



World Statistics Day

**ESTADÍSTICA Y ECONOMÍA: ANÁLISIS LONGITUDINAL DE
NECESIDADES DE ASEGURAMIENTO Y VULNERABILIDAD DE
HOGARES POBRES EN MÉXICO**

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Octubre, 2015

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Microinsurance

Introduction

1. How Microinsurance could be used as a tool to fight against poverty?
2. Analysis of the extent to which poor and vulnerable households in Mexico are able to insure their consumption from:
 - Fluctuation in their real income
 - Specific economic shocks

Using a panel survey data (ENNViH1 y 2 (2002, 2005))

3. A proposal of a stochastic model for shocks simulation and analysis of the economic viability of the adoption of a massive Microinsurance program for the poor and non poor but vulnerable households.

Outline

1. Introduction

2. Motivation and Literature Review

3. Need of Microinsurance for vulnerable households

4. Conclusions

Main Objective

Find the effects of income shocks and specific economic shocks on the consumption of Mexican households, depending on the following factors:

- Level of income
- Area of Residence (rural or urban)
- Types of consumption

And identify that there's an opportunity in Mexico for Microinsurance development.

Microinsurance

Introduction: Defining Microinsurance

Definition

“Microinsurance is the protection of low-income people against specific perils in exchange for regular premium payments proportionate to the likelihood and cost of the risk involved”, Craig C. (2006)

A more general definition:

Microinsurance is an insurance product designed for low income people.

Microinsurance

Introduction: General Aspects of Microinsurance

Special Features:

1. Affordable Premiums
2. Small Amount of Coverage (small insured sum)
3. Simplified Claim Process
4. Few Exclusions
5. Simplified Pricing Process
6. Low Operational Costs

Microinsurance

Introduction: Premium of Microinsurances

Premium

Another aspect that is important to know, is the difference between Microinsurance premium and traditional insurance premium. Comparing two policies with the same amount of insured sum and same coverage, we have:

Traditional Insurance

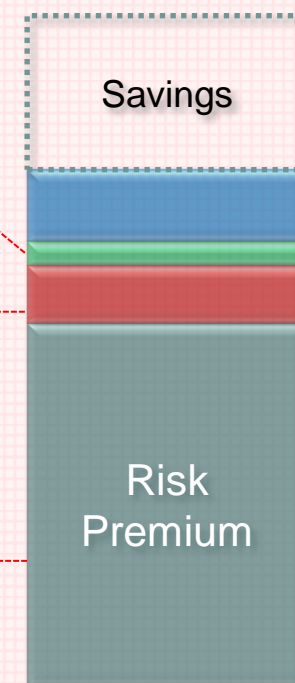


Savings comes from distribution channel

Savings comes from simplification oper.proc.

Comes from lack of selection

Microinsurance



Comes from Simplification of operational process

Outline

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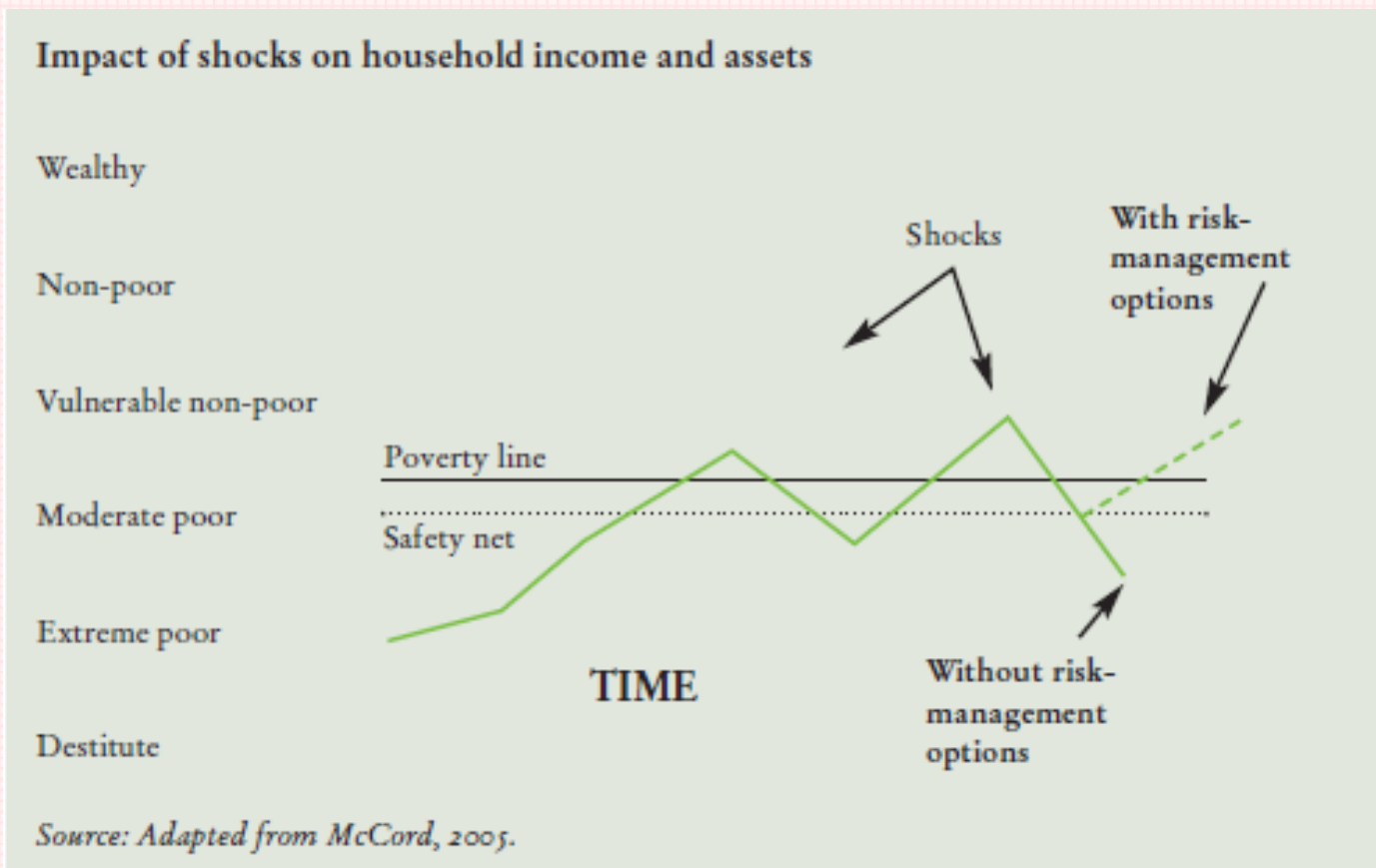
Microinsurance

Motivation and Literature Review

- A household's observed poverty level is an **ex-post** measure of a household's well-being (or lack thereof). But poverty is a stochastic phenomenon and the current poverty level of a household, may not necessarily be a good guide to the household's expected poverty in the future. The critical need then is to go beyond a cataloging of who is currently poor and who is not, to an assessment of households' vulnerability to poverty, Chaudhuri (2003).
- In the absence of sufficient assets or insurance to smooth consumption shocks can lead to irreversible losses, such as the sale of productive assets, reduced nutrient intake, disruption of education that permanently reduces human capital, leading victims to perpetual poverty, Jacoby and Skoufias (1997).
 - Vulnerable households, aware of the potential irreversible outcomes, frequently employ strategies to mitigate risks that reduce effects of events.
- When households lack the means to smooth consumption due to income variation, are often trapped in poverty, given their attempts to stay out of the irreversible effects, Morduch, 1994; Barret, 1999.

Microinsurance

Motivation and Literature Review



Microinsurance

Motivation and Literature Review

- In the last years, Microinsurance has been considered a high potential instrument in mitigating some of the problems faced by low-income people who are poor or vulnerable to poverty.
- It is the reason why it is relevant to understand how Microinsurance could help in reduction of poverty.
- However, it is an issue that has not been studied much.
 - Therefore the motivation of this research is to deepen in the analysis of the way how Microinsurance:
 - 1) could diminish vulnerability to poverty for non-poor-households.
 - 2) could help poor households change their poverty status.

Microinsurance

Motivation and Literature Review

- Some research presents analysis of the Microinsurance marginal effects focusing on health insurance and index insurance.
- None literature about studies that address and present concrete results on how Microinsurance can help mitigate the vulnerability to poverty under the effects of various types of shocks.

Outline

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Microinsurance

Is there an opportunity for Microinsurance development?

Some poverty data (CONEVAL, 2012):

- Mexico is a country with 112 million people and 28 millions of households.
- The average household size is 3.9 individuals.
- There are 52 million people in poverty condition,
 - 12 million people are in extreme poverty and 40 million in moderate poverty.
- From all those who are classified as non-poor, 39 million live in a difficult economic situation so they are considered as vulnerable to poverty
- According to this information, poverty is a big problem in Mexico

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Is there an opportunity for Microinsurance development?

- **Shocks are the main cause that produces poverty to poor and vulnerable people**

Percentage of households with at least 1 shock in the last five years

	Total Population	Urban	Rural
Shock	29.17%	29.22%	28.96%

Percentage of households with at least 1 shock, 2002-2005

	Total Population	Urban	Rural
Shock	26.55%	26.70%	25.96%

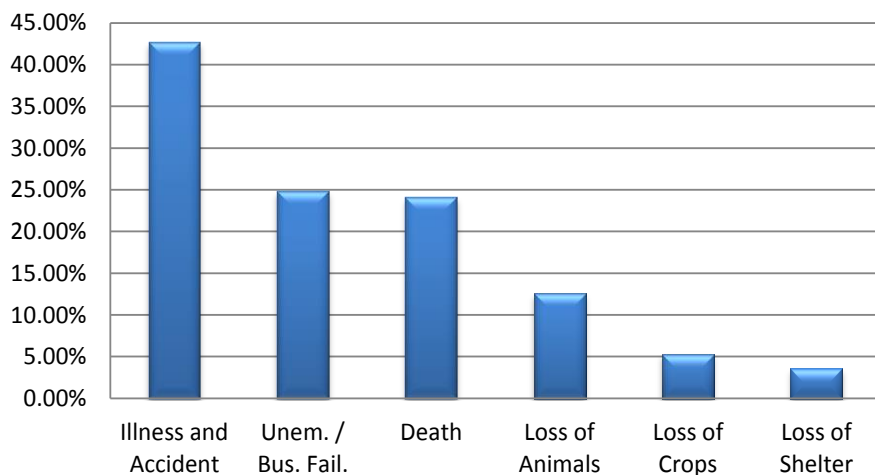
Source: Author's calculations, from Encuesta Nacional de Niveles de Vida de los Hogares, ENNViH-1 y 2 (2002 y 2005). Balanced panel, considering inflation factors.

Microinsurance

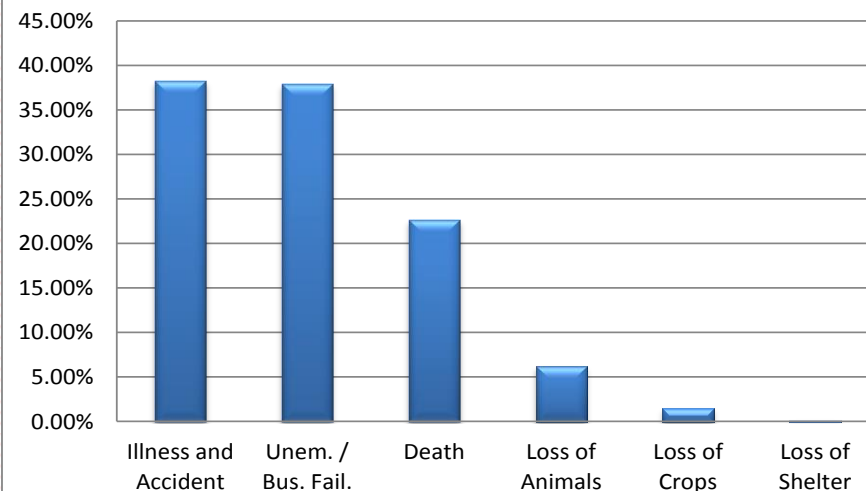
Is there an opportunity for Microinsurance development?

Types of shocks

Types of Shocks, 2002-2005: rural areas



Types of Shocks, 2002-2005: urban areas



Source: Author's calculations, from Encuesta Nacional de Niveles de Vida de los Hogares, ENNViH-1 y 2 (2002 y 2005). Balanced panel, considering inflation factors.

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Is there an opportunity for Microinsurance development?

Consumption Smoothing Model:

- The empirical analysis in this section, consists on to the estimation if Mexican households with different income levels are able to insure their consumption from economic shocks and fluctuations in their real income. The appropriate model to analyze that, is the theoretical model which is based on the consumer's optimization problem (expected utility maximization problem), Deaton (1992), Alderman y Paxson (1992), Townsend (1994), and Skoufias (2005), etc.
- The model consists in measuring the covariance between the growth rate in consumption per capita of household h in community j with the growth rate in income per capita of household h in community j.

$$(1): \quad \Delta \ln c_{hj} = \sum_j \delta_j (D_j) + \beta \Delta \ln y_{hj} + \gamma X_{hj} + \Delta \varepsilon_{hj}$$

$$(2): \quad \Delta \ln c_{hj} = \sum_j \delta_j (D_j) + \sum_k \beta_k S(k)_{hj} + \phi X_{hj} + \Delta \varepsilon_{hj}$$

$$(3): \quad \Delta \ln c_{hj} = \alpha + \tilde{\beta} \Delta \ln y_{hj} + \gamma X_{hj} + \Delta \varepsilon_{hj}$$

$$(4): \quad \Delta \ln c_{hj} = \alpha + \beta \Delta \ln y_{hj} + \gamma \Delta (\overline{\ln y_j}) + \delta X_{hj} + \Delta \varepsilon_{hj}$$

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SPECIFICATION	HYPOTHESIS
$\Delta \ln c_{hj} = \sum_j \delta_j (D_j) + \beta \Delta \ln y_{hj} + \gamma X_{hj} + \Delta \varepsilon_{hj}$	Complete risk sharing, it is equivalent to test $\beta=0$
$\Delta \ln c_{hj} = \sum_j \delta_j (D_j) + \sum_k \beta_k S(k)_{hj} + \phi X_{hj} + \Delta \varepsilon_{hj}$	As in specification (1). Under the null Hypothesis of complete risk sharing, ➤ <i>Specific shocks</i> , should not play a role in explaining the growth rate of household consumption
$\Delta \ln c_{hj} = \alpha + \tilde{\beta} \Delta \ln y_{hj} + \gamma X_{hj} + \Delta \varepsilon_{hj}$	Investigate whether: $\tilde{\beta} > \beta$ It is the equivalent to study that risk sharing and covariance risk has a significant role in explaining household consumption.
$\Delta \ln c_{hj} = \alpha + \beta \Delta \ln y_{hj} + \gamma \Delta (\overline{\ln y_j}) + \delta X_{hj} + \Delta \varepsilon_{hj}$	Evidence that the growth rate in average community income has a significant role in the growth of household consumption, ➤ That is, $\gamma \neq 0$ is consistent with the hypothesis that some risk sharing is taking place within the communities.

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Is there an opportunity for Microinsurance development?

Consumption Insurance

Basic Contribution of my research:

- Construction of a database for the analysis based on MxFLS (1 and 2)
 - Data Cleaning
 - Build data mergers
 - Construction of consumption variables: food and non-food consumption, different types of consumption
 - Construction of income variables: current income (labor (monetary) and non-labor (monetary and non-monetary income))
 - Construction of shock variables
 - Construction of dummy variables for controls (age, gender, schooling, insurance, debts, etc)
- Rural and urban areas for Mexico
- Other types of consumption
- Income levels (poor and vulnerable household)
- I linked the analysis with types of Microinsurances that could mitigate poverty in Mexico

Microinsurance

Is there an opportunity for Microinsurance development?

Consumption Insurance

- The estimations were based on a panel survey data:
 - ENNViH: The Mexican Family Life Survey (MxFLS) is a multi-thematic and longitudinal database which collects, with a single scientific tool, a wide range of information on socioeconomic indicators, demographics and health indicators on the Mexican population.
 - MxFLS is the first Mexican survey with national representation departing from a longitudinal design, tracking the Mexican population for long periods of time regardless of migration decisions with the objective of studying the dynamics of economy, demographics, epidemiology, and population migration throughout this panel study of at least, a 10-year span.
 - The base-line (MxFLS-1) was conducted during 2002. The second wave of field work (MxFLS-2) was conducted during 2005-2006 with a 90 per cent re-contacting rate at household levels. The 3rd and 4th waves of the survey are programmed for the years 2009 and 2012, respectively.
 - The design, planning and execution of MxFLS-1 and MxFLS-2 have been managed by Principal Project Researchers: Graciela Teruel (UIA), Luis Rubalcava (CIDE, Spectron Desarrollo S.C.), Duncan Thomas (Duke) and Elizabeth Frankenberg (Duke).

Microinsurance

Is there an opportunity for Microinsurance development?

- Are Mexican households with different income levels able to insure their consumption* from specific shocks and fluctuations in their real income?
- In this research the hypothesis are:

1)The household consumption insurance* shows differences to different idiosyncratic income shocks, depending on:

- Level of household income
- Area of Residence: urban or rural
- Type of consumption

2) There are Insurance differences in household consumption upon the occurrence of certain shocks, depending on:

- Level of household income
- Area of Residence: urban or rural
- Type of consumption

***Consumption Insurance:** Degree to which the growth rate of household consumption covaries with the growth rate of household income

Microinsurance

Is there an opportunity for Microinsurance development?

Initial Conditions (2002):

	TOTAL POPULATION		URBAN		RURAL	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Age of de HH	47.59	0.325	45.34	0.363	49.61	0.514
HH is man	0.81	0.008	0.80	0.016	0.83	0.012
HH is marriage	0.78	0.009	0.77	0.011	0.79	0.014
Years of Education HH	6.15	0.091	7.67	0.121	4.79	0.122
Experience HH	35.43	0.375	31.67	0.430	38.82	0.578
Urban Area	0.47	0.011				
HH speaks Spanish	0.91	0.016	0.99	0.008	0.86	0.023
HH reads Spanish	0.74	0.026	0.88	0.024	0.68	0.036
HH speaks an indogenous language	0.07	0.031	0.45	0.046	0.79	0.040
HH attended school someday	0.79	0.024	0.90	0.022	0.74	0.034
Schooling HH:						
Incomplete Elementary Education	0.42	0.011	0.27	0.012	0.551	0.016
Complete Elementary Education	0.58	0.011	0.73	0.012	0.449	0.016
Complete Middle Education	0.33	0.010	0.47	0.014	0.208	0.013
Complete High School Education	0.13	0.007	0.22	0.011	0.055	0.008
Complete Graduate Education	0.05	0.004	0.09	0.007	0.017	0.004
Complete Postgraduate Education	0.004	0.002	0.01	0.001	0.003	0.003
Household Size	4.25	0.042	4.17	0.050	4.32	0.07
Equivalent Adult	3.73	0.034	3.68	0.041	3.78	0.05
# Children under 12 years old	1.19	0.027	1.12	0.031	1.25	0.04
# Senior Citizens	0.26	0.012	0.18	0.011	0.33	0.02
Households that save:	0.15	0.01	0.23	0.01	0.08	0.01

Source: Author's calculations, from Encuesta Nacional de Niveles de Vida de los Hogares, ENNViH-1 y 2 (2002 y 2005). Balanced panel, considering inflation factors.

Microinsurance

Is there an opportunity for Microinsurance development?

Main Results: FC, N-FC

$$\Delta \ln c_{hj} = \alpha + \tilde{\beta} \Delta \ln y_{hj} + \gamma X_{hj} + \Delta \varepsilon_{hj}$$

		RURAL			URBAN		
		Coefficient: $\tilde{\beta}$	t-Statistic	R ²	Coefficient: $\tilde{\beta}$	t-Statistic	R ²
Food Consumption		0.0655	1.34	0.0491	0.1631 **	3.31	0.0739
	e.e.	0.0488			0.0493		
Non-food Consumption		0.1266 **	2.3	0.056	0.2032 **	3.45	0.0877
	e.e.	0.0551			0.0589		
Total Consumption		0.0766	1.61	0.0404	0.1594 **	3.36	0.0762
	e.e.	0.0475			0.0474		

**Significant at the 5% level; *Significant at the 10% level

Absolut value of t-statistics

Standard errors are corrected for heteroskedasticity using the Huber-White method

$$\Delta \ln c_{hj} = \alpha + \beta \Delta \ln y_{hj} + \gamma \Delta (\ln y_j) + \delta X_{hj} + \Delta \varepsilon_{hj}$$

		RURAL				URBAN			
		Coefficient β	t-Statistic	Coefficient γ	t-Statistic	Coefficient β	t-Statistic	Coefficient γ	t-Statistic
Food Consumption		0.0683	1.41	-0.0505	1.34	0.1635 ***	3.3	-0.0339	0.61
		0.0486		0.0378		0.0495		0.0561	
	e.e.	0.0534				0.0749			
Non-food Consumption		0.1256 **	2.27	0.0139	0.28	0.2047 ***	3.48	-0.1042	1.38
		0.0553		0.0492		0.0588		0.0754	
	e.e.	0.0562				0.0946			
Total Consumption		0.0787 *	1.66	-0.0344	1.04	0.1600 ***	3.37	-0.0370	0.69
		0.0474		0.0332		0.0474		0.0538	
	e.e.	0.0430				0.0780			

**Significant at the 1% level; *Significant at the 5% level; *Significant at the 10% level

Absolut value of t-statistics

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Microinsurance

Is there an opportunity for Microinsurance development?

Main Results: FC, N-FC

$$\Delta \ln c_{hj} = \sum_j \delta_j (D_j) + \sum_k \beta_k S(k)_{hj} + \phi X_{hj} + \Delta \varepsilon_{hj}$$

LEAST SQUARES DETERMINANTS OF CHANGE IN FOOD, NON-FOOD, TOTAL CONSUMPTION PER CAPITA

Tipo de Shock	Food Consumption		Non-food Consumption		Total Consumption	
	Coefficient β	t-Statistic	Coefficient β	t-Statistic	Coefficient β	t-Statistic
Death	-0.01808	0.23	-0.2357 **	2.57	-0.1186 *	1.73
Illness Accident	-0.09628	1.18	0.1100	1.22	-0.0789	1.09
Unemployment Business Failure	-0.03004	0.32	-0.1924 **	2.26	-0.0560	0.66
Loss of shelter	-0.26490 ***	2.77	-0.2495 ***	3	-0.2084 ***	2.66
Loss of crops	-0.06766	0.38	-0.1575 **	2.1	-0.1012	0.89
Loss of animals	-0.00212	0.72	-0.1329	0.9	-0.1043	0.82
R²	0.0848		0.1078		0.087	

Rural

FC	NFC
Loss of shelter (-0.29752)**	Death (-0.2722)**
Loss of Animals (-0.15171)*	Loss of shelter (-0.2412)**
	Total Loss of Crops (-0.1980)**

Urban

CC	CNC
Death (-0.14273)*	Unemployment or Business Failure (-0.1994)**

So, I conclude that there are different insurance needs depending on the area of residence.



Microinsurance

Is there an opportunity for Microinsurance development?

Main Results: TC

$$\Delta \ln c_{hj} = \alpha + \beta \Delta \ln y_{hj} + \gamma \Delta (\overline{\ln y_j}) + \delta X_{hj} + \Delta \varepsilon_{hj}$$

Type of Consumption	RURAL		URBAN	
	Coefficient β	t-Statistic	Coefficient β	t-Statistic
Basic Food Consumption	0.1046 **	2.33	0.1013 **	2.40
e.e.	0.0449		0.0422	
R ²	0.0557		0.0618	
Non-Basic-Food Consumption	0.0169	0.35	0.1656 **	3.52
e.e.	0.0487		0.0471	
R ²	0.0475		0.0685	
Personal and Household Products	0.1483 **	3.10	0.1641 **	3.22
e.e.	0.0479		0.0510	
R ²	0.0341		0.0673	
Clothing	0.1117 *	1.90	-0.0031	0.05
e.e.	0.0589		0.0570	
R ²	0.0347		0.0808	
Health Care	0.6398	1.09	0.3877	0.92
e.e.	0.5881		0.4214	
R ²	0.0098		0.0521	
Furniture & Electronics	0.2330 **	3.65	0.0890	1.57
e.e.	0.0639		0.0568	
R ²	0.1239		0.1199	
Education Expenses	1.4252 **	2.37	0.9960	1.32
e.e.	0.6006		0.7535	
R ²	0.0412		0.0707	
Total Consumption	0.0974 **	2.01	0.1735 **	3.58
e.e.	0.0486		0.0485	
R ²	0.0348		0.0726	

**Significativo a un nivel del 5%; *Significativo a un nivel del 10%

Se muestra valor absoluto del estadístico t

Errores Estándar Robustos usando el Método Huber-White

Microinsurance

Is there an opportunity for Microinsurance development?

Main Results: By level of income

$$\Delta \ln c_{hj} = \alpha + \beta \Delta \ln y_{hj} + \gamma \Delta (\overline{\ln y_j}) + \delta X_{hj} + \Delta \varepsilon_{hj}$$

		Poor Population				Vulnerable Population			
		Coefficient β	t-Statistic	Coefficient γ	t-Statistic	Coefficient β	t-Statistic	Coefficient γ	t-Statistic
Food Consumption		0.0003	0	-0.0624	1.23	0.1305 **	2.49	-0.0724 *	1.8
	e.e.	0.0758		0.0508		0.0524		0.0403	
	R ²				0.0728				0.0695
Non-food Consumption		0.0968	1.26	-0.0750	1.49	0.2016 **	2.82	-0.0530	0.91
	e.e.	0.0766		0.0504		0.0714		0.0582	
	R ²				0.0398				0.0681

**Significant at the 5% level; *Significant at the 10% level

Absolut value of t-statistics

Standard errors are corrected for heteroskedasticity using the Huber-White method

Microinsurance

Is there an opportunity for Microinsurance development?

Main Results: By level of Income : Types of Consumption

$$\Delta \ln c_{hj} = \alpha + \beta \Delta \ln y_{hj} + \gamma \Delta (\overline{\ln y_j}) + \delta X_{hj} + \Delta \varepsilon_{hj}$$

	Poor Population				Vulnerable Population			
	Coefficient β	t-Statistic	Coefficient γ	t-Statistic	Coefficient β	t-Statistic	Coefficient γ	t-Statistic
Basic Food Consumption	0.1255 *	1.83	-0.0049	0.13	0.0854 *	1.68	0.0017	0.05
e.e.	0.0688		0.0379		0.0508		0.0368	
R ²				0.0334				0.0844
Non-Basic-Food Consumption	-0.0056	0.08	-0.0041	0.09	0.0959 *	1.88	0.0063	0.2
e.e.	0.0719		0.0471		0.0510		0.0313	
R ²				0.0465				0.0663
Personal and Household Products	0.0446	0.63	-0.0032	0.1	0.2191 **	3.7	-0.0484	1.27
e.e.	0.0707		0.0333		0.0593		0.0382	
R ²				0.0334				0.0692
Clothing	-0.0795	1.4	-0.0306	0.91	0.1413 *	1.87	-0.0359	0.8
e.e.	0.0567		0.0338		0.0756		0.0446	
R ²				0.0881				0.0466
Health Care	-0.1401	0.37	-0.0051	0.04	1.2218 **	1.99	-0.1833	0.65
e.e.	0.3821		0.1253		0.6143		0.2804	
R ²				0.0838				0.0180
Furniture & Electronics	0.1870 **	2.42	0.0179	0.76	0.2096 **	2.32	-0.0291	0.74
e.e.	0.0773		0.0236		0.0904		0.0391	
R ²				0.0983				0.0935
Education Expenses	0.0205	0.23	-0.0366	0.87	0.1028	1.42	0.0318	0.66
e.e.	0.0878		0.0421		0.0723		0.0483	
R ²				0.0845				0.2083

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Microinsurance

Is there an opportunity for Microinsurance development?

In general, **vulnerable households** have different insurance needs **from poor households** when income shocks are analyzed.

In summary: specific shocks to which households (classified by income) are not insured are:

Poor Households	Vulnerable Households
Death	Accident or Illness that requires hospitalization
Accident or Illness that requires hospitalization	Unemployment or Business Failure
Loss of animals	Loss of Shelter
Loss of shelter	Loss of Crops

Outline

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4. Conclusions

Microinsurance

Conclusions

- The consumption of vulnerable households is not well insured, it means that social assistance programs are not enough for these households. Therefore they need another kind of protection. In conclusion, there's an important opportunity for Microinsurance development in Mexico.
- The insurance needs are different between rural and urban households.
- The insurance needs are different between households with different income level.
- There is not any literature that addresses the question of how Microinsurance could be used as a tool to fight against poverty through a technical and formal analysis.

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Main Results: FC, N-FC $\Delta \ln c_{hj} = \sum_j \delta_j (D_j) + \sum_k \beta_k S(k)_{hj} + \phi X_{hj} + \Delta \varepsilon_{hj}$

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Unemployment Business Failure	-0.03004	0.32	-0.1924 **	2.26	-0.0560	0.66
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Loss of crops	-0.06766	0.38	-0.1575 **	2.1	-0.1012	0.89
Loss of animals	-0.00212	0.72	-0.1329	0.9	-0.1043	0.82
R²	0.0848		0.1078		0.087	

RURAL

Tipo de Shock	Food Consumption		Non-food Consumption		Total Consumption	
	Coefficient β	t-Statistic	Coefficient β	t-Statistic	Coefficient β	t-Statistic
Death	-0.00104	0.01	-0.2722 **	3.02	-0.1203	1.45
Illness Accident	-0.14563	1.49	0.1607	1.52	-0.1009	1.13
Unemployment Business Failure	-0.05067	0.4	-0.1559	1.38	-0.0758	0.66
Loss of shelter	-0.29752 **	3.07	-0.2412 **	2.7	-0.2234 **	2.77
Loss of crops	-0.02291	0.11	-0.1980 **	2.07	-0.0802	0.63
Loss of animals	-0.15171 *	1.67	-0.1680	0.88	-0.2221 *	1.77
R²	0.1113		0.1347		0.1085	

URBAN

Tipo de Shock	Food Consumption		Non-food Consumption		Total Consumption	
	Coefficient β	t-Statistic	Coefficient β	t-Statistic	Coefficient β	t-Statistic
Death	-0.14273 *	1.79	-0.1979	0.88	-0.1480	1.44
Illness Accident	0.22616 *	1.83	-0.0529	0.39	-0.0218	0.29
Unemployment Business Failure	-0.09385	1.49	-0.1994 **	1.98	-0.0503	0.74
Loss of shelter						
Loss of crops	-0.16952	1.04	0.2124 *	1.87	-0.0256	0.16
Loss of animals	0.02168	0.1	-0.0009	1.34	-0.0441	0.19
R²	0.0691		0.0741		0.0766	

***Significant at the 1% level; **Significant at the 5% level; *Significant at the 10% level

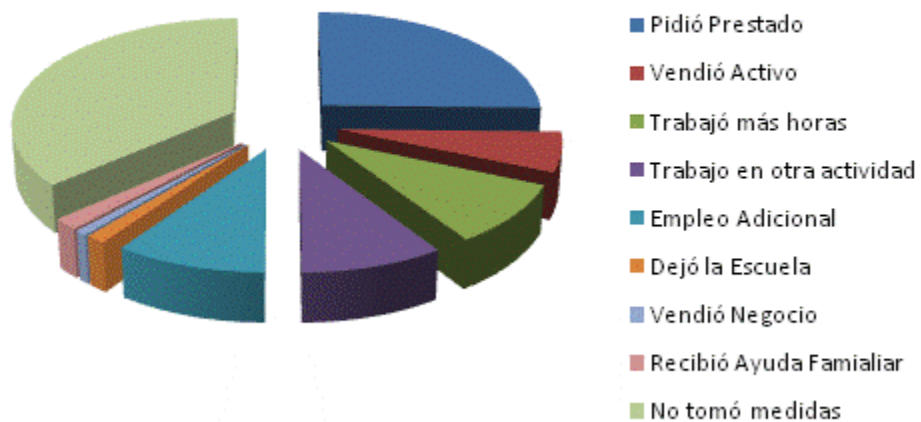
Absolut value of t-statistics

Standard errors are corrected for heteroskedasticity using the Huber-White method



Instituto Tecnológico Autónomo de México

Formas de Enfrentar Choques: 2002



Formas de Enfrentar Choques: 2005

