increasingly popular in the eyes of developmentalists. As the underlying integration of the world's economies continues to grow, the sum of workers' earnings sent abroad has increased. Although difficult to estimate, worldwide annual international remittances may amount to more than one hundred billion dollars. Among the regions in the world, Latin America receives the most remittance income in total dollars. Within Latin America, Mexico is the largest recipient of remittance income, having received in excess of 16.6 billion US dollars *(Banco de Mexico)* in 2004. This

represents close to 2% of GDP and the stimulative effects of this cash flow could cause output to increase by as much as 10%(Durand, et al, 1996). Because remittance income is such an important part of the developing economy, governments have[70] responded with policies to encourage the growth of remittances and the ease of their transaction. For example, government sponsored programs, such as matching contributions on behalf of local governments or remittance-backed home mortgages, have sprung up in Mexico to augment or encourage the sending of remittances.

Central to the understanding of the efficacy of remittance receipts as a catalyst to growth are the ways in which remittance receipts affect household decision-making. The present study attempts to understand the association of remittance income and labor supply decisions at the household level after controlling for various characteristics such as education, age, and number of family members. Primarily, I hope to determine whether remittances exhibit an effect on household labor supply decisions allowing a better understanding of the role of remittances in the larger economy. I find that, as might be expected, the receipt of remittances is associated with a small but significant negative response in hours worked, implying income elasticities in the range of those estimated elsewhere[1].

The paper begins by reviewing the relevant literature on remittances and describes the current understanding of the remittance phenomenon and its relationship to economic outcomes. The following section describes the dataset. The model and econometric results are then discussed. The paper concludes with the implications of the study.

REVIEW OF LITERATURE

A number of studies have analyzed the flow of remittance income, its persistence, the motivations for remitting (Lucas and Stark, 1985), and the impact of remittances on national income. Of concern to this study are the ways in which remittance income is used. To the extent that households use remittance income only for consumption, the growth in remittances could lead to a culture of dependency and possibly idleness (Kapur, 2003). In fact, much of the early literature cautioned of the possible deleterious effects of labor migration and remittance sending. Durand and Massey(1992) review thirty-seven community studies finding that investigators were "remarkably unanimous in condemning international migration as a palliative that improves the well-being of particular families but does not lead to sustained economic growth within sending communities." Specific to Mexico by Dinerman(1982), Lopez(1986) and others find the majority of remittance income spent on consumption, rather than investment. If households use remittance income primarily for consumption, one conclusion might be that migration perpetuates a culture of economic dependency which undermines the prospects for development.

While there have been remarkably few country-wide studies which investigate the ways in which remittance income is used at the household level, a few studies have presented an opposing view highlighting the important benefits of remittances for the household. Woodruff and Zenteno(2001) analyze whether remittances are relied on for small firms to access capital. Using a survey of small urban firms, they estimate that remittances are responsible for almost 20% of the capital invested in micro-enterprises in urban Mexico. Thus they conclude that remittances play an important role in mitigating capital constraints in small business development in the Mexican context. This suggests that remittances are used to shift labor supply across various types of employment. Funkhouser(1992) also finds that remittances increase entrepreneurial self-employment among remittance receiving households in Nicaragua. In the case of the Dominican Republic, however, Amuedo-Durantes and Pozo(2003) find no evidence that remittances promote small business ownership.

Cox-Edwards and Ureta(2003) examine the effect of remittance income on schooling choices and argue that remittances, playing the role of a randomly assigned transfer, provide a clean estimate of the impact of marginal income on[71] school retention rates. They find that children are more likely to stay in school if they reside in a household that receives remittances from abroad. While not a study of overall expenditure patterns, their study provides some evidence that households use remittance income for investment purposes.

Quinn(2005) uses data related to Mexican immigrants in the U.S. gathered from the Mexican Migration Project to test a model of consumption and saving decisions as a function of relative rates of return on saving in the resident and sending countries. While primarily a model concerned with the motivation of remittances, he finds that remittances are sensitive to the relative rate of returns and substitute for savings, implying that remittances are to some degree a saving mechanism on the part of the migrant.

Of particular importance in the context of this paper is the study by Durand, et al (1996) which claims that the direct effect of remittances is "overshadowed by the indirect effects of consumer spending." They argue that associated with the remittance effects are large multiplier effects. Using community level surveys, they estimate that a US$2 billion in remittances generates US$6.5 billion in additional production in Mexico. Remittances thus are cited as having large stimulative effects on the economy in addition to the direct effects. For example, the authors estimate that a small scale farmer who receives $100 from a worker abroad will increase local demand for goods and services by $300, thereby benefiting local providers of food, services, clothing, and other locally provided goods. These multiplier effects are, of course, sensitive to the ways in which households respond to remittance income, particularly as they affect labor supply decisions. The degree to which household labor supply decisions are affected is the focus of this paper.

REMITTANCES TO MEXICO: THE DATA

While a number of studies have investigated both the motivations for and, to some extent, the use of remittances in Mexico, many of them have been limited by the data source. For example, studies used to evaluate the expenditures of remittance data have usually relied either upon recipients' explicit reporting of how remittance income was spent, or senders' reporting of the intent of the use of the remitted funds. This study utilizes a large household income and expenditure survey that provides detailed information on the labor force participation of all household members.
 I use data from the Household Income and Expenditure Survey (ENIGH) for the years 1992, 1994, 1996, 1998, and 2000. While there exist alternative data sources to analyze income, the ENIGH is the only nationally representative survey and contains observations across a relatively long time period. The ENIGH is based on a stratified random sample and conducted by the Instituto Nacional de Estadistica, Geografica e Informática(INEGI) in Mexico. The income and demographics supplements of ENIGH contain individual level information on demographic characteristics, employment, and earnings. Depending on the year, the survey details as many as thirty-six various categories of income for the individual including regular earnings, overtime, bonus, transfers, sale of durables goods, etc. Included in income is money received from abroad in the form of remittances.

Table 1 presents remittance income as a share of household income for the years analyzed as well as the years 1984 and 1989.   While the incidence of remittance income at the household level has been rising, from 1.3% of households reporting the receipt of some remittance income in 1984 to 4.3% of households in 2000, the importance of remittances within those households receiving remittances remained relatively stable from 1994 through the end of the decade. For those households receiving remittances, remittance income accounts for over half of all income, on average, in most years. In

Mexico, as in most countries, remittances are typically reported by the national bank estimated from the balance of payments accounts.

TABLE 1 REMITTANCES TO MEXICO, 1984-2000

year	Share of households receiving positive remittances	Remittances as a share of total household income conditional upon receiving positive remittances	Total estimated international remittances to Mexico(ENIGH) billions US dollars	Total estimated international remittances to Mexico(Banco de Mexico)billions US dollars
1984	1.34%	51.48%		
1989	2.98%	60.66%		
1992	2.81%	38.95%	1.67	2.43
1994	2.70%	59.63%	2.78	3.72
1996	4.01%	59.40%	3.65	4.22
1998	4.15%	56.59%	4.26	5.63
2000	4.27%	54.35%	5.85	6.57

Source: Author's calculations based on ENIGH(INEGI), Banco de Mexico

The final two columns of Table 1 compare the estimated level of remittances, measured in current U.S. dollars, with the total remittances claimed by the households in the ENIGH survey, using the sample weights to represent the entire nation. In each year, the Bank of Mexico's estimate is larger than that calculated using the ENIGH survey, suggesting that the Bank's estimates may overstate the amount of remittances received by households.

Table 2 combines all years to demonstrate the differences between households that receive remittance income and all households. Combining all years results in observations on 58,440 households, 2,377 of which report positive remittance income. As can be seen from the table, the average monthly income in 1994 pesos is 2,198 pesos for all households and only 881 pesos for households that receive some remittance income during the month. The two proximate explanations for this are that the remittance receiving household has lower wages and works fewer hours. However, including the remittance income increases the total mean household income to 1,912 pesos, or 87% of the average income for all households. Likewise, once accounting for the size of the family, the per capita income among remittance receiving households is 83% of that of non-remittance receiving households, on average. Households receiving remittances are also somewhat more likely to have young children.

Table 2 also highlights the differences in characteristics of the household head between all households and only those households that report positive remittance income in the month of the survey. The typical household head of a household receiving remittance income is more likely to be female, older, less educated, works fewer hours, and has a lower average wage than the typical household head within Mexico as a whole. It remains the case that the majority of remittance-receiving households are headed by working-age males. This suggests that remitters are likely to be adult children or relatives of the head rather than the household head himself.

One weakness of the data is that the source of the remittance income is not observed. In some cases, the household head is reported to be absent from the household, in which case it may be that the income is remitted by the head, temporarily working outside of Mexico. But the majority of the heads are present in the household, suggesting that the remitters are likely to be children or other relatives of household members.

TABLE 2 DESCRIPTIVE STATISTICS, 1992-2000

Characteristic, household	mean(sd)	mean(sd)
total monthly household income excluding remittance(1994 pesos)	2198 (6824)	881 (1705)
total monthly household income including remittance(1994 pesos)	2198 (6824)	1912 (2328)
number of children under age of 5	0.61	0.67
children between ages of 6 and 10	0.56	0.57
Characteristic, head of household		
Age	45.1(15.4)	49.6(16.1)
% female	16.30%	24.50%
years of education	5.75(4.8)	2.4(3.4)
hourly wage(1994 pesos)	6.75(12.5)	2.92(4.6)
total hours worked per week	41.2(24.5)	20.1(26.1)
N	58,440	2,377

Source: Author's calculations based on ENIGH(INEGI)

All income in the ENIGH is self-reported and individual-specific, whereas expenditures are reported at the household level. Each member of the household identifies themselves relative to the household head. Table 3 depicts the contribution to household labor income (not including remittances) by relationship to household head. As can be seen, over two thirds of total labor income is reported by household heads. Spouses account for little more than 10% of labor income reported. Since it is well known that spousal and child labor force participation is complicated by a host of confounding variables within the joint labor supply decision, I will restrict the present analysis to household heads and use measures of remittance income at both the individual and household level.

To analyze the labor supply decision, I use a simple functional form derived from the indirect utility function (Stern, 1986) of the household head. The semi-log labor supply equation is as follows:

wre H_i represents total weekly hours worked by the household head, W_i is the real hourly wage calculated as the total monthly labor income [ii] divided by 4.33 x hours worked per week, R is average of total monthly international remittances received by the household, and **Z** is a vector of personal and household characteristics including number of children under the age of 5, number of children between the ages of 6 and 15, total number of persons in the household, age and education of the household head,etc. Within this framework, the chief parameter of interest is $_2$. the degree to which changes

$$H_i = a + \beta_1 \ln W_i + \beta_2 \ln R_i + \beta \mathbf{Z}_i + u_i \qquad (1)$$

in hours worked by the household head are associated with the receipt of foreign remittances.

Since some household heads report zero hours worked, particularly households headed by women, a selection model (Heckman, 1979) is utilized whereby the probability of being in the workforce is determined by the age, education, whether the household is in a rural or urban setting, and the number of children in the household, as well as a dummy variable indicating whether or not the household received remittance income in the period considered. The inverse mills ratio, or nonselection hazard, is then entered as an explanatory variable in the weighted maximum likelihood estimation of total hours on wages, the remittance variable of concern, dummy variables to control for fixed year effects, and other controls as mentioned below.

TABLE 3 INCOME BY POSITION IN HOUSEHOLD, 1992-2000

Position in Household	Share of Total Household Income
Head	69.15%
Spouse	10.80%
Son or Daughter of Head	16.10%
Parent or Brother of head	3.60%
All other	0.35%
N	58,440

Source: Author's calculations based on ENIGH(INEGI)

In thinking about the effect of remittance income on household labor supply, at least two issues of endogeneity, or selection, are important. The first is the selection of the remittee. Since it is not the case that remittances are sent randomly to households within the Mexican population, it must be the case that receiving families are different than non-receiving families in ways that are either observable or unobservable. An example is the case of a family jointly deciding to send a son to the U.S. in order for that son to send money home. If the remittance is a result of a prior agreement, or even as compensation for costs incurred in the migration, the recipient is not randomly selected.

Likewise, if the remitter sends money *in response to* a certain observable characteristic, such as the presence of children in the household, the remittance income will be endogenous to the labor supply decision. However, this is of less importance in the context of this study, since I am interested primarily in the average effect of remittance income on labor supply decisions and particularly the contribution of remittances to output at the aggregate level. Put another way, the total impact of remittance income on the output of the Mexican economy in any given year is the total observed output less the (counterfactual) output in the absence of remittance income. The predicted counterfactual labor supply is robust to these selection concerns[iii].

Tables 4 through 6 present the results of the regression of hours worked by the working-age household head on a variety of control variables, by sex. In each table, the estimated coefficients for the wage variable and unearned income variables are presented. From the estimating equation, the uncompensated wage elasticity is calculated as

$$\frac{\partial \ln H_i}{\partial \ln W_i} = \beta_1 \Big/ H_i \text{, and the elasticity of remittance income is } \frac{\partial \ln R_i}{\partial \ln H_i} = \beta_2 \Big/ H_i.$$

In table 4, for men the estimated coefficients imply uncompensated wage elasticity at the sample mean of .085 and an elasticity of remittance income of -.009. These results suggest that at the sample mean, an additional 100 pesos of remittance

income lowers the expected number of hours worked by approximately 1.7 hours/week. Considering that the average weekly remittance income is approximately 250 pesos, the receipt of remittances is associated, on average, with a small but significant[75] decrease in labor force participation by household heads.

Looking at table 5, I perform the same regression, this time only using households located in rural communities. The results are similar for men with a significantly lower response for women. The most likely explanation being that women have less flexibility in the workforce in small towns relative to large employment centers. Because data collection is problematic among the self-employed, especially self-reported income, Table 6 reports estimated coefficients excluding all self-employed workers. The results presented here are consistent with the full sample results, all implied elasticities of remittance income range between -.006 and -.010 for men and -.018 and -.030 for women. In all specifications, the estimate of lambda indicates that I am unable to reject the hypothesis of no selection.

TABLE 4 ESTIMATES OF REMITTANCE INCOME ON HOURS WORKED BY HOUSEHOLD HEAD - FULL SAMPLE

coefficient	Men		Women	
	estimate	s.e.	estimate	s.e.
ln(wage)	4.36	0.095	4.29	0.263
ln(remittance income)	-0.436	0.038	-1.22	0.215
ln(other unearned income)	-0.492	0.038	-0.838	0.079
married	0.172	0.032	-0.126	0.095
children<6	0.019	0.011	-0.074	0.021
children>5	0.051	0.011	0.053	0.024
education	0.128	0.005	0.044	0.008
age	-0.016	0.0001	-0.031	0.002
inverse mills ratio	-20.23	1.09	-20.96	1.62
N	44,375		6,982	

Source: ENIGH; 1992, 1994, 1996, 1998, 2000 (INEGI)

Notes: results from weighted maximum likelihood estimation with sample selection; the selection equation includes education, age, number of children under the age of 6, number of children between thee ages of 6 and 15, a dummy for married, dummies for year, and a dummy for rural/urban designation. The regression equation includes the selection variables as well as log of real wage, log of remittance and other unearned income. Reported standard errors are heteroskedasticity robust (White) standard errors.

TABLE 5 ESTIMATES OF REMITTANCE INCOME ON HOURS WORKED BY HOUSEHOLD HEAD – RURAL HOUSEHOLDS

coefficient	Men		Women	
	estimate	s.e.	estimate	s.e.
ln(wage)	3.8	0.127	4.5	0.539
ln(remittance income)	-0.537	0.115	-0.758	0.354
ln(other unearned income)	-0.531	0.049	-1.099	0.183
married	0.067	0.049	-0.062	0.164
children<6	0.032	0.014	-0.029	0.034
children>5	0.039	0.014	0.066	0.037
education	0.348	0.013	0.063	0.021
age	0.002	0.001	-0.016	0.003
inverse mills ratio	-13.67	1.49	-34.24	5.8
N	20,922		2,380	

Source: ENIGH; 1992, 1994, 1996, 1998, 2000 (INEGI)

Notes: results from weighted maximum likelihood estimation with sample selection; the selection equation includes education, age, number of children under the age of 6, number of children between thee ages of 6 and 15, a dummy for married, and dummies for year. The regression equation includes the selection variables as well as log of real wage, log of remittance and other unearned income. Reported standard errors are heteroskedasticity robust (White) standard errors.

TABLE 6 ESTIMATES OF REMITTANCE INCOME ON HOURS WORKED BY HOUSEHOLD HEAD – EXCLUDING SELF-EMPLOYED

coefficient	Men		Women	
	estimate	s.e.	estimate	s.e.
ln(wage)	5.77	0.118	5.3	0.348
ln(remittance income)	-0.425	0.096	-0.9349	0.242
ln(other unearned income)	-0.39	0.042	-0.607	0.085
married	0.239	0.037	-0.265	0.114
children<6	-0.011	0.023	-0.084	0.026
children>5	0.029	0.013	0.053	0.028
education	0.166	0.005	0.108	0.009
age	-0.027	0.0001	-0.039	0.002
inverse mills ratio	-13.14	0.629	-11.51	1.07
N	28,270		5,070	

Source: ENIGH; 1992, 1994, 1996, 1998, 2000 (INEGI)

Notes: results from weighted maximum likelihood estimation with sample selection; the selection equation includes education, age, number of children under the age of 6, number of children between thee ages of 6 and 15, a dummy for married, dummies for year,and a dummy for rural/urban designation. The regression equation includes the selection variables as well as log of real wage, log of remittance and other unearned income. Reported standard errors are heteroskedasticity robust(White) standard errors.

SUMMARY AND CONCLUSION

Remittances are one of the larger ways in which Mexican immigrants in the United States affect the people and communities within Mexico. Unlike foreign aid, remittance flows impose no burden on taxpayers. Remittance flows are a steady and predictable source of foreign funds, especially compared to either foreign direct investment or portfolio flows. Remittances require no bureaucracy, simply going directly to households as cash transfers. As immigration, both legal and illegal, continues to be an important policy issue in the U.S., little is known about the effects of remittances sent by those immigrants to households in their country of origin. Fundamental to our understanding of migration policy is our understanding of how sending communities are affected. One important effect is that of remittances on household labor supply decisions. In this study I utilize a nationally representative household survey to analyze the impact of remittances on decisions within the household. I find that remittance income is associated with reduced work hours for the average household head, particularly for women. I estimate elasticities in the range of -.006 to -.03, well within the range of estimates found in labor supply studies elsewhere (Blundell and MaCurdy(1999)).

While remittance income to Mexico is a large and growing contributor to total output, this provides some evidence that estimates of the contribution of remittances to aggregate output in Mexico may be overstated, to the extent that some of its effect may be offset by lower labor force participation.

NOTES

[i] Blundell and MaCurdy(1996) in Table 1 provide a comprehensive survey of estimates of income elasticities of labor supply. The survey covers over twenty studies and includes a variety of econometric approaches. Most estimates lie in the range of -.03 and -.2.

[ii] Earnings are deflated using the national consumer price index published by the Bank of Mexico with 1994 as the base year, thus all earnings are measured in constant terms. It should be noted that in real terms, wages in Mexico have been relatively constant over the period of investigation.

[iii] For example, the household head elicits the sending of remittances from a migrant friend or relative in order to participate less in the formal labor market. Clearly the labor supply decision was not in *response* to the remittance, but in fact *elicited* the remittance. However, from the standpoint of total economic output, the effect is equivalent.

REFERENCES

Amuedo-Durantes, Catalina, and Pozo, Susan "Workers' Remittances and Business Ownership in the Dominican Republic," 2003, working paper.

Blundell, Richard and MaCurdy, Thomas, "Labor Supply: A Review of Alternative Approaches", in *Handbook of Labor Economics, Vol 3A*,1999.

Dinerman, I.R, "Migrants and Stay-at-Homes:A comparative study of rural migration from Michoacan, Mexico". Monographs in U.S._Mexican Studies, NO 5 U.C. San Diego.1982.

Durand, Jose and Massey,Douglas, "Mexican Migration to the U.S.: A critical Review," *Latin American Research Review*,1992, Vol. 27, pp.3-43.

Durand, Jose; Massey, Douglas; and Parrado, Emilio, "Migradollars and Development: A Reconsideration of the Mexican Case", *International Migration Review*, 1996,Vol. 30(2), pp.423-444.

Edwards, Alejandra Cox and Ureta, Manuelita, "International Migration, Remittances, and Schooling: Evidence from El Salvador," *Journal of Development Economics*, 2003, Vol. 72(2).

Funkhouser, Edward, "Migration from Nicaragua: Some Recent Evidence", World Development, 1992, Vol. 20(8), pp. 1209-1218.

Heckman, James,"Sample Selection Bias as a Specification Error", *Econometrica*, 1979, Vol. 47, pp. 153-161.

Kapur, Devesh, Mimeo, Center for Global Development, 2003.

López, G., "La Casa Dividida: Un Estudio de Caso Sobre Migación a Estados Unidos en un Pueblo Michoacano", Zamoro, Michoacán: El Colegio de Michoacán, 1986.

Lucas, Robert, and Stark, Oded, "Motivations to Remit: Lessons from Botswana", *Journal of Political Economy*, 1985, Vol. 93, pp. 901-18.

Quinn, Michael A., "Remittances, Savings, and Relative Rates of Return", *The Journal of Developing Areas,* 2005,Vol.38, No.2, pp. 1-23.

Stern,Nicholas,"On the Specification of Labor Supply Functions", in: R.W. Blundell and I. Walker,eds.,Unemployment, Search and Labour Supply(Cambridge UniversityPress,Cambridge,UK) 1986, pp 121-142.

Woodruff Christopher and Zenteno, Rene, "Remittances and Microenterprises in Mexico", working paper. 2001.