Essays on financial management and low income households

by

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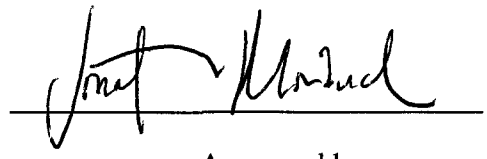

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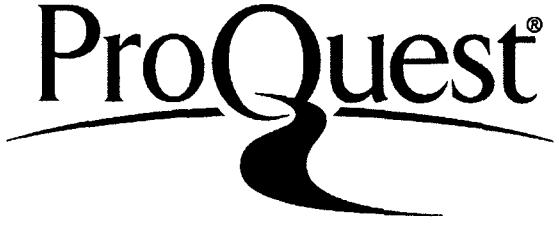

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Chapter 1. Introduction

Financial management is increasingly known to be a key factor in the lives of poor households. The poor manage their money intentionally and frequently, and the success or failure of the tools they use makes a material difference in their lives (Rutherford, 2000; Banerjee and Duflo, 2007; Armendáriz de Aghion and Morduch, 2005). Many governments in low income countries have recognized the critical role that financial instruments play in the lives of poor populations and have introduced policies designed to encourage the development of financial services that serve their needs.

But determining how to design financial services that encourage effective financial management remains a challenge. Initially, it is logical to imagine that simply lowering transaction costs—that is, making banking cheaper and more accessible—would increase usage of the formal financial sector by the underserved. However, evidence from behavioral economics suggests that merely changing the *economics* of financial services may not be enough to encourage increased formal savings in poor households, and it may even be a disincentive to retaining savings over a longer period of time. Laibson (1997) has even suggested that the increased liquidity offered by electronic cash has been, in some part, responsible for the declining savings rate in the U.S. Chapter 2 of this dissertation, "Policies to shift the savings practices of the poor," expands on these thoughts by providing further evidence that lowering banking transaction costs may not be the boon to the poor that we had hoped, throwing doubt on the efficacy of many financial-inclusion policies that strive to make banking services cheaper and more accessible. In contrast, as Chapter 2 explains, within a set of financial inclusion policies

introduced in South Africa, direct deposit is the most associated with significant benefits for savings behavior.

Banerjee and Mullainathan (2009) would argue that the poorest need particular help to resist borrowing and encourage savings because they are susceptible to small but reachable temptations that strain their budgets. In Chapter 3, "Testing Temptation," I extend this idea into an investigation of the most basic financial services available to the poorest. On the liabilities side of the household balance sheet, even the poorest have access to credit at the local store, but few other formal borrowing opportunities. Yet this type of quick credit is a tool that leaves users particularly vulnerable to temptation, especially in comparison to loans, which require forethought and planning. On the savings side of the balance sheet, savings in the house is another financial instrument available to virtually anyone. However, savings kept in the house remain very accessible and are therefore available when temptation strikes. I therefore test whether the poor, through their lack of financial options, are doubly taxed: not only by tempting expenditures but also by the lack of control offered by their financial tools.

A dearth of detailed household- and individual-level data confounds efforts to disentangle diverse influences on the financial management of poor households. Most household-level financial data is generated by surveys that ask respondents about a long list of financial devices. However, this type of instrument fails to capture the cash-flow data that is so important to understanding the financial management strategies of the poor. Chapter 4, "Going with the flow," explores the pitfalls and strengths of such one-time surveys against a new set of high frequency panel survey data.

This dissertation will proceed in the following way. Chapter 2 explores the relationships between several financial inclusion policies recently introduced in South Africa and concomitant changes in financial portfolios—taking into account psychological characteristics—for individuals from low income communities. Chapter 3 continues to investigate the importance of behavioral factors in poor households by empirically testing the theory that the poor inherently face a larger "temptation tax" than the better off, and discussing whether the most common financial tools used by the poorest increase or decrease their vulnerability to temptation. Chapter 4 shifts to the topic of measuring financial management in poor households, corroborating and opposing commonly held notions about collecting income, expenditure, and financial data in low income communities in the developing world.

Chapter 2. Policies to shift the savings practices of the poor: What works?

2.1. Introduction

What can policymakers in developing countries do to improve savings behavior at the household and individual levels? Buoyed by evidence that increased formal financial participation is associated with higher growth at a country level (King and Levine, 1993; Townsend and Ueda, 2006; Kaboski and Townsend, 2005), many governments of developing countries have introduced policies to lower the economic costs of using banks.

Most of these policies arise from traditional economic theory—the desire to reduce transaction costs for all parties, including consumers. But another set of ideas suggests that savings is driven more by *behavioral* factors than economic ones. In the U.S., these ideas are finding a policy platform that proposes introducing "behaviorally informed" financial services regulation (Barr, Mullainathan and Shafir, 2008). The premise behind behaviorally informed financial services is that individuals' natural inclinations drive their financial behaviors to save or spend, and that financial instruments should be designed to either work with or to help overcome these inherent preferences.

Both economic and behavioral ideas are embedded in most policies to increase savings among low income households. For example, a policy to reduce travel time and costs for clients may require increasing the number of bank branches, particularly in rural areas. However, there may be significant ramifications to having savings in closer reach—more

convenient savings can be more easily withdrawn, and therefore may be more easily spent on impulse items, rather than kept for longer-term uses. Another policy may support direct deposit of regular earnings, including government grant payments, into a bank account. Respondents have the economic benefit of not needing to visit the bank to deposit, and there might also be a psychological benefit to keeping cash out of the recipients' hands—once the money is in the bank, it can be easier for individuals to leave it alone. A third policy may introduce a basic bank account targeted at the poor. This account comes with smaller fees, an economic benefit, but it may also be accompanied by the behavioral push that comes from a marketing campaign encouraging users to save.

In South Africa, several policies to increase financial inclusion have been introduced in the past five years. Two of the above-mentioned measures were introduced by the *Financial Sector Charter* (the "Charter"), which both encouraged banking institutions to build branches and ATMs closer to poorer populations, and also introduced the *Mzansi* account, a basic bank account offered by the four main banks and the Postbank. The third measure mentioned above, direct deposit, has been the norm among salaried workers for some time, but the South African government is now making efforts to include recipients of government grants in the direct deposit pool. Although the prime motivation is lowering the government's costs of distributing grants, the secondary benefits to the client may indeed help increase the amount of savings held within bank accounts. These lessons from South Africa can be extended to other countries, such as Kenya, Ethiopia, Pakistan, and India, which are experimenting with the direct deposit of social payments.

South Africa's recent history, then, can be seen as a very useful laboratory for testing theories of both economic and psychological drivers for savings behavior. However, it is critical to first define what "savings behavior" means. Is it merely saving more out of income, or is it keeping that savings for a longer period of time? And does it matter where the savings are kept, i.e., in the house, in a bank, or with an informal savings club?

One impediment to answering these questions is finding data with enough detail to tell us how people use the savings options they have access to. Usually, we know very little about how people use financial instruments, beyond the fact that a household has an account and perhaps some self-reported information about whether it is used. This paper uses a new source of household-level panel data called the Financial Diaries. The detailed, high-frequency panel nature of this dataset allows us to quantify and assess savings behavior within the context of a full set of financial instruments, household income, and expenditure flows. I use this panel dataset—and take advantage of the introduction of the Charter as well as the rise of direct deposit within the past five years—to empirically assess whether South Africa's new Charter-based policies are associated with a shift of individuals' savings behaviors away from their existing savings strategies.

2.2. Background

South Africa's Financial Sector Charter was a voluntary agreement among the entire membership of the financial sector in South Africa and stakeholders, including government, labor, and community, with the objective of making the sector more racially

inclusive and representative. The Charter's first undertaking was to commit the financial sector to substantially increasing effective access to transactions as well as savings, credit, and insurance products among lower-income populations. Specifically, this meant increasing service points so that low income populations were no farther than 20 kilometers from financial services, ATMs included, by 2008 (Porteous and Hazelhurst, 2004). This means that transaction costs—i.e. travel times and costs—should have fallen since the introduction of the Financial Sector Charter.

The Charter's second undertaking was to introduce appropriate products. In October 2004, the four largest commercial banks in South Africa, together with the state-owned Postbank, launched the *Mzansi* account, an entry-level bank account. The development and rollout of the Mzansi account was designed to help fulfil the four retail banks' commitments to significantly improving access to banking—particularly transactional banking—for all South Africans, as set out in the Charter. Table 2.1 below presents the product features of the current Mzansi account offered by the five banks, compared to the typical features offered by the respective nearest equivalent accounts ("NEAs").

Table 2.1: Mzansi account product features compared to NEAs

	Mzansi (2008)	Typical NEA (2008)
Account opening	• National identification required • Proof of residence required for higher incomes	
Monthly fee	• None	• Yes (varies by bank)
Balance limit	• $1,500 for private banks • $2,500 for public sector bank (Postbank)	• No • Only public sector bank (Postbank) has $2,500 maximum
Transaction limit	• $500 daily limit • $2,500 monthly limit	

Debit card	• Card allows ATM and POS transactions • All but 1 of the banks provide free card (FNB charges $2.50)	• Card allows ATM and POS transactions • Card provided free
Checks	• None	
Paper statements sent automatically	• No	
Cash deposits	• Unlimited deposits at any frequency • 1 free per month at teller or ATM • Fees for subsequent deposits vary by bank	• Unlimited deposits at any frequency • Fees vary by bank
Electronic deposits	• Unlimited • Free	
Cash withdrawals	• Unlimited withdrawals at any frequency • Fees vary by bank • Mzansi offers same price for ATM-not-on-us as ATM-on-us • NEAs charge more for ATM-not-on-us	
Debit orders (outgoing)	• Unlimited • Fees vary by bank	
Minimum opening balance	• Varies by bank o From none to $2.00	• Varies by bank o From none to $5.00
Minimum ongoing balance	• Varies by bank o From none to $2.00	• Varies by bank o From none to $5.00
Interest paid	• Varies by bank o All pay on all balances but offer tiered rates o All rates are well below inflation	• Varies by bank o Some don't pay below a certain balance threshold o All offer tiered rates o All rates are well below inflation
Penalty for high transaction volume	• Varies by bank o 3 of the 4 private banks increase fees on transactions beyond a monthly threshold	• No
Other payments	• Varies by bank o Purchase mobile phone airtime o Electronic bill pay o Internet/ mobile transfers	

Source: Bankable Frontier Associates (2009)

Table 2.1 shows that the Mzansi account has only one lower cost barrier than the NEAs, namely that Mzansi incurs no monthly fees, while NEA monthly fees vary by bank, ranging from $0.65 to $1.00. However, this one cost difference can be quite material for

poor customers, as a monthly fee can quickly cut into the small amounts that low income users might save. Other than this and a balance limit (which, at $1,500, is about three or four times the monthly income of low income households), Mzansi's core fee features are essentially the same as those of NEAs.

Because of its cross-cutting release across five major banks, Mzansi received national attention and therefore considerable marketing exposure. Bankable Frontier Associates (2009) report that a survey of Mzansi users felt that "Mzansi is a product for all South Africans" (96% agreed with this statement) and "Mzansi gives low income people an opportunity to have a bank account" (92% agreed with this statement). This suggests that, aside from any economic benefits that Mzansi may have over other accounts, the Mzansi account was seen as an opportunity to save.

The increased number of individuals receiving direct deposits of regular monthly income is an additional factor affecting low income households. Salaried workers have, for the past decade or so, received payments directly into their bank accounts, but new efforts to provide the same service for recipients of government grants have arisen over the past five years. Over 13 million South Africans—over 27% of the population—receive social grants, including child support grants, old age grants, disability grants, and foster care grants. In recent years, the South African Social Security Agency has been promoting the receipt of these grants electronically, directly into bank accounts. Although electronic receipt of these payments has not been yet mandated, grant recipients are increasingly encouraged to open bank accounts and to sign up for direct deposits. This paper discusses some direct evidence of this trend, particularly within the rural sample.

2.3 Theoretical Framework

2.3.1 Traditional economic theories of savings behavior

Traditional theoretical models of savings originate with the life cycle model, originally proposed by Modigliani and Brumberg (1954, 1979). This model proposes that individuals smooth their consumption over their lifetimes, being net savers in their working years and dissavers during retirement. Friedman (1957) expanded this view with the permanent-income hypothesis, which allows not only for a lifetime horizon (coinciding with the life cycle hypothesis) but also covers shorter time frames, such as seasonal ebbs and flows of income. Deaton (1997) builds on the Friedman model, introducing uncertainty and a convex marginal-utility-of-consumption function. In this model, an increase in uncertainty about consumption in the future will increase current saving. Deaton does this by working from the Euler inequality:

$$u'(c_t) \geq \delta R u'(c_{t+1}) \qquad (1)$$

Equation 1 suggests that if someone is borrowing at rate R, then marginal utility today must be higher than marginal utility tomorrow scaled by R and the discount rate δ, because the borrower could always borrow less and generate R units of consumption tomorrow. In other words, if the real interest rate is high enough to compensate for foregoing income today, then people should save.

At the heart of this model lies the rational consumer of financial services, a person who is making carefully considered choices about the benefits and costs of using certain financial services vis-à-vis his own preferences. In this model, the interest rate paid on

savings will be a key driver of product take-up, as will transaction costs such as fees, transport costs, and the time spent to get to the bank to make a transaction. Against such models, lowering economic costs—such as transaction costs and fees—should lead to increased bank account usage and savings.

2.3.2 Behavioral theories of savings behavior

However, as mentioned in the Introduction, a second set of ideas suggests that additional savings drivers lie beyond the pure economics of the transaction. In fact, behavioral research suggests that *higher* transaction costs, rather than decreasing likelihood of the poor taking up formal savings instruments, can actually be used to *increase* savings balances. Strotz (1955) and Phelps and Pollak (1968) were forerunners in developing models describing outcomes when there are inconsistencies between current temporal trade-offs and future temporal trade-offs. In other words, they see a difference between a consumer's impatience in the near term—when the sacrifices needed to achieve financial goals are very tangible—and the relative patience expected of a "future self." This presents a problem of self control—that is, the consumer would like to save more, but does not like the necessary implication of needing to consume less *right now* in order to do so. These models use hyperbolic or quasi-hyperbolic preferences (Ainslie, 1992; Laibson, 1997; O'Donoghue and Rabin, 1999), theories of temptation (Gul and Pesendorfer, 2001; Gul and Pesendorfer, 2004), or dual-self models of self control (Fedenberg and Levine, 2005). All these models suggest that individuals, provided that they are aware of their self-control challenges, would prefer to use savings products that restrict future choices, i.e., that have some level of illiquidity. As mentioned above,

Laibson (1997) goes so far as to suggest that financial innovation in the U.S., which has led to increased liquidity and lower implicit opportunities to commit to savings goals, could have led to the lower savings rates that we have seen over the past few decades.

Mullainathan and Shafir (2009) extend this discussion by suggesting that, though both the poor and wealthy are subject to the behavioral biases discussed above, wealthy or middle-income householders function within a robust financial system—with automatic deductions and deposits, "no-fee" options, and other tools—that help them to overcome or work with their behavioral biases. However, the poor do not have equal access to these tools—moreover, because they have less money, their margin for error is slim, and a lack of support for their behavioral biases has greater consequences (Bertrand, Mullainathan and Shafir 2004, 2006).

One could conclude that mechanisms such as direct deposit can help individuals overcome their natural inclinations toward faulty planning and procrastination. Savings would therefore work best as a default. For example, participation in 401(k) plans is significantly higher when employers offer automatic enrollment (Madiran and Shea, 2001). And the take-up of inoculations, to use a famous example from another field, increased significantly when a map of exactly where people should go for their shot was widely disseminated (Leventhal, Singer and Jones, 1965). Likewise, the Mzansi account, which was marketed to a specific clientele (low income people), for a specific purpose (savings), and at a specific, easy to reach place (all major banks) in essence opened up a "channel"—i.e., a clear plan for opening and using a savings account. Mzansi, by virtue

of being available at all banks under the same product name, therefore, may have provided a behavioral "road map" to savings.

2.4 Empirical Literature

2.4.1 Evidence from increasing availability of banking

Most of the literature that explores the impact of increasing the availability of banking to poor households uses an identification strategy that leverages an exogenous decrease in the cost of accessing bank products—whether by increasing proximity, lowering fees on products, or introducing new products. Many of these studies indicate that lowering economic costs does indeed appear to increase bank usage, although none are without caveats about the robustness of the results.

Distance

For example, Ikhide (1996) examines five bank extension programs in Africa. These programs were designed to address the distance of bank branches, where the required travel was felt to impede effective household savings. Ikhide uses a simple OLS (Ordinary Least Squares) equation focusing on population per bank branch as a means of measuring branch distance—i.e., the accessibility of banking services to the population. His sample includes Nigeria (whose rural bank program started in 1978), Kenya (program started in 1982), Tanzania (program started in 1982), and Ghana (program started in 1977). (He also includes Ethiopia, which has not seen an explicit attempt to extend banking services to rural areas, but which established the Commercial Bank of Ethiopia in the towns during the time period studied.) He uses pooled time series data

across these five countries from 1975-1990, gathered from IMF's IFS (International Financial Statistics) and Government Finance Statistics Yearbook. Pooled OLS regressions for the entire period suggest that the population per bank branch is *as important* in explaining changes in the gross domestic savings ratio as other variables such as income.

Branch expansion

Studies like this show a relationship between adding bank branches and overall economic growth, but say nothing about the impact that bank expansions have on the poor. Burgess and Pande (2005) estimate the impact of a rural bank expansion by using an identification strategy that takes advantage of a policy that began in India in 1969 (after bank nationalization) and ended in 1990. They were able to get around the non-random nature of the rural banking programs (i.e., private-sector banks opened branches in richer areas, while state-led banks opened branches in poorer areas) by using a policy rule that mandated that, in order to receive a license for an additional branch in a location with one or more branches (i.e., a banked location), a bank had to open branches in four eligible unbanked locations. Their research shows that branch expansion into rural unbanked locations in India significantly reduced rural poverty by increasing deposit mobilization and credit disbursement.

However, the results of this study have been criticized by both Panagariya (2006) and Kochar (2005). Panagariya (2006) contends that the introduction of the rural bank policy was not as sharp as the authors suggest, and that the branch expansion itself was not actually carried out within the period specified. Both factors throw the identification

strategy of Burgess and Pande into question. Kochar (2005) also raises questions about the Burgess and Pande's identification strategy, as the bank expansion took place alongside broader anti-poverty programs. Using a different identification strategy, Kochar argues that the increase in the number of rural banks benefited the non-poor, while providing little significant benefit to the poor.

For the purposes of this paper, the evidence presented by Burgess and Pande is difficult to translate into a meaningful result about the impact of the bank expansion on savings. Much of their discussion about the causal chain between bank branch openings and poverty reduction is connected to credit disbursement rather than savings.

Expansion and new products

Aportela (1999) looks specifically at how a bank expansion program and two new savings products affected savings in Mexico. In 1993, PAHNAL (Patronato del Ahorro Nacional, which is Mexico's national savings institute) embarked on an expansion, opening new branches in post offices and creating new savings instruments with no fees or commissions and low minimum balances.[1] Aportela used the 1992 and 1994 ENIGH results (Encuesta Nacional de Ingresos y Gastos de los Hogares, or the National Survey

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[1] At the time, banks offered savings accounts that required high initial deposits and minimum balances, and were accompanied by several fees (a fee to open an account, an annual fee, fees for withdrawal and balance inquiries, and penalties if the monthly balance went below the minimum) as well as commissions. PAHNAL offered two new savings instruments. One was a fixed-term instrument with compulsory monthly deposits of at least 50 pesos (a little more than $5 at the end of November 1999); maturity terms of 12, 24, and 36 months; a high real interest rate; and no fees or commissions. The other was a deposit account with a low minimum balance and no commission or fees, but a lower interest rate. PAHNAL also offers monthly lotteries to its accounts holders where, for every 25 pesos, the depositor gets one ticket to participate in the monthly lottery. PAHNAL wanted to expand its rural network to 400 branches by the end of 2000.

of Income and Expenditures of Households) to compare savings rates in expansion towns compared to non-expansion towns. He suggests that the expansion of PAHNAL increased households' average saving rate by 3 to 5 percentage points, and that the effect was higher for low income individuals. On average, savings rates for households with income per member lower than the minimum wage were more than 5.7 percentage points higher than households in towns not affected by the expansion. However, it is unclear whether PAHNAL's expansion strategically added more branches in poorer areas. If this is the case, then pre-existing savings rates or poverty levels could be correlated with the expansion path, which would present a selection bias.

Removing cost barriers

In work that used a randomized experiment, and was therefore less prone to selection bias, Dupas and Robinson (2008) examined the impact of providing women who were running small-scale businesses in Kenya with savings accounts in a village bank.[2] Conceptually, they used small-scale business owners as a way to pinpoint the difference between returns to savings versus returns to investing in the businesses. If the savings interest rate is negative and marginal returns in the business is non-zero, then the women should choose not to save but should reinvest in their business. However, if investments are lumpy, then women will save over time, and the time it takes before they can make the next bulky investment will depend on the savings interest rate. The savings accounts examined in this study were interest-free and had substantial withdrawal fees, so the interest rate earned on deposits was effectively negative. These were not commitment

[2] The authors paid the women's account opening fees and provided the minimum opening balances.

savings devices, but they included elements of inflexibility—as mentioned, there were heavy withdrawal fees and the bank was only open 6 hours a day, 5 days a week. The authors reasoned that, with the bank accounts offering a negative effective interest rate, the women should not have been enticed to take them up, and gaining access to the account should have no impact on the growth rate of the working capital. The authors also reasoned that customers should take up the account if it paid a higher interest rate on savings than informal devices currently in use. The authors used changes in business investments to show whether access to the bank account allowed the customers to increase their working capital and business growth.

Dupas and Robinson found that the savings accounts had substantial positive impacts on investments for the women. The difference in daily productive investment was found to be about 40% in average investment about 4-6 months after opening the account. This suggests that the women face large negative private returns on the money they save informally, and that these negative returns matter enough to make them behave differently when an alternative presents itself. Six months after gaining access to the account, the daily private expenditures of women were, on average 37% to 48% higher than those in the comparison group. Food expenditures were higher as well, suggesting that the higher investment levels had led to higher income levels. The authors also noticed that the bank accounts appeared to make the women less vulnerable to health shocks, as the control group was forced to draw down working capital in response to these family crises. Although Dupas and Robinson provide some of the strongest evidence yet that removing economic barriers to bank accounts does indeed shift savings

patterns to benefit poor households, the data they collected appears noisy. One of the key contributions of this paper is to use a detailed, high-frequency data set that allows specific operationalizations of key variables.

2.4.2 Behavioral features in informal finance—Deposit collectors, ROSCAs, and ASCAs

In the U.S., several researchers have investigated the effectiveness of adding behaviorally sensitive elements into financial devices (Thaler and Sunstein, 2008; Thaler and Benartzi, 2004). These lessons are now making their way into the regulatory framework (Barr, Mullainathan and Shafir, 2008). In developing countries, evidence that behavioral issues matter comes mainly from observations of effective informal-sector devices such as savings clubs and deposit collectors.

Deposit collectors encourage savings by visiting clients on a periodic basis and collecting savings from them. In Ghana, for example, individuals pay for deposit collection services through *susu* collectors, who travel to homes at regular intervals to collect savings deposits (Aryeetey and Steel 1995). Aryeetey and Gockel (1991) report that 78% of so-called "market women" in Ghana's largest cities save by using *susu* collectors. Although collectors certainly save customers time, they do not necessarily save them money, as the collectors tend to charge enough for the service to generate negative interest rates on savings (Rutherford 2000). Ashraf, Karlan and Yin (2006a) suggest that psychological factors also lie behind use of deposit collectors. They point out that the face-to-face contact with the collector provides pressure to make a deposit. Using a random control trial, they found that customers who were offered a deposit-taking service

increased their savings by about 25% and were also less likely to borrow from the same institution.

Savings clubs such as ASCAs (Accumulating Savings and Credit Associations) and ROSCAs (Rotating Savings and Credit Associations) are even more ubiquitous tools in developing countries, as detailed by Rutherford (2000). Unlike deposit collectors, ASCAs and ROSCAs are not associated with negative rates of interest, although members rarely earn interest on their savings. Collins et al. (2009) show that informal savings clubs can be an effective means of setting aside funds, with survey households in South Africa using them to set aside substantial portions of monthly income. Researchers have long suggested social reasons, such as a sense of camaraderie or a mechanism to keep funds away from other household members, for using ROSCAs despite the lack of earned interest (Besley, Coates and Loury, 1993; Burman and Lembete, 1995; Buijs, 1998, 2002; Calomiris and Rajaraman, 1999). But more evidence is building that the reasons may be more behavioral than economic (Ardener, 1964; Bouman 1995; Chamlee-Wright, 2002; Rutherford, 1999; Wright, 1999; Gugerty, 2007; Anderson and Baland, 2002; Tanaka and Nguyen, 2009; Ambec and Treich, 2007; Dangnelie and LeMay-Boucher, 2008; Basu, 2008). In other words, members may use a savings club to keep money safe from their own spending desires as much as the desires of others in their household who want to spend it.

Experiments have also shown that adding a behaviorally sensitive feature, such as a commitment device, to a financial instrument, without changing the economic features, can increase take-up and use. Ashraf et al. (2006b) conducted a field experiment that

offered respondents a new bank account with a commitment feature but no further benefits (i.e., it restricted access to deposits as per the client's instructions upon opening the account), and it did not compensate the client for this restriction. They found that those who used the product increased their savings by 81 percentage points relative to a control group who were not offered the product. Bauer et al. (2009) stretch the definition of what may be "behaviorally sensitive" beyond deposit collectors or commitment devices. They suggest that part of microfinance's attraction may be not simply the improved access to credit, but rather the discipline it brings to poor borrowers' lives.

2.5 Reflections on the literature and clarification of the research question

As the above section shows, the existing literature has focused on a number of different ideas—the possible impact of economic costs on savings, the psychological aspects of personal finance, the motivations underlying the use of informal savings groups—but the strength of these concepts relative to each other has yet to be examined.

Poor households utilize not just one financial instrument but an entire portfolio of financial tools for different purposes and at different times (Collins et al., 2009). Moreover, as Table 2.2 shows, poor households already save a substantial portion of their income, some 21% per month. The issue is not the poor's being *able* to save, but *how* they save their money. What Table 2.2 suggests is that much of this savings takes place informally, being kept in the house and put into savings clubs, rather than being deposited in a bank, particularly among the poorest. Savings kept in the house is clearly at risk—e.g., theft, deterioration, or capture by members of the household or relatives. As

mentioned in above, savings clubs are tools that protect savings from being spent. Yet Wright and Mutesasira (2001) provide evidence that savings clubs, for all their attractions, also hold serious, risks such as not getting savings back when clubs fail. Therefore, it is not clear whether holding such large portions of savings in savings club is optimal for poor households.

Table 2.2: Savings patterns for South African households, based on dollars per day income levels

	Percent of sample	Mean accumulation as % of income	Mean accumulated in:				
			Saving in the house	Money guarding	Savings clubs	Bank accounts	Provident funds/savings annuities
< $2	10%	18%	45%	0%	48%	7%	0%
$2 - $5	31%	14%	29%	1%	49%	13%	1%
$5 - $10	28%	18%	8%	4%	21%	52%	10%
> $10	32%	31%	9%	1%	31%	19%	40%
Total sample	100%	21%	19%	2%	36%	25%	16%

Notes: Data in this table come from the 2004 South African Financial Diaries dataset, described in Section 2.6. The sample is 152 poor households selected from two urban and one rural site in South Africa. Data on income, expenditure, and financial transactions were collected every fortnight for over a year. Dollar-a-day figures are calculated by deflating South African Rand monthly income for each household to 1993 prices and converting to U.S. dollars using the 1993 purchasing power parity conversation factor provided by the World Bank.

In short, the question at hand is not so much whether the three policy innovations discussed in the Introduction to this Chapter (that is, geographic distance of bank branches, entry-level accounts, and direct deposit of income) are associated with households being able to simply save more *as a whole*, but with *households' changing their savings patterns.* In other words, what are the innovations that can help households

move their portfolios away from saving in the house or in savings clubs and into saving at the bank?

This paper aims to contribute to the literature by clarifying which policies appear to be associated with shifting savings patterns away from informal savings and into bank accounts.

2.6 Data and empirical strategy

This paper uses the Financial Diaries,[3] a unique dataset on household financial flows in South Africa. This dataset is not a set of self-report "diaries," but a year-long series of fortnightly household interviews tracking daily income, expenditures, and transactions. The sample is focused on 125[4] black households in one rural (Lugangeni) and two urban (Diepsloot and Langa) areas of South Africa.

The two urban areas represented great diversity. Langa, which was very close to Cape Town, is the oldest black township in the metropolitan area. As such, there are a number of households in the sample who owned their own homes, passed down to them from their familes. However, there are also a number of households drawn from nearby informal shack areas. These households are newly arrived in Cape Town, coming from the rural areas for work. Diepsloot is an urban area close to Johannesburg. Unlike

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[3] The Financial Diaries is a research project based at the University of Cape Town and funded by the Ford Foundation, FinMark Trust, and the Micro Finance Regulatory Council of South Africa. Please see www.FinancialDiaries.com for more information.

[4] The sample started out with 181 households and had an attrition rate of 19% through the survey year. The second panel succeeded in finding 125 households. The analysis shown in this paper is based on the 157 individuals for whom we have a complete set of data in both years.

Langa, Diepsloot was created when the municipal council required those living in very crowded Alexandria to move. Diepsloot is considerably further away from central and suburban Johannesburg than Langa is to Cape Town. A number of households in Diepsloot own their homes either through a special mortgage financing program or the government's Reconstruction and Development Programme. However, as in Langa, there are a number of informal shack areas and the Financial Diaries draw proportionately on these areas as well as those in brick homes.

Rural Lugangeni is in the Eastern Cape Province, one of the poorest provinces of South Africa. The nearest major town is Mount Frere, where respondents do their banking and major shopping. Most respondents in Lugangeni lives in homes they own, but many are dependent on monthly social welfare payments. Moreover, the respondents from this area are considerably poorer, with a higher percentage than the urban areas living at the $2 per capita per day or below. Collins (2005) provides more details of all three areas.

The original dataset is complemented by a more recent panel, a month-long round of interviews completed in 2009. This second panel took a total of seven weeks: one week to reconnect with the previous respondents; two weeks to conduct a "refresher" interview to update changes in household membership, sources, and levels of income, as well as the closing and opening of financial instruments; and then four weeks to do two fortnightly diaries questionnaires, capturing a full month's worth of actual household cash flows. Lastly, in 2010, the Financial Diaries households were visited again to collect individual level psychological and cognitive skills variables. Table 2.3 below shows the number of households and individuals at each stage of the Financial Diaries.

Table 2.3: Number of households and adult individuals in each stage of Financial Diaries

	Total sample	Lugangeni (Rural)	Langa (Urban)	Diepsloot (Urban)
Original 10 month sample (at end in December 2004)				
2003 households	181	61	60	60
2003 adult individuals	418	143	132	143
Original 10 month sample (at end in December 2004)				
2004 households	152	59	45	48
2004 adult individuals	281	104	88	89
One month revisit sample				
2009 households	125	48	37	39
2009 adult individuals	212	74	69	69
Collection of psychological and cognitive data				
2010 households	115	46	34	35
2010 adult individuals	157	47	49	61

As Table 2.3 shows, attrition in the urban areas was much higher, roughly 25%, compared to the attrition in the rural areas, only 15%, over the six years of data collection. Table 2.4 shows that the households that stayed in the sample are not only more rural, but are poorers, less banked and have heavier dependency ratios. In the regressions shown in Section 2.7, I only use the households that remained in the sample for both 2004 and 2009 panels.

Table 2.4: Characteristics of households that attrited from sample from 2004 to 2010 versus those that remained (2004 data shown)

	Attrited households	Households remaining in the sample
Number	37	115
Per capita monthly household income (US$)	$196	$136
% banked	73%	64%
% rural	32%	40%
Dependency Ratio (number of children to adults)	0.68	1.15

As mentioned above, between 2004 and 2009, the Mzansi account was introduced and a number of bank branches were opened in urban areas. During this same time, a new road was built between the rural village of Lugangeni and its town center of Mount Frere, where there were a number of bank branches. Individuals in the Lugangeni area also received higher amounts of their monthly income via direct deposit, thanks largely to new efforts by the South African Social Security Agency. Note that these changes in Lugangeni lack a control group and I therefore only measure an *association* between policy variables and financial management, and so cannot show any causal influence for the policy variables.

2.6.1 Operationalization of savings

One of this Chapter's key contributions is using the richness of the Financial Diaries data to operationalize the questions posed above. The advantage of having such detailed data is that I can measure savings in different ways. For example, the Financial Diaries

provide measures of use over time. One way of getting usage information is simply to ask the household whether they have used the account in the past period; this is a common question in one-off surveys of financial behavior. However, the Financial Diaries did not track usage by simplistically asking respondents whether they had used a financial device within a particular period of time. Rather, the Diaries questionnaires observed the daily cash flows in and out of the device, so the Diaries allow me to measure savings as both a flow and a stock.

Having panel data is particularly important when measuring savings flow, for two reasons. First of all, households do not maintain a slow and steady pattern of savings accumulation. In the real world, each household's savings pattern changes over time. In the 2004 Diaries, households would put aside different amounts from month to month, usually choosing to save via savings clubs, and they might need to withdraw savings to fund an event or emergency. But savings clubs can be amorphous, particularly small ones between only a few people. During one cycle, a savings club may consist of six members, with each contributing a substantial amount, but during the next cycle, half the members might decide to sit out and the contributions might be smaller. To help overcome the seasonal differences, I use the period in the 2004 data that exactly matches the seven-week period of data collection for the second panel of Diaries in 2009.

Second, the data allow me to measure portfolio rebalancing effects at different points and to better understand how financial behaviors may be related to changes in policy variables. In particular, the Financial Diaries allow me to measure portfolio rebalancing in terms of both stock and flows, as well as between different instruments. I can, for

example, capture a rebalancing between formal and informal financial instruments, but also, more specifically, between bank accounts and savings clubs, or between bank accounts and saving in the house. Table 2.5 describes how the dependent variables are defined.

Table 2.5: Dependent variable definitions

Variable name	Definition
Bank use	The number of times the respondent uses the bank in a month.
Bank balance	The balance in all bank accounts that the respondent has at the end of the given time period. Specified as the share of total financial assets.
Net Bank Flows	The sum of flows into all bank accounts, less the withdrawals from all bank accounts, over a month. Specified as a ratio over total income.
House balance	The balance in all hiding places in the house that the respondent has at the end of the given time period. Specified as a share of total financial assets.
Savings club flows	The sum of flows into all savings clubs over a month. Specified as a ratio over total income.

2.6.2 Operationalization of financial policy variables

The three different policies discussed above (building ATMs and branches closer to poorer populations, introducing the Mzansi account, and supporting direct deposit) were initiated between 2004 and 2009. Table 2.6 describes these policy variables:

Table 2.6: Policy variable definitions

Variable name	Definition
Travel time to the bank	The Financial Sector Charter required that banks provide services closer (specifically, 20 km) to low income areas. This had the effect of decreasing travel time to the bank. Diaries respondents were asked to report the amount of time (in minutes) it took them to travel (one way) to their bank branch to make a withdrawal (respondents were also asked about travel to make deposits, but the difference between responses was insignificant). In 2009, respondents were asked about current travel time, and they were also asked retrospectively how long the travel had taken in 2004. For those who did not have a bank account in

	either period, the average travel time for their immediate neighbors is used.
Travel cost to the bank	With the bank closer, travel costs should be lower, although rising transportation costs resulting from accumulated inflation of 42% between 2004 and 2009 may have diluted this effect. Respondents were asked to report the cost (in rand) of travelling (one way) to their bank branch where they make a withdrawal (respondents were also asked about travel to make deposits, but the difference between responses was insignificant). In 2009, respondents were asked about current costs, and they were also asked retrospectively about costs in 2004. For those who did not have a bank account in either period, the average travel cost for their immediate neighbors is used. 2009 costs are inflation-adjusted.
Mzansi	Dummy variable specifying 1 if respondent has an Mzansi account, 0 if not. Note that Mzansi was launched at end of 2004; no respondent had an Mzansi account in 2004.
Direct deposit into the bank	The Financial Diaries interviews gathered information on income amounts and how they were paid. The direct deposit in the bank was calculated as a percentage of the total income over the period.

2.6.3 Operationalization of psychological characteristics

The literature discussed in Section 2.4 points to a breadth of evidence that every individual's underlying psychological factors play into their financial management behaviors. Therefore, in order to understand which policies were most associated with changes in savings behavior, it is crucial to control for each respondent's underlying psychological propensities.

Psychological variables were developed in a series of hypothetical questions asked in follow-up interviews (the questionnaire is reproduced in Appendix 1) that took place between February and July 2010. Other researchers, particularly Bauer et al., measure discount rates and time preferences in carefully conceived experiments that use actual money rewards. I did not have the resources to measure behavioral characteristics in this way. These questions were asked by a researcher whom the respondents already knew

well, as they had engaged in Diaries interviews with her for at least the past several months.[5] The psychological characteristics measured were:

- Patience level (using a method following Bauer et al., 2009)
- Time consistency (using a method following Bauer et al., 2009)
- Risk aversion (using a method following Cole et al., 2009, and Binswanger, 1980)
- Fatalism (using a method following Cole et al., 2009)

The level of *Patience* was determined by respondents' choices between how much money they would accept today versus in the future. Respondents were asked whether they would prefer Rx today or Rx after one month. The payoffs for the current time frame and for a future time frame are summarized in Table 2.7.[6]

Discount rates were then calculated for each respondent, taking 0.25% monthly inflation into account. The discount rates for both present and future choices were then used to create five different categorical variables which are shown in Table 2.8.

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[5] This pre-existing relationship is significant, as respondents were likely to be more open and honest with someone to whom they had already exposed their financial lives. That said, the 2009 interviews were carried out by Zanele Ramuse alone, while the 2004 interviews were carried out by a team of six field staff, including Zanele, who worked in the rural area of Lugangeni.

[6] Respondents were also asked a final question about how much they would have to be paid in order to wait for the reward. These questions were used to create categorical patience and time-inconsistency variables and were not found to be directionally different from those using the switching method.

Table 2.7: Time consistency payoff choices asked of respondents in current and future time frames

Binary choices in the current time frame			*Binary choices in future time frame*		
	Today	After 1 month		After 1 year	After 1 year and 1 month
Choice 1	R100	R100	Choice 1	R100	R100
Choice 2	R100	R110	Choice 2	R100	R110
Choice 3	R100	R120	Choice 3	R100	R120
Choice 4	R100	R150	Choice 4	R100	R150

Notes: In 2010, Financial Diaries respondents were asked to choose between how much money they would accept today versus tomorrow. They were asked each of the choices above: whether they would prefer R100 today or another amount after one month, with the amounts after one month increasing with each question. They were then asked about choices in one year versus being paid after one year and one month, with later choices again increasing for each question. The answers to these questions were then used to calculate categorical variables based on patience and on time consistency, as described in Table 2.8.

Table 2.8: Discounts and categorical variables created for each respondent

Point at which respondent decides to wait for larger payoff	Discount rate	Category
Choosing to wait even if same amount	-0.25	Delayers
Choosing to wait if small payoff (at 2nd question)	0.07	Very patient
Choosing to wait if larger payoff (at 3rd question)	0.36	Patient
Choosing to wait if very large payoff (at 4th question)	1.11	Impatient
Never choosing to wait	1.33	Very impatient

Notes: These variables were created using responses to questions about money choices shown in Table 2.5. Discount rates were calculated using the formula: *((((choice after 1 month/choice today)^(1/30))-1)-0.0025)*100.* In the case of choosing never to wait, I assumed the payoff was R160, i.e., any amount greater than R150.

Allowing the respondent to choose to wait for the same amount of money adds an unusual element to this game, one which is not included in most similar games. However, some poor respondents, who naturally find it difficult to put money aside every month, may see the benefit of receiving money later, even if they could receive the same amount of money today. I call individuals who display this behavior *Delayers.*

Time consistency was calculated by simply subtracting the present discount rate from the future discount rate. A set of time consistency categorical variables was created based on the sign of these scores, where a positive score means greater future bias, a neutral score (0) means time consistency, and a negative score indicates a greater present bias, or hyperbolic discounting.

Calculating the *Risk aversion* score entailed asking respondents a series of questions (shown in Appendix 2) about the odds at which they would accept a gamble rather than a sure payout. These questions posited gambles with decreasing odds but higher payouts. The score was calculated using the point at which the respondent decided to gamble. While the regressions in the next section use the numerical score, the following categorical variables were also created and tested:

Table 2.9: Creation of Risk aversion score and associated categorical variables

Point at which the respondent chooses to gamble	Score	Category
Always picks 1	100	Extreme
Only picks 2 at question 5	80	Severe
Only picks 2 at question 4	60	Moderate
Only picks 2 at question 3	40	Inefficient
Only picks 2 at question 2	20	Slight to neutral
Always picks 2	0	None

Notes: The scores and categorical variables were created for each respondent using a series of questions (see Appendix 2) about the odds at which they would accept a gamble versus a sure payout. The questions follow a pattern of asking about gambles with decreasing odds but higher payouts.

A *Fatalism* score was calculated based on a series of three questions (see Appendix 2). The score is based on the number that the respondent strongly agrees with, agrees with, or disagrees with. A higher score indicates a lower feeling of control over the future.

2.6.4 Operationalization of cognitive skills

Following Cole et al. (2009), I also generated knowledge-based scores as controls in the regression analysis. The first is a *Math* score based on a set of eight math questions. The Math score was a straightforward calculation: Respondents were asked how much would be paid in total on credit, and a point was given if the number was higher than zero. A *Financial literacy* score is based on two questions. This score was harder to calibrate. I asked two questions about what interest rate the number given in the previous question implied, with a point given if the implied interest rate based on the response was correct. (The questions appear in Appendix 2.) For both sets of scores, a higher score means a larger percent were correct.

2.6.5 Empirical strategy

With all the above measures in hand, I first assess the determinants of having a bank account by running a Probit regression against a number of characteristics:

$$P(B_{it}=1)=\alpha+\beta TR_{it}+\rho PS_{it}+\delta C_{it}+\mu X_{it}+\gamma T09_{it}+\varepsilon_{it} \qquad (2)$$

Where B refers to whether the respondent currently has a bank account, i.e. *Banked*=1, TR refers to travel time and costs, PS refers to psychological variables, C refers to cognitive skills variables, and X is a vector of covariates for each individual *i* and time *t*. I pool together the data from both years and use T09 as a time dummy which equals 1 if the data is from 2009. I do this rather than using fixed effects, as the psychological variables were only measured once and are therefore the same in both years. Time-invariant variables would drop out of a fixed effects model and I do not want to lose what

could be important controls based on each individual's psychological make-up. The results of this regression provide some initial insights on whether transaction costs (time and/or cost of travel to the bank) or personal characteristics appear to drive uptake of banking products.

I then measured the association between the transaction costs, Mzansi use, direct deposit use, and psychological variables using both pooled and fixed effects specifications. The OLS regressions using two different specifications for each of the five financial variables:

$$F_{it} = \alpha + \beta P_{it} + \rho PS_{it} + \delta C_{it} + \mu X_{it} + \gamma T09_{it} + \varepsilon_{it} \qquad (3)$$

Where F refers to Financial variables, P refers to Policy variables, PS refers to Psychological variables, C refers to Cognitive skills variables, and X is a vector of covariates for each individual *i* and year *t*. I specify the Financial variables as defined in Table 2.5. In this specification, I pool together the data from both years and use T09 as a time dummy which equals 1 if the data is from 2009. The coefficient β for the P variables are of the most interest, and they will suggest financial behavior that is associated with policy variables.

I also run these regressions using a Fixed Effects specification:

$$F_{it} = \alpha_{it} + \beta P_{it} + \mu X_{it} + \varepsilon_{it} \qquad (4)$$

In this specification, I cannot include psychological variables and cognitive skills variables as they were measured only once. Likewise, I only control for two time-

varying covariates, real per capita income and the household dependency ratio of children to adults.

Because not every individual within the sample has a bank account, savings in the house, or in a savings club, the dependent variable data is left-censored. In order to address this, I also use a Tobit regressor on both the pooled data and for the fixed effects.[7]

2.7. Results

This Results section is divided into eight sub-sections. Sections 2.7.1 and 2.7.2 describe the statistics for the financial, policy, banking status, psychological, and cognitive variables discussed in the prior section. Section 2.7.3 reports the results of the probit regression. Finally, Sections 2.7.4 to 2.7.8 provide regression results for each financial variable in turn.

2.7.1 Descriptive statistics for changes in financial and policy variables: Differences from 2004 to 2009

Table 2.8 below shows descriptive statistics for both the Financial and Policy variables in 2004 and 2009, as discussed above. An interesting story now starts to emerge from the data. First, although *Bank use* has increased significantly, savings behavior (measured in various ways across all areas) has changed much less over five years. *Bank balance* ratio as a share of overall financial assets is the only ratio that increased significantly over the five years, and this was driven mostly by an increased ratio in the urban Diepsloot area. *Bank accumulation* rate has changed very little across any area. *House balance* ratio has

[7] A better specification, arguably, is to simply use only banked individuals for the first three sets of regressions. However, this means cutting an already small sample size of 314 to 188, which could lead to spurious results.

also changed very little, with the exception of an increase in Langa, the other urban area, a move that cuts *against* the goal of financial inclusion. With more policies introduced to improve financial inclusion, we had hoped to see this ratio decrease rather than increase. Lastly, *Savings club accumulation* rate has also changed very little; again, with policies being introduced to bring more savings into the formal financial sector, we would hope that this rate would have decreased. However, as the literature review in Section 2.4 suggests, savings club members find savings clubs compelling for a large variety of reasons, and users may not move away from these mechanisms very quickly. Overall, aside from *Bank use,* most *Financial* variables stayed stable despite significant increases in income.

Yet the *Policy* variables certainly suggest that the decline in *Bank transaction costs,* as well as the uptake of *Mzansi accounts* and *Direct deposit,* was significant. Table 2.10 shows that *Bank transaction costs*—as measured by *Travel time, Travel costs,* and *Transaction time*—have all changed significantly. *Travel time, Real travel costs* and *Transaction time* (measured only for those who are *Banked*[8]*)* decreased significantly. Only in rural Luganeni, have *Travel costs* increased significantly in real terms.

Table 2.10 also shows that roughly 13% of the sample has taken up *Mzansi accounts.* The Diepsloot population saw greater uptake of *Mzansi accounts* between 2004 and 2009, although rural Lugangeni saw the highest rate of change of any area in the banked population (this statistic is not shown in Table 2.10).

[8] Transaction time can only be measured for those who have a bank account, so this variable is not used in the regression analysis.

The percent of income now received through *Direct deposit* also increased significantly. Diepsloot did not see a significant change in the percentage of income received through *Direct deposit,* perhaps because the direct-deposit rate was 42% in 2004, much higher than the other two areas studied.

Table 2.10: Descriptive statistics for Financial and Policy variables: 2004 and 2009

	2004	2009
Financial variables		
Bank use (times per month)	2.07***	3.48**
Ratios (percent)		
Bank balance over financial assets	24.77%**	36.27%**
Net Bank Flows over income	8.55%	7.43%
House balance over financial assets	25.36%	28.55%
Savings club flows over income	7.98%	6.09%
Policy variables		
Bank transaction costs		
Travel time to transact (Minutues)	41.16***	24.40***
Travel cost to transact (South Africa rand 2004 prices)	R6.24**	R5.52**
Transaction time (Minutes, Banked only)	25.37***	14.35***
Mzansi accounts (Percent)	0%***	13.38%***
Direct deposit (Average % of income)	28.69%***	42.38%***
Banking status (Percent)	63.69%***	76.43%***
Number of individuals	157	157

Notes: Definitions of Financial and Policy variables can be found in Tables 2.5 and 2.6, respectively. Financial variables are measured for each participant in the sample. Transaction costs are measured by a one-time transaction based on responses from each participant. For those without bank accounts, Travel time and Travel costs are measured by assuming that those respondents would have the same Travel times and Travel costs as their close neighbors.

* Change between 2004 and 2009 are significant at 10%

** Change between 2004 and 2009 are significant at 5%

*** Change between 2004 and 2009 are significant at 1%

The final section of Table 2.10 shows the *Banked* status of the sample. Over half the sample in all areas were banked in both years, although some individuals switched status between the years, either becoming banked or unbanked.

2.7.2 Summary statistics for psychological and cognitive skills variables

Table 2.11 below describes the Psychological and Cognitive Skills variables for the various subsamples. With respect to *Patience*, it shows that Langa respondents seem particularly *Impatient,* while those in rural Lugangeni seem *Very patient.* This does not mean, however, that Langa respondents are particularly hyperbolic, as we see from the *Time consistency* measures. Diepsloot's respondents are particularly hyperbolic, which should, arguably, make it more difficult for them to control a natural predisposition to want to spend. By contrast, those in rural Lugangeni appear to have a greater *Future bias*—that is, more inclined to sacrifice now, but not in the future. Those in Lugangeni also score slightly higher for *Fatalism*—that is, they believe they have little control over their future. This seems odd, as one would imagine that *Future bias* and *Fatalism* would move in opposition to each other. The *Math score* suggests that most respondents across all areas have fairly high numeracy, despite differing education levels. The *Total financial literacy score* is not as strong, although the easier financial literacy question *(Score for question 1)* had very high scores. It is worth noting, and impressive, that nearly 30% of the respondents in rural Lugangeni had a correct answer on the more difficult financial literacy question *(Score for question 2).*

Table 2.11: Summary statistics for psychological and cognitive data

	Total Sample	Rural Lugangeni	Urban Langa	Urban Diepsloot
Patience				
Mean discount rate	46.26%	22.92%	88.65%	32.36%
(standard deviation)	(0.58)	(0.51)	(0.52)	(0.46)
% categorized as:				
Delayer	20.38%	36.07%	8.16%	12.77%
Very patient	22.29%	24.59%	6.12%	36.17%
Patient	22.93%	21.31%	14.29%	34.04%
Impatient	19.11%	6.56%	44.90%	8.51%
Very impatient	15.29%	11.48%	26.53%	8.51%
Time consistency				
% categorized as:				
Present bias (hyperbolic)	21.02%	13.11%	16.33%	36.17%
Future bias	29.30%	54.10%	16.33%	10.64%
Time consistent	49.68%	32.79%	67.35%	53.19%
Other psychological characteristics				
Risk aversion, average score	82.80	79.34	91.02	78.72
(standard deviation)	(0.33)	(0.37)	(0.24)	(0.34)
Fatalism, % agree or strong agree	63.69%	76.50%	46.26%	65.25%
Cognitive skills				
Math score	86.23%	81.76%	92.60%	85.37%
(standard deviation)	(0.19)	(0.25)	(0.12)	(0.15)
Total financial literacy score	54.78%	57.38%	50.00%	56.38%
(standard deviation)	(0.23)	(0.32)	(0.10)	(0.16)
Score for question 1	93.63%	85.25%	97.96%	100.00%
Score for question 2	15.92%	29.51%	2.04%	12.77%
Number of individuals	157	61	49	47

Notes: Individuals in the sample were asked a series of questions about money tradeoffs, fatalism, risk aversion, and understanding, described in Section 2.6. Interviews took place during a revisit in 2010.

It is useful to compare these descriptive statistics to those found in previous literature. In terms of *Patience,* Ashfraf et al. (2006) found that about one-third of their respondents in the Philippines were considered patient, while Bauer et al. (2009) found that a similar

percentage of their sample in rural India were patient. The results in Table 2.11 suggest that patience is quite a bit higher in this South Africa sample, with the exception of Langa. However, Bauer et al. (2009) found that 23% could be considered the most patient, that is, had the lowest discount rate. This is roughly the same as I found in this sample, although Bauer et al. did not consider a commitment-focused group.

The more disturbing comparison comes from the *Time consistency* data, specifically the *Present bias* data. Ashraf et al. (2006) found that about 25.7% of their sample were present-biased, or hyperbolic, while only 14.6% were what this paper terms "time inconsistent"—that is, patient now, impatient later, which I call *Future bias*. Likewise, Bauer et al. (2009) found that roughly one-third of their sample were hyperbolic (considering those who were both weakly and strongly present-biased), while only 9.6% of their sample were time-inconsistent. I found a similar percentage of the South African sample to be hyperbolic, but a greater share of the Financial Diaries sample has a *Future bias* than Ashraf et al. and Bauer et al. found in their samples.

However, as intimated above, measuring hyperbolic discounting can be difficult within a household survey, where there is no distribution of actual money. Cole et al. (2009) used a questionnaire-based tool for their study populations in Indonesia and India (as I did here), and they found that a measure of hyperbolic discounting is not statistically different from zero—that is, they find that most respondents are time-consistent. This result contradicts Bauer et al.'s finding that a third of their sample, also based in India, are hyperbolic discounters. These odd results may be the result of imperfect measurement of time inconsistency.

Measures of *Fatalism* and *Risk aversion*[9] were created following Cole et al. (2009), who gathered data in India and Indonesia. The *Fatalism* score for the South African respondents was 64%, compared to 53% of the respondents in India and 60% of the respondents in Indonesia. Compared to the Indonesia and Indian samples used by Cole et al. (2009), South Africans appear to be extremely risk averse. Some 92% of the South African sample opted to receive money for certain rather than gamble, even though the payoffs were larger than the examples that Cole et al. had used in India and Indonesia. In contrast, 19% of the India sample was risk averse and 36% of the Indonesia sample was risk averse.

I evaluated *Math* score with a series of eight questions similar to Cole et al., finding an average score of 86% among the South African sample, higher than the 62% Cole et al. found in India but similar to the 81% in Indonesia. Although I based my two financial literacy questions on Cole et al., I changed them enough to make comparisons less than informative.

2.7.3 Who is most likely to be banked?

This section discusses the results of the probit model, which help us better understand the determinants of being Banked in the sample. The results below show the marginal effects and associated standard errors (in parentheses) of socioeconomic variables, Psychological variables, Cognitive abilities, and the distance from the bank, both in terms of time and cost.

[9] Although Cole et al. (2009) used actual lotteries, where I did not.

Table 2.12: Probit regression results for being banked

Regressor	Probit
Socioeconomic variables	
Log personal income	0.10***
	(0.02)
Age	-0.00
	(0.00)
Education	0.02***
	(0.01)
Gender	-0.12*
	(0.06)
Regular job	0.27***
	(0.06)
Receiving grant into bank	0.31***
	(0.11)
Psychological variables	
Delayer	-0.20*
	(0.11)
Very patient	-0.23**
	(0.11)
Patient	-0.42***
	(0.10)
Very impatient	-0.25**
	(0.10)
Future bias	0.09
	(0.08)
Present bias	0.14*
	(0.08)
Risk aversion	0.00
	(0.00)
Fatalism	0.11
	(0.10)
Cognitive abilities	
Financial literacy	0.06
	(0.13)
Math	0.07
	(0.17)
Distance from bank	

Travel time to bank	-0.00
	(0.00)
Travel cost to bank	-0.01
	(0.01)
(Pseudo) R-squared	0.34
Number of observations	314

Notes: Specifications of dependent variables are described in Table 2.5, policy variables in Table 2.6 and description of behavioral variables in section 2.6. In all specifications, I control for the area in which the respondent resides as well as a year dummy. I left out the patience dummy *Impatient*. I left out the time inconsistency variable *Time consistent*. Standard errors are heteroskedasticity-corrected. Marginal effects are shown with standard errors in parentheses.
* Significant at 10%
** Significant at 5%
*** Significant at 1%

It appears that almost all socioeconomic variables are significant determinants of being Banked, with the exception of age and a weak association with gender (women are less likely to be Banked). Two coefficients that are highly significant and have large point estimates are being employed and receiving a social grant directly into the bank. Both of these imply a direct deposit, which naturally drives being required to have a bank account rather than seeking one out.

This first set of regressions provides the first example of how the Psychological variables are used in the regression analysis. We would expect that the coefficients for the Patience variables should be relatively to each other, i.e., that a high coefficient for Delayers should be followed by a smaller coefficient for Very patient, an even smaller coefficient for Patient, and so on. As Impatient is the missing variable, we should also expect a sign change from Patient to Very impatient. The same logic applies to the Time consistency variables, i.e., the sign of Future basis should be different from Present bias.

In the regression results above, this pattern does not hold, which suggests that there is no strong relationship between Psychological variables and being Banked. Likewise, Cognitive abilities and distance from the bank do not seem to be significantly related to being Banked.

Therefore, the key insights derived from Table 2.12 is that banking status is perhaps driven more by requirement than by any impulse from the individuals themselves. Therefore, financial inclusion, as measured by actually having a bank account, may be driven by policy rather than behavior. The regression analyses in the next several sections will show whether individuals, once they have bank accounts, actually change their *usage patterns* in response to policy.

2.7.4 Regression results for bank use

As Section 2.7.1 suggests, most savings behavior (as shown in Table 2.10 by Bank balance ratio, Bank accumulation rate, House balance ratio, and Savings club accumulation rate) changed very little between 2004 and 2009, although Policy variables changed significantly during this same time period. Table 2.13 below provides the results of the regression analysis on the first of the five financial variables described in Section 2.5—Bank use—to dig deeper into the associations, controlling for Psychological variables, Banked status, and a number of other covariates listed in the Notes to this Table. Table 2.13 shows the regression using different specifications – pooled OLS and Tobit and fixed effects and fixed effects tobit.

Table 2.13: Regression results for bank use

Regression	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Regressor	Pooled OLS		Pooled Tobit		Pooled OLS		Pooled Tobit		Fixed Effects		Fixed Effects Tobit	
Policy variables												
Travel time to bank	-0.01	-	-0.01	-	-0.01	-	-0.01	-	-0.03**	-	-0.02*	-
	(0.01)		(0.02)		(0.01)		(0.02)		(0.01)		(0.01)	
Travel cost to bank	-	-0.09**	-	-.013**	-	-0.09**	-	-0.13*	-	-0.04	-	-0.12
		(0.04)		(0.07)		(0.04)		(0.07)		(0.07)		(0.07)
Mzansi	0.40	0.28	1.43	1.22	0.34	0.20	1.39	1.16	1.75**	2.01***	3.66***	3.83***
	(0.63)	(0.65)	(0.92)	(0.96)	(0.61)	(0.63)	(0.88)	(0.92)	(0.74)	(0.75)	(0.92)	(0.92)
% of income direct deposited	4.10***	4.16***	5.76***	5.86***	4.01***	4.07***	5.52***	5.63***	4.09***	4.33***	8.33***	8.82***
	(0.46)	(0.46)	(0.80)	(0.81)	(0.47)	(0.47)	(0.87)	(0.88)	(0.97)	(0.98)	(1.24)	(1.22)
Psychological variables												
Delayer	-	-	-	-	0.37	0.33	0.80	0.70	-	-	-	-
					(0.70)	(0.69)	(1.22)	(1.20)				
Very patient	-	-	-	-	0.61	0.57	0.66	0.61	-	-	-	-
					(0.70)	(0.68)	(1.10)	(1.09)				
Patient	-	-	-	-	0.12	0.02	-0.32	-0.55	-	-	-	-
					(0.60)	(0.60)	(1.08)	(1.08)				
Very impatient	-	-	-	-	-0.72	-0.75	-2.17**	-2.19**	-	-	-	-
					(0.46)	(0.45)	(1.09)	(1.09)				
Future bias	-	-	-	-	-0.93**	-0.92**	-0.88	-0.89	-	-	-	-
					(0.46)	(0.45)	(0.90)	(0.89)				
Present bias	-	-	-	-	-0.24	-0.18	0.10	0.23	-	-	-	-
					(0.42)	(0.42)	(0.90)	(0.92)				
Risk aversion	-	-	-	-	0.00	0.00	0.01	0.01	-	-	-	-
					(0.01)	(0.01)	(0.01)	(0.01)				
Fatalism	-	-	-	-	-1.11**	-1.09**	-1.30	-1.14	-	-	-	-
					(0.55)	(0.55)	(1.18)	(1.15)				

Table 2.13: Regression results for bank use (cont.)

Regression	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Regressor	Pooled OLS		Pooled Tobit		Pooled OLS		Pooled Tobit		Fixed Effects		Fixed Effects Tobit	
Cognitive abilities												
Financial literacy	-	-	-	-	-0.32 (0.58)	-0.41 (0.57)	-0.74 (1.49)	-0.85 (1.45)	-	-	-	-
Math	-	-	-	-	0.58 (0.80)	0.65 (0.79)	0.44 (1.96)	0.71 (1.93)	-	-	-	-
(Pseudo) R-squared	0.46	0.46	0.35	0.35	0.49	0.49	0.36	0.36	0.82	0.82	-	-
Number of observations	314	314	314	314	314	314	314	314	314	314	314	314

Notes: Specifications of Dependent variables are described in Table 2.5, Policy variables in Table 2.6, and description of Psychological and Cognitive ability variables in section 2.6. In all specifications, other than those that use fixed effects, I control for observable characteristics (education, age, gender, real per capita income, child to adult ratio and the area in which the respondent resides) as well as a year dummy. In fixed effects specifications, I control for real per capita income and child to adult ratio. I left out the patience dummy Impatient. I left out the time inconsistency variable Time consistent. Standard errors are heteroskedasticity-corrected and clustered by household. Coefficients and standard errors for the Tobit regressions are shown in the table above, but marginal effects are available upon request.

* Significant at 10%

** Significant at 5%

*** Significant at 1%

All specifictions suggest that an increased usage of Direct deposit services has a positive, significant and material association with increased Bank use. This is expected, as one would need to use the bank to withdraw directly deposited grants and salaries. Travel cost is also significant and negative across all specifications. This is is as expected, as an increased cost to transaction is associated with decreased use. Within the fixed effects specifications, Mzansi has a positive and significant association with bank use, but this is not robust across the other specifications.

Several other results are also worth noting. As discussed above, we would expect the psychological variables' coefficients to make sense relative to each other and, as Impatient is the missing variable, we would also expect a sign change from Patient to Very impatient. In this set of results, neither the patience nor the time consistency variables reflect this logical pattern.

However, it is interesting to see that Fatalism is negative and significant in the OLS regression, although not in the Tobit. This means that a higher degree of Fatalism is associated with less bank use, which is logical.

Cognitive skills do not appear to be related to bank use in any significant way. I also used the first financial literacy question only in place of the combined financial literacy score and there was no difference.

Overall, this set of regression results suggests that direct deposit may be associated with more bank use while higher travel costs are associated with fewer transactions, both of

which are intuitive. Moreover, it begins to highlight the importance of other psychological variables, not just Patience and Time consistency, to financial behavior.

2.7.5 Regression results for bank balance

This section focuses on two different dependent variable specifications, again using pooled OLS and Tobit and Fixed Effects and Fixed Effects Tobit as regressors. In all specifications the dependent variable is the ratio of bank savings stock over financial assets. Given that most policy makers view increasing formal-sector savings as a central goal, and given that Table 2.10 showed that bank balance ratios were one of the few savings variables that increased, these regression results are of particular interest.

Table 2.14: Regression results for bank balance

Regression	I	II	III	IV	V	VI	VII	VIII	IX	XI	XI	XII
Regressor	Pooled OLS		Pooled Tobit		Pooled OLS		Pooled Tobit		Fixed Effects		Fixed Effects Tobit	
Policy variables												
Travel time to bank	0.00 (0.00)	-	0.00 (0.00)	-	0.00 (0.00)	-	0.00 (0.00)	-	0.00 (0.00)	-	-0.00 (0.00)	-
Travel cost to bank	-	-0.00 (0.01)	-	0.00 (0.01)	-	-0.01 (0.01)	-	-0.01 (0.01)	-	-0.01 (0.02)	-	-0.01 (0.01)
Mzansi	0.17 (0.14)	0.17 (0.14)	0.34** (0.15)	0.36** (0.15)	0.07 (0.15)	0.07 (0.15)	0.28* (0.15)	0.28* (0.16)	0.25** (0.17)	0.24** (0.17)	0.48*** (0.14)	0.48*** (0.14)
% of income direct deposited	0.18** (0.09)	0.18** (0.09)	0.30** (0.13)	0.30** (0.13)	0.20** (0.08)	0.20** (0.09)	0.33** (0.13)	0.33*** (0.13)	-0.09 (0.22)	-0.10 (0.22)	-0.04 (0.16)	-0.03 (0.16)
Psychological variables												
Delayer	-	-	-	-	-0.10 (0.10)	-0.10 (0.10)	-0.03 (0.16)	-0.03 (0.16)	-	-	-	-
Very patient	-	-	-	-	-0.06 (0.12)	-0.05 (0.12)	0.00 (0.17)	0.01 (0.17)	-	-	-	-
Patient	-	-	-	-	-0.21 (0.13)	-0.22 (0.13)	-0.27* (0.16)	-0.27* (0.16)	-	-	-	-
Very impatient	-	-	-	-	-0.12 (0.09)	-0.12 (0.09)	-0.27* (0.16)	-0.27* (0.16)	-	-	-	-
Future bias	-	-	-	-	-0.03 (0.09)	-0.03 (0.09)	-0.06 (0.12)	-0.07 (0.12)	-	-	-	-
Present bias	-	-	-	-	0.23** (0.09)	0.24** (0.10)	0.34** (0.14)	0.35** (0.15)	-	-	-	-
Risk aversion	-	-	-	-	0.00* (0.00)	0.00* (0.00)	0.00 (0.00)	0.00 (0.00)	-	-	-	-
Fatalism	-	-	-	-	-0.40** (0.17)	-0.40** (0.17)	-0.27 (0.17)	-0.26 (0.16)	-	-	-	-

Table 2.14: Regression results for bank balance (cont.)

Regression	I	II	III	IV	V	VI	VII	VIII	IX	XI	XI	XII
Regressor	Pooled OLS		Pooled Tobit		Pooled OLS		Pooled Tobit		Fixed Effects		Fixed Effects Tobit	
Cognitive abilities												
Financial literacy	-	-	-	-	-0.17* (0.09)	-0.16* (0.09)	-0.17 (0.25)	-0.15 (0.25)	-	-	-	-
Math	-	-	-	-	-0.09 (0.23)	-0.09 (0.23)	0.28 (0.42)	0.29 (0.42)	-	-	-	-
(Pseudo) R-squared	0.13	0.13	0.21	0.21	0.21	0.22	0.22	0.22	0.66	0.66	-	-
Number of observations	314	314	314	314	314	314	314	314	314	314	314	314

Notes: Specifications of Dependent variables are described in Table 2.5, Policy variables in Table 2.6, and description of Psychological and Cognitive ability variables in section 2.6. In all specifications, other than those that use fixed effects, I control for observable characteristics (education, age, gender, real per capita income, child to adult ratio and the area in which the respondent resides) as well as a year dummy. In fixed effects specifications, I control for real per capita income and child to adult ratio. I left out the patience dummy Impatient. I left out the time inconsistency variable Time consistent. Standard errors are heteroskedasticity-corrected and clustered by household. Coefficients and standard errors for the Tobit regressions are shown in the table above, but marginal effects are available upon request.

* Significant at 10%

** Significant at 5%

*** Significant at 1%

Table 2.14 again suggests that, across the pooled specifications, direct deposit is associated with higher bank balances, although this is not the case in the fixed effects specifications. Conversely, Mzansi appears to have a positive relationship with bank balances, across half the specifications, particularly across the fixed effects specifications. This result may indicate that the lack of a monthly fee is relevant to those who want to shift a savings balances into Mzansi and leave it there. Because Mzansi does not have the monthly fee that other bank accounts have, those who deposit small balances in them do not face these savings being eroded over time. These results seem to reflect that respondents understand the benefits of this feature and shift financial assets as a result.

Although Patience variables do not have the logical progression that we would expect, as discussed above, time consistency does. However, it is a bit surprising that those with a present bias are associated with a higher bank balance while those who are future biased are associated with a lower balance. This association is significant, albeit more weakly, even when considering the overall share of the bank balance against financial assets as a dependent variable. This is unexpected, as a present bias suggests behavioral difficulty in saving. It may suggest, however, that having a bank account allows those who are present-biased to help control their temptations by putting money out of reach—a theme that we will explore more thoroughly below.

As above, fatalism appears to be significantly and negatively related to bank balances, although only for the pooled OLS specifications. This makes intuitive sense—the more control you feel you have over your life, the more you will save.

Again, cognitive skills do not seem to be significantly related to bank balances.

This set of regressions shows a continuation of the results found for bank use in section 2.7.4 above, namely, that fatalism seems to be associated with changes in savings behavior, more so than patience or time consistency, and that direct deposit continues to be associated with higher savings behavior, although there is some evidence of association between Mzansi and savings behavior.

2.7.6 Regression results for net bank flows

This section focuses on the same set of regression specifications used in the table above but using net monthly bank flows over monthly income as the dependent variable. Bank accumulation is the amount of savings left in the bank every month, so rather than a stock, like the bank balance ratio above, it is a flow variable. We saw from Table 2.10 that bank accumulation changed very little across all the sub-sample areas, so the regression results will be particularly interesting if they show any underlying relationships that an area overview did not pick up.

Table 2.15: Regression results for net bank flows

Regression	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Regressor	Pooled OLS		Pooled Tobit		Pooled OLS		Pooled Tobit		Fixed Effects		Fixed Effects Tobit	
Policy variables												
Travel time to bank	0.00	-	0.00	-	0.00	-	0.00	-	0.00**	-	0.01***	-
	(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)	
Travel cost to bank	-	0.01	-	0.01	-	0.01	-	0.00	-	-0.00	-	0.00
		(0.01)		(0.01)		(0.01)		(0.01)		(0.01)		(0.01)
Mzansi	-0.06	-0.04	0.04	0.06	-0.06	-0.05	0.04	0.05	-0.02	-0.05	0.22**	0.17
	(0.07)	(0.07)	(0.10)	(0.10)	(0.07)	(0.07)	(0.11)	(0.10)	(0.09)	(0.09)	(0.11)	(0.12)
% of income direct deposited	0.08*	0.06	0.23***	0.23***	0.07	0.07	0.23***	0.23***	0.09**	0.07**	0.63**	0.47*
	(0.05)	(0.05)	(0.08)	(0.07)	(0.05)	(0.05)	(0.09)	(0.08)	(0.12)	(0.12)	(0.27)	(0.26)
Psychological variables												
Delayer	-	-	-	-	0.02	0.03	-0.01	-0.00	-	-	-	-
					(0.08)	(0.08)	(0.14)	(0.14)				
Very patient	-	-	-	-	-0.09	-0.09	-0.15	-0.14	-	-	-	-
					(0.07)	(0.07)	(0.14)	(0.13)				
Patient	-	-	-	-	-0.08	-0.07	-0.25*	-0.24*	-	-	-	-
					(0.07)	(0.06)	(0.14)	(0.13)				
Very impatient	-	-	-	-	-0.00	-0.00	-0.13	-0.13	-	-	-	-
					(0.05)	(0.05)	(0.13)	(0.13)				
Future bias	-	-	-	-	0.00	-0.00	0.00	0.00	-	-	-	-
					(0.03)	(0.03)	(0.07)	(0.07)				
Present bias	-	-	-	-	0.03	0.03	0.04	0.03	-	-	-	-
					(0.05)	(0.05)	(0.09)	(0.10)				
Risk aversion	-	-	-	-	0.00	0.00	0.00	0.00	-	-	-	-
					(0.00)	(0.00)	(0.00)	(0.00)				
Fatalism	-	-	-	-	0.04	0.04	0.03	0.02	-	-	-	-
					(0.05)	(0.05)	(0.14)	(0.13)				

Table 2.15: Regression results for net bank flows (cont.)

Regression	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Regressor	Pooled OLS		Pooled Tobit		Pooled OLS		Pooled Tobit		Fixed Effects		Fixed Effects Tobit	
Cognitive abilities												
Financial literacy	-	-	-	-	-0.02 (0.04)	-0.01 (0.04)	-0.04 (0.13)	-0.04 (0.13)	-	-	-	-
Math	-	-	-	-	0.07 (0.07)	0.07 (0.07)	0.20 (0.22)	0.20 (0.22)	-	-	-	-
(Pseudo) R-squared	0.06	0.06	0.39	0.39	0.09	0.09	0.39	0.38	0.56	0.55	-	-
Number of observations	314	314	314	314	314	314	314	314	314	314	314	314

Notes: Specifications of Dependent variables are described in Table 2.5, Policy variables in Table 2.6, and description of Psychological and Cognitive ability variables in section 2.6. In all specifications, other than those that use fixed effects, I control for observable characteristics (education, age, gender, real per capita income, child to adult ratio and the area in which the respondent resides) as well as a year dummy. In fixed effects specifications, I control for real per capita income and child to adult ratio. I left out the patience dummy Impatient. I left out the time inconsistency variable Time consistent. Standard errors are heteroskedasticity-corrected and clustered by household. Coefficients and standard errors for the Tobit regressions are shown in the table above, but marginal effects are available upon request.

* Significant at 10%

** Significant at 5%

*** Significant at 1%

Once again, of all the policy variables, direct deposit has a positive and significant association with net bank flows, across the Tobit specifications. Given the not every respondent in the sample has a bank account, the Tobit specification is important as it will take into account the left censored nature of the dependent variable. The coefficient size reflects a material shift in savings portfolios associated with increased direct deposit. No other policy variables are significantly related to net bank flows. Likewise no psychological or cognitive ability variables are related to net bank flows.

In sum, building on the results of the last two regression results, it appears that direct deposit has a more significant relationship with increased bank accumulation rates than do transaction costs or Mzansi. Moreover, neither patience, time consistency attributes, nor cognitive skills appears to have a strong relationship with Bank accumulation.

The next two sections will examine changes in non-bank financial behavior, and these regression results may provide some insight into the results thus far.

2.7.7 Regression results for savings in the house

In the next two sections, the dependent variables used in regression are not measuring bank use or savings, but rather looking at changes in other instruments in the financial portfolio—savings in the house and savings clubs. The association of policy variables should therefore be indirect and work in reverse to the regression results with bank-related variables. In other words, a policy that is expected to *increase* bank use or savings would be expected to *decrease* savings in the house. In these two regressions, I also control for Banked status.

Table 2.16: Regression results for house balance

Regression	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Regressor	Pooled OLS		Pooled Tobit		Pooled OLS		Pooled Tobit		Fixed Effects		Fixed Effects Tobit	
Policy variables												
Travel time to bank	0.00	-	0.00	-	0.00	-	0.00	-	-0.00	-	-0.01**	-
	(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)	
Travel cost to bank	-	-0.02***	-	-0.06***	-	-0.02***	-	-0.06***	-	-0.02	-	-0.07***
		(0.01)		(0.02)		(0.01)		(0.02)		(0.02)		(0.02)
Mzansi	-0.02	-0.03	-0.18	-0.22	-0.00	-0.03	-0.16	-0.20	0.07	0.04	0.18	0.16
	(0.11)	(0.11)	(0.14)	(0.14)	(0.10)	(0.10)	(0.14)	(0.14)	(0.16)	(0.16)	(0.17)	(0.16)
% of income direct deposited	-0.12*	-0.10	-0.28**	-0.27**	-0.10	-0.08	-0.24**	-0.22*	0.14	0.13	0.23	0.15
	(0.07)	(0.07)	(0.12)	(0.11)	(0.07)	(0.07)	(0.12)	(0.12)	(0.21)	(0.20)	(0.22)	(0.22)
Banked	-0.17	-0.17	-0.30**	-0.31**	-0.16	-0.17	-0.28**	-0.30**	-0.10	-0.09	-0.22	-0.12
	(0.11)	(0.11)	(0.13)	(0.14)	(0.12)	(0.12)	(0.13)	(0.14)	(0.14)	(0.14)	(0.14)	(0.13)
Psychological variables												
Delayer	-	-	-	-	-0.06	-0.07	0.13	0.15	-	-	-	-
					(0.11)	(0.11)	(0.16)	(0.15)				
Very patient	-	-	-	-	-0.02	-0.01	-0.01	0.04	-	-	-	-
					(0.08)	(0.08)	(0.15)	(0.15)				
Patient	-	-	-	-	0.17	0.15	0.25	0.22	-	-	-	-
					(0.11)	(0.11)	(0.17)	(0.16)				
Very impatient	-	-	-	-	0.01	0.00	0.03	0.01	-	-	-	-
					(0.08)	(0.07)	(0.14)	(0.14)				
Future bias	-	-	-	-	0.02	0.02	0.01	-0.01	-	-	-	-
					(0.08)	(0.08)	(0.13)	(0.13)				
Present bias	-	-	-	-	0.07	0.10	0.01	0.06	-	-	-	-
					(0.09)	(0.10)	(0.14)	(0.14)				
Risk aversion	-	-	-	-	0.00	0.00	0.00	0.00	-	-	-	-
					(0.00)	(0.00)	(0.00)	(0.00)				

Table 2.16: Regression results for house balance (cont.)

Regression	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Regressor	Pooled OLS		Pooled Tobit		Pooled OLS		Pooled Tobit		Fixed Effects		Fixed Effects Tobit	
Psychological variables (cont)												
Fatalism	-	-	-	-	0.17** (0.08)	0.18** (0.08)	0.25* (0.14)	0.29** (0.14)	-	-	-	-
Cognitive abilities												
Financial literacy	-	-	-	-	0.13 (0.13)	0.13 (0.13)	0.13 (0.20)	0.12 (0.19)	-	-	-	-
Math	-	-	-	-	0.25 (0.17)	0.27 (0.16)	0.51* (0.28)	0.57** (0.27)	-	-	-	-
(Pseudo) R-squared	0.10	0.11	0.20	0.22	0.14	0.15	0.21	0.23	0.67	0.67	-	-
Number of observations	314	314	314	314	314	314	314	314	314	314	314	314

Notes: Specifications of Dependent variables are described in Table 2.5, Policy variables in Table 2.6, and description of Psychological and Cognitive ability variables in section 2.6. In all specifications, other than those that use fixed effects, I control for observable characteristics (education, age, gender, real per capita income, child to adult ratio and the area in which the respondent resides) as well as a year dummy. In fixed effects specifications, I control for real per capita income and child to adult ratio. I left out the patience dummy Impatient. I left out the time inconsistency variable Time consistent. Standard errors are heteroskedasticity-corrected and clustered by household. Coefficients and standard errors for the Tobit regressions are shown in the table above, but marginal effects are available upon request.

* Significant at 10%

** Significant at 5%

*** Significant at 1%

Surprisingly, two policy variables—Direct deposit and the Travel cost to the bank—are significant even though the dependent variable in this regression is not related to a bank account, but to an entirely different financial device in the individual's portolio. This means that policy measures aimed at increasing financial inclusion in the banking system can indeed be associated with a re-balancing in the way people manage their money. This is reflected in another part of the regression output—across some of the specifications, Banked status is negatively associated with savings in the house.

When significant, Direct deposit again has the expected sign—i.e., it shows that having more income direct deposited in the bank *lowers* the amount of savings in the house. However, this result is not robust across all specifications, particularly for the Fixed Effects and Fixed Effects Tobit specifications.

The relationship between Travel cost and savings in the house is robut across specifications, but the negative sign is counter-intuitive—i.e., that as travel costs to the bank increase, savings in the house decreases. One explanation may be that, because economic costs are high, account-holders go to the bank less but withdraw more money each time, and keep higher balances in the house to avoid having to go to the bank for cash needs. Therefore, perhaps a missing variable in this regression is bank use. However, separate regressions, available upon request, do indeed suggest there is a significant and *negative* relationship between bank use and the share of saving in the house over total financial assets. But there is still a significant and negative relationship between savings in the house and travel costs to the bank, which runs contrary to the logic above.

An alternative explanation may be that, though travel costs increase, bank use—that is, the frequency of using the bank—remains the same, but there remains less to save in the house, simply because the cost of travel eats into the amount available to save. However, the point estimates on the regression results are indeed quite small, and the increase in travel costs are only large in rural Lugangeni, remaining unchanged or decreased in the other two urban areas. Therefore, it is difficult to create a generalizable and robust explanation for this result.

Again, Fatalism is significant and has a positive sign as expected: that is, the more fatalistic a respondent is, the higher are the savings in the house. This finding is robust across all specifications.

In sum, we are again finding a similar set of results, now on a non-banking financial instrument. Direct deposit again appears to have a significant relationship with keeping lower balances, as a proportion of financial assets, in the house. This is the first sign we've seen that a policy variable that is associated with banking has a relationship with other choices within the overall financial portfolio. Moreover, Fatalism again appears to be a strong psychological attribute for financial management choices.

2.7.8 Regression results for savings club flows

This last results section looks at regression estimates using Savings club flows as the dependent variable. Savings club flows is the amount put into savings clubs every month as a share of monthly income. Given that this is a non bank-related variable, the association of policy variables should therefore be indirect and work in reverse to what

we would expect to find in the regression results with bank related variables. In other words, a policy that is expected to *increase* bank use or savings would be expected to *decrease* savings club accumulation.

Table 2.17: Regression results for savings club flows

Regression	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Regressor	Pooled OLS		Pooled Tobit		Pooled OLS		Pooled Tobit		Fixed Effects		Fixed Effects Tobit	
Policy variables												
Travel time to bank	-0.00	-	-0.00	-	-0.00	-	-0.00	-	-0.00	-	0.00	-
	(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)	
Travel cost to bank	-	0.01	-	0.01	-	0.01	-	0.01	-	-0.00	-	-0.01
		(0.01)		(0.01)		(0.01)		(0.01)		(0.00)		(0.01)
Mzansi	-0.02	-0.01	-0.03	-0.02	-0.01	-0.00	-0.01	-0.01	0.01	0.01	0.10	0.08
	(0.03)	(0.03)	(0.13)	(0.13)	(0.03)	(0.03)	(0.12)	(0.12)	(0.05)	(0.05)	(0.11)	(0.11)
% of income direct deposited	0.00	-0.01	-0.06	-0.07	0.02	0.01	-0.03	-0.04	-0.04	-0.04	-0.05	-0.09
	(0.04)	(0.03)	(0.11)	(0.10)	(0.04)	(0.04)	(0.11)	(0.10)	(0.06)	(0.06)	(0.16)	(0.16)
Banked	0.00	0.00	-0.02	-0.02	-0.01	-0.01	-0.06	0.22*	-0.04	-0.03	-0.14	-0.14
	(0.02)	(0.02)	(0.08)	(0.08)	(0.02)	(0.02)	(0.07)	(0.13)	(0.04)	(0.04)	(0.10)	(0.09)
Psychological variables												
Delayer	-	-	-	-	0.07**	0.07**	0.23*	0.22*	-	-	-	-
					(0.03)	(0.03)	(0.13)	(0.13)				
Very patient	-	-	-	-	0.01	0.01	0.01	0.01	-	-	-	-
					(0.03)	(0.03)	(0.13)	(0.13)				
Patient	-	-	-	-	0.00	0.01	0.02	0.03	-	-	-	-
					(0.03)	(0.03)	(0.12)	(0.12)				
Very impatient	-	-	-	-	-0.00	-0.00	-0.02	-0.01	-	-	-	-
					(0.04)	(0.04)	(0.14)	(0.14)				
Future bias	-	-	-	-	0.01	0.02	0.09	0.09	-	-	-	-
					(0.02)	(0.02)	(0.08)	(0.08)				
Present bias	-	-	-	-	0.05	0.04	0.07	0.05	-	-	-	-
					(0.04)	(0.03)	(0.11)	(0.10)				
Risk aversion	-	-	-	-	0.00	0.00	0.00	0.00	-	-	-	-
					(0.00)	(0.00)	(0.00)	(0.00)				

Table 2.17: Regression results for savings club flows (cont.)

Regression	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Regressor	Pooled OLS		Pooled Tobit		Pooled OLS		Pooled Tobit		Fixed Effects		Fixed Effects Tobit	
Psychological variables (cont)												
Fatalism	-	-	-	-	0.01 (0.04)	-0.00 (0.04)	0.05 (0.12)	0.04 (0.12)	-	-	-	-
Cognitive abilities												
Financial literacy	-	-	-	-	0.07** (0.03)	0.07** (0.03)	0.26** (0.12)	0.26** (0.11)	-	-	-	-
Math	-	-	-	-	0.01 (0.05)	0.00 (0.05)	0.04 (0.19)	0.03 (0.19)	-	-	-	-
(Pseudo) R-squared	0.06	0.08	0.45	0.45	0.10	0.12	0.45	0.45	0.67	0.67	-	-
Number of observations	314	314	314	314	314	314	314	314	314	314	314	314

Notes: Specifications of Dependent variables are described in Table 2.5, Policy variables in Table 2.6, and description of Psychological and Cognitive ability variables in section 2.6. In all specifications, other than those that use fixed effects, I control for observable characteristics (education, age, gender, real per capita income, child to adult ratio and the area in which the respondent resides) as well as a year dummy. In fixed effects specifications, I control for real per capita income and child to adult ratio. I left out the patience dummy Impatient. I left out the time inconsistency variable Time consistent. Standard errors are heteroskedasticity-corrected and clustered by household. Coefficients and standard errors for the Tobit regressions are shown in the table above, but marginal effects are available upon request.

* Significant at 10%

** Significant at 5%

*** Significant at 1%

The results of this set of regressions are as interesting for what is *not* significantly associated to Savings club accumulation as what *is*. For example, none of the Policy variables appears to be significantly related to Savings club accumulation. On one hand, this is perhaps to be expected, as it would be a quite indirect relationship. However, the preceding section shows that Savings in the house is indeed related to Direct deposit, indirect as this association may be. Moreover, the balance of Savings in the house is *significantly* related to Banked status, whereas the results in Table 2.17 suggest that Savings club flows are *not*.

This finding suggests that even if an individual has a bank account, she may still use a savings club just as much as if she did not have a bank account, but the same does not hold true for savings in the house. In other words, having a bank account may displace savings in the house—i.e., someone might save less in the house, but this savings is less likely to displace saving through savings clubs. This stands to reason, as the literature review in Section 2.4.2 suggests. Savings clubs have the behavioral feature of commitment which savings in the house, and even generic bank accounts, do not. It therefore makes sense that savings clubs give individuals added benefits that acquiring a bank account would not replace. However, savings in the house has no such features, and having a bank account would therefore be associated with different usage patterns of savings in the house.

The behavioral characteristics of those who contribute more to savings clubs every month can be seen in the significance of Psychological variables shown in Table 2.17. First, the pattern of Patience variables makes sense. Second, and more importantly, the delayers

are strongly associated with higher levels of savings club accumulation. This strongly significant association holds across specifications. This suggests that those who are more prone to want to postpone receipt of cash are strong users of savings clubs. This stands to reason, as many savings clubs do exactly that—postpone the distribution of a lump sum without earning interest.

This result also suggests how "sophisticated" individuals might be about their own psychological make-up and the actions they may take to counteract their natural tendency to avoid saving. Ashraf et al. (2006) suggest that those who have present-biased tendencies are more likely to take up a commitment product, suggesting a sophisticated understanding of one's own psychological make-up. In contrast, Tanaka and Nguyen (2009) suggest the opposite, that those with less present-bias and more patience are drawn to participate in savings clubs. The evidence presented in Table 2.17 agrees with the latter, that individuals who are more prone to patience will contribute more to savings clubs. Based on this evidence, I would suggest that heavy savings club usage reflects rather an *extension* of one's natural tendencies and preferences rather than a way of *controlling* them, as Ashraf et al. suggest. That said, it may be interesting to speculate which comes first—whether those who are prone to be delayers are drawn to heavy savings club usage, or whether those who use savings clubs heavily have learned the benefits to postponing lump sum distribution, even if they don't earn interest. Such a question is beyond the scope of this paper, but might be important to consider when seeking to understand the sophistication levels of commitment device participants.

In sum, then, the last two sets of non bank-associated regressions build on the previous results by suggesting that, while having a bank account may be associated with a decline of savings in the house, there is no significant relationship between being banked and the contributions to savings clubs. Moreover, the amount of money received via direct deposit to a bank account has a strong association to a decline in savings in the house. So policies to increase financial inclusion—direct deposit in particular—may indeed be associated with a portfolio re-balancing away from savings in the house and towards the bank.

2.8 Conclusions and limitations

This paper has examined a complex set of relationships among policy changes, savings behavior, psychological attributes, and cognitive skills, all of which are central to understanding financial management. Although testing such a complex set of relationships with such a small sample of data may be pushing the data too hard, the analysis nonetheless offers interesting and informative outcomes, based as much on what has *not* been found as what *has* been found.

The descriptive data would suggest that respondents' financial portfolios have changed very little in five years, despite significant increases in income and several significant changes in the financial services sector during that time. This may suggest that policy changes had little effect on savings behavior. However, regression results revealed much more nuanced associations between policy changes and savings behaviors.

Direct deposit seems to be the policy variable most strongly associated with increased bank use and bank savings, and with decreased savings in savings clubs. Specifically, an increase in direct-deposited income was associated with increased bank use and bank balances, and with decreased savings in the house. This is an extremely relevant finding, as many governments are now moving to deliver government-to-person social payments through electronic devices rather than in cash. Although one reason for this policy is to decrease costs and improve reliability, this paper presents an important benefit to the recipient—improved savings behavior.

Mzansi, with its no monthly fee feature, seems to also be associated with higher bank blances. However, the results from the Net Bank Flow regressions suggest that this might be the case only for those who decide to shift balances once and not to continue to add to the savings in Mzansi. Moreover, the benefit to household financial portfolios may also be its downfall from a sustainability point of view. From a bank's perspective, Mzansi's lack of monthly administrative fees has meant "huge losses" ("Financial Mail," 2011). The banking community's concerns about Mzansi's lack of broad, long-term appeal and sustainability is counterbalanced by this paper's empirical evidence that Mzansi's low fee may indeed help low income households to retain savings in the bank.

What is potentially surprising is how little transaction costs—travel time and cost—are associated with savings behaviors. The goal of the Financial Sector Charter, and the goal of many other financial-inclusion innovations like mobile and agent banking, is to address the costs that remote customers suffer. However, it is important to remember that most respondents in our sample only had to travel, on average, 16 minutes to get to the

bank and paid, on average, only $0.22, or 0.06%, of their income per month to do their banking. Although declines in travel time were significant, it did not seem to matter at these levels. Moreover, changes in costs, positive in some areas and negative in others, were significant, but may not have been material *enough* within the sample respondents' budgets to effect much change in behavior. Although transaction costs appear not to be associated with changed behavior in this sample, this doesn't mean that there wouldn't be a stronger association for those who originally lived hours away from a bank, or who were given the opportunity to transact immediately, say, on their mobile phone.

It remains to be seen whether these results shed any light on whether behavior-focused policy innovations are more effective than those that improve the economic costs of transacting. One could argue that direct deposit's behavior features, rather than its cost savings, would incentivize the account-holder's tendency to save. Having a grant or salary direct deposited into an account certainly does save the recipient the time and expense of traveling to the bank to make a deposit. However, as the analysis shows, changes in travel costs and times do not appear to be correlated with changed financial behavior. It is therefore more likely that the direct-deposit feature most closely associated with savings is the fact that direct deposit happens by default; because money is deposited into the bank automatically, it is easier to leave at least some of it there than to pull it all out.

From a methodological standpoint, the associations with psychological and cognitive measures are also informative. For example, this chapter shows that Math scores were more important than Financial literacy in explaining the savings behaviors of the newly

banked. Also, these sets of regressions strongly suggest that psychological measures such as Fatalism are as important as being Patient and having Time consistency in explaining savings patterns of the newly banked. Those researchers who control for Fatalism (such as Cole et al., 2009) find that this variable tends to have significant associations with financial behavior, albeit to a lesser extent than I have shown here. However, many researchers who examine the relationship between psychology and finance do not look far beyond variables such as Patient and Time consistent, though the results of my analysis suggests that perhaps they should.

Granted, this result may have been due to the validity of the measures Patient and Time consistent used in this paper. This paper measured psychological characteristics via questionnaire alone. Across most regressions, the variables measuring Patient and, to a lesser extent, Time consistent, did not make sense. The Financial literacy measure I used, moreover, relied on only two questions, and it is difficult to argue that these two questions perfectly captured this very challenging concept. Therefore, it is difficult to know how much of the psychological and cognitive results are due to weaknesses in measurement and how much are due to a lack of valid association with financial management.

Finally, it cannot go without saying that the ultimate limitation of this analysis is, of course, the size of the Financial Diaries sample, as the sample's relatively small size limits the degrees of freedom. The challenges of capturing fine-grained financial-flow data in a one-off questionnaire are substantial, and are the topic of Chapter Three, "Testing Temptation." However, this initial exploration using fine-grained data to

comment on the association between policy innovations and the portfolios of the poor suggests that the creation of a larger set of Financial Diaries data would yield promising insights into a complex set of financial behaviors.

Chapter 3. Testing Temptation: How do financial instruments help (or prevent) the poor escape from poverty?

3.1. Introduction

When imagining the lives of the poor—continually facing uncertain, low incomes and a constant battle to make ends meet—it's easy to imagine that they lack the ability to see far into the future, beyond the challenge of simply putting food on the table every day. Certain endemic behaviors, like borrowing at very high interest rates, would seem to confirm that view. However, other evidence, such as the active use of savings tools—even the most basic—suggests otherwise (Rutherford, 2000).

Banerjee and Mullainathan (2010) explain this contradiction by suggesting that the poor are stuck in a poverty trap simply because some consumption choices are just too tempting. This temptation, they argue, is not simply about wanting more of *all* goods today, but arises because *some* goods are more tempting than others. If we see these "temptation goods" as highly visceral, such as foods containing sugar or fat, like a cup of tea or a doughnut, then we can also see that purchasing one of these goods from time to time may considerably stretch—although it may not break—the budgets of poor households. But we can also see that wanting more than one tempting item, or wanting one every day, would perpetually throw low-income budgets out of whack, although it would barely dent those of the better off. If this is so, goes the logic of Banerjee and Mullainathan, then perhaps we can think of the poor as more vulnerable to these visceral temptations than the rich, and this, in effect, creates an inherent poverty trap.

We can then imagine a similar process at play in terms of the financial devices the poor have to manage their money. It is not that they do not have any choices—even the poorest are able to save and borrow with such instruments as mud banks used to save at home, or by informally buying goods on credit at a local store (Collins et al., 2009). The point is rather that these options leave the poor particularly open to temptation. In other words, the poor do not have financial options, such as automatic deductions into savings plans, that could help them manage their money well *despite* the everyday temptations to do otherwise—for now, these well-structured financial tools are the exclusive preserve of the better-off.

With temptation at hand and with the consequences of giving into it so dire, the poorest are triply cursed in having few ways of choosing to tie their hands to avoid temptation. Savings in the house is always nearby and easily used—it is difficult to have the discipline to build up a large and useful lump sum of cash in the house. Informal devices such as savings clubs, which have inherent commitment features, are often out of reach for the poorest, limiting their ability to save significant amounts over longer periods of time. Similarly, incremental credit is much more readily available to the poor than lump-sum loans. To be clear, I do not mean to suggest that poorer credit-users are necessarily more indebted than better-off credit-users. But credit instruments such as credit cards or shopkeepers' credit can let users immediately give in to temptation. Lump-sum loans take time and planning to raise, and are, arguably, therefore less likely to be spent on temptation goods. Of course, most poor individuals do not have access to formal credit cards or bank loans, but they do have access to informal equivalents, such as credit at the

neighborhood store, while the wealthier have access to larger loans that can be taken in a more considered manner. The limited financial vehicles the poor have to manage their money are the very vehicles that are the least effective at managing the problem of temptation.

This paper seeks to add layers of empirical evidence to these ideas. First, I test Banerjee and Mullainathan's theory that a particular set of readily-available temptation *goods* tends to land the poor in a poverty trap. Second, I extend these ideas into household-level financial management in order to test whether the most basic financial *tools* available to the poor also leave them open to temptation, thus reinforcing this poverty trap. I use the unique Financial Diaries micro dataset described in Section 2.6 on poor and non-poor households from the same low-income neighborhoods to test both of these notions.

The results have potential implications for policies on financial inclusion and regulation. If it is true that the lowest-income households do not have access to the savings products that allow them to resist temptation, then simply including the poor in the formal financial system will not be enough—more attention will have to be given to developing products with the commitment features that have been inaccessible to the poorest. With respect to credit problems, policymakers tend to focus on over-borrowing, but the problem may in fact be the *type* of borrowing rather than the amount—more regulatory focus should perhaps be put, for example, on credit card issuers than on lump-sum lenders, on or finding ways to regulate credit in small shops.

3.2. Theoretical framework

The basis for the ideas tested in this chapter is a new paper by Banerjee and Mullainathan (2010), who develop a model based on the interaction between temptation problems and poverty levels. They start from the Euler inequality:

$$u'(c_t) \geq \delta R u'(c_{t+1}) \qquad (1)$$

Where $u(C_t)$ is the utility function of consumption in time t and $t+1$, δ is the discount rate and R is the interest rate. One implication of this equation is that $\delta \leq 1/R$—that is, that those with low consumption levels also have a very low discount rate. This suggests that the poor are myopic, a view that seems to be corroborated by several observations about the behavior of poor households, such as serial borrowing at high interest rates (Karlan and Mullainathan, 2009). However, Banerjee and Mullainathan then go on to show that the same populations who borrow at very high interest rates also engage in various far-sighted behaviors, such as purchasing burial insurance. In other words, they are myopic about some decisions but not about others. Another way of explaining this behavior is "time inconsistency," or present bias (Shefin and Thaler, 1981; Laibson, 1997; O'Donoghue and Rabin, 1999). However, while most models of time inconsistency are focused on consumption levels of *all* goods, Banerjee and Mullainathan focus on the *composition* of consumption. They propose that there is a different time inconsistency in the demand for some *types* of goods versus others.

Specifically, Banerjee and Mullainathan assume that consumption c has two components—a portion spent on goods without temptation (x) and a portion spent on

goods with temptation (z). Every individual values x now and for all future periods. In contrast, only the present self values z, so z has no value in future periods. This model determines consumption by a modified Euler equation:

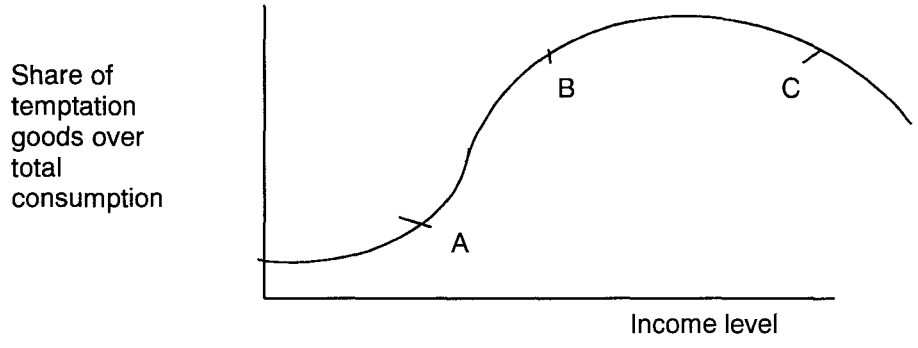
$$u'(x_t) = \delta R u'(x_{t+1})[1 - z'(c_{t+1})] \qquad (2)$$

So spending tomorrow (t+1) comes with a "temptation tax" ($z'(c_{t+1})$), as Banerjee and Mullainathan put it—i.e., a dollar spent tomorrow is a dollar that is partly dissipated on temptation goods. This means that behaviors such as high interest-rate borrowing could be due *either* to a low discount rate (δ) *or* to a high temptation tax $z'(c)$.

One implication of this model is that $z'(c)$ is decreasing while $z(c)$ is concave. This suggests that, as individuals consume more (i.e., as they grow more wealthy), the share spent on temptation goods increases at a decreasing rate, and could eventually start to decline. Figure 3.1 illustrates what a concave $z(c)$ means in terms of a poverty trap. The relationship curve between income level and the share of temptation goods is concave. Person A is at the low end of the income curve. He spends a fairly small share of his overall consumption on temptation goods because his other consumption needs take up the bulk of his income. Person B, who earns more, spends as much as he/she likes on temptation goods and so spends a higher *share* of total consumption on temptation goods. Person C might spend as much as Person B on temptation goods, but because he/she has a higher income, the share of temptation goods to income is lower.

Banerjee and Mullainathan (2010) go on to show that the implications of this curve—i.e., that temptation decreases at the margin as incomes increase—is that poorer individuals are not incentivized to save because, as their income increases, they will increase spending on temptation goods. This, in effect, creates the poverty trap discussed above. At a certain level, the poor cannot save their way out of this trap because, as income begins to go up, temptation is too strong.

Figure 3.1: Theoretical relation between income and share of expenditure on temptation goods



Implicit in this assumption is that, at certain levels of consumption, one becomes satiated with temptation goods. If we think of a doughnut as an prime example of a temptation, it is easy to imagine that there are only so many doughnuts that one would like to eat at one sitting! Banerjee and Mullainathan suggest that most temptations work in the same way—i.e., they are a craving for sweets or for something fatty. They are visceral and inherent in our physiology. This insight appears to hold true based on evidence within the consumption literature. For example, Deaton and Subramanian (1996) analyze food expenditures in rural Maharashtra. They find that the poorest deciles of rural households spend 12.2% of total expenditures on sugar, oils, and fats, while the richest deciles spend only 8.7% on the same items.

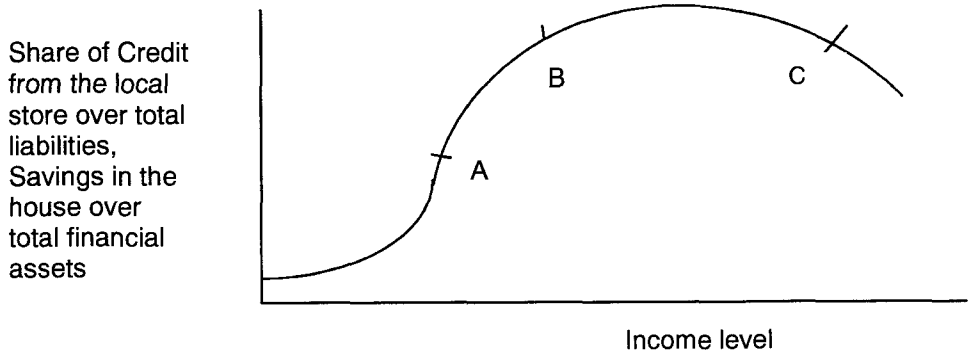
Moreover, temptation goods tend to be relatively cheap. Items that are really expensive, such as cars or homes, are difficult to buy on impulse. Buying these items takes time, so buyers have more opportunity to weigh the pros and cons of purchasing them.

When temptation goods are seen as items that are viscerally craved but only to a limit, as well as being relatively inexpensive, the combination of these factors suggest that, as overall income rises, self-control problems lessen. The hypothesis, therefore, is that $z'(c)$ is decreasing while $z(c)$ is concave. The alternative hypothesis is, of course, that self-control, or temptation problems, stays in constant step with income, which would be reflected in a straight line rather than a curved one.

What if we looked at this theory in terms of financial tools instead of expenditure? Evidence suggests that even the poorest of the poor tend to have very basic financial instruments, such as saving in a hiding place at home or taking small amounts of credit at a local store—two instruments that facilitate giving in to temptation rather than resisting it. Credit at a local store, for example, would bring any small item even closer within reach. And savings in the house is always accessible, making small amounts of temptation goods that much more available. In contrast, again, lump sum loans tend to take a while to acquire; their very nature as large sums with particular purposes makes them less prone to impulse spending. And, as I argue below, savings clubs are often taken up because their commitment features make it easier to save a lump sum than saving in the house.

However, because the poorest have low and often irregular incomes, they often do not have access to lump sum loans and savings devices with commitment features. We can see how this situation leads to a poverty trap. Using the income curve, we place the share of credit at the local store over total liabilities and savings in the house over total financial assets on the y-axis in Figure 2. Person A, on the low end of the income curve, has a lower share of credit at the local store and savings in the house than Person B, who has a higher income. If Person A achieves very small increases in income, and still has no access to financial devices besides store credit and saving money at home, then the balances in both credit at the local store and savings in the house will increase significantly. In contrast, Person C, who has much higher income, likely has access to a wider variety of financial services, so his/her share of credit at the local store and savings in the house decrease. Only having access to credit at the local store and savings in the house pulls Person A into a poverty trap—both these financial instruments encourage spending on temptation goods, rather than providing a roadblock to temptation.

Figure 3.2: Theoretical relationship between income and credit from the local store and savings in the house



3.3 Empirical literature

The theory above relies heavily on the assumption that different types of financial options allow individuals to be more, or less, susceptible to temptation purchases. To what extent does the empirical literature support this idea? In general, the literature on use of both savings and credit among poor households indicates several links between measures of consumer self-control and financial devices. A number of researchers connect hyperbolic discounting (i.e., a present bias) and commitment devices—for example, showing that informal savings clubs work like commitment devices. However, there is little discussion in the savings literature about whether poorer households make relatively more use of savings clubs versus non-commitment savings devices (like saving in the home or bank) than wealthier households do. And in the credit literature, there is a great deal more discussion, particularly based on U.S. populations, about whether poorer households are more susceptible to credit-card debt and payday loans. However, neither body of literature explores whether the poor have more access to credit *rather than* loans, as we shall see below.

3.3.1 Savings

Two pieces of research provide robust evidence that those who find it difficult to save may deliberately seek commitment devices to help them overcome the tendency to spend: Ashraf et al. (2006b) and Bauer et al. (2009).

Ashraf et al. (2006b) conducted a field experiment that offered respondents a new bank account with a commitment feature, but no further benefits—i.e., it restricted access to

deposits as per the client's instructions upon opening the account, but it did not compensate the client for this restriction. The authors found that those who used the product increased their savings by 81 percentage points relative to the control group, which was not offered the product.

More important for the topic at hand, the Ashraf et al. study also operationalized characteristics of self-control and temptation with a series of questions about near- and far-term financial preferences. Respondents who wanted immediate rewards in either timeframe were considered "impatient." Respondents who chose immediate rewards in the near term but who delayed rewards in the far term were considered "hyperbolic discounters." These hyperbolic discounters were more patient over future trade-offs than current trade-offs, which means that the implied discount rate in the near term is higher than in the far term. Finally, respondents who were patient now but impatient later were defined as "reverse time inconsistent."

Ashraf et al. (2006b) focused most heavily on the hyperbolic discounters, suggesting that if individuals are sophisticated enough to realize that they have inconsistent time preferences, then they should be interested in devices with commitment features that help them tame their present temptations while satisfying their future selves' savings goals. The results of the field experiment show that this was indeed true—for women, take-up of the commitment savings device is predicted by time-inconsistent behavior (i.e., impatient now, patient later) rather than simply by impatient behavior (impatient now).

Bauer et al. (2009) approach this same question with a sample of 573 randomly selected participants in rural South India. One of that paper's most important findings is that present-biased women kept a lower proportion of their savings in the home. This suggests that these women are aware of their temptation to spend and therefore try to keep their money outside the home, where it is less available for spontaneous spending.

Both Ashraf et al. and Bauer et al. therefore suggest that those who are present-biased (that is, hyperbolic) are sophisticated enough about their weakness to seek financial instruments that offer control. However, there is a difference between Ashraf's hyperbolic discounting and Mullainathan and Banerjee's "temptation tax" discussed in Section 3.2 above. Hyperbolic discounting is measured in three periods—today, the near future, and the far future—while the temptation tax described by Banerjee and Mullainathan is a simple trade-off between two time periods, now and the future. The temptation tax relates to patience versus impatience, and focuses on differences between the two in terms of certain commodities and at different income levels. The analysis of Ashraf et al., however, suggests that household income is a significant predictor of whether (female) respondents are impatient in the near-term framework, and shows that the shape of this relationship is concave—i.e., it is decreasing at an increasing rate, as suggested by Banerjee and Mullainathan. Nevertheless, when considering whether this impatience leads to a sophisticated choice to take up commitment devices, both studies find that the more important predictor is hyperbolic preferences, and not simply impatience.

In the literature on savings clubs, researchers offer various reasons why households so frequently use these mechanisms, when they usually impose significant inflexibility and offer no interest payment. Anderson and Baland (2002) suggest that the motivation behind use of savings club is the difficulty of keeping money safe from husbands. Aryeetey (1995) suggests that the high transaction costs of other financial instruments are an important reason why households use ROSCAs (rotating savings and credit associations). Besley, Coates and Loury (1993) suggest that savings clubs are used to save for lumpy durables. Burman and Lembete (1995) suggest that they provide knowledge sharing. Burman and Lembete (1995) and Buijs (1998, 2002) argue that they offer social contact. Finally, Calomiris and Rajaraman (1998) suggest that they insure members against future shocks.

However, ethnographic and anthropological work, as well as quantitative surveys, also emphasizes the important *commitment* features of savings clubs (Ardener, 1964; Bouman, 1995; Chamlee-Wright, 2002; Wright, 1999). Gugerty (2007) points to the social features of savings clubs—noting that clubs are normally formed between members who know each other well and who screen each other—as a way of suggesting how important it is that newcomers do not disrupt the commitment to hold the savings for the requisite period of time. She then presents evidence suggesting that savings club take-up is better explained as a commitment device than as a spousal-control device. A spate of recent literature (Tanaka and Nguyen, 2009; Ambec and Treich, 2007; Dangnelie and LeMay-Boucher, 2008; Basu, 2008) also offers evidence that savings clubs are used to enforce commitment and self-control.

In South Africa, where the data for this paper were gathered, savings clubs have been researched longer and are better documented than any other financial management tool available to poor. Savings clubs have supported financial transactions of the South African poor for decades, as evidenced by anthropological studies as far back as 1934 (Hellman, 1934; Kuper and Kaplan, 1944). More recent studies emphasize the importance of ROSCAs in South Africa, showing that they take a variety of forms and cover a wide range of needs. The above-mentioned papers therefore show important linkages between poor householders' deliberate use of commitment vehicles to help overcome the tendency to spend.

3.3.2 Credit

The credit literature shows a divide in theories about whether extending credit to the poor is harmful or beneficial. On one hand, there is evidence from the U.S. that credit card debt and payday loans make poor households debt-stressed. On the other hand, evidence from the developing world suggests that microfinance customers repay their loans, and that consumer credit borrowers appear to benefit from their loans and do not appear to be debt-stressed. The distinction, perhaps, does not lie in different environments, but in different types of instruments.

There is considerable evidence that credit cards work against self-control. Ausubel (1991) presents evidence that consumers do not always behave the way they say they do. His survey of bank credit cards shows that the majority of credit-card holders pay significant finance charges. Gross and Souleles (2002) show that when credit card limits increase, credit purchases also increase, even among cardholders who have cheaper

alternatives. Laibson, Repetto and Tobacman (2001) offer evidence of "impulsive" and "planner" selves engaging in contrasting behaviors: Their study shows consumers borrowing at high interest rates on credit cards while simultaneously patiently accumulating long-term assets like pensions.

Even though the poor in developing countries do not have easy access to formal credit instruments such as credit cards, we see that these same patterns prevail among households using informal credit instruments. In rural South India, Bauer et al. (2009) found evidence that strongly present-biased women are more likely to borrow from self-help groups, which feature structured repayment features and peer pressure. This again suggests that sophisticated individuals carefully choose financial instruments to help control their natural spending impulses.

In South Africa, Karlan and Zinman (2008a) use a random, controlled experiment to explore the impact of using loans and credit over the long term. In this experiment, a sample of credit applications that had been marginally rejected was randomly approved. Certain borrower indicators were then followed over the next two years. The results showed that expanded access to credit led to higher job retention, higher incomes, less hunger, and a more positive outlook. This shows that access to formal financial instruments with structured payback features can help mitigate users' tendencies to spend today. There was also little impact on borrowers' credit scores—which appears to refute notions that formal lenders can lay ongoing debt traps for unsophisticated borrowers.

So the U.S. evidence emphasizes the way that credit debt can overwhelm low-income consumers, while the evidence from India and South Africa suggests that most consumers use loans as a way to increase income without falling into a debt trap. What can account for these different results? One solution may lie in considering both the type of debt instrument and the loan size relative to borrowers' income. In South Africa, the debts were "longer-term" loans (i.e., for four months). Moreover, they were relatively large loans (40% of the median borrower's gross monthly income). These relatively large, relatively long-term loans are, arguably, less susceptible to temptation spending than the comparatively small, incremental amounts charged on credit cards. Because loans require so much time and effort to obtain, it could be argued that borrowers have had time to clearly plan how they are going to spend the money, making it less susceptible to temptation spending. Similarly, data microfinance institutions reporting to MIX (Microfinance Information eXchange) suggest that these loans (large relative to household income and difficult to obtain on the spot) enjoy very low default rates, implying that consumers do not face undue repayment strain. In comparison, the U.S. research focuses heavily on credit-card debt, which is more easily accessible and arguably more susceptible to temptation.

What about payday loans, which fall somewhere between credit and lump-sum loans? It is easy to imagine that users would treat them like lump-sum loans, as the borrower must go to a payday lender to arrange them. Yet these loans are, by their nature, very short-term, only tiding the borrower over until the next pay cycle. A US-based study by Skiba and Tobacman (2008) provides evidence that payday lending focuses on already stressed

borrowers, who repeatedly take out loans at very high rates. They also study the causal impact of access to payday loans on bankruptcy petitions, using a regression discontinuity design and a unique dataset from a large payday-and-pawn lender, which they match to public records on bankruptcy filings. They find that loan approval for first-time applicants increases the bankruptcy filing rate by 2.48 percentage points. Moreover, this result is driven by consumers who are already financially distressed when they begin using payday loans. The study also shows that approved applicants borrow repeatedly on payday loans and pawnbroker loans. The cumulative interest burden from payday and pawn loans amounts to roughly 11% of the total liquid debt burden at the time of bankruptcy filing. Within Skiba and Tobacman's sample, payday loans are relatively small: The total loan is about 18% of monthly income at both the median and mean. And they are short-term—50% of borrowers receive their salaries biweekly, so most payday loans are taken for, at the most, two weeks. Moreover, they are easily approved—89% of loans are approved on repeat visits. One could therefore argue that payday loans are similar to credit cards, and may offer the same type of "temptations" as credit cards.

3.4 Empirical strategy

Below, I test whether temptation *expenditure* is declining in income, as shown in Figure 3.1, and whether temptation-encouraging *financial tools,* such as saving in the house and credit at the local store, are declining in income, as shown in Figure 3.2. I undertake four empirical exercises that test both propositions against the null hypothesis that the temptation tax, with respect to goods expenditure or with respect to financial management, is constant against income:

- Testing whether the purchase of temptation goods is declining with income;
- Testing whether discount rates on temptation goods is declining with income;
- Testing whether credit at the local store is declining with income; and
- Testing whether savings in the house is declining with income.

3.4.1 *Goods temptation: Whether the purchase of temptation goods is declining with income*

The first strategy, testing whether purchase of temptation goods declines with income, is suggested by Banerjee and Mullainathan themselves. As emphasized above, their theory is based on the notion that different goods hold different temptations. In order to test the theory that the purchase of temptation goods declines with income, I construct Engel curves for each good. The Engel curves for non-temptation goods should be steeper than those for temptation goods. In particular, I work with a Working-Leser Engel curve, which specifies the share of expenditure on a good *i* (w_i) as a function of both log expenditure (y) and the square of log expenditure:

$$w_i = \beta_0 + \beta_1 \log(y_i) + \beta_2 \log^2(y_i) + \varepsilon_i \qquad (3)$$

The null hypothesis of constant returns would be confirmed if $\beta_2 = 0$, and the elasticity of high-temptation goods is higher than low-temptation goods. The results of this analysis are described in Section 3.5, below.

3.4.2 Goods temptation: Whether relative discount rates on temptation goods is declining with income

The second exercise suggested in Banerjee and Mullainathan (2009) is testing whether the difference in impatience between rich and poor is due more to the composition of goods than to impatience in general. They suggest first backing out an apparent discount rate for money (δ_m) by asking a set of questions about whether a respondent would prefer an amount guaranteed today or a larger amount *d* guaranteed in one month. The next step is to back out an apparent discount rate (δ_k) on a range of *k* goods—that is, offering 1 unit of good *k* today versus *d* units in the next period, as shown in Appendix 3. The final step is to test whether δ_m / δ_k is declining in income across individuals—i.e., whether the poor are much more impatient about money than about non-temptation goods, and whether this gap closes as income increases.

$$\frac{\delta_m}{\delta_{k_i}} = \beta_0 + \beta_1 \log(y_i) + \beta_2 \log^2(y_i) + \beta_3 X_i + \varepsilon_i \qquad (4)$$

Where X is a vector of covariates such as gender, age, area and education.

If the poor are indeed impatient with respect to temptation goods, I would expect to see $\beta_1>0$ and $\beta_2<0$. The results of this analysis are described in Section 3.5, below.

3.4.3 Financial temptation: Whether credit at the local store is declining with income

The third empirical test is to determine whether the share of credit at the local store is declining in income. As shown in Section 3.3, the empirical literature suggests that

credit, more than loans, could create a poverty trap. The hypothesis is that the relationship between the share of credit in the local store (C) is concave to income.

To test this idea in a controlled manner, I run OLS regressions of the equation:

$$C_i = \beta_0 + \beta_1 y_i + \beta_2 y_i^2 + \beta_b X_i + \varepsilon_i \qquad (5)$$

C_i is operationalized in two ways, as a share of aveage total monthly flows of credit being repaid (including flows to repay loans) and as a share of total liability stock as of November 2004. Income, y_i, is also operationalized in two ways, first as log household income per capita and then as log individual income, both monthly averages over the February to November 2004 time period. X_i is a vector of individual-level covariates, including age, gender, education, risk aversion, fatalism, math score, financial literacy, time discounting preferences and geographical area. All these variables are measured at the level of the individual (*i*). In regressions using log individual income, I also control for the child to adult ratio in the household.

If the poor are more susceptible to credit as a temptation, I would expect to see $\beta_1>0$ and $\beta_2<0$. The results of this analysis are explored in Section 3.5.

3.4.4 Financial temptation: Whether savings in the house is declining in income

Finally, I test whether the share of savings in the house is declining in income. As savings in the house is often the only savings instrument available to the poorest, I am testing to see whether use of this instrument slows as incomes increase.

To test this idea in a controlled manner, I run OLS regressions of the equation:

$$S_i = \beta_0 + \beta_1 y_i + \beta_2 y_i^2 + \beta_b X_i + \varepsilon_i \qquad (6)$$

All variables are measured at the level of the individual (*i*). S_i operationalizes savings in the house in two ways, as the average share of monthly savings flows over February to November 2004 and as the share of financial assets in November 2004. Income, y_i, is also operationalized in two ways, first as log household income per capita and then as log individual income, both monthly averages over the February to November 2004 time period. X_i is a vector of individual-level covariates, including age, gender, education, risk aversion, fatalism, math score, financial literacy, time discounting preferences and geographical area. All these variables are measured at the level of the individual (*i*). In regressions using log individual income, I also control for the child to adult ratio in the household.

If the poor are more susceptible to the temptation of raiding savings held in the house, I would expect to see $\beta_1>0$ and $\beta_2<0$. The results of this analysis are explored in Section 3.5, below.

3.5 Data

The data used to implement these tests come from the South African Financial Diaries dataset, described in Section 2.6 ("Data and empirical strategy") above. Monthly income, savings, and credit-and-loan flows are monthly averages of data collected between

February 2004 and November 2004. Credit-and-loan balances are as of November 2004. Age, gender, and education were collected at the beginning of the 2004 Financial Diaries.

As described in Section 2.6, risk aversion, time-discounting-preferences for money, financial literacy, fatalism, and cognitive abilities were collected during a round of revisits to the households in February-June 2010. In addition, a series of time-discounting questions about three different types of commodities were collected. For example, respondents were asked about how much of the commodity they would prefer to receive today versus tomorrow, as shown in Appendix 3.

Following piloting in one of the Diaries field sites, I determined that two possible temptation goods that applied to all three areas were a small bag of potato chips ("crisps") and a can of soft drink. A non-temptation good was half a loaf of bread, something that a worker or school child would have for lunch every day. The section of the Questionnaire that asks about these preferences is shown in Appendix 3.

The answers to these questions are converted into discount rates and assigned a categorical variable in the same manner described in Section 2.6 ("Data and empirical strategy").

3.6 Results

The first set of nine regressions is taken at the household level and based on the February-November 2004 totals of income and expenditure for various items. One item, food, could be considered a necessity, while the other eight items could be considered luxuries and therefore more susceptible to temptation. If the poor are more susceptible to

temptation, then the expenditure curves related to shares of spending on these goods should be concave.

Table 3.1 shows the results of these nine regressions, with very few significant relationships. Food and personal spending (like haircuts) are the only two categories that behave as one might expect—i.e., with a declining β_2 and a significantly positive β_1. However, the elasticity for food is higher than for personal items, which is not in line with the hypothesis discussed in section 3.4.1.

These results, however, may be misleading in two ways. First, they are based on household, rather than individual, spending. Evidence that individual spending can differ within a household is robust enough to suggest that differences in temptation between individuals may cancel each other out at the household level. Second, these expenditure categories may not be fine-grained enough to truly tease out temptation. "Food" could mean a package of staple *mealie meal* or it could mean a chocolate bar, but the Diaries data do not include enough detail to let us differentiate spending at this level. And, unfortunately, the Diaries dataset did not track expenditure at the fine-grained, individual level that would let us overcome either of those two problems.

Table 3.1: OLS regression results for household level Working-Leser curves

Regression Number	Dependent variable (w_i)	Expenditure[10]		R^2	Number of households
		Elasticity ($\beta 1$)	$\beta 2$		
I	Food	0.64*	-0.11***	0.54	152
		(0.34)	(0.04)		
II	Luxury items (sum of all those listed below)	-0.16	0.02	0.11	152
		(0.27)	(0.03)		
III	Luxury items excluding shoes	-0.22	0.02	0.09	152
		(0.26)	(0.03)		
IV	Cell phone	0.06*	-0.01	0.10	152
		(0.03)	(0.00)		
V	Lotto	0.01	-0.00	0.07	152
		(0.02)	(0.00)		
VI	Cigarettes	-0.12	0.01	0.12	152
		(0.11)	(0.01)		
VII	Beer, spirits	-0.20	0.02	0.12	152
		(0.17)	(0.02)		
VIII	Shoes	0.06	-0.01*	0.19	152
		(0.04)	(0.01)		
IX	Personal (e.g., haircut)	0.04**	-0.00**	0.11	152
		(0.02)	(0.00)		

Notes: Each row is a separate regression specified as $w_i = \beta_0 + \beta_1 \log(y_i) + \beta_2 \log^2(y_i) + \varepsilon_i$. (This is regression "(3)", introduced in Section 3.3, "Empirical study and data," above.) Regressions are controlled for age and gender of household head, number of people in the house, share of household members with a regular income (either a job or government grant), and area dummies. Standard errors are heteroskedasticity-corrected.

* Significant at 10%

** Significant at 5%

*** Significant at 1%

Follow-up questions about commodity and time preferences, however, may provide the fine-grained, individual-level data on which to test this hypothesis. Table 3.2 ("Summary statistics for individual-level data, commodity/time preferences"), below, shows the

[10] Other dependent variables tested were the share of household income and income per capita. Expenditure fit best, was more intuitively appropriate, and was more frequently used in previous work, but results using the other two dependent variables did not differ from Expenditure in significance or coefficient signs.

results of the time-preference questions for the three commodities discussed above—a can of cool drink, a packet of crisps, and half a loaf of bread.

Table 3.2: Summary statistics for individual-level data, commodity/time preferences

	Total Sample	Rural Lugangeni	Urban Langa	Urban Diepsloot
Goods discount rates				
Cool drink, average	46.79%	36.05%	40.16%	67.64%
Standard deviation	0.59	0.52	0.54	0.67
% *categorized as:*				
Delayers	15.29%	14.75%	16.33%	14.89%
Very patient	31.85%	39.34%	28.57%	25.53%
Patient	21.02%	22.95%	30.61%	8.51%
Impatient	7.01%	8.20%	6.12%	6.38%
Very impatient	24.84%	14.75%	18.37%	44.68%
Packet of crisps, average	36.70%	15.25%	34.29%	67.06%
Standard deviation	0.58	0.41	0.56	0.67
% *categorized as:*				
Delayers	21.66%	22.95%	24.49%	17.02%
Very patient	35.03%	52.46%	28.57%	19.15%
Patient	17.20%	14.75%	22.45%	14.89%
Impatient	5.73%	4.92%	10.20%	2.13%
Very impatient	20.38%	4.92%	14.29%	46.81%
Half loaf of bread, average	42.01%	38.20%	50.04%	38.57%
Standard deviation	0.56	0.54	0.55	0.56
% *categorized as:*				
Delayers	14.65%	21.31%	8.16%	12.77%
Very patient	33.12%	27.87%	30.61%	42.55%
Patient	25.48%	24.59%	30.61%	21.58%
Impatient	6.37%	9.84%	8.16%	0.00%
Very impatient	20.38%	16.39%	22.45%	23.40%
Number of individuals	157	61	49	47

Notes: Each discount rate is calculated for each individual as described in Section 2.6, and is based on the questionnaire reproduced in Appendix 3.

The results are the exact opposite of what one would expect, suggesting that, on average, discount rates for half a loaf of bread, expected *not* to be a temptation good, are in line with discount rates for a bag of crisps and a cool drink. In other words, on average, making someone wait for half a loaf of bread is contrary to what they want and, to make it worth their while, you need to offer them significantly more bread. When translated into categorical variables, a higher percentage of respondents registered Delayers or Very patient for a packet of crisps (56.7%) than for either a can of cool drink (47.1%) or for half a loaf of bread (47.8%).[11] Within the study areas, only Diepsloot has the discount rates that one might expect, i.e., much lower discount rates for the half loaf of bread than for the cool drink or the packet of crisps. It may be that these particular goods are highly attuned to tastes in Diepsloot but do not match tastes as well in the other two areas.

Table 3.3: OLS regression results for ratio of money to goods discount rates for individuals

Dependent variable	Ratio of money discount rate over goods discount rate for		
	Can of cool drink	Packet of crisps	Half loaf of bread
Log (income)	-0.24	-0.24	-0.23
	(0.36)	(0.49)	(0.48)
Log (income) ^{2}	0.04	0.04	0.04
	(0.07)	(0.09)	(0.09)
R-squared	0.18	0.19	0.14
Number of individuals	157	157	157

Notes: Each regression controls for log household income, age, gender, education and area dummies. Standard errors are heteroskedasticity-corrected.
* Significant at 10%
** Significant at 5%
*** Significant at 1%

[11] Results based on the last question of the series ("How MANY COOL DRINKS would we have to give you TOMORROW for you to choose to wait instead of receiving 1 COOL DRINK TODAY?") suggest even stronger results—in other words, the half loaf of bread was no less a temptation good than were the other two commodities.

Table 3.3 confirms what the raw discount data suggest—that a respondent who is *Patient* for half a loaf of bread is similarly *Patient* for the other two goods.[12] The elasticities with respect to all three goods are virtually the same.

Two conclusions could arise from this set of results. Either there is not as much temptation differentiation among commodities as Banerjee and Mullainathan expect, or the Financial Diaries data are simply not fine-grained enough across a wide enough sample to empirically support their hypothesis. I argue that my dataset is not robust enough to support this particular type of question, and that further research with a dataset more adapted to this purpose should be pursued before rejecting the idea that poor households face different constraints than wealthier ones when trying to manage their temptations.

On the other hand, the Financial Diaries dataset (as described in Section 2.6) is very well-suited for testing hypotheses about financial behavior. Table 3.4 ("OLS regression results for credit at the local stores"), below, shows the results of OLS regressions for Credit at the local store as a share of total monthly flows and a share of liabilities. In each regression, I first use household income per capita and then individual income.

[12] One interesting but tangential result is that women had a higher discount rate to a half loaf of bread but not to the other goods, perhaps suggesting the women were more sensitive to the value of a vital foodstuff and were willing to wait to get it.

Table 3.4: OLS regression results for credit at the local store

Regression	I	II	III	IV
Dependent variable:	Share of monthly liability flows		Share of liability balances	
Log household income per capita	-0.20 (0.46)	-	0.22 (0.34)	-
Log household income per capita - squared	0.00 (0.01)	-	-0.01 (0.01)	-
Log individual income	-	0.39*** (0.12)	-	0.33*** (0.11)
Log individual income - squared	-	-0.07*** (0.02)	-	-0.06*** (0.02)
R-squared	0.28	0.24	0.19	0.22
Number of observations	157	157	157	157

Notes: The above results are coefficients calculated by ordinary least squares regressions, with standard errors in parentheses. *Log individual income* is the nominal average individual income between February and November 2004, as is *Log household income per capita.* I control for, but do not show here, age, gender, education, financial literacy score, math score, patience and time consistency variables as defined in section 2.6 and dummy variables for geographical area. In the regressions with individual income I also control for child to adult ratios in the household. Standard errors are heteroskedasticity-corrected.
* Significant at 10%
** Significant at 5%
*** Significant at 1%

These results are much more revealing than the attempt to support Banerjee and Mullainathan's theory. The relationship between credit at the local store and individual income is significantly concave—i.e., it looks similar to the shape in Figure 3.1. The strong concave relationship between credit at the local store and individual income suggests that poor individuals use less credit at the local store than their wealthier counterparts do; this relationship also suggests that, as individuals' income increases, they do begin to use more credit at the local store, but at a slower rate.

The so-called credit trap may therefore arise from easy access to relatively small amounts of credit, say through the local shop, that can be tapped in varying and small amounts, and which increases as income increases. For example, a local shopkeeper may need to give credit *because* the borrower's income low and irregular. This type of credit makes any good within a local shop available on temptation, and it appears that this temptation is lessens as earnings increase, i.e. the concavity of this relationship suggests that credit is a particularly difficult financial management tool for poor households to manage well, and that it present significant temptation to the poor.

What is very surprising about these results is that *household* level income is not significantly related to the share of credit at the local store, but *individual* level income is.[13] This runs contrary to most theoretical models of household decision-making which either treat the household as an individual decision maker or as a bargaining process between agents (see for example, Manser and Brown, 1980; McElroy and Horney, 1981; Lundberg and Pollak, 1994; and Browning and Chiappori, 1994). These models, which assume Pareto optimality and complete information, are contradicted by empirical evidence (Udry,1996; Goldstein and Udry, 1999; Ashraf, 2009). This evidence adds to the empirical evidence that indeed intra-household resource allocations may not be Pareto efficient and decisions about how to allocate resources within the household may not be discussed or decided as much as theory might expect.

[13] An over-identification test on regressions combining both individual and household income for both Table 3.5 and 3.6 suggest that both individual and household income are exogenous.

Table 3.5 ("OLS regression results for saving in the house"), below, shows the regression results for savings in the house. The results of these regressions are similar to what is shown in the results from Table 3.4. Savings in the house is concave to individual income, but not household level income.

Table 3.5: OLS regression results for saving in the house

Regression	I	II	III	IV
Dependent variable:	Share of monthly financial asset flows		Share of financial asset balances	
Log household income per capita	-0.08 (0.50)	-	0.51 (0.56)	-
Log household income per capita - squared	-0.00 (0.02)	-	-0.02 (0.02)	-
Log individual income	-	0.26 (0.18)	-	0.58*** (0.18)
Log individual income - squared	-	-0.05* (0.03)	-	-0.12*** (0.03)
R-squared	0.25	0.25	0.26	0.28
Number of observations	157	157	157	157

Notes: The above results are coefficients calculated by ordinary least squares regressions, with standard errors in parentheses. *Log individual income* is the nominal average individual income between February and November 2004, as is *Log household income per capita.* I control for, but do not show here, age, gender, education, financial literacy score, math score, patience and time consistency variables as defined in section 2.6 and dummy variables for geographical area. In the regressions with individual income I also control for child to adult ratios in the household. Standard errors are heteroskedasticity-corrected.
* Significant at 10%
** Significant at 5%
*** Significant at 1%

This can be seen more clearly by digging into the details of Table 3.6, "Savings patterns for South African households, based on dollars-per-day income levels," below, with the data from Table 2.2 ("Savings patterns for South African households, based on dollars per day income levels"). It shows that even the poorest, those living below the $2-per-

day poverty level, keep just under half of their savings in savings clubs, slightly more than they save in the house.

Table 3.6: Savings patterns for South African households, based on dollars-per-day income levels

	Percent of sample	Mean accumulation as % of income	Mean accumulated in:				
			Savings in the house	Money guarding	Savings clubs	Bank accounts	Provident funds/savings annuities
< $2	10%	18%	45%	0%	48%	7%	0%
$2 - $5	31%	14%	29%	1%	49%	13%	1%
$5 - $10	28%	18%	8%	4%	21%	52%	10%
> $10	32%	31%	9%	1%	31%	19%	40%
Total sample	100%	21%	19%	2%	36%	25%	16%

Notes: Data in this table come from the 2004 South African Financial Diaries dataset, described in Section 2.6. The sample of 152 poor households was selected from two urban and one rural site in South Africa. Data on income, expenditure, and financial transactions were collected every fortnight for over a year. Dollar-a-day figures are calculated by deflating South African Rand monthly income for each household to 1993 prices, then converting to U.S. dollars using the 1993 purchasing power parity conversion factor provided by the World Bank.

However, for those 15 people in the sample used in this paper who live in a household where there is less than $3 PPP of income per person per day, only six (40%) belong to savings clubs, which is only a slightly higher number than the five (33%) who have a bank account. This compares to the sample of 23 individuals in this sample who come from households that live on between $3-$5 per person per day, of which 48% participate in a savings club and only 35% have a bank account. The correlation is not only with the income level but also the regularity. Within the less than $3 per day sample, only 26% have regular income in the form of a social grant or wage, and it is these few individuals

who belong to savings clubs. In the $3-$5 per day sample, 70% of the individuals have some form of regular income. So savings clubs may, in this sample, be the "middle class" savings instrument of choice, but not for the poorest.

3.7 Conclusions and limitations

The above analysis provides little basis for either proving or disproving the hypothesis put forward by Banerjee and Mullainathan, that the poor face greater temptation than the relatively better off. The data used here do not cover a wide enough breadth of commodities to confirm or detract from their ideas. Future research should include a large number of different commodities, and should use both time preferences and the ratio of amount spent on those items out of total expenditure, in order to determine whether the poor are indeed more susceptible to small purchases of tempting goods.

However, these results provide more conclusive evidence that the financial instruments available to the poorest exacerbate, rather than control, the temptations they face. Use of credit at the local shop is nearly ubiquitous among respondents in the South African Financial Diaries sample, both among the poorest and the better off. The regression results shown in this paper suggest that the relationship between this type of credit and income levels is concave. This means that, because the poor do not have better financial choices, they use significantly more credit as their income increases. Credit is therefore a financial tool that is particularly supportive of temptation, especially when compared to loans, which tend to be taken with more planning and far less impulse.

Likewise, the results show that savings in the house is concave to income. Savings in the house have few controls to help the poor control their temptations and, as a result, they provide them with little means for saving for a future. This means that the poor are caught by their lack of financial options when they begin to climb up the income curve; the availability of easy credit and the lack of savings options that would help control temptation is what keeps the poor in a poverty trap.

From a policy standpoint, both pieces of evidence should incentivize policymakers and others to redouble efforts to reach the poorest in communities, who, like anyone else, suffer from a lack of self-control, but lack the core financial tools to help them gain financial control over the few resources they have.

One of the most interesting results is that decisions around these most basic of financial tools are associated with individual level income rather than household level income. This runs contrary to many theoretical models of household-level decision making and adds to the growing wealth of evidence that financial decisions are made independently by individuals. This suggests that financial decision-making might be more private than theory may predict and, consequently, intra-household resource allocations may indeed not be Pareto optimal.

Chapter 4. Going with the flow: Measuring financial usage in poor households

4.1 Introduction

Poverty is not measured in money alone but also in terms of what money can buy: Access to health, education and, at the most fundamental level, freedom (Sen, 1999). However, we increasingly see evidence that financial management, as much as income levels themselves, matter to poor households. In a striking example, Duflo, Kremer and Robinson (2008) study fertilizer use in western Kenya. They found that the largest barrier to adopting new fertilizer was not understanding the benefits, or even knowing its price, but in timing savings in order to have the right amount of money available to buy the fertilizer at the right time. We increasingly see that having the right financial tools, in coordination with income stream and consumption needs, is central to overcoming the vulnerabilities of poverty.

Increased interest in understanding financial access in developing countries has increased cross-country data collection efforts, such as FinScope (a financial-services survey conducted in 15 different countries across Africa) and the World Bank Access to Finance surveys. However, there is little evidence about how valid these survey instruments are. Both Sudman et al. (1996) and Samphantharak and Townsend (2009) point out that, while the literature focuses on the theoretical basis of sampling and survey design, far less attention is focused on interviewing and measurement techniques, leaving

questionnaire design largely in the domain of the in-house tradition of survey firms and researchers' personal experience.

Contributions to the micro data survey measurement literature are few, but they have generated key insights into the most appropriate methods of gathering household-level data. Broadly speaking, these investigations support moving beyond asking respondents about a long list of items. Deaton and Grosh (2000) pay particularly close attention to household consumption data and investigate the usefulness of using such tools as respondent-kept diaries and questioning expenditures over both the long and short terms.

Thus far, existing financial access surveys have not been extensively probed to assess how similarly innovative methods might improve data robustness. One exception is the work of Cull and Scott (2009), who performed experiments in Ghana designed to show who is the best household member to interview, as well as how best to capture information on the household's financial products or institutions. This unique work aside, most current surveys only ask whether households have different financial instruments, stopping short of capturing actual balances and flows of data. Yet, as the fertilizer example shows, questions about the timing and size of financial flows across a range of financial products can be crucial to understanding how households manage their money. The problem is that information on financial flows is difficult to collect. These flows can be tiny and very transitory; the structure of informal financial services is not well understood, so the door is opened to misunderstandings between researcher and respondent; and respondents are naturally sensitive about revealing too much. These factors make it particularly difficult to collect survey data on household-level financial

management, but having this information could help researchers develop new and innovative methodologies, thereby helping policymakers and private-sector institutions create new products and services that support these financial flows.

This paper contributes to the literature on household-level data measurement by examining the conceptual and empirical literature—and by using a unique, high-frequency panel dataset to interrogate a number of commonly held assumptions about financial data collection.

4.2 Theoretical frameworks

The existing measurement literature, both theoretical and empirical, is focused two areas of household surveys: consumption and small businesses. While each is seen as distinct, both point to similar ideas about how household finances should be conceptualized.

4.2.1 Consumption

Both conceptual thinking and empirical evidence are covered comprehensively in Deaton and Grosh's 2000 chapter on measuring consumption. Their comments focus primarily on the context of the Living Standard Measurement Surveys (LSMS) collected by the World Bank. The LSMS's objective is to measure poverty and, to a lesser extent, equity. As Deaton and Grosh relate, these surveys measure poverty via consumption data, rather than income data, for two reasons. First, although income and assets help people obtain goods and services, it is the goods and services themselves that directly generate well-being. Consumption measures what people actually acquire, and therefore directly measures their standard of living. Moreover, Deaton and Grosh suggest that the practical

outcome of consumption data is a tool to construct indirect utility curves. For this reason, they say, it is necessary to collect a comprehensive set of consumption items. If only a subset of items is collected, the relationship between that subset and the entire basket of consumptions is not stable over time or across households, and this weakens a valid representation of the utility curve.

4.2.2 Small Businesses

Within the relationship between small businesses and household finances, Samphantharak and Townsend (2009) have made an important contribution by conceptualizing households as corporate firms. Their framework is based on the view that, to date, definitions of critical terms such as household income, consumption, savings, and financing have been unclear. Borrowing the tools of corporate finance, they equate such things as household assets to equity, consumption to dividends, and the household budget constraint to cash flow. This allows them to view household concepts through a new lens. For example, savings is seen as a budget surplus in the cash flow statement, rather than asset accumulation. This view provides an important connection between liquidity and performance, rather than simply between income and performance. As pointed out in the Introduction to this paper, this ties well into evidence suggesting that poor households struggle not simply with low incomes but, more importantly, in terms of having the right amount of money at the right time—i.e., liquidity.

4.3. Empirical literature

The empirical literature focuses on *how* to collect household-level data in the most valid way. This includes *which* questions to ask (that is, which measures most aptly operationalize a particular concept), *how* to ask these questions (that is, how to avoid recall errors and other errors), and even *whom* to ask.

4.3.1 Consumption

Deaton and Grosh (2000) provide a good, comprehensive summary of the empirical literature. With respect to the question of *what* to ask, they point to the extensive literature suggesting that, even in poor communities, people smooth their incomes over the course of a year (Bhalla, 1979 and 1980; Musgrove, 1978 and 1979; Paxson, 1992 and 1993; Wolpin, 1982; Chapter 6 of Deaton, 1997). The implication is that any survey that is administered only once will better reflect living standards throughout the year by measuring consumption rather than income. A second implication arises: If it is feasible to visit households on many occasions throughout the year, thus capturing seasonality in household income, then there is little difference between measuring income and consumption if one measure can be captured as cheaply and accurately as the other.

To back up this suggestion, Deaton and Grosh checked the accuracy of the consumption modules of the LSMS surveys against each country's National Income and Product Accounts[14] ("NIPA") by looking at ratios of annual estimates of expenditure of

[14] Deaton and Grosh point out that this should not be taken too seriously because there is no rigorous information about their accuracy, and the surveys are from various reports rather than original microdata, so there may be some incomparabilities in their calculations.

household surveys over annual estimates of NIPA expenditure. They found general consistency between the two measures, although there were large discrepancies for certain countries and years. Most important, however, they were concerned about underreporting of expenditures in household surveys, as respondents tend to want to play down their standards of living. However, they found no evidence of understated expenditures from these household surveys.

In terms of *how* to ask about household consumption data, Neter (1970) provides a typology of collection errors in expenditure surveys:

i. Recall errors associated with fading memories;
ii. Telescoping of reported events by incorrect dating;
iii. Reporting errors associated with respondents' being overwhelmed by the length of the survey or the number of items covered;
iv. Prestige errors—that is, reporting errors due to various social pressures;
v. Conditioning effects from participating in the survey;
vi. Respondent effects—that is, how respondents' identities affect their answers;
vii. Interviewer effects; and
viii. Effects associated with instrument design.

Deaton and Grosh point out that most of the empirical literature focuses on items i. and ii., that is, recall errors and telescoping errors.

Recall errors are, essentially, progressive forgetting—that is, increased underestimation of expenditures as the recall period increases. Scott and Amenuvegbe (1990) ran a series of experiments with households from the Ghanaian Living Standards Survey; they found that reported expenditures fell an average of 2.9% for every day, up to a week, that was added to the recall period. This means that, for a 7-day recall period, expenditures were just 87% of what was reported for a single day. A two-week recall period yielded a total expenditure that was another 5 percentage points lower than that yielded by the one-week period. They also found a difference according to whether questions were phrased in a normative or factual way. Annual recall based on explicitly normative questions (for example, "How much do you *usually* spend on x?") resulted in an expenditure figure that was 91% of the one-day recall, while annual recall based on ostensibly factual questions (i.e., "How much did you spend on x?") gave 113% of the one-day recall figure.

Telescoping is slightly different than progressive forgetting, and has been formally modeled by Rubin and Baddeley (1989) and by Bradburn, Huttenlocher and Hedges (1994). These models suggest that respondents remember the *event* making of a large purchase such as a TV, bike, or radio more than the actual date, so they are apt to bring that expenditure forward into the referenced time period. This naturally causes a net upward bias in resulting data—that is, the further in the past the event is, the greater the uncertainty about the date. Thus, the probability that the expenditure will be placed closer to the present is higher than the probability of its being placed farther into the past. In other words, past events are more likely to intrude into the reference period than relevant events are to be lost.

Neter and Waksberg (1964) suggest a fix for telescoping, which they label "bounded recall." In this technique, the interviewer asks about expenditures in the past month, but then does a second interview in which respondents are asked about purchases since the first interview. This prevents respondents from double-counting purchases close to the boundary between the two interviews.

Silberstein (1990) uses data from the U.S. Consumer Expenditure Survey (CEX) to provide evidence on telescoping. Respondents are interviewed about household purchases on five separate occasions. The first interview (recall over the past month) is discarded, then four more quarterly interviews are conducted, all asking for expenditures during the past three months, i.e., since the last interview. Results from the first interview show much higher expenditures than results from the others. For example, respondents report 40% higher expenditures for clothing in the first interview than for the average of the subsequent four interviews.

Sudman et al. (1996) used themes in cognitive psychology to develop lessons in questionnaire design. This study contends that, when recounting expenditures in the short term or recalling important events, respondents estimate their expenditures by counting the events. But when recalling long periods of time that do *not* include important events, respondents instead estimate the frequency of expenditure over a shorter time frame, then multiply the results from this time frame by the length of the reference period. Sudman et al. show that the estimation of expenditure itself may be unbiased, but the counting methods may be biased either upwards for short time periods

or downwards for longer periods. In other words, respondents are "cognitive misers"—that is, they try to minimize the effort of responding to the interviewer's questions.

One instrument that is frequently used to help minimize data-collection errors is a respondent-completed diary.[15] Blaizeau (1998) provides evidence of the experience of using diaries throughout seven African countries. He suggests that such diaries are time-consuming because interviewers have to spend a great deal of time visiting households, almost daily, to help respondents complete them. Moreover, he found that they were only pertinent for short-recall items, and not for a large proportion of non-food expenditures, because respondents were not motivated to complete them and needed frequent help. Martini and Ivanova (1996) provide additional evidence that respondent fatigue and decreased interest prevent households from completing diaries. They found that expenditures recorded in the second week were about 15% lower than those in the first week.

Deaton and Grosh explain how these lessons have influenced LSMS's attempts to address both recall and telescoping. First, different types of expenditures are separated into different frequency periods. For example, frequent-purchase items will have a week or two recall period, while more occasional items will be recalled within the past month, quarter, or year. For food expenditures, LSMS uses a bounded-recall technique using a two-interview process. During the first interview, respondents are asked whether certain foods were consumed in the last year; during the second interview, respondents are asked

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[15] Earlier work using diaries to test data-collection errors can be found in the experiments described in Sudman and Ferber (1971).

about purchases made since the last visit. Respondents are also asked during how many months of the year the household purchased items, how often in each month, and how much they usually spend each time. This allows for the computation of both a "last visit" measure and a "usual month" measure. But because there is no demonstrable evidence that this technique is superior to interviews, LSMS surveys have made little use of diaries.

4.3.2 Financial instruments

Evidence of the validity of financial services measurement is decidedly thinner, largely because financial services have only recently become a substantive part of household questionnaires. Nonetheless, some empirical evidence is offered on *which* questions are asked and *who* answers them.

Karlan and Zinman (2008b) offer evidence about what may be left out of surveys on financial usage, specifically credit. They use bank records to check survey data in South Africa, finding that borrowers do not report their higher-interest consumer loans in surveys. Moreover, they find differences in data-measurement error across population segments that would lead to biased inferences in indebtedness statistics if based purely on self-reported data.

Kochar (2000) uses results from the LSMS surveys to focus on measuring savings. She concentrates on two different estimates of savings: income less consumption and changes in household assets. Using Ghana and Pakistan, she shows that there are substantive differences between savings estimates derived from asset-value changes compared to

those computed using income-less-expenses. She also enumerates several reasons why both measures should be considered suspect.

Cull and Scott (2009) use experiments in Ghana to see how a variety of different financial devices are used. They provide evidence about *who* should be asked about financial instrument usage as well as *which questions* to ask. They motivate their paper by drawing on the different methodologies used by LSMS versus FinScope. They find that reported rates of household usage are similar whether the head of the household reports on behalf of the rest of the household or whether the household is fully enumerated. They also note that randomly-selected informants provide a less complete picture than either of these methods.

With respect to *which* questions are asked, Cull and Scott test whether it is better to ask about institutions (i.e., "Do you have an account with a bank?") or specific products (i.e., "Do you have an ATM card/debit card/current account/savings account?"). They find that institutional questions are appropriate when asking about basic services like savings. This finding holds true whether respondents hold savings at banks or formal non-bank institutions (such credit unions and savings associations) or whether they hold savings at informal credit institutions (such as deposit collectors). In contrast, Cull and Scott found that some concepts—including formal credit (whether issued by credit unions or banks, informal savings (such as savings clubs), and insurance (such as life insurance)—are

more complex, and showed that responses were improved by asking more detailed product questions.[16]

4.4. Using a new dataset to comment on the literature

I will use the Financial Diaries dataset described in Section 2.6 to corroborate some of these results. The literature has focused on using small experiments designed to validate specific questions. The Financial Diaries dataset offers a complementary approach. It is not simply a set of self-report "diaries" as discussed above, but a year-long series of fortnightly household interviews tracking daily incomes, expenditures, and financial transactions.

The Financial Diaries data is aided by a margin-of-error tool that provides both a helpful device for designing innovative questionnaire strategies and a means of testing the robustness of those strategies. A relational database was specially built to aid data collection, and it allowed household-specific questionnaires to be generated based on data from the previous interview. Field workers were trained to calculate an on-the-spot reconciliation of household cash-flow statements, which allowed them to easily target cash flows that households may have forgotten or avoided discussing. Both these elements offer highly precise recall and reporting, even for small financial transactions.

An example shows how this margin of error is calculated. The following accounts are those of a 50-year-old woman, whom we call Pumza, who lives with her three children and one grandchild in Langa, Cape Town. Table 4.1 shows her complete set of cash

[16] Although elements of Cull and Scott's work are tested in this paper, this is one conclusion that I cannot comment on. The data used in this paper were specified by product rather than by institution.

flows for April 2004, the combined results of two interviews. Pumza supports her family with profits from cooking and selling sheep intestines on the street, with a bit of extra income from a monthly government child grant. In addition, in April, her oldest daughter worked a few days at a casual job, and Pumza received some money from her aunt.

Table 4.1: Pumza's Sources and Uses of Funds, April 2004

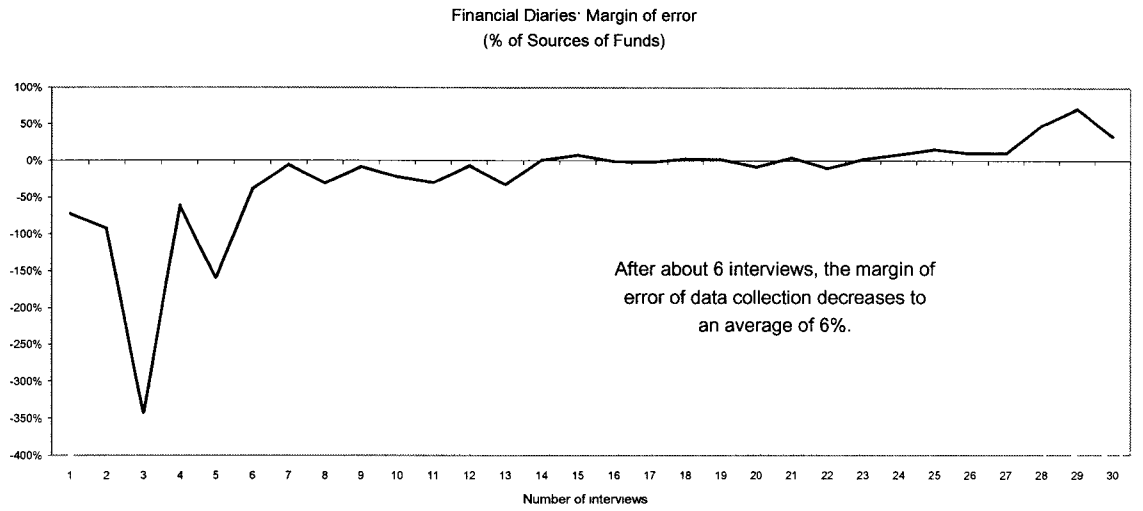
Sources of funds			**Uses of funds**	
Operational			*Operational*	
Casual wage	$ 52		Food	$ 85
Business revenues	$ 218		Business inventory	$ 119
Child grant	$ 26		Business expenses	$ 2
Remittances received	$ 27		Paraffin	$ 6
Financial			Electricity	$ 22
Received mashonisa loan			Household products	$ 46
Savings club payout	$ 23		Transport to work	$ 12
			Newspapers, magazines	$ 1
			Vodacom container	$ 3
			Penalties and fines	$ 1
			Personal (haircut)	$ 2
			Clothing	$ 17
			Financial	
			Savings club payment	$ 121
Total	**$ 438**		**Total**	**$ 437**
Survey margin of error ($438 – $437) = $ 1				

Notes: Data in this table come from the 2004 South African Financial Diaries dataset, described in Section 2.6. The example shown is one of 152 poor households selected from two urban and one rural site in South Africa. Data on income, expenditures, and financial transactions were collected every fortnight for over a year. Figures in dollars are converted from South African rand at prevailing market rates of $1=ZAR6.5.

She and her children also belonged to eight different savings clubs over the year: most were Christmas clubs and one helped fund her cash-flow requirements for business inventories. However, she found that the other members in the club she used for business

cash flow did not pay on time, so she also took a loan from a moneylender. The club's payout came late in the month, and she used it to pay back the moneylender in May.

Chart 4.1: Financial Diaries Margin of Error (% of sources of funds)



Notes: Data in this chart come from the 2004 South African Financial Diaries dataset, described in Section 2.6. Data on income, expenditures, and financial transactions were collected every fortnight for over a year. Margin of error is calculated by subtracting uses of funds from sources of funds, then dividing by sources of funds.

What explains the improved margin of error in the Financial Diaries data? First, households came to trust the researchers more over time, and thus revealed more over time. (This effect is not necessarily helpful in the context of this paper, as we are motivating a methodology that could be successfully used in a one-time questionnaire rather than a panel.) However, the second element that helped improve data collection was the introduction of an in-field calculation of the margin of error, which we introduced several months after beginning the field work in February 2004. To do this calculation, field researchers simply added up the *sources* of funds less the *uses* of funds. If there was a high margin of error, this gave the field researchers an opportunity to probe

the household further about what cash flows might be missing. Soon after implementing this field device (which we launched after about three or four months of interviews), we saw a decline in the margin of error.

4.5 Empirical strategy

The empirical strategy used to measure financial usage in poor households is focused on better understanding the major pitfalls in one-off household surveys of financial management. Several types of questions were asked, both about income and expenditure data, and about financial-management data.

4.5.1 Income and expenditure

As discussed above, most household questionnaires favor capturing expenditures for several reasons, including the irregularity of income and the lack of robust self-reporting. I draw upon the Financial Diaries data to investigate several questions, including:

- What types of income data typically fail to be captured in one-off questionnaires?
- Are income or expenditure data captured more accurately by one-off questionnaires?
- Does this result differ depending on income levels?

4.5.2 Financial instruments

One of the key challenges of collecting financial information is that households are either not motivated to be honest about their financial use, or they do not understand what they are being asked. This section seeks to better understand which types of financial

instruments are most likely left out of initial interactions. We can determine this by comparing which types of financial instruments are not mentioned in the initial interview[17] against learnings from subsequent interviews. We can also estimate how long it takes households to report financial instruments. The collection of each financial device within the Financial Diaries database has two associated time records. The first is the date of interview at which it was detected. The second is the date when the household opened the device. I use these two pieces of information to calculate a variable which I call "LATEFI":

$$LATEFI_f = DATE\ OF\ RECORD_f - DATE\ STARTED_f \qquad (2)$$

This will be calculated for each type of financial device *f*.

With this variable in hand, I then explore which other elements were associated with late discovery of a financial device. In particular, I seek to explore whether the type of financial instrument matters—i.e., loan, savings, or insurance—and whether informal or formal financial instruments are reported "late" more frequently. I do this by running a cross-section OLS regression:

$$LATEFI_f = \alpha + \beta_1 Savings_f + \beta_2 Loan_f + \beta_3 Formal_f + \beta_4 X_f + \varepsilon_f \qquad (3)$$

Savings and Loan are dummy variables (insurance is left out) and Formal is a dummy variable indicating whether the instrument is formal or informal. X is a vector of

[17] Financial instruments were captured in the third and fourth of a series of four "initial questionnaire" decribed in Section 4.6 of this paper. The financial instruments questions were product based, but they should not be taken as a test of the FinScope survey instruments mentioned above. The initial financial instrument questionnaires were not constructed based on the Finscope survey instrument.

household and individual characteristics. Each variable is measured for each financial instrument used (*f*).

It would also make sense for LATEFI to be modeled as a survival model because it is, in essence, a time to expiration. I have no *a priori* expectations about what shape curve this relationship should take, so I fit these data using a Cox Proportional Hazard model.

I also explore the extent to which the *flows* through financial instruments are accurately reported in a one-off questionnaire as compared to the information revealed by ongoing interviews.

4.5.3 Who is best to ask?

Using the margin of error I can test the robustness of data measurement, whether interviewing the head of household, taking a full enumeration, or interviewing an alternative family member about not only financial information, but about full household information. The Financial Diaries are sometimes done with a household head, sometimes with a spouse, and sometimes with another family member. I can separate the sample households into those where head of household responded, versus where a non-head of household responded:

$$M_i = \alpha + \beta_1 I_i + \beta_2 X_i + \varepsilon_i \qquad (4)$$

Where M is the margin of error for each household *i*. I is a household interview dummy which would take on four different values depending on whether the main interviewee is the household head, spouse of the household head, child of the household head, or other.

X is a vector of covariates such as log per capita household income; share of those receiving regular income; age, education, literacy, fatalism, math skills, regularity of income, and marital status of the most often interviewed; and which researcher interviewed the household. The coefficient of interest is β_1.

4.6 Results

Several descriptive tables give us an initial overview of the Financial Diaries data. For all these tables, two data points are compared. First, the data labeled "data from initial questionnaires" is taken from the first three questionnaires, which are administered soon after meeting the respondent for the first time. We would argue that these questionnaires are a proxy for a one-off survey. Initial contact with the respondent would have occurred during the survey's recruitment phase, when the team performed participatory wealth rankings to determine the wealthiest and poorest within the neighborhood or village. Soon after, the team would have approached the respondent to gain permission for the interviews. The respondent would then have been interviewed four consecutive times, in what we call the "initial interviews." The first interview covers the household register, dietary habits, living conditions, and a tally of physical assets. The second interview covers income and expenditure. The third interview, which was later split into two sittings because the field workers found it so long, is a full register of financial instruments.

Most of these initial questionnaires, with the exception of the third questionnaire about financial instruments, borrowed heavily from existing national household surveys in

South Africa. We would therefore argue that these initial questionnaires yield the type of robust data that would have been gathered from a one-off questionnaire. We then compare the data gathered from these preliminary interviews to the data yielded by the Diaries data—as mentioned above, Diaries data collection began two weeks after the completion of the third questionnaire. The Diaries questionnaires ran from November 2003 to December 2004, and respondents were interviewed every other week. As Chart 4.1 above suggests, only the data after about six interviews, or three months, has a low margin of error. The Tables below therefore only include Diaries data gathered from February to November 2004.

Table 4.2 analyzes income data, comparing the preliminary questionnaire data to the Diaries data. Not surprisingly, the preliminary questionnaires yield a lower income per capita than expected. On average, households report monthly income per month that is R37.40 lower than the level recorded by the Diaries, which is significant at $0.50 per day on a PPP basis[18]. What accounts for the difference? According to Table 4.2, respondents report the share of their income coming from government grants and from small businesses at levels that tend to be confirmed by Diaries data. This result for government grants is not surprising, as respondents know exactly how much they receive in grants (so there is little respondent error) and they tend not to hide this income. That they accurately report small-business income is more surprising, and we look more closely at small-business details below.

[18] Using PPP conversation rate of R2.7 per US$.

Table 4.2: Monthly income from initial questionnaire versus Diaries

	Data from initial questionnaires	Data from diaries	Average % difference across households
Household income			
Average monthly per capita	$146	$152	-8.8%
Difference by income quartiles			
Lowest quartile			44.9%*
Second lowest quartile			13.1%*
Second highest quartile			5.5%
Highest quartile			-18.2%***
Share of income			
From regular jobs	48.2%	41.8%	10.6%***
From casual work	9.0%	5.8%	9.3%**
From government grants	23.8%	24.0%	-0.5%
From remittances	5.8%	16.7%	-11.2%***
From small business	7.2%	7.1%	0.3%

Notes: Data in this table come from the 2004 South African Financial Diaries dataset, described in Section 2.6. The sample is 152 poor households selected from two urban and one rural site in South Africa. Data on income, expenditures, and financial transactions were collected every fortnight for over a year. Income quartiles were determined by the Diaries per capita income. Figures in dollars are converted from South African rand at a rate of $1=ZAR6.5. Significance in the difference between the two series is tested using a two-sided paired T test.

* Significant at 10%

** Significant at 5%

*** Significant at 1%

Respondents overestimate income from regular jobs, which we found occurred largely because they reported gross income rather than net. Only once we knew respondents better and they felt comfortable enough to show us their pay slips were we able to see that not only taxes and other mandatory subtractions were taken from gross pay, but a number of loan payments were also taken out directly. Casual work was overestimated for a different reason. Respondents simply worked a great deal less than they reported when asked to state the number of days they planned to work in an average month. The

biggest difference was in the money respondents received from other family members. Because these remittances were often irregular—both in timing and amounts—and because respondents did not think of them as "income," they would rarely report this important source of income in the preliminary interviews.

These discrepancies differ by income quartile, with more wealthy households reporting a very different, and lower, income in the preliminary questionnaires than in the Diaries. Within the lowest quartiles, the differences are distinctly less significant, with households *over reporting* their income. Sensitivities about reporting income therefore seem to be confined to the highest-income categories. This result is consistent with other research, both in the U.S. (Bound and Krueger, 1991) and in the developing world (Akee, 2010).

Table 4.3 reports expenditure items, again comparing data-gathering during the (second) preliminary questionnaire compared to the Diaries data. Generally speaking, respondents are far worse at reporting expenditures than income. On average, households in this sample underreported their monthly expenditures per capita by R2862, which works out to underreporting by $35 per day, far more than the $0.50 income shown above. The underreporting seems to be spread across all regular items, but food expenditures are particularly underreported in terms of percentage of income. Moreover, this type of underreporting occurs across all income quartiles.

This is contrary to Deaton's suggestion that households should find it easier to report expenditures. I suggest that this discrepancy exists because cash flows for expenditures are much tinier and more frequent, and they therefore go missing easily. For example, in

the preliminary questionnaire, households estimated that they spent R419 on food per month, while they actually spent, on average, R5150 per month. Respondents also over report the share of income they spend on energy and telephone.

Table 4.3: Monthly expenditure from initial questionnaire versus Diaries

	Data from initial questionnaires	Data from diaries	Average % difference across households
Household expenditure			
Average monthly per capita	$45	$486	-90***
Difference by expenditure quartiles			
Lowest quartile			-88.5%***
Second lowest quartile			-89.8%***
Second highest quartile			-89.5%***
Highest quartile			-92.0%***
Share of expenditure			
For food	54.6%	62.1%	-7.5%***
For energy (including electricity, paraffin)	13.7%	10.6%	3.1%**
For transport (including transport to work, school, shopping)	13.9%	15.6%	-1.7%
For cigarettes	3.3%	1.6%	1.7%***
For beer and alcohol	1.1%	1.3%	-0.2%
For telephone (including landline, cell phone, pay phone)	7.1%	3.7%	3.3%**
Regular monthly items (including rent, water, sanitation, rates and taxes, church fees, union fees)	6.2%	5.0%	1.2%*

Notes: Data in this table come from the 2004 South African Financial Diaries dataset, described in Section 2.6. The sample is 152 poor households selected from two urban and one rural site in South Africa. Data on income, expenditures, and financial transactions were collected every fortnight for over a year. Household expenditure is defined as the sum of the most common items, which are listed in the table. Expenditure quartiles were determined by the Diaries per capita expenditure. Figures in dollars are converted from South African rand at a rate of $1=ZAR6.5. Significance in the difference between the two series is tested using a two-sided paired T test.

* Significant at 10%

** Significant at 5%

*** Significant at 1%

Generally speaking, households have little feeling for exactly how much money slips through their fingers on a monthly basis. This notion is similar to that put forward by Gibson (2002), who suggests that, as household size rises, so do the number of food purchases in a time period, and therefore so does measurement error. With these data, I see no such relationship between measurement error and household size, but I suggest that the frequency of food purchases is what drives up measurement error.

I also use several methods to investigate how well households report usage of financial instruments. First, I look at how quickly households report owning the financial instrument. Then I look at how well households report the transactions they make on these instruments. Finally, I look at what makes these financial instruments "appear"—that is, what causes respondents to finally report them—and whether certain types of households underreport financial instruments.

Table 4.4 shows each type of financial instrument we designated for the sample, the total number that we ultimately tracked across the entire sample, and the percentage that were missed in the one-off questionnaire. One might expect loans to be underreported because, as Karlan and Zinman (2008b) suggested, respondents often lie about borrowing. However, we found that the least-often mentioned financial instruments were formal services. Informal instruments such as savings clubs, money guarding, and giving credit to customers were all reported from the beginning of the interviews. Similarly, credit instruments such as moneylender loans, credit from the local store, and borrowing from an individual (such as family, friends or neighbors) were reported faithfully. The least-reported financial instruments were insurance, pension or provident funds, and

retirement annuities. None of these instruments can be associated with the "shame" that is supposedly associated with using lending instruments, so there seems to be no clear reason for underreporting these instruments.

Table 4.4: Financial instruments: Instruments not reported in initial interview

Financial instrument type	Number of instruments owned by the sample	Percent missed in the initial interview
Bank account	246	24.6%
Pension/provident fund	55	34.5%
Savings clubs	224	4.9%
Funeral insurance	269	25.7%
Retirement annuities	25	56.0%
Insurance (excluding funeral insurance)	53	47.2%
Loans from banks/savings clubs	140	15.0%
Moneylender loan	109	1.8%
Credit/hire purchase	239	7.5%
Credit from a local shop	101	0.1%
Giving loans to an individual	367	1.6%
Taking loans from an individual	232	3.0%
Money-guarding – looking after someone's money	17	11.8%
Money guarding – having someone else look after your money	23	4.3%
Saving in the house	163	10.4%
Rent arrears	23	13.0%
Wage advance	30	3.3%
Income arrears	46	0.0%
Giving credit to customers	351	0.3%
Receiving trade credit	1	0.0%
Credit cards	86	0.0%
Salary timing	11	0.0%
Debts under administration	11	18.2%

Notes: Data in this table come from the 2004 South African Financial Diaries dataset, described in Section 2.6. The sample is 152 poor households selected from two urban and one rural site in South Africa. "Financial instruments" are predefined and asked about in the third of a set of preliminary questionnaires. As householders are probed in subsequent Diaries interviews, some revealed that they had held these instruments since the first interview.

I would instead argue that respondents who owned these instruments were largely confused about what they were. Many respondents who held these types of instruments were employed, and the payments came directly out of their paycheck. Diaries data show that these respondents frequently did not understand what these deductions were, and that they were reluctant to ask their employers. It was not until I looked at the respondents' pay slips and probed further that we were able to discern whether the instrument was insurance or long-term savings and, as mentioned, respondents frequently did not themselves know what the instrument was. Therefore, I argue that this lack of reporting had more to do with a lack of financial understanding rather than deliberately failing to report financial dealings.

Contrary to findings by Karlan and Zinman (2008b), Table 4.5 below suggests that loans are reported far more quickly than savings or insurance instruments. The OLS regression results show that the number of days it took to report a loan or credit instrument was significantly fewer than for savings or insurance instruments. Also interesting was that the fact that, the higher the respondent's education, the fewer days it took to report the instrument. Also, the higher the respondent's age, the longer it took to report the instrument. Both of these results are consistent with a picture of misreporting instruments based on misunderstanding either the question or the types of instruments being asked about. Formal instruments also take longer to be reported, as do instruments owned by men rather than women.

Table 4.5: Regression results: Predictors of the number of days it took for financial instruments reported after they had started to be used

Estimator	OLS	Cox Proportional Hazard Model
Dependent variable : log (LATEFI)	Coefficient (Standard Errors)	Coefficient (Standard Errors)
Savings	-0.05 (0.09)	0.06 (0.20)
Loan or credit	-0.35*** (0.08)	1.14*** (0.24)
Formal	0.14* (0.08)	-0.33* (0.17)
Age of person with instrument	0.01** (0.00)	-0.02*** (0.01)
Education of person with instrument	-0.00*** (0.00)	0.00 (0.00)
Gender of person with instrument	-0.14* (0.07)	0.35* (0.18)
Log (household income per capita)	0.09 (0.09)	-0.11 (0.20)
R-squared	0.19	
Pseudo R-squared		0.03
Number of financial instruments	169	169

Notes: Each regression controls for area dummies. I left out the financial variable type *Insurance*. *Formal* instruments are coded 1. *Female* is coded 1. OLS standard errors are heteroskedasticity-corrected.
* Significant at 10%
** Significant at 5%
*** Significant at 1%

This regression was also specified as a Cox Proportional Hazard model. The sign of the coefficients in this specification is interpreted as the influence of the covariate on the baseline hazard function. Therefore, a variable with a positive coefficient increases the "hazard" of discovering the instrument, while a negative coefficient decreases the hazard of discovery. So a loan or credit instrument is at increased hazard of being discovered, compared to an insurance instrument. Likewise, a respondent who is older and female decreases the hazard of finding the instrument, as above, and formal instruments have

decreased hazards of being found. Interestingly, education is not significant in this specification.

Perhaps the biggest challenge in obtaining financial data from household surveys is getting good estimates of the financial flows going through the reported instruments. Table 4.6 provides the monthly flows, in rand terms, going through several financial instruments. On average, households tended to accurately report most financial flows, except for withdrawals from savings in the house and contributions to savings clubs. However, both of these items are significant.

Table 4.6: Monthly flows into financial instruments: Initial versus actual by instrument

	Data from initial questionnaires	Data from diaries	Average difference across households
Bank account deposits	$ 316	$323	-$ 7
Bank account withdrawals	$ 226	$247	-$21
Savings in house deposits	$ 41	$ 47	-$ 5
Savings in house withdrawals	$ 25	$ 37	-$12**
Savings club contributions	$ 49	$ 29	$21***
Funeral insurance contributions	$ 24	$ 22	$ 2

Notes: Data in this table come from the 2004 South African Financial Diaries dataset, described in Section 2.6. The sample is 152 poor households selected from two urban and one rural site in South Africa. Data on income, expenditures, and financial transactions were collected every fortnight for over a year. Figures in dollars are converted from South African rand at a rate of $1=ZAR6.5. Significance in the difference between the two series is tested using a two-sided paired T test.

* Significant at 10%

** Significant at 5%

*** Significant at 1%

Households may willingly report that they have savings in the house, as seen above in Table 4.4, but they do not accurately report how much they might use this financial instrument. In fact, they considerably underreport withdrawals from savings in the

house. Based on a single questionnaire, a researcher may conclude that a respondent is saving significantly more than he or she claims. Savings-club contributions are also, surprisingly, significantly lower than reported in a one-off questionnaire. This frequently occurs because contributions are often made late or not at all and are only deducted from the final payout, so respondents may report that they are saving more than they really are.

Finally, I looked at the question of who within the household provided the fullest answer about all household cash flows. To answer this question, I used the absolute value of the margin of error described above in an OLS regression against the household role of the month's respondent, as well as household- and individual-level covariates. The results in Table 4.7 below confirm Cull and Scott's (2009) finding that the head of the household provides the fullest picture of cash flows, i.e., the lowest average absolute margin of error. Child of household head is also significant, but there are only five cases in our sample where the child of the household head is the most-interviewed member, and all are adult children in their 30s and are the *de facto* household heads.

Table 4.7: OLS regression results—Predictors of absolute value of margin of error

Dependent variable: Absolute value of margin of error	Coefficient (standard error)
Household characteristics	
Log per capita income	-29.37
	(19.18)
Share of those receiving regular income (either government grant or salary)	26.53
	(27.77)
Household position of person interviewed most	
Head of household	-46.27***
	(16.86)
Spouse of head	9.50
	(33.36)
Child of head	-77.95*
	(43.56)
Personal characteristics of person interviewed most	
Age	0.11
	(0.50)
Education	1.64
	(1.40)
Married or partnered	-35.87**
	(17.41)
Math score	-50.53
	(60.80)
Fatalism score	-41.68*
	(24.27)
Financial literacy score	152.69
	(115.63)
Regularity of income	-60.47
	(43.19)
R-squared	0.18
Number of households	152

Notes: Each regression controls for dummies representing individual enumerators (which implicitly also controls for area). Math, fatalism score, and financial literacy score are described in Section 2.6. I left out the *Other household member* variable. Married or partnered is coded 1, while divorced, single, or widowed is coded 0. Regularity of income is coded 1 if head of household receives either a salaried wage or a monthly government grant; 0 if other. Standard errors are heteroskedasticity-corrected.
* Significant at 10% ** Significant at 5% *** Significant at 1%

I also estimated this regression[19] using first only the positive margin of error (41% of the sample) and then the negative margin of error (59% of the sample). The regression using the positive margin of error showed a strong negative relationship between the spouse of the household head and the margin of error. The regression using the negative margin of error did not show that any household-place variables were significant, but did show a strong negative relationship with the "married" variable. The non-symmetric results for the positive margin of errors suggests that, among household members underestimating uses versus sources, spouses (usually women) provide the most complete information. In other words, the spouse, usually a woman, provides the best information on expenditures.

4.7 Conclusions and suggestions for collecting financial flow data

The empirical results in the above section echo the conceptual platforms presented in Section 4.3, suggesting an important notion about collecting household-level financial-access data. Understanding the economics of poor households means understanding the cash flows that they see on a day-to-day basis. As Deaton and Grosh (2000, p. 8) suggest, "Questionnaires should be designed around items that are familiar to the respondent—typically cash flows or flows of goods—provided that enough information is gathered to allow total consumption to be calculated." The empirical literature, as well as the evidence presented above, suggests that the most successfully-collected data are those that are the most familiar—that is, informal flows and loans, including those that are lumpy. This suggests that the respondents' cognitive biases—the tendency to

[19] Results available upon request.

keep thinking about lumpy expenditures and obligations such as loans—keeps these cash flows at the top of the mind. In South Africa, income flows, which tend to be lumpy and regular,[20] are better collected through a one-off questionnaire than through expenditure flows, which are irregular, small and frequent. In other environments, where income flows are much more irregular and small, such as for casual workers, this may not be the case.

The results also suggest the importance of looking at financial portfolios within context. Using the basic tools of corporate finance, as per Samphantharak and Townsend (2009), household-level financial management can be seen as daily a balancing act, rather than being clinically viewed as a series of isolated "types" of behavior or instrument. Although households may not perfectly report borrowing, for example, they may report borrowing far more frequently than they report insurance.

Both results suggest possible improvements to household surveys about financial use. While current financial-access surveys consist of long lists asking about usage of various financial products,[21] a more fruitful approach includes two additional elements. The first element is a household reconciliation of a full set of cash flows for a recent period (for a month or two weeks, depending on income frequency). These cash flows would include not only financial flows but expenditure and income data, as well as cash on hand. This element leverages the concepts specified by Deaton and Grosh, by Samphantharak and Townsend, and by the evidence shown here: namely, that financial management is best

[20] Thanks to a high number of monthly grant recipients and salary earnings.

[21] I can include details of these, along with average times they take for respondents to complete.

understood through the cash flow statement; that questions should be familiar to the respondents; and that understanding financial management can only be achieved within the context of the whole of household economic activities.

Finally, the empirical literature on consumption strongly suggests that households clearly recall spending on certain events and large assets, and the Diaries evidence certainly supports the contention that households have difficulty remembering small, high-frequency expenditures. The additional element required to improve financial surveys is therefore finding key events and asset purchases in the respondent's near past, then asking how the respondent financed the purchase and whether the financial instrument that enabled that funding is still in use.[22]

[22] One could also ask questions about how future events, such as weddings or retirement, will be financed, which would pick up financial instruments that may have already been funded, such as fixed deposit accounts, and which have large balances but no associated cash flows.

Chapter 5. Conclusions

The three previous chapters delved deeply into the financial lives of the poor, tackling a wide range of issues including policy levers, the relationship between poverty traps and financial management, and measurement of financial behavior.

Several themes recur in each chapter. The first theme is that the poor's financial lives can be measured precisely, can be influenced by public and private innovations, and seem to have an association with their poverty levels. We see that tiny cash flows combine into intricate patterns that tie complex patterns of financial decisions to broader life circumstances.

The second theme explores how psychological characteristics dominate the financial management practices of the poor. Chapter 2 shows how using direct deposit to keep money unavailable appears to be associated with poor households' shifting their portfolios towards higher bank savings. In Chapter 3, we see that the types of financial instruments available to the poor appear to influence their ability to address the temptation toward impulsive spending. Even Chapter 4 suggests that respondents' cognitive biases play a significant role in financial measurements.

And the last theme examines how challenging it is to shift financial patterns. Chapter 2 shows how little most respondents changed their financial practices over five years, despite a significant increase in income over that time. Only direct deposit has consistently significant associations with increasing bank savings. It seems that once people settle into their financial habits, these patterns are very difficult to shift. This

plays out in Chapter 3 as well which suggests that, although savings clubs have a fairly high level of risk, even savers who had access to more sophisticated financial instruments continued to use them.

In short, the financial lives of the poor are important, psychologically sensitive, and difficult to change. The resulting policy challenge is worth the effort, but also requires the best possible data-driven analysis and insight.

Appendix 1. Questionnaire to determine level of patience and time inconsistent preferences

Section 3: Preferences (this is best done when respondent is alone)

A. Money preferences (between now and this same day one month from now)

1. Would you prefer to receive R100 guaranteed today or R100 guaranteed one month from today? CIRCLE ONE
01=R100 today
02=R100 one month from today

2. Would you prefer to receive R100 guaranteed today or R110 guaranteed one month from today? CIRCLE ONE
01=R100 today
02=R110 one month from today

3. Would you prefer to receive R100 guaranteed today or R120 guaranteed one month from today? CIRCLE ONE
01=R100 today
02=R120 one month from today

4. Would you prefer to receive R100 guaranteed today or R150 guaranteed one month from today? CIRCLE ONE
01=R100 today
02=R150 one month from today

5. How much would we have to give you in one month for you to choose to wait instead of receiving R100 today? _____

B. Money preferences (between **1 year from now** (next May 2011) and **1 year, 1 month from now (next June 2011)**)

6. Would you prefer to receive R100 guaranteed in **May 2011** or R100 guaranteed in **June 2011**? CIRCLE ONE
01=R100 IN MAY 2011
02=R100 IN JUNE 2011

7. Would you prefer to receive R100 guaranteed in **May 2011** or R110 guaranteed in **June 2011**? CIRCLE ONE
01= R100 IN MAY 2011
02=R110 IN JUNE 2011

8. Would you prefer to receive R100 guaranteed in **MAY 2011** or R120 guaranteed in **JUNE 2011**? CIRCLE ONE
01=R100 IN MAY 2011
02=R120 IN JUNE 2011

9. Would you prefer to receive R100 guaranteed in **May 2011** or R150 guaranteed in **June 2011**? CIRCLE ONE
01=R100 IN M 2011
02=R150 IN APRIL 2011

10. How much would we have to give you in **June 2011** for you to choose to wait instead of receiving R100 **in May 2011**? _____

Appendix 2: Questionnaire to determine risk aversion, fatalism, cognitive (math) ability and financial literacy

F. Risk aversion: These are hypothetical gambles

Which gamble would you prefer to undertake:

1. Receiving R100 for certain or playing a lottery that would pay you R400 with a probability of 50% or R0 with a probably of 50%? CIRCLE ONE
   01=Receive R100
   02=Play lottery

2. Receiving R100 for certain or playing a lottery that would pay you R500 with probability of 40% or R0 with a probably of 60%? CIRCLE ONE
   01=Receive R100
   02=Play lottery

3. Receiving R100 for certain or playing a lottery that would pay you R650 with probability of 30% or R0 with a probably of 70%?
   01=Receive R100
   02=Play lottery

4. Receiving R100 for certain or playing a lottery that would pay you R1000 with probability of 20% or R0 with a probably of 80%?
   01=Receive R100
   02=Play lottery

5. Receiving R100 for certain or playing a lottery that would pay you R2000 with probability of 10% or R0 with a probably of 90%?
   01=Receive R100
   02=Play lottery

G. Fatalism

Say whether you disagree, agree or strongly agree:

i. I have little control over what will happen to me in my life.
(circle one) DISAGREE AGREE STRONGLY AGREE

ii. Good things tend to happen to other people, not to me or my family.
(circle one) DISAGREE AGREE STRONGLY AGREE

iii. I have a hard time saving money, even though I know I want to save more.
(circle one) DISAGREE AGREE STRONGLY AGREE

Section 4: Cognitive ability and financial literacy

Cognitive ability

1. What is 4 +3 ? _____

2. What is 20 + 60?_____
3. What is 7 – 4?_____
4. What is 43 – 23?_____
5. What is 2 x 6?_____
6. What is 3 x 6?_____
7. What is 400 divided by 10?_____
8. What is 1/3 of 66?_____

Financial literacy

1. Suppose you were buy a lounge suite and the price tag said R10 000. You don't have enough cash to buy it so you buy on credit. You need to pay back every month over a year. How much do you think you will spend, adding up all the monthly installments over 1 year? (DON'T GIVE ANY HINTS!)
   Take your best guess_____

Note: Based on the answers, I give full points to any answer greater than R10,000 and an incorrect for any answer R10, 000 or below.

2. Given your answer to Question 1, what percent rate of interest per year does this total payment represent?
   Take your best guess_____

Note: Based on the answer to question 1, I back out an implicit answer to question 2. I give full points only to those who give the exact correct response based on their answer to question 1.

Appendix 3: Questions that determine discount rates of three types of goods

C. Commodity preferences: COOL DRINK (1 COOL DRINK = 1 CAN)

1. Would you prefer to receive 1 COOL DRINK TODAY or 1 COOL DRINKS TOMORROW? CIRCLE ONE

01=1 COOL DRINK TODAY
02=1 COOL DRINKS TOMORROW

2. Would you prefer to receive 1 COOL DRINK today or 2 COOL DRINKS TOMORROW? CIRCLE ONE

01=1 COOL DRINK TODAY
02=2 COOL DRINKS TOMORROW

3. Would you prefer to receive 1 COOL DRINK today or 3 COOL DRINKS TOMORROW? CIRCLE ONE

01=1 COOL DRINK TODAY
02=3 COOL DRINKS TOMORROW

4. Would you prefer to receive 1 COOL DRINK today or 4 COOL DRINKS TOMORROW? CIRCLE ONE

01=1 COOL DRINK TODAY
02=4 COOL DRINKS TOMORROW

5. How MANY COOL DRINKS would we have to give you TOMORROW for you to choose to wait instead of receiving 1 COOL DRINK TODAY?

_____

D. Commodity preferences: PACKET OF CRISPS

1. Would you prefer to receive 1 PACKET OF CRISPS TODAY or 1 PACKET OF CRISPS TOMORROW? CIRCLE ONE

01=1 PACKET OF CRISPS TODAY
02=1 PACKET OF CRISPS TOMORROW

2. Would you prefer to receive 1 PACKET OF CRISPS today or 2 PACKETS OF CRISPS TOMORROW? CIRCLE ONE

01=1 PACKET OF CRISPS TODAY
02=2 PACKET OF CRISPS TOMORROW

3. Would you prefer to receive 1 PACKET OF CRIPS today or 3 PACKETS OF CRISPS TOMORROW? CIRCLE ONE

01=1 PACKET OF CRISPS TODAY
02=3 PACKETS OF CRISPS TOMORROW

4. Would you prefer to receive 1 PACKET OF CRISPS today or 4 PACKETS OF CRIPS TOMORROW? CIRCLE ONE

01=1 PACKET OF CRISPS TODAY
02=4 PACKETS OF CRISPS TOMORROW

5. How MANY PACKETS OF CRISPS would we have to give you TOMORROW for you to choose to wait instead of receiving 1 PACKET OF CRISPS TODAY?_____

E. Commodity preferences: HALF LOAF OF BREAD

1. Would you prefer to receive 1 HALF LOAF OF BREAD TODAY or 1 HALF LOAF OF BREAD TOMORROW? CIRCLE ONE

01=1 HALF LOAF OF BREAD TODAY
02=1 HALF LOAF OF BREAD TOMORROW

2. Would you prefer to receive 1 HALF LOAF OF BREAD today or 2 HALF LOAVES OF BREAD TOMORROW? CIRCLE ONE

01=1 HALF LOAF OF BREAD TODAY
02=2 HALF LOAF OF BREAD TOMORROW

3. Would you prefer to receive 1 HALF LOAF OF BREAD today or 3 HALF LOAVES OF BREAD TOMORROW? CIRCLE ONE

01=1 HALF LOAF OF BREAD TODAY
02=3 HALF LOAVES OF BREAD TOMORROW

4. Would you prefer to receive 1 HALF LOAF OF BREAD today or 4 HALF LOAVES OF BREAD TOMORROW? CIRCLE ONE

01=1 HALF LOAF OF BREAD TODAY
02=4 HALF LOAVES OF BREAD TOMORROW

5. How MANY HALF LOAVES OF BREAD would we have to give you TOMORROW for you to choose to wait instead of receiving 1 HALF LOAF OF BREAD TODAY? _____

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