

Liquidity Profiles of Poor Mexican Households:

The Role of Economic Shocks and Banking

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Buffer stock savings theories predict that more vulnerable households build up liquid savings in order to cope with income variability but the extent to which this holds in developing countries with limited financial tools is not well understood. Using data from 1801 marginalized Mexican households, this paper examines how household liquidity levels vary by income level and use of banking. The paper finds strong evidence of buffer stock savings in lower income groups. It also shows that membership in a financial cooperative is a positive and significant determinant of higher household liquidity levels and a buffer against idiosyncratic shocks. Households use different coping mechanisms depending on the type of economic shock encountered, with financial instruments being used more to confront idiosyncratic shocks than for systemic shocks. Idiosyncratic shocks and remittances are important determinants of liquidity levels in unbanked households.

JEL: C1, G14, O16, Q14

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I. Introduction

The desire to understand and explain the complexities of how the world's poor save has generated a huge volume of literature and yet, no consensus exists within the literature on how theoretical savings models pertain to the poor. Many empirical studies, particularly in developed countries, have shown savings to be a luxury good given that the poor save a smaller (or negative) portion of their incomes than do higher income households (Modigliani, 1986; Hubbard, Skinner, and Zeldes, 1994). However, many household studies using developing country data do find evidence of savings among the poorest of the poor. In fact, research is increasingly showing that lower incomes require more financial intermediation, albeit on a micro-level (Collins, et al. 2009; Rutherford, 2000; Morduch, 1994, 1995). Given uncertainty and the lack of financial options, economic theory would suggest the importance of liquid savings in the poorest households.

Research on precautionary savings has become increasingly prevalent in the savings literature as a way of explaining the savings patterns of the poor. The combination of income volatility and borrowing constraints make it necessary for the poor to build up savings in the form of liquid and semi-liquid assets as a buffer stock against income shocks (Deaton, 1992). Empirical evidence of this type of precautionary savings in developing countries has been mixed, in part due to varying measures and definitions as well as a lack of reliable household data. Many of the macroeconomic time-series studies on savings lack sufficient detail to accurately model household saving behavior in developing countries. In particular, the large component of informal savings and nonfinancial savings is absent in country level statistics. Household surveys, particularly in developing countries, are needed to provide the richness of detail on savings behavior that is lacking in aggregate statistics.

This paper contributes to the burgeoning literature on savings by the poor in several ways. It utilizes an exhaustive 2004 household survey of 1801¹ marginalized Mexican households that has a unique depth and breadth of detail. Using a flexible definition of savings (Paxton, 2009), liquid assets are a composite measure of informal and formal savings instruments that not only includes cash, but other liquid stores of value including small farm animals and stored grain. The paper contributes to our understanding of the savings behavior of poor households by posing several pertinent questions. Is there evidence of buffer-stock savings in the form of

higher household liquidity levels among poor households? Do bank members have different liquidity profiles than non-bank members? Do certain types of economic shocks affect household liquidity more than others for bank and non-bank members?

The answer to each of these questions is a resounding “yes”. The paper finds strong evidence of buffer stock savings in lower income groups. It also shows that membership in a financial cooperative is a significant determinant of household liquidity levels and that these liquidity levels are more influenced by idiosyncratic shocks and remittances in non-banked households. A literature review is offered in Section II followed by an overview of the data in Section III. The liquidity model and its results are presented in Sections IV and V with the conclusion in Section VI.

II. Literature Review

Precautionary savings models predict that poor and young households with uncertainty and a high rate of time preference will have a motive for creating a buffer stock of savings to be used to smooth consumption (Deaton, 1992; Banerjee and Duflo, 2007). Risk augmented life cycle models and precautionary savings models may predict increased levels of savings to offset income variability. Numerous empirical studies show a significant link between uncertainty and precautionary savings (Paxson, 1992; Carroll and Samwick, 1998). Gourinchas and Parker (2002) find evidence of buffer stock savings among the younger consumers. In Mexico, Attanasio and Székely (2001) find that poorer households are much less able to smooth consumption through liquidating savings than richer households.

Insights from behavioral economics highlight inconsistencies in our saving behavior as people fail to save with perfect foresight and rationality. Self-discipline problems associated with hyperbolic discounting affect the usage of financial instruments (Thaler and Sunstein, 2008). Disaggregating savings by liquidity is a burgeoning and provocative area of research that has raised as many questions as it has answered. The “debt puzzle” line of research examines the coexistence of high credit card debt in the United States despite accumulated liquid and illiquid savings (Gross and Souleles, 2002; Angeletos, et. al. 2001). Laibson, Repetto, and Tobacman (2003) introduce hyperbolic discount functions to the Life Cycle Hypothesis to explore the effects of illiquid assets or “golden eggs” on savings. They hypothesize that accumulating illiquid assets may be a commitment savings strategy in the face of hyperbolic discounting. Little is understood about how access to financial instruments changes the liquidity portfolio of the household.

Access to formal financial intermediation may increase the range and depth of financial tools available to poor households and therefore alter the household liquidity mix. Morduch (1994)

emphasizes the problem of weak financial institutions and inefficient markets for credit and insurance in developing economies. He points out that when households in developing economies have access to financial institutions, they often face borrowing constraints when times are bad but not when times are good. Additionally, formal and informal credit may be much harder to access during times of systemic economic distress (for example, during times of drought, natural disaster, falling commodity prices, etc.) due to covariant risk. Srinivasan (1993) proposes that inadequate credit and insurance markets reinforce the precautionary motive for saving. In other words, households that believe they will be unable to access future credit will instead accumulate assets to be liquidated in times of need.

Likewise, households that have access to deposit services in financial institutions benefit from a secure means to accumulate financial savings that are easily liquidated in times of need. Indeed, such deposit services allow households to handle emergency needs, smooth consumption, accumulate large amounts of cash for anticipated needs, and take advantage of investment opportunities (Consultative Group to Assist the Poorest, 2005). Collins, et. al. (2009) argue that financial management tools (savings, credit, and insurance) are critical among the poorest households and that well functioning financial services are key to consumption smoothing and investment opportunities. Ashraf, Karlan, and Yin (2006) found evidence that hyperbolic savers with private incentives to undersave were more likely to adopt commitment microsavings products in the Philippines using a randomized control methodology.

This study will build on the existing literature by providing empirical results from Mexico of savings behavior in response to specific economic shocks. A carefully constructed household liquidity measure based on both financial savings and savings in kind reflects a comprehensive snapshot of household liquidity. The richness of detail provides a window to view differences in financial behavior of households by income level and by membership in financial cooperatives.

III. Data

In 2003, the Mexican Secretary of Agriculture, Livestock, Rural Development, Fisheries, and Food (SAGARPA) and the National Bank of Savings and Financial Services (BANSEFI) initiated a collaborative project named the Project of Technical Assistance for Rural Microfinance (PATMIR). The project targeted several Mexican states identified as having high levels of marginalization and aimed to expand outreach and achieve sustainability of financial institutions in those areas. The project targeted financial cooperatives as the vehicle for achieving greater outreach and sustainability in selected marginalized areas (Paxton, 2007). In an effort to gather more detailed information about the financial behavior of cooperative member households as well as households that choose not to access financial services from these institutions, the collaboration funded a household survey of 865 member households and 861 unbanked households. For each member household included in the survey, a non-member household was also selected that was located in the same area and, by outward physical characteristics of the home, indicated similar socio-economic status as the member household.

There are obvious reasons why cooperative members may be different from unbanked households. The most financially savvy, educated, and entrepreneurial community members may use formal finance more readily. Although many cooperatives do not have minimum balance and literacy requirements to become savers (more stringent requirements exist for lending), many poorer households may self-select out of the cooperative. When asked why they did not open a savings account in the cooperative, 89 percent of the unbanked households responded that they did not have enough money to open a savings account.

As Table 1 shows, the unbanked households cannot be considered a control group, but they still offer an interesting contrast to cooperative member households. The household heads of the cooperative member group are more likely to be male, married, employed, and to speak an indigenous language than the household heads of the unbanked group. Their income and education levels are higher than the unbanked group. With regards to average age of the household head, average number of household members, average number of children, and average number of elderly, the two groups are similar.

Table 1: Characteristics of Cooperative Members and Unbanked Households

	Cooperative Members	Unbanked
Location of household (% urban)	32%	34%
Gender of household head (% male)	85%	76%
Civil status of household head (% married)	84%	74%
Employment status of household head (% in labor force)	89%	82%
Indigenous language of household head (% that speaks an indigenous language)	36%	31%
Average annual household income (2004 pesos ²)	62,992	32,342
Average age of household head	47.58	46.96
Average education of household head (years in school)	9.36	6.97
Average number of household members	4.66	4.36
Average number of children in household	1.44	1.58
Average number of working age adults	3.01	2.50
Average number of elderly in household	0.21	0.28

In order to facilitate the analysis of household savings portfolios (total household savings), four savings categories were created. The first category is *financial savings* and includes money in savings accounts as well as cash saved informally in the home, with money-holders, etc. The second category is *liquid assets* and includes physical assets that are easily liquidated, including stored grain and small farm animals such as chickens, turkeys, pigs, goats, and rabbits. The third category is *quasi-liquid assets* and includes physical assets that are not as easily liquidated, including household appliances, vehicles, farm equipment and tools, and larger farm animals such as cattle, horses, and sheep. The fourth category is *illiquid assets* and includes physical assets that are difficult to liquidate, including houses, agricultural lands, and other large properties. The savings portfolio (total household savings) of any household, then, is the sum of *financial savings*, *liquid assets*, *quasi-liquid assets*, and *illiquid assets*.

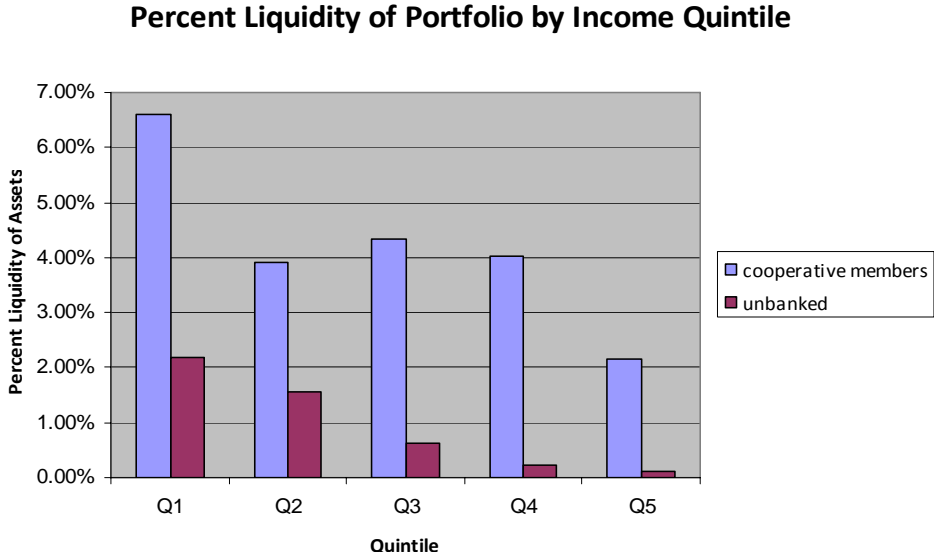
Table 2 shows the household liquidity profile of banked and unbanked households by income quintile. Supporting buffer stock theory, the lowest quintile has the smallest percentage of the savings portfolio in illiquid assets (68.68% and 80.46% respectively) and the highest quintile has the largest percentage in illiquid assets (86.65% and 96.41% respectively). Within every income quintile, unbanked households are more likely to have a greater percentage of their savings portfolios in illiquid assets. This tendency is most extreme for the unbanked households in the highest quintile, holding more than 96% of the savings portfolio in illiquid assets. Quasi-liquid assets are a notable savings strategy in low income households. One might expect that unbanked households would compensate for their lack of financial liquidity with other types of liquid and quasi-liquid assets. However, within every income quintile, cooperative member households are more likely to have a greater percentage of their savings portfolios in quasi-liquid assets. Thus, the unbanked appear to be quite vulnerable to shocks. The analysis underscores the possibility of multiple underlying savings strategies with more risk averse households trending towards the utilization of formal finance and diversification. Household liquidity analysis sheds light on the determinants of household portfolio choices.

Table 2: Household Liquidity Allocation by Income Quintile

	Income Quintile	formal fin. savings	informal fin. savings	liquid assets	quasi-liquid assets	illiquid assets
cooperative	Q1	5.13%	0.20%	1.28%	24.71%	68.68%
	Q2	2.77%	0.12%	1.02%	11.30%	84.78%
	Q3	3.58%	0.35%	0.43%	13.89%	81.77%
	Q4	3.72%	0.11%	0.20%	9.08%	86.90%
	Q5	1.91%	0.05%	0.18%	11.21%	86.65%
unbanked	Q1	0.00%	0.32%	1.85%	17.37%	80.46%
	Q2	0.00%	0.65%	0.89%	9.02%	89.44%
	Q3	0.00%	0.16%	0.47%	7.86%	91.52%
	Q4	0.00%	0.06%	0.17%	6.48%	93.28%
	Q5	0.00%	0.02%	0.08%	3.49%	96.41%

For this paper, liquidity of the savings portfolio is the ratio of liquid savings (the sum of formal and informal financial savings and liquid assets) to total savings. According to precautionary savings and buffer-stock theory, it is expected that the poorer households (and, therefore, the most vulnerable to income and consumption variability) have more liquid savings portfolios than the higher income households. As Figure 1 illustrates, lower income households have more liquid savings portfolios, and a trend toward less liquidity with higher income exists for both the banked and unbanked groups. In addition, cooperative member households have a significantly more liquid savings portfolio than the unbanked group. The higher liquidity may be a function of two main influences: access to secure savings accounts and a predisposition towards cautious financial management that led them to create buffer stocks, diversify assets, and become cooperative members in the first place.

Figure 1: Percent Liquidity of Savings Portfolios by Cooperative Member and Unbanked Households and by Income Quintile



Vulnerability to economic shocks is a key component of precautionary savings behavior. Among the full sample (1724 households), 863 households experienced no shock, 299 households reported at least one idiosyncratic shock, 719 households had at least one systemic shock, and 157 had both idiosyncratic and systemic shocks within the last year. For the purpose of this study, the eight types of shocks mentioned in the household survey were grouped into two categories: idiosyncratic shock and systemic shock. The idiosyncratic shock category includes events that have impact primarily within the household (death of a household

member, illness of a household member, loss of employment, and equipment failure). The systemic shock category includes events that have impact at the community, regional, or national level (natural disaster, lack of work opportunities, reduction of commodity prices, and reduced sales of products sold by the household). The shocks were categorized in this manner because the preliminary analysis indicates that households generally have a different response pattern to idiosyncratic shocks (utilizing savings, obtaining credit, and seeking support from family and friends) as to systemic shocks (working more hours, reallocating the household labor supply, or taking no action). Table 3 highlights how savings and credit are used more readily among cooperative members to confront idiosyncratic shocks.

Table 3: Household Responses to Different Types of Economic Shocks, by Cooperative Member and Unbanked Households

PROBLEM	GROUP	loan	savings	sold assets	spend less	nothing	work more	family /friends	other
IDIOSYNCRATIC SHOCKS									
death	coop. member	30%	22%	11%	0%	15%	4%	15%	4%
	unbanked	14%	10%	7%	7%	14%	0%	38%	10%
illness	coop. member	45%	14%	5%	0%	15%	2%	6%	12%
	unbanked	39%	11%	2%	0%	14%	2%	14%	19%
equip. problems	coop. member	27%	48%	0%	6%	6%	0%	0%	12%
	unbanked	13%	50%	13%	0%	13%	0%	0%	13%
loss of work	coop. member	0%	6%	0%	9%	21%	55%	0%	9%
	unbanked	7%	5%	0%	20%	14%	52%	0%	2%
SYSTEMIC SHOCKS									
low sales	coop. member	3%	3%	1%	11%	66%	4%	1%	10%
	unbanked	5%	3%	1%	7%	63%	6%	4%	13%
lack of work	coop. member	4%	2%	1%	8%	50%	32%	2%	1%
	unbanked	7%	2%	0%	9%	49%	32%	1%	1%
natural disaster	coop. member	4%	7%	0%	4%	70%	2%	4%	9%
	unbanked	0%	0%	0%	7%	64%	18%	7%	4%
low prices	coop. member	2%	4%	2%	4%	71%	5%	0%	13%
	unbanked	4%	0%	0%	8%	65%	4%	0%	19%

It is interesting to note that cooperative member households are much more likely to report experiencing shocks than unbanked households. Cooperative member households were 45% more likely to report illness of a family member, 64% more likely to report suffering from natural disaster, 111% more likely to report suffering from falling prices, 87% more likely to report suffering from falling sales, and 313% more likely to report suffering from equipment failure. On the other hand, unbanked households were 65% more likely to report suffering from lack of work opportunities and 33% more likely to report suffering from loss of employment.

One possible explanation for this pattern is that treatment households simply have a lower threshold for conceptualizing shock. Another possible explanation is that households that are more exposed to risk actively seek out the services of financial institutions for that very reason. Or, perhaps 2004 was simply a bad year for the cooperative member households.

There seem to be a number of opposing forces at work with regard to the experience of shock, income, and savings. It may be that systemic shocks are difficult to plan for because the impact can be felt for an extended period of time and can become gradually more severe over time. Systemic shocks could cause a medium or long term downward adjustment in terms of the welfare of the household. Perhaps because of these characteristics of systemic shocks, households were more likely to report working more hours, reallocating the household labor supply, or taking no action in response. As a result of one or more systemic shocks, a household may experience a reduction in income and may gradually spend down savings as a coping mechanism. However, as a result of the experience of systemic shock, households may also wish to increase the target wealth stock (Carroll, 1992) of the household, thereby building a larger buffer-stock of savings in order to smooth future consumption. It is understandable then, that the households that reported experiencing systemic shock in this sample reported lower than average household incomes but roughly the same level of total savings as the full sample.

The average liquidity of the savings portfolio for the group experiencing systemic shock (5.24%) is lower than the full sample (5.81%) and lower than households reporting no shock (6.38%). These findings suggest that the households experiencing systemic shock have utilized their liquid savings as a coping strategy. In response to systemic shock, it could be that the tendency to spend down savings to smooth consumption dominates the tendency to build up savings to lessen the future vulnerability of the household.

Idiosyncratic shocks, on the other hand, tend to be felt suddenly. If, for example, an important piece of farm equipment fails, it may be a medium or large expenditure to replace or fix it, but the household could recover relatively quickly. Perhaps because of the short-term nature of idiosyncratic shocks, households were more likely to respond by obtaining loans, utilizing savings, or seeking out support from friends or family members. As a result of idiosyncratic shock, the household's income may not be negatively affected (unless the shock involves loss of employment), but some savings may be liquidated as a coping mechanism. After the household has recovered, however, it may likely work to build up the buffer-stock again to reach the target wealth stock. The households that reported experiencing idiosyncratic shock in this sample reported higher than average household incomes and significantly higher than average total savings in relation to the comparison groups. In addition, the average liquidity of the savings portfolio for the group experiencing systemic shock (4.95%) is lower than the full sample (5.81%) and lower than households reporting no shock (6.38%). These findings suggest that the households experiencing idiosyncratic shock have utilized their liquid savings as a coping strategy. In response to idiosyncratic shock, it seems that the tendency to spend down savings to smooth consumption dominates the tendency to build up savings to lessen the future vulnerability of the household.

The households in the sample that reported not experiencing any type of shock in the previous year had a slightly higher average household income but the lowest average total savings in relation to the comparison groups. It is possible that their incomes tend to be higher than average due to recent insulation from economic shock. Likewise, because of this perceived insulation from shock, the target wealth stock of the households may be much smaller corresponding to lower total savings in relation to comparison groups. This group reporting no shock also has the most liquid savings portfolios in relation to the comparison groups. These findings suggest that recent insulation from economic shock has allowed these households to leave the precautionary stock of liquid savings untouched.

IV. Empirical Model of Household Savings Portfolio Liquidity

Preliminary analysis shows clear signs of differing liquidity profiles by income level and by use of banking. In order to test for the statistical significance of these relationships, the following empirical model was adapted using the framework developed by Paxton (2009) on subsistence savings strategies. This model builds on the empirical formulation in two important ways. Firstly, the model uses liquid assets as a percentage of total assets as the dependent variable. Secondly, the model incorporates the two types of economic shock variables into the analysis to test whether idiosyncratic or systemic shocks are important determinants of household liquidity. Following Paxton (2009), the explanatory variables have been grouped into household income and financial variables, demographic variables, and risk variables³.

$$\text{LQD} = f [\alpha_0 + \alpha_1 \ln(Y) + \alpha_2 \ln(W) + \alpha_3 \ln(\text{REM}) + \alpha_4 \ln(\text{CRD}) + \alpha_5 (\text{MEM}) + \alpha_6 (\text{AGE}) + \alpha_7 (\text{AGESQ}) + \alpha_8 (\text{MAR}) + \alpha_9 (\text{GEN}) + \alpha_{10} (\text{ED}) + \alpha_{11} (\text{URB}) + \alpha_{12} (\text{FAM}) + \alpha_{13} (\text{DIV}) + \alpha_{14} (\text{IDISHK}) + \alpha_{15} (\text{SYSHK})] \quad (1)$$

Household income and financial variables:

- **Y** is the natural log of total household income (not including any remittances received), measured in 2004 Mexican pesos. It is expected that the coefficient sign of the **Y** variable be negative, indicating lesser liquidity for higher income households and greater liquidity for poorer households. Poorer households are expected to need more liquid savings in order to cope with economic shocks since they are more vulnerable to income and consumption variability.
- **W** is the natural log of total household wealth (the sum of financial savings and all assets), measured in 2004 Mexican pesos. The coefficient sign of the **W** variable is expected to be negative. Households with smaller accumulated savings would be expected to have a larger percentage of liquid savings since they would tend to build up a buffer stock of relatively liquid savings in good times to be used in bad times.
- **REM** is the natural log of total remittances received within the previous 12 months, measured in 2004 Mexican pesos. In this sample, only 5% of households reported receiving remittances, but for those households, remittances constituted 29% of total

household income on average. Paxton (2009) found that receipt of remittances was positively associated with the quantity of liquid savings in a Mexican sample, and especially so for households headed by females. Likewise, it is expected that households receiving remittances in this sample will use remittances to build up precautionary savings, and, therefore the coefficient sign of **REM** is expected to be positive.

- **CRD** is the natural log of total credit (formal and informal) obtained by the household within the previous 12 months, measured in 2004 Mexican pesos. The coefficient of the credit variable is difficult to predict because credit can be used for lifecycle needs, emergencies, and investments. If the credit obtained by a household is primarily used for emergency needs, the household may likely obtain the credit because savings are insufficient (suggesting a negative relationship). If the credit obtained by the household is primarily used for productive investments, the household may likely have more substantial savings but may wish to keep those savings for lifecycle needs and/or emergencies (suggesting a positive relationship). The sign of the coefficient may depend, therefore, on the primary use of the credit.
- **MEM** is whether or not the household has membership with a financial cooperative (0=non-member, 1=member). The coefficient sign of **MEM** is expected to be positive. As illustrated in Figure 1, households that are members of cooperatives have more liquid savings due to the ability to securely deposit cash in savings accounts and the possible selection bias of more financially dynamic households into cooperative membership.

Demographic variables:

- **AGE** is the age of the household head and **AGESQ** is the squared age of the household head. In theory, households would build savings through the middle years and would dissave in later years, therefore the sign could be either positive or negative.
- **MAR** is the marital status of the household head (0=not married, 1=married) and **GEN** is the gender of the household head (0=female, 1=male). The coefficient signs of **MAR** and **GEN** are expected to be negative. Relatively more stable male household heads and married household heads would be expected to have less liquidity of total savings while relatively more vulnerable female household heads and unmarried household heads would be expected to have more liquidity of total savings.
- **ED** is the number of years of education obtained by the household head. The coefficient sign of **ED** is difficult to predict. Higher levels of education have been associated with higher levels of total savings, but the relationship between education and liquidity of the savings portfolio is not as well understood. An assumption is that lower levels of education would be associated with greater risk exposure, and therefore greater liquidity of the savings portfolio.
- **URB** is the location of the household (0=rural, 1=urban). It is expected that the coefficient sign of **URB** be negative. As such, rural households that face relatively more risk are expected to have more liquid savings portfolios and urban households that have more opportunity and face relatively less risk are expected to have less liquid savings portfolios.

- **FAM** is the total number of household members. It is difficult to forecast the coefficient sign of **FAM**. Larger households with more dependents might have more liquid savings portfolios because a larger buffer-stock of savings would be needed to smooth consumption in times of need. On the other hand, larger households with more dependents might also have less liquid savings portfolios because of the difficulty of saving while supporting numerous dependents with immediate needs.

Risk variables:

- **DIV** is the diversification of household income (dividing the number of different principal employment activities of working household members by the number of working household members) ⁴. It is expected that the coefficient sign of **DIV** be negative. In other words, households with good income diversification would not require highly liquid savings portfolios. On the other hand, households with poor income diversification would rely more on buffer-stock precautionary savings because of their relatively greater risk exposure.
- **IDISHK** is the number of idiosyncratic shocks and **SYSHK** is the number of systemic shocks experienced by the household within the previous 12 months. An idiosyncratic shock is considered to be a shock that only affects that household (illness, death, job loss, equipment failure, etc.) while a systemic shock affects the entire community (rainfall, low agricultural prices, natural disaster, recession, etc.). Based on preliminary analysis, households that experience either type of shock are likely to use precautionary savings as a means to smooth consumption in the aftermath of the shock. The coefficient sign for both shock variables, then, is expected to be negative.

IV. Empirical Results

Regression analysis was run for the total sample, the cooperative households, and the unbanked households. The results of the CUSUMSQ and Rainbow tests led to an acceptance of the null hypothesis and the conclusion that the model is correctly specified. Empirical results after correcting for heteroskedasticity are presented in Table 4.

Table 4: Determinants of Savings Portfolio Liquidity

Variable		Full Sample (n=1706)	Cooperative Members (n=859)	Unbanked (n=847)
MEM cooperative membership	Coefficient t-Statistic	0.23309E-01 11.549***		
Y In household income	Coefficient t-Statistic	-0.99753E-03 -1.3138	0.76450E-03 0.51753	-0.92187E-03 -2.5538**
W In household wealth	Coefficient t-Statistic	-0.56447E-02 -7.1062***	-0.19788E-01 -8.2208***	-0.16132E-02 -4.3208***
REM In remittances	Coefficient t-Statistic	0.33308E-03 1.6133	0.91526E-03 0.86135	0.21700E-03 3.4445***
CRD In credit	Coefficient t-Statistic	0.31525E-03 2.1268**	0.11402E-02 2.4830**	0.28083E-04 0.48415
AGE	Coefficient t-Statistic	0.12881E-03 0.58632	-0.86925E-03 -0.78333	-0.14515E-03 -1.6030
AGESQ age squared	Coefficient t-Statistic	-0.13471E-05 -0.65498	0.83573E-05 0.82299	0.12341E-05 1.4195
MAR civil status	Coefficient t-Statistic	-0.23296E-03 -0.10347	0.10029E-01 0.91590	-0.23458E-03 -0.40166
GEN gender	Coefficient t-Statistic	-0.11369E-03 -0.46825E-01	-0.19680E-01 -1.5343	0.16216E-03 0.26817
ED education	Coefficient t-Statistic	-0.56521E-04 -0.45542	0.91305E-03 2.2258**	-0.91126E-04 -2.0492**
URB location	Coefficient t-Statistic	-0.23997E-02 -2.1336**	0.36732E-02 0.84349	-0.86974E-03 -2.1123**
FAM family size	Coefficient t-Statistic	0.42872E-03 1.4751	-0.58039E-03 -0.58067	0.20867E-03 1.7184*
DIV income diversification	Coefficient t-Statistic	-0.36380E-02 -1.7126*	-0.69493E-02 -0.91457	-0.12056E-02 -1.4328
IDISHK idiosyncratic shock	Coefficient t-Statistic	-0.20244E-02 -1.7815*	-0.55780E-04 -0.017152	-0.75481E-03 -1.9543*
SYSHK systemic shock	Coefficient t-Statistic	-0.14694E-02 -1.7697*	-0.43273E-02 -1.9370*	-0.57196E-04 -0.15266
C constant	Coefficient t-Statistic	0.83193E-01 9.3125***	0.29681 7.6091***	0.37063E-01 8.5015***
	R-squared	0.1999	0.2549	0.1586
	F-statistic	28.148	20.620	11.199

* Significant at 10% level, ** Significant at 5% level, *** Significant at 1% level

As predicted, the coefficient sign of the cooperative membership variable (MEM) is positive and significant at the 1% level for the full sample. The underlying liquidity function for cooperative member households and the unbanked households is strikingly different. This can reflect the selection bias of the more financially dynamic households that are members of cooperatives. In addition, the cooperative members have the ability to securely deposit cash in savings accounts. Based on the literature, three groups of independent variables are included in the regression in order to measure their impact on liquidity levels including financial variables, demographic variables, and risk variables.

Financial Variables

The regression results provide evidence of buffer stock saving. The coefficients of the household wealth variable (W) for the full sample, the banked, and unbanked groups are all negative and significant at the 1% level. As expected, households with smaller accumulated savings portfolios have a larger percentage of liquid savings since they would be relatively vulnerable to economic shock and would need a buffer stock of easily liquidated savings to be used in times of need. The coefficient of the household income variable (Y) is only statistically significant among the unbanked group. The lower the income of the household, the more liquid is the savings portfolio. This result supports the hypothesis that poorer households utilize more liquid savings in order to cope with income and consumption variability, particularly when financial intermediation instruments are limited.

Another coping mechanism among the unbanked households is the use of remittances. This variable was significant only for the unbanked group. It was expected that households receiving remittances would use remittances to build up precautionary savings. The results indicate that this is true for households that do not rely on deposit and credit services at a financial institution.

The coefficients of the credit variable (CRD) are all positive and are significant at the 5% level for the full sample and for the cooperative member group. Having access to credit may allow households to simultaneously have liquid precautionary savings and credit for household and business expenditures. This finding mirrors the debt puzzle literature found among credit card holders in developed countries who also have liquid assets (Angeletos, et al, 2001). These households may wish to keep those savings for lifecycle needs and/or emergencies, diversify their financial portfolios, and maintain open lines of credit. The credit variable is insignificant for the unbanked group as these households only have access to informal credit and therefore have relatively small, short-term loans from family, friends, moneylenders, and businesses.

Demographic Variables

Many of the demographic variables including age, marital status, and gender of head of household are not statistically significant. It is possible that these variables would have been significant determinants of *total savings*. It seems that the liquidity of the savings portfolio is less dependent on demographic variables and more dependent on household income and financial variables as well as exposure to risk.

A couple of the demographic variables are significant in one of the samples. Interestingly, the impact of education on household liquidity changes sign when comparing the cooperative member and unbanked groups. Education is a statistically significant determinant of savings portfolio liquidity at the 5% level for the cooperative member group and the unbanked group. For the unbanked group, more highly educated households have less liquidity. On the other hand, the households with higher levels of education in the cooperative member group tend to have more liquid savings portfolios and higher levels of financial savings. Higher levels of education may likely be connected to greater financial literacy and greater awareness of the advantages of liquid savings. In the case of the unbanked, the more educated households may be constrained by lack of secure savings facilities and instead choose a more illiquid household portfolio allocation.

The coefficient of the location variable (URB) was expected to be negative and this was found to be true for the full sample and the unbanked group and significant for both of these groups at the 5% level. The economic reasoning behind this relationship is that rural households facing relatively more risk are expected to have more liquid savings portfolios and urban households that have more opportunity and face relatively less risk are expected to have less liquid savings portfolios. The unbanked rural households are more likely to hold their liquid assets in the form of small livestock. Interestingly, the coefficient of the location variable is positive for the cooperative member group and not statistically significant. Based on this result, it seems that households that utilize the services of financial cooperatives have more similar savings portfolios regardless of being in an urban or rural location.

Family size is positive and statistically significant only for the unbanked group at the 10% level. It was mentioned earlier that the coefficient sign of the family variable (FAM) was difficult to forecast because larger households with more dependents might have more liquid savings portfolios because a larger buffer-stock of savings would be needed to smooth consumption in times of need but might have less liquid savings portfolios because of the difficulty of saving while supporting dependents with immediate needs.

Risk Variables

A key component of the buffer-stock theory is that vulnerable households are more likely to build up liquid savings. Three risk variables (household employment diversification, idiosyncratic shocks and systemic shocks) were included in the regression to measure their impact on household liquidity. The coefficient sign for the diversification variable (DIV) is negative in all groups and statistically significant at the 10% level for the full sample only. The results indicate that households with good income diversification will rely less on liquid savings.

The coefficient sign for the idiosyncratic shock variable (IDISHK) is negative for all groups and statistically significant for the full sample and for the unbanked. Households that reported experiencing an idiosyncratic shock in the past year had lower than average liquidity, possibly indicating the liquidation of the precautionary savings as a coping mechanism for idiosyncratic shock. The regression results support this finding. Interestingly, the cooperative members'

liquidity levels were not significantly impacted by an idiosyncratic shock, suggesting that utilization of financial instruments allowed them to smooth consumption through adversity.

Likewise, the coefficient sign for the systemic shock variable (SYSHK) is negative for all groups. This variable is significant at the 10% level for the full sample and the cooperative group. It was expected that this coefficient be negative, based on the preliminary descriptive statistics of households experiencing systemic shock. Given that the idiosyncratic and the systemic shock variables are negative for each group, it seems plausible that liquid savings are generally utilized to buffer the household from both types of shock. It is a fascinating result that cooperative member liquidity levels are more affected by a systemic shock than by an idiosyncratic one. There could be various explanations for this including the relatively more severe impact of a systemic shock and/or the better preparation for an idiosyncratic shock (dedicated savings for illness, funerals, equipment failure using mental accounting). More research on how savings is used for specific types of shocks is needed.

In sum, the liquid savings function of households that utilize the services of financial institutions is very different from the liquid savings function of households that do not utilize the services of financial institutions. The significant determinants of the liquidity of the savings portfolio for the cooperative member group are wealth, credit, education, and systemic shock. On the other hand, the significant determinants of the liquidity of the savings portfolio for the unbanked group are income, wealth, remittances, education, location, family size, and idiosyncratic shock. Interestingly, only two variables (wealth and education) are significant determinants for both groups, and the education variable has opposite signs for the two groups. In addition, in both the banked and unbanked groups, experiencing any type of shock is related to having a less liquid savings portfolio, likely indicating the previous liquidation of precautionary savings to cope with the shock.

V. Conclusion

This study addresses two sets of questions regarding saving behavior and risk-coping strategies within the Mexican context. First, was there evidence of a buffer stock saving motive among households in the sample? It was expected that poorer households (and, therefore, the most vulnerable to income and consumption variability) would have more liquid savings portfolios than the higher income households. It was also expected that households that belong to financial cooperatives would tend to have more liquid savings portfolios due to the ability to securely deposit financial savings. Second, how did the experience of shock affect the liquidity of the savings portfolio for the households in the sample? Were there patterns suggesting that households could better plan for and respond to certain types of shocks more than others?

The findings of the preliminary statistical analysis as well as the regression results indicate that member households and non-member households are quite different in terms of income level, education of the head of household, and savings behavior. Regression results indicated that the two groups face very different liquid saving functions. Member households have more expanded options and opportunities in terms of savings and credit services. Non-member

households have limited financial options and opportunities, and also must engage in more costly mechanisms to smooth income and consumption.

A problem of causality and self-selection into membership and non-membership categories exists. It may likely be that member households are socially and economically more dynamic than non-member households. But were they always more dynamic, or did membership with the financial institution allow them to become socially and economically more dynamic? Do cultural norms and social and economic hierarchies create barriers to financial services that certain segments of the population would be reluctant to cross? The result of self-selection into membership or non-membership appears to make a big difference in terms of maintaining and advancing the livelihood of the household. These questions can only be answered using rigorous statistical controls or randomized controlled trials.

The unbanked group showed strong evidence of a precautionary saving motive. For this group, wealth and income were both highly significant determinants of savings portfolio liquidity. Households with the lowest income and the lowest level of total savings had the most liquid savings portfolios, suggesting that the most vulnerable households maintained a larger buffer stock of liquid savings to manage their risk exposure. On the other hand, a pattern of precautionary saving is more difficult to tease out for the cooperative member households. Member households have access to both savings and credit services which they can potentially use for investment opportunities and life-cycle needs, as well as emergency needs. Because savings and credit are fungible, it is difficult to track motives for these funds. Matin, Hulme, and Rutherford (2002) propose that one of the main ways that financial services impact households in developing countries is by improving the household management of assets and credit. In particular interest to this study, the authors suggest that having access to financial services lessens the need for precautionary savings, simply because access to financial services broadens the options and opportunities of the household. The findings of this study would support this claim.

For all households, the experience of one or more idiosyncratic or systemic shocks is related to less liquid savings portfolios. Both types of shocks are significant for the full sample. This finding would indicate that households liquidate precautionary savings in order to maintain their livelihoods in the face of economic shock. It appears that this tendency to liquidate precautionary savings overrides the opposing tendency to rebuild the buffer-stock of precautionary savings once the household is able to do so. This finding may suggest increasing vulnerability to shock given insufficient financial recovery. Unfortunately, data is not available regarding the impact, duration, or timing of the reported shocks. This information would have shed more light on financial impact and coping behavior.

Statistical analysis found that households report responding to idiosyncratic and systemic shocks differently. The patterns that emerge from the responses suggest that households generally take active measures in response to idiosyncratic shocks (seeking support from friends/family, obtaining a loan, utilizing savings, and working more hours) and are much more likely to report taking no action in response to systemic shock. One possible explanation for this finding is that households may be better equipped to save and plan for the possibility of

idiosyncratic shock but feel relatively uncertain of appropriate action in the face of systemic shock. If, for example, a farm household were faced with prolonged drought or falling commodity prices, it would be immensely difficult to forecast the duration or the depth of the shock impact. If no end is in sight, the household is likely reluctant to take out a loan or to dig too deeply into savings or to rely too much on friends or family members for fear of not making it through to the end. On the other hand, if the family experiences an idiosyncratic shock such as the death of a family member, the household may feel relatively more confident obtaining a loan to pay for funeral expenses and smooth consumption for the period of time it would take for the household to reallocate the labor supply.

Martin, Hulme, and Rutherford (2002) propose that informal savings and credit mechanisms may be appropriate for idiosyncratic shocks but are inadequate to smooth consumption in the face of systemic shocks. These authors suggest that households with access to financial services are relatively better equipped to smooth consumption in the face of systemic shock. However, the findings of this survey indicate that cooperative member households were more likely to respond to each type of systemic shock by taking no action as compared to the unbanked households. Undoubtedly, access to savings and credit services help to lessen the vulnerability of a household, but insurance mechanisms (unavailable for most households in this survey) would greatly help households buffer themselves from systemic shock.

This study reveals key insights into the liquidity profiles of poor households, the role of banking, and the impact of shocks. By exploring these issues, several new lines of future research are relevant. What role does mental accounting play in saving for specific types of economic shocks? How does the type and duration of shock impact household liquidity over time? Do households tend to underestimate the buffer-stock of precautionary savings needed to weather systemic shocks? If so, does hyperbolic discounting play a role in determining this shortfall? Clearly, more directed research along these lines using panel data would help providers of banking services and policy makers to more adequately develop products to best meet the financial needs of the populations they aim to serve.

VI. References

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VII. Endnotes

¹ Information was collected from 1801 total households in 2004. However, 77 households were omitted for being outliers in income, asset, or loan categories and an additional 18 households were omitted due to missing variables, leaving 1706 households in the sample.

² The official exchange rate in 2004 was 11 Mexican pesos for 1 U.S. dollar (The World Bank Group, 2009).

³ In theory, the empirical model should include a variable that would estimate the return to all forms of savings. However, this information is not available from this data set.

⁴ The DIV explanatory variable is an indicator of the diversification of household income (a ratio of the number of different principal employment activities of working household members to the number of working household members). Seventy-nine households in this sample reported having no household members in the labor force, and for these households a value of zero was given for the DIV variable.