

This article was downloaded by: [Universidad de los Andes]

On: 01 March 2012, At: 05:46

Publisher: Routledge

Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



Canadian Journal of Development Studies/Revue canadienne d'études du développement

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/rcjd20>

Vulnerability and risk management: the importance of financial inclusion for beneficiaries of conditional transfers in Colombia

María Alejandra Urrea ^a & Jorge H. Maldonado ^b

^a Department of Economics, CEDE, Universidad de los Andes, Bogotá, Colombia, and Lumni Research Ltd, Bogotá, Colombia

^b Department of Economics, CEDE, Universidad de los Andes, Bogotá, Colombia

Available online: 01 Mar 2012

To cite this article: María Alejandra Urrea & Jorge H. Maldonado (2011): Vulnerability and risk management: the importance of financial inclusion for beneficiaries of conditional transfers in Colombia, *Canadian Journal of Development Studies/Revue canadienne d'études du développement*, 32:4, 381-398

To link to this article: <http://dx.doi.org/10.1080/02255189.2011.647442>

PLEASE SCROLL DOWN FOR ARTICLE

Full terms and conditions of use: <http://www.tandfonline.com/page/terms-and-conditions>

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan, sub-licensing, systematic supply, or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae, and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings,

demand, or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

Vulnerability and risk management: the importance of financial inclusion for beneficiaries of conditional transfers in Colombia

María Alejandra Urrea^a and Jorge H. Maldonado^{b*}

^aDepartment of Economics, CEDE, Universidad de los Andes, Bogotá, Colombia, and Lumni Research Ltd, Bogotá, Colombia; ^bDepartment of Economics, CEDE, Universidad de los Andes, Bogotá, Colombia

ABSTRACT This paper studies effects of savings, credit and insurance on the vulnerability of households to idiosyncratic income shocks. This approach is made through matching methods using data from around 650 households that have been beneficiaries of the Colombian conditional cash-transfer programme *Familias en Acción*. Results indicate that access to savings and credits, both formal and informal, have significant and differentiated effects on the vulnerability of families. These results focus attention on promoting financial inclusion for a population group that has generally been excluded from the formal financial system.

Keywords: financial services; impact evaluation; income smoothing; consumption smoothing; conditional cash transfers

RÉSUMÉ Cette étude examine les effets des épargnes, de crédit et de l'assurance sur la vulnérabilité des foyers aux chocs idiosyncrasiques de revenus. Cette approche est faite en jumelant des méthodes utilisant les données d'à peu près 650 foyers qui ont bénéficié du programme de transfert conditionnel de fonds *Familias en Acción*. Les résultats indiquent que l'accès aux épargnes et crédits, à la fois formels et informels, a des effets importants et différenciés sur la vulnérabilité des familles. Ces résultats mettent l'accent sur la promotion de l'inclusion financière pour une section de la population qui a généralement été exclue jusqu'à présent d'un système formel financier.

Introduction

Households are constantly exposed to economic shocks that alter their incomes and consequently, their consumption. These fluctuations can generate severe consequences for families, as they do not always have good coping measures to protect themselves (Morduch 1994). In fact, the absence of protection mechanisms is a latent problem since a family's welfare depends on both consumption levels and ability to handle risk. Lack of insurance may even affect households with high levels of consumption, as economic shocks may induce them to use mechanisms that are costly to family welfare, leading them to fall into poverty (Ligon and Schechter 2003). Examples of such mechanisms include cutting food expenditure or reducing education expenses. Although this phenomenon may affect all types of households, the situation is more critical for low-income families given their lack of assets. This constrains their access to adequate insurance

*Corresponding author. Email: jmaldona@uniandes.edu.co

mechanisms (Deaton 1992b), increases their vulnerability to shocks and causes important welfare losses (Foster 1995, Jacoby and Skoufias 1997, Beegle *et al.* 2003).

Several studies have empirically researched the relation between unanticipated fluctuations of households' income and strategies to safeguard consumption. In general, it has been found that families' welfare is not guaranteed against unexpected changes in income due to a lack of sufficient tools to protect themselves (Cochrane 1991, Altonji *et al.* 1992). However, various mechanisms used by individuals to mitigate the effects of income volatility on welfare have been identified in the literature. Among these tools financial savings, credit and insurance stand as commonly used instruments to deal with unforeseen income shocks (Deaton 1992a, Paxson 1992).

In this setting, vulnerability can be understood as the risk of a household's welfare will be reduced when facing events that negatively affect its income. When these shocks occur, household vulnerability is reflected through a decrease in consumption (Christiaensen and Boisvert 2000, McCulloch and Calandrino 2003) and through the implementation of post-shock strategies that tend to be costly in terms of welfare (Morduch 1994). Vulnerable families are considered to be those with an imminent probability of falling into poverty (regardless of the initial poverty status), those without the ability to smooth consumption after income shocks, or those with no access to risk-management instruments to protect their welfare (Holzmann *et al.* 2003).

With regards to Colombia, there has been very little exploration of how far the vulnerability of households to idiosyncratic shocks may be reduced using financial instruments. This paper aims to deepen current knowledge in this field and to contribute to the literature by quantifying the effect of access to different financial tools, both formal and informal, on the vulnerability of households linked to the conditional cash-transfer programme *Familias en Acción*. For this research, vulnerability is defined as the use of costly strategies that occur after negative events (Holzmann *et al.* 2003). Vulnerable households are those that have to resort to costly actions in terms of their welfare to cope with economic shocks. Propensity score matching is the methodology used to estimate the effects of savings, credit and insurance on the vulnerability of this group of families, which are characterised by poverty and by a historical lack of access to formal financial services.

The results show that households with access to financial tools indeed are less vulnerable to income shocks. Informal savings reduce vulnerability by enabling households to opt for strategies that have less severe impact on households' welfare. Yet, the effect of informal savings is not sufficient to reduce the use of extreme actions after a shock. Extreme strategies, such as decreasing food expenditure, are found to maintain the potential for increased household vulnerability. Formal and informal credits are found to have an important effect on these extreme strategies, however, and therefore avert more severe vulnerability. As for insurance, there is no clear and conclusive effect on vulnerability in the sample.

This remainder of the paper is structured as follows. The next section reviews the literature about household vulnerability and protection strategies. The third section introduces a theoretical framework about the vulnerability of households using financial tools and their effect on welfare. The fourth section describes the main characteristics of the sample used for this paper, and the fifth section develops the empirical model used for estimations. The sixth presents the results of the econometric estimations, and the final section summarises the main findings of the study.

Research to date on risk management

Existing literature about risk management has focused on analysing the tools used by households to face the effects of abrupt income shocks on their welfare. Some studies have shown that in response to income volatility, households may trade assets (Rosenzweig and Wolpin 1993),

increase their members' participation in the labour market (Kochar 1995, Jalan and Ravallion 1998) and use several protective formal and informal tools (Townsend 1994).

Financial tools such as savings and credit have been predominantly studied in this field. On the one hand, households use their savings as a mechanism to respond to unexpected income changes (Paxson 1992). Nevertheless, savings are uncommon among those who rely on other types of insurance against shocks (Palumbo 2000). On the other hand, Deaton (1992a) states that the way families borrow and lend money determines how they anticipate future events, but finds no strong statistical evidence of "consumption smoothing" through these mechanisms.

Although research about vulnerability in Latin America has been constrained by the lack of longitudinal data allowing for the study of households' dynamics vis-à-vis income shocks (Baez 2006), some work in the region has been done. Barrera and Pérez-Calle (2005) find that Nicaraguan and Colombian households partially manage to protect their consumption against income fluctuations, but that their insurance is not complete. Gaviria (2002) finds that the tools available to households for mitigating changes in income levels depend on their wealth. In Mexico, households mitigate the effects of income volatility by sharing their individual risk with other families in the same community (García-Verdú 2002). While in Colombia, however, microcredit is used to reduce vulnerability (García 2008).

Furthermore, some studies reveal that while families can use formal and informal tools to protect their consumption levels, they can also choose to smooth their income. Empirical evidence shows a significant relationship between households' risk aversion and crop choices among agricultural families in Asia (Binswanger and Rosenzweig 1993, Morduch 1995, Dercon 1996) where, for instance, the fear of being involved in high risk agricultural activities makes families choose safer, but lower-yielding crops. In Latin America, Alpizar (2007) finds that access to financial markets among rural households in El Salvador allows families to improve their insurance against idiosyncratic shocks, and thus increases efficiency in the allocation of agricultural resources.

Nonetheless, Carter and Lybbert (2010) find that in the presence of poverty traps, households may respond to shocks using one of two mechanisms: they can alter their consumption or adjust their assets. For individuals with the imminent risk of falling into poverty, reducing consumption is not necessarily a symptom of vulnerability; rather it acts as a strategy to avoid asset reduction and falling into the trap. Households registered in the conditional cash transfer (CCT) programme in Colombia, *Familias en Acción*, respond to shocks by smoothing their assets, thereby relying primarily on the second mechanism. However, their welfare continues to be significantly affected by reductions in food expenditure, creating negative impacts on human-capital accumulation.

There are few academic studies of the vulnerability of households in Colombia as a result of idiosyncratic shocks. Several studies, however, have focused on exploring the use of financial instruments among the Colombian population (Melo *et al.* 2006, Marulanda 2007, Tovar 2008). A high proportion of the disadvantaged does save and borrow, but as household income decreases, access to financial services depends more on the informal sector (Marulanda 2007). In particular, rural and urban beneficiaries of *Familias en Acción* have very limited interaction with the formal financial system (Maldonado and Tejerina 2010), informal savings and credit instruments are predominantly used instead (Maldonado and Moreno 2010, Maldonado and Urrea 2010). The most common forms of saving are piggy banks (cash), while the usual sources of credit are relatives, friends and moneylenders. An increasing use of funeral insurance among the poorest and more vulnerable population has been observed as well (Maldonado and Urrea 2010).

Theoretical framework

Households can be exposed to different shocks that alter their income path. Economic shocks affect households in various ways, causing these to react with different strategies to protect

their welfare. The theoretical framework discussed in this section for analysing income shocks and household responses allows a closer examination of the role of financial instruments in risk management and the reasons underlying their rationing for low-income populations.

Shocks

When an event affects only a few families in the same community, the shock is considered idiosyncratic. However, when it affects simultaneously all or most individuals in a community, it is considered a covariate shock (Holzmann and Jorgensen 1999, Morduch and Sharma 2002). For example, the loss of a household member's job can be classified as an idiosyncratic shock to income, whereas natural disasters such as earthquakes and floods are covariate.

Shocks can also be analysed according to their frequency and the severity of impact on income flow. Low-frequency events that severely affect household income are considered catastrophic shocks, while recurrent events that do not have severe effects on families' income are classified as non-catastrophic shocks (Holzmann and Jorgensen 1999). For instance, the death of the household head is a catastrophic shock since it reduces family income permanently.

Strategies

Households rely on a wide range of strategies, both formal and informal, to deal with negative events. When there is full access to financial markets, families can acquire optimal insurance tools to dissipate the consequences of a negative event. The best strategy to cope with unexpected income fluctuations is to have insurance against harmful events (Morduch 1994). Accordingly, a home can protect itself from adverse events by regularly paying an insurance premium. However, households that do not have access to these optimal tools are forced to take ex-ante and -post actions to the shock. In many cases, these strategies generate inefficient results since they can be extremely costly in terms of welfare.

The first way to classify these strategies is based on the timing of implementation. Ex-ante strategies are measures adopted in advance to maintain a smooth consumption path, while ex-post strategies are those implemented by a household after a shock (Morduch and Sharma 2002). Ex-ante and -post strategies can be further classified according to additional criteria.

In the case of ex-ante strategies, households have two possibilities. First, families can choose to try reducing their income volatility by taking jobs with no substantial income fluctuations. The main feature of these income-smoothing strategies lies in promoting lower-risk yet low profitability activities or by participating in the labour market through a low salary but stable job (Binswanger and Rosenzweig 1993, Morduch 1994, 1995). Second, households that participate in high-risk activities, and therefore worry about negative future events, prepare themselves to mitigate the adverse shocks associated. Mitigation strategies are based on building liquid assets, such as cash on hand, for quick protection against losses associated with a shock. Mitigation strategies focus on liquid assets as opposed to saving or investing, which render lower financial returns (Holzmann *et al.* 2003). Precautionary savings are among this kind of strategy.

Alternatively, in the absence of insurance products, households can employ ex-post or reactive strategies. The main objective is to lessen the impact of shocks on households' welfare once they occur (Holzmann *et al.* 2003). This category encompasses measures such as increasing the number of household members in the labour force or reducing asset stocks. Although these strategies allow families to address immediate consumption needs in times of crisis, they can generate welfare losses in the long run due to underutilisation and misallocation of human and physical capital.

The management of risk through these different strategies implies changes in wellbeing. Income-smoothing and reactive strategies may reduce future welfare as they sacrifice opportunities to engage in economic activities that would allow increasing productive capital and wealth (Binswanger and Rosenzweig 1993, Morduch 1994, 1995). As a result, response strategies to shocks can significantly reduce families' welfare level and perpetuate poverty (Morduch 1994, Foster 1995, Jacoby and Skoufias 1997, Beegle *et al.* 2003). In this context, financial tools are an alternative for households, enabling these to face income shocks without negatively affecting their consumption or compromising future wellbeing.

Financial tools

Financial tools may play an important role in protecting households' welfare, particularly when they are exposed to frequent income level fluctuations. On the one hand, financial tools can protect consumption without incurring decisions that are harmful in the long term (Tejerina *et al.* 2006). On the other hand, they allow households to build assets and consequently reduce their poverty and vulnerability conditions (Morduch and Armendáriz de Aghion 2005). The use of these tools is so important that the low financial market development in poor countries is considered one of the main causes of poverty and vulnerability (Morduch 1994). Moreover, a double-causality problem exists between these two phenomena: the lack of assets not only causes households to have no access to insurance mechanisms, but also the absence of these protective measures can lead to increased poverty (Deaton 1992b). Although vulnerability is a cross-trait for households from all income levels, low-income families have a higher propensity to suffer the consequences of a shock since they are excluded from the financial system (Holzmann *et al.* 2003), and live in an unstable economic environment.

Financial markets might ration the supply of services for some groups of the population (Stiglitz and Weiss 1981). Financial market rationing can occur for three reasons: adverse selection, moral hazard and contract enforcement (Ghosh *et al.* 2000). This combination of conditions leaves a significant number of households unprotected from economic risks, eventually resulting in severe consequences for their welfare.

This situation is particularly critical for very low-income population groups, since an additional problem arises limiting their access: high transaction costs (Morduch 2004). Poor families are generally located in remote areas with limited access. Under these circumstances it is difficult for financial institutions to obtain information from these clients. In addition, since the products needed by these families are usually smaller monetary amounts, suppliers face high costs relative to the amount being traded (Ledgerwood 1999).

In this context, microfinance appears as an alternative to extend formal services to individuals usually excluded from the market (Morduch 1999). Through the application of technologies that suit their particular conditions, such as the implementation of a flexible payment scheme or the waiver of physical collateral as a requirement to access the system, among others, the supply of financial products available to poor households has been consolidating (Morduch and Armendáriz de Aghion 2005). In that sense, this and other forms of financial inclusion have been encouraged, given its association with improvements on household wellbeing (McKernan 2002, Townsend 2002).

Under this theoretical framework, the next step is to empirically explore the patterns that characterise risk management, financial services and shocks among the households within a particular population sample, beneficiaries of Colombia's CCT programme *Familias en Acción*.

Banking survey data

In order to evaluate the effect of different financial tools on the vulnerability of the poorest households in the country, data from a 2009 IDB-funded banking survey¹ are used. This survey was

conducted among a sample of 658 beneficiaries of *Familias en Acción* in six cities (Bogotá, Montería, Sincelejo, Pasto, Valledupar and Cali) during the last 3 months of 2009. In addition to financial data, the survey collected information about households’ socioeconomic variables, revenues and expenses, and perception about financial inclusion and the banking plan within the programme (Maldonado and Urrea 2010). The survey also collected data regarding unexpected shocks and the strategies used to face and cope with their effects (Table 1). This latter information is used to measure households’ vulnerability.

Access to financial services

Sampled households have several financial arrangements – formal and informal – that can be useful in managing risk and the accumulation of assets (Table 2). Formal services comprise all those linked to any regulated institution within the financial sector, including banks, cooperatives or microfinance institutions. Informal services include those offered by institutions that are not regulated. Additionally, insurances are classified into two categories: voluntary and involuntary. Voluntary ones correspond to products offered by the market to cover a household from a damaging event in exchange of paying an insurance premium. The involuntary type is not acquired by households’ initiative. Rather they are part of the social safety network in the country. This last category includes retirement pension benefits, medical assistance and insurance for work-related injuries or diseases that are mandatory for a member of the household.

Despite the precarious level of income and assets that characterise poor families, a noteworthy proportion of families have access to a variety of financial tools. Credit constitutes the most common instrument – more than 50 per cent of the beneficiaries use credit to finance their needs. The situation is less optimistic for savings and insurances. However, it must be highlighted

Table 1. Unexpected shocks and household responses.

Unexpected shocks	Household responses
- A member of the household lost their job	- Use precautionary savings
- Income of a member of the household decreased	- Use insurance
- A member of the household has an accident or illness	- Obtain aid from the government
- A newborn in the household	- Use loans from family or friends
- Household was victim of violence	- Use loans from banks or cooperatives
- Community faced gang confrontations	- Increase the number of working hours of working members in the household
- Parents of the household divorced	- Ask for advances on salary payments
- A member of the household died	- Reduce food expenditure
- The household head left the house	- Increase the number of people working in the household
- An important celebration in the household (i.e. weddings)	- Use loans from informal moneylenders
- A member of the household lost money in ‘chains’	- Pawn assets
- The household head died	- Sell assets
- A member of the household lost money in ROSCAS	- Mortgage
- The household was displaced due to violence	- Transfer children to a less expensive school
- The household was affected by natural disasters	- Move to a less expensive dwelling
	- Move in with relatives
	- Migrate to another town or city
	- Do nothing.
	- Other responses

Source: Data collated by the authors for the 2009 IDB banking survey. Authors’ calculations.

Downloaded by [Universidad de los Andes] at 05:46 01 March 2012

Table 2. Percentage of households with financial tools.

	Number of households	Percentage of households
<i>Savings</i>	167	25.61
Formal savings	34	5.21
Informal savings	149	22.78
<i>Loans</i>	351	54.08
Formal loans	100	15.46
Informal loans	290	44.48
<i>Insurance</i>	146	22.32
Voluntary insurance	88	13.37
Involuntary insurance	83	12.61

Source: Data collated by the authors for the 2009 IDB banking survey. Authors' calculations.

that over 20 per cent of households manage to save a proportion, although small, of their monthly income. The use of insurance was reported by close to 20 per cent of all beneficiaries. Even with these figures, these tools are characterised as being mostly informal arrangements, reflecting the large distance between the families and the formal financial system.

Since the time when the survey was conducted, beneficiaries of *Familias en Acción* have been included in the formal financial system through a savings account. The Colombian central government made mandatory the use of such financial product in order to receive the cash transfers since 2009. As a result, now more than two million low-income families that participate in the programme are included in the formal financial system. Although financial inclusion through the CCT programme presents an opportunity for households to begin using other financial services such as credits, insurance and saving products, the relationship between families and the formal sector could be strengthened further.

Sample groups

To determine the effect of each financial instrument on the vulnerability of households, the sample of *Familias en Acción* beneficiaries is divided into different comparison groups. The treatment group is made up of households with access to the financial service under examination and the control group consists of households without such instrument. Statistical tests on mean differences between variables are used to infer some patterns of similarity between the groups. First, for groups classified by access to savings and credits – formal and informal – there are no statistically significant differences in most of the households' variables. This finding suggests that the treatment and control groups are similar with regard to these financial tools: the households with savings or credit, formal or informal, are similar to homes that lack them. These characteristics reduce risk of selection bias when estimating the effect of financial tools on vulnerability. In the case of insurance, however, the situation is different. In comparing groups classified by access to voluntary and involuntary insurance, there are statistically significant differences for most variables. This result suggests that within the sample there are large differences between households with and without access to insurance services.

Some variables are important to mention in order to contextualise the access to and the use of financial tools. The families in this sample have a monthly average income of COP\$493,000 (around 256 USD at the exchange rate of the survey's date) and monthly average expenses of COP\$536,000 (around 279 USD). By comparing revenues and expenses, we found that 48 per cent of sampled beneficiaries have expenses higher than their income, suggesting that these

households must use strategies to reallocate their resources between periods in order to meet their consumption needs (Maldonado and Urrea 2010).

Empiric strategy

Risk management studies generally use longitudinal data due to the fact that vulnerability is linked to future income-flow uncertainty, strong fluctuations in consumption or the use of costly strategies after unexpected shocks occur. In the absence of such data, alternate approaches are needed. This research estimates the effect of access to financial services on household vulnerability using propensity score matching with cross-sectional data resulting from the comparison of different groups.

Vulnerability

Vulnerability, V_h , is defined according to information about different strategies used by families in response to shocks that occurred during the year preceding the survey. Based on the data, 20 possible responses to shock events can be identified. These responses are classified into four groups according to the timing of the action and to the effects on household welfare (Table 3). The classification responds to theoretical considerations of households' vulnerability. First, the measures are divided into two main groups according to the timing of implementation by individuals.

The first group of measures contains ex-ante strategies and the second group ex-post strategies. Strategies are then divided into severe and not severe, in terms of their potential effect on household wellbeing. Severe strategies are those that strongly compromise households' welfare and that may generate utility losses in the current or future periods. The 2009 IDB Banking Survey allows us to identify strategies in three categories. However, we are not able to identify severe and ex-ante responses from the survey information.

For this research, vulnerable households are understood as those that have to use reactive strategies after an income shock has occurred, including families that use severe and non-severe ex-post strategies.

Table 3. Classification of responses after income shocks.

<i>Non-severe and ex-ante responses</i>	<i>Non-severe and ex-post responses</i>
To use precautionary savings	Obtain aid from the government
To use insurance	Use loans from family or friends
	Use loans from banks or cooperatives
	Increase the number of working hours of working members in the household
	Ask for advances of salary payments
<i>Severe and ex-ante responses</i>	<i>Severe and ex-post responses</i>
No data	Reduce food expenditure
	Increase the number of people working in the household
	Use loans from informal moneylenders
	Pawn assets
	Sell assets
	Mortgage
	Transfer children to a less expensive school
	Move to a less expensive dwelling
	Move in with relatives
	Migrate to another town or city

Source: Data collated by the authors for the 2009 IDB banking survey. Authors' calculations.

The effects of financial tools are measured over two discrete variables associated with each of these two broad categories. The ex-post severe vulnerability variable takes a value of one if the household has used at least one of the strategies classified as severe ex-post. However, the ex-post non-severe variable takes a value of one if the household has used one or more strategies classified as non-severe ex-post. This vulnerability measure makes sense because the optimal strategy to handle income shocks is to have access to insurance products before the event occurs, and because a different strategy can turn out to be very costly in terms of household welfare, potentially causing welfare losses (Morduch 1994).

The empirical model assumes that the vulnerability of each household is determined by a number of family characteristics (income, monetary value of assets, number of children, household size, among others) gathered in the vector X_h , and by the use of financial tools HF_h (Equation 1).

$$V_h = \beta_0 + \beta_1 HF_h + \beta_2 X_h + \varepsilon_h \quad (1)$$

Financial tools are a relevant factor in determining the vulnerability of families and are the focus of this study. In this sense, HF_h is a dummy variable that takes the value of one if the household uses the financial instrument being evaluated and a value of zero. This analysis evaluates the impact of nine financial tools on the vulnerability of households: formal savings, informal savings, general savings, formal loans, informal loans and general loans, voluntary insurance, involuntary insurance and insurance in general. In the case of credits, strategies related to borrowing from informal and formal sources are omitted in the vulnerability variable in order to avoid endogeneity.

Effects on vulnerability

To determine the average effect of treatment (access to financial tools) on vulnerability the method used is propensity score matching. This method allows us to compare vulnerability among two groups: households who have access to financial tools and households who do not. Each household in the treatment group is matched with one or several households in the control group based on the similarity of their characteristics. The estimates obtained through this method allow us to calculate less biased and more robust estimators compared to other methodologies used for such assessments (Rubin and Thomas 2000).

To calculate the effect of financial tools, a counterfactual (or household in the control group) with similar characteristics is assigned to every household in the treatment group (Ravallion 2006). The matching is based upon the probability of having access to the financial tool that is being evaluated. Therefore, treatment households are matched with other households that have a similar probability of having access to financial tools but belong to the control group. This probability is known as Propensity Score, $Pr(X)$, (Equation 2).

$$Pr(X) = Pr(HF = 1|X) \quad (2)$$

The estimation of the Propensity Score involves social and economic variables that might affect the use of savings, credits and insurance of each household. First, variables that reflect the value of assets and family income are included, since the presence of financial tools is positively correlated with wealth levels (Tovar 2008). Second, aspects such as household size, number of children, education of the beneficiary, and employment situation are considered. These latter variables can determine the degree of credit rationing experienced by these households in the formal financial sector, and which alter their use of savings, insurance and credits. Finally, in the pairing, dichotomous variables are considered to control for possible differences by city.

Three hypotheses are considered around the effect of access to financial services on household vulnerability. The first states that households that use financial tools can reduce their vulnerability as they are able to allocate their resources optimally between periods, smoothing their consumption and maximising their utility. The second hypothesis postulates that given the infrequent use of formal financial services, informal access to savings and credits can play an important role in reducing vulnerability. The third hypothesis relates to insurances and claims that their impact can be expected to remain limited because this sample population makes little use of them – despite their being some of the most promising tools for reducing vulnerability to idiosyncratic shocks.

Results

The results of the study are presented in this section. Before discussion the main results of the study, we present a non-parametric analysis of shocks and the strategies used by households. Afterwards, the results of the econometric exercise are presented.

Summary statistics

Beneficiaries of CCTs in Colombia are a group of households that is highly exposed to risks that jeopardise their income: 43 per cent of households have faced a shock with economic consequences. The most frequent events include: loss of employment of the household head, unexpected reduction of workers' income, and sickness or accident of a family member. A significant proportion has also been exposed to violence and crime events that may affect their income and wealth. Besides, births and big celebrations are recurrent events among these families. While the last two events are not negative shocks, they are included in this study because they require major outlays from the family (Table 4).

Each of these events is associated with economic responses. The relationship between shocks and the response strategies chosen after the shocks is presented in the shock–response matrix (Table 5). This matrix shows the percentage of households using each strategy after the occurrence of each income shock.

Table 4. Main income shocks and percentage of households that suffered them.

	Number of households	Percentage of households
A member of the household lost their job	122	18.54
Income of a member of the household decreased	109	16.57
A member of the household has an accident or illness	63	9.57
A newborn in the household	46	6.99
Household was victim of violence	37	5.62
Community faced gang confrontations	23	3.5
Parents of the household divorced	22	3.34
A member of the household died	16	2.43
The household head left the house	11	1.67
An important celebration in the household (weddings)	9	1.37
A member of the household lost money in 'chains'	8	1.22
The household head died	7	1.06
A member of the household lost money in ROSCAS	6	0.91
The household was displaced due to violence	4	0.61
The household was affected by natural disasters	4	0.61
Any income shock	282	42.92

Source: Data collated by the authors for the 2009 IDB banking survey. Authors' calculations.

Table 5. Matrix of shocks and corresponding response by households.

	Affected households (number)	Increase working members	Increase working hours	Use precautionary savings	Pawn assets	Sell assets	Family and friends loans	Moneylenders loans	Formal credit	Reduce food expenditure	Move in with relatives	Salary advances requests	Migrate	Use insurances	No response	Aid from government	Other responses
Job loss	122	13.9	9	3.3	1.6		14.8	0.8		36.9	0.8		0.8		23		31
Income reduction	109	8.3	7.3	3.7	1.8		14.7	2.8	1.8	44.0	0.9				26		28
Accident or illness	63	7.9	4.8	7.9	3.2		20.6	3.2	1.6	30.2	3.2	1.6		1.6	33	1.6	27
Newborn	46	2.2	4.4	6.5	2.2	4.4	17.4	2.2		28.3		2.2		2.2	26	2.2	33
Victims of violence	37	10.8	2.7	2.7			5.4	2.7		35.1	2.7	2.7			76		8.1
Gang confrontations	23	4.4		4.4	4.4		8.7			39.1			4.4		61	4.4	8.1
Parents divorced	22	13.6	9.1	4.6		4.6	9.1	4.6	4.6	36.4	9.1				46		18
Member death	16			6.3			18.8			31.3		6.3			31	6.3	6.3
Home abandonment	11	18.2	9.1				9.1		9.1	27.3	9.1	9.1			36		9.1
Celebrations	9			22.2			22.2			22.2					33		22
Money lost in chains	8		12.5			13	12.5								13		
HH head died	7						14.3			42.9					14	14.3	29
Money lost in ROSCAS	6						16.7			66.7							
Displacement	4	25											75		25		
Natural disasters	4									25					50		25

Note: The percentage of each response is the number of households that used such response over the total of households that suffered each income shock.

Source: Data collated by the authors for the 2009 IDB banking survey. Authors' calculations.

First, it is important to highlight the role of financial tools in this aspect. Although savings are not the most frequently used strategy, they are the instruments used when the most recurrent events happen (job loss or income reduction). In addition, the protection provided by insurance appears to be more limited, as these are used only when births, accidents or illnesses occur, that is, they are instruments mainly related to health issues. The use of credit varies depending on the nature of the shock: formal credits (from banks or cooperatives) are unusual in this population, while loans from family and friends are the most common financial tool.

Financial instruments are complemented by more costly strategies. First, reduction in food expenditure is particularly strong among those facing job losses or income reduction, but it is also used in situations such as important celebrations or weddings. This behaviour suggests that this strategy is not perceived as a mechanism that strongly affects welfare, being frequently used even when other alternatives are available. In addition, the proportion of households that respond by increasing the number of people in the labour force is higher compared with households that respond by increasing the number of working hours of employed family members. This response might imply taking children out of school, given that children represent more than half of the individuals in a family.

The response patterns identified suggest that while financial tools are important for risk management, families also use other strategies with severe consequences for welfare, some of which may also negatively impact future welfare. These results, however, need econometric evidence that allows controlling for multivariate effects.

Parametric analysis

The parametric analysis estimates the effect of financial tools on vulnerability by matching households from the control and treatment groups based on their propensity score. This matching is estimated using three mechanisms: one-to-one matching (1:1), kernel-based matching (kernel) and five nearest-neighbour matching (N[5]). The exercise is done to observe the effect of each financial tool (savings, credit and insurance) on severe ex-post vulnerability (Table 6) and on non-severe ex-post vulnerability (Table 7). Generally, the analysis shows that financial services have negative and statistically significant effects on the two types of vulnerability evaluated, particularly savings and credit; and the access to insurance has a significant but less clear effect on vulnerability for this population. Notice once again that in order to estimate the effect of credit on vulnerability, all strategies related to borrowing from informal and formal sources are omitted from the variable 'vulnerability'. This avoids the problem of endogeneity.

Access to credit, no matter the matching method, exhibits a highly statistically significant effect on reducing severe ex-post vulnerability, defined as the need for strategies with a high cost in terms of welfare, as a response to shocks. Households with access to credit reduce their probability of adopting severe ex-post strategies by approximately 14 per cent. These results tend to remain significant when the effects of using formal or informal credits are differentiated. Note (Table 6) that the magnitude of the impact of informal instruments is higher compared to the effect of formal instruments (10% for informal against 8% for formal).

Informal loans are easier to obtain among this population, they do not require complicated procedures and they are expedient in times of crisis. In particular, households insure their consumption through borrowing from small grocery stores in the neighbourhood that allow them to repay by the end of the month. Although the loans might not have an explicit interest rate, they are associated with higher prices in the traded goods. Opportunity and liquidity of informal credits are reflected also in the fact that they are somewhat effective in reducing non-severe vulnerability. On the other hand, formal credits are less expensive but also less available to low-

Table 6. Effects of financial tools on severe and ex-post vulnerability.

	1:1 matching			N(5) matching			Kernel-based matching		
	Treated	Control	ATT ¹	Treated	Control	ATT	Treated	Control	ATT
Savings	0.26	0.15	0.11** (0.06)	0.26	0.18	0.08* (0.05)	0.26	0.18	0.08* (0.04)
Formal savings	0.41	0.38	0.03 (0.13)	0.41	0.24	0.17** (0.10)	0.41	0.23	0.19** (0.10)
Informal savings	0.22	0.20	0.03 (0.06)	0.22	0.19	0.03 (0.05)	0.22	0.17	0.05 (0.05)
Credit	0.18	0.31	-0.14*** (0.05)	0.18	0.31	-0.13*** (0.04)	0.18	0.33	-0.15*** (0.04)
Formal credit	0.15	0.17	-0.02 (0.06)	0.15	0.22	-0.08* (0.05)	0.15	0.22	-0.08** (0.04)
Informal credit	0.19	0.23	-0.04 (0.05)	0.19	0.29	-0.10*** (0.04)	0.19	0.29	-0.10** (0.03)
Insurance	0.22	0.39	-0.17** (0.07)	0.22	0.33	-0.11** (0.05)	0.21	0.29	-0.08* (0.05)
Voluntary insurance	0.19	0.29	-0.10 (0.08)	0.19	0.24	-0.06 (0.06)	0.18	0.24	-0.06 (0.05)
Involuntary insurance	0.22	0.32	-0.10 (0.08)	0.22	0.27	-0.06 (0.06)	0.22	0.27	-0.05 (0.06)

Source: Data collated by the authors for the 2009 IDB banking survey. Authors' calculations.

¹ATT refers to the Average Treatment Effect on the Treated, used to measure the effect of the financial services on the vulnerability outcome of each group.

***1% significance level, **5% significance level, *10% significance level. Standard error in parenthesis.

Table 7. Effects of financial tools on non-severe and ex-post vulnerability.

	1:1 matching			N(5) matching			Kernel-based matching		
	Treated	Control	ATT ¹	Treated	Control	ATT	Treated	Control	ATT
Savings	0.11	0.14	-0.03 (0.55)	0.11	0.20	-0.08** (0.04)	0.11	0.18	-0.08** (0.03)
Formal savings	0.10	0.03	0.07 (0.07)	0.10	0.15	-0.05 (0.07)	0.10	0.17	-0.07 (0.06)
Informal savings	0.11	0.19	-0.08* (0.05)	0.11	0.16	-0.05* (0.04)	0.10	0.17	-0.07** (0.03)
Credit	0.05	0.05	0.00 (0.03)	0.05	0.03	0.02 (0.02)	0.05	0.04	0.02 (0.02)
Formal credit	0.10	0.15	-0.05 (0.05)	0.10	0.10	0.00 (0.04)	0.10	0.10	0.00 (0.03)
Informal credit	0.07	0.03	0.05** (0.02)	0.07	0.03	0.04** (0.02)	0.07	0.02	0.05*** (0.02)
Insurance	0.19	0.12	0.07 (0.06)	0.19	0.14	0.05 (0.04)	0.18	0.15	0.03 (0.04)
Voluntary insurance	0.14	0.12	0.03 (0.06)	0.14	0.11	0.03 (0.05)	0.14	0.14	0.00 (0.04)
Involuntary insurance	0.20	0.19	0.01 (0.07)	0.20	0.17	0.04 (0.05)	0.21	0.15	0.05 (0.05)

Source: Data collated from the IDB Banking Survey. Authors' calculations.

¹ATT refers to the Average Treatment Effect on the Treated, used to measure the effect of the financial services on the vulnerability outcome of each group.

*** 1% significance level, ** 5% significance level, * 10% significance level. Standard error in parenthesis.

income households; their role is evident when the effect on vulnerability is severe, but not when the effect is less severe.

Savings have a complementary role on vulnerability to that of credit; they reduce the use of non-severe ex-post strategies by approximately 8 per cent. This effect of savings seems to be driven by the role of informal savings (for example, piggy banks or cash at home), with its easy availability (high liquidity). Perhaps, for the same reason, formal savings exhibit a null effect on non-severe ex-post vulnerability. In the sample, 41 per cent of households that hold savings in financial institutions do so in the National Savings Fund (*Fondo Nacional del Ahorro*); the fund is in charge of promoting house acquisition by encouraging savings and credit for this specific goal. Since the function of this kind of formal savings is to build assets, effects would be visible only in the long run.

The differences between the effects of credits and savings can be better understood if one examines the amounts related with each instrument. The average value of informal savings among households in the sample is COP\$158.000 (around 82 USD), while the average amount of informal and formal credits is, respectively, COP\$575.000 (about 300 USD) and COP\$2.000.000 (about 1,040 USD). Therefore, families that only use their savings to respond to shocks have a lower coverage compared with the ones that have access to any type of financing. If a household relies only on informal savings, relatively small in amount, it will not be able to avoid using of severe ex-post strategies. However, households with access to credit have, on average, more resources and thus can avoid using strategies with strong negative consequences on welfare.

The latter instrument evaluated in this exercise is insurance. Having access to insurance exhibited a negative and statistically significant effect on the most critical measures of vulnerability. However, it is not clear from this exercise how families choose to use insurance tools. Thus, the presence of both voluntary and non-voluntary insurance instruments limits our ability to distinguish the effects of insurance on household welfare.

Conclusions

This paper investigates the effect of different financial tools on the vulnerability of the poorest households in Colombia that are linked to the CCT programme *Familias en Acción*. Savings, credit and insurance are considered relevant instruments for households that face volatile income flows, as these services allow households to reallocate resources inter temporally and to smooth their consumption. The absence of protection mechanisms to cope with unexpected income shocks may be accompanied by considerable loss of family welfare.

The results indicate that informal savings reduce non-severe vulnerability, while formal savings do not show significant effects. The differences between the effects of these two types of savings may be related to the rigidity of the products, since informal savings are much more liquid than formal ones. In this sense, the effects of formal savings are more visible in the long run as investments, rather than as smoothing tools. Although savings are important self-insurance strategies, they appear as insufficient instruments for reducing more severe vulnerability. Therefore, a latent need emerges to ease access to other instruments, such as credits and insurance, to manage risk and avoid significant welfare losses.

On the contrary, credit (formal and informal) play a more important role on protecting the household from severe vulnerability. Informal credit exhibits a stronger effect than formal credit, which is possibly related to its flexibility and opportunity for assisting households after an unexpected shock, as in the case of savings. However, the financial tool that provides greater protection can also be among the most expensive; for instance, the second most frequent source of informal credit are moneylenders, who charge rates well above the legal formal rates in

the country. Because the use of this source is related to the absence of alternative funding sources, the importance of financial inclusion in order to increase access to instruments that protect welfare timely and with lower costs is corroborated and highlighted.

Finally, the results show that the effect of insurance is not entirely conclusive for this sample. For this particular group of families, access to insurance products is very limited, and the channels of action are not clear enough to draw conclusions. Nevertheless, the potential of this instrument should not be underestimated, as academic research indicates that insurance can be one of the most efficient tools to protect households from vulnerability. This research can be extended to find more conclusive effects of using the tool of insurance, especially for systemic shocks.

Three aspects limit the results of this study. First, cross-sectional data do not allow us to observe the households dynamics or their inter-temporal expectations about shocks. Second, expectations about reactive strategies available may also alter the way households cope with risk before the event, leading to potential bias in the estimation. Finally, the sample size does not allow for controlling the kind of shock that families face, making comparisons between households suffering similar shocks more difficult. These limitations suggest the need for extending this research to include longitudinal data and a larger sample size.

In sum, financial tools such as credit and savings are among the tools available to manage and cope with risk, one of the most important threats to the wellbeing of this sector of the population. Thus, financial inclusion is gaining a role in the public policy package of Colombia's social protection system. Families exposed to the risk levels of those groups described in this study should be offered more than programmes designed to overcome poverty by means of asset accumulation and capital formation. Policies aimed at providing the tools for protection from idiosyncratic and systemic risks should also be promoted.

Acknowledgements

We are grateful to the Inter-American Development Bank (IDB), which financed the development of the Survey of Banking for the beneficiaries of *Familias en Acción* as part of the Project RG-K1048 and allowed us to use the information from the survey for this research. The banking survey was conducted by Center of Economic Development Studies (CEDE, Centro de Estudios de Desarrollo Económico) during September, November and December 2009 in six major cities in Colombia. The main results of this survey were published in Maldonado and Urrea (2010). We thank all of the beneficiaries of the of *Familias en Acción* programme who answered the survey for their patience and involvement. We also want to express our gratitude to the anonymous reviewer whose careful comments improved the manuscript. Any remaining errors are our responsibility.

Biographical notes

María A. Urrea earned her BA and MA in economics from Universidad de los Andes (Bogotá, Colombia). She has worked as research assistant at the university's Center of Economic Development Studies (CEDE) and in educational research projects in Lumni Research Ltd. Her research interests are in education, conditional cash transfer programmes, financial services and financial education.

Jorge H. Maldonado is an associate professor in the Department of Economics and a researcher at the Center of Economic Development Studies (CEDE) – Universidad de los Andes (Bogotá, Colombia). He is also Deputy Director of the Latin American and Caribbean Program in Environment and Resource Economics (LACEEP). He holds a PhD in agricultural, environmental and development economics from Ohio State University and his research interests include development economics, poverty, microfinance, environment and natural resources.

Note

1. This survey, funded by Inter-American Development Bank, was conducted by the Center of Economic Development Studies (CEDE, Centro de Estudios de Desarrollo Económico) and led by the authors of the present article. Details and main results of the survey can be found in Maldonado and Urrea (2010).

References

- Alpizar, C.A., 2007. *Risk coping strategies and rural household production efficiency: quasi – experimental evidence from El Salvador*. Thesis (PhD). Ohio State University.
- Altonji, J.G., Hayashi, F., and Kotlikoff, L.J., 1992. Is the extended family altruistically linked? Direct test using micro data. *American economic review*, 82 (5), 1177–1198.
- Baez, J.E., 2006. Income volatility, risk-coping behaviour and consumption smoothing mechanisms in developing countries: a survey. *Desarrollo y sociedad*, 58, 37–83.
- Barrera, F. and Pérez-Calle, F., 2005. Consumption smoothing: empirical evidence from Colombia and Nicaragua, FEDESARROLLO (Fundación para la Educación Superior y el Desarrollo) Working Paper.
- Beegle, K., Dehejia, R., and Gatti, R., 2003. Child labour, crop shocks and credit constraints, NBER (National Bureau of Economic Research), Working Paper 10088.
- Binswanger, H. and Rosenzweig, M., 1993. Wealth, weather risk and the composition of profitability of agricultural investment. *The economic journal*, 103 (146), 56–78.
- Carter, M. and Lybbert, T.J., 2010. Who smooths what? Asset smoothing versus consumption smoothing in Burkina Faso, University of California, Davis, Working Paper.
- Christiaensen, L. and Boisvert, R.N., 2000. Measuring household food vulnerability: case evidence from Northern Mali. Department of Agricultural, Resource, and Managerial Economics, Cornell University, Working Paper 200-05.
- Cochrane, J.H., 1991. A simple test on consumption insurance. *Journal of political economy*, 99 (5), 957–976.
- Deaton, A., 1992a. Saving and income smoothing in Cote d'Ivoire. *Journal of African economies*, 1 (1), 1–24.
- Deaton, A., 1992b. *Understanding consumption*. Oxford: Oxford University.
- Dercon, S., 1996. Risk, crop-choice and savings: evidence from Tanzania. *Economic development and cultural change*, 44 (3), 485–513.
- Foster, A., 1995. Prices, credit markets and child growth in low-income rural areas. *The economic journal*, 105 (430), 551–570.
- García, A.M., 2008. *Microfinanzas y manejo del riesgo: un estudio de caso para los usuarios de la Corporación Mundial de la Mujer – Bogotá*. Thesis (Masters). Universidad de los Andes, Bogotá.
- García-Verdú, R., 2002. *Evaluation of conditional income support programs: the case of Mexico's Progresa*. Thesis (PhD). University of Chicago.
- Gaviria, A., 2002. Households responses to adverse income shocks in Latin America. *Desarrollo y sociedad*, 49, 99–127.
- Ghosh, P., Mookherjee, D., and Ray, D., 2000. Credit rationing in developing countries: an overview of the theory. In: D. Mookherjee and D. Ray, eds. *A reader in development economics*. London: Blackwell, 283–301.
- Holzmann, R. and Jorgensen, S., 1999. *Social protection as social risk management: conceptual underpinnings for the social protection sector strategy paper*. World Bank, Social Protection Discussion Paper Series No. 9904.
- Holzmann, R., Sherburne-Benz, L., and Tesliuc, E., 2003. *Social risk management: the World Bank's approach to social protection in a globalizing world*. Washington, DC: The World Bank.
- Jacoby, H. and Skoufias, E., 1997. Risk, financial markets, and human capital in a developing country. *Review of economic studies*, 64 (3), 311–335.
- Jalan, J. and Ravallion, M., 1998. *Behavioural responses to risk in rural China*. The World Bank, Policy Research Working Paper Series 1978.
- Kochar, A., 1995. Explaining households' vulnerability to idiosyncratic income shocks. *American economic review*, 85 (2), 159–164.
- Ledgerwood, J., 1999. *Microfinance handbook: and institutional and financial perspective*. Washington, DC: The World Bank.
- Ligon, E. and Schechter, L., 2003. Measuring vulnerability. *The economic journal*, 113 (486), 95–102.
- Maldonado, J.H. and Moreno, R.P., 2010. *Estrategias de suavización del consumo y del ingreso de las madres beneficiarias del programa Familias en Acción: un análisis cualitativo* [online]. Universidad de los Andes, Documento CEDE 23-2010. Available from: <http://economia.uniandes.edu.co/publicaciones/dcede2010-23.pdf> [Accessed 7 October 2011].
- Maldonado, J.H. and Tejerina, L., 2010. *Investing in large scale financial inclusion: the case of Colombia. División de salud y protección social*. Washington, DC: Inter American Development Bank, IDB-TN-197.
- Maldonado, J.H. and Urrea, M.A., 2010. *Bancarización y acceso a servicios financieros de beneficiarios urbanos del Programa Familias en Acción* [online]. Universidad de los Andes, Documento CEDE

- 41-2010. Available from: <http://economia.uniandes.edu.co/publicaciones/dcede2010-41.pdf> [Accessed 7 October 2011].
- Marulanda, B., 2007. *Microfinanzas y pobreza. Estrategia para la reducción de la pobreza y la desigualdad*. Colombia, Bogotá: Departamento Nacional de Planeación.
- McCulloch, N. and Calandrino, M., 2003. Vulnerability and chronic poverty in rural Sichuan. *World development*, 31 (3), 611–628.
- McKernan, S.M., 2002. The impact of microcredit programs on self-employment profits: do non-credit program aspects matter? *The review of economics and statistics*, 84 (1), 93–115.
- Melo, L., Téllez, J., and Zárate, H., 2006. El ahorro de los hogares en Colombia. *Ensayos sobre política económica*, 52, 110–161.
- Morduch, J., 1994. Poverty and vulnerability. *The American economic review*, 84 (2), 221–225.
- Morduch, J., 1995. Income smoothing and consumption smoothing. *The journal of economic perspectives*, 9 (3), 103–114.
- Morduch, J., 1999. The microfinance promise. *Journal of economics literature*, 37 (4), 1567–1614.
- Morduch, J., 2004. Micro-insurance: the next revolution? Oxford University Press Working Paper.
- Morduch, J. and Armendáriz de Aghion, B., 2005. *The economics of microfinance*. Cambridge, MA: MIT Press.
- Morduch, J. and Sharma, M., 2002. *Redes de seguridad, seguro informal y microfinanzas*. Banco Mundial, Serie de Documentos Sobre la Protección Social.
- Palumbo, M.G., 2000. Estimating the effects of earnings uncertainty on families' saving and insurance decisions. *Southern economic journal*, 67 (1), 64–86.
- Paxson, C., 1992. Using weather variability to estimate the response of savings to transitory income in Thailand. *American economic review*, 82 (1), 15–33.
- Ravallion, M., 2006. Evaluating anti-poverty programs. In: R.E. Evenson and T.P. Schultz, eds. *Handbook of development economics volume 4*. Amsterdam: Elsevier, 3787–3846.
- Rosenzweig, M. and Wolpin, K., 1993. Credit market constraints, consumption smoothing, and the accumulation of durable production assets in low-income countries: investments in bullocks in India. *Journal of political economy*, 101 (2), 223–244.
- Rubin, D.B. and Thomas, N., 2000. Combining propensity score matching with additional adjustments for prognostic covariates. *Journal of American statistical association*, 95 (450), 573–585.
- Stiglitz, J.E. and Weiss, A., 1981. Credit rationing in markets with imperfect information. *The American economic review*, 71 (3), 393–410.
- Tejerina, L., Bouillon, C.P., and Demaestri, E., 2006. *Financial services and poverty reduction in Latin America and the Caribbean*. Washington, DC: Inter American Development Bank.
- Tovar, J., 2008. Caracterización del ahorro en Colombia. *Coyuntura social*, 20 (38–39), 183–206.
- Townsend, R., 1994. Risk and insurance in village India. *Econometrica* 62 (3), 539–591.
- Townsend, R., 2002. Safety nets and financial institutions in the Asian crisis: the allocation of within-country risk. In: *Proceedings, from the conference on macroeconomic policies and poverty reduction*, 14–15 March, Washington, DC: International Monetary Fund.