Remittance Income Volatility and Labor Supply in Mexico

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Motivation

- **A significant body of research currently analyzes the impact of remittances on economies around the globe:**
  - **At the microeconomic level:**
    - Health
    - Education
    - Labor Supply
  - **At the macroeconomic level:**
    - Economic growth
    - Poverty rates
    - Income distribution

  Evidence of the impacts of remittances on the well-being of recipients and on national progress is mixed, with all the literature focusing on the impact of remittance inflows.

Objectives

- **To acknowledge the role of both the *level* and *volatility* in remittances on the behavior of remittance-receiving HHs.**
- **Specifically, to assess the impact of the *level* and *volatility* in remittances on the labor supply of remittance-receiving HHs. Our hypotheses are:**
  - **Hypothesis no.1: Remittance inflows reduce LS, e.g. income effect.**
  - **Hypothesis no.2: Remittance income uncertainty increases LS.**

Remittances and Labor Supply

- **Rodriguez and Tiongson (2001):** Remittances lower employment in the Philippines.
- **Funkhouser (1992):** Remittances reduce employment of Nicaraguan men and women by 2% and 5% points, respectively.
- **Cox-Edwards and Rodriguez-Oreggia (2006):** Remittances have no impact on the labor supply of household members in Mexico.
- **Amuedo-Dorantes and Pozo (2006b) and by Hanson (2007):** Mexican women reduce labor supply, whereas men do not.

Remittances and Labor Supply-Cont'd

- **What may account for these results and gender differences?**
  - Methodology
  - Geographic and cultural differences in how LS responds to RE
  - Non-linear differences in the response of LS to RE
- **We propose that differences in the certainty of remittances may be one of the causes:**
  - Does the certainty of remittances vary by gender?
  - If men experience greater uncertainty in remittance receipts, they may be less likely to withdraw from the workforce
- **Implication:** Important omitted variable bias.

Why Should We Care?

- **Policy-making has been directed towards lowering transactions fees and integrating immigrant populations into the financial sector. Yet…**
  - Should we encourage regular and periodic remittance transfers?
  - Or is it more important to lower the cost of remitting even if remittances are received on an irregular basis? E.g. a flat fee could encourage larger and less regular remittance flows.
- **Understanding the role of remittance income uncertainty on the behavior of households can inform about policies that harness the most out of remittances.**

Theoretical Model: Block and Heineke (1973)

If: $Y = wL + e$ and individuals maximize: $U(L, Y)$, where:

- $U_Y>0$ (i.e. income is a normal good),
- $U_L<0$ (i.e. labor is a discommodity),
- $U_{YY}<0$ (i.e. individuals are risk averse),
- If ARA: $R(Y, L) = -U_{YY}/U_Y$, then: $R_Y<0$ and $R_L=0$.

Using the FOC, we get two comparative statics:

- Replacing non-labor income (e) with ($e+\theta_1$) in the FOC, differentiating it wrt θ_1, and evaluating the partial at $\theta_1=0$:

  Hypothesis no. 1: $\partial L/\partial \theta_1 = -E(U_{LY}+wU_{YY})/H < 0$

- Replacing (e) with ($\gamma e+\theta_2$) in the FOC, differentiating it wrt γ, evaluating the partial at $\gamma=1$ and $\theta_2=0$:

  Hypothesis no.2: $\partial L/\partial \gamma = -cov(e, U_{LY}+wU_{YY})/H > 0$.

Data

- **Harmonized 2000, 2002, 2004, and 2005 ENIGH waves**
- **Advantages:**
  - Detailed data on income and employment
  - Six-month history of receipts, not in other data sets:
    - Mexican Family Life Survey
    - Mexican Census

Sample Characteristics

Table 1
Descriptive Statistics of Working-age Individuals

Sample:	Men			Women		
Variables	**Obs.**	**Mean or Proportion**	**S.D.**	**Obs.**	**Mean or Proportion**	**S.D.**
Age	84486	34.808	13.248	94118	34.845	13.056
Household Head	84486	0.591	0.492	94118	0.129	0.335
Primary Education or Less	84486	**0.386**	0.487	94118	**0.441**	0.496
Secondary Education	84486	**0.413**	0.492	94118	**0.387**	0.487
High Education	84486	0.193	0.395	94118	0.169	0.375
Working	84442	**0.829**	0.376	93749	**0.444**	0.497
Hours Worked (if employed)	70007	**208.857**	61.560	41664	**167.561**	73.242
Percent of Young Children in the HH	84486	**0.112**	0.156	94118	**0.122**	0.161
Percent of Elderly HH Members	84486	**0.030**	0.097	94118	**0.037**	0.108
Percent of Working HH Members	84486	0.004	0.039	94118	0.003	0.036
HH without an Adult Head	84486	0.001	0.028	94118	0.001	0.026
Single Female Headed HH	84486	0.090	0.286	94118	0.189	0.392
Single Male Headed HH	84486	0.082	0.274	94118	0.034	0.180
Traditional HH	84486	**0.838**	0.368	94118	**0.786**	0.410
Quality of Home Construction	84486	**7.587**	1.618	94118	**7.640**	1.591
Lives in a Rural Area	84486	**0.267**	0.442	94118	**0.256**	0.437

179,000 working-age individuals (i.e. 16 and 64 years old): 47% are men (due to emigration), even split with regards to primary and secondary education, men more likely at work, women more likely to reside in HHs with more children and elderly members, men more likely to reside in traditional HHs, men and women have similar housing quality and rural residency higher for men.

Remittance Receiving Patterns

Table 2
Remittance and Other Income Descriptive Statistics

Sample:		**Men**			**Women**	
Variables	**Obs.**	**Mean or Proportion**	**S.D.**	**Obs.**	**Mean or Proportion**	**S.D.**
Individuals in Remittance Receiving HHs	84486	0.039	0.195	94118	0.057	0.232
Individuals in Remittance Receiving HHs						
Every Month	84486	0.020	0.141	94118	0.032	0.176
Not Every Month out of the Last Six Months	84486	0.019	0.137	94118	0.025	0.156
Monthly HH Remittance Income (pesos)	3333	1932.495	1945.78	5361	2166.005	2077.049
Monthly HH Income -No Remittances (pesos)	84450	1987.777	7400.339	94092	2071.744	7575.629

Women receive more remittances than men.

The "regularity" of receipts differs for men and women .

The difference in proportion of women who receive remittances regularly and irregularly is statistically different from zero, but not among men.

Remittance receipts are fairly large relative to other NLI (includes other non-remittance transfers, capital and property rents uncommon among poorer HHs.)

Gender Differences in Uncertainty

Table 3
Descriptive Statistics for Working-age Individuals in Remittance-receiving Households

Sample:		Men			Women	
Variables	**Obs.**	**Mean or Proportion**	**S.D.**	**Obs.**	**Mean or Proportion**	**S.D.**
Age	3333	**36.428**	15.363	5361	**35.737**	14.217
Household Head	3333	0.533	0.499	5361	0.226	0.418
Primary Education or Less	3333	**0.496**	0.500	5361	**0.586**	0.493
Secondary Education	3333	0.322	0.467	5361	0.336	0.472
High Education	3333	0.085	0.279	5361	0.077	0.267
Working	3330	**0.698**	0.459	5356	**0.383**	0.486
Hours Worked (if employed)	2323	**198.319**	68.395	2051	**157.167**	81.758
Percent of Young Children in the HH	3333	0.117	0.156	5361	**0.142**	0.172
Percent of Elderly HH Members	3333	0.046	0.123	5361	**0.057**	0.130
Percent of Working Members in the HH	3333	0.006	0.047	5361	0.006	0.050
HH without an Adult Head	3333	0.001	0.035	5361	0.001	0.033
Single Female Headed HH	3333	0.112	0.315	5361	0.210	0.407
Single Male Headed HH	3333	0.172	0.377	5361	0.106	0.307
Traditional HH	3333	0.834	0.372	5361	0.766	0.423
Quality of Home Construction	3333	7.483	1.392	5361	7.519	1.378
Lives in a Rural Area	3333	**0.512**	0.500	5361	**0.504**	0.500
Uncertainty in Remittance Income	3333	0.828	0.875	5361	0.801	0.872
Uncertainty in HH NLI (No Remittances)	3333	0.861	0.910	5361	0.761	0.867

Uncertainty, measured as the CV, in remittance income and in NLI is always larger among men.

Remittances, Uncertainty and Work

Table 4
Work and Hours Worked According to the Frequency of Remittance Receipt

Work and Hours Worked	Non-remittance Receivers		Sporadic Remittance Receivers		Monthly Remittance Receivers	
	Incidence	Work Hours	Incidence	Work Hours	Incidence	Work Hours
Men	0.834	209	0.769	199	0.631	198
Women	0.448	168	0.425	159	0.350	155

Re: Hypothesis no. 1: Non-remittance receivers work the most, i.e. RE lower LS.

Re: Hypothesis no. 2: Regularity in remittance receipts also seems to favor the purchase of leisure as hypothesized, i.e. RE uncertainty raises LS.

Remittance Uncertainty and Work

Table 5
Work and Hours Worked According to Household Remittance Income Uncertainty

Sample:	**Men**				**Women**			
Variables	**N**	**Mean or Proportion**	**Diff.**	**t-stat**	**N**	**Mean or Proportion**	**Diff.**	**t-stat**
Work								
Low Uncertainty	1665	0.634	-		2677	0.341	-	
High Uncertainty	1665	0.761	-0.127***	-8.035	2679	0.425	-0.084***	-6.325
Hours Worked								
Low Uncertainty	1161	196.95	-		1025	156.31	-	
High Uncertainty	1162	199.68	-2.726	-0.961	1026	158.02	-1.805	-0.475

Working-age individuals with higher remittance income uncertainty (above the median) display a higher propensity to work.

Among working remittance-receiving individuals, there are no significant differences in the number of hours worked.

Methodology

We estimate the following model:

$$Y_i = \alpha_0 + \alpha_1 R_i + \alpha_2 RU_i + X_i \beta + \varepsilon_i,$$

Y=hours of work, *R*=remittance income, *RU*=remittance income uncertainty, and *X*=individual and household level variables:

- Level and uncertainty of other sources of NLI,
- Personal characteristics: Household head, age and educational attainment,
- Household characteristics: Household composition (i.e. percent of young children, percent of elderly members, percent of working members), type of household (i.e. single female/male headed, traditional, HH without an adult head), housing quality and household location, e.g. rural or urban,
- Mexican state and year dummies.

Some Econometric Issues…

- **Large number of zeros in the dependent variable**
- **R and RU may be correlated with the error term**:
  - Unobserved heterogeneity and omitted variables
  - Reverse causality
- **Classical errors in variables problem**

Hence, we estimate an IV-Tobit. Our instruments are:

- For Remittance Income: Weighted averages of 2000-2005 unemployment and wages, and
- For Remittance Income Uncertainty: Weighted averages of the s.d. of monthly unemployment and wages in U.S. destination states.

Weights reflect the incidence of migration from the Mexican state in question to U.S. destinations.

Non-IV Results

Table 6
Tobit Model for Work and Hours Worked by Men and Women

Variables	Men			Women		
	Coefficient	M.E. on Prob (Y>0)	M.E. on E(Y|Y>0)	Coefficient	M.E. on Prob (Y>0)	M.E. on E(Y|Y>0)
HH Remittance Income	**-17.420*** **	**-0.037**	**-13.931**	**-22.861*** **	**-0.047**	**-9.068**
Uncertainty in Remittance Income	**6.512** **	**0.014**	**5.208**	**11.463*** **	**0.024**	**4.547**
No. of Observations:		3333			5361	
Uncensored Observations		2323			2051	
LR Chi-square		736.44			409.03	
Prob > Chi-square		0.0000			0.0000	

- **A 1,000 peso increase in remittance income (about US$ 100) lowers the employment likelihood of men by 0.4% points and of women by 0.5% points. Among working individuals, there is a reduction of 1.4 hrs./month for men and by 0.9 hrs./month for women.**
- **A one s.d. increase in remittance income uncertainty raises the employment likelihood of men by 0.6% points and of women by 1% point, while hours worked go up by 2.3 hrs./month for men and by 2 hrs./month for women.**

First-Stage IV Results

Tobit Models Predicting Remittance Income and Remittance Income Uncertainty

Group	Men			
Variables	Remittance Income		Remittance Income Uncertainty	
	Coefficient	S.E.	Coefficient	S.E.
U.S. Earnings	-	-	**-2.280*** **	0.675
U.S. Earnings Variability	-	-	6.389	5.971
U.S. Unemployment Rate	**-0.662*** **	0.243	-	-
U.S. Unemployment Rate Variability	**-2.554*** **	0.768	-	-
Number of Observations:	80972		3310	
Uncensored Observations	3310		2286	
LR Chi-square	3702.99		387.57	
Prob > Chi-square	0.000		0.000	

Group	Women			
Variables	Remittance Income		Remittance Income Uncertainty	
	Coefficient	S.E.	Coefficient	S.E.
U.S. Earnings	-	-	**-1.130** **	0.550
U.S. Earnings Variability	-	-	5.603	4.703
U.S. Unemployment Rate	**-0.539*** **	0.203	-	-
U.S. Unemployment Rate Variability	**-2.716*** **	0.637	-	-
Number of Observations:	90504		5329	
Uncensored Observations	5329		3529	
LR Chi-square	5956.27		535.85	
Prob > Chi-square	0.000		0.000	

- **Higher U.S. unemployment rates and volatility reduce remittance income inflows.**
- **Higher U.S. wages reduce remittance income uncertainty. Higher U.S. wage uncertainty increases it, but not significantly.**

IV Results

Table 7
IV-Tobit Model for Work and Hours Worked by Men and Women

Variables	Men			Women		
	Coefficient	M.E. on Prob (Y>0)	M.E. on E(Y|Y>0)	Coefficient	M.E. on Prob (Y>0)	M.E. on E(Y|Y>0)
HH Remittance Income	**3.110**	**0.007**	**2.482**	**20.335**	**0.041**	**8.075**
Uncertainty in Remittance Income	**18.314****	**0.039**	**14.617**	**84.520*****	**0.172**	**33.563**
No. of Observations:		3310			5329	
Uncensored Observations		2308			2038	
Log Likelihood		-15456.617			-15442.594	
IV Exogeneity Test[a]		$1.07 < \chi^2_{4,5\%} = 9.49$			$1.06 < \chi^2_{4,5\%} = 9.49$	

- **The impact of remittance income disappears once we account for its endogeneity, whereas the impact of remittance income uncertainty strengthens.**
- **A half s.d. increase in remittance income uncertainty raises the employment likelihood of men by 1.7% points and hours worked by 6.4 hrs./month or 3%. Likewise, a similar increase raises women's employment likelihood by 7.5% points and their work hours by 14.6 hrs./month or 9%.**
- **Increases in remittance income uncertainty impact the LS of women to a larger extent than they do for men.**

Conclusions

- **Once we instrument remittance income and remittance income uncertainty, the LS of men and women solely responds to the *uncertainty* of remittance inflows:**
  - This result suggests that the impact of remittance is biased upwards in the non-instrumented regression analysis, while the opposite is true for remittance income uncertainty.
- **The LS response of women to increases in remittance income uncertainty is significantly larger than the LS response of men.**
  - Perhaps women, due to their lower LFP rates and fewer work hours when employed, are more likely to step into the labor market and/or increase their hours of work to buffer household income.
  - This response may be more limited with respect to men, who are more likely to already be at work and employed full-time.

Policy Implications

- **Policies that influence the periodicity and volatility of remittances will have appreciable impacts on the LS patterns of men and women.**
- **Policies promising equivalent levels of remittance flows are not the same if the time patterns of remittance flows in each policy differ. They will have different impacts on the labor markets of the recipient nations.**

Comments welcome!

Thanks!