ESSAYS IN DEVELOPMENT AND BEHAVIOURAL ECONOMICS

The Role of Insurance and Consumer Disclosure in Household Vulnerability and Financial Decision Making

A THESIS SUBMITTED TO THE UNIVERSITY OF DUBLIN, TRINITY COLLEGE IN APPLICATION FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

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Declaration

I declare that this thesis has not been submitted as an exercise for a degree at this or any other university and it is entirely my own work.

Chapter 3 and 4 are based on the joint work with my supervisor Professor Michael King. I declare that I was the lead author for each of the co-authored chapters in the thesis.

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Summary

The core of this thesis consists of three chapters. Although on distinct topics, these chapters relate to vulnerability and financial decision making of households in Rwanda, Viet Nam and Ireland.

Chapter 2 investigates the impact of micro-insurance on health seeking behaviour, out of pocket medical expenses, hardship financing, and financial outcomes of the insured. Health insurance protects households from costly health shocks, and by encouraging health seeking behaviour, can safeguard earnings and assets. The results confirm that micro-insurance serves as a social safety net by increasing health seeking behaviour and reducing out of pocket medical expenses. The chapter finds evidence for complementarity between health micro-insurance membership and formal savings activity, confirming positive spillovers between formal financial products. Further, the results indicate substitution between health micro-insurance and informal financial services, where micro-insurance crowds out both informal savings and informal borrowings. In obtaining these results, I use instrument variable estimation to correct for the issue of self-selection, an issue that undermines many previous studies. The chapter uses nationally representative cross-sectional data from Rwandan Integrated Living Conditions Survey conducted in 2005-06 and 2010-11.

Chapter 3 adds to our understanding of how farmer's value agricultural insurance in Viet Nam. The chapter employs a novel approach to investigate the reasons for low demand for agricultural insurance and confirm that farmers systematically undervalue agricultural insurance. First, the chapter finds that private transfers, mainly from family members, explain under valuation of agricultural insurance. Second, membership of a farmer's union, interpreted as a form of social capital or pro-active behaviour, explains the differential between willingness to pay (WTP) and the predicted economic value of insurance. Third, the chapter helps answer the puzzle why the most risk averse are least likely to take-up agricultural insurance. The analysis finds that over-confidence holds a positive and significant relationship with WTP for agricultural insurance and interpret this as evidence that, within the context of implementation challenges and likely concerns about insurer viability, only the most confident are likely to purchase insurance. These results hold across a range of robustness checks.

Chapter 4 conducts a series of online choice experiments to assess the impact of advanced consumer disclosure and misleading marketing nudges on preference for expensive cashback mortgage products. Financial products with a cashback feature typically cost consumers significantly more in the long run. Using a nationally representative online sample in Ireland, the chapter finds that consumers who are younger, less educated, suffer from present bias, and are inattentive are more likely to choose costly cash back mortgages. Further, the experiment provides strong evidence that advanced disclosure improves financial decision making of customers and that negative nudges, or advertising, encourages prospective buyers into more costly mortgages.

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Dedication

To my grand parents, Smt. Shanti Devi and Thakur Rajendra Singh Bhadouria for their unconditional love and blessings.

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Chapter 1

Introduction

1.1 Thesis Motivation and Chapter Previews

This thesis focuses on economic issues related to household vulnerability and financial decision-making. Through three essays, the thesis assesses the role of insurance and consumer disclosure on outcomes such as health service utilisation, hardship financing, use of financial services, and choice of mortgage products in Rwanda, Viet Nam, and Ireland. The three economies chosen for this research are distinct in terms of macro-economic factors and political institutions. While at different levels of macroeconomic development, households in the selected countries face similar behavioural and micro-economic issues related to vulnerability and financial decision-making.

The first essay addresses the impact of community based health insurance in Rwanda on health service utilisation, hardship financing, and financial outcomes related to savings and borrowings. The second essay is an empirical assessment of the valuation of agricultural insurance by farmers in Viet Nam. Finally, the third essay assesses the impact of advanced consumer disclosure and misleading marketing nudges on the choice of expensive cashback mortgage products through series of online choice experiments conducted in Ireland.

The thesis contributes to the empirical literature in development and behavioural economics. More specifically, chapter two shows that health insurance acts as a social safety net by increasing health service utilisation and reducing out of pocket medical expenses of the insured. The findings confirm that micro insurance acts as a complement to formal savings activity and a substitute to informal financial services, where insurance crowds out both informal savings and borrowings. Chapter three shows that farmers in Viet Nam significantly undervalue agricultural insurance. The results confirm the role of private money

transfers and social capital in explaining insurance undervaluation. Further, the study finds a positive relationship between over-confidence and insurance valuation; a finding that helps explain why the most risk-averse are least likely to take-up agricultural insurance. Finally, chapter four shows that individuals who are younger, less educated, suffer from present bias, and are inattentive are more likely to choose costly cashback mortgages. The study provides evidence that advanced disclosure improves financial decision-making of customers and that negative nudges, or advertising, increases the likelihood prospective buyers choose costly mortgages.

The remainder of this chapter highlights specific issues addressed by the thesis, and summarises the following chapters.

1.1.1 Micro-insurance at Scale: Evidence on Impact from Rwanda

It is well established in the literature that the economic cost of health shocks undermines household welfare through out of pocket (OOP) medical expenses, and poor health seeking behaviour can lead to losses of earnings and assets (Dercon and Krishnan, 2000; Gertler and Gruber, 2002). Within the context of pervasive health risks and low levels of government investment in universal health care provision in developing countries, health insurance offers households the potential to avoid health cost related poverty. Insurance as a risk-coping instrument insulates households from unanticipated individual and common risks, and helps in maintaining higher level of utility for a given health shock (Arrow, 1992; Mayers and Smith Jr, 1988; Farley and Wilensky, 1985). Moreover, household financial decision-making and use of financial services may improve as result of insurance membership, as suggested under the informational or learning effect channel by Giesbert et al. (2011).

This chapter examines the role of micro-insurance on health service utilisation, out of pocket medical expenses, hardship financing, and financial decision-making of the insured. The chapter uses household enrolment profile in the Rwandan micro-insurance scheme Mutuelles de Sante (MdS) and derives causal impact of insurance membership on outcomes such as formal health seeking behaviour, out of pocket medical costs, likelihood to sell assets, and savings and borrowings. The identification strategy for this chapter involves Instrumental Variable estimation (IV) to address concerns of endogeneity due to self-selection of households. The analysis for this chapter is based on two cross-sectional data-sets from the Rwanda Integrated Living Conditions Survey (EICV) conducted for the periods 2005-06 and 2010-11.

Chapter 2 contributes to the existing literature in two ways. First, this chapter addresses the issue of endogeneity due to self-selection faced by numerous earlier studies. Second, to the best of our knowledge this is the first study to explore if micro-insurance acts as a

substitute or as a complement for household savings and borrowings status in developing countries.

The findings of this chapter suggest that insurance membership increases health service utilisation and reduces out of pocket medical expenses; particularly for extremely poor households. The results also confirm complementarity between insurance membership and formal savings, thus providing evidence for the learning effects of insurance, as described under information advantage channel by Giesbert et al. (2011). Further, there is a negative effect of insurance membership on informal savings and borrowings of the insured, thus confirming crowding-out of informal financial services used by the poor. The chapter finds no evidence for the impact of insurance membership on hardship financing.

1.1.2 Understanding Farmer's Valuation of Agricultural Insurance: Evidence from Viet Nam

Agricultural shocks such as floods, drought, crop disease and pests contribute to poverty when assets are damaged, and yields disappoint. Farming households, thrust into poverty by such shocks, often choose between asset depletion or consumption reduction, and often find it difficult to recover and restart the long process of accumulating productive assets (Carter et al., 2014; Mahul and Skees, 2007). Proposed as a formal financial instrument for risk management, area yield agricultural insurance has been introduced in several developing countries such as Brazil, Ethiopia, India, Kenya, Malawi and Viet Nam over the last 30 years. However, uptake has disappointed. Data from the Viet Nam Access to Resources Household Survey (VARHS) suggests less than 0.5 per cent penetration, despite the fact that Viet Nam ranks sixth in a list of countries for agricultural losses suffered due to natural disasters and crop disease.

Poor uptake led Clarke (2011) to note two puzzles. Why is demand for agricultural insurance products so low, especially for households operating with pervasive weather and environmental risks? And why is demand particularly low for the most risk averse (Cole et al., 2013; Giné et al., 2008)?

The chapter uses a novel approach to answer these questions and investigate the role of behavioural as well as socio-economic factors. First, we examine evidence on how Vietnamese farmers value agricultural insurance though self-reported Willingness to Pay (WTP) responses. Second, we assess how their self-reported WTP valuation deviates from their predicted economic valuation derived from expected utility theory. Employing survey data on von Neumann-Morgenstern (VNM) preferences over wealth outcomes and on recent agricultural losses due to weather and disease, we estimate the rational economic value of agricultural insurance for farming households using Constant Relative Risk Aversion (CRRA) utility function. The CRRA utility function uses the coefficient of Relative Risk

Aversion (RRA) derived from a Becker-DeGroot-Marschak (BDM) bidding game played in the VARHS survey.

There are four main findings from this chapter. First, Vietnamese farmers systematically undervalue agricultural insurance. Second, private transfers from family and friends act as substitutes for agricultural insurance and therefore dampen the demand. Third, social capital in the form of membership to a farmer's group is positively related to the valuation of agricultural insurance. Lastly, over-confidence holds a positive relationship with willingness to pay for agricultural insurance, suggesting certain degree of confidence and trust required to believe that insurance will pay-out when losses occur.

1.1.3 Conned by a Cashback? Disclosure, Nudges and Consumer Rationality in Mortgage Choice

Mandatory disclosure of financial product information has become the default policy for regulators to protect consumers (Sunstein, 1998; Lacko and Pappalardo, 2010; Agarwal and Mazumder, 2013). Disclosure policy is designed to achieve informed customers through mandatory disclosure of product attributes and conditions at the point of save. The standard expected utility model assumes that informed rational consumers evaluate all options available in the market and choose an option that results into the lowest overall cost, implying that banks, aware of consumer rationality, will compete to provide the lowest cost products. However, behavioural economics has illustrated that customers, even with a full set of information, make sub-optimal long-run decisions when they get lost in overwhelming amount of market options, thus making predictable mistakes (Thaler, 1985; Barr et al., 2008; Estelami, 2001)

Exacerbating these consumer heuristics is behaviourally informed marketing by banks distracting consumers through certain product characteristics, such as cashback benefits, without comparing the total cost of the products, leading to costlier product choice (Rowe et al., 2015; CCP, 2017).

Through a series of online choice experiments in Ireland, this chapter examines the role of socioeconomic and behavioural factors in consumer decisions to choose more expensive cashback mortgages. Further, the chapter derives evidence for the impact of advanced financial disclosure on choice of mortgages, and lastly, the effect of promotional marketing on prospective house buyers.

The results of this chapter suggest that first; consumers who are younger and less educated are more likely to choose a cashback mortgage. Behaviourally, the chapter finds robust evidence that customers who suffer present bias and are inattentive are more likely to choose costly cashback mortgages. Second, advanced financial disclosure that highlights the cost

differential between products at the point of decision are effective in turning consumers away from costly cashback mortgages. Third, the chapter finds that very basic promotional marketing that highlights the cashback feature is effective at encouraging prospective house buyers into choosing expensive cashback mortgages.

This chapter builds on the assessments of first generation disclosure policy (e.g. TILA, GFE, KFD, etc.) and contributes to the literature on consumer protection and advanced disclosure by Lacko and Pappalardo (2010); Bertrand and Morse (2011), and Shu (2010). The chapter also contributes to the literature on the role of present-bias and inattentiveness on the choice of mortgage products (Gathergood and Weber, 2017; Agarwal et al., 2016; Miles, 2004; Hirshleifer and Teoh, 2003; Gabaix and Laibson, 2006).

Lastly, the findings of the chapter contribute to the literature on financial stability where poor financial decision making of consumers can concentrate systematically in important banks and lead to episodes such as the sub-prime crisis of 2007.

Chapter 2

Micro-insurance at Scale: Evidence on Impact from Rwanda

2.1 Introduction

Health shocks are a major obstacle to economic progress in developing countries. At the aggregate level, poor health outcomes are associated with lower rates of savings, lower capital returns and lower levels of domestic and foreign investment (Ruger and Kim, 2006). The economic cost of health shocks at the household level undermines welfare through out of pocket (OOP) medical expenses and poor health seeking behaviour, and associated losses of earnings (Dercon and Krishnan, 2000; Gertler and Gruber, 2002). Pushed into cycles of poverty by costly health shocks, households often engage in expensive risk-coping activities such as sale of assets, and borrowings from family and friends (Wilkes et al., 1997; Sauerborn et al., 1996; Nahar and Costello, 1998).

Within the context of pervasive health risks and low levels of government investment in free health care provision in developing countries, health insurance offers households the potential to avoid health related poverty. Economic theory suggests insurance helps households achieve consumption smoothing and maximisation of intertemporal utility through improvement in health service utilisation and financial protection of households. Insurance as a risk-coping instrument insulates households from unanticipated individual and common risks, and helps in maintaining higher level of utility for a given health shock (Arrow, 1992; Mayers and Smith Jr, 1988; Farley and Wilensky, 1985). In parallel, through a second order effect, household financial decision-making may improve due to an informational or learning effect associated with the use of insurance, under the information advantage channel described by Giesbert et al. (2011).[1]

[1]The information advantage channel is interpreted as the learning effect due to spillovers from the use of one financial service which makes households aware of benefits other financial services (Giesbert et al., 2011).

With this in mind, institutions such as the World Health Organisation (WHO) and International Labour Organisation (ILO) advocate for the adoption of prepayment and risk-pooling micro-insurance networks, such as the Community Based Health Insurance (CBHI).[2] However, the demand and adoption of micro-insurance in developing countries is severely diminished by economic constraints such as poverty and social-exclusion (Liu and Myers, 2016). The spread of micro-insurance is very limited in developing countries with an estimated coverage ratio of 5.43 percent in Africa, 6.96 percent in Asia and Oceania, and 8.52 percent in Latin America and Caribbean.[3]

The literature on micro-insurance focuses primarily on health service utilisation and financial protection of households. While this provides some evidence for policy-makers, the existing literature lacks credibility due to endogeneity resulting from self-selection and reverse-causation.[4] Moreover, there is gap in existing literature regarding the role of micro-insurance on financial behaviour in developing countries. To the best of our knowledge, there is no existing empirical evidence that establishes if micro-insurance acts as a substitute or as a complement for household savings and borrowings status.

This chapter examines the role of micro-insurance on outcomes related to health service utilisation, financial protection, and financial status of households. We provide empirical evidence on the impact of CBHI enrolment on household health seeking behaviour, total OOP expenses, likelihood to sell assets, and the status of savings and borrowings, both formal and informal. Our empirical strategy allows us to test the following hypotheses; (i) micro-insurance membership increases health service utilisation of households, (ii) micro-insurance membership reduces total out of pocket (OOP) medical expenses and the likelihood to sale assets, (iii) micro-insurance membership increases savings, and (iv) micro-insurance membership reduces borrowing.

In addressing these hypotheses, we proceed as follows. First, building on the work of Dercon and Hoddinott (2003), we develop a conceptual framework that discusses the intertemporal utility maximisation of a household, as a result of integrating micro-insurance in the household health production function. Second, we use household enrolment profile in the Rwandan micro-insurance scheme "*Mutuelles de Sante*" (MdS) to derive causal impact of micro-insurance on outcomes such as formal health seeking behaviour, out of pocket medical costs, likelihood to sell assets, and savings and borrowing. The assessment of micro-insurance membership on status of formal and informal savings/borrowings provides new evidence for the role of micro-insurance on financial outcomes of the households in developing countries. Moreover, we use Instrumental Variable (IV) estimation to address issues of self-selection and reverse-causation and contribute to the existing body of empirical evidence on micro-insurance schemes in developing countries.

[2] As put forward by Dror and Jacquier (1999), CBHI is a form of micro-insurance where "micro" refers to the level of society where the interaction is located, i.e. generally for the low income people, and "insurance" refers to the economic instrument like self-help schemes for social health insurance.

[3] Total Microinsurance Coverage Ratio, World Map of Microinsurance. Micro insurance Network. Retrieved from: http://worldmapofmicroinsurance.org/

[4] See Gumber (2001); Jütting (2004); Jütting et al. (2004); Ranson (2001), and Smith and Sulzbach (2008).

For the instrumental variable analysis, we employ intensity of micro-insurance penetration in each Principal Sampling Unit (PSU) as an instrument for our endogenous variable; household micro-insurance status. We choose this IV because first, higher micro-insurance penetration in a PSU should have a positive peer effect on the enrolment decision of a household, and second, PSU insurance rate is a good measure of the performance of community health workers in their effort to expand the membership in MdS (Lu et al., 2012).

The analysis of this chapter is based on two cross-sectional data-sets from the Rwanda Integrated Living Conditions Survey (EICV) conducted for the periods 2005-06 and 2010-11.[5] The EICV data shows that membership in MdS, which was launched nationally in 2005, increased substantially between 2005-06 and 2010-11. We interpret this increase, in part, as a result of extensive enrolment campaigns and community sensitization carried by district officials and community health workers, and the introduction of national insurance law in 2007.[6]

First, we find that micro-insurance leads to an increase in health service utilisation; captured by formal health seeking behaviour reported by the household. Insured households are 9 percent and 21 percent more likely to use a health care service in 2005-06 and 2010-11 respectively. This result holds across a range of robustness checks and is stronger in 2010-11; particularly for the extremely poor households. This result provides evidence for the achievement of equity in MdS and creation of social safety net for the medical care of the poorest. This result supports the branch of literature that finds positive impacts of micro-insurance on health seeking behaviour (Msuya et al., 2004; Chankova et al., 2008; Axelson et al., 2009; Aggarwal, 2010; Fitzpatrick et al., 2011; Mahal et al., 2013; Dror et al., 2016).

Second, we find evidence that micro-insurance membership reduces total out of pocket (OOP) medical expenses. There is a reduction of 901 RwF (124 percent) and 133 RwF (32 percent) in the mean of two week OOP expenses in 2005-06 and 2010-11 respectively.[7] This result confirms the role of micro-insurance in reducing illness related costs of the insured and supports the findings from Ghana, Cambodia, India, and Nigeria (Nguyen et al., 2011; Levine et al., 2016; Mahal et al., 2013; Gustafsson-Wright et al., 2013).

In terms of hardship financing of medical costs, we find no evidence for the impact of micro-insurance membership on the sale of assets such as farm land, farm equipment, or livestock. This

[5] We chose this data-set over Rwandan Demographic and Health Surveillance (RDHS) data-set because RDHS was more related to health variables and general demographic information, thus providing no information about the financial activity. EICV, on the other hand provides comprehensive information about education, health indicators, migration, housing, economic activity, credits, durables and savings. It therefore allows for detailed analysis for different areas of research providing regional and national level evidence for policy-makers.

[6] Law No. 62/2007 of December 30th, disseminated in March 2008.

[7] The larger magnitude of this result in 2005-06 may be attributed to; one, higher differential of OOP between the insured and uninsured in 2005-06, and two, overall larger OOP spending in 2005-06 due to higher incidence of illness episodes reported in that period, confirmed by the main indicator report on EICV2 survey.

may be due to very low sales activity in Rwanda, at least for land in 12 months prior to the EICV survey, or support from social networks that helps maintain assets in the family in times of crisis. This finding may be context specific as there exists some evidence which supports protection from hardship financing in Cambodia, India, and Kenya with an effective decrease of up to 9 percent in the sale of assets as a result of micro-insurance membership (Levine et al., 2016; Aggarwal, 2010; Janzen and Carter, 2013).

Third, micro-insurance leads to a reduced likelihood of being an active saver and lower total savings balances in 2010-11; however we find the opposite for both variables in 2005-06. This apparent contradiction is explained when we look at the relative impact of micro-insurance on formal and informal savings respectively. We find that micro-insurance membership increases the likelihood of formal savings in line with the predictions of Giesbert et al. (2011) and Starr-McCluer (1996). In 2010-11 we find strong evidence that micro-insurance reduced informal savings in community savings groups. This suggests that the impact of micro-insurance on savings needs to take into consideration the differential impacts on formal and informal savings devices. In summary, we find evidence that when MdS established itself as a successful national micro-insurance scheme by 2010-11, it acted as a complement for formal savings and a substitute for informal community savings. This suggests that the impact of micro-insurance on savings needs to take into consideration the differential impacts on formal and informal savings devices, since information advantage channel as suggested by Giesbert et al. (2011) may lead into a shift from informal savings activity towards use of formal savings devices. Primarily, this may be the result of insured members of the community learning from the positive experience of having insurance, and thus shifting towards adoption of more formal ways of financial activities.

For borrowing, we find a somewhat similar story. We found evidence that micro-insurance is negatively related to borrowing in 2010-11 but no impact in 2005-06. We specifically find that in 2010-11 micro-insurance membership reduced the likelihood of informal borrowings, either the decision to borrow informally or total informal loan amount. Much like the impact on savings status, this result suggests that insurance has a slow but real impact on financial behaviour. This result draws strength from the findings of FinScope (2008), which suggests that 22 percent of borrowers indicate medical expenses as one of the primary reason to borrow from informal sources.[8]

This chapter is connected to two main strands of literature. First, studies assessing the impact of insurance on health seeking behaviour and OOP expenses, and second, studies focussing on the relationship between insurance membership and financial decision-making. For the first strand, there is an extensive literature on the impact of micro-insurance in developing countries of Asia and sub-Saharan Africa.[9] Specifically, for health service utilisation, Fitzpatrick et al. (2011) find that the

[8]According to FinScope (2008) report, the household informal savings increased from 38 percent in 2008 to 40 percent in 2012.

[9]The literature comprises of experimental and non-experimental studies, and systematic reviews suggests mixed evidence for health seeking behaviour and financial protection across Nicaragua, India, Democratic Republic of Congo, Uganda, Cameroon, Tanzania, Cambodia, and Senegal (Ekman, 2004).

Nicaraguan micro-insurance scheme for children increased health utilisation by 1.3 health visits, while Gustafsson-Wright et al. (2013) estimate 15 percent increase in health service utilisation from the insured in Nigeria. Similar positive results were obtained from Tanzania, Ghana, Mali, Senegal, Viet Nam, and India (Msuya et al., 2004; Chankova et al., 2008; Axelson et al., 2009; Aggarwal, 2010; Mahal et al., 2013; Dror et al., 2016). However, studies such as Levine et al. (2016), and Dercon et al. (2012) do not find any positive impact of micro-insurance on health utilisation in Cambodia and Kenya.

In terms of OOP expenses, there is evidence of a reduction in OOP from Ghana, (Nguyen et al. (2011) finds a decline of 67 percent in sample means of OOP), Cambodia (Levine et al. (2016) finds a 44 percent reduction in treatment costs), and Nigeria (Gustafsson-Wright et al. (2013) finds a 40 percent decline in health expenditures). However, Wagstaff et al. (2009) and Lei and Lin (2009) find no evidence on reduction in OOP in India and China, while Gumber (2001) and Chankova et al. (2008) find mixed evidence from west African countries.

For the second strand of literature, there are different mechanisms causing ambiguity on the direction of relationship between insurance and savings/borrowing. Research from Engen and Gruber (2001) and Chou et al. (2003) suggest the existence of a substitution effect between the adoption of insurance and savings/borrowing activity and vice-versa. This substitution effect exists because households, instead of adopting formal insurance, deplete precautionary savings and increase consumption credit when faced with health shocks. Similarly, insured households substitute savings activity and productive credit when uncertainty in income is reduced as a result of adopting formal insurance (Palumbo, 1999; Powers, 1998; Engen and Gruber, 2001; Chou et al., 2003).

In contrast, Starr-McCluer (1996) argues that the relationship between insurance and savings of a household extends beyond the precautionary motives or income uncertainty, thus reducing the substitution between the two due to factors such as occupation and wages. Further, the information advantage or learning view, as put forward by Giesbert et al. (2011) suggests a positive correlation between insurance and other forms of financial services due to an informational or learning effect associated with the expansion of financial markets. With exception of these few studies exploring the relationship between general insurance and savings/borrowings, we do not find any empirical evidence for the role of micro-insurance on financial outcomes in developing countries.

The rest of this chapter is organised as follows: Section 2.2 presents conceptual framework for the intertemporal utility maximisation of a household as a result of CBHI. Section 2.3 provides a brief background of Mutuelles de Sante and its operation in Rwanda. Section 2.4 presents the summary statistics for key variables in the study and discusses the choice and arguments for the validity of IV. The results from the econometrics analysis are presented in Section 2.5, and robustness checks are discussed in Section 2.6. The chapter concludes in Section 2.7.

2.2 Conceptual Framework

2.2.1 A Simple Framework on Health Stock and the Role of Micro-insurance

Modelling household health is essential to understand the link between insurance and household welfare. It can be shown using simple utility analysis that, given household aversion to unanticipated price changes and health shocks, welfare improvement can be obtained through social security nets such as the community based health insurance. The model presented here is based on Dercon and Hoddinott (2003) and links health shocks to the resulting wealth outcomes in a household. Here, households are assumed to maximise intertemporal expected utility, where utility in each period is a function of the health stock (H), consumption of goods (c), and some household characteristics (A); for example, the life-cycle position of household, its education, etc.

$$U_t = u_t(H_t, c_t, A_t) \tag{2.1}$$

Household preferences are assumed to be inter-temporally additive and utility functions are increasing and concave, thus implying risk-aversion. The assumption of health as a stock in the utility function is analogous to the analysis of durables or capital goods entering utility maximisation problem. The first constraint is the household health production function (as shown in Equation 2.2), where health (H) in time period 't' is determined by health in period *'t-1'* plus net investment in health. As health is taken as a stock, then focusing on net investment on health would include losses in this stock even if the body is in state of rest, much like the depreciation of capital goods. This is captured by the rate of metabolism or Basal Metabolic rate (BMR)[10] as the depreciation factor (represented by ρ) associated with heath stock (H) in period *'t-1'*. Further, the health function '$h(.)$' includes a positive addition to health stock through well-being and fitness induced from previous stock of health 'H_{t-1}', nutrient consumption (η), physical activity (ω), and specific unobserved health characteristics of the household such as inherent immunities (ϵ).

$$H_t = (1-\rho)H_{t-1} + h(H_{t-1}, \eta_{t-1}, \omega_{t-1}, \epsilon_{t-1}) \tag{2.2}$$

The budget constraint, linking time period 't' and *'t-1'* is shown in Equation 2.3, where wealth (W) in period 't' is the sum of wealth in period in period *'t-1'*, plus the difference between income (y) and expenditure (c). Also, market prices are denoted by 'p' and interest rate on both savings and debt is shown by 'r'. Income (y) is a function of market wages (w), labour (l), and health stock (H); creating a link between health stock (H) and wealth (W).

$$W_t = W_{t-1}(1 + r_{t-1}) + y_{t-1}(w_{t-1}, l_{t-1}, H_{t-1}) - p_{t-1}.c_{t-1} \tag{2.3}$$

[10]Basal Metabolic rate: A measurement of the number of calories needed to perform your body's most basic (basal) functions, like breathing, circulation and cell production. Source: Malia Frey in a report published in verywellfit on May 26, 2018. Retrieved from: https://www.verywellfit.com/what-is-bmr-or-basal-metabolic-rate-3495380

As put forward by Dercon and Hoddinott (2003), the assumptions so far imply that interior solutions for the optimum path of health stock involve constant expected marginal utilities over time. In order to write the solution, the user cost of the additional stock of health (or marginal cost) will be similar to the rental cost of capital stock. Thus, the optimal path for health will involve equal marginal benefits from additional health stock in each period, up to the discounted relative user cost of health. The user cost of health is affected by all sources of heterogeneity described in the household health production function (Equation 2.2). These sources include; one, adverse impact of unanticipated health shocks on household's well-being/fitness, level of physical activity, and individual immunity; and two, fluctuations in asset and food markets that affects nutrient consumption through change in prices.

Given household aversion towards these fluctuations (implied by concave utility function), welfare improvements can be obtained by; first, reducing the negative effect of unanticipated health shocks on the well-being/fitness 'H_{t-1}', physical activity 'ω', and immunity of households 'ϵ', and second, having stability in the asset and food markets to reduce variability in nutrient prices and consumption 'η'. The former can be achieved by integrating a safety net, such as household membership to a CBHI in household health production function, shown in Equation 2.2. This addition of 'Ω' representing household membership in CBHI modifies Equation 2.2, as shown in Equation 2.4.

$$H_t = (1-\rho)H_{t-1} + h(H_{t-1}, \Omega_{t-1}, \eta_{t-1}, \omega_{t-1}, \epsilon_{t-1}) \tag{2.4}$$

The integration of health insurance membership 'Ω' to health production function 'H' shall induce stability in user cost of health stock over time since insurance improves household health seeking behaviour and health outcomes (Msuya et al., 2004; Chankova et al., 2008; Axelson et al., 2009; Aggarwal, 2010). Moreover, stability in asset and food markets would also reduce variability in the health production function by reducing fluctuation in nutrient prices (Dercon and Hoddinott, 2003).

Although, membership of health insurance is critical to achieve stability in user-cost of health stock, there are many challenges faced by developing countries to expand insurance coverage. Primarily, these challenges are related to the supply-side constraints related to poorly developed insurance markets (Islam and Maitra, 2012), and demand-side constraints due to unaffordability (Liu and Myers, 2016). As a solution, CBHI in developing countries can over-come supply-side constraints by implementing insurance at the community level, while the demand-side constraints can be reduced by targeting the most vulnerable in terms of poverty and social exclusion.[11]

Clarke and Dercon (2009) suggest two competing views for the limiting effect of poverty on a household. The first view is termed as traditional view of poverty and it fundamentally concentrates on the

[11] In line with Clarke and Dercon (2009), we define poverty as non-access to goods and services due to unaffordability, while we outline social exclusion as lower social standing, and low outcomes for income, human capital, access to employment and services and voice in both local and national decision-making (World Bank, 2013).

lack of capital by the poor, thus constraining the accumulation of assets (Ray, 2007). An important implication of this view is that a supply-side policy intervention, such as implementation of CBHI, can increase poor's access to health and well-being, and break the health poverty trap.

The second view of poverty is termed as the vulnerability view, where unanticipated household risk is an important feature. According to this view, poor households are forced to build precautionary savings in liquid assets, which limits productive capital investment. However, with the membership of CBHI, the reliance of households on precautionary savings shall reduce, providing opportunity for more productive capital investments (Dekker and Wilms, 2010).

In addition to poverty, CBHI also reduces social exclusion by operating on the principles of solidarity and equity (Health and Financing Systems Review, 2008). With context to Rwanda, CBHI intervention is aimed at strengthening inter-sectoral coordination, community participation, decentralisation of its operations, and partnership between policy makers and the local community to provide a well-functioning health system (Ministry of Health, 2012). Moreover, MdS favours the membership of poor in rural areas and informal service sector by providing subsidies to the poorest of poor (Makaka et al., 2012). Thus, CBHI in Rwanda evolved as an important instrument of social inclusion and cohesion.

Based on this discussion of the intertemporal utility of households, the health production function, and the role of CBHI in reducing poverty and social exclusion, we propose the following hypotheses:

Hypothesis 1: Micro-insurance membership leads to increase in the health service utilisation of households.

Hypothesis 2: Micro-insurance membership leads to fall in the total out of pocket (OOP) medical expenses and reduces the likelihood to sell assets.

2.2.2 Framework for the Role of Micro-insurance on Financial Behaviour of Households

Multiple channels link insurance membership with household financial status. These channels induce ambiguity in the direction of the relationship between insurance and household decision to save and borrow.

Precautionary saving helps households manage unanticipated income shocks (Browning and Lusardi, 1996; Giles and Yoo, 2007; Palumbo, 1999; Powers, 1998). Moreover, further empirical evidence shows a substitution effect between insurance and household savings (Engen and Gruber, 2001; Chou et al., 2003). This substitution may exist because the motivation for saving is reduced when households obtain formal insurance against unanticipated illness events in the future. Little is known if this substitution operates for the poor in developing countries.

The evidence for substitution between insurance and financial decision-making is further explored in Starr-McCluer (1996), where the findings suggest non-existence of substitution between insurance and savings. On the contrary, the results suggest complementarity between health insurance and savings/wealth. The study interprets this result as evidence that savings activity of a household extends beyond the precautionary motives or uncertainty, and insured households maintain much higher wealth and savings due to factors such as occupation and wages.

Further, the non-existence of substitution between insurance and savings/borrowings is also explained from the view of information or learning effect as put forward by Giesbert et al. (2011). According to this view, there is a positive correlation between insurance and other forms of financial services. There are two main reasons for this phenomenon to exist. First, insured households may be introduced to other financial products that offer savings and credit and learn the benefits of integrated financial services. Second, expansion of a pioneering formal financial product opens up new opportunities for product bundling. Together, these factors indicate existence of the learning or informational effect associated with the demand of financial products.

Lastly, for household borrowing, credit serves as an important risk-coping mechanism against unanticipated income shocks. Hence, insurance should reduce the demand for credit and vice-versa; a channel explored in empirical studies such as Kruk et al. (2009); Zeller (2001), and Eswaran and Kotwal (1989). Within the context of Rwanda, medical emergency is an important income shock that contributes almost 22 percent of household to borrow (FinScope, 2008). Thus, there is potential for household borrowing status and loans to reduce in Rwanda, as a result of CBHI membership.

In light of the above discussion we propose the following hypotheses:

Hypothesis 3: Micro-insurance membership leads to significant change in savings decisions and saving deposits of the households.

Hypothesis 4: Micro-insurance membership leads to fall in the likelihood to borrow and total loan amount of households.

2.3 Background: *Mutuelles de Sante* in Rwanda

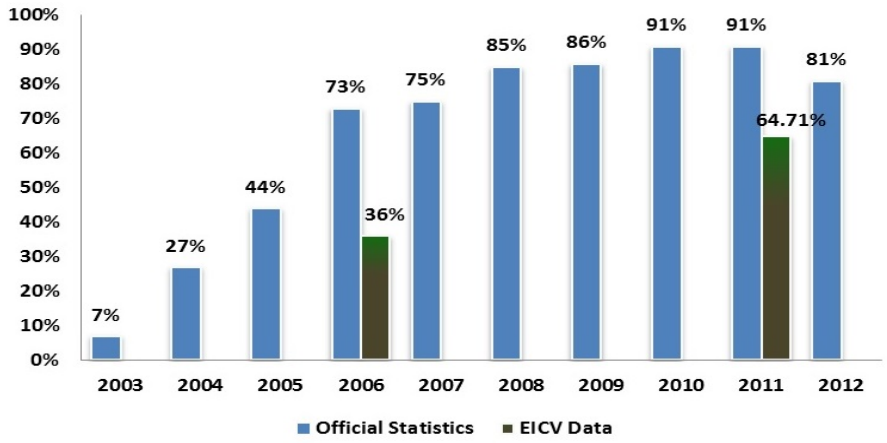
Rwanda is a small country in Africa, with a population of around 12 million people, of which about 90 percent are involved in subsistence agriculture.[12] The country faced a civil-war and genocide in 1994, which led to economic turmoil that continued for many years. However, Rwandan economy has been stable in the last decade and per capita income increased from 204 USD in 1996 to 445

[12]The World Fact-book, Central Intelligence Agency. Link: https://www.cia.gov/library/publications/the-world-factbook/geos/rw.html

USD in 2014 (constant 2015 USD), with the real GDP growth rate of 8 percent per year between 2001 and 2015 (Harrison, 2017).

The genocide crippled the health infrastructure of the country and in response the government abolished medical user fees between 1994 and 1996; providing free medical care in their effort to fight ill health and diseases (Kayonga, 2007). However, the system was heavily under-resourced. Free medical care ended in 1996 and this severely affected health service utilisation of Rwandans. Evidence suggests that medical service use in public and church-owned health facilities dropped from 0.3 consultations per capita per year in 1997 to 0.25 in 1999 (Schneider, 2005). As a response, the government decided to establish a pre-payment community based health insurance scheme to improve health care coverage.

Figure 2.1: Enrolment in *Mutuelles de Sante* (2003-2012)



Source: Ministry of Health, Rwanda 2012.

In order to assess the feasibility of a health micro-insurance scheme, CBHI was first piloted in 1999 in three districts namely; Byumba, Kabgayi, and Kabutare covering which covered 52 health centres and three district hospitals (Ministry of Health, 2012). This pilot was gradually expanded to cover more districts each year and it was used to understand the issues in implementation of micro-insurance, its effectiveness, and its sustainability before being adopted as a national policy. After seven years of intense pilot programme, the CBHI was formally launched at the national level as Mutuelles de Sante (MdS) in all 30 districts of Rwanda in 2006. Awareness campaigns through community health workers (CHWs), local leaders and radio programmes were undertaken to increase the membership in the scheme (ODI, 2012).

Operating for almost 18 years, MdS has scaled up considerably and now is one of the largest CBHIs in the world. USAID estimates that the coverage of MdS increased from about 10 percent in 1999 to 91 percent in 2010 (see Figure 2.1). However, MdS still qualifies as a CBHI scheme due to extensive role of local community in making MdS an instrument of social cohesion and inclusion in Rwanda.

2.3.1 Subscription and Services

Enrolment in MdS requires household subscription in order to limit the problem of adverse selection. Initially, the annual premium payment for MdS was fixed at 2500 RwF (around 4.5 USD in 2007) for a family of 7 members. However, the family payment structure was discontinued in 2007 and annual premiums of 1000 RwF (around 1.8 USD in 2007) were introduced for each member in the household.[13]

In order to limit the problem of moral hazard, MdS requires co-payment for medical services.[14] The co-payment was fixed at 100 to 150 RwF (0.18 to 0.28 USD in 2006) per visit to the health centre and up to 50 percent of the hospitalisation fees. In 2007, the co-payments were increased to 200 RwF (0.28 current USD) for visit to the health centre, while decreased to 10 percent of the total charges for hospitalisation (Lu et al., 2012).

In terms of health services offered under MdS, an exhaustive set of rules were introduced in 2007 with clear distinction of services offered by the health-centres and hospitals. The health-centres provided services listed under the minimum service package (PMA), while the hospitals provided services under the complementary service package (PCA) (Lu et al., 2012). These services provided comprehensive set of medical facilities under MdS and therefore were critical in attracting enrolment (Health Financing Systems Review, 2008). Table 2.1 shows the components of PMA and PCA at health centres and district hospitals respectively.

2.3.2 Organisational Structure of *Mutuelles de Sante*

The management of MdS includes different roles played by the central and district governments, communities, health facilities, and international donors. The central government manages the national and district financial pool of MdS and leads on policy development. It is also responsible for strengthening the technical and logistical requirements of district health centres, and provides premium subsidies to the poorest of poor. In addition to the central government, MdS is also managed at the district level, where community mobilisation and expansion of MdS is one of the major responsibilities of district officials. Further, it also provides essential logistics and validates the invoices of district hospitals.

MdS incentivises its officials by offering performance contracts, called Performance Based Financing (PBF). These incentives relate to all arms of administrative decentralisation in Rwanda and expansion of CBHI is one of the key indicators for the performance of district mayors and officials

[13]The payment of flat premium was discontinued in 2011 and a new stratification system was introduced. Under this new system, the lowest income category pays annual contribution of 2,000 RwF (USD 2.68), second income category pays 3,000 RwF (USD 4), and the highest income category pays 7,000 RwF (USD 9.40). Moreover, the government subsidises the premium payments for the lowest income groups.

[14]Co-payment is the amount that the insured pays as out-of-pocket expense for health-care services at the time when medical service is rendered with the insurer paying the remaining costs. Co-payments are necessary to reduce the problem of moral hazard. Source: Investopedia. Link: http://www.investopedia.com/terms/c/copay.asp

Table 2.1: Components of PMA and PCA

Service Provided	**Contents**
Minimum Service Package (**PMA**)	Prevention Activities: Prenuptial examination, prenatal and postnatal consultations, voluntary consultation and testing for HIV, family planning, vaccination, screening and epidemiological surveillance, water and sanitation. Curative Activities: Curative consultations, child health care, chronic diseases, HIV/AIDS patient treatment, nutritional rehabilitation, inpatient care, minor surgery, laboratory tests, drug provision. Health Promotion Activities: Information, education and communication for health, child-growth monitoring, psychological support. Maternal Health Activities: Deliveries, post- abortion treatment.
Complementary Service package (**PCA**)	Provision of services and treatment to patients referred by health centres for consultation and surgery. Provision of obstetric cases. Emergency services. Ambulatory services. Provision of drugs. Child Health Laboratory imaging and testing. Training of health centre staff. Planning, implementation, surveillance and evaluation of health centre activities.
Source: Health Financing Systems Review (2008), Ministry of Health, Rwanda.	

(Samuels and Pose, 2013). The PBF also exists at lower levels of administration where incentives are offered to village Community Health Workers (CHWs) who reside and work in their respective communities.[15]

2.4 Data and Methodology

2.4.1 Membership in *Mutuelles de Sante*

This chapter uses two nationally representative data-sets from Integrated Household Living Conditions Survey (EICV) for 2005-06 and 2010-11.[16] The total number of households surveyed in 2005-06 and 2010-11 was 6,900 and 14,310 respectively.[17]. The primary sampling unit for the survey was villages, defined as enumeration zones, as per the census.[18]

Under the official rules of MdS, the enrolment requires household subscription to avoid the problem of adverse selection; however, the EICV data shows that some households do not have all their family members enrolled in the scheme. The proportion of partially enrolled households was recorded as 16.5 and 23.6 percent for 2005-06 and 2010-11 respectively. The EICV data shows that majority

[15]A village has three CHWs: a male-female pair that provides basic care against illnesses and one CHW in-charge of maternal health. They are elected at the village level and have an important role to play in creating awareness towards community participation in MdS.

[16]The dataset provides comprehensive information about education, health indicators, migration, housing, economic activity, credits, durables and savings.

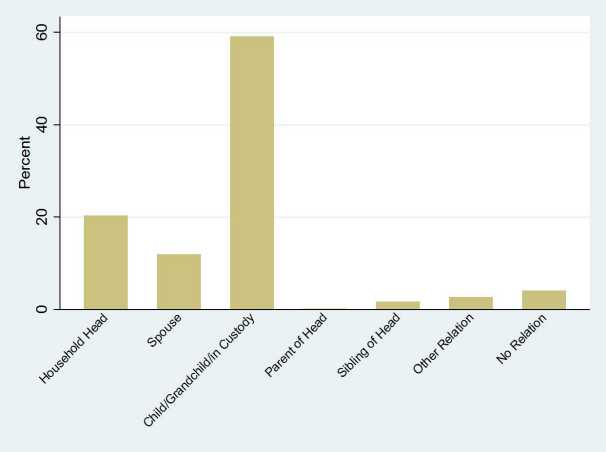
[17]The total individuals surveyed in EICV were 34,789 in 2005-06 and 68,398 in 2010-11.

[18]The choice of the sample of these zones was based on the probability proportional to the number of households in the zones. Following this procedure, the second step involved the selection of a set of 9 households in each urban zone and 12 sample households in the rural zone.

of non-enrolled in the family were children, grand-children or child in custody of the household head (59.20 percent), followed by the household head (20 percent), and the spouse of the head (12 percent), as shown in Figure 2.2. This is further confirmed by the age distribution of the non-enrolled and we find that the age-group less than 12 months of age has highest share of non-enrolled, followed by the age distribution from 10 to 20 years (see Figure 2.3).

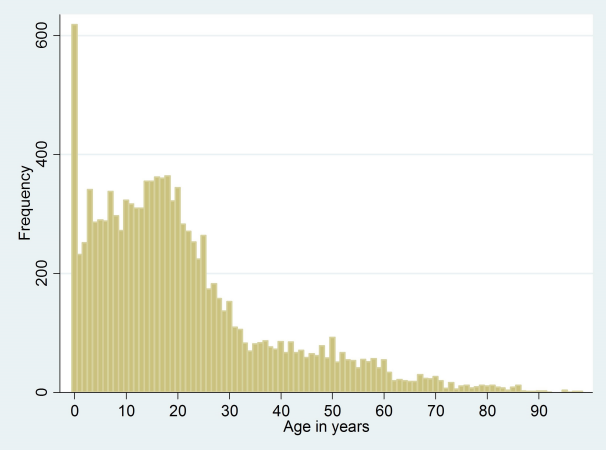
Thus, it appears that the majority partial enrolment in MdS is due to infants in the family who were either delivered after the family had already enrolled in the scheme or household preferences to enrol adults. The possibility of within household adverse selection in the scheme is also supported by the findings of Health Financing Systems Review of Rwanda, (2008).

Figure 2.2: Relationship of Uninsured with HH Head



Source: EICV Data.

Figure 2.3: Age of uninsured in the Household



Source: EICV Data.

Furthermore, partial enrolment can also be a result of an exemption given to certain members in the household if they are part of any other insurance scheme. We check this on the EICV data

and find that only 15.44 percent of non-enrolled individuals from partially enrolled households had membership of any other insurance service. Other than the possibility of adverse selection in the scheme, non-enrolment may also exist due to the financial incapacity of households to pay the cost of premium for all members of the family at the same time (Kalk, 2008).[19]

Heterogeneity of household membership in MdS is accounted for by constructing the measure of insurance intensity; derived as the mean of insurance membership at the household level. The measure ranges as a continuous variable from zero to one.[20] A similar kind of approach has been used by Parmar et al. (2012) and we consider the constructed intensity measure as a direct proxy of insurance penetration at the household level. However, in one of the robustness checks employed in this chapter, we drop the partially enrolled households to verify if the main results are affected by the issue of adverse selection in the scheme (see Appendix 2.B).

The descriptive statistics for insurance membership at the household level are shown in Table 2.2. The EICV data on MdS enrolment suggests that membership increased at all levels of income groups in the five year period from 2005-06 to 2010-11.[21] The increase was substantial for non-poor households where enrolment (partial or full) increased from 45 percent in 2005-06 to 80 percent in 2010-11. For poor households, the enrolment (partial or full) increased from 46 percent to 73 percent, while for extremely poor households the increase in enrolment was from 35 percent in 2005-06 to 65.80 percent in 2010-11. Thus, it can be deduced that enrolment in MdS became more equitable in later years as compared to the initial phase. For households with partial enrolment in MdS, the overall proportion increased to almost 24 percent in 2010-11 as compared to 16.5 percent in 2005-06, mostly driven by extremely poor households.

Table 2.2: Insurance Intensity in the Household

Sample	**2005-06 (N=6,900)**			**2010-11 (N=14,308)**		
	CBHI=0	**0<CBHI<1**	**CBHI=1**	**CBHI=0**	**0<CBHI<1**	**CBHI=1**
Entire Sample	4,007	1,129	1,764	3,467	3,380	7,461
	58%	16.50%	25.50%	24.23%	23.62%	52.15%
Extremely Poor	1,351	265	461	1,018	771	1,188
	65%	13%	22%	34.20%	25.80%	40%
Poor	708	210	390	765	658	1,428
	54%	16%	30%	26.80%	23.20%	50%
Non-Poor	1,948	654	913	1,684	1,951	4,845
	55%	20%	25%	19.86%	23%	57.13%

Source: Author calculation using EICV data.

At the individual level, the proportion of individuals having no insurance reduced significantly from 57.23 percent in 2005-06 to 31.56 percent in 2010-11 (see Table 2.3). This reduction can be attributed

[19]The EICV data shows that proportion of partially enrolled members was highest in the extremely-poor households in 2010-11 (25.80 percent as shown in Table 2.2); while in 2005-06, the financial incapacity is highlighted by highest non-enrolment from extremely poor households (65 percent as shown in Table 2.2).

[20]Table 2.2 suggests that there were 1,129 and 3,380 households in 2005-06 and 2010-10 respectively who did not have full enrolment of MdS.

[21]The classification is done as per the poverty and extreme poverty status provided in the data-set.

to the strong political commitment by the central and district government to expand CBHI, and the subsidies offered for the poorest of the poor (Ministry of Health, 2012).[22] Further, the increase was also due to the introduction of insurance law no. 62/2007 in December 2007; making health insurance mandatory for all Rwandans. It should be noted that the enrolment was made compulsory for any health insurance offered in Rwanda, and not to just MdS per se. However, most people being poor, and in the informal sector found CBHI as the most suitable insurance scheme (Chemouni, 2016). This is reflected in the EICV data, where membership in MdS increased from 36.42 percent in 2005-06 to 64.71 percent in 2010-11, while membership to any other forms of insurance reduced from 6.34 percent in 2005-06 to 3.74 percent in 2010-11 (RAMA, MMI, employer insurance, etc.).[23]

Table 2.3: Insurance profile at the Individual Level

Enrolment in Insurance	**2005-06 (N=34,789)**	**2010-11 (N=68,398)**
Mutuelles de Sante	36.42%	64.71%
Other Insurance	6.34%	3.74%
No-insurance	57.23%	31.56%

Source: Author calculation using EICV data.

Despite the official law for mandatory health insurance in Rwanda (either MdS or any other form of insurance), substantial number of individuals remained uninsured in 2010-11 (see Table 2.4). The majority of these individuals belonged to the lowest income group in both periods of EICV survey, thus indicating the need for continued subsidisation of MdS for the poorest of poor.

Table 2.4: Income profile of Uninsured (MdS or any other Insurance)

Year	**Extremely Poor**	**Poor**	**Non-Poor**
2005-06	65.66% (N=11,377)	56.37% (N=6,652)	51.86% (N=16,760)
2010-11	46.55% (N=16,321)	36.74 (N=14,215)	23.14% (N=37,862)

Source: Author calculation using EICV data.

The membership numbers from the nationally representative EICV are significantly lower than the figures supplied by the Ministry of Health that claimed MdS enrolment being close to 91 percent in 2010 (see Figure 2.1). This discrepancy may have occurred due to misreporting of the actual figures by the ministry and it must be noted that charges of inflating records were made on some mayors and MdS officials. The false reporting may be driven by pressure on authorities to expand the coverage of micro-insurance (Chemouni, 2016).[24]

2.4.2 Household profile across Insured and non-Insured in MdS

The difference of means t-test results for demographic variables at the household level are presented in Table 2.5. The difference is obtained between the mean values of relevant variables for households

[22] CBHI is an important indicator of performance based contracts.

[23] Categories reported for other forms of insurance in data include RAMA (La Rwandaise d'Assurance Maladie), MMI (Military Medical Insurance), Employer Insurance, and other.

[24] Rwanda operates on Performance Based Financing (PBF), therefore there is incentive to misreport the statistics to derive rewards. An example was seen when several resignations and arrests were made in late 2014 and 2015, covered extensively by media and print (Chemouni, 2016).

having positive enrolment (partial or full) in MdS (MdS>0) and households having zero enrolment (MdS=0).

We find statistically significant differences in the mean values of the variables in 2005-06 and 2010-11. It can be deduced from the test that households with higher intensity of MdS enrolment have significantly higher rates of male and older household heads. In terms of household composition and household size, MdS enrolment is significantly higher for bigger households having larger number of adults, children, and women in the family. Also, the proportion of MdS enrolment is significantly higher for households having higher proportion of family members attending primary school.

Further, households who do not have MdS membership report higher participation in other forms of insurance such as RAMA, Military Medical Insurance (MMI), or any other employer insurance. In order to control for the effect arising from the membership in any other form of insurance, the regression analysis for the main results employs membership in other insurance as one of the control variables.

The results from the difference of means analysis suggest significant differences in the characteristics of enrolled versus non-enrolled households indicating the possibility of self-selection in the scheme. Therefore, it is imperative to control for individual and household level factors and correct for the endogeneity issues in order to obtain meaningful results for the impact of MdS.

Table 2.5: Difference of Means for Demographic Variables for Insured and non-Insured in MdS

Variables	**2005-06**				**2010-11**			
	Mean		**Diff.**	**P-Value**	**Mean**		**Diff.**	**P-Value**
	MdS>0 (N=2,893)	**MdS=0 (N=4,007)**			**MdS>0 (N=10,841)**	**MdS=0 (N=3,467)**		
Male HH Head	0.74	0.7	0.04***	0.00	0.73	0.71	0.02*	0.04
Age in years	45.23	43.22	2.01***	0.00	45.51	43.87	1.64***	0.00
Size of Household	5.39	4.79	0.59***	0.00	4.88	4.47	0.41***	0.00
Other Insurance	0.02	0.08	-0.07***	0.00	0.02	0.07	-0.05***	0.00
Adults	3.07	2.73	0.34***	0.00	2.84	2.43	0.41***	0.00
Children	2.71	2.58	0.13***	0.00	2.5	2.59	-0.08**	0.01
Women	1.63	1.52	0.11***	0.00	1.53	1.35	0.18***	0.00
Married	0.6	0.47	0.13***	0.00	0.58	0.48	0.09***	0.00
Mean Schooling in HH	0.8	0.76	0.04***	0.00	0.82	0.78	0.04***	0.00

Source: Author calculation using EICV data.

2.4.3 Main Outcomes of Interest

The focus of this chapter is to derive the causal impact of MdS membership on outcomes such as health services utilisation, out of pocket medical expenses, hardship financing, and financial outcomes related to savings and borrowings. The difference of means for these outcomes for insured and non-insured households is reported in Table 2.6. In most cases, the differences are statistically significant across the micro-insurance membership profile of the households.

To capture health services utilisation, a measure of formal health seeking behaviour is constructed at the household level such that it takes the value 1 if any member in the household seeks medical attention in the two weeks period prior the survey, and zero otherwise. The result of the t-test shows that

enrolled households are significantly more likely to seek formal medical care as compared to uninsured households in both 2005-06 and 2010-11 respectively. The differential is higher in 2010-11 indicating some evidence for improved health seeking behaviour in over the years of MdS operation in Rwanda.

OOP includes all expenses made on medical services such as health check-up fee, purchase of medicines, imaging, pathological expenses, etc. reported for any health conditions in the period of two weeks prior the survey. We find that non-enrolled households incur higher OOP expenses in 2005-06 with the difference being statistically significant. The OOP expenses in 2010-11 are lower compared to 2005-06 and the difference between MdS and non-MdS households in 2010-11 is statistically insignificant.

For hardship financing, the data on sale of assets, irrespective of the reason for the sale, shows that enrolled households have higher proportion of the sale activity in 12 months prior the EICV survey; being statistically significant for both periods. Further, the majority of the sale activity takes place for livestock with very few insured and uninsured households engaging in the sale of farm-land and farming equipment. The results from difference of mean t-test do not provide any evidence for the relationship between insurance membership and the sale of assets. However, it is essential to control for unobserved factors and self-selection through formal regression analysis in order to make any final deductions.

The financial behaviour of the households is captured by savings and borrowing status using both formal and informal sources, and total savings deposits and loans, reported in Rwandan Francs (RwF). Savings status (borrowing status) is binary variable where the variable takes the value as 1 if a household saves (borrow) and zero otherwise in 12 month prior to the EICV survey. Formal savings pertain to any savings made by the household using savings account, while informal savings imply participation of households in community savings group called Tontine.[25]

Existence of savings is significantly higher for enrolled households in both years with the differential being 14 and 11 percent in 2005 and 2010. Moreover, the likelihood of formal and informal community savings is also higher for insured households. These results provide a first indication that membership of insurance is associated with higher savings; however, the issue of self-selection and reverse causality cannot be excluded. Therefore, results from IV estimation are necessary to make any conclusive argument regarding the causality between insurance and savings. Further, overall

[25] Usually a tontine is formed with friends or work mates. The group agrees on a monthly amount that each member will contribute to the tontine, and each month the pool of money is given to one individual from the group to do with as he or she pleases. The amount is usually enough to start a project, make an investment (livestock, for example), or simply a lump sum to put in the bank. Retrieved from: Tontine: A Home-grown answer to Micro-finance, Link: https://rwandanights.wordpress.com/2012/06/16/tontine-a-homegrown-answer-to-microfinance/

savings activity is recorded much higher in 2010 as compared to 2005.[26] Finally, we do not find any significant differences in the amount of savings-formal or informal between insured and non-insured households in 2005 and 2010.

For borrowing status, it is noted that insured households borrow 2 percent less in 2010, the differential being significant at 5 percent level. This reduction seems to be driven by the decrease in informal borrowings made by insured households from sources such as parent or friend, tontine, NGO, employer, and other traditional or modern lenders. However, this result also needs further inspection from regression estimation before any final deductions can be made.

Table 2.6: Difference of means for Main outcomes between Insured and non-Insured in MdS

Variables	**2005-06**				**2010-11**			
	Mean		**Difference**	**P-Value**	**Mean**		**Difference**	**P-Value**
	MdS>0 N=2,893	**MdS=0 N=4,007**			**MdS>0 N=10,841**	**MdS=0 N=3,467**		
Seek Formal Medical Care	0.25	0.16	0.08***	0.00	0.29	0.11	0.18***	0.00
Total OOP Expenses	519.3	884.9	-365***	0.00	444.37	327.51	116.86	0.17
Sold Assets	0.58	0.53	0.05***	0.00	0.68	0.65	0.03*	0.01
Sold Livestock	0.54	0.48	0.07***	0.00	0.63	0.58	0.05***	0.00
Sold Farm Equip.	0.002	0.00	-0.000	0.73	0.02	0.02	-0.01***	0.00
Sold Farmland	0.06	0.06	0	0.97	0.1	0.1	0	0.93
Household Saves	0.53	0.39	0.14***	0.00	0.67	0.56	0.11***	0.00
Saves Formal	0.24	0.18	0.05***	0.00	0.42	0.28	0.15***	0.00
Saves Informal (Tontine)	0.41	0.27	0.13***	0.00	0.48	0.42	0.07***	0.00
Total Savings (RwF)	40,801.65	34,671.48	6,130.18	0.24	1,088,426.7	1,781,074.42	-692,647.60	0.38
Total Formal Savings (RwF)	26,070.38	24,329.65	1,740.73	0.72	77,032.80	67,450.63	9,582.20	0.42
Total Informal Savings (RwF)	14,749.30	10,353.97	4,395.32*	0.01	1,044,868.8	1,750,510.56	-705,641.60	0.37
Household Borrows	0.59	0.56	0.03*	0.01	0.73	0.75	-0.02**	0.01
Borrows Formally	0.16	0.14	0.03***	0.00	0.1	0.08	0.02***	0.00
Borrows Informally	0.42	0.42	0.01	0.65	0.63	0.68	-0.04***	0.00
Total Borrowings (RwF)	93,507.73	75,635.24	17,872.49	0.37	517,386.10	153,254.04	364,132.04	0.22
Total Formal Borrowings (RwF)	69,565.90	54,102.66	15,463.23	0.36	198,740.50	129,079.90	69,660.60	0.46
Total Informal Borrowings (RwF)	17,492.80	14,036.96	3,455.85	0.65	217,362.20	20,150.60	197,211.61	0.39

Source: Author calculation using EICV data.

2.4.4 Methodology

While health insurance is officially mandatory in Rwanda, the reality on the ground is different allowing for possible self-selection of enrolees, based on individual and household level observed and unobserved factors. Endogeneity may also occur due to reverse-causation when for example higher health seeking behaviour may lead to higher micro-insurance membership. As a consequence, Ordinary Least Square (OLS) estimation gives biased results; due to endogeneity. In order to deal with these empirical issues, this chapter employs instrumental variable (IV) estimation with exhaustive set of household and district level controls to derive the causal impact of micro-insurance.

Our identification strategy requires identification of an instrumental variable which satisfies two conditions; first, correlated with the key explanatory variable; micro-insurance membership, and second,

[26] This is in line with the official statistics from Rwanda suggesting an increase of 163.1 percent in savings deposits from 2005 to 2010 as suggested by the National Bank of Rwanda data. Source: Statistical Article published on 9th January, 2013. Retrieved from: http://www.statistics.gov.rw/publication/tremendous-growth-savings-culture-rwanda

uncorrelated with the outcomes of interest, in the process satisfying the exclusion restriction principle.[27] The study follows the approach adopted by Lu et al. (2012) to identify a valid IV. Accordingly, we construct the measure "PSU insurance rate" for the household; the mean of insurance intensity in primary sampling unit excluding the household for which the IV is being constructed.[28]

The PSU insurance rate helps in satisfying the first stage requirement of the IV for two reasons. First, it determines the penetration of MdS in the zone where the household resides; capturing the peer-effect behind a household's decision to enrol or not in MdS. Second, the PSU insurance rate determines the performance of the Community Health Workers (CHWs), since a higher magnitude of this variable in a PSU would imply effective awareness campaigns carried out by CHWs; thereby increasing the chances for a household's decision to enrol in MdS and vice-versa. In absence of any other variable to capture the awareness campaign and performance of CHWs, this measure acts as a good indicator of CHW operations; given that every CHW is incentivised to expand MdS coverage under Performance Based Financing (PBF).[29] Also, there is enough variation for the IV in different PSUs as every PSU has its own mobilisation committee which trains CHWs to deliver awareness of CBHI; in exchange of monetary incentives and social recognition (Health Financing Systems Review, 2008).

Our choice of instrument should satisfy the exclusion restriction principle because the PSU insurance rate should only affect the household's decision to enrol in MdS and remain uncorrelated with the outcomes such as OOP, hardship financing, and existence of savings and borrowings. However, the IV might be correlated with the outcome for utilisation of health services and therefore we do not use this instrument for the assessment of the impact of MdS on health seeking behaviour. We do this as a precaution because CHW operation in a PSU might have some unobserved effect on the health seeking behaviour of households. Nonetheless, we expect that this IV does not affect the OOP expenses, hardship financing, and existence of savings and borrowings because these outcomes are beyond the scope of CHW operations or any peer effect of PSU insurance intensity on the households.

Microinsurance in Rwanda is implemented and administered by the Ministry of Health such that it has no influence on the membership and expansion of other formal financial services such as savings and borrowings. There was no supply-side structural change to have simultaneously provided the rural communities an opportunity to change their financial decisions like savings and borrowings with the same pace as insurance membership. In light of no significant supply-side changes to financial infrastructure in Rwanda from the Ministry of Finance, the resulting changes in the financial decision of households should primarily be determined by the individual demand-side demographic

[27] Exclusion Restriction Principle: The instrument Z should not affect Y when X is held constant. The effect of Z on Y should only be through X.

[28] Considered as zones de dnombrement (ZD) for EICV 2 and 3.

[29] As mentioned previously, Rwanda operates on Performance Based Financing (PBF) at every level of administrative disaggregation. This makes CHWs at the lowest administrative level well incentivised to carry out effective awareness campaign and a variable which can record the performance though insurance penetration would have a greater validity and strength.

factors. Furthermore, the argument against the exogeneity of the IV that it may also affect the financial decisions of the uninsured households due to associated spill-overs is just one of the many demand-side channels for the complementarity or substitutability between financial services. Moreover, for the uninsured, community spill-overs is the only major demand-side factor through which the expansion of micro-insurance in the commune could be a resultant force for their decision to save and borrow. On the other hand, most of the demand side changes directly attributable to the expansion of micro-insurance should primarily act on the insured members (post-insurance membership) such as risk-aversion, precautionary savings decisions, moral hazard behaviour, etc.

In a situation where the likelihood of a supply-side structural change cannot be ruled out in the short-run, the regressions in this chapter control for District level fixed effects, in addition to household level controls. The district level fixed effects should take into account any unobserved district level changes brought over time with expansion of micro-insurance and other administrative and demographic factors. It should also be noted that there is no product bundling between MdS and any other financial product; therefore, the extent with which MdS expansion in a commune would have a one-to-one impact on household savings and borrowings for both insured and uninsured is rather a very strict, yet untestable assertion. It is because of the combination of the aforesaid reasons cited in the earlier studies such as Shimeles (2010), Lu et al. (2012), and Binagwaho et al. (2012) that this IV (PSU insurance rate) has been used with context to the assessment of Mutuelles de Sante on financial risk and expansion of medical services in Rwanda. Furthermore, this IV has also been employed in other settings such as Vietnam and China by Lei and Lin (2009) and Tra and Thong (2016) for the assessment of New Cooperative Medical Scheme (NCMS) and Health Care Fund for the Poor (HCFP) respectively.

In relation to the arguments above, we understand the concern that community spill-overs and person-to-person interaction may simultaneously affect the decision of both insured and uninsured with expansion of insurance in the commune. While we do not disagree fully with this possibility, it is our understanding that the commune expansion of micro-insurance has potential to reasonably impact the informal financial decisions of the commune population, leaving formal financial decisions of the uninsured unaffected. The reason not to expect much changes in the formal financial decisions is related to the justification in the earlier argument regarding no structural changes in the supply-side dynamics of financial services.

With respect to informal financial decisions, we check the possibility of spill-over effects and draw empirical support to for PSU insurance rate as the IV by running a robustness check in which the informal sources of borrowings involving person-to-person or community interaction are excluded. These sources include borrowing from friends and family, parents, neighbours, and Tontine community savings group. The exclusion of borrowings from these sources is done to minimise the possibility of changing patterns of loan behaviour amongst the uninsured, triggered from the corresponding changes in the savings/borrowings decisions of the insured commune members.

In order to assess whether the IV is uncorrelated with the aforesaid outcome variables, we explore if there are any significant systematic differences in the PSUs having higher and lower intensity of MdS enrolment. We do this to check for the possibility of correlation between the instrument and outcome variables due to institutional and administrative factors of the respective PSUs that can affect MdS enrolment and outcome variables simultaneously. To assess this, we obtain the difference of means t-test between high intensity PSUs and low intensity PSUs on the variables that capture the administrative and health institutional setup.[30]

The variables chosen for the difference of means t-test include time to district administrative office and health centre, and the satisfaction derived from the use of these services, as reported by the households in EICV data. The time is recorded in minutes and the satisfaction is a binary variable that takes the value as 1 if the household is satisfied with the service and zero otherwise. Ideally, time to banking institutions or financial services would be more appropriate to assess the relation between the insurance intensity in a PSU and the financial protection/existence of savings and borrowing. However, this was not possible since the EICV data does not provide any information on time to financial institutions or banking services. In light of this limitation, we consider time to administrative office as an imperfect proxy for the financial integration of households in Rwanda, assuming that the district administrative office should be in the close proximity of major financial institutions. The results for the t-tests for 2005-06 and 2010-11 are shown in Table 2.7. In addition to these variables, we also consider variables which capture key components such as agricultural production, education services, wealth, etc.

[30]The assignment of a PSU into high insurance or low insurance zone is based on the mean values of the PSU insurance intensity. If a PSU has insurance intensity lower (higher) than the mean value, it is assigned as low (high) intensity PSU.

Table 2.7: Difference of means test for checking the exclusion restriction principle

Variables	**2005**				**2010**			
	Mean		**Difference**	**P-Value**	**Mean**		**Difference**	**P-Value**
	Low Inten. PSU	**High Inten. PSU**			**Low Intensity PSU**	**High Intensity PSU**		
Time: Administrative Office	120.52	120.24	0.27	0.90	73.82	71.76	2.06*	0.06
Time: Health Centre	66.81	64.99	1.81	0.12	186.65	189.32	-2.67	0.19
Satisfaction: Administrative Office	0.08	0.06	0.01*	0.05	0.96	0.95	0.00	0.42
Satisfaction: Health Centre	0.22	0.20	0.02*	0.06	0.93	0.92	0.01*	0.08
Additional Variables tested for Exclusion Restriction Principle to suffice								
Household Vaccinated	0.99	0.99	-0.00	0.18	1.00	1.00	0.00	0.16
Household Vaccinated Card	0.73	0.74	-0.01	0.52	0.80	0.81	-0.01	0.27
Vaccinated Service development during the last 12 months in Administrative Office	2.98	2.96	0.02	0.36	2.68	2.68	0.00	0.89
Occupation Sector	3.94	3.90	0.05	0.37	3.01	3.11	-0.10	0.10
Total Long Run Harvest	2,926.11	2,922.54	3.57	0.98	92,968.58	97,691.04	-4,722.45	0.17
Total Farmed Area	80.54	84.48	-3.94	0.30	56.87	60.85	-3.98*	0.09
Amount paid for acquisition of farm land	87,155.95	74,903.24	12,252.71	0.16	2,742,078.81	995,968.61	1,746,110.20	0.32
School Annual registration fees	125,902.17	72,333.33	53,568.84	0.15	258,487.50	316,220.10	-57,732.60	0.38
Primary health problem	3.51	3.77	-0.26*	0.07	4.03	3.89	0.14	0.14

Here, the difference in means between low intensity PSU and high intensity PSU for the time to district administrative office is small and insignificant for 2005. Although, this differential is significant in 2010, however the level of significance is 10 percent with a small differential of only 2 minutes. For the time to health centre, the difference in the mean values of time is also small and insignificant for both 2005-06 and 2010-11.

In terms of the satisfaction derived from these services, the difference between the mean values is significant for 2005-06 at 10 percent level. However, it is important to consider the positive signs of the satisfaction differentials because they imply that satisfaction derived from administrative or health services is higher in a low intensity PSU. If the satisfaction from these services was to affect simultaneously the enrolment decision in MdS and outcomes variables, it was necessary that the satisfaction and quality of these institutions was higher in high intensity PSU. Since, we do not find any evidence for this, the possibility for the satisfaction and quality of these institutions to determine both enrolment in MdS and outcome variables is limited.

The variables such as household status of vaccination, ownership of vaccination card and primary health problems represent health status of residents in the high and low density communes. Barring prevalence of the type of disease which is relatively exogenous (significant at 10 percent level in 2005-2006), there is no significant difference between these observables w.r.t PSU insurance rate. In terms of the exogeneity of the IV with regards to other underlying differences in the administrative capacity and demographic trends, it is found that variables such as occupation sector in the communes, farm land acquisition amounts, total long-run harvests, total farmed area, service development of administrative services, and education registration fees remain significantly not different between low and high intensity insurance communes. These results support the justification given earlier that the supply-side factors undertaken to expand MdS did not involve any component of information which could have led the commune density of insurance to affect outcome variables of interest outside individual insurance status.

We present the first-stage reduced form regression Equation 2.5. Here, our endogenous variable is the household intensity of insurance; represented by the variable 'CBHI'. This is regressed on the instrument PSU insurance rate, represented by the variable 'Ins.Rate PSU' and other co-variates.

$$CBHI_i = \alpha_i + \beta(Ins.RatePSU)_i + (Demo)_i\gamma + (ECON)_i\delta + \tau + \epsilon \tag{2.5}$$

The predicted values of CBHI from the first stage reduced form regression (Equation 2.5) are used to estimate the structural equations, as shown in Equation 2.6 and Equation 2.7. Here, the assessment for binary dependent variables such as health seeking behaviour, sale of assets, existence of savings, and borrowing status is conducted by obtaining marginal effects following probit and IV probit estimation, as shown in Equation 2.6. However, for continuous variables such as OOP expenses and

amounts for saving deposits and loans, the assessment is conducted using OLS and IV two-staged least square regression (IV2SLS), as shown in Equation 2.7.

$$Pr(Outcomes)_i = \alpha_i + \beta(CBHI)_i + (Demo)_i\gamma + (ECON)_i\delta + \tau + \epsilon \tag{2.6}$$

$$Outcomes_i = \alpha_i + \beta(CBHI)_i + (Demo)_i\gamma + (ECON)_i\delta + \tau + \epsilon \tag{2.7}$$

The key variable of interest in the specifications is '*CBHI*' and therefore 'β' represents the magnitude of the impact of MdS. Several set of controls are used to deal with the problem of omitted variable bias, hence the vector '*DEMO*' represents demographic features such as the household size, proportion of adults and children in the house, age and schooling of the household head, and household features such as the type of dwelling, and sources for household water, lighting, and cooking fuel. '*ECON*' captures economic characteristics such as total value of short as well as long term harvests, possession of household items such as TV and Radio, material of floor, and ownership of other insurance products (RAMA, MMI or employment insurance). In addition to these, we control for district level fixed effects, as shown by 'τ', by including district level dummies. This is done to control for unobserved factors at the district level affecting the decision of households to enrol in the scheme. Standard errors are adjusted for 30 clusters at district level and regression equations are weighted in order to derive representative estimates at the national level; as per the recommendation of the EICV survey reports.

2.5 Results

2.5.1 Hypothesis 1: Impact of Mutuelles de Sante on Health Service Utilisation

The first hypothesis relates to the impact of micro-insurance membership on health service utilisation of households. We investigate this through probit regression with formal health seeking behaviour as the dependent variable and MdS intensity of insurance, as our main variable of interest (CBHI). The results are reported as marginal effects in Table 2.8. As mentioned earlier, we do not attempt IV estimation due to the concerns of the violation of exclusion restriction principle.

It can be inferred from the marginal effects that there is a positive and significant relationship between health seeking behaviour and micro-insurance intensity with the magnitude of 9 percent and 21 percent in 2005-06 and 2010-11 respectively. The coefficients on CBHI can be interpreted as the likelihood of seeking formal medical care when the micro-insurance intensity in the household changes from zero to 1, i.e. from being uninsured to fully insured. Further, health seeking behaviour is also positively correlated with the characteristics such as membership of other forms of insurance and the number of adults and children in the household. These results provide evidence for hypothesis 1, and the effect of CBHI is stronger in 2010-11. This can be credited to various outreach

strategies for community sensitization and awareness carried out on national as well as local levels, such as radio programmes, leaflets, posters, and introduction of Insurance Law in 2007 (Ministry of Health, 2012; Chemouni (2016).

Table 2.8: Health Seeking Behaviour and Insurance Intensity

Variables	**Formal Health Seeking (2005-06)**			**Formal Health Seeking (2010-11)**		
	Probit	**Probit**	**Probit**	**Probit**	**Probit**	**Probit**
CBHI	0.078***	0.078***	0.090***	0.181***	0.181***	0.214***
	(0.015)	(0.015)	(0.015)	(0.016)	(0.015)	(0.016)
Radio		0.031**	0.025*		0.018*	0.009
		(0.012)	(0.013)		(0.009)	(0.010)
TV		0.029	-0.001		0.075***	-0.013
		(0.032)	(0.060)		(0.021)	(0.031)
Adults		0.019***	0.019***		0.018***	0.026***
		(0.006)	(0.006)		(0.006)	(0.006)
Children in HH		0.016***	0.016***		0.014***	0.017***
		(0.003)	(0.004)		(0.004)	(0.004)
Women in HH		0.014	0.007		0.016*	0.005
		(0.008)	(0.010)		(0.008)	(0.009)
Age of HH head		-0.006**	-0.006**		-0.010***	-0.012***
		(0.003)	(0.003)		(0.002)	(0.002)
Age Sq.		0.000*	0.000		0.000***	0.000***
		(0.000)	(0.000)		(0.000)	(0.000)
HH Mean Schooling			0.050*			0.036
			(0.027)			(0.029)
Urban			-0.008			0.020
			(0.027)			(0.019)
Other Insurance			0.139***			0.311***
			(0.032)			(0.038)
Time to Health Centre			-0.000			-0.000
			(0.000)			(0.000)
Harvest Small		-0.026	-0.047		-0.000	-0.003
		(0.135)	(0.132)		(0.000)	(0.002)
Harvest Large		-0.004	0.007		0.000	0.000
		(0.078)	(0.074)		(0.000)	(0.002)
Observations	6,900	5,265	4,526	14,308	10,959	9,910
Controls	No	Yes	Yes	No	Yes	Yes
Household Controls	No	Yes	Yes	No	Yes	Yes
District FE	No	Yes	Yes	No	Yes	Yes

Source: Author calculation of average marginal effects using EICV 2005-06 and 2010-11 data on Stata14.
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

The main results in Table 2.8, may suffer from reverse causation due to unobserved factors such as adverse selection. This is because higher health seeking behaviour can positively induce households to purchase the membership of MdS. We check for this particular issue within the household by conducting a robustness check by dropping households that have partial membership of MdS. We do this because partially enrolled households are suspected for causing adverse selection in the scheme (Health Financing Systems Review of Rwanda, 2008). Under the robustness checks, the results as discussed in section 2.6, hold and are consistent with the main findings, giving some evidence against adverse selection within households; however we acknowledge that adverse selection across households still remains a concern due to absence of IV estimation. Thus, these results should be interpreted with caution and should be deemed as a measure of correlation and not the causal impact of micro-insurance on health seeking behaviour.

The results for health seeking behaviour are economically meaningful, as household consumption is found to be negatively associated with the employment days lost due to illness, as shown in Table 2.9.[31]

[31] Consumption in the household is taken for the non-food consumption only. The data for food consumption in 2010 could not be retrieved from EICV.

Table 2.9: Consumption in the household, days lost during illness, and household insurance intensity

Variables	Household Consumption (2005-06) OLS	Household Consumption (2005-06) OLS	Household Consumption (2010-11) OLS	Household Consumption (2010-11) OLS
Days lost during Illness	-0.050***	-0.029**	-0.024***	-0.011**
	(0.017)	(0.013)	(0.008)	(0.004)
CBHI		0.311**		0.291***
		(0.126)		(0.072)
Adults		0.308***		0.183***
		(0.058)		(0.036)
Children in HH		-0.014		0.054**
		(0.039)		(0.025)
Women in HH		0.118		0.072
		(0.096)		(0.067)
Age of HH head		-0.005		-0.022*
		(0.041)		(0.013)
Age Sq.		-0.000		0.000
		(0.000)		(0.000)
HH Mean Schooling		0.334**		0.601***
		(0.155)		(0.147)
Urban		1.408***		0.127
		(0.397)		(0.137)
Time to Health Centre		0.001		0.000
		(0.001)		(0.000)
Harvest Small		4.454***		0.029
		(1.44)		(0.036)
Harvest Large		1.066		0.128***
		(0.814)		(0.043)
Constant	10.102***	7.942***	10.759***	9.821***
	(0.149)	(1.072)	(0.121)	(0.552)
Observations	1,224	759	1,724	1,169
Controls	No	Yes	No	Yes
Household Controls	No	Yes	No	Yes
District FE	No	Yes	No	Yes

Source: Author calculation of average marginal effects using EICV 2005-06 and 2010-11 data on Stata14.
Notes: Standard Errors clustered at cluster level, shown in brackets.
Harvest Small/Large: RwF Values/1,000,000.
*** p<0.01, ** p<0.05, * p<0.1

2.5.2 Hypothesis 2: Impact of Mutuelles de Sante on Out of Pocket Expenses and Hardship Financing

After controlling for possible confounders and instrumenting, we find that higher intensity of MdS membership in the household negatively impacts OOP expenses (see Table 2.10) and this is consistent across different specifications and estimation techniques for both 2005-06 and 2010-11. The results show that moving from zero membership to an increase in the membership of insurance by 1 member in the households (25 percent associated increase) leads to a fall in OOP expenses by 31 percent in 2005-06 and 8.2 percent and 2010-11. With the average two-week OOP expenses of 731 RwF (0.43 USD) and 416 RwF (0.72 USD) in 2005-06 and 2010-11, the results indicate an average fall of 226 RwF (1.82 USD) and 34 RwF (0.06 USD) in the OOP incurred in 2 weeks prior the survey was conducted.[32] and 416 RwF (0.72 USD)[33] in 2005-06 and 2010-11, the results indicate an average fall of 906 RwF (1.82 USD) and 133.2 RwF (0.23 USD). Other significant predictors of OOP expenses include household size, incidence of diseases, and medical consultation; having positive relationship with OOP, while the effect of membership in other insurance is negative and significant, much like the effect of MdS membership.

We do not find evidence of changes in levels of hardship financing attributable to MdS (see Table

[32]Exchange Rate 1USD=528.16 RwF, as on 31st August, 2006. Retrieved from: https://currencies.zone/historic/us-dollar/rwanda-franc/p69.

[33]Exchange Rate 1USD=574.58 RwF, as on 31st December, 2010. Retrieved from: https://currencies.zone/historic/us-dollar/rwanda-franc/p69

Table 2.10: Impact of MdS on Out of Pocket Medical Expenses (OOP)

Variables	Out of Pocket Exp. (2005-06)						Out of Pocket Exp. (2010-11)					
	OLS	OLS	OLS	IV2SLS	IV2SLS	IV2SLS	OLS	OLS	OLS	IV2SLS	IV2SLS	IV2SLS
CBHI	-0.209**	-0.314***	-0.519***	-1.188***	-1.305***	-1.240***	-0.271***	-0.249***	-0.327***	-0.580***	-0.325*	-0.328*
	(0.091)	(0.101)	(0.069)	(0.321)	(0.357)	(0.249)	(0.060)	(0.064)	(0.061)	(0.175)	(0.180)	(0.175)
HH Size		0.224***	0.098***		0.221***	0.096***		0.107***	0.052**		0.106***	0.052**
		(0.041)	(0.027)		(0.041)	(0.027)		(0.024)	(0.023)		(0.024)	(0.023)
HH Mean Schooling		0.240	-0.024		0.376	0.084		-0.058	-0.057		-0.052	-0.057
		(0.223)	(0.145)		(0.230)	(0.148)		(0.111)	(0.106)		(0.111)	(0.105)
Age of HH Head		-0.014	0.004		-0.014	0.005		-0.026***	-0.010		-0.026***	-0.010
		(0.020)	(0.013)		(0.020)	(0.013)		(0.009)	(0.009)		(0.009)	(0.009)
Age Sq.		0.000	-0.000		0.000	-0.000		0.000***	0.000		0.000***	0.000
		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)
Children in HH		-0.025	-0.039		-0.009	-0.029		-0.018	0.001		-0.019	0.001
		(0.054)	(0.037)		(0.054)	(0.037)		(0.029)	(0.028)		(0.029)	(0.028)
Disease in HH			2.124***			2.059***			1.344***			1.344***
			(0.086)			(0.088)			(0.063)			(0.064)
Other Insurance			-0.793***			-1.174***			-0.670***			-0.670***
			(0.194)			(0.235)			(0.200)			(0.240)
Medical Consultation			3.836***			3.926***			0.452***			0.452***
			(0.103)			(0.106)			(0.096)			(0.098)
Harvest Small		0.423	0.211		0.722	0.430		-0.015	-0.010		-0.014	-0.010
		(1.319)	(0.762)		(1.265)	(0.718)		(0.014)	(0.015)		(0.014)	(0.015)
Harvest Large		-0.691	-0.279		-0.597	-0.228		0.024	0.020		0.025	0.020
		(0.802)	(0.472)		(0.784)	(0.475)		(0.018)	(0.017)		(0.019)	(0.017)
Constant	2.402***	2.058**	-0.092	2.758***	1.907**	-0.167	1.237***	2.529***	1.883***	1.438***	2.577***	1.884***
	(0.063)	(0.907)	(0.532)	(0.131)	(0.905)	(0.537)	(0.052)	(0.491)	(0.416)	(0.122)	(0.502)	(0.430)
Observations	6,900	4,892	4,889	6,900	4,892	4,889	14,308	10,509	10,506	14,308	10,509	10,056
R-squared	0.001	0.058	0.571	-0.018	0.039	0.562	0.002	0.072	0.18	-0.001	0.072	0.18
First Stage F-stat	-	-	-	1,313	551	485	-	-	-	5,216	1,882	1,584
Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Household Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
District FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes

Source: Author calculation using EICV 2005-06 and 2010-11 data on Stata14.
OOP Expenses: Log values where all values reported as zero replaced by 1 to avoid missing observations
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

2.11). There is no significant impact of micro-insurance membership (MdS or other insurance) on the decision to sell assets, irrespective of the asset type we consider (see section 2.6).

This finding may be for one of three reasons. First, the differential between the cost of uninsured medical care and insured medical care may not be as significant in Rwanda, as it might be in other countries. Second, ill members of an uninsured family may go untreated rather than sell productive assets that the rest of the family depends on. Third, households without formal health insurance may rely instead on social networks to overcome unexpected medical bills. Practically, there are a small proportion of households engaging in sale of assets in last 12 months (as shown previously in Table 2.6) which also undermines our ability to pick up an effect.

2.5.3 Hypothesis 3: Impact of MdS on Existence of Savings and Savings Deposits

After correcting for self-selection through IV estimation, it is found that existence of savings in the household and amount of savings (formal and informal) are negatively affected by micro-insurance intensity in 2010-11; however, opposite results are obtained for 2005-06, as shown in Table 2.12.[34]

Our prior was that micro-insurance either acts as a substitute through precautionary savings channel (Engen and Gruber, 2001; Chou et al., 2003) or as a complement through the information or learning effect (Giesbert et al., 2011). However, conflicting results in 2005-06 and 2010-11 limit our ability

[34] We only present the full regression model for findings on hypothesis 3 and 4; however results hold for different specifications using several combinations of control variables.

Table 2.11: Impact of MdS on Decision to Sell Assets (Hardship financing)

Variables	Sale of Land or Livestock or Farm Equipment (2005-06)						Sale of Land or Livestock or Farm Equipment (2010-11)					
	Probit	Probit	Probit	IVProbit	IVProbit	IVProbit	Probit	Probit	Probit	IVProbit	IVProbit	IVProbit
CBHI	0.048***	0.026	0.023	-0.011	-0.062	-0.066	0.018	0.007	0.004	-0.005	0.038	0.032
	(0.018)	(0.019)	(0.019)	(0.057)	(0.065)	(0.070)	(0.014)	(0.014)	(0.015)	(0.031)	(0.035)	(0.036)
HH Size		0.028***	0.026***		0.027***	0.025***		0.009*	0.008*		0.009*	0.008*
		(0.007)	(0.007)		(0.007)	(0.007)		(0.005)	(0.005)		(0.005)	(0.005)
HH Mean Schooling		0.097**	0.090**		0.109***	0.104**		0.065**	0.063**		0.062**	0.061**
		(0.040)	(0.040)		(0.040)	(0.041)		(0.028)	(0.028)		(0.028)	(0.028)
Age of HH Head		0.000	0.001		0.000	0.001		0.001	0.002		0.001	0.002
		(0.003)	(0.003)		(0.003)	(0.003)		(0.002)	(0.002)		(0.002)	(0.002)
Age Sq.		-0.000	-0.000		-0.000	-0.000		-0.000	-0.000		-0.000	-0.000
		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)
Children in HH		-0.014	-0.014		-0.012	-0.013		-0.000	-0.000		-0.000	0.000
		(0.009)	(0.009)		(0.009)	(0.009)		(0.006)	(0.006)		(0.006)	(0.006)
Disease in HH			0.025			0.016			-0.010			-0.007
			(0.018)			(0.020)			(0.012)			(0.013)
Other Insurance			0.003			-0.047			0.023			0.046
			(0.053)			(0.064)			(0.047)			(0.055)
Medical Consultation			0.059***			0.071***			0.028*			0.022
			(0.021)			(0.023)			(0.015)			(0.017)
Harvest Small		1.452***	1.458***		1.470***	1.476***		0.022***	0.022***		0.021***	0.021***
		(0.243)	(0.243)		(0.244)	(0.244)		(0.005)	(0.005)		(0.005)	(0.005)
Harvest Large		0.174	0.179		0.176	0.180		0.040***	0.040***		0.040***	0.040***
		(0.121)	(0.121)		(0.121)	(0.121)		(0.006)	(0.006)		(0.006)	(0.006)
Observations	4,699	3,934	3,933	4,699	3,934	3,933	10,101	8,303	8,300	10,101	8,303	8,300
First Stage F-Stat	-	-	-	1,313	551	485	-	-	-	5,216	1,882	1,584
Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Household Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
District FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes

Source: Author calculation of average marginal effects using EICV 2005-06 and 2010-11 data on Stata14.
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 2.12: Impact of MdS on Existence of Savings and Amount of Savings (Formal and Informal)

	Existence of Savings (Formal and Informal)				Amount of Savings (Formal and Informal)			
	2005-06		2010-11		2005-06		2010-11	
Variables	Probit	IVProbit	Probit	IVProbit	OLS	IV2SLS	OLS	IV2SLS
CBHI	0.122***	0.118*	0.062***	-0.096**	1.219***	1.211*	0.829***	-0.969**
	(0.016)	(0.065)	(0.013)	(0.039)	(0.163)	(0.645)	(0.140)	(0.417)
HH Size	0.036***	0.036***	0.028***	0.027***	0.332***	0.332***	0.225***	0.209***
	(0.006)	(0.006)	(0.005)	(0.005)	(0.054)	(0.054)	(0.044)	(0.045)
HH Mean Schooling	0.163***	0.164***	0.162***	0.173***	1.549***	1.550***	1.957***	2.111***
	(0.030)	(0.033)	(0.021)	(0.022)	(0.275)	(0.291)	(0.227)	(0.233)
Age of HH Head	0.006**	0.006**	0.005**	0.006***	0.040	0.040	0.057***	0.063***
	(0.003)	(0.003)	(0.002)	(0.002)	(0.026)	(0.026)	(0.022)	(0.022)
Age Sq.	-0.000***	-0.000***	-0.000***	-0.000***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	-0.011	-0.011	-0.018***	-0.019***	-0.059	-0.059	-0.097*	-0.116**
	(0.008)	(0.008)	(0.006)	(0.006)	(0.076)	(0.076)	(0.056)	(0.056)
Disease in HH	0.007	0.007	0.011	-0.006	0.052	0.051	-0.010	-0.204
	(0.016)	(0.017)	(0.012)	(0.012)	(0.150)	(0.160)	(0.124)	(0.127)
Other Insurance	0.107**	0.105*	0.336***	0.203***	0.969**	0.965*	2.977***	1.476***
	(0.046)	(0.056)	(0.061)	(0.068)	(0.475)	(0.558)	(0.367)	(0.483)
Medical Consultation	0.036**	0.037*	0.019	0.049***	0.317*	0.318*	0.258**	0.604***
	(0.017)	(0.019)	(0.012)	(0.013)	(0.170)	(0.184)	(0.121)	(0.135)
Harvest Small	0.421**	0.423**	0.027***	0.028***	4.941***	4.943***	0.252***	0.272***
	(0.187)	(0.192)	(0.005)	(0.005)	(1.787)	(1.814)	(0.036)	(0.039)
Harvest Large	0.316**	0.317**	0.045***	0.046***	3.638***	3.639***	0.294***	0.313***
	(0.127)	(0.127)	(0.008)	(0.008)	(1.216)	(1.206)	(0.041)	(0.044)
Constant					2.778**	2.777**	0.866	2.107***
					(1.216)	(1.208)	(0.768)	(0.790)
Observations	4,887	4,887	10,488	10,488	4,889	4,889	10,506	10,506
R-Squared	-	-	-	-	0.189	0.189	0.189	0.170
First Stage F-Stat	-	485	-	1,584	-	485	-	1,584
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using EICV 2005-06 and 2010-11 data on Stata14.
Amount of Savings: Log values where all values reported as zero replaced by 1 to avoid missing observations
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

to identify the true channel between micro-insurance and household savings. Thus, in order to fully understand the causal mechanism of micro-insurance on savings, we isolate formal and informal savings from the total.

Table 2.13: Impact of MdS on Existence of Savings and Amount of Savings (Formal)

	Existence of Savings (Formal and Informal)				Amount of Savings (Formal and Informal)			
	2005-06		2010-11		2005-06		2010-11	
Variables	Probit	IVProbit	Probit	IVProbit	OLS	IV2SLS	OLS	IV2SLS
CBHI	0.077***	0.085**	0.119***	0.073**	0.701***	0.673*	1.237***	0.777***
	(0.011)	(0.039)	(0.013)	(0.036)	(0.105)	(0.352)	(0.099)	(0.293)
HH Size	0.014***	0.014***	0.029***	0.028***	0.042	0.042	0.128***	0.124***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.037)	(0.036)	(0.039)	(0.039)
HH Mean Schooling	0.138***	0.137***	0.196***	0.201***	0.822***	0.826***	1.587***	1.626***
	(0.023)	(0.024)	(0.023)	(0.024)	(0.149)	(0.159)	(0.171)	(0.171)
Age of HH Head	0.003	0.003	0.003	0.003	0.006	0.006	0.017	0.019
	(0.002)	(0.002)	(0.002)	(0.002)	(0.017)	(0.016)	(0.015)	(0.015)
Age Sq.	-0.000	-0.000	-0.000	-0.000*	-0.000	-0.000	-0.000**	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	0.002	0.002	-0.014***	-0.015***	0.127**	0.127**	0.037	0.033
	(0.005)	(0.005)	(0.005)	(0.005)	(0.051)	(0.051)	(0.048)	(0.048)
Disease in HH	-0.000	0.001	0.008	0.004	0.021	0.018	-0.032	-0.083
	(0.011)	(0.011)	(0.010)	(0.011)	(0.096)	(0.099)	(0.092)	(0.095)
Other Insurance	0.143***	0.147***	0.580***	0.545***	1.793***	1.778***	5.173***	4.789***
	(0.026)	(0.033)	(0.061)	(0.066)	(0.414)	(0.442)	(0.342)	(0.411)
Medical Consultation	0.023**	0.022*	0.031**	0.040***	0.167	0.171	0.279***	0.370***
	(0.011)	(0.013)	(0.013)	(0.014)	(0.114)	(0.125)	(0.108)	(0.115)
Harvest Small	0.218***	0.216***	0.019***	0.020***	2.560**	2.568**	0.189***	0.194***
	(0.083)	(0.083)	(0.004)	(0.004)	(1.170)	(1.164)	(0.034)	(0.034)
Harvest Large	0.211***	0.211***	0.039***	0.040***	3.597***	3.599***	0.333***	0.338***
	(0.069)	(0.069)	(0.006)	(0.006)	(1.068)	(1.059)	(0.050)	(0.051)
Constant					3.040***	3.037***	1.271*	1.590**
					(0.914)	(0.911)	(0.659)	(0.686)
Observations	4,887	4,887	10,487	10,487	4,889	4,889	10,059	10,059
R-Squared	-	-	-	-	0.245	0.245	0.293	0.291
First Stage F-Stat	-	485	-	1,584	-	485	-	1,584
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using EICV 2005-06 and 2010-11 data on Stata14.
Amount of Savings: Log values where all values reported as zero replaced by 1 to avoid missing observations
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

The results show that there is positive impact of micro-insurance membership on existence of formal savings and associated amounts for both 2005-06 and 2010-11 (see Table 2.13). The regression coefficient on CBHI indicates that household micro-insurance membership from none to all increases the likelihood that an individual has formal savings by 8 percent and 7 percent in 2005-06 and 2010-11 respectively. Further, an associated increase of 0.67 percent and 0.77 percent is noted for formal savings amount as a result of a percentage increase of insurance membership in the households. With respect to increase in insurance membership by 1 member (approximately 25 percent), this represents an associated increase of 16.8 percent and 19.25 percent in the amount of savings in the households. These results are in line with the predictions of Starr-McCluer (1996) regarding the complementarity between insurance and savings. Moreover, since the increase is noted for formal savings, it confirms the existence of informational or learning effect from the use of micro-insurance for formal financial behaviour; as highlighted in the information or learning effect channel by Giesbert et al. (2011).

Finally, we interpret these results as one of the explanations for the overall increase in formal savings accounts and savings deposits held in Rwanda between 2005-06 and 2010-11, as suggested by FinScope (2012) and statistics from National Bank of Rwanda.[35]

[35]There was an increase in savings accounts from 6.8 percent to 18.2 percent in rural areas and from 20.3 percent to 33.2 percent for urban areas from 2005-06 to 2010-11 (FinScope, 2012). Also,

Table 2.14: Impact of MdS on Existence of Savings and Amount of Savings (Informal)

	Existence of Savings (Formal and Informal)				Amount of Savings (Formal and Informal)			
	2005-06		2010-11		2005-06		2010-11	
Variables	Probit	IVProbit	Probit	IVProbit	OLS	IV2SLS	OLS	IV2SLS
CBHI	0.087***	0.078	0.037**	-0.139***	0.903***	0.983	0.428***	-1.380***
	(0.017)	(0.072)	(0.014)	(0.044)	(0.165)	(0.687)	(0.143)	(0.471)
HH Size	0.031***	0.031***	0.015***	0.013**	0.333***	0.333***	0.213***	0.197***
	(0.006)	(0.006)	(0.005)	(0.005)	(0.056)	(0.056)	(0.051)	(0.052)
HH Mean Schooling	0.142***	0.144***	0.119***	0.131***	1.243***	1.231***	1.323***	1.478***
	(0.030)	(0.032)	(0.024)	(0.025)	(0.268)	(0.284)	(0.236)	(0.243)
Age of HH Head	0.006**	0.006**	0.007***	0.008***	0.044*	0.043*	0.057***	0.063***
	(0.003)	(0.003)	(0.002)	(0.002)	(0.024)	(0.024)	(0.022)	(0.022)
Age Sq.	-0.000***	-0.000***	-0.000***	-0.000***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	-0.012	-0.012	-0.006	-0.007	-0.134*	-0.135*	-0.103	-0.122*
	(0.008)	(0.008)	(0.006)	(0.006)	(0.077)	(0.078)	(0.065)	(0.065)
Disease in HH	0.009	0.008	0.009	-0.010	0.087	0.095	0.074	-0.121
	(0.016)	(0.017)	(0.012)	(0.013)	(0.146)	(0.160)	(0.128)	(0.132)
Other Insurance	-0.027	-0.031	-0.009	-0.155***	-0.035	0.007	0.297	-1.212*
	(0.046)	(0.058)	(0.048)	(0.058)	(0.459)	(0.565)	(0.581)	(0.688)
Medical Consultation	0.022	0.024	0.009	0.042***	0.196	0.186	0.103	0.451***
	(0.018)	(0.020)	(0.014)	(0.015)	(0.172)	(0.189)	(0.143)	(0.159)
Harvest Small	0.297*	0.300*	0.030***	0.031***	3.844**	3.819**	0.269***	0.290***
	(0.173)	(0.177)	(0.005)	(0.004)	(1.785)	(1.812)	(0.035)	(0.037)
Harvest Large	0.228*	0.229*	0.015***	0.016***	2.190*	2.184*	0.192***	0.210***
	(0.121)	(0.121)	(0.005)	(0.005)	(1.260)	(1.248)	(0.051)	(0.054)
Constant					0.480	0.488	-0.394	0.854
					(1.296)	(1.287)	(0.766)	(0.817)
Observations	4,887	4,887	10,497	10,497	4,889	4,889	10,506	10,506
R-Squared	-	-	-	-	0.135	0.135	0.123	0.104
First Stage F-Stat	-	485	-	1,584	-	485	-	1,584
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using EICV 2005-06 and 2010-11 data on Stata14.
Amount of Savings: Log values where all values reported as zero replaced by 1 to avoid missing observations
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

The positive impact of micro-insurance membership on formal savings implies that the negative impact on overall savings in 2010-11 (formal and informal as shown in Table 2.12) must be driven from the informal component of savings status and amount of savings. This is confirmed from the IV results in Table 2.14, where we find that micro-insurance membership negatively affects household decision to save in informal community groups in 2010-11, with no effect in 2005-06.

The change in household micro-insurance membership by 1 member (average 25 percent increase) reduces the decision to save in informal community groups by almost 14 percent with associated decline of 34.5 percent (-1.38*25) in the amount of informal community savings. The presence of this negative relation in 2010-11 highlights the role of micro-insurance membership in shifting the focus of households from saving in informal sources to more formal sources. This provides clear evidence of substitution between health insurance and informal community savings.

2.5.4 Hypothesis 4: Impact of MdS on Status of Borrowing and Loan Amounts

As shown in Table 2.15, the IV estimates for 2010-11 suggest that micro-insurance intensity in the households negatively affects the borrowings status and associated loan amounts (formal and informal). However, there is no evidence for this relationship in 2005-06 when MdS was in its infancy as a national programme.

there was an increase of 163.81 percent in savings deposits from 2005 to 2010 (NBR, retrieved from: http://www.statistics.gov.rw/publication/tremendous-growth-savings-culture-rwanda).

Table 2.15: Impact of MdS on Borrowing Status and Amount of Loans (Formal and Informal)

	Borrowing Status (Formal and Informal)				Amount of Loans (Formal and Informal)			
	2005-06		2010-11		2005-06		2010-11	
Variables	Probit	IVProbit	Probit	IVProbit	OLS	IV2SLS	OLS	IV2SLS
CBHI	0.009	0.044	-0.056***	-0.153***	0.247	0.476	-0.319**	-1.224***
	(0.017)	(0.057)	(0.013)	(0.034)	(0.162)	(0.534)	(0.125)	(0.344)
HH Size	0.013**	0.013**	0.007*	0.006*	0.223***	0.224***	0.230***	0.222***
	(0.006)	(0.006)	(0.004)	(0.004)	(0.054)	(0.054)	(0.041)	(0.040)
HH Mean Schooling	0.144***	0.138***	0.035*	0.043**	1.606***	1.571***	0.768***	0.845***
	(0.032)	(0.033)	(0.021)	(0.021)	(0.294)	(0.296)	(0.211)	(0.212)
Age of HH Head	-0.002	-0.002	0.003*	0.004**	-0.017	-0.017	0.049**	0.052***
	(0.003)	(0.003)	(0.002)	(0.002)	(0.027)	(0.026)	(0.020)	(0.020)
Age Sq.	-0.000	-0.000	-0.000***	-0.000***	-0.000	-0.000	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	-0.006	-0.006	0.001	-0.000	-0.092	-0.095	-0.111**	-0.120**
	(0.008)	(0.008)	(0.005)	(0.005)	(0.072)	(0.072)	(0.056)	(0.056)
Disease in HH	0.061***	0.064***	0.058***	0.047***	0.488***	0.509***	0.556***	0.459***
	(0.016)	(0.017)	(0.011)	(0.011)	(0.151)	(0.158)	(0.111)	(0.114)
Other Insurance	0.043	0.062	0.113***	0.030	0.978**	1.099**	3.110***	2.355***
	(0.044)	(0.052)	(0.042)	(0.049)	(0.453)	(0.518)	(0.414)	(0.485)
Medical Consultation	0.003	-0.002	0.025**	0.043***	0.158	0.130	0.307***	0.481***
	(0.018)	(0.020)	(0.012)	(0.013)	(0.170)	(0.185)	(0.114)	(0.129)
Harvest Small	0.203	0.192	0.003	0.005*	2.656	2.587	0.094***	0.104***
	(0.182)	(0.183)	(0.003)	(0.003)	(1.742)	(1.739)	(0.030)	(0.030)
Harvest Large	-0.272**	-0.274**	0.001	0.002	-2.246*	-2.262*	0.078*	0.088*
	(0.117)	(0.117)	(0.003)	(0.003)	(1.227)	(1.222)	(0.044)	(0.045)
Constant					7.131***	7.155***	5.735***	6.359***
					(1.309)	(1.303)	(0.848)	(0.883)
Observations	4,887	4,887	10,493	10,493	4,889	4,889	10,506	10,506
R-Squared	-	-	-	-	0.073	0.073	0.116	0.110
First Stage F-Stat	-	485	-	1,584	-	485	-	1,584
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using EICV 2005-06 and 2010-11 data on Stata14.
Amount of Loans: Log values where all values reported as zero replaced by 1 to avoid missing observations
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

We find that increased household membership in MdS by 1 member (25 percent increase) reduces the borrowing status by 15 percent, with reduction in loan amount by 30.5 percent (-1.22*25). This result indicates a substitution effect between insurance and household borrowings as suggested by Kruk et al. (2009); Zeller (2001), and Eswaran and Kotwal (1989).

We reproduce these results by differentiating formal and informal borrowings from the total. This is done to ascertain if reduction in borrowing status and amount of loans follow from the introduction of micro-insurance. We find no impact of MdS membership on formal borrowing and this is an unsurprising result given that formal loans in Rwanda are given out either in the context of collateral (long term asset purchase) or seasonal agricultural investment, often with the context of a cooperative (see Table 2.16).

The result for no impact on formal borrowings (as shown in Table 2.16) indicates that the negative impact of micro-insurance on overall borrowings (as shown in Table 2.15) is driven from the reduction in its informal component. This is confirmed from results in Table 2.17, where we find that increase in insurance membership of households from zero to all negatively affects the status of informal borrowings and loan amounts in 2010-11.

With these results, we establish that micro-insurance membership reduced informal borrowing by 15 percent in 2010-11, with an associated decline of 30.5 percent in informal loan amounts. With annual mean value of loans of 169,572 RwF (295 USD) as recorded in the EICV 2010 data, the

Table 2.16: Impact of MdS on Borrowing Status and Amount of Loans (Formal)

	Borrowing Status (Formal)				Amount of Loans (Formal)			
	2005-06		2010-11		2005-06		2010-11	
Variables	Probit	IVProbit	Probit	IVProbit	OLS	IV2SLS	OLS	IV2SLS
CBHI	0.016	-0.040	0.025***	0.005	0.171	-0.243	0.255***	0.034
	(0.013)	(0.042)	(0.007)	(0.019)	(0.132)	(0.419)	(0.069)	(0.225)
HH Size	0.002	0.001	0.013***	0.013***	0.054	0.053	0.220***	0.218***
	(0.004)	(0.004)	(0.002)	(0.002)	(0.047)	(0.047)	(0.038)	(0.038)
HH Mean Schooling	0.096***	0.104***	0.046***	0.048***	0.774***	0.836***	0.249**	0.268**
	(0.024)	(0.024)	(0.015)	(0.015)	(0.190)	(0.195)	(0.116)	(0.117)
Age of HH Head	0.010***	0.010***	0.005***	0.005***	0.077***	0.078***	0.032***	0.033***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.018)	(0.018)	(0.012)	(0.012)
Age Sq.	-0.000***	-0.000***	-0.000***	-0.000***	-0.001***	-0.001***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	-0.002	-0.001	-0.010***	-0.010***	-0.030	-0.025	-0.187***	-0.189***
	(0.006)	(0.006)	(0.003)	(0.003)	(0.065)	(0.065)	(0.052)	(0.052)
Disease in HH	-0.007	-0.012	-0.005	-0.007	-0.058	-0.095	-0.071	-0.095
	(0.012)	(0.013)	(0.006)	(0.006)	(0.116)	(0.124)	(0.074)	(0.076)
Other Insurance	0.073**	0.043	0.230***	0.213***	1.337***	1.119**	7.425***	7.240***
	(0.028)	(0.034)	(0.017)	(0.022)	(0.435)	(0.473)	(0.532)	(0.563)
Medical Consultation	0.033**	0.040***	0.014*	0.018**	0.392***	0.444***	0.156	0.199*
	(0.014)	(0.015)	(0.008)	(0.008)	(0.143)	(0.156)	(0.098)	(0.109)
Harvest Small	-0.126	-0.108	0.001	0.001	-1.029	-0.903	0.017	0.019
	(0.105)	(0.107)	(0.001)	(0.001)	(0.972)	(0.985)	(0.025)	(0.025)
Harvest Large	0.001	0.005	0.003**	0.003**	0.149	0.178	0.077**	0.079**
	(0.081)	(0.081)	(0.002)	(0.002)	(1.004)	(0.993)	(0.037)	(0.037)
Constant					2.190*	2.147*	-0.349	-0.196
					(1.206)	(1.195)	(0.569)	(0.582)
Observations	4,887	4,887	10,493	10,493	4,889	4,889	10,506	10,506
R-Squared	-	-	-	-	0.073	0.071	0.216	0.215
First Stage F-Stat	-	485	-	1,584	-	485	-	1,584
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using EICV 2005-06 and 2010-11 data on Stata14.
Amount of Loans: Log values where all values reported as zero replaced by 1 to avoid missing observations
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 2.17: Impact of MdS on Borrowing Status and Amount of Loans (Informal)

	Borrowing Status (Informal)				Amount of Loans (Informal)			
	2005-06		2010-11		2005-06		2010-11	
Variables	Probit	IVProbit	Probit	IVProbit	OLS	IV2SLS	OLS	IV2SLS
CBHI	-0.006	0.082	-0.077***	-0.152***	0.073	0.082	-0.574***	-1.237***
	(0.018)	(0.057)	(0.013)	(0.036)	(0.157)	(0.057)	(0.125)	(0.362)
HH Size	0.012*	0.012*	-0.008**	-0.009**	0.174***	0.012*	0.002	-0.004
	(0.006)	(0.006)	(0.004)	(0.004)	(0.056)	(0.006)	(0.043)	(0.043)
HH Mean Schooling	0.061*	0.047	0.011	0.017	0.775***	0.047	0.499**	0.556***
	(0.033)	(0.034)	(0.023)	(0.023)	(0.286)	(0.034)	(0.211)	(0.213)
Age of HH Head	-0.010***	-0.010***	0.001	0.001	-0.098***	-0.010***	0.016	0.018
	(0.003)	(0.003)	(0.002)	(0.002)	(0.025)	(0.003)	(0.020)	(0.020)
Age Sq.	0.000**	0.000**	-0.000*	-0.000*	0.001**	0.000**	-0.000**	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	-0.005	-0.007	0.013**	0.012**	-0.070	-0.007	0.086	0.079
	(0.008)	(0.008)	(0.006)	(0.006)	(0.071)	(0.008)	(0.059)	(0.059)
Disease in HH	0.067***	0.074***	0.066***	0.057***	0.550***	0.074***	0.635***	0.563***
	(0.017)	(0.017)	(0.012)	(0.012)	(0.146)	(0.017)	(0.113)	(0.119)
Other Insurance	-0.054	-0.007	-0.446***	-0.505***	-0.418	-0.007	-4.436***	-4.990***
	(0.048)	(0.056)	(0.042)	(0.048)	(0.433)	(0.056)	(0.421)	(0.490)
Medical Consultation	-0.034*	-0.045**	0.009	0.024*	-0.265	-0.045**	0.132	0.260*
	(0.018)	(0.019)	(0.013)	(0.014)	(0.162)	(0.019)	(0.120)	(0.135)
Harvest Small	0.306*	0.278	0.002	0.003	3.454**	3.260**	0.076**	0.083**
	(0.173)	(0.175)	(0.003)	(0.003)	(1.604)	(1.610)	(0.034)	(0.033)
Harvest Large	-0.292**	-0.295**	-0.005**	-0.004*	-2.338**	-2.383**	-0.001	0.006
	(0.132)	(0.132)	(0.003)	(0.003)	(1.124)	(1.120)	(0.030)	(0.030)
Constant					5.056***	4,887	6.144***	6.602***
					(1.322)	485	(0.921)	(0.946)
Observations	4,887	4,887	10,493	10,493	4,889	Yes	10,506	10,506
R-Squared	-	-	-	-	0.047	Yes	0.102	0.099
First Stage F-Stat	-	485	-	1,584	-	Yes	-	1,584
Controls	Yes	Yes	Yes	Yes	Yes	0.082	Yes	Yes
Household Controls	Yes	Yes	Yes	Yes	Yes	(0.057)	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	0.012*	Yes	Yes

Source: Author calculation using EICV 2005-06 and 2010-11 data on Stata14.
Amount of Loans: Log values where all values reported as zero replaced by 1 to avoid missing observations
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

coefficient of -1.23 on the CBHI indicates a decline of almost 51,719 RwF (90 USD) in the informal loans.

This result further solidifies the argument for slow but real impact of insurance on financial behaviour of households. Specifically, in Rwandan context, this result has important policy implication since findings from FinScope (2008) survey shows that 22 percent of borrowers in Rwanda indicate medical expenses as one of the primary reason to borrow from informal sources.

2.5.5 Heterogeneous Analysis

For the heterogeneous analysis, we split the main data into three income groups; extremely poor, poor, and non-poor, as categorised by the EICV. The categorisation of households in respective income groups is based on total consumption expenditure of each household. This includes purchase of food and the value of food consumed from own production, non-food expenditure, and rental value of houses. The results are reported in Appendix 2.E.

The heterogeneous analysis for the first hypothesis shows that the magnitude of health seeking behaviour is similar for all income groups in 2005-06; however in 2010-11, the impact of micro-insurance membership is highest for the extremely poor households. This result draws further strength from the assessment of OOP expenses (hypothesis 2), where the IV estimates for extremely poor households suggest a reduction of 65 percent in OOP expenses. The negative impact on OOP expenses, together with the positive impact for health seeking behaviour, confirms the role of micro-insurance as a social safety net for the poorest of poor in successive years of MdS operation in Rwanda. The heterogeneous analysis does not provide any evidence for the sale of assets across three income groups, much like the results from the main analysis.

For hypothesis 3, we find significant variation across income categories. The IV estimates suggest that micro-insurance increased the existence of formal savings and their respective amounts for only non-poor households in 2005-06. However, in 2010-11, the increase is significant only for the lowest income category. This is an interesting finding and provides an excellent check for the existence of informational learning effect from micro-insurance towards the use of formal financial services by the poorest of poor.

Similar to the results on savings, we find that the reduction in informal borrowings in 2010-11 is primarily driven from the extremely poor households and non-poor households. However, the magnitude and significance of this negative impact is stronger for the extremely poor households. This is again a very interesting finding, underlining inclusivity in the role of MdS for reducing risk-coping borrowings, particularly for the poorest of poor.

2.6 Robustness Checks

We conduct three sets of robustness checks in this chapter. First, we exclude households with partial membership of MdS to address the possible issue of adverse selection within the household. Second, we remove the top 5 percent observations from the outcome variables related to OOP expenses, savings, and borrowings to verify if our main results are not plagued by outliers for these variables.[36] Third, we aggregate all the outcome variables and the key independent variable at the district level to conduct panel regression at the district level. The results for our first set of robustness checks are reported in Appendix B, while Appendix C and Appendix D report the second and third set of robustness checks respectively.[37]

The robustness checks 1 and 2 confirm the positive relationship between health seeking behaviour and micro-insurance membership (hypothesis 1). Further, the estimates are similar to the main results. For hypothesis 2, the robustness checks confirm reduction in out of pocket expenses in 2005-06; however we lose significance for the result in 2010-11 when outliers are removed from the data (robustness check 3). This might be due to small differential for OOP expenses between the insured and non-insured in 2010-11. Thus, it can be concluded that the negative impact of insurance on OOP expenses in 2010-11 is sensitive to changes made in the data.

In terms of hardship financing, we continue to find no evidence for the impact of micro-insurance on the decision to sell assets in the first robustness check. In the second robustness check, we conduct the analysis for different set of assets (farm-land, farm-equipment, and livestock); however there is no impact of micro-insurance on sell decisions, as shown by the IV estimates.

The two robustness checks also validate results for hypothesis 3. The results confirm positive impact of micro-insurance membership on formal savings status and associated deposits in 2005-06 and 2010-11, and negative impact on informal savings in 2010-11. Lastly, the robustness checks confirm hypothesis 4 and provide validation for the negative impact of micro-insurance on informal borrowings and loan amounts in 2010-11. The consistency of results across these two robustness checks confirms that the main results of this chapter are not affected by issues such as partial enrolment in MdS, or outliers in the data.[38]

[36] The outliers in binary variables for decision to save and borrow are removed by recoding these variables to missing values if the associated amounts of savings and loans fall in the top 5 percent observations. Our ability to remove outliers for the sale of assets is limited due to its binary nature, however we conduct the robustness check by splitting the assets into respective constituents, viz. sale of livestock, farm-land, and farm-equipment.

[37] Having partial enrolment and outliers removed from the main data leads to changes in the distribution of our key independent variable (MdS membership). As a result, the first stage reduced form regression results for IV estimation also change; however the reported F-statistics still confirm validity of our instrument in all robustness checks.

[38] All robustness checks hold for the main results, except reduction in OOP expenses in 2010-11 for robustness three.

Table 2.18: Robustness Check for testing the likelihood of spillover effects from insured to uninsured in terms of informal borrowings

	2005-06			2010-11		
VARIABLES	Informal Loan	Informal Loan	Informal Loan	Informal Loan	Informal Loan	Informal Loan
(Mean)CBHI	-0.289**	-0.193	-0.163	-0.809**	-0.747**	-0.770**
	(0.131)	(0.173)	(0.182)	(0.383)	(0.338)	(0.351)
(Mean)HH size		0.016	0.014		-0.005	-0.018
		(0.021)	(0.021)		(0.042)	(0.042)
(Mean)School		0.138	0.118		0.054	0.087
		(0.099)	(0.099)		(0.210)	(0.210)
(Mean)Age		0.023***	0.022***		-0.008	-0.002
		(0.008)	(0.008)		(0.019)	(0.019)
(Mean)Age Sq.		-0.000***	-0.000***		-0.000	-0.000
		(0.000)	(0.000)		(0.000)	(0.000)
(Mean)Children		-0.006	-0.004		0.048	0.054
		(0.028)	(0.028)		(0.056)	(0.055)
(Mean)HH Disease			0.006			0.219*
			(0.055)			(0.120)
(Mean)Other Insurance			0.414			-2.515***
			(0.272)			(0.438)
(Mean)HH Consumption			0.027			0.204
			(0.064)			(0.147)
(Mean)Short Run Harvest		-0.153	-0.165		-0.016	-0.015
		(0.449)	(0.449)		(0.029)	(0.029)
(Mean)Long Run Harvest		-0.254	-0.241		0.043	0.039
		(0.316)	(0.314)		(0.031)	(0.030)
Constant	0.391***	-0.262	-0.294	4.039***	5.596***	5.721***
	(0.054)	(0.415)	(0.424)	(0.253)	(0.931)	(0.938)
Observations	6,899	4,892	4,889	14,307	10,509	10,506
R-squared	-0.005	0.011	0.013	-0.002	0.109	0.114
Controls	No	Yes	Yes	No	Yes	Yes
Household Controls	No	Yes	Yes	No	Yes	Yes
District FE	No	Yes	Yes	No	Yes	Yes

The key independent variables are aggregated at the district level.

In terms of empirically checking the possibility of spill-over effects and draw empirical support to the existing IV results, we conduct a robustness check by excluding the sources of borrowings involving person-to-person or community interaction. These sources include borrowing from friends and family, parents, neighbours, and Tontine community savings group. The exclusion of borrowings from these sources is done to exclude the possibility of changing patterns of loan behaviour amongst the uninsured, triggered from the corresponding changes in the savings/borrowings decisions of the insured commune members.

The IV results obtained for the impact of insurance membership on the informal decision to borrow are presented in Table 2.18. The results are fully consistent with the main IV findings in the chapter. As before, we find no significant impact of microinsurance on the informal borrowings in 2005-06, while there is a negative and significant impact of microinsurance intensity on the informal borrowings in 2010-11. Since person-to-person sources of borrowings are excluded from this analysis, these results minimise the limitations due to the likely concerns of spill-overs leading to the violation of exclusion restriction principle in the choice of IV. Furthermore, the similarity of these results in significance and direction with the earlier IV estimates for informal borrowings provide strength to the robustness of existing IV estimates. Finally, these results also imply that although possible to some degree, the concern for spill-over and community-wide interaction between insured and uninsured is not a major issue or caveat for the use of this IV.

The results of the third robustness from the panel analysis are presented in Appendix 2.C. With respect to the ability to retrieve only very few control variables at the district level and small number of observations, these results may not be very superior. The OLS results in Table 2.48 suggest an overall positive relationship between the insurance intensity and intensity of health seeking behaviour

aggregated at the district level, as shown in column 2. The coefficient of 25.3 percent for 2010-11 derived from the interaction of the intensity of micro-insurance and year dummy 2010 is higher from the 21 percent differential obtained from the probit estimates. Overall, the similarity of these results in terms of the significance and direction with the main results adds to the robustness and strengths for the findings for Hypothesis 1 of the chapter.

The amount of total OOP spending is aggregated at the districts level and a log-linear panel OLS estimation is conducted. The results of this robustness check are shown in Table 2.49. The results are in line with the estimates obtained in the main analysis. The coefficient of -1.624, significant at 10 percent level indicates an associated decline of 1.6 percent in OOP expenses of insured with 1 percent increase in the district insurance intensity (the CBHI ranges from 0.20 to 0.80). This is very similar to the coefficient of 1.24 percent obtained from the IV estimation for 2005-06. For the 2010-11, the interaction terms with the magnitude of -1.6 suggests a negative relationship, however the coefficient is not significant. The non-significance here can be attributed the small sample size reducing from over 10,000 observations in the main IV results to just 60 in the panel estimates. Moreover, the impact of microinsurance on OOP in 2010-11 is not found to be robust for other robustness checks in the chapter. Hence, the non-significance of the results for 2010-11 is in line with the overall findings of the chapter.

The robustness check for the impact of district intensity of micro-insurance on hardship financing is shown in Table 2.50. As earlier, there is no significant impact on the hardship financing. The Probit and IVProbit estimates in the main results were also insignificant, hence these results are in line with the main findings in the chapter. The results for the decision to save- total, formal and informal are presented in Table 2.51 below. The decision to save variable is aggregated on the individual household decision to save at the district level and the results are in line with the IV estimates in the main results. Once again, the coefficients are higher in magnitude as compared to the main results, however they are similar in terms of significance and direction. Particularly, the direction of impact is found positive for 2005-06 and negative for 2010-11. The direction of the coefficients remain similar to the main results once the savings decision is disaggregated for formal and informal components. However, the results lose significance, particularly for 2010-11, as evident from the interaction terms in Table 2.51. This might be an issue due to low number of observations and insufficient power to capture significance in the differential of savings between the insured and non-insured.

The results for total amount of savings are shown in Table 2.52. Once again, the results are robust for total and formal savings amount (as shown in column 2 and 5); however, the results lose significance for the impact once the decision to save is disaggregated into formal and informal. Also, there is inconsistency for the impact on informal savings as compared to the main results. In summary, our ability to ascertain if the district level aggregate impacts of microinsurance on informal savings follow the estimates derived from the individual level of information in the main results. Again, this might be an issue due to self-selection at individual household level which gets subsumed when the variables are aggregated at the district level.

In terms of the decision to borrow and loan amounts, the results are shown in Table 2.53 and Table 2.54. The main results derived from IV and normal Probit regressions for the decision to borrow do not show any significance for year 2005-06 while a negative and significant impact is found for 2010-11 for informal borrowings. However, the results obtained here for decision to borrow (Table 8) are inconsistent and insignificant in most cases and do not provide a robustness check for the decision to borrow as found in the main results. For overall loan amount, although the coefficients are negative, there is lack of significance once the results are disaggregated into formal and informal borrowings.

The inconsistency of the borrowing and loan results with the main Probit and IVProbit estimates may again be an issue of the district level results failing to capture the higher degree of variation between the insured and non-insured. To conclude, the results of this robustness checks for savings and borrowings may not be comparable to the main results due to the following reasons: (a) the lack of sufficient number of observations, (b) lack of variability in the key variable of interest 'CBHI', (c) the underlying differences between what the key variable of interest (CBHI) is measuring in the main results (status of household insured/uninsured) as compared to the robustness check at the district level (penetration of insurance in the district), and finally (d) the possibility of individual self-selection at the household level subsumed in the aggregates derived at the district level.

2.7 Conclusion

This chapter provides evidence that micro-insurance not only acts as a social safety-net against unanticipated illness events, but it also induces positive financial behaviour amongst the most vulnerable. Our analysis confirms that micro-insurance increases the inclusion of extremely poor households leading to equitable gains against adverse effects of poverty, social exclusion, and unavailability of insurance markets. The case of Rwanda is an excellent example, where government intervention by engaging local community is essential to achieve the goal of Universal Health Coverage. Nonetheless, micro-insurance is yet to achieve scale in many other developing countries and therefore it calls for further innovation in the distribution channels and services.

Our first set of results contributes to the literature on the impact of micro-insurance membership on health seeking behaviour and out of pocket medical expenses. We are able to confirm that micro-insurance membership is associated with increase in health seeking behaviour, and leads to fall in out of pocket medical expenses, particularly for the poorest of poor. These results are consistent across robustness checks conducted in the chapter and align with the findings of Msuya et al. (2004); Chankova et al. (2008); Axelson et al. (2009); Aggarwal (2010); Nguyen et al. (2011); Levine et al. (2016) and Gustafsson-Wright et al. (2013).

The second set of results in this chapter contribute to the literature assessing the role of insurance on household financial decisions related to savings and borrowing. We explore if insurance and savings

are substitutes or complements and find that within the context of low savings activity and lack of formal financial services in developing countries, insurance membership acts as a complement for formal saving status. We interpret these findings as a result of the informational or learning effect, as suggested under the information advantage channel by Giesbert, Steiner, and Bendig (2011). To the best of our knowledge, this is the first study which investigates the impact of micro-insurance on savings behaviour of households in developing countries. In terms of household decision to borrow, we provide evidence for reduction in informal borrowings for the extremely poor as a result of micro-insurance membership. This result highlights the role of insurance in reducing risk-coping through borrowings from family, friends, and informal community groups in developing countries.

2.A Variables used in the Chapter and FinScope Statistics

1) Household Insurance Intensity (MdS/CBHI): The proportion of households enrolled in Mutuelles de Sante. Continuous variable from 0 to 1 where 0 indicates zero enrolment, 1 indicates full enrolment and values between 0 and 1 indicate partial enrolment.

2) Other Insurance: The proportion of households enrolled in insurance schemes such as RAMA, Military Medical Insurance (MMI), employment insurance, and other services. Continuous variable from 0 to 1 where 0 indicates zero enrolment, 1 indicates full enrolment and values between 0 and 1 indicate partial enrolment.

3) Health Seeking Behaviour: Binary variable that takes the value as 1 is a member of the household reported illness to a doctor or medical practitioner for period of two weeks prior the survey.

4) Out of Pocket Medical Expenses (OOP): The amount of money spent by households on medical expenses related to health check-up, purchase of medicines, imaging, pathological expenses, etc. reported for any health conditions in the period of two weeks prior the survey. Amount reported in RwF, the local currency of Rwanda.

5) Sale of Land: Binary variable taking the value as 1 if a household sold any farm land in last 12 months.

6) Sale of Livestock: Binary variable taking the value as 1 if a household sold or killed any livestock in last 12 months for consumption.

7) Sale of farm Equipment: Binary variable taking the value as 1 if a household sold any farm equipment in last 12 months.

8) Savings and Amount of total Savings: Binary variable taking the value as 1 if a household has positive savings amount (reported in RwF) and zero otherwise. Amount of Savings: Total current formal savings and contributions in Tontine group in last 12 months reported in RwF.

9) Formal Savings and Amount of Formal Savings: Binary variable taking the value as 1 if a household saves in established savings institutions such as Commercial Banks, Microfinance Savings and Credit Cooperative. Amount of Formal Savings: current savings amount (net of deposits and withdrawals made in last 12 months reported in RwF).

10) Informal Savings and Amount of Informal Savings: Binary variable taking the value as 1 if a household contributed in Tontine Savings Group in last 12 months. Amount of Informal Savings: Contributions made to Tontine Savings Group in last 12 months.

11) Borrowing and Total Loans: Binary variable for borrowing taking the value as 1 if a household borrowed formally or informally. Total Loans: The loan amount borrowed in last 12 months reported in RwF.

12) Formal Borrowing and Total Formal Loans: Binary variable for formal borrowing taking the value as 1 if a household borrowed from formal sources such as State Bank, Commercial Bank, Credit Co-operative and Microfinance. Total Formal Loans: The formal loan amount borrowed in last 12 months reported in RwF.

13) Informal Borrowing and Total Informal Loans: Binary variable for informal borrowing taking the value as 1 if a household borrowed from informal sources such as relative, tontine, and informal lender. Total Informal Loans: The informal loan amount borrowed in last 12 months reported in RwF.

14) Radio: Dummy variable representing ownership of Radio in the household.

15) TV: Dummy variable representing ownership of TV in the household.

16) Children: Number of children in the household.

17) Women: Number of women in the household.

18) Adults: Number of adults in the household.

19) Age of Household Head: Reported in Years.

20) HH Mean Schooling: The proportion of households that attended primary school.

21) Urban: Dummy variable to indicate if the household resided in urban or rural area.

22) Time to Health Centre/Administrative Office: Reported in minutes.

23) Disease in HH: The incidence of disease in the household for two weeks prior the survey was conducted.

24) Harvest Small: Total value of Harvests for crops cultivated on small scale, reported in RwF.

25) Harvest Large: Total value of Harvests for crops cultivated on large scale, reported in RwF.

26: PSU Insurance Rate: The IV used in the study. Proportion of enrolment in Mutuelles de Sante for a zone/village excluding the enrolment of a household for which the IV is constructed.

FinScope (2008) Evidence on Borrowings and Savings in Rwanda

We explore the financial outcomes in Rwanda from FinScope (2008) survey to provide additional sources of information to understand the reasons for formal and informal savings and borrowings. In terms of formal and informal savings, Table 2.19 below shows that the differential for formal savings between the insured and non-insured is very high and significant at 1 percent level. This is different when informal saving is considered, since the magnitude of differential reduces by almost half from 14 percent to 7 percent with level of significance falling from 1 percent level to 5 percent level. The significant differential for formal savings between insured and uninsured is driven primarily from savings at banks which accounts for 11 percent of the differential between insured and uninsured. On the other hand, the differential for informal savings is driven from community savings groups (Tontine/ikamina/ umuryango).

Table 2.19: Savings across insured and uninsured (FinScope, 2008)

VARIABLES	Insured=0	Insured=1	Differential	P-value
Formal Savings	0.07754	0.2244	-0.1469***	0.00
Informal Savings	0.6042	0.6808	-0.0765**	0.00
Formal Savings				
Savings - Savings at a bank	0.05	0.16	-0.11***	0.00
Savings - Savings at a microfinance institution (MFI)	0.01	0.03	-0.02*	0.06
Savings - Savings at a post office	0.00	0.00	-0.00	0.50
Savings - Employer savings schemes	0.00	0.00	-0.00	0.24
Savings - Capital/stock market (including Treasury bonds)	0.00	0.00	0.00	
Savings - Savings account at an agricultural co-op	0.03	0.05	-0.03*	0.03
Informal Savings				
Savings - Membership of Caisse dEntre (Cash Centres)	0.00	0.01	-0.01*	0.08
Savings - Membership or Tontine or ikamina or umuryango (Community Savings)	0.16	0.27	-0.11***	0.00
Savings - Give to someone else for safe keeping	0.11	0.12	-0.01	0.46
Savings - Keep cash at home or in a secret hiding place	0.54	0.57	-0.03	0.27

Source: *FinScope 2008 Survey*

In terms of borrowings, the insured households are significantly more likely to borrow formally but this is not true for informal borrowings where the borrowing status is not significantly different amongst the insured and uninsured, although the rate of informal borrowings is higher as compared to formal loans. When disaggregated into different sources, it is seen that the differential between insured and uninsured across different formal sources is driven from the loans obtained from banks and MFIs, while for informal borrowings, there is no

Table 2.20: Different Formal and Informal Sources of Savings and Borrowings

VARIABLES	Insured=0	Insured=1	Differential	P-value
Formal Loans	0.0080	0.0485	-0.0405***	0.0004
Informal Loans	0.2005	0. 2060	-0.0054	0.8126
Formal Sources of Loans				
Borrowed from - Bank (e.g. Bank Kigali, BCR)	0.00	0.03	-0.03***	0.00
Borrowed from - Insurance company	0.00	0.00	0.00	
Borrowed from - Micro finance institution	0.01	0.02	-0.01*	0.09
Informal Sources of Loans				
Borrowed from - A shop or agricultural co-op	0.05	0.07	-0.02	0.11
Borrowed from – Family/ friends/someone	0.16	0.14	0.02	0.32
Borrowed from - Employer	0.01	0.01	0.00	0.79
Borrowed from - Other	0.00	0.00	0.00	

Source: *FinScope 2008 Survey*

Table 2.21: Reasons to Save and Borrow across insured and uninsured

VARIABLES	Insured=0	Insured=1	Differential	P-value
Medical Savings	0.2699	0. 2299	0.0400	0.1127
Savings for Emergencies Other than Medical	0. 2367	0.1550	0.0816***	0.0006
Medical Borrowings	0.0510	0. 0534	-0.0024	0.8480
Borrowing for Capital Investment (farm, business, etc.)	0.1340	0.0882	0.0458*	0.0158

Source: *FinScope 2008 Survey*

difference in the significance of borrowings between insured and uninsured from sources such as family or friends, a shop, or employer.

From the stats shown in Table 2.19 and Table 2.20, there seems to be an indication of more financial activity (savings and borrowings) amongst the insured as compared to the uninsured. To further understand, what drives this, conditional of insurance membership, Table 2.21 presents the difference of means across various reasons to save and borrow between the insured and the insured. In terms of saving for medical emergencies, the differential between the insured and uninsured is insignificant; however, for other emergencies the savings are significantly more in the insured group. This is an expected result given, that once insured, households move on to shift focus from medical precautionary savings towards savings for other purposes, a channel purported under the vulnerability view of poverty by Clarke and Dercon (2009) discussed in the paper in section 2.2.1.

2.B Robustness Results 1

The followings results exclude partial enroled households (Table 2.22 to Table 2.30).

Table 2.22: Health Seeking Behaviour and Insurance Intensity (Robustness 1)

Variables	Formal Health Seeking (2005-06)			Formal Health Seeking (2010-11)		
	Probit	Probit	Probit	Probit	Probit	Probit
CBHI	0.062***	0.073***	0.081***	0.203***	0.197***	0.232***
	(0.015)	(0.015)	(0.016)	(0.016)	(0.014)	(0.015)
Radio		0.016	0.009		0.008	0.003
		(0.012)	(0.014)		(0.010)	(0.009)
TV		0.023	0.012		0.089***	0.032
		(0.031)	(0.063)		(0.032)	(0.041)
Adults		0.015*	0.015**		0.009	0.018***
		(0.008)	(0.007)		(0.007)	(0.007)
Children in HH		0.014***	0.016***		0.012**	0.016***
		(0.004)	(0.004)		(0.005)	(0.005)
Women in HH		0.016	0.006		0.018**	0.008
		(0.011)	(0.012)		(0.008)	(0.009)
Age of HH head		-0.006**	-0.006*		-0.007***	-0.009***
		(0.003)	(0.003)		(0.003)	(0.002)
Age Sq.		0.000	0.000		0.000**	0.000***
		(0.000)	(0.000)		(0.000)	(0.000)
HH Mean Schooling			0.036			0.017
			(0.031)			(0.034)
Urban			-0.009			0.010
			(0.031)			(0.024)
Other Insurance			0.103***			0.329***
			(0.033)			(0.049)
Time to Health Centre			-0.000			0.000
			(0.000)			(0.000)
Harvest Small			-0.022			-0.003
			(0.129)			(0.003)
Harvest Large			0.005			-0.003
			(0.086)			(0.002)
Observations	5,771	4,385	3,765	10,928	8,318	7,616
Controls	No	Yes	Yes	No	Yes	Yes
Household Controls	No	Yes	Yes	No	Yes	Yes
District FE	No	Yes	Yes	No	Yes	Yes

Source: Author calculation of average marginal effects using EICV 2005-06 and 2010-11 data on Stata14.
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 2.23: Impact of MdS on Out of Pocket Expenses (OOP) (Robustness 1)

Variables	Out of Pocket Exp. (2005-06)						Out of Pocket Exp. (2010-11)					
	OLS	OLS	OLS	IV2SLS	IV2SLS	IV2SLS	OLS	OLS	OLS	IV2SLS	IV2SLS	IV2SLS
CBHI	-0.350***	-0.368***	-0.530***	-1.306***	-1.364***	-1.121***	-0.251***	-0.270***	-0.334***	-0.342**	-0.143	-0.205
	(0.093)	(0.105)	(0.070)	(0.314)	(0.344)	(0.246)	(0.062)	(0.068)	(0.065)	(0.149)	(0.159)	(0.153)
HH Size		0.192***	0.097***		0.174***	0.087***		0.101***	0.054*		0.100***	0.054*
		(0.048)	(0.031)		(0.048)	(0.031)		(0.030)	(0.029)		(0.030)	(0.029)
HH Mean Schooling		0.257	0.026		0.393	0.115		-0.096	-0.103		-0.108	-0.116
		(0.235)	(0.154)		(0.243)	(0.156)		(0.122)	(0.114)		(0.123)	(0.115)
Age of HH Head		-0.019	0.005		-0.018	0.006		-0.034***	-0.020*		-0.035***	-0.020*
		(0.021)	(0.014)		(0.021)	(0.014)		(0.012)	(0.011)		(0.012)	(0.011)
Age Sq.		0.000	-0.000		0.000	-0.000		0.000***	0.000		0.000***	0.000*
		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)
Children in HH		0.035	-0.023		0.064	-0.009		0.006	0.013		0.009	0.015
		(0.063)	(0.041)		(0.064)	(0.042)		(0.034)	(0.033)		(0.034)	(0.032)
Disease in HH			2.163***			2.101***			1.372***			1.389***
			(0.093)			(0.094)			(0.071)			(0.072)
Other Insurance			-0.795***			-1.094***			-0.639***			-0.522**
			(0.206)			(0.239)			(0.227)			(0.254)
Medical Consultation			3.843***			3.923***			0.388***			0.358***
			(0.114)			(0.117)			(0.110)			(0.111)
Harvest Small		1.034	0.400		1.332	0.583		-0.023	-0.013		-0.024	-0.015
		(1.482)	(0.834)		(1.414)	(0.785)		(0.016)	(0.015)		(0.016)	(0.015)
Harvest Large		-0.221	-0.045		-0.127	-0.007		0.006	0.007		0.004	0.006
		(0.854)	(0.522)		(0.839)	(0.531)		(0.019)	(0.018)		(0.019)	(0.018)
Constant	2.343***	2.858***	0.115	2.653***	2.678**	0.030	1.143***	2.619***	1.994***	1.206***	2.535***	1.907***
	(0.064)	(1.037)	(0.610)	(0.120)	(1.053)	(0.624)	(0.054)	(0.525)	(0.421)	(0.107)	(0.528)	(0.428)
Observations	5,771	4,062	4,059	5,771	4,062	4,059	10,928	7,992	7,989	10,928	7,992	7,989
R-squared	0.003	0.062	0.572	-0.017	0.041	0.565	0.002	0.070	0.181	0.002	0.070	0.180
First Stage F-stat	-	-	-	1,119	457	407	-	-	-	4,276	1,808	1,461
Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Household Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
District FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes

Source: Author calculation using EICV 2005-06 and 2010-11 data on Stata14.
OOP Expenses: Log values where all values reported as zero replaced by 1 to avoid missing observations
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 2.24: Impact of MdS on Decision to Sale Assets (Robustness 1)

Variables	Sale of Land or Livestock (2005-06)						Sale of Land or Livestock (2010-11)					
	Probit	Probit	Probit	IVProbit	IVProbit	IVProbit	Probit	Probit	Probit	IVProbit	IVProbit	IVProbit
CBHI	0.031*	0.014	0.010	-0.001	-0.032	-0.031	0.021	0.007	0.005	0.019	0.052	0.049
	(0.018)	(0.020)	(0.020)	(0.057)	(0.065)	(0.069)	(0.014)	(0.015)	(0.016)	(0.027)	(0.034)	(0.036)
HH Size		0.025***	0.023***		0.024***	0.022***		0.006	0.006		0.006	0.006
		(0.008)	(0.008)		(0.008)	(0.008)		(0.006)	(0.006)		(0.006)	(0.006)
HH Mean Schooling		0.095**	0.089**		0.102**	0.096**		0.061**	0.060*		0.058*	0.056*
		(0.044)	(0.044)		(0.044)	(0.045)		(0.031)	(0.031)		(0.031)	(0.031)
Age of HH Head		-0.000	0.000		-0.000	0.000		-0.001	-0.001		-0.001	-0.001
		(0.004)	(0.004)		(0.004)	(0.004)		(0.003)	(0.003)		(0.003)	(0.003)
Age Sq.		-0.000	-0.000		-0.000	-0.000		0.000	0.000		0.000	0.000
		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)
Children in HH		-0.006	-0.007		-0.004	-0.006		0.005	0.005		0.006	0.006
		(0.011)	(0.011)		(0.011)	(0.011)		(0.007)	(0.007)		(0.007)	(0.007)
Disease in HH			0.027			0.022			-0.007			-0.001
			(0.019)			(0.021)			(0.015)			(0.015)
Other Insurance			-0.005			-0.028			0.022			0.063
			(0.055)			(0.065)			(0.057)			(0.065)
Medical Consultation			0.069***			0.075***			0.019			0.008
			(0.024)			(0.026)			(0.019)			(0.021)
Harvest Small		1.649***	1.639***		1.664***	1.653***		0.022***	0.022***		0.022***	0.022***
		(0.296)	(0.297)		(0.297)	(0.297)		(0.005)	(0.005)		(0.005)	(0.005)
Harvest Large		0.112	0.112		0.113	0.112		0.036***	0.036***		0.036***	0.035***
		(0.134)	(0.134)		(0.134)	(0.134)		(0.006)	(0.006)		(0.006)	(0.006)
Observations	3,858	3,224	3,223	3,858	3,224	3,223	7,758	6,330	6,327	7,758	6,330	6,327
First Stage F-Stat	-	-	-	1,119	457	407	-	-	-	4,276	1,808	1,461
Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Household Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
District FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes

Source: Author calculation of average marginal effects using EICV 2005-06 and 2010-11 data on Stata14.
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 2.25: Impact of MdS on the Existing of Savings and Amount of Savings (Formal and Informal) (Robustness 1)

	Existing of Savings (Formal and Informal)				Amount of Savings (Formal and Informal)			
	2005-06		2010-11		2005-06		2010-11	
Variables	**Probit**	**IVProbit**	**Probit**	**IVProbit**	**OLS**	**IV2SLS**	**OLS**	**IV2SLS**
CBHI	0.122***	0.106*	0.062***	-0.072*	1.236***	1.079*	0.802***	-0.597
	(0.016)	(0.063)	(0.014)	(0.038)	(0.168)	(0.627)	(0.151)	(0.404)
HH Size	0.035***	0.035***	0.030***	0.029***	0.325***	0.322***	0.253***	0.249***
	(0.007)	(0.007)	(0.005)	(0.005)	(0.066)	(0.066)	(0.051)	(0.051)
HH Mean Schooling	0.188***	0.191***	0.173***	0.185***	1.673***	1.697***	2.060***	2.201***
	(0.033)	(0.035)	(0.024)	(0.024)	(0.291)	(0.306)	(0.255)	(0.263)
Age of HH Head	0.006*	0.006*	0.004	0.004*	0.034	0.035	0.039	0.044*
	(0.003)	(0.003)	(0.002)	(0.002)	(0.028)	(0.028)	(0.025)	(0.025)
Age Sq.	-0.000**	-0.000***	-0.000**	-0.000**	-0.001**	-0.001**	-0.001**	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	-0.008	-0.008	-0.020***	-0.022***	-0.032	-0.028	-0.118*	-0.146**
	(0.009)	(0.009)	(0.007)	(0.007)	(0.088)	(0.088)	(0.069)	(0.068)
Disease in HH	0.014	0.012	0.006	-0.012	0.110	0.093	-0.044	-0.226
	(0.017)	(0.018)	(0.014)	(0.014)	(0.163)	(0.174)	(0.138)	(0.146)
Other Insurance	0.097**	0.089	0.291***	0.168**	0.884*	0.805	2.479***	1.206**
	(0.048)	(0.057)	(0.073)	(0.080)	(0.500)	(0.568)	(0.468)	(0.572)
Medical Consultation	0.027	0.030	0.017	0.049***	0.294	0.315	0.270*	0.602***
	(0.020)	(0.021)	(0.014)	(0.016)	(0.195)	(0.209)	(0.141)	(0.164)
Harvest Small	0.315	0.321	0.031***	0.033***	3.673*	3.721*	0.310***	0.325***
	(0.192)	(0.196)	(0.005)	(0.005)	(1.916)	(1.944)	(0.048)	(0.050)
Harvest Large	0.346**	0.349**	0.042***	0.043***	4.255***	4.265***	1.271	2.219***
	(0.139)	(0.139)	(0.009)	(0.008)	(1.375)	(1.364)	(0.818)	(0.846)
Constant					3.400***	3.377***	1.271	2.219***
					(1.298)	(1.287)	(0.818)	(0.846)
Observations	4,057	4,057	7,974	7,974	4,059	4,059	7,989	7,989
R-Squared	-	-	-	-	0.185	0.185	0.187	0.173
First Stage F-Stat	-	407	-	1,461	-	407	-	1,461
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using EICV 2005-06 and 2010-11 data on Stata14.
Amount of Savings: Log values where all values reported as zero replaced by 1 to avoid missing observations
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 2.26: Impact of MdS on the Existing of Savings and Amount of Savings (Formal) (Robustness 1)

	Existing of Savings (Formal)				Amount of Savings (Formal)			
	2005-06		2010-11		2005-06		2010-11	
Variables	**Probit**	**IVProbit**	**Probit**	**IVProbit**	**OLS**	**IV2SLS**	**OLS**	**IV2SLS**
CBHI	0.070***	0.095**	0.127***	0.060*	0.664***	0.848**	1.237***	0.633**
	(0.011)	(0.038)	(0.013)	(0.033)	(0.109)	(0.340)	(0.103)	(0.276)
HH Size	0.014***	0.014***	0.029***	0.029***	0.054	0.057	0.158***	0.156***
	(0.004)	(0.004)	(0.005)	(0.005)	(0.042)	(0.042)	(0.046)	(0.046)
HH Mean Schooling	0.131***	0.128***	0.205***	0.213***	0.764***	0.736***	1.650***	1.710***
	(0.025)	(0.025)	(0.026)	(0.026)	(0.155)	(0.165)	(0.189)	(0.189)
Age of HH Head	0.002	0.002	0.004	0.004	-0.001	-0.002	0.016	0.018
	(0.002)	(0.002)	(0.002)	(0.002)	(0.018)	(0.018)	(0.019)	(0.019)
Age Sq.	-0.000	-0.000	-0.000*	-0.000*	-0.000	-0.000	-0.000	-0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	0.002	0.002	-0.011*	-0.013*	0.122**	0.117**	0.029	0.017
	(0.006)	(0.006)	(0.006)	(0.006)	(0.057)	(0.057)	(0.059)	(0.059)
Disease in HH	0.009	0.012	0.009	0.000	0.085	0.104	-0.004	-0.083
	(0.011)	(0.012)	(0.012)	(0.013)	(0.102)	(0.105)	(0.103)	(0.106)
Other Insurance	0.125***	0.138***	0.551***	0.492***	1.638***	1.731***	4.689***	4.142***
	(0.027)	(0.033)	(0.077)	(0.082)	(0.440)	(0.461)	(0.425)	(0.485)
Medical Consultation	0.015	0.011	0.018	0.034**	0.134	0.109	0.220*	0.365***
	(0.013)	(0.014)	(0.016)	(0.018)	(0.130)	(0.140)	(0.131)	(0.139)
Harvest Small	0.227**	0.221**	0.018***	0.019***	3.975***	3.964***	0.195***	0.202***
	(0.089)	(0.091)	(0.005)	(0.005)	(1.235)	(1.224)	(0.041)	(0.041)
Harvest Large	0.210***	0.209***	0.037***	0.038***	3.351***	3.377***	0.345***	0.352***
	(0.073)	(0.074)	(0.006)	(0.006)	(1.135)	(1.125)	(0.057)	(0.058)
Constant					3.351***	3.377***	1.089	1.503**
					(1.135)	(1.125)	(0.695)	(0.714)
Observations	4,057	4,057	7,974	7,974	4,059	4,059	7,711	7,711
R-Squared	-	-	-	-	0.231	0.231	0.269	0.265
First Stage F-Stat	-	407	-	1,461	-	407	-	1,461
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using EICV 2005-06 and 2010-11 data on Stata14.
Amount of Savings: Log values where all values reported as zero replaced by 1 to avoid missing observations
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 2.27: Impact of MdS on the Existing of Savings and Amount of Savings (Informal) (Robustness 1)

	Existing of Savings (Informal)				Amount of Savings (Formal and Informal)			
	2005		2010		2005		2010	
Variables	Probit	IVProbit	Probit	IVProbit	OLS	IV2SLS	OLS	IV2SLS
CBHI	0.090***	0.069	0.033**	-0.073*	0.950***	0.883	0.389**	-0.811*
	(0.017)	(0.069)	(0.015)	(0.044)	(0.172)	(0.660)	(0.152)	(0.448)
HH Size	0.030***	0.030***	0.015***	0.015***	0.313***	0.312***	0.225***	0.253***
	(0.007)	(0.007)	(0.006)	(0.006)	(0.067)	(0.067)	(0.058)	(0.058)
HH Mean Schooling	0.163***	0.166***	0.132***	0.142***	1.385***	1.395***	1.461***	1.728***
	(0.033)	(0.034)	(0.027)	(0.027)	(0.289)	(0.302)	(0.263)	(0.269)
Age of HH Head	0.006**	0.007**	0.006**	0.006**	0.045*	0.045*	0.040	0.040
	(0.003)	(0.003)	(0.003)	(0.003)	(0.026)	(0.026)	(0.025)	(0.025)
Age Sq.	-0.000***	-0.000***	-0.000***	-0.000***	-0.001***	-0.001***	-0.001**	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	-0.009	-0.009	-0.006	-0.008	-0.099	-0.097	-0.102	-0.156**
	(0.009)	(0.009)	(0.008)	(0.007)	(0.087)	(0.088)	(0.078)	(0.078)
Disease in HH	0.012	0.009	0.004	-0.010	0.108	0.101	0.015	-0.177
	(0.017)	(0.019)	(0.014)	(0.015)	(0.158)	(0.172)	(0.145)	(0.157)
Other Insurance	-0.042	-0.053	0.014	-0.082	-0.169	-0.203	0.593	-0.208
	(0.047)	(0.057)	(0.055)	(0.064)	(0.472)	(0.557)	(0.646)	(0.722)
Medical Consultation	0.021	0.024	0.012	0.037**	0.190	0.199	0.144	0.460**
	(0.020)	(0.022)	(0.016)	(0.018)	(0.193)	(0.209)	(0.159)	(0.185)
Harvest Small	0.202	0.209	0.033***	0.034***	2.545*	2.549*	0.287***	0.310***
	(0.176)	(0.180)	(0.005)	(0.005)	(1.350)	(1.338)	(0.039)	(0.042)
Harvest Large	0.258**	0.260**	0.013**	0.015***	0.369	0.360	0.193***	0.203***
	(0.126)	(0.126)	(0.005)	(0.006)	(1.380)	(1.367)	(0.059)	(0.063)
Constant					0.369	0.360	0.398	2.339
					(1.380)	(1.367)	(0.883)	(2.523)
Observations	4,057	4,057	7,979	7,979	4,059	4,059	7,989	7,989
R-Squared	-	-	-	-	0.135	0.135	0.132	0.120
First Stage F-Stat	-	485	-	1,584	-	407	-	1,461
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using EICV 2005-06 and 2010-11 data on Stata14.
Amount of Savings: Log values where all values reported as zero replaced by 1 to avoid missing observations
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 2.28: Impact of MdS on Borrowing Status and Amount of Loans (Formal and Informal) (Robustness 1)

	Borrowing Status (Formal and Informal)				Amount of Loans (Formal and Informal)			
	2005-06		2010-11		2005-06		2010-11	
Variables	Probit	IVProbit	Probit	IVProbit	OLS	IV2SLS	OLS	IV2SLS
CBHI	0.007	0.059	-0.056***	-0.128***	0.238	0.610	-0.314**	-1.361***
	(0.018)	(0.057)	(0.013)	(0.029)	(0.171)	(0.547)	(0.129)	(0.325)
HH Size	0.007	0.007	0.007*	0.006*	0.177***	0.184***	0.225***	0.222***
	(0.007)	(0.007)	(0.004)	(0.004)	(0.066)	(0.066)	(0.049)	(0.048)
HH Mean Schooling	0.156***	0.148***	0.035*	0.041*	1.713***	1.657***	0.805***	0.911***
	(0.034)	(0.035)	(0.021)	(0.021)	(0.309)	(0.311)	(0.233)	(0.234)
Age of HH Head	-0.001	-0.001	0.003*	0.004**	-0.012	-0.013	0.061***	0.065***
	(0.003)	(0.003)	(0.002)	(0.002)	(0.029)	(0.028)	(0.023)	(0.023)
Age Sq.	-0.000	-0.000	-0.000***	-0.000***	-0.000	-0.000	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	0.002	0.001	0.001	-0.000	-0.033	-0.042	-0.104	-0.125*
	(0.009)	(0.009)	(0.005)	(0.005)	(0.084)	(0.084)	(0.066)	(0.066)
Disease in HH	0.083***	0.089***	0.058***	0.050***	0.687***	0.726***	0.535***	0.399***
	(0.017)	(0.018)	(0.011)	(0.011)	(0.161)	(0.170)	(0.126)	(0.130)
Other Insurance	0.059	0.085	0.113***	0.053	1.112**	1.300**	2.192***	1.239**
	(0.047)	(0.054)	(0.042)	(0.047)	(0.475)	(0.541)	(0.492)	(0.547)
Medical Consultation	-0.003	-0.010	0.025**	0.039***	0.130	0.079	0.297**	0.546***
	(0.020)	(0.022)	(0.012)	(0.013)	(0.187)	(0.204)	(0.129)	(0.144)
Harvest Small	0.104	0.088	0.002	0.004	1.618	1.502	0.076**	0.090***
	(0.195)	(0.196)	(0.003)	(0.003)	(1.915)	(1.908)	(0.031)	(0.031)
Harvest Large	-0.263**	-0.265**	0.001	0.002	-1.994	-2.017	0.092*	0.104**
	(0.132)	(0.133)	(0.003)	(0.003)	(1.377)	(1.374)	(0.048)	(0.049)
Constant					7.052***	7.106***	6.123***	6.833***
					(1.381)	(1.373)	(0.825)	(0.859)
Observations	4,057	4,057	7,977	7,977	4,059	4,059	7,989	7,989
R-Squared	-	-	-	-	0.074	0.073	0.114	0.105
First Stage F-Stat	-	407	-	1,461	-	407	-	1,461
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using EICV 2005-06 and 2010-11 data on Stata14.
Amount of Loans: Log values where all values reported as zero replaced by 1 to avoid missing observations
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 2.29: Impact of MdS on Borrowing Status and Amount of Loans (Formal) (Robustness 1)

	Borrowing Status (Formal)				Amount of Loans (Formal)			
	2005		2010		2005		2010	
Variables	Probit	IVProbit	Probit	IVProbit	OLS	IV2SLS	OLS	IV2SLS
CBHI	0.016	-0.029	0.025***	-0.003	0.177	-0.126	0.252***	-0.041
	(0.013)	(0.042)	(0.007)	(0.017)	(0.138)	(0.428)	(0.072)	(0.197)
HH Size	-0.003	-0.004	0.011***	0.011***	0.007	0.002	0.191***	0.190***
	(0.005)	(0.005)	(0.002)	(0.002)	(0.052)	(0.052)	(0.044)	(0.043)
HH Mean Schooling	0.113***	0.119***	0.035**	0.038**	0.917***	0.963***	0.204	0.234*
	(0.024)	(0.024)	(0.015)	(0.015)	(0.192)	(0.197)	(0.126)	(0.127)
Age of HH Head	0.012***	0.012***	0.005***	0.005***	0.091***	0.092***	0.039***	0.040***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.019)	(0.018)	(0.013)	(0.013)
Age Sq.	-0.000***	-0.000***	-0.000***	-0.000***	-0.001***	-0.001***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	0.005	0.006	-0.007**	-0.008**	0.029	0.036	-0.150***	-0.156***
	(0.006)	(0.006)	(0.003)	(0.003)	(0.069)	(0.069)	(0.057)	(0.056)
Disease in HH	0.002	-0.003	-0.002	-0.006	0.048	0.016	-0.040	-0.078
	(0.014)	(0.015)	(0.007)	(0.007)	(0.131)	(0.141)	(0.086)	(0.087)
Other Insurance	0.082***	0.060*	0.194***	0.168***	1.438***	1.284***	6.132***	5.865***
	(0.028)	(0.034)	(0.020)	(0.024)	(0.444)	(0.481)	(0.669)	(0.677)
Medical Consultation	0.030**	0.037**	0.002	0.009	0.374**	0.415**	0.032	0.101
	(0.015)	(0.017)	(0.008)	(0.009)	(0.164)	(0.179)	(0.101)	(0.112)
Harvest Small	-0.199	-0.185	0.001	0.001	-1.740*	-1.646	0.015	0.019
	(0.127)	(0.128)	(0.001)	(0.001)	(0.998)	(1.007)	(0.025)	(0.026)
Harvest Large	0.037	0.040	0.003*	0.004**	0.524	0.543	0.088**	0.091**
	(0.094)	(0.093)	(0.002)	(0.002)	(1.116)	(1.101)	(0.040)	(0.040)
Constant					1.758	1.714	-0.365	-0.167
					(1.359)	(1.348)	(0.642)	(0.654)
Observations	4,050	4,050	7,974	7,974	4,059	4,059	7,989	7,989
R-Squared	-	-	-	-	0.075	0.074	0.169	0.167
First Stage F-Stat	-	407	-	1,461	-	407	-	1,461
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using EICV 2005-06 and 2010-11 data on Stata14.
Amount of Loans: Log values where all values reported as zero replaced by 1 to avoid missing observations
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 2.30: Impact of MdS on Borrowing Status and Amount of Loans (Informal) (Robustness 1)

	Borrowings Status (Informal)				Amount of Loans (Informal)			
	2005-06		2010-11		2005-06		2010-11	
Variables	Probit	IVProbit	Probit	IVProbit	OLS	IV2SLS	OLS	IV2SLS
CBHI	-0.007	0.081	-0.078***	-0.151***	0.061	0.745	-0.563***	-1.283***
	(0.018)	(0.058)	(0.014)	(0.034)	(0.163)	(0.535)	(0.133)	(0.342)
HH Size	0.011	0.012*	-0.006	-0.006	0.176***	0.187***	0.029	0.027
	(0.007)	(0.007)	(0.005)	(0.005)	(0.063)	(0.063)	(0.053)	(0.052)
HH Mean Schooling	0.058*	0.044	0.025	0.032	0.732**	0.629**	0.586**	0.659***
	(0.035)	(0.035)	(0.025)	(0.025)	(0.302)	(0.306)	(0.236)	(0.238)
Age of HH Head	-0.011***	-0.011***	0.001	0.001	-0.106***	-0.108***	0.021	0.024
	(0.003)	(0.003)	(0.002)	(0.002)	(0.027)	(0.027)	(0.022)	(0.022)
Age Sq.	0.000**	0.000**	-0.000	-0.000	0.001***	0.001***	-0.001**	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	-0.004	-0.007	0.009	0.008	-0.070	-0.086	0.054	0.039
	(0.009)	(0.009)	(0.007)	(0.007)	(0.080)	(0.081)	(0.068)	(0.068)
Disease in HH	0.081***	0.089***	0.058***	0.048***	0.644***	0.716***	0.576***	0.483***
	(0.018)	(0.019)	(0.013)	(0.014)	(0.159)	(0.167)	(0.129)	(0.135)
Other Insurance	-0.046	-0.001	-0.397***	-0.460***	-0.333	0.014	-4.018***	-4.673***
	(0.050)	(0.057)	(0.051)	(0.057)	(0.449)	(0.518)	(0.514)	(0.580)
Medical Consultation	-0.039*	-0.050**	0.025*	0.042***	-0.271	-0.364*	0.254*	0.426***
	(0.020)	(0.021)	(0.015)	(0.016)	(0.178)	(0.190)	(0.136)	(0.154)
Harvest Small	0.260	0.232	0.001	0.002	3.085*	2.872	0.060*	0.070**
	(0.195)	(0.198)	(0.003)	(0.003)	(1.824)	(1.835)	(0.032)	(0.031)
Harvest Large	-0.319**	-0.320**	-0.005*	-0.004	-2.392**	-2.436**	0.000	0.009
	(0.142)	(0.141)	(0.003)	(0.003)	(1.210)	(1.204)	(0.033)	(0.034)
Constant					5.337***	5.436***	6.505***	6.993***
					(1.517)	(1.505)	(0.945)	(0.967)
Observations	4,057	4,057	7,977	7,977	4,059	4,059	7,989	7,989
R-Squared	-	-	-	-	0.051	0.046	0.100	0.095
First Stage F-Stat	-	407	-	1,461	-	407	-	1,461
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using EICV 2005-06 and 2010-11 data on Stata14.
Amount of Loans: Log values where all values reported as zero replaced by 1 to avoid missing observations
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

sectionRobustness Results 2 The following results exclude any other forms of Insurance (Table 2.31 to Table 2.39).

Table 2.31: Health Seeking Behaviour and Insurance Intensity (Robustness 1)

Variables	**Formal Health Seeking (2005-06)**			**Formal Health Seeking (2010-11)**		
	Probit	**Probit**	**Probit**	**Probit**	**Probit**	**Probit**
CBHI	0.097***	0.089***	0.091***	0.206***	0.207***	0.211***
	(0.015)	(0.016)	(0.015)	(0.016)	(0.014)	(0.015)
Radio		0.026**	0.025*		0.010	0.008
		(0.013)	(0.013)		(0.009)	(0.010)
TV		-0.018	-0.079		0.056*	-0.000
		(0.035)	(0.063)		(0.031)	(0.042)
Adults		0.015**	0.016**		0.017***	0.021***
		(0.007)	(0.007)		(0.006)	(0.006)
Children in HH		0.017***	0.017***		0.016***	0.018***
		(0.004)	(0.004)		(0.004)	(0.004)
Women in HH		0.016*	0.012		0.017**	0.010
		(0.009)	(0.011)		(0.008)	(0.009)
Age of HH head		-0.006**	-0.005*		-0.010***	-0.011***
		(0.003)	(0.003)		(0.002)	(0.002)
Age Sq.		0.000	0.000		0.000***	0.000***
		(0.000)	(0.000)		(0.000)	(0.000)
HH Mean Schooling			0.045			0.041
			(0.028)			(0.029)
Urban			-0.013			0.021
			(0.025)			(0.021)
Time to Health Centre			-0.000			-0.000
			(0.000)			(0.000)
Harvest Small			-0.079			-0.003
			(0.133)			(0.002)
Harvest Large			0.024			-0.000
			(0.079)			(0.002)
Observations	6,714	4,955	4,368	14,147	10,538	9,661
Controls	No	Yes	Yes	No	Yes	Yes
Household Controls	No	Yes	Yes	No	Yes	Yes
District FE	No	Yes	Yes	No	Yes	Yes

Source: Author calculation of average marginal effects using EICV 2005-06 and 2010-11 data on Stata14.
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 2.32: Impact of MdS on Out of Pocket Expenses (OOP) (Robustness 2)

Variables	Out of Pocket Exp. (2005-06)						Out of Pocket Exp. (2010-11)					
	OLS	OLS	OLS	IV2SLS	IV2SLS	IV2SLS	OLS	OLS	OLS	IV2SLS	IV2SLS	IV2SLS
CBHI	-0.150*	-0.316***	-0.524***	-1.148***	-1.247***	-1.225***	-0.215***	-0.286***	-0.328***	-0.346**	-0.299*	-0.317*
	(0.090)	(0.103)	(0.068)	(0.315)	(0.360)	(0.245)	(0.060)	(0.066)	(0.061)	(0.167)	(0.176)	(0.173)
HH Size		0.214***	0.089***		0.214***	0.088***		0.106***	0.053**		0.106***	0.053**
		(0.042)	(0.027)		(0.042)	(0.027)		(0.024)	(0.023)		(0.024)	(0.023)
HH Mean Schooling		0.223	-0.015		0.353	0.080		-0.039	-0.061		-0.038	-0.062
		(0.222)	(0.146)		(0.230)	(0.149)		(0.112)	(0.106)		(0.112)	(0.106)
Age of HH Head		0.002	0.007		0.006	0.011		-0.021**	-0.010		-0.021**	-0.010
		(0.018)	(0.011)		(0.018)	(0.011)		(0.009)	(0.008)		(0.009)	(0.008)
Age Sq.		-0.000	-0.000		-0.000	-0.000		0.000**	0.000		0.000**	0.000
		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)
Children in HH		-0.027	-0.037		-0.016	-0.029		-0.015	0.002		-0.015	0.002
		(0.055)	(0.038)		(0.055)	(0.038)		(0.029)	(0.028)		(0.029)	(0.028)
Disease in HH			2.156***			2.093***			1.342***			1.343***
			(0.087)			(0.089)			(0.064)			(0.065)
Medical Consultation			3.869***			3.961***			0.458***			0.456***
			(0.104)			(0.108)			(0.098)			(0.100)
Harvest Small		0.660	0.633		0.950	0.854		-0.020	-0.015		-0.020	-0.015
		(1.322)	(0.709)		(1.264)	(0.667)		(0.014)	(0.014)		(0.014)	(0.015)
Harvest Large		-0.574	-0.151		-0.512	-0.112		0.024	0.021		0.024	0.020
		(0.806)	(0.458)		(0.786)	(0.459)		(0.018)	(0.017)		(0.018)	(0.017)
Constant	2.325***	1.058	-0.476	2.703***	0.858	-0.615	1.158***	2.327***	1.750***	1.246***	2.337***	1.742***
	(0.063)	(0.838)	(0.496)	(0.134)	(0.846)	(0.503)	(0.052)	(0.480)	(0.386)	(0.118)	(0.490)	(0.398)
Observations	6,714	4,761	4,758	6,712	4,761	4,758	14,147	10,298	10,295	14,147	10,298	10,295
R-squared	0.000	0.057	0.574	-0.020	0.040	0.565	0.001	0.071	0.179	0.001	0.071	0.179
First Stage F-stat	-	-	-	1,184	515	481	-	-	-	5,879	2,063	1,771
Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Household Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
District FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes

Source: Author calculation using EICV 2005-06 and 2010-11 data on Stata14.
OOP Expenses: Log values where all values reported as zero replaced by 1 to avoid missing observations
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 2.33: Impact of MdS on Decision to Sale Assets (Robustness 2)

Variables	Sale of Land or Livestock (2005-06)						Sale of Land or Livestock (2010-11)					
	Probit	Probit	Probit	IVProbit	IVProbit	IVProbit	Probit	Probit	Probit	IVProbit	IVProbit	IVProbit
CBHI	0.052***	0.026	0.022	-0.002	-0.059	-0.061	0.024*	0.009	0.003	-0.002	0.042	0.035
	(0.018)	(0.019)	(0.019)	(0.057)	(0.067)	(0.068)	(0.014)	(0.015)	(0.015)	(0.029)	(0.034)	(0.035)
HH Size		0.031***	0.030***		0.031***	0.029***		0.008*	0.008*		0.009*	0.008*
		(0.007)	(0.007)		(0.007)	(0.007)		(0.005)	(0.005)		(0.005)	(0.005)
HH Mean Schooling		0.089**	0.083**		0.101**	0.094**		0.060**	0.059**		0.057**	0.057**
		(0.040)	(0.040)		(0.041)	(0.041)		(0.028)	(0.028)		(0.028)	(0.028)
Age of HH Head		-0.004	-0.004		-0.004	-0.004		0.001	0.001		0.001	0.001
		(0.003)	(0.003)		(0.003)	(0.003)		(0.002)	(0.002)		(0.002)	(0.002)
Age Sq.		0.000	0.000		0.000	0.000		-0.000	-0.000		-0.000	-0.000
		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)
Children in HH		-0.016*	-0.017*		-0.015	-0.015		0.000	0.000		0.000	0.000
		(0.009)	(0.009)		(0.009)	(0.009)		(0.006)	(0.006)		(0.006)	(0.006)
Disease in HH			0.026			0.018			-0.012			-0.009
			(0.018)			(0.020)			(0.012)			(0.013)
Medical Consultation			0.061***			0.073***			0.030*			0.024
			(0.022)			(0.023)			(0.016)			(0.017)
Harvest Small		1.488***	1.497***		1.509***	1.517***		0.022***	0.022***		0.022***	0.022***
		(0.250)	(0.250)		(0.252)	(0.252)		(0.005)	(0.005)		(0.005)	(0.005)
Harvest Large		0.190	0.195		0.190	0.194		0.041***	0.041***		0.041***	0.041***
		(0.124)	(0.125)		(0.124)	(0.125)		(0.006)	(0.006)		(0.006)	(0.006)
Observations	4,608	3,828	3,827	4,608	3,828	3,827	10,014	8,140	8,137	10,014	8,140	8,137
First Stage F-Stat	-	-	-	1,184	515	481	-	-	-	5,879	2,063	1,771
Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Household Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
District FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes

Source: Author calculation of average marginal effects using EICV 2005-06 and 2010-11 data on Stata14.
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 2.34: Impact of MdS on the Existing of Savings and Amount of Savings (Formal and Informal) (Robustness 2)

	Existing of Savings (Formal and Informal)				Amount of Savings (Formal and Informal)			
	2005-06		2010-11		2005-06		2010-11	
Variables	**Probit**	**IVProbit**	**Probit**	**IVProbit**	**OLS**	**IV2SLS**	**OLS**	**IV2SLS**
CBHI	0.126***	0.086	0.065***	-0.101**	1.252***	0.905	0.815***	-1.045**
	(0.016)	(0.064)	(0.014)	(0.039)	(0.163)	(0.630)	(0.142)	(0.419)
HH Size	0.035***	0.035***	0.030***	0.029***	0.350***	0.350***	0.231***	0.214***
	(0.006)	(0.006)	(0.005)	(0.005)	(0.056)	(0.056)	(0.046)	(0.047)
HH Mean Schooling	0.164***	0.170***	0.164***	0.175***	1.525***	1.572***	1.898***	2.055***
	(0.031)	(0.033)	(0.022)	(0.022)	(0.280)	(0.293)	(0.228)	(0.234)
Age of HH Head	0.012***	0.012***	0.010***	0.011***	0.095***	0.096***	0.114***	0.121***
	(0.003)	(0.003)	(0.002)	(0.002)	(0.022)	(0.022)	(0.021)	(0.021)
Age Sq.	-0.000***	-0.000***	-0.000***	-0.000***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	-0.012	-0.011	-0.018***	-0.020***	-0.087	-0.083	-0.089	-0.110*
	(0.008)	(0.008)	(0.006)	(0.006)	(0.078)	(0.079)	(0.058)	(0.058)
Disease in HH	0.009	0.006	0.015	-0.004	0.075	0.044	0.053	-0.152
	(0.016)	(0.017)	(0.012)	(0.012)	(0.147)	(0.156)	(0.124)	(0.128)
Medical Consultation	0.033*	0.038**	0.024*	0.056***	0.286*	0.332*	0.293**	0.661***
	(0.017)	(0.019)	(0.012)	(0.014)	(0.172)	(0.187)	(0.124)	(0.139)
Harvest Small	0.345*	0.359*	0.024***	0.026***	4.051**	4.161**	0.241***	0.262***
	(0.181)	(0.188)	(0.005)	(0.005)	(1.765)	(1.808)	(0.036)	(0.039)
Harvest Large	0.316**	0.320**	0.039***	0.040***	3.817***	3.836***	0.300***	0.319***
	(0.126)	(0.127)	(0.007)	(0.007)	(1.230)	(1.225)	(0.042)	(0.045)
Constant					1.206	1.137	-1.036	0.244
					(1.230)	(1.221)	(0.758)	(0.796)
Observations	4,756	4,756	10,289	10,289	4,758	4,758	10,295	10,295
R-Squared	-	-	-	-	0.180	0.178	0.166	0.145
First Stage F-Stat	-	481	-	1,771	-	481	-	1,771
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using EICV 2005-06 and 2010-11 data on Stata14.
Amount of Savings: Log values where all values reported as zero replaced by 1 to avoid missing observations
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 2.35: Impact of MdS on the Existing of Savings and Amount of Savings (Formal) (Robustness 2)

	Existing of Savings (Formal)				Amount of Savings (Formal)			
	2005-06		2010-11		2005-06		2010-11	
Variables	**Probit**	**IVProbit**	**Probit**	**IVProbit**	**OLS**	**IV2SLS**	**OLS**	**IV2SLS**
CBHI	0.076***	0.073*	0.122***	0.080**	0.711***	0.564*	1.224***	0.784***
	(0.011)	(0.038)	(0.013)	(0.036)	(0.104)	(0.335)	(0.100)	(0.290)
HH Size	0.010***	0.010***	0.029***	0.028***	0.041	0.044	0.125***	0.121***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.037)	(0.037)	(0.040)	(0.040)
HH Mean Schooling	0.140***	0.140***	0.199***	0.203***	0.847***	0.853***	1.524***	1.561***
	(0.023)	(0.024)	(0.024)	(0.024)	(0.143)	(0.153)	(0.171)	(0.171)
Age of HH Head	0.007***	0.007***	0.007***	0.007***	0.047***	0.050***	0.068***	0.069***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.015)	(0.015)	(0.015)	(0.015)
Age Sq.	-0.000***	-0.000***	-0.000***	-0.000***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	0.005	0.005	-0.012**	-0.013**	0.119**	0.116**	0.055	0.049
	(0.005)	(0.005)	(0.005)	(0.005)	(0.051)	(0.050)	(0.049)	(0.049)
Disease in HH	0.003	0.002	0.012	0.007	0.026	0.009	0.006	-0.043
	(0.010)	(0.011)	(0.011)	(0.011)	(0.093)	(0.094)	(0.090)	(0.095)
Medical Consultation	0.025**	0.025**	0.034**	0.042***	0.193*	0.198	0.326***	0.415***
	(0.011)	(0.013)	(0.013)	(0.015)	(0.114)	(0.125)	(0.110)	(0.119)
Harvest Small	0.126	0.127	0.018***	0.019***	1.799	1.832	0.173***	0.178***
	(0.085)	(0.085)	(0.004)	(0.004)	(1.169)	(1.157)	(0.034)	(0.034)
Harvest Large	0.212***	0.212***	0.037***	0.038***	3.789***	4.024***	0.337***	0.341***
	(0.065)	(0.065)	(0.005)	(0.006)	(1.067)	(1.056)	(0.051)	(0.051)
Constant					1.705*	1.184	-0.145	0.160
					(0.932)	(0.984)	(0.656)	(0.689)
Observations	4,756	4,756	10,288	10,288	4,758	4,757	9,872	9,872
R-Squared	-	-	-	-	0.201	0.203	0.229	0.228
First Stage F-Stat	-	481	-	1,771	-	481	-	1,771
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using EICV 2005-06 and 2010-11 data on Stata14.
Amount of Savings: Log values where all values reported as zero replaced by 1 to avoid missing observations
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 2.36: Impact of MdS on the Existing of Savings and Amount of Savings (Informal) (Robustness 2)

	Existing of Savings (Informal)				Amount of Savings (Formal and Informal)			
	2005		2010		2005		2010	
Variables	Probit	IVProbit	Probit	IVProbit	OLS	IV2SLS	OLS	IV2SLS
CBHI	0.089***	0.055	0.037**	-0.159***	0.925***	0.802	0.424***	-1.578***
	(0.016)	(0.071)	(0.014)	(0.042)	(0.164)	(0.673)	(0.143)	(0.460)
HH Size	0.032***	0.032***	0.016***	0.014***	0.349***	0.349***	0.222***	0.204***
	(0.006)	(0.006)	(0.005)	(0.005)	(0.057)	(0.056)	(0.051)	(0.052)
HH Mean Schooling	0.134***	0.139***	0.112***	0.125***	1.168***	1.184***	1.254***	1.423***
	(0.031)	(0.032)	(0.024)	(0.024)	(0.269)	(0.281)	(0.236)	(0.244)
Age of HH Head	0.010***	0.010***	0.011***	0.011***	0.072***	0.072***	0.095***	0.102***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.020)	(0.020)	(0.021)	(0.021)
Age Sq.	-0.000***	-0.000***	-0.000***	-0.000***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	-0.014*	-0.014*	-0.006	-0.008	-0.155**	-0.154*	-0.102	-0.125*
	(0.008)	(0.008)	(0.006)	(0.006)	(0.078)	(0.079)	(0.065)	(0.065)
Disease in HH	0.009	0.006	0.010	-0.012	0.106	0.095	0.092	-0.128
	(0.016)	(0.017)	(0.012)	(0.013)	(0.145)	(0.158)	(0.127)	(0.133)
Medical Consultation	0.017	0.021	0.009	0.048***	0.144	0.160	0.117	0.513***
	(0.018)	(0.020)	(0.014)	(0.015)	(0.173)	(0.190)	(0.141)	(0.158)
Harvest Small	0.283	0.294*	0.028***	0.030***	3.432*	3.471*	0.259***	0.281***
	(0.173)	(0.178)	(0.005)	(0.004)	(1.761)	(1.792)	(0.034)	(0.037)
Harvest Large	0.188	0.190	0.014***	0.016***	1.840	1.847	0.185***	0.206***
	(0.121)	(0.121)	(0.005)	(0.005)	(1.259)	(1.249)	(0.052)	(0.055)
Constant					-0.283	-0.307	-1.099	0.280
					(1.296)	(1.289)	(0.739)	(0.797)
Observations	4,756	4,756	10,284	10,284	4,758	4,758	10,295	10,295
R-Squared	-	-	-	-	0.138	0.137	0.126	0.102
First Stage F-Stat	-	481	-	1,771	-	481	-	1,771
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using EICV 2005-06 and 2010-11 data on Stata14.
Amount of Savings: Log values where all values reported as zero replaced by 1 to avoid missing observations
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 2.37: Impact of MdS on Borrowing Status and Amount of Loans (Formal and Informal) (Robustness 2)

	Borrowing Status (Formal and Informal)				Amount of Loans (Formal and Informal)			
	2005-06		2010-11		2005-06		2010-11	
Variables	Probit	IVProbit	Probit	IVProbit	OLS	IV2SLS	OLS	IV2SLS
CBHI	0.010	0.042	-0.055***	-0.160***	0.257	0.369	-0.316**	-1.229***
	(0.017)	(0.056)	(0.013)	(0.034)	(0.162)	(0.519)	(0.125)	(0.339)
HH Size	0.013**	0.013**	0.006	0.005	0.219***	0.219***	0.207***	0.199***
	(0.006)	(0.006)	(0.004)	(0.004)	(0.056)	(0.055)	(0.041)	(0.040)
HH Mean Schooling	0.145***	0.140***	0.039*	0.047**	1.633***	1.618***	0.813***	0.890***
	(0.032)	(0.032)	(0.021)	(0.021)	(0.290)	(0.290)	(0.210)	(0.212)
Age of HH Head	-0.002	-0.002	0.003*	0.003**	-0.033	-0.034	0.032	0.035*
	(0.003)	(0.003)	(0.002)	(0.002)	(0.026)	(0.025)	(0.020)	(0.020)
Age Sq.	-0.000	-0.000	-0.000***	-0.000***	-0.000	-0.000	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	-0.007	-0.007	0.001	0.000	-0.096	-0.097	-0.088	-0.098*
	(0.008)	(0.008)	(0.005)	(0.005)	(0.074)	(0.073)	(0.056)	(0.056)
Disease in HH	0.059***	0.062***	0.058***	0.046***	0.449***	0.460***	0.558***	0.458***
	(0.017)	(0.017)	(0.011)	(0.011)	(0.152)	(0.159)	(0.111)	(0.115)
Medical Consultation	-0.002	-0.006	0.027**	0.048***	0.116	0.101	0.334***	0.515***
	(0.019)	(0.020)	(0.012)	(0.013)	(0.173)	(0.187)	(0.115)	(0.129)
Harvest Small	0.216	0.207	0.004	0.005*	2.928	2.893	0.095***	0.105***
	(0.191)	(0.192)	(0.003)	(0.003)	(1.845)	(1.839)	(0.030)	(0.030)
Harvest Large	-0.276**	-0.277**	0.001	0.002	-2.344*	-2.350*	0.084*	0.093**
	(0.118)	(0.118)	(0.003)	(0.003)	(1.229)	(1.223)	(0.045)	(0.046)
Constant					7.301***	7.323***	6.120***	6.749***
					(1.323)	(1.315)	(0.879)	(0.911)
Observations	4,756	4,756	10,283	10,283	4,758	4,758	10,295	10,295
R-Squared	-	-	-	-	0.067	0.067	0.097	0.091
First Stage F-Stat	-	481	-	1,771	-	481	-	1,771
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using EICV 2005-06 and 2010-11 data on Stata14.
Amount of Loans: Log values where all values reported as zero replaced by 1 to avoid missing observations
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 2.38: Impact of MdS on Borrowing Status and Amount of Loans (Formal) (Robustness 2)

	Borrowing Status (Formal)				Amount of Loans (Formal)			
	2005		2010		2005		2010	
Variables	**Probit**	**IVProbit**	**Probit**	**IVProbit**	**OLS**	**IV2SLS**	**OLS**	**IV2SLS**
CBHI	0.014	-0.048	0.024***	0.012	0.170	-0.396	0.257***	0.147
	(0.013)	(0.041)	(0.007)	(0.018)	(0.131)	(0.398)	(0.070)	(0.218)
HH Size	0.002	0.002	0.011***	0.011***	0.050	0.050	0.185***	0.184***
	(0.004)	(0.004)	(0.002)	(0.002)	(0.047)	(0.047)	(0.037)	(0.037)
HH Mean Schooling	0.096***	0.105***	0.042***	0.043***	0.799***	0.876***	0.282**	0.291**
	(0.024)	(0.024)	(0.014)	(0.014)	(0.193)	(0.196)	(0.119)	(0.119)
Age of HH Head	0.006***	0.007***	0.000	0.000	0.041**	0.044**	-0.008	-0.008
	(0.002)	(0.002)	(0.001)	(0.001)	(0.018)	(0.018)	(0.016)	(0.016)
Age Sq.	-0.000***	-0.000***	-0.000	-0.000	-0.000***	-0.001***	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	-0.002	-0.001	-0.008**	-0.008**	-0.027	-0.021	-0.151***	-0.152***
	(0.006)	(0.006)	(0.003)	(0.003)	(0.064)	(0.064)	(0.052)	(0.052)
Disease in HH	-0.015	-0.021	-0.006	-0.008	-0.150	-0.201	-0.074	-0.086
	(0.012)	(0.013)	(0.006)	(0.006)	(0.117)	(0.125)	(0.072)	(0.074)
Medical Consultation	0.037***	0.045***	0.014*	0.016**	0.416***	0.490***	0.163*	0.184*
	(0.014)	(0.015)	(0.008)	(0.008)	(0.145)	(0.158)	(0.098)	(0.109)
Harvest Small	-0.109	-0.089	0.001	0.002	-0.869	-0.690	0.021	0.022
	(0.108)	(0.109)	(0.001)	(0.001)	(1.010)	(1.026)	(0.024)	(0.024)
Harvest Large	-0.005	-0.001	0.003**	0.003**	0.071	0.102	0.078**	0.079**
	(0.081)	(0.081)	(0.002)	(0.002)	(0.987)	(0.973)	(0.038)	(0.037)
Constant					2.307**	2.194*	1.030*	1.106*
					(1.164)	(1.152)	(0.588)	(0.602)
Observations	4,756	4,756	10,279	10,279	4,758	4,758	10,295	10,295
R-Squared	-	-	-	-	0.054	0.049	0.102	0.102
First Stage F-Stat	-	481	-	1,771	-	481	-	1,771
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using EICV 2005-06 and 2010-11 data on Stata14.
Amount of Loans: Log values where all values reported as zero replaced by 1 to avoid missing observations
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 2.39: Impact of MdS on Borrowing Status and Amount of Loans (Informal) (Robustness 2)

	Borrowings Status (Informal)				Amount of Loans (Informal)			
	2005-06		2010-11		2005-06		2010-11	
Variables	**Probit**	**IVProbit**	**Probit**	**IVProbit**	**OLS**	**IV2SLS**	**OLS**	**IV2SLS**
CBHI	-0.004	0.091	-0.077***	-0.167***	0.084	0.772	-0.572***	-1.370***
	(0.018)	(0.056)	(0.013)	(0.035)	(0.156)	(0.516)	(0.125)	(0.355)
HH Size	0.012*	0.012*	-0.007*	-0.008*	0.174***	0.175***	0.018	0.011
	(0.006)	(0.006)	(0.004)	(0.004)	(0.057)	(0.056)	(0.044)	(0.044)
HH Mean Schooling	0.060*	0.046	0.013	0.020	0.777***	0.683**	0.509**	0.577***
	(0.033)	(0.033)	(0.023)	(0.023)	(0.285)	(0.288)	(0.212)	(0.214)
Age of HH Head	-0.007***	-0.008***	0.004*	0.004**	-0.076***	-0.080***	0.040**	0.043**
	(0.003)	(0.003)	(0.002)	(0.002)	(0.024)	(0.024)	(0.020)	(0.019)
Age Sq.	0.000	0.000	-0.000***	-0.000***	0.000	0.000*	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	-0.006	-0.007	0.012**	0.011*	-0.074	-0.082	0.070	0.061
	(0.008)	(0.008)	(0.006)	(0.006)	(0.072)	(0.072)	(0.060)	(0.060)
Disease in HH	0.074***	0.082***	0.066***	0.055***	0.605***	0.667***	0.639***	0.551***
	(0.017)	(0.017)	(0.012)	(0.012)	(0.147)	(0.153)	(0.114)	(0.120)
Medical Consultation	-0.041**	-0.053***	0.011	0.029**	-0.322*	-0.413**	0.151	0.309**
	(0.019)	(0.020)	(0.013)	(0.014)	(0.166)	(0.176)	(0.121)	(0.137)
Harvest Small	0.307*	0.275	0.002	0.003	3.529**	3.311**	0.072**	0.081**
	(0.179)	(0.180)	(0.003)	(0.003)	(1.672)	(1.677)	(0.034)	(0.033)
Harvest Large	-0.291**	-0.292**	-0.005*	-0.004	-2.363**	-2.401**	0.002	0.011
	(0.134)	(0.133)	(0.003)	(0.003)	(1.138)	(1.133)	(0.030)	(0.031)
Constant					5.018***	5.155***	5.113***	5.663***
					(1.386)	(1.381)	(0.952)	(0.980)
Observations	4,756	4,756	10,283	10,283	4,758	4,758	10,295	10,295
R-Squared	-	-	-	-	0.045	0.041	0.087	0.082
First Stage F-Stat	-	481	-	1,771	-	481	-	1,771
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using EICV 2005-06 and 2010-11 data on Stata14.
Amount of Loans: Log values where all values reported as zero replaced by 1 to avoid missing observations
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

2.C Robustness Results 2

The following results exclude outliers in the data (Table 2.40 to Table 2.47).

Table 2.40: Impact of MdS Out of Pocket Expenses (OOP) (Robustness 3)

Variables	Out of Pocket Exp. (2005-06)						Out of Pocket Exp. (2010-11)					
	OLS	OLS	OLS	IV2SLS	IV2SLS	IV2SLS	OLS	OLS	OLS	IV2SLS	IV2SLS	IV2SLS
CBHI	0.039	-0.061	-0.386***	-0.777***	-1.064***	-1.155***	-0.090*	-0.063	-0.108**	-0.205*	-0.008	-0.008
	(0.086)	(0.098)	(0.069)	(0.292)	(0.339)	(0.256)	(0.046)	(0.051)	(0.048)	(0.123)	(0.137)	(0.135)
HH Size		0.179***	0.078***		0.177***	0.076***		0.049***	0.014		0.049***	0.014
		(0.039)	(0.027)		(0.039)	(0.027)		(0.018)	(0.017)		(0.018)	(0.018)
HH Mean Schooling		0.221	-0.002		0.363*	0.113		-0.037	-0.043		-0.041	-0.052
		(0.207)	(0.145)		(0.213)	(0.148)		(0.100)	(0.095)		(0.099)	(0.095)
Age of HH Head		-0.022	0.000		-0.021	0.002		-0.011	-0.001		-0.011	-0.001
		(0.019)	(0.013)		(0.019)	(0.013)		(0.007)	(0.007)		(0.007)	(0.007)
Age Sq.		0.000	-0.000		0.000	-0.000		0.000	-0.000		0.000	-0.000
		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)
Children in HH		-0.006	-0.023		0.012	-0.011		-0.007	0.006		-0.007	0.007
		(0.052)	(0.037)		(0.053)	(0.037)		(0.024)	(0.023)		(0.024)	(0.023)
Disease in HH			2.113***			2.046***			0.995***			1.005***
			(0.085)			(0.086)			(0.053)			(0.053)
Other Insurance			-0.716***			-1.130***			-0.258			-0.173
			(0.194)			(0.237)			(0.161)			(0.187)
Medical Consultation			3.463***			3.591***			0.265***			0.245***
			(0.104)			(0.111)			(0.079)			(0.080)
Harvest Small		-0.431	0.041		-0.026	0.374		-0.001	0.002		-0.001	0.000
		(1.124)	(0.797)		(1.090)	(0.768)		(0.012)	(0.012)		(0.012)	(0.012)
Harvest Large		-0.202	-0.111		-0.139	-0.087		-0.002	-0.003		-0.002	-0.004
		(0.787)	(0.470)		(0.766)	(0.468)		(0.013)	(0.012)		(0.013)	(0.012)
Constant	2.010***	1.493**	-0.232	2.312***	1.338*	-0.332	0.729***	1.130***	0.726**	0.804***	1.096***	0.656**
	(0.057)	(0.754)	(0.473)	(0.121)	(0.761)	(0.480)	(0.038)	(0.376)	(0.310)	(0.084)	(0.383)	(0.323)
Observations	6,549	4,696	4,693	6,549	4,696	4,693	13,580	10,055	10,052	13,580	10,055	10,052
R-squared	0.000	0.047	0.535	-0.016	0.025	0.522	0.000	0.051	0.138	-0.000	0.051	0.138
First Stage F-stat	-	-	-	1,280	551	466	-	-	-	4,692	1,739	1,481
Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Household Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
District FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes

Source: Author calculation using EICV 2005-06 and 2010-11 data on Stata14.
OOP Expenses: Log values where all values reported as zero replaced by 1 to avoid missing observations
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 2.41: Impact of MdS on Hardship Financing: Decision to Sale Livestock, Farm Land, and Farm Equipment (Robustness 3)

	Decision to Sale Livestock				Decision to Sell Farm Land				Decision to Sell Farm Equipment			
	2005-06		2010-11		2005		2010-11		2005-06		2010-11	
Variables	**Probit**	**IVProbit**	**Probit**	**IVProbit**	**Probit**	**IVProbit**	**Probit**	**IVProbit**	**Probit**	**IVProbit**	**Probit**	**IVProbit**
CBHI	0.036*	-0.039	0.028*	0.058	-0.008	-0.028	-0.022***	-0.025	-0.002	-0.008	-0.007*	-0.009
	(0.019)	(0.069)	(0.016)	(0.038)	(0.008)	(0.026)	(0.008)	(0.020)	(0.003)	(0.015)	(0.004)	(0.011)
HH Size	0.029***	0.029***	0.012**	0.012**	-0.000	-0.000	0.002	0.002	0.001	0.001	-0.001	-0.001
	(0.007)	(0.007)	(0.005)	(0.005)	(0.003)	(0.003)	(0.003)	(0.003)	(0.001)	(0.001)	(0.002)	(0.002)
HH Mean Schooling	0.089**	0.100**	0.074**	0.072**	0.034*	0.037*	0.002	0.002	0.000	0.001	0.017*	0.017*
	(0.041)	(0.042)	(0.030)	(0.030)	(0.019)	(0.020)	(0.016)	(0.016)	(0.008)	(0.009)	(0.009)	(0.009)
Age of HH Head	0.001	0.001	0.000	0.000	0.002	0.002	0.005***	0.005***	-0.001*	-0.001	0.001	0.001
	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age Sq.	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000***	-0.000***	0.000	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	-0.014	-0.013	-0.007	-0.006	-0.002	-0.002	0.002	0.001	0.002	0.002	0.001	0.001
	(0.009)	(0.009)	(0.006)	(0.006)	(0.004)	(0.004)	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)
Disease in HH	0.002	-0.005	-0.010	-0.007	0.014*	0.013*	0.007	0.007	-0.002	-0.003	0.001	0.000
	(0.018)	(0.019)	(0.013)	(0.013)	(0.007)	(0.008)	(0.007)	(0.008)	(0.004)	(0.004)	(0.004)	(0.004)
Other Insurance	0.003	-0.039	0.053	0.079	-0.002	-0.012	-0.057**	-0.060*	0.007	0.005	-0.072**	-0.074**
	(0.056)	(0.067)	(0.052)	(0.060)	(0.024)	(0.028)	(0.029)	(0.033)	(0.007)	(0.008)	(0.034)	(0.035)
Medical Consultation	0.067***	0.078***	0.024	0.018	0.008	0.011	0.009	0.009	0.005	0.006	0.003	0.003
	(0.021)	(0.023)	(0.016)	(0.018)	(0.009)	(0.009)	(0.008)	(0.009)	(0.004)	(0.004)	(0.004)	(0.005)
Harvest Small	1.403***	1.417***	0.029***	0.028***	-0.008	-0.028	0.006***	0.006***	0.013	0.016	-0.002	-0.002
	(0.254)	(0.257)	(0.005)	(0.005)	(0.008)	(0.026)	(0.002)	(0.002)	(0.030)	(0.035)	(0.001)	(0.001)
Harvest Large	0.218*	0.220*	0.047***	0.047***	-0.000	-0.000	0.001	0.001	0.026	0.029	0.003***	0.003***
	(0.116)	(0.116)	(0.006)	(0.006)	(0.003)	(0.003)	(0.002)	(0.002)	(0.021)	(0.024)	(0.001)	(0.001)
Observations	3,894	3,894	8,034	8,034	4,804	4,804	10,338	10,338	2,470	2,470	7,454	7,454
First Stage F-Stat	-	466	-	1,481	-	466	-	1,481	-	466	-	1,481
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		

Source: Author calculation using EICV 2005-06 and 2010-11 data on Stata14.
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 2.42: Impact of MdS on the Existing of Savings and Amount of Savings (Formal and Informal) (Robustness 3)

	Existing of Savings (Formal and Informal)				Amount of Savings (Formal and Informal)			
	2005-06		2010-11		2005-06		2010-11	
Variables	**Probit**	**IVProbit**	**Probit**	**IVProbit**	**OLS**	**IV2SLS**	**OLS**	**IV2SLS**
CBHI	0.119***	0.115*	0.061***	-0.099**	1.132***	1.148*	0.732***	-1.088**
	(0.016)	(0.067)	(0.014)	(0.040)	(0.161)	(0.643)	(0.141)	(0.426)
HH Size	0.036***	0.036***	0.028***	0.026***	0.327***	0.367***	0.190***	0.205***
	(0.006)	(0.006)	(0.005)	(0.005)	(0.055)	(0.055)	(0.046)	(0.046)
HH Mean Schooling	0.162***	0.163***	0.164***	0.174***	1.526***	1.786***	1.877***	2.142***
	(0.031)	(0.033)	(0.022)	(0.022)	(0.272)	(0.295)	(0.228)	(0.233)
Age of HH Head	0.007**	0.007**	0.006***	0.006***	0.047*	0.034	0.066***	0.065***
	(0.003)	(0.003)	(0.002)	(0.002)	(0.026)	(0.025)	(0.021)	(0.021)
Age Sq.	-0.000***	-0.000***	-0.000***	-0.000***	-0.001***	-0.001**	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	-0.011	-0.011	-0.019***	-0.020***	-0.067	-0.090	-0.087	-0.139**
	(0.008)	(0.008)	(0.006)	(0.006)	(0.077)	(0.076)	(0.058)	(0.056)
Disease in HH	0.008	0.007	0.013	-0.005	0.066	0.031	0.047	-0.193
	(0.016)	(0.017)	(0.012)	(0.012)	(0.151)	(0.165)	(0.123)	(0.131)
Other Insurance	0.091*	0.089	0.307***	0.174**	0.547	0.840	2.283***	1.121**
	(0.050)	(0.059)	(0.066)	(0.072)	(0.505)	(0.566)	(0.432)	(0.522)
Medical Consultation	0.041**	0.041**	0.020	0.051***	0.383**	0.446**	0.279**	0.683***
	(0.017)	(0.019)	(0.013)	(0.014)	(0.167)	(0.186)	(0.124)	(0.142)
Harvest Small	0.391**	0.393**	0.027***	0.029***	4.505**	5.020***	0.248***	0.276***
	(0.187)	(0.192)	(0.006)	(0.005)	(1.788)	(1.859)	(0.038)	(0.045)
Harvest Large	0.296**	0.296**	0.045***	0.047***	3.136**	3.628***	0.342***	0.372***
	(0.132)	(0.132)	(0.008)	(0.008)	(1.278)	(1.267)	(0.043)	(0.048)
Constant					1.364	-0.232	0.127	1.066
					(1.347)	(1.027)	(0.747)	(1.149)
Observations	4,750	4,750	10,116	10,116	4,751	4,750	10,131	10,131
R-Squared	-	-	-	-	0.161	0.153	0.153	0.128
First Stage F-Stat	-	466	-	1,481	-	466	-	1,481
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using EICV 2005-06 and 2010-11 data on Stata14.
Amount of Savings: Log values where all values reported as zero replaced by 1 to avoid missing observations
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 2.43: Impact of MdS on the Existing of Savings and Amount of Savings (Formal) (Robustness 3)

	Existing of Savings (Formal)				Amount of Savings (Formal)			
	2005-06		2010-11		2005-06		2010-11	
Variables	Probit	IVProbit	Probit	IVProbit	OLS	IV2SLS	OLS	IV2SLS
CBHI	0.067***	0.080**	0.127***	0.147***	0.551***	0.518*	1.433***	1.489***
	(0.011)	(0.039)	(0.018)	(0.051)	(0.090)	(0.311)	(0.158)	(0.437)
HH Size	0.012***	0.012***	0.031***	0.031***	0.020	0.021	0.138***	0.140***
	(0.004)	(0.004)	(0.006)	(0.006)	(0.035)	(0.035)	(0.052)	(0.052)
HH Mean Schooling	0.128***	0.126***	0.154***	0.151***	0.740***	0.739***	1.568***	1.520***
	(0.023)	(0.024)	(0.034)	(0.035)	(0.137)	(0.144)	(0.311)	(0.309)
Age of HH Head	0.004*	0.004*	-0.001	-0.002	0.021	0.022	-0.018	-0.018
	(0.002)	(0.002)	(0.003)	(0.003)	(0.015)	(0.015)	(0.030)	(0.029)
Age Sq.	-0.000*	-0.000*	0.000	0.000	-0.000*	-0.000**	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	0.002	0.001	-0.012	-0.011	0.116**	0.113**	0.067	0.067
	(0.005)	(0.005)	(0.008)	(0.008)	(0.050)	(0.050)	(0.066)	(0.067)
Disease in HH	-0.000	0.001	0.005	0.007	0.031	0.029	0.013	0.022
	(0.011)	(0.011)	(0.015)	(0.015)	(0.084)	(0.085)	(0.133)	(0.138)
Other Insurance	0.131***	0.138***	0.470***	0.486***	1.500***	1.483***	3.789***	3.806***
	(0.026)	(0.033)	(0.083)	(0.091)	(0.408)	(0.430)	(0.361)	(0.502)
Medical Consultation	0.026**	0.024*	0.041**	0.038**	0.214*	0.207*	0.316**	0.295*
	(0.011)	(0.013)	(0.017)	(0.019)	(0.110)	(0.120)	(0.152)	(0.157)
Harvest Small	0.207**	0.204**	0.013**	0.013**	2.362**	2.564***	0.265***	0.267***
	(0.083)	(0.084)	(0.006)	(0.006)	(0.956)	(0.959)	(0.039)	(0.039)
Harvest Large	0.172**	0.172**	0.028***	0.028***	1.568*	1.289	3.871***	3.318***
	(0.070)	(0.071)	(0.006)	(0.006)	(0.890)	(0.935)	(0.957)	(1.031)
Constant					1.568*	1.289	3.871***	3.318***
					(0.890)	(0.935)	(0.957)	(1.031)
Observations	4,767	4,767	5,522	5,522	4,768	4,767	5,550	5,550
R-Squared	-	-	-	-	0.179	0.181	0.220	0.222
First Stage F-Stat	-	466	-	1,481	-	466	-	1,481
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using EICV 2005-06 and 2010-11 data on Stata14.
Amount of Savings: Log values where all values reported as zero replaced by 1 to avoid missing observations
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 2.44: Impact of MdS on the Existing of Savings and Amount of Savings (Informal) (Robustness 3)

	Existing of Savings (Informal)				Amount of Savings (Formal and Informal)			
	2005		2010		2005		2010	
Variables	Probit	IVProbit	Probit	IVProbit	OLS	IV2SLS	OLS	IV2SLS
CBHI	0.074***	0.041	0.033**	-0.152***	0.712***	0.449	0.335**	-1.596***
	(0.017)	(0.073)	(0.015)	(0.044)	(0.162)	(0.669)	(0.139)	(0.468)
HH Size	0.028***	0.028***	0.013**	0.011**	0.293***	0.292***	0.174***	0.152***
	(0.006)	(0.006)	(0.005)	(0.005)	(0.057)	(0.057)	(0.049)	(0.050)
HH Mean Schooling	0.142***	0.147***	0.110***	0.123***	1.243***	1.281***	1.151***	1.313***
	(0.031)	(0.033)	(0.025)	(0.025)	(0.266)	(0.280)	(0.236)	(0.243)
Age of HH Head	0.006**	0.006**	0.008***	0.008***	0.040	0.041*	0.064***	0.070***
	(0.003)	(0.003)	(0.002)	(0.002)	(0.025)	(0.024)	(0.022)	(0.022)
Age Sq.	-0.000***	-0.000***	-0.000***	-0.000***	-0.001**	-0.001**	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	-0.011	-0.011	-0.005	-0.007	-0.124	-0.121	-0.090	-0.108*
	(0.008)	(0.008)	(0.006)	(0.006)	(0.078)	(0.077)	(0.061)	(0.061)
Disease in HH	0.006	0.003	0.010	-0.010	0.045	0.021	0.099	-0.110
	(0.016)	(0.017)	(0.013)	(0.013)	(0.143)	(0.156)	(0.124)	(0.130)
Other Insurance	-0.092*	-0.109*	-0.050	-0.197***	-0.807*	-0.939*	-0.344	-1.915***
	(0.052)	(0.063)	(0.049)	(0.058)	(0.432)	(0.540)	(0.513)	(0.631)
Medical Consultation	0.031*	0.036*	0.007	0.043***	0.302*	0.335*	0.081	0.453***
	(0.018)	(0.020)	(0.014)	(0.015)	(0.165)	(0.183)	(0.137)	(0.154)
Harvest Small	0.202	0.211	0.028***	0.030***	2.510	2.583	0.277***	0.308***
	(0.175)	(0.179)	(0.005)	(0.005)	(1.764)	(1.782)	(0.041)	(0.044)
Harvest Large	0.210*	0.213*	0.012**	0.014***	1.945	1.969	0.146***	0.170***
	(0.124)	(0.124)	(0.005)	(0.005)	(1.269)	(1.259)	(0.050)	(0.053)
Constant					-0.680	-0.712	-1.649**	-0.339
					(1.162)	(1.151)	(0.735)	(0.779)
Observations	4,662	4,662	10,031	10,031	4,663	4,663	10,040	10,040
R-Squared	-	-	-	-	0.123	0.123	0.106	0.082
First Stage F-Stat	-	466	-	1,481	-	407	-	1,461
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using EICV 2005-06 and 2010-11 data on Stata14.
Amount of Savings: Log values where all values reported as zero replaced by 1 to avoid missing observations
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 2.45: Impact of MdS on Borrowing Status and Amount of Loans (Formal and Informal) (Robustness 3)

	Borrowing Status (Formal and Informal)				Amount of Loans (Formal and Informal)			
	2005-06		2010-11		2005-06		2010-11	
Variables	Probit	IVProbit	Probit	IVProbit	OLS	IV2SLS	OLS	IV2SLS
CBHI	0.004	0.030	-0.058***	-0.158***	0.145	0.229	-0.353***	-1.298***
	(0.017)	(0.056)	(0.013)	(0.035)	(0.159)	(0.514)	(0.126)	(0.348)
HH Size	0.008	0.008	0.003	0.002	0.145***	0.146***	0.141***	0.133***
	(0.006)	(0.006)	(0.004)	(0.004)	(0.055)	(0.055)	(0.042)	(0.042)
HH Mean Schooling	0.142***	0.138***	0.037*	0.045**	1.556***	1.544***	0.772***	0.852***
	(0.033)	(0.033)	(0.022)	(0.021)	(0.297)	(0.299)	(0.209)	(0.210)
Age of HH Head	-0.001	-0.001	0.004**	0.004**	0.002	0.001	0.049**	0.053***
	(0.003)	(0.003)	(0.002)	(0.002)	(0.026)	(0.026)	(0.019)	(0.019)
Age Sq.	-0.000	-0.000	-0.000***	-0.000***	-0.000	-0.000	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	-0.003	-0.003	0.005	0.004	-0.035	-0.037	-0.023	-0.033
	(0.008)	(0.008)	(0.005)	(0.005)	(0.074)	(0.074)	(0.056)	(0.056)
Disease in HH	0.064***	0.066***	0.061***	0.049***	0.536***	0.543***	0.598***	0.494***
	(0.017)	(0.018)	(0.011)	(0.012)	(0.152)	(0.159)	(0.109)	(0.114)
Other Insurance	-0.022	-0.009	0.005	-0.077	-0.022	0.020	1.281**	0.512
	(0.047)	(0.055)	(0.045)	(0.051)	(0.459)	(0.516)	(0.520)	(0.575)
Medical Consultation	0.000	-0.003	0.025**	0.044***	0.131	0.120	0.283**	0.468***
	(0.019)	(0.020)	(0.012)	(0.013)	(0.172)	(0.187)	(0.114)	(0.128)
Harvest Small	0.213	0.205	0.003	0.005*	-2.759**	-2.761**	0.090***	0.101***
	(0.187)	(0.188)	(0.003)	(0.003)	(1.172)	(1.165)	(0.031)	(0.031)
Harvest Large	-0.308**	-0.308**	-0.001	0.000	3.504**	3.515**	0.050	0.061
	(0.126)	(0.127)	(0.003)	(0.003)	(1.445)	(1.438)	(0.040)	(0.042)
Constant					3.504**	3.515**	4.687***	5.358***
					(1.445)	(1.438)	(0.930)	(0.956)
Observations	4,724	4,724	10,112	10,112	4,725	4,725	10,122	10,122
R-Squared	-	-	-	-	0.056	0.056	0.091	0.084
First Stage F-Stat	-	407	-	1,461	-	407	-	1,461
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using EICV 2005-06 and 2010-11 data on Stata14.
Amount of Loans: Log values where all values reported as zero replaced by 1 to avoid missing observations
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 2.46: Impact of MdS on Borrowing Status and Amount of Loans (Formal) (Robustness 3)

	Borrowing Status (Formal)				Amount of Loans (Formal)			
	2005		2010		2005		2010	
Variables	Probit	IVProbit	Probit	IVProbit	OLS	IV2SLS	OLS	IV2SLS
CBHI	0.004	-0.048	0.014**	0.014	0.027	-0.412	0.140**	0.155
	(0.017)	(0.040)	(0.006)	(0.015)	(0.119)	(0.363)	(0.057)	(0.154)
HH Size	0.008	-0.004	0.005***	0.005***	-0.027	-0.028	0.068***	0.068***
	(0.006)	(0.004)	(0.002)	(0.002)	(0.039)	(0.039)	(0.025)	(0.025)
HH Mean Schooling	0.142***	0.087***	0.027**	0.027**	0.664***	0.729***	0.226**	0.225**
	(0.033)	(0.023)	(0.011)	(0.011)	(0.188)	(0.192)	(0.092)	(0.093)
Age of HH Head	-0.001	0.010***	0.003***	0.003***	0.080***	0.081***	0.021***	0.021***
	(0.003)	(0.002)	(0.001)	(0.001)	(0.016)	(0.016)	(0.008)	(0.008)
Age Sq.	-0.000	-0.000***	-0.000***	-0.000***	-0.001***	-0.001***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	-0.003	0.004	-0.004	-0.004	0.034	0.040	-0.049	-0.049
	(0.008)	(0.006)	(0.003)	(0.003)	(0.056)	(0.056)	(0.032)	(0.032)
Disease in HH	0.064***	-0.010	-0.006	-0.006	-0.042	-0.083	-0.066	-0.065
	(0.017)	(0.013)	(0.005)	(0.005)	(0.110)	(0.118)	(0.053)	(0.054)
Other Insurance	-0.022	-0.027	0.041**	0.042*	0.036	-0.187	0.627	0.639
	(0.047)	(0.037)	(0.021)	(0.024)	(0.319)	(0.356)	(0.428)	(0.443)
Medical Consultation	0.000	0.025*	0.005	0.005	0.185	0.241*	0.060	0.057
	(0.019)	(0.014)	(0.006)	(0.006)	(0.124)	(0.135)	(0.064)	(0.068)
Harvest Small	-0.077	-0.061	0.000	0.000	-0.425	-0.294	0.006	0.006
	(0.099)	(0.099)	(0.001)	(0.001)	(0.825)	(0.832)	(0.014)	(0.014)
Harvest Large	-0.012	-0.008	0.002**	0.002**	0.067	0.089	0.029*	0.029*
	(0.076)	(0.076)	(0.001)	(0.001)	(0.760)	(0.755)	(0.016)	(0.016)
Constant					-2.049**	-2.089**	-0.937***	-0.947***
					(0.835)	(0.826)	(0.341)	(0.363)
Observations	4,723	4,723	10,057	10,057	4,724	4,724	10,074	10,074
R-Squared	-	-	-	-	0.075	0.074	0.030	0.030
First Stage F-Stat	-	407	-	1,461	-	407	-	1,461
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using EICV 2005-06 and 2010-11 data on Stata14.
Amount of Loans: Log values where all values reported as zero replaced by 1 to avoid missing observations
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 2.47: Impact of MdS on Borrowing Status and Amount of Loans (Informal) (Robustness 3)

	Borrowings Status (Informal)				Amount of Loans (Informal)			
	2005-06		2010-11		2005-06		2010-11	
Variables	Probit	IVProbit	Probit	IVProbit	OLS	IV2SLS	OLS	IV2SLS
CBHI	-0.016	0.088	-0.082***	-0.149***	-0.052	0.780	-0.654***	-1.092***
	(0.018)	(0.056)	(0.014)	(0.037)	(0.155)	(0.503)	(0.127)	(0.350)
HH Size	0.004	0.002	-0.010**	-0.012***	0.084	0.086	-0.019	-0.023
	(0.006)	(0.006)	(0.004)	(0.004)	(0.053)	(0.053)	(0.040)	(0.040)
HH Mean Schooling	0.041	0.016	0.005	-0.004	0.490*	0.366	0.349	0.385*
	(0.033)	(0.034)	(0.023)	(0.023)	(0.281)	(0.288)	(0.214)	(0.215)
Age of HH Head	-0.009***	-0.008***	0.001	0.001	-0.084***	-0.085***	0.011	0.013
	(0.003)	(0.003)	(0.002)	(0.002)	(0.025)	(0.025)	(0.020)	(0.020)
Age Sq.	0.000*	0.000	-0.000	-0.000*	0.001**	0.001**	-0.000*	-0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	-0.002	-0.002	0.013**	0.014**	-0.026	-0.039	0.068	0.064
	(0.008)	(0.008)	(0.006)	(0.006)	(0.068)	(0.068)	(0.057)	(0.057)
Disease in HH	0.065***	0.077***	0.066***	0.060***	0.523***	0.600***	0.634***	0.585***
	(0.017)	(0.017)	(0.012)	(0.013)	(0.145)	(0.151)	(0.115)	(0.119)
Other Insurance	-0.057	-0.019	-0.470***	-0.562***	-0.456	-0.027	-4.173***	-4.537***
	(0.053)	(0.058)	(0.045)	(0.051)	(0.419)	(0.472)	(0.366)	(0.450)
Medical Consultation	-0.032*	-0.044**	0.008	0.019	-0.220	-0.329*	0.092	0.177
	(0.019)	(0.020)	(0.013)	(0.014)	(0.162)	(0.173)	(0.122)	(0.132)
Harvest Small	0.180	0.126	-0.003	-0.004	1.754	1.446	0.003	0.010
	(0.189)	(0.187)	(0.003)	(0.003)	(1.637)	(1.644)	(0.029)	(0.029)
Harvest Large	-0.278**	-0.302**	-0.009***	-0.010***	-2.023**	-2.036**	-0.042*	-0.037
	(0.134)	(0.132)	(0.003)	(0.003)	(0.960)	(0.966)	(0.025)	(0.025)
Constant					3.581***	3.664***	5.245***	5.551***
					(0.986)	(0.986)	(0.928)	(0.954)
Observations	4,652	4,654	9,920	9,934	4,654	4,654	9,940	9,940
R-Squared	-	-	-	-	0.057	0.049	0.116	0.114
First Stage F-Stat	-	407	-	1,461	-	407	-	1,461
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using EICV 2005-06 and 2010-11 data on Stata14.
Amount of Loans: Log values where all values reported as zero replaced by 1 to avoid missing observations
Harvest Small/Large: RwF Values/1,000,000.
Notes: Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

2.D Robustness Results 3

The following results present Random Effects panel regression results for the data aggregated at the level of 30 districts in the sample.

Table 2.48: The impact of District level MdS intensity on Health Seeking Behaviour

	Health Seeking Behaviour		
	(1)	(2)	(3)
CBHI	0.146***	0.118*	-0.088
	(0.030)	(0.061)	(0.093)
2010*CBHI			0.253**
			(0.111)
(Mean)Radio		0.185**	0.189**
		(0.093)	(0.089)
(Mean)TVD		-0.058	-0.229
		(0.097)	(0.153)
(Mean)Adults		-0.066	-0.013
		(0.072)	(0.084)
(Mean)Child		0.077*	0.094***
		(0.044)	(0.035)
(Mean)Women		0.011	0.074
		(0.139)	(0.113)
(Mean)Age		-0.002	-0.005
		(0.004)	(0.005)
(Mean)School		0.366	0.089
		(0.304)	(0.269)
(Mean)OtherInsu		0.630**	0.540*
		(0.296)	(0.311)
(Mean)SMHarv		-0.000	-0.000
		(0.000)	(0.000)
(Mean)LRHarv		-0.000	-0.000
		(0.000)	(0.000)
(Mean)Time			-0.014
			(0.071)
Constant	0.152***	-0.202	-0.061
	(0.018)	(0.396)	(0.319)
Observations	60	60	60
Number of District	30	30	30
Controls	No	No	No

The key independent variables are aggregated at the district level.

Table 2.49: The impact of District level MdS intensity on OOP

	Total OOP in District		
	(1)	(2)	(3)
(Mean)CBHI	-1.437*	-1.624*	-0.547
	(0.852)	(0.919)	(0.951)
Time*CBHI			-1.654
			(1.597)
(Mean)HHSize		-0.285	-0.302
		(0.486)	(0.474)
(Mean)School		5.834***	5.795***
		(2.090)	(2.092)
(Mean)Age		0.044	0.046
		(0.036)	(0.035)
(Mean)Child		0.956	0.802
		(0.799)	(0.840)
(Mean)Disease		1.080	1.216
		(1.233)	(1.231)
(Mean)Other Insurance		10.518***	11.708***
		(3.366)	(3.278)
(Mean)Consult		3.022*	3.417**
		(1.595)	(1.665)
(Mean)Short run Harvest		-0.000	-0.000
		(0.001)	(0.001)
(Mean)Long run Harvest		-0.001*	-0.001
		(0.001)	(0.001)
Constant	12.199***	2.889	2.710
	(0.345)	(3.295)	(3.514)
Observations	60	60	60
Number of Distrct	30	30	30
Controls	No	Yes	Yes

The key independent variables are aggregated at the district level.

Table 2.50: Impact of MdS intensity of Decision to Sale Assets

	Assets		
	(1)	(2)	(3)
(Mean)CBHI	-0.118	-0.064	-0.075
	(0.092)	(0.107)	(0.156)
Time*CBHI			0.012
			(0.173)
(Mean)HHSize		-0.020	-0.020
		(0.046)	(0.050)
(Mean)School		0.252	0.253
		(0.281)	(0.277)
(Mean)Age		0.005	0.005
		(0.007)	(0.007)
(Mean)Disease		0.188	0.186
		(0.157)	(0.158)
(Mean)Consult		0.060	0.057
		(0.222)	(0.226)
(Mean)Other Insurance		-0.047	-0.049
		(0.582)	(0.621)
(Mean)Short run Harvest		0.000	0.000
		(0.000)	(0.000)
(Mean)Long run Harvest		0.000	0.000
		(0.000)	(0.000)
Constant	0.601***	0.220	0.215
	(0.036)	(0.531)	(0.519)
Observations	60	60	60
Number of Distrct	30	30	30
Controls	Yes	Yes	Yes

The key independent variables are aggregated at the district level.

Table 2.51: Impact of MdS Density on Decision to Save- Total, Formal and Informal

	Total Savings			**Formal Savings**			**Informal Savings**		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(Mean)CBHI	0.607***	0.355***	0.475**	0.580***	0.283***	0.158	0.431***	0.195	0.363
	(0.061)	(0.086)	(0.189)	(0.040)	(0.091)	(0.110)	(0.070)	(0.127)	(0.224)
Time*CBHI			-0.442**			-0.142			-0.322
			(0.180)			(0.105)			(0.237)
(Mean)HHSize		0.021	0.149		-0.029	0.082		0.047	0.101
		(0.081)	(0.112)		(0.071)	(0.074)		(0.113)	(0.141)
(Mean)School		0.425	0.105		1.019***	0.901***		-0.101	-0.293
		(0.513)	(0.500)		(0.322)	(0.267)		(0.596)	(0.613)
(Mean)Age		-0.004	-0.012		-0.003	-0.006		0.001	-0.006
		(0.013)	(0.014)		(0.007)	(0.005)		(0.015)	(0.017)
(Mean)Child		0.031	-0.123		0.102	-0.027		-0.110	-0.187
		(0.143)	(0.145)		(0.073)	(0.084)		(0.183)	(0.181)
(Mean)Disease		0.127	0.055		0.226**	0.100		0.066	0.045
		(0.130)	(0.164)		(0.101)	(0.096)		(0.162)	(0.188)
(Mean)Other Insurance		0.328	1.176		0.480	0.827**		0.183	0.604
		(0.846)	(0.928)		(0.477)	(0.350)		(0.907)	(1.030)
(Mean)Short run Harvest		0.000	0.000		0.000***	0.000		0.000	0.000
		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)
(Mean)Long run Harvest		0.000	0.000		0.000	-0.000*		0.000*	0.000
		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)
Constant	0.237***	-0.007	0.195	-0.001	-0.623*	-0.609**	0.184***	0.207	0.484
	(0.038)	(1.025)	(1.031)	(0.036)	(0.341)	(0.280)	(0.034)	(1.296)	(1.350)
Observations	60	60	60	60	60	60	60	60	60
Number of Distrct	30	30	30	30	30	30	30	30	30
Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes

The key independent variables are aggregated at the district level.

Table 2.52: Regressions results for Amount of Savings in the district- Total, Fomrla and Informal

	Total Savings			Formal Savings			Informal Savings		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(Mean)CBHI	7.728***	5.147*	0.958	5.088***	1.768**	2.548	8.509***	6.277*	1.302
	(1.296)	(2.935)	(3.557)	(0.666)	(0.796)	(2.091)	(1.357)	(3.376)	(4.036)
Time*CBHI			1.365			-2.573			0.939
			(5.317)			(1.700)			(6.230)
(Mean)HHSize		-1.916	-0.437		-0.755	-0.273		-2.498	-0.552
		(2.791)	(2.785)		(1.079)	(1.409)		(3.270)	(3.226)
(Mean)School		6.275	4.161		10.979***	10.468***		1.466	-1.334
		(8.344)	(8.743)		(2.534)	(1.898)		(10.385)	(10.607)
(Mean)Age		-0.183	-0.216		0.072	0.058		-0.286	-0.329
		(0.241)	(0.236)		(0.063)	(0.062)		(0.289)	(0.284)
(Mean)Child		3.651	2.313		3.027**	2.377		3.379	1.527
		(3.363)	(3.073)		(1.240)	(1.497)		(4.065)	(3.636)
(Mean)Disease		5.291	2.786		1.958	1.770		5.424	2.356
		(4.115)	(3.870)		(1.340)	(1.440)		(4.997)	(4.692)
(Mean)Other Insurance		-5.425	-2.345		15.222***	18.340***		-11.128	-6.427
		(11.765)	(11.673)		(5.342)	(5.382)		(14.300)	(14.257)
(Mean)Short run Harvest		0.000	-0.001		0.001**	0.001*		-0.000	-0.002
		(0.002)	(0.002)		(0.001)	(0.001)		(0.003)	(0.003)
(Mean)Long run Harvest		0.004*	0.002		0.001***	0.001*		0.004*	0.002
		(0.002)	(0.002)		(0.000)	(0.001)		(0.002)	(0.003)
Constant	13.053***	16.144	16.629	12.794***	-2.691	-3.199	12.047***	27.053	27.588
	(0.701)	(13.683)	(13.985)	(0.515)	(4.067)	(3.523)	(0.654)	(17.687)	(17.844)
Observations	60	60	60	60	60	60	60	60	60
Number of Distrct	30	30	30	30	30	30	30	30	30
Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes

The key independent variables are aggregated at the district level.

Table 2.53: Regressions results for Decision of Borrowings in the district

	Total Savings			Formal Savings			Informal Savings		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(Mean)CBHI	0.170	0.350**	0.179	0.018	0.023	0.111	0.189	0.315**	0.080
	(0.111)	(0.139)	(0.175)	(0.030)	(0.047)	(0.072)	(0.116)	(0.150)	(0.181)
Time*CBHI			0.256			-0.140*			0.369**
			(0.164)			(0.072)			(0.164)
(Mean)HHSize		-0.048	-0.032		0.023	0.017		-0.070	-0.051
		(0.083)	(0.084)		(0.025)	(0.025)		(0.093)	(0.093)
(Mean)School		0.007	-0.151		0.065	0.096		0.055	-0.197
		(0.292)	(0.307)		(0.100)	(0.112)		(0.315)	(0.323)
(Mean)Age		0.006	0.004		0.001	0.001		0.005	0.004
		(0.008)	(0.007)		(0.002)	(0.002)		(0.009)	(0.008)
(Mean)Disease		0.035	-0.017		-0.098*	-0.076		0.149	0.063
		(0.267)	(0.283)		(0.051)	(0.055)		(0.265)	(0.291)
(Mean)Consult		0.011	-0.085		0.040	0.083		-0.021	-0.156
		(0.228)	(0.239)		(0.081)	(0.088)		(0.246)	(0.245)
(Mean)Other Insurance		0.460	0.293		0.235	0.288		0.179	-0.003
		(0.604)	(0.630)		(0.181)	(0.182)		(0.619)	(0.670)
(Mean)Short run Harvest		-0.000**	-0.000**		-0.000**	-0.000*		-0.000**	-0.000*
		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)
(Mean)Long run Harvest		0.000	0.000		-0.000**	-0.000		0.000*	0.000
		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)
Constant	0.516***	0.313	0.557	0.143***	-0.010	-0.058	0.359***	0.212	0.558
	(0.043)	(0.408)	(0.399)	(0.013)	(0.145)	(0.162)	(0.049)	(0.444)	(0.446)
Observations	60	60	60	60	60	60	60	60	60
Number of Distrct	30	30	30	30	30	30	30	30	30
Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes

The key independent variables are aggregated at the district level.

Table 2.54: Regressions results for amount of total loan amounts in the district

	Total Savings			Formal Savings			Informal Savings		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(Mean)CBHI	-3.885**	-4.667*	-2.942	-1.055	0.132	1.540	-2.349	-4.281*	-5.452
	(1.818)	(2.619)	(3.326)	(1.459)	(1.683)	(2.685)	(1.746)	(2.568)	(3.475)
Time*CBHI			-2.657			-2.244			1.788
			(2.952)			(2.455)			(2.340)
(Mean)HHSize		1.452	1.346		0.676	0.559		1.519*	1.604*
		(0.960)	(0.976)		(1.131)	(1.187)		(0.811)	(0.857)
(Mean)School		7.801*	8.065*		4.488	5.173		7.986**	7.853**
		(4.511)	(4.200)		(4.358)	(4.121)		(3.658)	(3.752)
(Mean)Age		0.120	0.124		0.187*	0.180*		-0.066	-0.071
		(0.093)	(0.090)		(0.099)	(0.104)		(0.055)	(0.057)
(Mean)Disease		-0.406	-0.082		0.794	1.259		-2.615	-2.778
		(1.677)	(1.722)		(1.369)	(1.324)		(1.800)	(1.862)
(Mean)Consult		-1.815	-1.096		0.939	1.676		1.014	0.457
		(2.918)	(3.256)		(2.892)	(3.428)		(2.663)	(2.917)
(Mean)Other Insurance		16.764***	18.252***		25.779***	27.027***		7.592	6.603
		(5.967)	(6.476)		(6.016)	(6.190)		(5.796)	(6.219)
(Mean)Short run Harvest		-0.001	-0.001		-0.000	0.000		-0.000	-0.000
		(0.001)	(0.001)		(0.001)	(0.001)		(0.001)	(0.001)
(Mean)Long run Harvest		-0.001	-0.001		0.001	0.001		-0.001	-0.001
		(0.001)	(0.001)		(0.001)	(0.001)		(0.001)	(0.001)
Constant	17.227***	-1.337	-2.189	15.603***	-0.719	-1.447	15.361***	4.765	5.299
	(0.763)	(6.578)	(6.227)	(0.702)	(7.033)	(6.854)	(0.700)	(5.767)	(5.877)
Observations	60	60	60	60	60	60	60	60	60
Number of Distrct	30	30	30	30	30	30	30	30	30
Controls	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes

The key independent variables are aggregated at the district level.

2.E Heterogeneous Results

The following results are across income groups: Extremely Poor, Poor, Non-Poor (Table 2.55 to Table 2.47).

Table 2.55: Impact of CBHI on Health Seeking Behaviour

Variables	Health Seeking Behaviour (2005-06)			Health Seeking Behaviour (2010-11)		
	Probit Ext. Poor	Probit Poor	Probit Non-Poor	Probit Ext. Poor	Probit Poor	Probit Non-Poor
CBHI	0.070***	0.111***	0.079***	0.238***	0.143***	0.207***
	(0.014)	(0.027)	(0.026)	(0.021)	(0.028)	(0.016)
Radio	0.033*	-0.005	0.011	-0.040**	-0.000	0.027
	(0.020)	(0.031)	(0.023)	(0.017)	(0.025)	(0.019)
TV	Omitted	Omitted	0.006	Omitted	-0.268	-0.019
			(0.071)		(0.171)	(0.035)
Adults	0.013	0.018	0.024**	0.028**	0.033***	0.025**
	(0.011)	(0.020)	(0.011)	(0.013)	(0.010)	(0.010)
Children in HH	0.018***	0.031***	0.014**	0.027***	0.025***	0.022***
	(0.007)	(0.008)	(0.006)	(0.006)	(0.007)	(0.007)
Women in HH	0.002	0.004	0.018	0.002	0.003	0.011
	(0.014)	(0.025)	(0.015)	(0.019)	(0.015)	(0.017)
Age of HH head	-0.011***	-0.010**	0.002	-0.011**	-0.006	-0.012***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)
Age. Sq.	0.000**	0.000**	-0.000	0.000***	0.000	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
HH Mean Schooling	0.014	0.086	0.026	0.062*	-0.031	0.029
	(0.045)	(0.055)	(0.046)	(0.033)	(0.043)	(0.049)
Urban	0.030	0.048	-0.022	-0.002	0.027	0.018
	(0.048)	(0.063)	(0.035)	(0.038)	(0.039)	(0.022)
Other Insurance	0.018	0.095	0.183***	0.201	0.114	0.311***
	(0.057)	(0.101)	(0.042)	(0.176)	(0.187)	(0.043)
Time to Health Centre	0.000	-0.000	-0.000	0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Harvest Small	-0.000**	0.000	-0.000	-0.000**	-0.000	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Harvest Large	0.000	0.000	-0.000	0.000*	-0.000**	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	1,564	1,016	1,933	2,439	2,304	5,149
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation of average marginal effects using EICV 2005-06 and 2010-11 data on Stata14.
Standard Errors clustered at cluster level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1.

Table 2.56: Impact of MdS on Out of Pocket Medical Expenses (OOP)

Variables	OOP Expenses (2005-06)						OOP Expenses (2010-11)					
	Ext. Poor OLS	Ext. Poor IV2SLS	Poor OLS	Poor IV2SLS	Non-Poor OLS	Non-Poor IV2SLS	Ext. Poor OLS	Ext. Poor IV2SLS	Poor OLS	Poor IV2SLS	Non-Poor OLS	Non-Poor IV2SLS
CBHI	-0.508***	-1.181***	-0.424***	0.713	-0.661***	-1.392***	-0.265***	-0.652*	-0.474***	-0.184	-0.411***	-0.457
	(0.114)	(0.426)	(0.143)	(3.047)	(0.103)	(0.503)	(0.091)	(0.341)	(0.115)	(0.404)	(0.095)	(0.346)
HH Size	0.109**	0.124***	0.148***	0.158**	0.084**	0.077*	0.013	0.008	0.039	0.037	0.085**	0.084**
	(0.047)	(0.047)	(0.054)	(0.062)	(0.041)	(0.041)	(0.035)	(0.037)	(0.043)	(0.043)	(0.036)	(0.035)
HH Mean Schooling	-0.106	-0.096	-0.277	-0.422	-0.018	0.142	-0.407**	-0.462**	-0.056	0.040	0.152	0.165
	(0.216)	(0.218)	(0.308)	(0.622)	(0.254)	(0.269)	(0.194)	(0.200)	(0.210)	(0.219)	(0.171)	(0.173)
Age	0.011	0.015	0.005	-0.003	0.003	0.005	-0.012	-0.012	0.011	0.011	-0.011	-0.010
	(0.023)	(0.023)	(0.026)	(0.035)	(0.021)	(0.021)	(0.017)	(0.018)	(0.016)	(0.016)	(0.014)	(0.014)
Age. Sq.	-0.000	-0.000	-0.000	0.000	-0.000	-0.000	0.000	0.000	-0.000	-0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	-0.023	-0.020	-0.036	-0.069	-0.023	0.004	0.020	0.017	0.052	0.065	0.013	0.012
	(0.060)	(0.061)	(0.076)	(0.087)	(0.058)	(0.060)	(0.045)	(0.047)	(0.054)	(0.055)	(0.043)	(0.043)
Disease in HH	1.713***	1.665***	2.361***	2.460***	2.412***	2.329***	1.022***	0.979***	1.168***	1.224***	1.629***	1.624***
	(0.117)	(0.121)	(0.176)	(0.281)	(0.142)	(0.149)	(0.096)	(0.105)	(0.099)	(0.112)	(0.100)	(0.102)
Other Insurance	-0.369	-0.644	-0.368	0.125	-1.157***	-1.630***	0.029	-0.321	-1.180	-0.186	-0.816***	-0.857**
	(0.401)	(0.418)	(0.495)	(1.661)	(0.247)	(0.370)	(0.708)	(0.663)	(1.270)	(1.226)	(0.221)	(0.367)
Medical Cons.	4.024***	4.076***	3.474***	3.314***	3.762***	3.849***	0.506***	0.630***	0.496***	0.450***	0.307**	0.314**
	(0.149)	(0.155)	(0.212)	(0.423)	(0.159)	(0.167)	(0.142)	(0.166)	(0.162)	(0.172)	(0.137)	(0.142)
Harvest Small	0.000	-0.000	-0.000	-0.000	-0.000	0.000	0.000	0.000	-0.000**	-0.000**	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Harvest Large	-0.000	-0.000	-0.000	0.000	-0.000	-0.000	-0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	3.479***	2.961***	-1.571	-0.216	0.145	0.066	0.601	0.198	0.639	1.185	1.757***	1.768***
	(1.154)	(0.814)	(1.040)	(3.150)	(0.693)	(0.687)	(1.060)	(0.941)	(0.900)	(1.264)	(0.523)	(0.561)
Observations	1,741	1,680	1,088	999	2,060	2,050	2,667	2,498	2,444	2,265	5,395	5,384
R-squared	0.534	0.526	0.582	0.556	0.618	0.610	0.166	0.167	0.188	0.192	0.197	0.197
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using EICV 2005-06 and 2010-11 data on Stata14. Standard Errors clustered at cluster level, shown in brackets. p<0.01, ** p<0.05, * p<0.1
OOP Expenses: Log values where all values reported as zero replaced by 1 to avoid missing observations

Table 2.57: Impact of MdS on Sale of Assets (Livestock or Farm-Land or Equipment)

Variables	Sale of Assets (2005-06)						Sale of Assets (2010-11)					
	Ext. Poor Probit	Ext. Poor IVProbit	Poor Probit	Poor IVProbit	Non-Poor Probit	Non-Poor IVProbit	Ext. Poor Probit	Ext. Poor IVProbit	Poor Probit	Poor IVProbit	Non-Poor Probit	Non-Poor IVProbit
CBHI	0.017	-0.179	-0.052	-0.016	0.042	-0.000	-0.029	0.008	-0.008	-0.180**	0.002	0.066
	(0.035)	(0.123)	(0.038)	(0.632)	(0.026)	(0.121)	(0.032)	(0.094)	(0.025)	(0.087)	(0.021)	(0.068)
HH Size	0.043***	0.044***	0.024	0.033**	0.026***	0.026***	-0.007	-0.004	0.022**	0.018*	0.014**	0.015**
	(0.011)	(0.012)	(0.015)	(0.015)	(0.009)	(0.009)	(0.010)	(0.011)	(0.010)	(0.010)	(0.006)	(0.006)
HH Mean Schooling	0.122*	0.120*	-0.028	-0.084	0.041	0.050	-0.020	-0.024	0.093*	0.088*	0.065*	0.061
	(0.068)	(0.066)	(0.082)	(0.150)	(0.057)	(0.061)	(0.057)	(0.059)	(0.053)	(0.053)	(0.037)	(0.038)
Age	-0.001	-0.001	-0.002	-0.004	0.005	0.005	0.004	0.003	0.003	0.006	0.002	0.002
	(0.007)	(0.007)	(0.007)	(0.010)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.003)	(0.003)
Age. Sq.	-0.000	-0.000	0.000	0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	-0.036**	-0.030**	0.005	-0.005	0.004	0.004	0.020	0.022	-0.009	-0.013	-0.001	-0.002
	(0.014)	(0.015)	(0.019)	(0.021)	(0.014)	(0.014)	(0.013)	(0.014)	(0.013)	(0.013)	(0.008)	(0.008)
Disease in HH	0.016	0.001	0.023	0.019	0.047*	0.039	-0.004	-0.001	-0.011	-0.043*	-0.008	-0.002
	(0.031)	(0.034)	(0.037)	(0.051)	(0.026)	(0.030)	(0.029)	(0.032)	(0.024)	(0.025)	(0.017)	(0.018)
Other Insurance	-0.097	-0.144	0.061	0.034	0.008	-0.020	-0.140	-0.111	0.035	-0.195	0.019	0.073
	(0.114)	(0.121)	(0.141)	(0.367)	(0.065)	(0.097)	(0.268)	(0.276)	(0.225)	(0.230)	(0.047)	(0.073)
Medical Cons.	0.097***	0.115***	0.046	0.052	0.004	0.011	-0.009	-0.019	0.054*	0.102***	0.023	0.013
	(0.038)	(0.038)	(0.046)	(0.100)	(0.030)	(0.033)	(0.034)	(0.046)	(0.029)	(0.031)	(0.020)	(0.022)
Harvest Small	0.000	0.000	0.000**	0.000*	0.000***	0.000**	0.000	0.000	0.000*	0.000**	0.000***	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Harvest Large	0.000	0.000	0.000	0.000	0.000	0.000	0.000***	0.000***	0.000***	0.000***	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	1,294	1,246	912	844	1,723	1,715	1,924	1,810	1,970	1,833	4,408	4,398
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation of average marginal effects using EICV 2005-06 and 2010-11 data on Stata14. Standard Errors clustered at cluster level, shown in brackets. *** p<0.01, ** p<0.05, * p<0.1

Table 2.58: Impact of MdS on Existence of Savings (Formal or Informal)

Variables	Household Saving (Formal and Informal) (2005)						Household Saving (Formal and Informal) (2010)					
	Ext. Poor Probit	Ext. Poor IVProbit	Poor Probit	Poor IVProbit	Non-Poor Probit	Non-Poor IVProbit	Ext. Poor Probit	Ext. Poor IVProbit	Poor Probit	Poor IVProbit	Non-Poor Probit	Non-Poor IVProbit
CBHI	0.083***	0.107	0.118***	0.361	0.133***	0.267***	0.044*	-0.062	0.033	-0.012	0.051***	-0.118**
	(0.024)	(0.092)	(0.030)	(0.439)	(0.024)	(0.095)	(0.024)	(0.087)	(0.025)	(0.093)	(0.017)	(0.058)
HH Size	0.038***	0.037***	0.047***	0.046**	0.038***	0.037***	0.033***	0.034***	0.031***	0.031***	0.029***	0.027**
	(0.009)	(0.009)	(0.013)	(0.020)	(0.008)	(0.008)	(0.009)	(0.010)	(0.010)	(0.010)	(0.006)	(0.006)
HH Mean Schooling	0.124***	0.124**	0.178***	0.143	0.095**	0.066	0.153***	0.127**	0.134***	0.142***	0.139***	0.150***
	(0.048)	(0.049)	(0.067)	(0.191)	(0.045)	(0.049)	(0.045)	(0.047)	(0.047)	(0.049)	(0.029)	(0.029)
Age	0.006	0.006	0.004	0.004	0.011**	0.011**	0.013***	0.013***	0.004	0.005	0.005**	0.006**
	(0.004)	(0.004)	(0.006)	(0.008)	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)	(0.002)	(0.002)
Age. Sq.	-0.000*	-0.000*	-0.000	-0.000	-0.000***	-0.000***	-0.000***	-0.000***	-0.000	-0.000	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	-0.014	-0.012	0.005	-0.003	0.001	-0.004	-0.026**	-0.029**	0.002	0.002	-0.005	-0.004
	(0.012)	(0.012)	(0.016)	(0.017)	(0.012)	(0.012)	(0.011)	(0.011)	(0.012)	(0.013)	(0.008)	(0.008)
Disease in HH	-0.002	-0.002	0.035	0.036	0.010	0.023	0.001	-0.004	0.027	0.016	0.008	-0.007
	(0.026)	(0.028)	(0.034)	(0.041)	(0.025)	(0.026)	(0.025)	(0.028)	(0.024)	(0.025)	(0.015)	(0.015)
Other Insurance	0.044	0.056	0.009	0.135	0.140**	0.214***	-0.208	-0.230	0.263	0.169	0.277***	0.127
	(0.086)	(0.094)	(0.113)	(0.285)	(0.059)	(0.076)	(0.239)	(0.236)	(0.176)	(0.205)	(0.065)	(0.081)
Medical Cons.	0.045	0.048	0.004	-0.011	0.018	-0.002	0.035	0.048	-0.012	0.021	0.008	0.031*
	(0.029)	(0.031)	(0.038)	(0.074)	(0.026)	(0.029)	(0.029)	(0.040)	(0.028)	(0.031)	(0.016)	(0.018)
Harvest Small	0.000**	0.000**	-0.000	-0.000	0.000	0.000	0.000	0.000	0.000**	0.000**	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Harvest Large	-0.000	-0.000*	0.000*	0.000	0.000**	0.000**	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	1,726	1,667	1,083	994	2,058	2,048	2,659	2,492	2,440	2,261	5,377	5,366
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation of average marginal effects using EICV 2005-06 and 2010-11 data on Stata14. Standard Errors clustered at cluster level, shown in brackets. *** p<0.01, ** p<0.05, * p<0.1

Table 2.59: Impact of MdS on Savings Deposits (Formal or Informal)

Variables	Household Savings Deposit (Formal and Informal) (2005)						Household Savings Deposit (Formal and Informal) (2010)					
	Ext. Poor OLS	Ext. Poor IV2SLS	Poor OLS	Poor IV2SLS	Non-Poor OLS	Non-Poor IV2SLS	Ext. Poor OLS	Ext. Poor IV2SLS	Poor OLS	Poor IV2SLS	Non-Poor OLS	Non-Poor IV2SLS
CBHI	0.724***	0.840	1.080***	6.867	1.397***	2.912***	0.435*	-0.662	0.176	-0.458	0.816***	-1.087*
	(0.240)	(0.863)	(0.300)	(7.757)	(0.255)	(1.128)	(0.227)	(0.818)	(0.249)	(0.934)	(0.195)	(0.656)
HH Size	0.382***	0.379***	0.494***	0.574***	0.302***	0.311***	0.248***	0.225**	0.251***	0.257***	0.227***	0.217***
	(0.088)	(0.088)	(0.121)	(0.157)	(0.074)	(0.075)	(0.089)	(0.093)	(0.093)	(0.094)	(0.056)	(0.056)
HH Mean Schooling	1.076***	1.107***	1.442**	0.740	1.191**	0.937*	1.162***	0.944**	1.275***	1.385***	2.028***	2.164***
	(0.401)	(0.407)	(0.607)	(1.536)	(0.464)	(0.496)	(0.415)	(0.432)	(0.455)	(0.476)	(0.343)	(0.354)
Age	0.038	0.040	0.037	0.022	0.100**	0.107**	0.095**	0.096**	0.062	0.066*	0.089***	0.100***
	(0.035)	(0.035)	(0.054)	(0.084)	(0.045)	(0.046)	(0.041)	(0.044)	(0.038)	(0.037)	(0.028)	(0.028)
Age. Sq.	-0.000	-0.000	-0.001	-0.001	-0.001***	-0.001***	-0.001**	-0.001**	-0.001**	-0.001**	-0.001***	-0.001***
	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	-0.117	-0.107	-0.002	-0.093	0.149	0.102	-0.107	-0.100	0.069	0.072	0.054	0.060
	(0.113)	(0.115)	(0.159)	(0.216)	(0.117)	(0.123)	(0.102)	(0.105)	(0.117)	(0.117)	(0.078)	(0.078)
Disease in HH	-0.051	-0.063	0.396	0.595	0.009	0.159	-0.083	-0.140	0.283	0.132	-0.045	-0.212
	(0.230)	(0.245)	(0.331)	(0.648)	(0.254)	(0.277)	(0.228)	(0.252)	(0.225)	(0.237)	(0.168)	(0.176)
Other Insurance	-0.379	-0.371	-0.184	3.272	1.603***	2.466***	-2.956	-2.656	2.040	1.418	2.635***	0.980
	(0.815)	(0.887)	(1.181)	(4.359)	(0.594)	(0.853)	(1.973)	(1.912)	(1.438)	(1.858)	(0.386)	(0.659)
Medical Cons.	0.439	0.491*	-0.022	-0.550	0.095	-0.106	0.294	0.420	0.146	0.499*	0.023	0.285
	(0.267)	(0.281)	(0.372)	(0.986)	(0.275)	(0.308)	(0.271)	(0.373)	(0.274)	(0.295)	(0.175)	(0.195)
Harvest Small	0.000	0.000*	-0.000	-0.000	0.000**	0.000**	0.000	0.000	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Harvest Large	-0.000	-0.000	0.000*	0.000	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	5.156**	3.112	-6.922***	-1.492	1.360	1.215	-3.195*	-1.851	-2.813	-2.586	0.516	1.756
	(2.271)	(2.013)	(2.642)	(8.155)	(1.620)	(1.624)	(1.783)	(2.017)	(1.740)	(2.364)	(1.005)	(1.078)
Observations	1,741	1,680	1,088	999	2,060	2,050	2,667	2,498	2,444	2,265	5,395	5,384
R.Square	0.154	0.160	0.184	-0.055	0.209	0.190	0.134	0.126	0.170	0.178	0.185	0.166
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation of average marginal effects using EICV 2005-06 and 2010-11 data on Stata14. Notes: Standard Errors clustered at cluster level, shown in brackets. *** p<0.01, ** p<0.05, * p<0.1

Table 2.60: Impact of MdS on Existence of Savings (Formal)

Variables	Household Saving (Formal) (2005-06)						Household Saving (Formal) (2010-11)					
	Ext. Poor Probit	Ext. Poor IVProbit	Poor Probit	Poor IVProbit	Non-Poor Probit	Non-Poor IVProbit	Ext. Poor Probit	Ext. Poor IVProbit	Poor Probit	Poor IVProbit	Non-Poor Probit	Non-Poor IVProbit
CBHI	0.038***	-0.010	0.066***	-0.015	0.110***	0.207**	0.091***	0.128*	0.057**	-0.053	0.121***	0.088
	(0.011)	(0.043)	(0.023)	(0.340)	(0.020)	(0.093)	(0.020)	(0.072)	(0.023)	(0.079)	(0.019)	(0.065)
HH Size	0.012***	0.012***	0.019**	0.021**	0.019***	0.020**	0.011	0.014*	0.030***	0.030***	0.041***	0.041***
	(0.004)	(0.004)	(0.008)	(0.009)	(0.007)	(0.006)	(0.007)	(0.008)	(0.008)	(0.008)	(0.006)	(0.006)
HH Mean Schooling	0.064**	0.073***	0.135***	0.142	0.156***	0.134***	0.150***	0.141***	0.113**	0.112**	0.204***	0.206***
	(0.026)	(0.028)	(0.050)	(0.089)	(0.044)	(0.049)	(0.039)	(0.040)	(0.045)	(0.047)	(0.035)	(0.035)
Age	-0.003	-0.002	0.008	0.007	0.009**	0.009**	0.011***	0.010**	0.001	-0.000	0.004	0.004
	(0.002)	(0.002)	(0.005)	(0.006)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)
Age. Sq.	0.000	0.000	-0.000	-0.000	-0.000***	-0.000***	-0.000***	-0.000**	-0.000	0.000	-0.000*	-0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	0.001	0.003	0.003	-0.002	0.010	0.007	-0.001	-0.003	0.002	0.002	-0.012	-0.012
	(0.005)	(0.005)	(0.011)	(0.012)	(0.009)	(0.010)	(0.009)	(0.009)	(0.010)	(0.011)	(0.008)	(0.008)
Disease in HH	-0.005	-0.009	0.020	-0.001	-0.002	0.008	0.018	0.020	0.007	0.006	0.001	-0.001
	(0.011)	(0.013)	(0.025)	(0.039)	(0.020)	(0.022)	(0.018)	(0.022)	(0.021)	(0.024)	(0.015)	(0.016)
Other Insurance	0.063**	0.047	0.183***	0.137	0.155***	0.212**	0.199	0.222	0.643***	0.517***	0.573***	0.546***
	(0.030)	(0.031)	(0.057)	(0.175)	(0.043)	(0.068)	(0.165)	(0.171)	(0.169)	(0.190)	(0.073)	(0.090)
Medical Cons.	0.014	0.022	-0.009	0.022	0.031	0.019	0.008	-0.009	0.002	0.020	0.035*	0.038*
	(0.014)	(0.017)	(0.027)	(0.050)	(0.021)	(0.024)	(0.023)	(0.032)	(0.022)	(0.026)	(0.019)	(0.020)
Harvest Small	0.000	0.000	-0.000	-0.000	0.000**	0.000*	0.000	0.000	0.000*	0.000*	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Harvest Large	0.000	0.000	0.000	0.000	0.000**	0.000**	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	1,612	1,557	983	899	2,056	2,046	2,658	2,492	2,441	2,262	5,375	5,364
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation of average marginal effects using EICV 2005-06 and 2010-11 data on Stata14. Notes: Standard Errors clustered at cluster level, shown in brackets. *** p<0.01, ** p<0.05, * p<0.1

Table 2.61: Impact of MdS on Savings Deposits (Formal)

Variables	Household Savings Deposit (Formal) (2005-06)						Household Savings Deposit (Formal) (2010-11)					
	Ext. Poor OLS	Ext. Poor IV2SLS	Poor OLS	Poor IV2SLS	Non-Poor OLS	Non-Poor IV2SLS	Ext. Poor OLS	Ext. Poor IV2SLS	Poor OLS	Poor IV2SLS	Non-Poor OLS	Non-Poor IV2SLS
CBHI	0.299***	-0.173	0.509***	0.842	0.959***	1.855**	0.782***	1.138**	0.445***	-0.350	1.503***	0.773
	(0.112)	(0.346)	(0.180)	(3.224)	(0.193)	(0.852)	(0.146)	(0.557)	(0.168)	(0.593)	(0.168)	(0.617)
HH Size	0.080**	0.083**	0.105	0.102	0.031	0.039	-0.014	0.010	0.039	0.043	0.260***	0.257***
	(0.037)	(0.038)	(0.076)	(0.078)	(0.066)	(0.065)	(0.058)	(0.062)	(0.072)	(0.075)	(0.055)	(0.055)
HH Mean Schooling	0.373**	0.421***	0.595**	0.497	1.161***	1.000***	0.949***	0.955***	0.881***	0.859***	1.806***	1.878***
	(0.155)	(0.156)	(0.264)	(0.588)	(0.314)	(0.344)	(0.237)	(0.243)	(0.316)	(0.328)	(0.293)	(0.294)
Age	-0.030	-0.027	0.037	0.031	0.055*	0.055*	0.047**	0.038	0.035	0.026	0.030	0.034
	(0.019)	(0.019)	(0.026)	(0.036)	(0.033)	(0.033)	(0.024)	(0.025)	(0.024)	(0.024)	(0.022)	(0.022)
Age. Sq.	0.000	0.000	-0.000	-0.000	-0.001**	-0.001**	-0.000	-0.000	-0.000*	-0.000	-0.000**	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	0.050	0.056	0.016	0.013	0.347***	0.317***	0.087	0.072	0.243***	0.230**	0.081	0.080
	(0.051)	(0.052)	(0.097)	(0.100)	(0.101)	(0.103)	(0.073)	(0.076)	(0.091)	(0.092)	(0.075)	(0.074)
Disease in HH	-0.050	-0.075	0.235	0.132	-0.054	0.036	0.126	0.157	0.043	0.007	-0.136	-0.190
	(0.092)	(0.094)	(0.196)	(0.296)	(0.199)	(0.213)	(0.131)	(0.157)	(0.168)	(0.185)	(0.147)	(0.157)
Other Insurance	0.189	-0.004	2.032*	2.691	1.879***	2.424***	1.293	1.541	6.543***	6.359***	4.967***	4.324***
	(0.351)	(0.395)	(1.077)	(2.068)	(0.541)	(0.728)	(1.475)	(1.523)	(1.420)	(1.631)	(0.367)	(0.631)
Medical Cons.	0.135	0.200	-0.188	-0.092	0.216	0.108	-0.003	-0.172	0.140	0.326	0.254	0.352*
	(0.127)	(0.144)	(0.220)	(0.445)	(0.215)	(0.236)	(0.182)	(0.253)	(0.180)	(0.205)	(0.166)	(0.181)
Harvest Small	0.000	0.000	-0.000	-0.000	0.000*	0.000*	0.000	0.000	0.000**	0.000**	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Harvest Large	0.000	0.000	0.000	0.000	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	6.500***	6.825***	-2.546***	-1.625	0.607	0.603	-0.083	0.668	-2.159*	-1.705	0.259	0.693
Observations	1,741	1,680	1,088	999	2,060	2,050	2,570	2,406	2,340	2,173	5,149	5,140
R-squared	0.072	0.059	0.100	0.104	0.288	0.279	0.088	0.082	0.145	0.137	0.318	0.316
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation of average marginal effects using EICV 2005-06 and 2010-11 data on Stata14. Notes: Standard Errors clustered at cluster level, shown in brackets. *** p<0.01, ** p<0.05, * p<0.1

Table 2.62: Impact of MdS on Existence of Savings (Informal)

Variables	Household Saving (Informal) (2005-06)						Household Saving (Informal) (2010-11)					
	Ext. Poor Probit	Ext. Poor IVProbit	Poor Probit	Poor IVProbit	Non-Poor Probit	Non-Poor IVProbit	Ext. Poor Probit	Ext. Poor IVProbit	Poor Probit	Poor IVProbit	Non-Poor Probit	Non-Poor IVProbit
CBHI	0.057**	0.054	0.072**	0.513***	0.101***	0.219**	0.008	-0.120	0.023	-0.099	0.022	-0.154**
	(0.025)	(0.098)	(0.030)	(0.154)	(0.026)	(0.110)	(0.024)	(0.000)	(0.025)	(0.093)	(0.020)	(0.075)
HH Size	0.028***	0.029***	0.048***	0.033	0.030***	0.030***	0.028***	0.026	0.032***	0.033***	0.005	0.004
	(0.009)	(0.009)	(0.013)	(0.023)	(0.009)	(0.008)	(0.009)	(0.000)	(0.010)	(0.010)	(0.007)	(0.007)
HH Mean Schooling	0.093**	0.095*	0.142**	0.024	0.111**	0.085	0.094**	0.075	0.046	0.064	0.126***	0.134**
	(0.047)	(0.049)	(0.067)	(0.124)	(0.048)	(0.053)	(0.046)	(0.000)	(0.047)	(0.049)	(0.035)	(0.035)
Age	0.010**	0.010**	0.004	0.000	0.008*	0.008*	0.009*	0.008	0.007*	0.007*	0.010***	0.011***
	(0.004)	(0.004)	(0.006)	(0.006)	(0.004)	(0.004)	(0.005)	(0.000)	(0.004)	(0.004)	(0.003)	(0.003)
Age. Sq.	-0.000**	-0.000**	-0.000	-0.000	-0.000**	-0.000**	-0.000**	-0.000	-0.000**	-0.000**	-0.000***	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	-0.011	-0.010	-0.005	-0.009	-0.005	-0.008	-0.015	-0.016	-0.008	-0.008	0.012	0.013
	(0.011)	(0.012)	(0.016)	(0.013)	(0.013)	(0.013)	(0.010)	(0.000)	(0.012)	(0.012)	(0.009)	(0.009)
Disease in HH	0.004	0.003	0.033	0.044	0.011	0.022	-0.018	-0.027	0.038	0.015	0.018	0.002
	(0.025)	(0.027)	(0.034)	(0.027)	(0.025)	(0.027)	(0.024)	(0.000)	(0.024)	(0.025)	(0.018)	(0.018)
Other Insurance	-0.029	-0.027	-0.154	0.180	0.021	0.090	-0.393	-0.284	-0.437	-1.676*	-0.033	-0.185**
	(0.086)	(0.093)	(0.130)	(0.172)	(0.063)	(0.089)	(0.323)	(0.000)	(0.302)	(0.962)	(0.051)	(0.079)
Medical Cons.	0.046	0.051	0.003	-0.048	-0.002	-0.018	0.045	0.065	0.011	0.053*	-0.028	-0.003
	(0.029)	(0.031)	(0.039)	(0.039)	(0.028)	(0.031)	(0.029)	(0.000)	(0.028)	(0.030)	(0.020)	(0.022)
Harvest Small	0.000*	0.000**	-0.000	-0.000	0.000	0.000	0.000	0.000	0.000***	0.000***	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Harvest Large	-0.000	-0.000*	0.000	0.000	0.000**	0.000*	0.000	0.000	0.000	0.000	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	1,726	1,667	1,086	997	2,058	2,048	2,664	2,497	2,440	2,261	5,383	5,372
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation of average marginal effects using EICV 2005-06 and 2010-11 data on Stata14. Notes: Standard Errors clustered at cluster level, shown in brackets. *** p<0.01, ** p<0.05, * p<0.1

Table 2.63: Impact of MdS on Savings Deposits (Informal)

Variables	Household Savings Deposit (Informal) (2005-06)						Household Savings Deposit (Informal) (2010-11)					
	Ext. Poor OLS	Ext. Poor IV2SLS	Poor OLS	Poor IV2SLS	Non-Poor OLS	Non-Poor IV2SLS	Ext. Poor OLS	Ext. Poor IV2SLS	Poor OLS	Poor IV2SLS	Non-Poor OLS	Non-Poor IV2SLS
CBHI	0.490**	0.548	0.775***	9.346	1.097***	2.512**	0.120	-0.926	0.100	-0.979	0.265	-1.642**
	(0.238)	(0.900)	(0.297)	(9.320)	(0.267)	(1.204)	(0.226)	(0.784)	(0.252)	(0.965)	(0.210)	(0.812)
HH Size	0.319***	0.318***	0.522***	0.632***	0.319***	0.328***	0.307***	0.253***	0.354***	0.363***	0.142*	0.132*
	(0.087)	(0.086)	(0.121)	(0.179)	(0.083)	(0.085)	(0.090)	(0.091)	(0.094)	(0.097)	(0.073)	(0.074)
HH Mean Schooling	0.824**	0.854**	1.204**	0.006	0.926**	0.688	0.717*	0.472	0.646	0.816*	1.497***	1.614***
	(0.395)	(0.399)	(0.607)	(1.787)	(0.458)	(0.503)	(0.411)	(0.430)	(0.443)	(0.467)	(0.360)	(0.372)
Age	0.064**	0.066**	0.035	0.001	0.074*	0.080*	0.064	0.070	0.061*	0.066*	0.097***	0.108***
	(0.032)	(0.033)	(0.052)	(0.096)	(0.042)	(0.042)	(0.040)	(0.044)	(0.036)	(0.035)	(0.029)	(0.030)
Age. Sq.	-0.001**	-0.001**	-0.001	-0.001	-0.001**	-0.001***	-0.001*	-0.001*	-0.001**	-0.001**	-0.001***	-0.001***
	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	-0.120	-0.115	-0.091	-0.220	-0.030	-0.075	-0.152	-0.116	-0.084	-0.084	0.083	0.089
	(0.111)	(0.113)	(0.158)	(0.247)	(0.124)	(0.131)	(0.101)	(0.103)	(0.119)	(0.120)	(0.100)	(0.101)
Disease in HH	-0.003	-0.017	0.336	0.775	0.116	0.253	-0.169	-0.208	0.314	0.100	0.188	0.013
	(0.223)	(0.239)	(0.325)	(0.756)	(0.246)	(0.274)	(0.228)	(0.245)	(0.228)	(0.237)	(0.185)	(0.196)
Other Insurance	-0.488	-0.493	-1.193	3.503	0.603	1.411	-3.942*	-3.154	-3.504*	-6.046***	-0.004	-1.660*
	(0.794)	(0.862)	(1.042)	(5.016)	(0.648)	(0.943)	(2.355)	(2.097)	(1.821)	(1.551)	(0.612)	(0.913)
Medical Cons.	0.432	0.479*	0.004	-0.885	-0.095	-0.279	0.423	0.523	0.177	0.568*	-0.308	-0.044
	(0.265)	(0.279)	(0.373)	(1.169)	(0.279)	(0.317)	(0.274)	(0.370)	(0.277)	(0.301)	(0.210)	(0.233)
Harvest Small	0.000	0.000*	-0.000	-0.000	0.000	0.000	0.000	0.000	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Harvest Large	-0.000	-0.000	0.000	0.000	0.000*	0.000	0.000	0.000***	0.000*	0.000*	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-1.690	-3.737*	-6.264**	1.725	0.267	0.149	-4.782***	-4.180***	-2.254	-1.808	-0.677	0.589
Observations	1,741	1,680	1,088	999	2,060	2,050	2,667	2,498	2,444	2,265	5,395	5,384
R-squared	0.147	0.153	0.182	-0.399	0.134	0.117	0.135	0.137	0.175	0.178	0.102	0.086
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation of average marginal effects using EICV 2005-06 and 2010-11 data on Stata14. Notes: Standard Errors clustered at cluster level, shown in brackets. *** p<0.01, ** p<0.05, * p<0.1

Table 2.64: Impact of MdS on Borrowing Status (Formal or Informal)

Variables	Household Borrowing (Formal and Informal) (2005)						Household Borrowing (Formal and Informal) (2010)					
	Ext. Poor Probit	Ext. Poor IVProbit	Poor Probit	Poor IVProbit	Non-Poor Probit	Non-Poor IVProbit	Ext. Poor Probit	Ext. Poor IVProbit	Poor Probit	Poor IVProbit	Non-Poor Probit	Non-Poor IVProbit
CBHI	-0.007	-0.165*	-0.007	-0.271	0.027	0.205*	-0.013	-0.149**	-0.084***	-0.099	-0.071***	-0.165***
	(0.029)	(0.100)	(0.035)	(0.511)	(0.026)	(0.107)	(0.023)	(0.074)	(0.021)	(0.077)	(0.018)	(0.059)
HH Size	0.015	0.016	-0.009	-0.010	0.021**	0.021**	0.007	0.000	0.009	0.008	0.008*	0.008
	(0.010)	(0.010)	(0.012)	(0.012)	(0.008)	(0.008)	(0.009)	(0.009)	(0.008)	(0.008)	(0.005)	(0.005)
HH Mean Schooling	0.156***	0.151***	0.241***	0.247***	0.046	0.010	0.028	0.018	0.072*	0.084**	0.019	0.023
	(0.053)	(0.052)	(0.065)	(0.064)	(0.051)	(0.053)	(0.040)	(0.042)	(0.041)	(0.043)	(0.034)	(0.034)
Age	-0.001	0.000	0.008	0.008	-0.005	-0.005	0.001	0.005	0.002	0.001	0.006**	0.007**
	(0.005)	(0.005)	(0.006)	(0.006)	(0.005)	(0.005)	(0.004)	(0.005)	(0.003)	(0.003)	(0.002)	(0.002)
Age. Sq.	-0.000	-0.000	-0.000*	-0.000	0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	-0.013	-0.012	0.027	0.026	-0.007	-0.012	0.020*	0.021**	-0.002	-0.001	-0.009	-0.009
	(0.014)	(0.014)	(0.017)	(0.017)	(0.012)	(0.011)	(0.010)	(0.010)	(0.011)	(0.011)	(0.007)	(0.007)
Disease in HH	0.046*	0.025	0.065*	0.029	0.070***	0.084***	0.060***	0.034	0.065***	0.061***	0.060***	0.050***
	(0.027)	(0.028)	(0.035)	(0.065)	(0.026)	(0.027)	(0.023)	(0.026)	(0.020)	(0.022)	(0.015)	(0.015)
Other Insurance	0.008	-0.059	0.024	-0.161	0.070	0.172**	-0.289*	-0.325**	0.414*	0.415	0.120***	0.037
	(0.097)	(0.101)	(0.113)	(0.276)	(0.060)	(0.082)	(0.162)	(0.156)	(0.241)	(0.254)	(0.046)	(0.067)
Medical Cons.	-0.014	0.005	0.035	0.061	-0.004	-0.026	0.045*	0.088**	0.026	0.029	0.012	0.025
	(0.033)	(0.035)	(0.040)	(0.064)	(0.028)	(0.031)	(0.027)	(0.037)	(0.024)	(0.026)	(0.016)	(0.017)
Harvest Small	0.000	0.000	-0.000	-0.000	0.000	0.000	-0.000*	-0.000	0.000	0.000	0.000	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Harvest Large	-0.000	-0.000	-0.000	0.000	-0.000***	-0.000***	-0.000	0.000	0.000	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	1,740	1,679	1,086	997	2,058	2,048	2,660	2,492	2,422	2,249	5,388	5,377
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation of average marginal effects using EICV 2005-06 and 2010-11 data on Stata14. Notes: Standard Errors clustered at cluster level, shown in brackets. *** p<0.01, ** p<0.05, * p<0.1

Table 2.65: Impact of MdS on Loan Amount (Formal or Informal)

Variables	Household Loan Amount (Formal and Informal) (2005)						Household Loan Amount (Formal and Informal) (2010)					
	Ext. Poor OLS	Ext. Poor IV2SLS	Poor OLS	Poor IV2SLS	Non-Poor OLS	Non-Poor IV2SLS	Ext. Poor OLS	Ext. Poor IV2SLS	Poor OLS	Poor IV2SLS	Non-Poor OLS	Non-Poor IV2SLS
CBHI	-0.006	-1.721*	0.063	-1.647	0.448*	2.163*	-0.052	-1.108	-0.586***	-0.823	-0.550***	-1.662***
	(0.253)	(0.979)	(0.325)	(5.956)	(0.254)	(1.216)	(0.216)	(0.724)	(0.192)	(0.706)	(0.187)	(0.619)
HH Size	0.226**	0.235**	0.030	0.024	0.327***	0.335***	0.239***	0.186**	0.234***	0.248***	0.267***	0.262***
	(0.091)	(0.093)	(0.117)	(0.127)	(0.081)	(0.081)	(0.086)	(0.088)	(0.080)	(0.083)	(0.060)	(0.060)
HH Mean Schooling	1.670***	1.691***	2.116***	2.301*	0.723	0.388	0.513	0.442	1.094***	1.202***	0.488	0.546
	(0.444)	(0.453)	(0.622)	(1.228)	(0.471)	(0.500)	(0.379)	(0.402)	(0.397)	(0.410)	(0.352)	(0.355)
Age	-0.026	-0.013	0.088*	0.101	-0.035	-0.036	0.004	0.039	0.036	0.027	0.095***	0.102***
	(0.045)	(0.046)	(0.053)	(0.067)	(0.046)	(0.046)	(0.041)	(0.045)	(0.033)	(0.033)	(0.028)	(0.028)
Age. Sq.	-0.000	-0.000	-0.001**	-0.001**	-0.000	-0.000	-0.000	-0.001	-0.001**	-0.001*	-0.001***	-0.001***
	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	-0.110	-0.096	0.187	0.177	-0.096	-0.142	0.052	0.060	-0.024	-0.033	-0.178**	-0.178**
	(0.123)	(0.128)	(0.163)	(0.176)	(0.118)	(0.121)	(0.102)	(0.104)	(0.108)	(0.111)	(0.086)	(0.086)
Disease in HH	0.327	0.134	0.467	0.213	0.637**	0.812***	0.533**	0.302	0.688***	0.701***	0.566***	0.464***
	(0.233)	(0.249)	(0.326)	(0.544)	(0.266)	(0.302)	(0.229)	(0.252)	(0.193)	(0.200)	(0.156)	(0.162)
Other Insurance	0.204	-0.484	0.624	-0.504	1.378**	2.433**	-2.685	-2.376	2.780*	3.913***	2.990***	2.014***
	(0.883)	(0.940)	(1.033)	(3.325)	(0.667)	(0.974)	(2.237)	(2.187)	(1.560)	(1.426)	(0.440)	(0.665)
Medical Cons.	-0.020	0.176	0.522	0.714	0.027	-0.186	0.531**	0.863**	0.031	0.014	0.215	0.369**
	(0.293)	(0.315)	(0.377)	(0.824)	(0.288)	(0.335)	(0.233)	(0.343)	(0.212)	(0.225)	(0.163)	(0.179)
Harvest Small	0.000	0.000	-0.000	-0.000	0.000	0.000	-0.000	-0.000	0.000*	0.000*	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Harvest Large	-0.000	-0.000	0.000	0.000	-0.000**	-0.000**	0.000	0.000**	0.000*	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-3.368	-0.649	-7.370***	-8.505	8.776***	8.876***	4.962**	5.673***	7.101***	8.398***	5.058***	5.766***
Observations	1,741	1,680	1,088	999	2,060	2,050	2,667	2,498	2,444	2,265	5,395	5,384
R-squared	0.075	0.047	0.088	0.048	0.106	0.083	0.109	0.099	0.119	0.119	0.128	0.122
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation of average marginal effects using EICV 2005-06 and 2010-11 data on Stata14. Notes: Standard Errors clustered at cluster level, shown in brackets. *** p<0.01, ** p<0.05, * p<0.1

Table 2.66: Impact of MdS on Borrow Status (Formal)

Variables	Household Borrowing (Formal) (2005-06)						Household Borrowing (Formal) (2010-11)					
	Ext. Poor Probit	Ext. Poor IVProbit	Poor Probit	Poor IVProbit	Non-Poor Probit	Non-Poor IVProbit	Ext. Poor Probit	Ext. Poor IVProbit	Poor Probit	Poor IVProbit	Non-Poor Probit	Non-Poor IVProbit
CBHI	0.002	-0.207**	0.004	-0.057	0.027	0.004	0.012	0.023	0.001	-0.048	0.029**	-0.005
	(0.019)	(0.090)	(0.025)	(0.506)	(0.021)	(0.086)	(0.010)	(0.034)	(0.010)	(0.042)	(0.013)	(0.041)
HH Size	0.004	0.005	0.002	0.000	0.004	0.004	0.007*	0.007*	0.006	0.007*	0.020***	0.020***
	(0.006)	(0.007)	(0.009)	(0.010)	(0.007)	(0.007)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)
HH Mean Schooling	0.066**	0.089**	0.068	0.067	0.133***	0.137***	0.029	0.024	0.033	0.037	0.038	0.041*
	(0.034)	(0.039)	(0.048)	(0.103)	(0.043)	(0.045)	(0.021)	(0.021)	(0.022)	(0.025)	(0.024)	(0.024)
Age	0.006	0.007*	0.013***	0.014**	0.015***	0.014***	-0.000	-0.000	0.005**	0.004**	0.008***	0.008***
	(0.004)	(0.004)	(0.005)	(0.006)	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Age. Sq.	-0.000	-0.000*	-0.000***	-0.000***	-0.000***	-0.000***	-0.000	-0.000	-0.000***	-0.000**	-0.000***	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	-0.008	-0.005	0.003	0.000	0.001	0.003	-0.007	-0.008	0.000	-0.001	-0.013***	-0.013***
	(0.009)	(0.010)	(0.011)	(0.014)	(0.009)	(0.010)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Disease in HH	-0.034*	-0.056**	-0.018	-0.027	0.027	0.023	-0.033***	-0.028***	-0.007	-0.007	0.012	0.010
	(0.020)	(0.023)	(0.025)	(0.045)	(0.021)	(0.024)	(0.010)	(0.011)	(0.010)	(0.011)	(0.011)	(0.012)
Other Insurance	0.078	0.010	-0.023	-0.035	0.088**	0.075	0.073	0.099*	0.145**	0.142*	0.289***	0.259***
	(0.052)	(0.062)	(0.080)	(0.274)	(0.040)	(0.064)	(0.057)	(0.054)	(0.070)	(0.078)	(0.023)	(0.041)
Medical Cons.	0.063***	0.091***	0.013	0.023	0.011	0.015	0.022**	0.014	-0.001	-0.002	0.007	0.010
	(0.020)	(0.024)	(0.029)	(0.069)	(0.022)	(0.024)	(0.011)	(0.013)	(0.012)	(0.014)	(0.013)	(0.014)
Harvest Small	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	0.000	-0.000	0.000	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Harvest Large	-0.000	-0.000	0.000	0.000	-0.000	-0.000	0.000*	0.000**	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	1,677	1,623	1,066	978	2,049	2,039	2,290	2,151	2,412	2,241	5,388	5,377
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation of average marginal effects using EICV 2005-06 and 2010-11 data on Stata14. Notes: Standard Errors clustered at cluster level, shown in brackets. *** p<0.01, ** p<0.05, * p<0.1

Table 2.67: Impact of MdS on Loan Amount (Formal)

Variables	Household Loan Amount(Formal) (2005-06)						Household Loan Amount(Formal) (2010-11)					
	Ext. Poor OLS	Ext. Poor IV2SLS	Poor OLS	Poor IV2SLS	Non-Poor OLS	Non-Poor IV2SLS	Ext. Poor OLS	Ext. Poor IV2SLS	Poor OLS	Poor IV2SLS	Non-Poor OLS	Non-Poor IV2SLS
CBHI	0.017	-1.713**	0.077	-0.655	0.286	0.236	0.099	0.101	0.019	-0.487	0.319**	-0.058
	(0.173)	(0.672)	(0.260)	(4.976)	(0.219)	(0.924)	(0.093)	(0.302)	(0.110)	(0.411)	(0.124)	(0.505)
HH Size	0.046	0.058	0.049	0.036	0.089	0.085	0.080*	0.085*	0.072	0.089*	0.349***	0.347***
	(0.059)	(0.061)	(0.095)	(0.104)	(0.080)	(0.079)	(0.046)	(0.047)	(0.051)	(0.053)	(0.061)	(0.061)
HH Mean Schooling	0.482*	0.628**	0.490	0.505	1.035***	1.042***	0.188	0.140	0.268	0.300	0.101	0.132
	(0.268)	(0.284)	(0.427)	(0.962)	(0.342)	(0.362)	(0.155)	(0.160)	(0.179)	(0.193)	(0.209)	(0.206)
Age	0.042	0.052*	0.101***	0.106**	0.114***	0.110***	-0.010	-0.009	0.036***	0.027*	0.061***	0.061***
	(0.029)	(0.031)	(0.034)	(0.048)	(0.033)	(0.033)	(0.016)	(0.016)	(0.014)	(0.014)	(0.020)	(0.020)
Age. Sq.	-0.000	-0.000*	-0.001***	-0.001***	-0.001***	-0.001***	0.000	0.000	-0.000***	-0.000**	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	-0.051	-0.029	0.026	-0.009	0.015	0.028	-0.072	-0.086	0.000	-0.024	-0.258***	-0.259***
	(0.085)	(0.089)	(0.123)	(0.136)	(0.116)	(0.119)	(0.055)	(0.057)	(0.065)	(0.066)	(0.087)	(0.087)
Disease in HH	-0.270	-0.437**	-0.163	-0.292	0.244	0.235	-0.270***	-0.250***	-0.111	-0.116	0.074	0.052
	(0.168)	(0.184)	(0.246)	(0.444)	(0.218)	(0.238)	(0.085)	(0.094)	(0.104)	(0.111)	(0.138)	(0.144)
Other Insurance	1.199	0.587	-0.049	-0.181	1.576**	1.565*	2.532	3.000	3.225	3.885	7.517***	7.186***
	(0.799)	(0.818)	(0.803)	(2.694)	(0.615)	(0.812)	(2.323)	(2.288)	(2.651)	(2.954)	(0.552)	(0.711)
Medical Cons.	0.595***	0.811***	0.123	0.265	0.235	0.256	0.183*	0.148	0.021	0.037	0.094	0.132
	(0.189)	(0.213)	(0.292)	(0.668)	(0.248)	(0.272)	(0.101)	(0.137)	(0.120)	(0.136)	(0.172)	(0.188)
Harvest Small	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	0.000	-0.000	0.000	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Harvest Large	-0.000	-0.000	0.000	0.000	-0.000	-0.000	0.000*	0.000***	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-1.820**	-0.940	-5.395***	-5.385	1.400	1.489	1.326	2.047	-0.750	1.184	-1.725**	-1.455*
Observations	1,741	1,680	1,088	999	2,060	2,050	2,667	2,498	2,444	2,265	5,395	5,384
R-squared	0.049	-0.024	0.067	0.050	0.110	0.110	0.047	0.057	0.045	0.043	0.248	0.248
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation of average marginal effects using EICV 2005-06 and 2010-11 data on Stata14. Notes: Standard Errors clustered at cluster level, shown in brackets. *** p<0.01, ** p<0.05, * p<0.1

Table 2.68: Impact of MdS on Borrowing Status (Informal)

Variables	Household Borrowing (Informal) (2005-06)						Household Borrowing (Informal) (2010-11)					
	Ext. Poor Probit	Ext. Poor IVProbit	Poor Probit	Poor IVProbit	Non-Poor Probit	Non-Poor IVProbit	Ext. Poor Probit	Ext. Poor IVProbit	Poor Probit	Poor IVProbit	Non-Poor Probit	Non-Poor IVProbit
CBHI	-0.009	0.023	-0.018	-0.197	0.004	0.201*	-0.023	-0.162**	-0.082***	-0.039	-0.097***	-0.153**
	(0.029)	(0.114)	(0.036)	(0.639)	(0.026)	(0.110)	(0.024)	(0.075)	(0.022)	(0.086)	(0.019)	(0.067)
HH Size	0.012	0.012	-0.008	-0.009	0.018**	0.018**	0.001	-0.006	0.003	0.000	-0.015***	-0.015***
	(0.010)	(0.011)	(0.013)	(0.013)	(0.009)	(0.008)	(0.009)	(0.009)	(0.009)	(0.009)	(0.006)	(0.006)
HH Mean Schooling	0.095*	0.077	0.185***	0.198**	-0.064	-0.098*	0.010	0.006	0.048	0.056	0.006	0.007
	(0.054)	(0.056)	(0.070)	(0.090)	(0.051)	(0.050)	(0.041)	(0.043)	(0.044)	(0.046)	(0.036)	(0.037)
Age	-0.006	-0.006	-0.002	-0.002	-0.017***	-0.016***	0.001	0.005	-0.001	-0.001	0.001	0.002
	(0.005)	(0.005)	(0.006)	(0.008)	(0.005)	(0.005)	(0.004)	(0.005)	(0.004)	(0.004)	(0.003)	(0.003)
Age. Sq.	0.000	0.000	0.000	0.000	0.000***	0.000**	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	-0.007	-0.009	0.021	0.025	-0.011	-0.017	0.026**	0.028***	-0.001	0.001	0.007	0.007
	(0.013)	(0.013)	(0.017)	(0.018)	(0.012)	(0.012)	(0.010)	(0.010)	(0.012)	(0.012)	(0.008)	(0.008)
Disease in HH	0.076***	0.074***	0.084**	0.062	0.043	0.061**	0.089***	0.059**	0.077***	0.075***	0.051***	0.044**
	(0.026)	(0.028)	(0.034)	(0.075)	(0.027)	(0.028)	(0.023)	(0.026)	(0.022)	(0.024)	(0.017)	(0.018)
Other Insurance	-0.078	-0.081	0.026	-0.134	-0.040	0.078	-0.476***	-0.541***	-0.073	-0.034	-0.460***	-0.506***
	(0.092)	(0.102)	(0.118)	(0.335)	(0.064)	(0.086)	(0.167)	(0.167)	(0.198)	(0.213)	(0.046)	(0.070)
Medical Cons.	-0.081**	-0.086**	0.020	0.033	-0.017	-0.041	0.024	0.071**	0.023	0.025	0.005	0.014
	(0.032)	(0.035)	(0.039)	(0.084)	(0.029)	(0.031)	(0.027)	(0.036)	(0.026)	(0.030)	(0.018)	(0.020)
Harvest Small	0.000	0.000	-0.000	-0.000	0.000*	0.000*	-0.000**	-0.000	0.000	0.000	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Harvest Large	-0.000	-0.000	-0.000	-0.000	-0.000*	-0.000**	-0.000*	-0.000	0.000	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	1,737	1,677	1,086	997	2,058	2,048	2,663	2,495	2,438	2,259	5,388	5,377
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation of average marginal effects using EICV 2005-06 and 2010-11 data on Stata14. Notes: Standard Errors clustered at cluster level, shown in brackets. *** p<0.01, ** p<0.05, * p<0.1

Table 2.69: Impact of MdS on Loan Amount (Informal)

Variables	Household Loan Amount(Informal) (2005-06)						Household Loan Amount(Informal) (2010-11)					
	Ext. Poor OLS	Ext. Poor IV2SLS	Poor OLS	Poor IV2SLS	Non-Poor OLS	Non-Poor IV2SLS	Ext. Poor OLS	Ext. Poor IV2SLS	Poor OLS	Poor IV2SLS	Non-Poor OLS	Non-Poor IV2SLS
CBHI	-0.007	0.057	-0.008	-1.419	0.144	1.783	-0.158	-1.223*	-0.593***	-0.321	-0.860***	-1.495**
	(0.249)	(0.971)	(0.325)	(6.365)	(0.236)	(1.195)	(0.224)	(0.731)	(0.203)	(0.774)	(0.184)	(0.684)
HH Size	0.184**	0.181**	-0.010	-0.006	0.239***	0.250***	0.153*	0.094	0.155*	0.151*	-0.090	-0.093
	(0.089)	(0.090)	(0.113)	(0.126)	(0.082)	(0.082)	(0.084)	(0.087)	(0.086)	(0.090)	(0.063)	(0.062)
HH Mean Schooling	1.112**	0.985**	1.599**	1.844	-0.349	-0.664	0.300	0.283	0.825**	0.908**	0.362	0.381
	(0.445)	(0.450)	(0.621)	(1.252)	(0.457)	(0.477)	(0.380)	(0.402)	(0.404)	(0.420)	(0.347)	(0.351)
Age	-0.069	-0.067	-0.017	-0.008	-0.155***	-0.152**	0.012	0.046	0.001	0.002	0.032	0.038
	(0.045)	(0.045)	(0.053)	(0.067)	(0.042)	(0.043)	(0.042)	(0.046)	(0.035)	(0.035)	(0.029)	(0.029)
Age. Sq.	0.000	0.000	0.000	0.000	0.001**	0.001**	-0.000	-0.001	-0.000	-0.000	-0.001**	-0.001**
	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Children in HH	-0.067	-0.076	0.160	0.189	-0.125	-0.178	0.134	0.156	-0.021	-0.005	0.091	0.092
	(0.115)	(0.115)	(0.158)	(0.180)	(0.115)	(0.121)	(0.100)	(0.103)	(0.114)	(0.117)	(0.086)	(0.086)
Disease in HH	0.597***	0.574**	0.672**	0.518	0.379	0.553**	0.819***	0.563**	0.801***	0.821***	0.496***	0.425**
	(0.225)	(0.240)	(0.301)	(0.530)	(0.252)	(0.281)	(0.222)	(0.245)	(0.206)	(0.217)	(0.175)	(0.186)
Other Insurance	-0.963	-1.024	0.588	-0.645	-0.281	0.707	-5.286***	-5.449***	-1.292	-1.035	-4.610***	-5.167***
	(0.728)	(0.808)	(1.082)	(3.435)	(0.607)	(0.895)	(1.309)	(1.372)	(1.754)	(2.147)	(0.458)	(0.717)
Medical Cons.	-0.642**	-0.665**	0.340	0.445	-0.226	-0.448	0.330	0.701**	0.008	-0.032	0.098	0.201
	(0.277)	(0.299)	(0.354)	(0.849)	(0.273)	(0.312)	(0.231)	(0.339)	(0.232)	(0.255)	(0.185)	(0.204)
Harvest Small	0.000	0.000	-0.000	-0.000	0.000*	0.000*	-0.000*	-0.000	0.000	0.000	0.000**	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Harvest Large	-0.000	-0.000	-0.000	-0.000	-0.000*	-0.000**	-0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-1.427	0.395	-1.766	-3.302	7.530***	7.524***	3.741*	3.737**	7.983***	7.309***	6.865***	7.240***
Observations	1,741	1,680	1,088	999	2,060	2,050	2,667	2,498	2,444	2,265	5,395	5,384
R-squared	0.076	0.075	0.069	0.049	0.062	0.038	0.107	0.095	0.096	0.092	0.120	0.119
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation of average marginal effects using EICV 2005-06 and 2010-11 data on Stata14. Notes: Standard Errors clustered at cluster level, shown in brackets. *** p<0.01, ** p<0.05, * p<0.1

Chapter 3

Understanding Farmer's Valuation of Agricultural Insurance: Evidence from Viet Nam

3.1 Introduction

Uninsured production shocks for farmers contribute to chronic poverty when assets are damaged and agricultural yields disappoint. Households, thrust into poverty by such shocks, often choose between asset depletion or consumption reduction, and often find it difficult to recover and restart the long process of accumulating productive assets (Carter et al., 2014; Mahul and Skees, 2007). Furthermore, the absence of agricultural insurance means many farmers adopt low-risk, low-return investment strategies. Rosenzweig and Binswanger (1993) provide an estimate of the possible gains from insurance; estimating that a one-standard-deviation decrease in weather risk (measured by the standard deviation of the timing of the rainy season) would raise average profits by up to 35 percent among farmers in the lowest wealth quartile.

Proposed as a formal financial instrument for risk management, area yield agricultural insurance has been introduced in several developing countries such as India, Brazil, Ethiopia, Kenya, Malawi and Viet Nam over the last 30 years. To address concerns over moral hazard and adverse selection, yield based agricultural insurance firms provide indemnity payments based on area rainfall or area agricultural yield indices (Jensen et al., 2014b; De Bock et al., 2010; Hess et al., 2005).[1] However, uptake has been disappointing. Exceptional cases such as regional initiatives in India (Cole et al.,

[1]The concept of agricultural insurance, based on a pre-determined index, has been explored by a number of studies such as Hazell et al. (2010); De Bock et al. (2010); Carter et al. (2014); Kaczala and Wisniewska (2015) and Mahul and Stutley (2010).

2014) and Malawi (Giné and Yang, 2009) indicate uptake ranging between 15-30 percent, while the case of Viet Nam is more representative of low income countries where data from the Viet Nam Access to Resources Household Survey (VARHS) suggests less than 1 percent penetration. In many instances, low levels of demand undermine the long-term sustainability of agricultural insurance schemes (Cole et al., 2014; Smith and Watts, 2009).

According to classical expected utility theory, an individual should obtain actuarially fair full insurance coverage (Ehrlich and Becker, 1972) to protect against damaging losses. For risk averse farmers, it is optimal to take out insurance, with the level of insurance determined by the level of risk aversion, and yet in practice we have seen low rates of uptake. This observation led Clarke (2011) to note two empirical puzzles. First, why has the demand for these products been so low, especially for households operating with pervasive weather and environmental risks. The second empirical puzzle is the observation that demand is particularly low for the most risk averse (Cole et al., 2013; Giné et al., 2008). Jurkovicova (2016) wonders why many people for whom insurance is worth purchasing do not, while others who do not need protection have purchased coverage.

An extensive literature employs contingent valuation methods (CVM), such as willingness to pay questions, and membership profiles to explain insurance demand. The evidence suggests that socio-economic factors such as wealth, education and financial illiteracy, risk aversion, financial liquidity, informal arrangements as well an insurance scheme particulars such as basis risk, price and previous experience of pay-outs are important in explaining demand for insurance (Dercon et al., 2014; Cole et al., 2014; McIntosh, 2013; Mobarak and Rosenzweig, 2013; Liu and Myers, 2012; Giné et al., 2008; Giné and Yang, 2009; Chantarat et al., 2013; Cole et al., 2014; Cai et al., 2015).

Behavioural deviations from the classical predictions of insurance demand may also help explain under-purchase, over-purchase or wrong purchase of insurance products (Zelizer, 1978; Kunreuther and Pauly, 2004, 2006; Jurkovicova, 2016). There is a limitation to human knowledge and dynamic computation that can hinder customer's ability to act 'rationally' in accordance with the predictions of standard classical or neo-classical economic models (Jurkovicova, 2016). Such 'irrationality' need not be wrong and, as suggested in Ariely (2007), irrational behaviours are neither random nor senseless but can be systematic and predictable. Behavioural factors that can affect the demand for insurance include present bias, over-confidence and gambler's fallacy, trust, status quo bias, choice aversion and limited attention.[2] However, the particular behavioural constraints that may explain low demand for agricultural index insurance remain largely unexplored in the literature. One exception is trust. The systematic review by Cole et al. (2012) highlights trust as an important factor for the purchase of index insurance, while a similar finding for formal bank products has been documented (Honohan and King, 2012).

[2]In related work Jurkovicova (2016) found systematic gender differences in the decision to purchase insurance. Factors such as emotional tension, advice from friends, advertisement, information campaigns, and fear of financial loss are more prominent amongst females as compared to males in making an insurance choice.

This chapter provides evidence on how Vietnamese farmers value agricultural insurance and how their self-reported Willingness to Pay (WTP) valuation deviates from their predicted valuation derived from expected utility theory. Employing survey data on von Neumann-Morgenstern (VNM) preferences over wealth outcomes and on recent agricultural losses due to weather and disease, we estimate the rational economic value of agricultural insurance for farming households using Constant Relative Risk Aversion (CRRA) utility function. The CRRA utility function uses the coefficient of Relative Risk Aversion (RRA) derived from a Becker-DeGroot-Marschak (BDM) bidding game played in the VARHS data. We examine whether a significant differential exists between the farmer's valuation of insurance, captured by their self-reported willingness to pay, and the value of insurance implied by theory. We assess the heterogeneous effects of gender, age, education and other socio-economic and demographic characteristics on the valuation differential and the role played by behavioural biases. Our hypotheses are that (i) there exists a significant differential between the value of insurance predicted by expected utility theory and the farmer's self-elicited valuation of insurance, (ii) various socioeconomic and demographic characteristics explain this valuation differential, (iii) availability of risk coping measures such as borrowings, receipt of public and private transfers and social capital act as substitutes implying lower valuation of insurance by farmers and (iv) behavioural biases can help predict the valuation deviation in accordance with the predictions from the literature. This chapter employs the Viet Nam VARHS panel dataset from 2008 to 2016 collected every two years.

We find that three quarters of households report their willingness to pay as zero. While this is in response to a hypothetical agricultural insurance scheme, rather than one with details, a glossy brochure and a well-trained salesperson, low demand is pervasive as evidenced by enrolment rates in agricultural insurance for households in our panel of 0.34 percent. We find evidence that recent losses due to agricultural shocks and natural disasters do not explain low valuation of agricultural insurance. Having losses greater than 5 percent of agricultural output, actually increases the likelihood of reporting a zero willingness to pay, while controlling for other variables, recent losses are not significantly related to household willingness to pay for agricultural insurance. This suggests that past losses do not inform self-reported valuations of insurance.

We find evidence to support our first hypothesis that a differential exists between self-reported WTP for agricultural insurance and the predicted economic value of this insurance. Our evidence shows that farmers are systematically undervaluing agricultural insurance and suggest that this finding is an important contribution to the literature.

We investigate the determinants of this differential and have three main results. First, we find that private transfers, such as from internal or overseas migrants (family members, friends and neighbours), are negatively related to both WTP and the differential between WTP and predicted economic value of insurance. First, it is possible that having access to remittances in times of need reduces the demand for insurance. Second, having a stream of remittances can mean that cash flow at household

level reduces the demand for formal insurance and the data suggests this is the more important mechanism at play. The evidence suggests that the latter channel is dominant with regular additions to cash flow through private transfers reducing household demand for agricultural insurance.

Second, we find that membership of a farmer's union is positively related to the differential between reported WTP and the predicted economic value of insurance, and this result holds for a range of robustness checks. Farmer's union members self-report improved access to agricultural inputs or technology, credit and insurance, education or training and market access as benefits, and yet membership is also likely to indicate higher levels of social capital, as argued by Newman and Kinghan (2015).

Third, over-confidence, measured by the log of the how much a household would bid to engage in a hypothetical gamble, holds a positive and significant relationship with WTP. This result was unexpected, since our prior was that a respondent depicting over-confidence would be likely to undervalue insurance; deeming it unnecessary. Instead, our interpretation of this result is that a level of overconfidence may be needed to believe that agricultural insurance will pay out when you have had a loss. This may be due to perceived unviability of previous agricultural schemes in Viet Nam, perceived problematic claims processes and/or lack of confidence in the yield calculations of the insurer. We interpret this as an explanation for Clarke (2011) empirical puzzle for why risk averse farmers are the least likely to take up agricultural insurance.

Our regressions control for a broad set of household characteristics, and time and household fixed effects are employed to control for unobservables. This approach is important because there are statistical differences between those who answer the WTP question and households who do not, and between households who play the BDM game and those that do not. Despite these differences, we do find that household's who play the BDM game do not have higher WTP for agricultural insurance.[3]

We pay particular attention to how we deal with non-responses in the data. While our main findings come with certain decisions about non-responses, our results are unaffected by the assumptions we make. Section 3.5.4, and appendices 3.B and 3.C, provide a comprehensive set of robustness checks. First, we assume for our main results that households who fail to answer the BDM game at any point in time (35 percent of sample) are not infinitely risk averse and would have participated in the gamble had the starting bid of loss been lower than 2,000 VND. We calculate RRA for these households taking the starting bid of the game as 1,000 VND. However, we additionally conduct robustness checks using alternative starting bids and by omitting households with non-responses. Second, informed by empirical studies that suggest that RRA can be considered constant over time (Brunnermeier and Nagel, 2008; Chiappori and Paiella, 2011), for households that played the game at least once, we assign the mean value of RRAs calculated from available data for all years. As the main

[3]The difference of means for WTP between the household who play the BDM game once, and the households who never play the game is statistically insignificant. Only 6 percent refuse to provide a willingness to pay response.

results could be influenced by this approach, we also conduct our entire analysis in two alternative ways; using actual BDM game observations and means only for missing years, and separately by dropping all observations when the BDM game was not played (no starting bid assumption for those who failed to play the game). Third, in our main analysis we drop the 6 percent of non-responses to the WTP question, but we also consider these to be the same as not interested or zero valuation. Fourth, we conduct the analysis only on years the behavioural bias questions were asked, dropping two of the five waves of data.

Additional robustness checks relate to the length of loss period that we employ in the calculation of economic value of insurance and the type of utility function assumed. In our main specification we use current year and all historical data available on losses to calculate our economic value of insurance. In Section 3.5.3 we restrict the analysis to agricultural losses in the current and previous year. And finally, we test the sensitivity of our results to the choice of the utility function when ascertaining the economic value of agricultural insurance for each farmer. We present robustness checks using both the CARA and DARA utility functions. We find that our main results are consistently found under each of the above approaches.

Predictably, the design of insurance products, not directly considered in this chapter, can also play a role in low demand. For example, the existence of high basis risk due to poor design of insurance can be one of the important factors behind the low up-take of agricultural insurance. Jensen et al. (2014a); De Bock et al. (2010); Carter et al. (2014) assert that imperfect correlation of indices (used for constructing the terms of agricultural insurance) with the key welfare measure of farmers (agricultural produce or income) means insurance products offer limited security against agricultural shocks. This was recognised by the seminal study by Miranda (1991) who acknowledged that the more highly correlated individual yield is to area-yield, the greater will be the hedging against covariate shocks in area-based index insurance.

The rest of this chapter is divided into background, conceptual framework and estimation strategy and results. Key policy implications are discussed in the conclusion.

3.2 Background

Viet Nam ranks sixth in the list of countries for agricultural losses suffered due to natural disasters and crop disease (Dao and Tai, 2014), and with nearly 50 percent of the workforce employed in farming, Viet Nam is seemingly well placed to be a leader in agricultural insurance.

Historical efforts to introduce agricultural insurance in Viet Nam have been unsuccessful. Introduced back in 1982 when the Bao Viet company started operating in Vu Ban and Nam Ninh provinces, the first agricultural insurance scheme in Viet Nam gradually expanded to 16 more provinces, but the company incurred huge losses and the services stopped in 1999 (Mahul and Stutley, 2010). In the

same year, another insurance product for pig feeding was introduced by a non-government organisation called GRET, but it was discontinued due to mismanagement and sustainability issues (Roth and McCord, 2008). In 2001, Groupama Viet Nam, operated by an experienced French company, obtained a licence for agricultural insurance in the Mekong Delta region, specifically for livestock, crops, farm physical assets and equipment, accident of agricultural workers and civil liability, and shrimp farming. In 2003, Groupama incurred heavy losses for five agricultural products in the southern region and did not prosper in Viet Nam because of low revenue, poor take-up and high compensation rates.

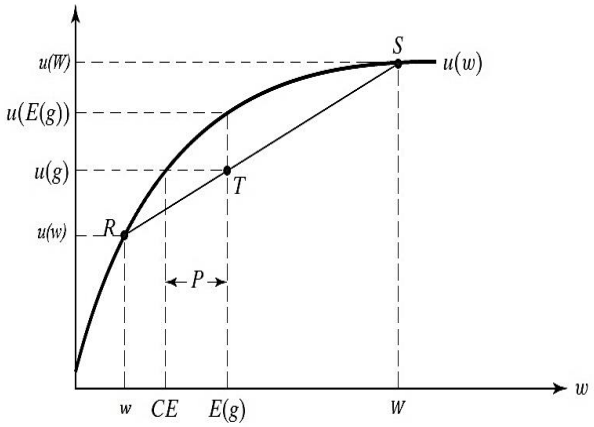
The most recent agricultural insurance scheme started in Viet Nam came into existence after the 2011 parliamentary decision no. 315/QD-TTg established a pilot of agricultural insurance for rice farmers, aquaculture poultry, and livestock. The insurance for rice is designed on the basis of area yield index and is yet to graduate as a universal risk managing instrument against covariate losses. Under the decision, the state will support 100 percent of insurance fees for poor farmers engaged in agricultural production and 80 percent of insurance fees for nearly poor farmers. By 2014, the programme failed to reach scale, only accounting for 3 percent of eligible households, and while the State and its various Ministries actively engaged press agencies to support take-up, very few farmers voluntarily purchased the insurance without full or partial subsidies. Implementation issues documented by Thang (2014) suggested some crop losses were not covered under the insurance simply because the commune based average yield insurance failed to take heterogeneity in productivity across large communes into consideration.

3.3 Conceptual Framework and Methodology

3.3.1 Conceptual Framework

To estimate the theoretically derived economic value of agricultural insurance for a farmer, we rely on standard VNM utility function and expected utility theory. We compare this estimated value of actuarially fair insurance for the farmer with their self-elicited Willingness to Pay (WTP) and arrive at a differential, described as under or overvaluation of insurance. The predicted value of insurance for farmers is taken as the risk premium/cost of risk implied by the VNM iso-elastic utility function; a function we reasonably assume is strictly concave in agricultural production. Strict concavity implies risk aversion where a consumer, a farmer, in our setting, always prefers the certain outcome compared to a fair gamble. In other words, a farmer would prefer to receive the expected value of the gamble with certainty, rather than accepting the inherent risk associated with the participation in the gamble itself. Figure 3.1 below diagrammatically presents this concept and it can be concluded that for a gamble $g \equiv (\psi \circ w, (1\text{-}\psi) \circ W)$ whenever $u(E(g)) > u(g)$, the farmer is said to be risk averse, where 'ψ' is the probability of loss 'L', such that '$L = W - w$'.

Figure 3.1: Concave utility function showing preferences over 'w'



Source: Author's illustration based on the standard concave utility function.

The individual would prefer $E(g)$ with certainty rather than the gamble 'g', where $E(g)$ in time period 't' is the abscissa of the convex combination of individual utilities $u(W)$ and $u(w)$ associated with the good (W) and bad states (w), represented in Equation 3.1 as:

$$u(g)_t = \psi.u(w) + (1 - \psi).u(W) \tag{3.1}$$

Here, 'ψ' is the probability of a bad state incurring an amount of loss given by 'L', resulting in agricultural production level 'w'.[4] We use the VARHS's individually reported value of crops and retrospective means of monetary losses due to natural disaster (floods, land-slides, typhoon, storms, and droughts) and agricultural shocks (pest infestation and crop disease) to infer 'w' and 'L'.[5] The probability of loss 'ψ' is calculated by taking the proportion of years (out of five survey years), when the productivity of rice in a commune falls below the average mean productivity of rice in that commune over the surveyed years.[6,7] Therefore, if a commune reports two occasions when the productivity of rice fell below the average productivity for the surveyed periods, we assign the probability of loss for the households in that commune as 0.4.[8] We use this method because for the

[4]The data reports farm area for the three most important crops only. We use this measure to standardise the values of crops and associated losses. Thus, the unit of 'w', 'W' and 'L' is VND/sq. metres, where VND is Vietnamese Dong; the local currency of Viet Nam.

[5]The missing values reported for agricultural losses imply no agricultural activity in the household in that period. We derive the value of agricultural loss 'L' as the mean of agricultural losses; calculated retrospectively for each household using all information on agricultural losses incurred in current as well as previous periods.

[6]We estimate probability of loss with respect to fall in productivity of rice because rice is the most important crop cultivated in the communes. The average days worked for rice by households is reported as 72 being greater than 53 days devoted for all other crops. Further, out of 10,745 households involved in agriculture, 77 percent households cultivate some amount of rice (8,331 households).

[7]The data uses values reported from the commune survey undertaken as part of the VARHS.

[8]There are five survey years (2008, 2010, 2012, 2014 and 2016), hence 'ψ'=2/5 or 'ψ'=0.4. In some periods, the average productivity of rice was not reported for all the communes in the data. For example,

simplest form of agricultural area based index insurance, the process of receiving payments in the event of loss is based on this principle.

A risk-averse person would be willing to pay some amount called the cost of risk or risk premium, 'P' in Figure 3.1, to obtain the expected utility of gamble 'g' but with certainty. Jehle and Reny (2011) define 'P' as the willingness to pay of an individual to avoid risk. We consider this 'P' the economic valuation of insurance and use the class of standard iso-elastic utility function to calculate it. Equation 3.2 describes the Constant Relative Risk Aversion (CRRA) utility function (Arrow, 1963, 1971).

$$U(w) = \frac{w^{1-\rho}}{1-\rho} \tag{3.2}$$

The key assumption of CRRA utility functions is that as wealth increases, the percentage of investment in risky assets remains constant. This implies that the level of risk aversion is measured as *relative risk aversion* (RRA) expressed as $-w * \frac{U''(w)}{U'(w)}$ and captured by the parameter 'ρ' in Equation 3.2. We prefer the iso-elastic utility function over exponential utility function such as Constant Absolute Risk Aversion (CARA), as shown in Equation 3.3.

$$U(w) = 1 - e^{-bw} \tag{3.3}$$

The choice of CRRA utility function is made over CARA, despite the analytical convenience of the latter because the predictions of CARA are counter-intuitive and contradicted by empirical studies (Alpanda and Woglom, 2007).[9] Also, a strand of asset pricing literature suggests that CRRA utility functions imply a stationary aggregate wealth to consumption ratio; which does not suffice for CARA utility functions because in CARA the optimal consumption is linear, not proportional in wealth, thus making the ratio non-stationary (Merton and Samuelson, 1992). Nevertheless, we present robustness checks using CARA utility function. In addition, a consumer's absolute risk aversion might decrease with increasing wealth; implying a Decreasing Absolute Risk Aversion (DARA), and hence an additional robustness check using a logarithmic utility function, as shown in Equation 3.4, is performed. Equation 3.4 implies DARA because it satisfies the positively skewed nature of DARA functions.[10]

$$U(w) = log(w) \tag{3.4}$$

out of 470 communes in 2008, average productivity of rice was not reported for 71 communes. Similarly, the value remained missing for 97 communes out of 472 in 2010, 65 communes out of 471 in 2012, 116 communes out of 488 in 2014, and 90 commune out of 482 in 2016. For these communes, the mean productivity of rice for the whole sample is then calculated by considering only the number of years when the average productivity data was reported.

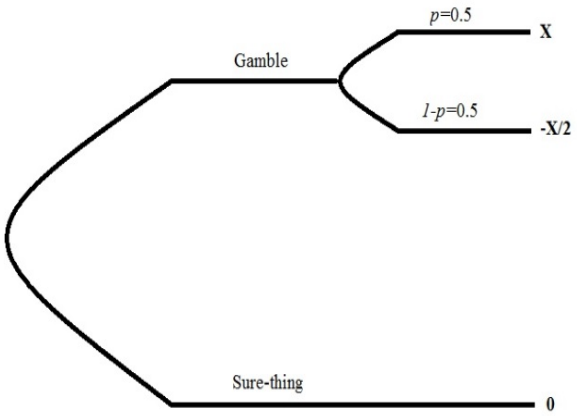
[9] CARA counter intuitively assumes that with increase in wealth, the absolute amount of investment in risky assets remains constant.

[10] It requires to meet the following necessary but not sufficient inequality: $u'''(X) = \frac{2}{X^3} (> 0)$

3.3.2 Estimation of the Coefficient of Relative Risk Aversion (RRA)

To derive utility with a CRRA utility function, we first estimated the value of the parameter 'ρ' (constant of RRA) in Equation 3.2. A strength of this study is that instead of parameterising RRA on the basis of exiting studies, we estimate it directly for each farmer through a *Becker-DeGroot-Marschak* (BDM) bidding game (Clemen and Reilly, 2013; Dacey, 2003). BDM game is shown in Figure 3.2 below, where the decision problem is such that; a gamble is played by an individual for some amount 'X' with probability of winning being 0.5 with an equal probability of loss which can be any proportion of the amount 'X'.[11] The sure thing gives a pay-off of zero and it is the outcome associated with the individual's decision not to play the game.

Figure 3.2: A Becker-DeGroot-Marschak game



Source: Author's illustration based on the standard standard BDM game outcomes.

BDM game, as explained by Becker et al. (1964), is a sequential experiment such that it provides the subject an estimate of utility in each state with consumption of a commodity (for example, money). The phenomenon is based on the expected utility hypothesis and there are many variations of the method, but mostly BDM is applied in relation to elicit the WTP. A common method is when the subject makes a bid which is compared to the price such that if the bid is higher than the price, the subject shall win the item and pay the price, or else pays nothing and receives nothing (Horowitz, 2006). The method applied in the VARHS survey is not designed to elicit WTP for any commodity; however, the incentive compatible nature of the game is expected to induce truthfulness in the choices for the gamble and present a valid estimate of revealed preference measure of risk-aversion for the farmers surveyed in VARHS data.

Following the method suggested by Dacey (2003), we assume that the decision maker has a CARA

[11] Considered (X/2) in Figure 3.2, but it can be any amount such as (X/3), (X/4), (5X/3), etc.

utility function, having the functional form as $U(X) = 1 - e^{-bX}$.[12] Here, the parameter 'b' is called the constant of *Absolute Risk Aversion* (ARA)[13] and it has got the following relationship with RRA:

$$RRA = ARA * X \tag{3.5a}$$

since,

$$ARA = -\frac{U''(w)}{U'(w)} \tag{3.5b}$$

multiplying (3.5b) with 'X' would produce RRA ('ρ') as shown in equation (3.5a), which we can use in estimating the risk premium/cost of risk from the CRRA utility function, as shown in Equation 3.2.

Returning to the BDM gamble, a person would be indifferent between the sure thing and playing the gamble if and only if:

$$0.5U(X) + 0.5U(-\frac{X}{2}) = U(0) \tag{3.6a}$$

which becomes,

$$0.5(1 - e^{-bX}) + 0.5(1 - e^{b\frac{X}{2}}) = 1 - e^{-b*0} \tag{3.6b}$$

this reduces to,

$$0.5(1 - e^{-bX}) + 0.5(1 - e^{b\frac{X}{2}}) = 0 \tag{3.6c}$$

$$e^{-bX} + e^{b\frac{X}{2}} = 2 \tag{3.6d}$$

assuming k=bX[14]

$$e^{-k} + e^{\frac{k}{2}} = 2 \tag{3.6e}$$

[12]Here, we consider CARA because the final winning amount associated with each bid of loss in the BDM game does not change and is fixed at 6,000 VND. Thus, absolute risk aversion is quite representative of the riskiness of individuals. However, the CARA function would have not been suitable if the winning amount was changing with every successive bets, since that situation would have changed the attitudes of people relatively and not in absolute terms.

[13]It is also called the Arrow-Pratt measure of absolute risk aversion named after Kenneth Arrow and John W. Pratt.

[14]Here, the equation would change with changing amounts of losses. This equation holds when the loss is (1/2) proportion of the winning amount 'X'. If winning amount was 6,000, then the loss amount here would be 3,000. If the loss amount was 2,000, then this equation would be $e^{-bX} + e^{b\frac{X}{3}} = 2$: because the loss amount has changed to (1/3) proportion of X.

We derive the roots of equation $(3.6e)$ and after solving for the value of 'k', and substituting the value of 'X', we solve for the *ARA*, i.e. 'b'. Once we have the parameter 'b', we can follow the step from equation $(3.5a)$ and multiply it with the value of 'X' to obtain *RRA*.[15] This value of *RRA* can then be treated as the measure of relative risk aversion and can be used as parameter 'ρ' in Equation 3.2. In the VARHS data, the BDM game is played in 2010, 2012 and 2014 surveys, where the respondents are asked to play a game in which the winning amount (X) is fixed to 6,000 Vietnamese Dong (VND) ('p'=0.5) and the loss amounts are fixed to 2,000, 3,000, 4,000, 5,000, 6,000, and 7,000 VND for subsequent rounds. We consider the highest bid of loss amount up to which the respondent stays in the game and calculate RRA at that amount with the method as mentioned above (3.5a-3.6e).

The results of the BDM game show that 35 percent of the households never participate in the game and reject the game in the first bid across all waves, i.e. at the loss amount of 2,000 VND. We make an assumption that these respondents are not infinitely risk-averse and would have participated in the gamble had the starting bid of loss been any lower than 2,000 VND. Therefore, we calculate RRA for these households taking the starting bid as 1,000 VND for the gamble. Robustness checks using starting bids of 1,500 VND and 500 VND are also conducted to capture any sensitivity to this assumption.

For households that play the game at least once, we assign the mean value of RRAs calculated from available data for all years, informed by empirical studies that suggest that RRA can be considered constant over time (Brunnermeier and Nagel, 2008; Chiappori and Paiella, 2011).[16] We take this approach also due to the fact that of the 65 percent of all households in the panel who play the game at least once, 63 percent play the game on one occasion, 31 percent on two occasions and 6 percent on three occasions. As the main results could be influenced by this approach, we also conduct our entire analysis in two alternative ways; using actual BDM game observations and means for missing years for households who played at least once, and using a smaller sample of only actual BDM observations, thus excluding observations where the assumption of lower starting bid of 1,000VND is required.

The values of respective RRAs calculated are shown by value of starting bid of loss in Table 3.1 and it can be seen that relative risk aversion decreases with increasing amounts of losses associated with the gamble, thus implying a less risk averse attitude of people who participate in the gamble for these increasing stakes.

We find that those who play the BDM game are systemically different from those who do not, suggesting that decisions to play the game are non-random. However, we do have at least one response for 65 percent of households, and in our subsequent econometric analysis we employ a range of observable controls, and time and household fixed effects to control for unobservable differences.

[15] These are shown in Table 3.1. Essentially, these values of RRA are also the roots for 'k', since $k = bX$, where $b = ARA$.

[16] Our data shows that where we have repeated observations of the BDM game, 68 percent of households stayed within plus or minus 1,000 VND and 91 percent within plus or minus 2,000 VND. The game had eight possible answers.

Table 3.1: Relative Risk Aversion calculated from the BDM game

Starting Bid of Loss (VND)	**Relative Risk Aversion**
1,000	4.11
2,000	1.82
3,000	0.96
4,000	0.49
5,000	0.19
6,000	0
7,000	-0.14

Source: Author calculation based on the VARHS data.

3.3.3 Econometric Specifications

With the calculation of 'ρ' for an iso-elastic utility function implying CRRA, we estimate risk premium/cost of risk (represented as 'P' in Figure 3.1), and identify our primary dependent variable as the difference between the self-elicited 'WTP' and the respective 'P' from CRRA utility function. Equation 3.7 lists the potential explanations of this differential.

$$(WTP - P)_{it} = \delta_i(demographicfactors, socialcapital, financialstatus, riskcopingstrategies, behaviouralfactors) \tag{3.7}$$

The functional form, as stated above, is taken as a reduced form regression equation with the econometric specification, as shown in Equation 3.8.

$$(WTP - P)_{it} = \alpha + (\boldsymbol{DEMO})_{it}\gamma + (\boldsymbol{FinActivity})_{it}\delta + \beta(\boldsymbol{SocCap})_{it} + (\boldsymbol{RiskCoping})_{it}\rho + (\boldsymbol{Behav})_{it}\sigma + \theta_i + \tau_t + \epsilon_{it} \tag{3.8}$$

DEMO is the vector of demographic variables such as age, education, log of net total income, and household status of being poor as designated by *MOLISA* (Ministry of Labour - Invalids and Social Affair). The vector *FinActivity* includes the set of controls such as household borrowing, insurance status, as well as public or private money transfers. We also take a measure of farm investment by considering the log of total investment in pesticides by the household. The control *SocCap* represents household membership in a farmer union. The vector *RiskCoping* controls for the risk-coping activities which households undertake to cope with shocks (idiosyncratic or co-variate in nature). We consider variables such as sale of land, borrowings from formal and informal sources, use of savings, and inactivity (doing nothing) as the measures of risk responses. The use of these variables helps understand how such activities influence insurance demand. Finally, *Behav* represents the vector of behavioural factors that we consider as per the available information in the VARHS data-set. The behavioural biases that we consider here are: first, over-confidence bias using the gamble amounts elicited for a lottery of winning 2 million VND; and second, trust using the response of people on the belief that people are honest and can be trusted. The information for these behavioural biases is available only for 2010, 2012 and 2014; therefore, we assign the mean values of these responses to

2008 and 2016 in order to deal with the missing information.[17]

The regression equation is estimated controlling for household level fixed effects 'θ_i' and time fixed effects as shown by 'τ_i'. The use of fixed effects estimation and inclusion of time-varying control variables deals with concerns about endogeneity due to omitted variable bias, unobserved heterogeneity as well as any measurement error in the surveyed variables. The standard errors are clustered at commune level. Empirical results are discussed in Section 3.5.

Already mentioned in this section, are robustness related to the choice of the utility function when ascertaining the economic value of agricultural insurance for each farmer and three alternative ways of dealing with non-responses to the BDM game. To further validate our results, we assess how sensitive our results are to approaches dealing with non-responses to the WTP question and for the two missing years of years of behavioural bias data. In our main analysis we drop the 6 percent of non-responses to the WTP question, but we also consider these to be the same as zero valuation/not interested. In addition, we also conduct robustness check by focussing only on existing years for the behavioural bias data. In Section 3.5 we present the key robustness checks, but further checks are available in appendices 3.B and 3.C.

3.3.4 Robustness Checks and Data Assumptions

This sub-section lists all the assumptions made regarding the non-response in the VARHS survey. It should be notes that the assumptions made are tested in the form of robustness checks for the main results of this chapter. First, we assume for our main results that households who fail to answer the BDM game at any point in time (35 per cent of sample) are not infinitely risk averse and would have participated in the gamble had the starting bid of loss been lower than 2,000 VND. We calculate RRA for these households taking the starting bid of the game as 1,000 VND. However, we additionally conduct robustness checks using alternative starting bids and by omitting households with non-responses. Second, informed by empirical studies that suggest that RRA can be considered constant over time (Brunnermeier and Nagel, 2008; Chiappori and Paiella, 2011), for households that played the game at least once, we assign the mean value of RRAs calculated from available data for all years. As the main results could be influenced by this approach, we also conduct our entire analysis in two alternative ways; using actual BDM game observations and means only for missing years, and separately by dropping all observations when the BDM game was not played (no starting bid assumption for those who failed to play the game). Third, in our main analysis we drop the 6 per cent of non-responses to the WTP question, but we also consider these to be the same as not interested or zero valuation. Fourth, we conduct the analysis only on years the behavioural bias questions were asked, dropping two of the five waves of data.

Additional robustness checks relate to the length of loss period we employ in the calculation of economic value of insurance and the type of utility function assumed. In our main specification we use

[17] There are no missing values for our behavioural variables in the years the question was asked.

current year and all historical data available on losses to calculate our economic value of insurance. In Section 5.3 we restrict the analysis to agricultural losses in the current and previous year. And finally, we test the sensitivity of our results to the choice of the utility function when ascertaining the economic value of agricultural insurance for each farmer. We present robustness checks using both the CARA and DARA utility functions. We find that our main results are consistently found under each of the above approaches

3.4 Descriptive Statistics

The dataset used in this chapter comes from Viet Nam Access to Resources Household Survey (VARHS) for 2008, 2010, 2012, 2014 and 2016. The five years of panel represents an unbalanced data-set of around 2,200 households in 2008 and 2010 and around 2,700 households in 2012, 2014 and 2016 giving us a well-balanced panel of 2,131 households. Our analysis is based on the unbalanced panel across five-year period, where all households occurring more than once in the VARHS survey are included in the analysis.

3.4.1 Willingness to Pay

The measure of individually reported WTP in VARHS survey was recorded using an open-ended contingent valuation framework.[18] Individuals were asked to state VND amounts that they would like to pay if an agricultural insurance, against the damage of crops was available to them. The respondents gave their values as either zero, not interested or any other amount which they deemed worth paying for agricultural insurance. We treat the response 'not interested' as the same as paying zero amount. The insurance here did not actually exist; but was rather hypothetical, therefore the question did not contain any further details such as the coverage options or details about the conditions of payment. The stated amounts were in absolute currency form without any bidding framework or closed bounds. It is worth noting that this chapter does not disentangle any errors in WTP directly, which might have resulted from the reporting or strategic bias as suggested in Arrow et al. (2001).

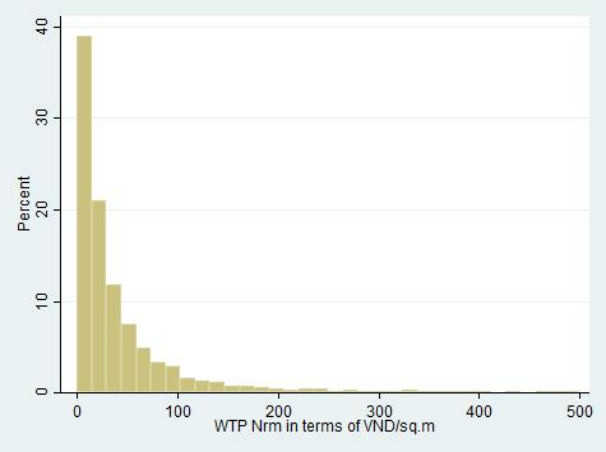
When we treat the not interested response as zero, it is observed that 76 percent of households in the data have zero WTP.[19] In order to improve understanding of the WTP distribution, Figure 3.3 shows the values of WTP near zero with the upper limit being fixed at 500 VND/sq.m and lower limit assigned as greater than zero (excluding the zero response).[20] As the graphs shows, majority responses are concentrated in the region from zero to 200 VND/sq.m, containing 98.86 percent of the total responses. Further, the zero (or not interested) responses for WTP are reported in Table 3.2.

[18] Appendix 3.A provides full details of all the variables used in this chapter.

[19] Not Interested is different from a normal missing value because out of the total sample size of 12,678 households, 701 values were reported as missing (5.53 percent) while others were either a positive WTP (23.21 percent), zero WTP (1.04 percent) or not interested response (70.22 percent).

[20] In order to make the willingness to pay measure comparable to the value of crops we use value of crops reported as VND/sq.m.

Figure 3.3: WTP responses from 0 to 500 VND/sq.m (excluding the 0 response)



Source: Author illustration based on the recordings of the VARHS data.

These high zero responses raise a concern over the validity of the WTP measure in accordance to the conclusion of the Federal Panel headed by Kenneth Arrow in 1993. The Federal Panel suggested that a high level of non-response in WTP is indicative of unreliability in the WTP measure. However, the non-response in the present case is representative of the low demand of farmers insurance recorded in the VARHS data, as shown in Table 3.3. We purport that the large number of those with zero valuation of agricultural, many of whom claimed not to be interested, are providing valid estimates of their valuation of agricultural insurance.

Table 3.2: WTP responses given as zero/not interested

Year	Zero Responses for WTP	Observations	Percent
2008	1,324	1,831	72.31
2010	1,246	1,972	63.18
2012	2,049	2,734	74.95
2014	2,213	2,704	81.84
2016	2,202	2,663	82.69
Overall	9,034	11,904	75.89

Source: Author calculation based on the VARHS data.

Table 3.3: Household membership in the Farmers Insurance

Year	Membership	Observations	Percent
2008	20	1,835	1.09
2010	15	2,230	0.67
2012	0	2,487	0
2014	0	1,758	0
2016	1	2,417	0.04
Overall	36	10,742	0.34

Source: Author calculation based on the VARHS data.

We find evidence that increasing agricultural losses do not tend to decrease the zero valuation of

insurance. This is shown in Table 3.4, where the valuation of insurance as zero is actually higher households that suffer losses above 5 percent.[21] We find that there are statistically significant differ-

Table 3.4: Distribution of Zero valuation of WTP as per the extent of Loss

Year	**(WTP=0|Loss<=5%)**	**(WTP=0|Loss>5%)**	**Observations**
2008	72.40%	72.19%	1,831
2010	58.48%	69.21%	1,972
2012	69.33%	84.74%	2,734
2014	78.95%	87.75%	2,704
2016	77.40%	92.15%	2,663
Overall	72.35%	81.75%	11,904

Source: Author calculation based on the VARHS data.

ences between those who fail to answer the WTP question (6 percent), and those who do answer (94 percent). In our main results, we simply exclude missing non-responses.

A further explanation for the majority zero valuation of agricultural insurance may be attributed to the concern regarding imperfect understanding of the product and poor financial literacy of the respondents. However, as shown in Table 3.6, around 89 percent of the respondents had some form of insurance membership that included health insurance, education insurance and vehicle insurance. Moreover, since Vietnamese government focuses on the Universal Health Coverage, a number of free health insurance schemes are operational including free health insurance for the poor, children, and the minority. Thus, there is significant exposure of Vietnamese population to the concept and understanding of insurance as a financial product. To the extent that agricultural insurance products, particular weather index based or area yield based index insurance are rather complex, it should be noted that the CVM does not provide any details regarding the design or operation of agricultural insurance scheme in question. The WTP question in the CVM simply asks the amount that the farmers would like to pay against the damage of their crops, thus minimising the possibility of imperfect understanding of the product or operational features of index based agricultural insurance by omitting any mention of weather, area yield base index, or co-variate risks

3.4.2 Data Description

Table 3.5 summarises the information directly associated with the CRRA utility function and provides information regarding the variables from Figure 3.1. The average value of Mean Loss '(L)'[22] calculated from the data is 930 VND/sq.m (USD0.04 approx.)[23], with an estimated probability of loss 'ψ' being almost half at 0.47. With this associated probability of loss, the average expected

[21]The trend persists for the distribution of losses above or below 10 percent.

[22]The mean of losses is calculated using the information on agricultural losses recorded in all the previous waves of VARHS survey. In case if value of losses in previous waves of VARHS survey are not available, the variable of 'mean agricultural losses' is assigned the current value of losses incurred by the household. This is done because missing value of losses in VARHS data in any year is associated with no agricultural production in that period.

[23]1VND=0.000004 USD (26th April, 2018).

value of crops (shown as '$E(g)$' in Figure 3.1) is estimated around 4,506 VND/sq.m (USD0.20 approx.). This lies between the bad state (shown as w in Figure 3.1) and good state (shown as W in Figure 3.1) outcome and is greater than the average certainty equivalent (shown as CE in Figure 3.1) value of 4,413 VND/sq.m (USD0.19 approx.). The difference between the average expected value of crops and CE gives average risk premium (shown as P Figure 3.1) of 110 VND/sq.m (0.005USD approx.).[24] Further, the average *RRA* associated with respective utilities of good and bad state outcomes is found as 1.92, lying between the relative risk aversion's of the first losing bid of 1,000 VND (*RRA* of 4.11) and the final losing bid of 7,000 VND (*RRA* of -0.14).

Table 3.5: Data description of variables used in VNM utility function

Variables	**Observations**	**Mean**	**Std.Dev.**	**Min**	**Max**
Bad State Value (w)	10,423	4.099	10.51	0	700
Good State Value (W)	10,423	4.839	17.26	0	836.7
Mean Loss (L)	11,517	0.93	17	0	833
Loss Probability (ψ)	12,461	0.473	0.244	0	1
Expected Value (E(g))	10,271	4.506	13.7	0	700
Certainty Equivalent (CE)	10,100	4.413	12.19	0.000269	700
Risk Premium (P)	10,962	0.11	3.968	0	367.4
RRA (ρ)	12,495	1.922	1.592	-0.143	4.11
Bad State Utility (u(w))	10,232	252.8	1538	-71.51	50,033
Good State Utility (u(W))	10,232	316.9	2559	-71.51	146,667

Source: Author calculation based on the VARHS data.
Notes: w, W, L, E(g), and CE reported as '000VND/sq.m.

Table 3.6 shows the descriptive statistics of variables used to estimate regression equation 3.8. The

Table 3.6: Descriptive Statistics

Variable	**Observations**	**Mean**	**Std.Dev.**	**Min**	**Max**
Differential	10,329	-0.08	4.122	-367.42	29.41
Net Total Income	12,677	87,332	124,816	0	4,522,582
Pesticide Invest.	10,410	1833	7516	0	261,000
Educational Grade	12,673	6.99	3.69	0	12
Age	12,668	52.93	14.36	13	99
Designated as Poor	12,677	0.137	0.344	0	1
Farmer Union	11,004	0.458	0.498	0	1
Risk Coping 1: Borrow	12,678	0.036	0.188	0	1
Risk Coping 2: Sold land	12,678	0.003	0.0547	0	1
Risk Coping 3: Use Saving	12,678	0.058	0.233	0	1
Risk Coping 4: Did Nothing	12,678	0.181	0.385	0	1
Private Transfer Receipt	11,751	0.574	0.494	0	1
Public Transfer Receipt	11,751	0.5	0.5	0	1
Borrowing Activity	12,677	0.39	0.488	0	1
Any Insurance	12,677	0.893	0.309	0	1
Savings Activity	11,553	0.829	0.377	0	1

Source: Author calculation based on the VARHS data.
Notes: Monetary Values expressed in 000'VND. Differential expressed in '000VND/sq.m.

[24] Calculation of risk premium can yield negative values in the extreme case when people have negative RRA. Here, negative RRA implies that an individual will pay positive amount to remain in the gamble (uncertain environment) thus depicting risk-loving nature. Since there were some households in the sample who showed negative $RRAs$, their risk premium is taken as zero. Due to these changes that were made in the data, the $Mean(RiskPremium)$ is no longer found to be exactly equal to $Mean(ExpectedIncome) - Mean(CertaintyEquivalent) = 4,506 - 4,413 = 93$ but is reported as 110 VND.

differential calculated between the WTP and Risk premium (P) shows a negative mean value of minus 80. The mean value of annual net total income of households is estimated around 87 million VND (USD3,858 approx.). The average educational grade measured on a 12-point grading system (up to end of secondary education) is around 7. The average age of the household head is 53 years, after adjusting for outliers. It is reported that almost 45 percent of household have membership of a farmer's union and average household investment on pesticide is reported around 1.8 million VND (USD80 approx.).

For self-reported risk coping strategies, almost 5.8 percent of household's report use of savings in dealing with an income shock that occurred in last two years.[25] This is higher than the 3.6 percent cases when household resorted to borrowings in the event of an income shock. The sale of land due to an income shock is very small and is reported by only 0.3 percent of the sample. In terms of receiving private transfers from children, relatives, and other friends not staying in the household but residing elsewhere, almost 57 percent of household report doing so. On the other hand, public transfers in the form of government social security programmes and emergence benefits, unions, pensions, etc. is reported by 50 percent of the households. For the financial activity variables, around 89 percent of household's report of having some kind of insurance, 83 percent households report to indulge in savings activity, whereas 39 percent of the household's report borrowings activity. The unusually high insurance proportion of households in Viet Nam, as compared to any other developing country can be credited to the government's focus on achieving Universal Health Coverage (UHC) for households through the provision of different forms of free medical insurance for children, ethnic minority and the poor.[26]

Table 3.7: Behavioural Factors

Variable	**Observations**	**Mean**	**Std.Dev.**	**Min**	**Max**
Trust	12,614	0.84	0.31	0	1
Gamble Value	12,614	3.169	12.96	0	300

Source: Author calculation based on the VARHS data.
Notes: Values for the gamble are expressed in 000'VND.

Our behavioural variables are available for only 2010, 2012, and 2014 and are summarised in Table 3.7. To preserve the sample size and conduct analysis for the entire time frame of VARHS, the two missing years are given the mean values calculated from available years. Having done so, the binary variable that was previously recorded as 1 if the respondent believed that most people are honest and

[25]Income shock here refers to any event related to losses due to natural disasters, agricultural shocks, avian flu, change in crop price, shortage or change in price for key agricultural inputs, change in prices of food, unemployment, unsuccessful employment, loss of land, crime, divorce or abandonment, serious illness, injury or death or any other shock not included in the above.

[26]Of the total 10,742 responses for the insurance information in all surveyed years, approximately 62 percent of household have medical insurance (amongst options such as health insurance, free health insurance for the poor, and free health insurance for children), 27 percent households have vehicle insurance and around 25 percent households possess education insurance.

can be trusted (and zero otherwise) is transformed into an intensity measure from zero to 1.[27] The mean value of this variable being 0.84 shows that majority people consider others to be trustworthy. This variable is considered an imperfect proxy measure for trust in formal financial institutions. The other factor considered for the analysis is the gamble value that people report for playing a gamble for a prize of 2 million VND with 10 percent chance of winning. We interpret this variable as a measure of overconfidence in winning a lottery; admittedly a lottery with attractive odds.

3.5 Results

3.5.1 The Differential between WTP and the Risk-premium

The first hypothesis stated relates to the significance of the differential between WTP of households and implied risk-premium from CRRA utility function. Figure 3.4 shows the distribution of this differential across the surveyed periods for pooled as well as individual surveys. Although the actual range of the estimated differential is from -367,000 VND to +30,000 VND, the graph for the pooled survey from 2008 to 2016 contain 69.20 percent of the differential values falling in the range of -500 to +500 VND (See Figure 3.4). The remainder 29.09 percent values are the differential equal to zero, while around 1.71 percent are extreme values above and below the range of -500 to +500 VND. Inspection of these graphs suggests that approximately 58.2 percent of the values of the differential concentrate around zero (-50 to +50 VND/sq.m.). The results of the t-tests confirm that there is a statistically significant difference between average WTP and average risk-premium. The risk-premium for this test uses CRRA utility function and we find that average WTP is systematically lower than the derived economic value of agricultural insurance. The results for this test are shown in Table 3.8. A negative differential was expected, given that the overall zero valuation of WTP is close to 76 percent. The differential between WTP and the economic value of insurance is significant at the 10 percent level and this result is robust to different lower bound BDM game assumptions and functional forms for utility.

Table 3.8: Difference of means of WTP and Risk Premium

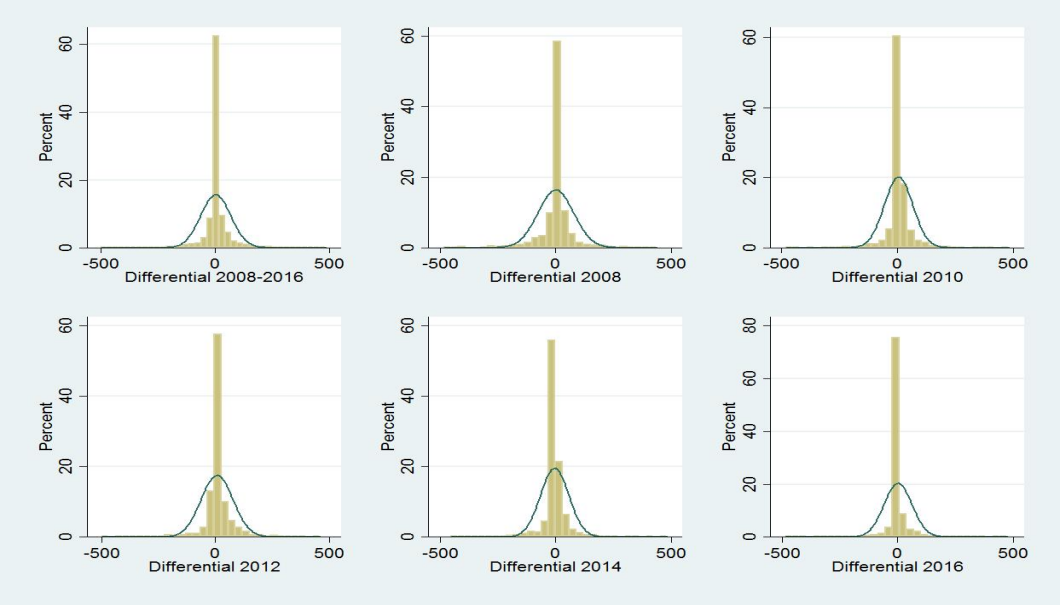
Functional Form	WTP	Risk Premium	Differential	P-value
CRRA	32.82	113.21	-80.39*	0.05
CRRA1500	32.82	109.05	-76.23*	0.06
CRRA500	32.82	119.87	-87.05**	0.03
DARA	32.75	123.21	-90.46**	0.04
CARA	35.44	221.76	-186.32**	0.02

Source: Author calculation based on the VARHS data.
Notes: WTP and Risk Premium expressed as VND/sq.m.

Table 3.14 in Appendix 3.B also presents the difference of means t-test between households with negative value of the differential (under-valuation) and zero differential. The sign of the difference

[27]The resulting intensity of this variable from 0 to 1 is a measure of how strongly a respondents believes that people can be trusted. It is an increasing scale.

Figure 3.4: The distribution of the differential between WTP and Risk-premium



Source: Author's illustration from the estimates of the differential calculated on the VARHS data. These graphs contain 69.20 percent of the data, with the remaining observations made up of zero values (29.09%) and extreme values outside the rate -500 to +500 VND (1.71%).

of means between these two groups across the variables follow the same direction as the results in Table 3.9 with only minor changes in the significance of variables. However, the sign of the difference of means value between households with zero differential and positive valuation of insurance is opposite to the signs in Table 3.9. This is intuitively correct because households who value insurance positively belong significantly more in the farmers union group, receive less private transfers and have higher education level.

3.5.2 Understanding the Differential

As discussed in Section 3.3.3 we employ a reduced form fixed effect panel regression to investigate the importance of socio-economic and demographic factors (hypotheses 2), existing risk coping mechanisms (hypotheses 3) and behavioural factors (hypotheses 4). First, we assess differences in means for the explanatory variables, categorised on the basis of households who value insurance less than their estimated risk premium versus household who value insurance more than their estimated risk premiums, referred to as undervaluation and over-valuation (see Table 3.9).

Before controlling for other factors, we find a negative and significant difference for education level indicating that higher educated households over value insurance as compared to households who have less educated heads. We find that those with other types of insurance, those who have borrowed recently, members of farmer's union and those who trust others are more likely to overvalue

Table 3.9: Difference of Means for Explanatory Variables for Valuation Negative vs Positive

Variable	**Negative**	**Positive**	**Difference**	**P-Value**
Net Total Income	88,741,487.24	88,680,763.94	60,723.30	0.98
Educational Grade	6.86	7.39	-0.53***	0
Age	53.26	51.78	1.48***	0
Farmer Union	0.46	0.57	-0.11***	0
Designated as Poor	0.15	0.1	0.05***	0
Pesticide Invest.	1,411,348.12	2,366,578.40	-955,230.27***	0
Risk Coping 1: Borrow	0.04	0.03	0.01**	0.01
Risk Coping 2: Sold land	0	0	0	0.83
Risk Coping 3: Use Saving	0.07	0.06	0.01	0.22
Risk Coping: Did Nothing	0.22	0.19	0.03***	0
Private Transfer Receipt	0.59	0.5	0.08***	0
Public Transfer Receipt	0.53	0.47	0.06***	0
Borrowing Activity	0.39	0.47	-0.08***	0
Any Insurance	0.94	0.96	-0.02***	0
Savings Activity	0.85	0.85	0	0.86
Trust	0.83	0.85	-0.02***	0
Gamble Value	3,538.75	2,534.68	1,004.07***	0

Source: Author calculation based on the VARHS data.
Notes: Monetary Values expressed in 000'VND. Gamble value expressed as VND.

agricultural insurance. On the other hand, households with older heads, engaging in more risk-coping activities (such as borrowing or savings) and have higher rate of public and private transfers are more likely to undervalue agricultural insurance.

The results for the fixed effects regression for equation 3.8 are shown in Table 3.10.[28] In addition to the differential, we also present the findings for WTP (column 2) and the risk premium using the CRRA utility function (column 3). When interpreting the results for the differential in column 1, it is worth noting that the value of the differential ranges from negative to positive, therefore positive coefficients of the regression results should be interpreted as the likelihood towards over valuation of insurance with respect to the risk premium implied by CRRA utility functions.

Education is positively related to WTP in our main specification. This result is significant at the 10 percent level of significance when household and time fixed effects are included. Given the use of household level FE in the regression results shown in Table 3.10, a positive relationship between education of the household head and the differential implies that the education of the head in data is not recorded as constant. Thus, there is some degree of variation in this variable such that increase in education of the household head holds a positive relationship with the valuation differential. This variation could be due to either or a mix of two factors; one, the household head got more educated over time; and second, the household head changed during the eight-year span of VARHS survey. If this was not the case, then the variable education would have been omitted from the FE regression.[29] Moreover, the coefficient for education is sensitive (i.e. not robust) to the exact specification and lower bound of risk aversion.

[28] Eleven extreme values out of 9,640 observations are excluded from the dependent variable of differential. This forms 0.0011 percent of the data.

[29] Other mechanisms could also be imagined such as how education may altering risk perceptions or access to alternative risk management strategies.

Table 3.10: Main regression results

Variables	(1) Differential	(2) WTP	(3) Risk Premium
Log of Net Total Income	15.711*	28.754	-25.762
	(8.832)	(23.463)	(24.932)
Educational Grade Obtained	10.102	14.731*	0.669
	(6.985)	(7.831)	(6.076)
Age of Household Head	-1.726	-1.141	1.018
	(1.845)	(1.904)	(1.618)
Designated as Poor	-30.945*	-41.278*	162.380
	(16.884)	(24.456)	(155.710)
Farmer Union Membership	57.249*	48.389*	5.396
	(30.912)	(28.208)	(11.332)
Log of Pesticide Investment	4.165	1.034	-2.942
	(2.659)	(1.942)	(1.918)
Risk Coping 1: Borrow	-59.766*	-11.487	80.624**
	(31.822)	(11.641)	(40.012)
Risk Coping 2: Sold land	-14.752	-35.244	-36.773
	(27.101)	(26.356)	(26.541)
Risk Coping 3: Use Savings	7.265	-5.403	42.401
	(23.550)	(24.433)	(32.995)
Risk Coping 4: Did Nothing	23.379	40.664	64.159
	(26.399)	(30.633)	(72.357)
Private Transfer Receipt	-59.656*	-69.194**	29.642
	(31.961)	(33.367)	(24.006)
Public Transfer Receipt	-46.285	-56.321	-12.544
	(42.662)	(42.898)	(33.090)
Borrowing Activity	31.773	41.327	-41.034*
	(22.488)	(25.426)	(22.845)
Any Insurance	13.175	59.585	-7.714
	(20.923)	(41.046)	(16.537)
Trust	-8.781	-25.377	
	(20.582)	(16.520)	
Log Gamble Value	4.260	6.215*	
	(2.925)	(3.264)	
Mean Loss		-0.024	
		(0.241)	
Constant	-417.395**	-648.940	533.271
	(178.941)	(488.634)	(351.159)
Observations	8,033	8,365	8,386
R-squared	0.012	0.014	0.004
Number of UID	2,403	2,424	2,418
Household FE	Yes	Yes	Yes
Commune Controls	Yes	Yes	Yes
Time FE	Yes	Yes	Yes

Source: Author calculation using VARHS data on Stata14.
Notes: Standard Errors clustered at commune level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1
Values reported as zero replaced by 1 before deriving logs
Relative Risk Aversion used as a regressor for WTP. Omitted in regression.

Private transfers such as from non-household based family members, friends and neighbours (including internal or overseas migrants) are negatively related at the 10 percent level to both WTP, and the differential between reported WTP and predicted economic value. This result holds for different versions of functional forms for utility and assumptions about the non-responses.

This finding may be for one of two reasons. First, it is possible that having access to remittances in times of need reduces the demand for insurance. Second, having a stream of remittances can mean that cash flow at household level reduces the demand for formal insurance. Examining the reasons for the receipt of these payments, we conclude that private transfers can be interpreted as ongoing financial support rather than one-off shock responses. The most cited purpose is 'no specific reason' (39%), with wedding/funeral/celebration (18%), child support (11%), medical expenses (10%) and educational expenses (5%). Hence, it appears that regular addition to cash flow, in the form of private transfers, reduces household demand for formal insurance.

Membership of a farmer's union in Viet Nam has been interpreted by some as a form of social capital (Newman and Kinghan, 2015) but membership is likely to indicate pro-active behaviour by farmers who wish to access technology, information and collective purchasing options. The data shows that 55 percent state that membership provided with access to agricultural inputs or technology, 11 percent to credit and insurance, 7 percent to education or training, and 3 percent to market access. We find that membership of a farmer's union is positively related to both willingness to pay and differential between reported WTP and predicted economic value of insurance (both at the 10% significance level) in our main results. However, only the relationship with the differential holds for all our robustness checks.

We find no robust evidence that risk coping mechanisms are related to WTP or the differential between WTP and the risk premium. None of our four measures of risk coping mechanisms show consistent relationships with our dependent variables.[30] This result may be related to the conditional nature of the variable employed as respondents are only asked what mechanism they use if they report having a recent shock. As a result, we cannot completely rule out the relevance of this channel in agricultural insurance demand.

While income is related to the differential in our main specification, this relationship is sensitive to the functional form we assume for utility and whether or not we assume lower bounds for those who refuse to play the BDM game (See appendix 3.C). The absence of any conclusive relationship between income and demand for insurance may suggests that social capital and behavioural factors may be limiting factors for agricultural demand even as incomes gradually rise in developing countries. In similar fashion, the significance of the relationship between whether a household is considered poor or not by MOLISA is not robust to our various specifications and assumptions about non-responses.

[30] Borrowing as a risk-coping activity is found to be significant for differential in our main specification but not for a range of alternative specifications.

The data allows us to explore two behavioural factors; trust and over-confidence. As it can be seen for Table 3.10, for the WTP, the measure for over-confidence (represented by the log of gamble value) holds a positive and significant coefficient in our main specification. The direction of this result was unexpected, since our prior was that a respondent depicting over-confidence would be likely to under-value insurance; deeming it unnecessary. Instead, our interpretation of this result is that a level of overconfidence may be needed to believe agricultural insurance will pay out when you have a claim. This may be due to perceived unviability of previous agricultural schemes in Viet Nam, perceived problematic claims processes and/or lack of confidence in the yield calculations on behalf of the insurer. We interrogate this result further and find that the relationship with WTP is robust across all, assumptions about the lower bound for risk aversion and approaches to non-responses, varying between 5 percent and 10 percent significance.

We find no robust evidence of a relationship between trust and WTP or the differential for any specifications across the three dependent variables. Results are insignificant for regressions conducted using risk premium as the dependent variable.

3.5.3 Alternating Loss Periods in Risk Premium Calculation

In the regressions shown in Table 3.10, the calculation of risk-premium from CRRA utility function considers 'L' as the mean of agricultural losses calculated retrospectively, including current year and responses in previous time periods. Long term panel data might help ascertain what length of time for losses has the most effect on WTP for insurance. While this is an interesting question, in the absence of such data, we assess, what is the impact on our findings of restricting the loss period to the immediate past – current period and previous year.

This alternative approach alters the value of 'L' in the iso-elastic utility function setup, thus changing the calculation of the risk premium and subsequently the differential between WTP and risk premium. Table 3.11 shows our main results hold in terms of direction, magnitude and significance.

We present in appendices additional robustness checks regarding our assumptions about non-responses for the BDM game, WTP, and the behavioural measures. Appendix 3.B provides the full set of econometric specifications for our main results (Table 3.11) and our main results with truncated loss period (current and previous year). Appendix 3.C provides four further robustness checks as follows. First, we omit households who never participated in the BDM game. Second, we use actual observations and means in years a household did not play the game (instead of means for all years). Third, we redo the analysis combining the previous two approaches. Fourth, rather than dropping the 6 percent of households who do not provide an answer to the WTP question, we assume that non-responses are zero valuation/not interested.[31] Fifth, we conduct analysis for behavioural factors by considering only the years when responses for behavioural factors were recorded. For each robustness checks, our main results are found to be consistent in significance and direction.

[31] Please note an attachment to this chapter that provides further robustness checks that combine in different ways the different assumptions is available on request from the authors.

Table 3.11: Regression results using differential and risk-premium estimated from recent losses (Current and last period)

Variables	(1) Differential	(2) WTP	(3) Risk Premium
Log of Net Total Income	20.847**	18.754	-11.318
	(10.599)	(13.924)	(30.037)
Educational Grade Obtained	8.481	14.232*	1.436
	(7.344)	(7.629)	(12.498)
Age of Household Head	-2.234	-1.512	1.207
	(2.253)	(1.892)	(2.384)
Designated as Poor	-36.246*	-44.481	236.077
	(19.027)	(27.141)	(226.340)
Farmer Union Membership	59.896*	52.167*	18.862
	(34.519)	(29.703)	(25.556)
Log of Pesticide Investment	4.167	1.230	-1.893
	(2.763)	(2.073)	(2.434)
Risk Coping 1: Borrow	-103.695**	-7.977	137.382**
	(48.184)	(12.038)	(55.749)
Risk Coping 2: Sold land	-2.016	-33.032	-80.424
	(33.765)	(24.883)	(53.813)
Risk Coping 3: Use Savings	8.873	-23.492	66.043
	(25.549)	(37.993)	(63.606)
Risk Coping 4: Did Nothing	18.291	35.025	83.007
	(27.795)	(27.776)	(104.042)
Private Transfer Receipt	-55.073*	-65.828**	86.962
	(32.788)	(32.557)	(73.519)
Public Transfer Receipt	-50.317	-51.700	-6.264
	(43.692)	(42.559)	(50.892)
Borrowing Activity	32.183	38.783	-84.855*
	(25.731)	(24.076)	(46.905)
Any Insurance	19.704	62.053	-12.531
	(23.006)	(44.598)	(17.773)
Trust	0.955	-29.816*	86.951
	(29.186)	(17.429)	(81.640)
Log Gamble Value	3.318	5.670*	9.212**
	(3.028)	(3.013)	(4.114)
Mean Loss		0.037	
		(0.083)	
Constant	-494.509**	-484.363	161.336
	(216.220)	(306.369)	(412.875)
Observations	7,936	8,000	8,287
R-squared	7,936	8,000	8,287
Number of UID	0.012	0.013	0.004
Household FE	Yes	Yes	Yes
Commune Controls	Yes	Yes	Yes
Time FE	Yes	Yes	Yes

Source: Author calculation using VARHS data on Stata14.
Notes: Standard Errors clustered at commune level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1
Values reported as zero replaced by 1 before deriving logs
Relative Risk Aversion used as a regressor for WTP but omitted in regression.

3.5.4 Robustness Check Across different functional forms of utility function

In this section, we present reduced set of robustness results for the main analysis. We first consider different functional forms to calculate the differential, in addition to the CRRA utility function. We re-estimate the main specification with the risk premium implied by DARA and CARA utility function, as discussed in section 3.3.1. As a further check for the consistency of relative risk aversion used in the *CRRA* utility function, we alternate our assumption of considering the starting losing bid of the BDM game for people who did not participate in the first round but chose to stay out of the game. Therefore, further to considering the starting losing bid of 1,000 VND for these household, we estimate the relative risk aversion by considering additional options such as 1,500 VND and 500 VND. This is done to test the sensitivity of our assumption. Thus, this leads to estimation of two new risk-premiums and subsequently two new differentials, represented by CRRA1,500, and CRRA 500 in Table 3.12.

In appendix 3.C, we present additional robustness checks in relation to our assumptions about non-responses for the BDM game, WTP, and the behavioural measures.

Table 3.12: Robustness Results using different functional forms and starting bids for BDM game

Variables	(1) Differential CRRA1500	(2) Differential CRRA500	(3) Differential DARA	(4) Differential CARA
Log of Net Total Income	14.357*	16.726*	4.051	15.834
	(8.678)	(8.894)	(8.959)	(10.088)
Educational Grade Obtained	10.270	10.125	9.828	11.278
	(6.966)	(7.015)	(6.982)	(7.904)
Age of Household Head	-1.834	-1.321	-1.811	-1.770
	(1.837)	(1.851)	(1.834)	(1.848)
Designated as Poor	-30.864*	-32.107*	-34.320**	-24.024
	(16.854)	(17.037)	(16.990)	(16.807)
Farmer Union Membership	56.343*	56.585*	52.633*	64.265*
	(30.853)	(30.969)	(30.352)	(36.319)
Log of Pesticide Investment	4.033	4.262	2.836	-0.280
	(2.650)	(2.663)	(2.618)	(2.265)
Risk Coping 1: Borrow	-54.028*	-62.067*	-36.265*	-97.324**
	(28.187)	(32.477)	(18.506)	(46.799)
Risk Coping 2: Sold land	-18.789	-10.830	-39.447	-16.212
	(25.992)	(29.039)	(30.818)	(32.436)
Risk Coping 3: Use Savings	8.836	4.385	-0.507	17.904
	(22.649)	(24.462)	(23.488)	(21.856)
Risk Coping 4: Did Nothing	22.693	23.052	21.694	25.942
	(26.243)	(26.629)	(26.064)	(24.976)
Private Transfer Receipt	-60.226*	-59.651*	-63.254**	-64.801*
	(31.906)	(31.971)	(32.066)	(33.123)
Public Transfer Receipt	-44.597	-47.398	-35.047	-39.333
	(42.581)	(42.681)	(42.690)	(47.562)
Borrowing Activity	31.810	30.950	29.387	24.706
	(22.318)	(22.559)	(22.197)	(23.357)
Any Insurance	13.947	13.728	16.901	12.213
	(20.623)	(20.967)	(20.080)	(23.597)
Trust	-10.410	-9.300	-24.720	-23.702
	(19.905)	(20.495)	(16.713)	(21.742)
Log Gamble Value	4.394	4.194	4.127	4.052
	(2.902)	(2.937)	(2.986)	(3.131)
Constant	-380.122**	-466.631**	-173.240	-357.772*
	(176.134)	(184.669)	(183.062)	(193.991)
Observations	8,033	8,033	8,051	7,319
R-squared	0.012	0.012	0.012	0.013
Number of UID	2,403	2,403	2,408	2,285
Household FE	Yes	Yes	Yes	Yes
Commune Controls	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Source: Author calculation using VARHS data on Stata14.
Notes: Standard Errors clustered at commune level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1.
For variables in logs, all values reported as zero replaced by 1 to avoid missing observations.
CRRA1500: Differential calculated from CRRA function using starting bid of 1500 VND
CRRA500: Differential calculated from CRRA function using starting bid of 500 VND
DARA: Differential calculated from DARA utility function.
CARA: Differential calculated from CARA utility function using starting bid of 1000 VND

3.5.5 Welfare Implications of Agricultural Losses on Household Consumption

To assess the underlying welfare rationale for agricultural insurance, we examine the relationship between agricultural shocks and consumption reduction in the household. Table 3.13 below shows estimates derived from a linear probability model using fixed effects. The dependent variable in the regression takes value 1 when the household reports of reducing consumption as a risk-coping mechanism when stuck by an income shock. The results indicate a statistically significant and positive relationship between agricultural losses with reduction of household consumption due to an income shock, and this result is robust to different specifications.[32] The small effect size is consistent with the earlier findings that average losses are small relative to average production; being around 20 percent (see Table 3.5).

Table 3.13: Likelihood of reducing consumption due to income shock

Variables	(1) Reduce Consumption	(2) Reduce Consumption	(3) Reduce Consumption
Log of Agri. Loss	0.020***	0.020***	0.020***
	(0.001)	(0.001)	(0.001)
Educational Grade Obtained		-0.006**	-0.008***
		(0.003)	(0.003)
Age of Household Head		-0.002	-0.002
		(0.002)	(0.002)
Farmer Union Membership		-0.005	0.008
		(0.014)	(0.016)
Private Transfer Receipt			0.010
			(0.012)
Public Transfer Receipt			0.035**
			(0.014)
Borrowing Activity			0.039***
			(0.013)
Any Insurance			0.011
			(0.019)
Savings Activity			-0.029*
			(0.017)
Constant	0.136***	0.240***	0.195**
	(0.028)	(0.079)	(0.093)
Observations	9,713	8,555	7,166
R-squared	0.246	0.248	0.261
Number of UID	2,555	2,446	2,379
Household FE	Yes	Yes	Yes
Commune FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes

Source: Author calculation using VARHS data on Stata14.
Notes: Standard Errors clustered at commune level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1
For variables in logs, all values reported as zero replaced by 1 to avoid missing observations
Loss taken as current reported losses due to natural or agricultural shock.
Reduce Consumption: Value=1 if a household reports reducing consumption when faces Income Shock

3.6 Conclusion

The prevalence of weather and disease related shocks for farmers across Viet Nam and our confirmation that production losses for farmers lead to reductions in household consumption, brings to

[32]The proportion of reducing consumption is 53 percent when a household reports positive loss due to agricultural shock or natural disaster.

the fore the question why area yield insurance, which protects farmers from covariate shocks, has failed to achieve scale. To help solve the puzzle of low demand for agricultural insurance, we investigate first the determinants of self-reported WTP and second, the differential between WTP and the predicted economic value of insurance to each farmer based on expected utility theory.

We find that private transfers substitute for agricultural insurance demand. This reflects the findings from Kenya where mobile money accelerated the process of private transfers from family, friends and neighbours and led to consumption smoothing Jack and Suri (2014). The phenomenon of increased and speedy private transfers, which is likely to accelerate further, with improved financial technologies and increased migration, agricultural insurance will continue to be challenging to market and bring to scale. We find that social capital (or pro-social behaviour) in the form of farmer union membership are important to encourage farmers to engage in formal risk management technologies such as agricultural insurance. Our evidence suggests that insurance providers in the process of rollout are more likely to achieve success by working through existing farming networks.

Insurance is not rare in Viet Nam, with 95 percent of the sample holding some form of insurance. It is interesting to note that many of these insurance contracts involve some form of subsidies or mandatory purchase. We note that the most recent attempt to establish agricultural insurance included subsidies for poor farmers and yet even within the context of a supportive state-led communication strategy, take-up disappointed. We find that income is not systematically related to WTP or the differential; suggesting that purchasing power is not the determining factor in agricultural insurance demand. This result can inform debates around whether subsidies for agricultural insurance might be effective.

Our analysis shows that the behavioural characteristic of over-confidence is important in the valuation of insurance and we consider this finding within the context of the likely perceived unviability of previous agricultural schemes in Viet Nam, perceived problematic claims processes and/or lack of confidence in the yield calculations of the insurer. Financial education, improved claims processes and the overall reputation of the sector maybe central to the medium-term prospects for agricultural insurance take-up. Each of these have specific implications for providers, and insurance regulators who often struggle to mediate the interaction between customers and insurance firms successfully for mutual welfare gains.

3.A Variables used in the Chapter:

1) Willingness to Pay: This measure records the absolute monetary value given for the Willingness to Pay for agricultural households in the survey. The exact question asked in the survey: If insurance against loss or damage of crop were available, how much would you be willing to pay for it? List in 000 VND/per year/household.

2) Value of crops: The exact wording for the question is: In last 12 months. What is total value of output produced? The reported value in '000VND is assigned to the Bad state value of crops.

3) Good State Value of Crops: The value of crops is derived by summing the value of crops produced and the value of reported loss.

4) Loss: This is the amount of loss reported, conditional on suffering from a natural disaster (floods, droughts, typhoons) or agricultural shock (pest infestation and crop disease).

5) Mean Loss: The main analysis of the paper derives mean losses by taking the average of reported loss in the current period and all preceding survey rounds.

6) Probability of Loss in the Commune: Calculated by taking proportion of the number of years (out of total surveyed years), when the productivity of rice in a commune falls below the average mean productivity of rice in that commune.

7) Average Mean Productivity of Rice: It is reported in the data in different units of weight (kg, quintal, ton) per hectare for summer and autumn. The study takes the mean productivity over both seasons of production.

8) Expected Value: This is the expected value of crops for a household. It is calculate using expected utility framework over good and bad state value of crops with associated probabilities.

9) Certainty Equivalent: The expected value of crops which a risk-averse household should accept to avoid the inherent probability of involved in agriculture.

10) Risk-Premium: Estimated by taking the difference between the expected value of crops and the certainty equivalent. Hence, it can be interpreted as the value which a household foregoes to avoid the gamble. The value as per the expected utility theory is the willingness to pay for actuarially fair insurance by a rational consumer.

11) Differential: It is estimated by taking the difference between the WTP and the risk premium.

12) Net Total Income: This is net total income reported by the household for last 12 months from sources such as wage/salary, agricultural activity, common property uses, non-farm, non-wage economic activity, rental income, land/real estate, other assets, sales of assets, private transfers, public transfers, and other sources.

13) Pesticide Investment: This is the amount of investment which a household makes in using pesticide for as an agricultural input in past 12 months of the survey.

14) Educational Grade: This captures the grade which the household head completed. The grades are as per the 12-grade system. The highest grade is secondary school.

15) Age: Derived from the year of birth of household head.

16) Farmer Union: This is a binary variable taking the value as 1 if any member of the household belongs to farmer's union.

17) Risk Coping: The four variables under this category are of binary nature and take the value as 1 if a household engages in borrowing, sale of land or use of savings in order to cope up with an income shock in following the last VARHS survey (approximately two years). The value recorded is conditional on household saying yes to the question if a household suffered from an income shock. Income shock means getting affected by the occurrence of natural disasters, agricultural shocks, avian flu, change in crop price, shortage or change in price for key agricultural inputs, change in prices of food, unemployment, unsuccessful employment, loss of land, crime, divorce or abandonment, serious illness, injury or death or any other shock not included in the above.

18) Transfer Receipt (Private/Public): This is a binary variable taking the value as 1 if the household received any money or goods from persons who are not members of their household such as relatives living elsewhere friends or neighbours (Private Transfers) or from public institutions, e.g. insurance money or social assistance (Public Transfers).

19) Borrowing Activity: This is a binary variable taking the value as 1 if the household borrowed money or goods (including seeds or fertilisers) from any source from the period following the last VARHS survey (approximately two years).

20) Any Insurance: This is a binary variable taking the value as 1 if a household possesses any kind of insurance amongst the options such as: farmer' insurance, fire insurance, life insurance, voluntary social insurance, compulsory social insurance, health insurance, free health insurance for children/poor, education insurance, vehicle insurance, or any other forms of insurance.

21) Trust: This is a binary variable taking the value as 1 if the respondent agrees to the following question: Most people are basically honest and can be trusted.

22) Gamble Value: This is recorded as the monetary value which the respondent gives to the following question: How much would you be willing to pay for a 1 in 10 chance of winning a prize of 2,000,000 VND?

3.B Additional Difference of Means t-test and Full Specification for results in Table 3.10 and Table 3.11

Table 3.14: Difference of Means t-test between zero insurance differential amd negative/positive insurance differential

Variables	Negative	Zero	Diff. of Means	(P-value)	Zero	Positive	Diff. of Means	(P-value)
Net Total Income	93033944	81956564	11,077,380.53***	0	81956564	87268328	-5,311,764.12*	0.09
Educational Grade	6.93	7	-0.08	0.4	7	7.32	-0.32***	0
Age	53.78	51.28	2.50***	0	51.28	51.8	-0.52	0.2
Farmer Union	0.42	0.44	-0.02	0.23	0.44	0.58	-0.14***	0
Designated as Poor	0.14	0.16	-0.02*	0.02	0.16	0.1	0.06***	0
Pesticide Invest.	1315421	1316029	-608.54	1	1316029	2253899	-937,869.76***	0
Risk Coping 1: Borrow	0.04	0.03	0.01*	0.01	0.03	0.03	-0.01	0.18
Risk Coping 2: Sold land	0	0	0.00*	0.04	0	0	-0.00*	0.04
Risk Coping 3: Use Saving	0.07	0.03	0.04***	0	0.03	0.07	-0.04***	0
Risk Coping: Did Nothing	0.2	0.09	0.11***	0	0.09	0.21	-0.11***	0
Private Transfer Receipt	0.59	0.59	0	0.81	0.59	0.5	0.09***	0
Public Transfer Receipt	0.53	0.49	0.03*	0.01	0.49	0.47	0.02	0.15
Borrowing Activity	0.37	0.37	0	0.75	0.37	0.46	-0.10***	0
Any Insurance	0.94	0.95	-0.01*	0.04	0.95	0.96	-0.01*	0.02
Savings Activity	0.85	0.81	0.04***	0	0.81	0.85	-0.04***	0
Trust	0.83	0.86	-0.03***	0	0.86	0.85	0	0.59
Gamble Value	3602.1	3197.16	404.94	0.22	3197.16	2431.47	765.68***	0.01

Author calculation based on the VARHS data. Monetary Values expressed in 000'VND. Gamble value expressed as VND.

Table 3.15: Different Specifications for Main Results as shown in Table 3.10

Variables	Differential	Differential	Differential	Differential	WTP	WTP	WTP	WTP	WTP	WTP	Risk Premium	Risk Premium	Risk Premium	Risk Premium
Log of Net Total Income	16.003*	15.615*	15.480*	15.711*	27.443	27.614	26.612	27.171	28.754	11.149	-26.505	-26.238	-25.831	-25.762
	(9.032)	(8.903)	(8.923)	(8.832)	(22.183)	(22.294)	(21.690)	(22.029)	(23.463)	(8.075)	(24.869)	(25.042)	(25.039)	(24.932)
Educational Grade Obtained	9.900	9.830	9.900	10.102	13.650*	13.622*	13.643*	13.884*	14.731*	11.898	1.168	0.849	0.739	0.669
	(6.919)	(6.865)	(6.881)	(6.985)	(7.403)	(7.376)	(7.368)	(7.429)	(7.831)	(7.777)	(6.309)	(6.101)	(6.081)	(6.076)
Age of Household Head	-2.063	-2.062	-2.024	-1.726	-1.460	-1.453	-1.424	-1.057	-1.141	-2.123	1.049	0.962	0.924	1.018
	(2.082)	(2.098)	(2.089)	(1.845)	(1.900)	(1.912)	(1.910)	(1.757)	(1.904)	(1.837)	(1.534)	(1.477)	(1.453)	(1.618)
Farmer Union Membership	59.685*	59.695*	58.279*	57.249*	48.432*	48.021*	46.312*	46.702*	48.389*	55.960*	3.749	3.335	4.590	5.396
	(31.177)	(31.012)	(30.428)	(30.912)	(26.981)	(26.795)	(26.244)	(27.098)	(28.208)	(31.756)	(11.393)	(11.368)	(11.318)	(11.332)
Private Transfer Receipt	-59.765*	-59.675*	-60.858*	-59.656*	-64.546**	-64.800**	-66.090**	-65.094**	-69.194**	-58.619*	30.628	27.550	29.277	29.642
	(31.856)	(32.346)	(32.863)	(31.961)	(31.263)	(31.459)	(32.064)	(31.436)	(33.367)	(31.219)	(23.868)	(22.828)	(23.493)	(24.006)
Log Gamble Value	4.728	4.683	4.621	4.260	5.891*	5.943*	5.909*	5.689*	6.215*	5.461*	3.793**	4.019**	4.001**	4.187**
	(3.014)	(3.021)	(3.037)	(2.925)	(3.064)	(3.077)	(3.089)	(3.043)	(3.264)	(3.011)	(1.893)	(1.950)	(1.958)	(2.005)
Log of Pesticide Investment				4.165				1.147	1.034	-2.125				-2.942
				(2.659)				(1.890)	(1.942)	(1.310)				(1.918)
Risk Coping 1: Borrow		-49.015	-60.848*	-59.766*		2.249	-12.359	-10.718	-11.487	-7.733		63.451	80.015**	80.624**
		(31.805)	(31.839)	(31.822)		(11.914)	(11.226)	(11.157)	(11.641)	(14.104)		(41.368)	(40.239)	(40.012)
Risk Coping 2: Sold land		-23.277	-24.791	-14.752		-37.090	-37.019	-30.569	-35.244	-37.179		-38.895	-34.958	-36.773
		(28.410)	(27.877)	(27.101)		(25.527)	(24.616)	(24.766)	(26.356)	(23.344)		(30.024)	(28.602)	(26.541)
Risk Coping 3: Use Savings		1.387	0.950	7.265		-10.400	-10.326	-4.639	-5.403	16.047		40.744	41.598	42.401
		(21.524)	(21.396)	(23.550)		(23.281)	(23.165)	(23.013)	(24.433)	(18.320)		(33.451)	(33.596)	(32.995)
Risk Coping 4: Did Nothing		23.787	22.743	23.379		40.588	39.212	39.627	40.664	23.730		61.199	62.891	64.159
		(26.668)	(26.030)	(26.399)		(29.984)	(29.202)	(30.022)	(30.633)	(25.221)		(70.635)	(71.170)	(72.357)
Public Transfer Receipt				-46.285				-52.721	-56.321	-40.173				-12.544
				(42.662)				(40.351)	(42.898)	(45.369)				(33.090)
Borrowing Activity			30.354	31.773			36.144	38.257	41.327	27.750			-41.615*	-41.034*
			(21.403)	(22.488)			(22.480)	(23.739)	(25.426)	(22.175)			(23.297)	(22.845)
Any Insurance			5.939	13.175			47.355	56.805	59.585	19.905			-8.514	-7.714
			(15.427)	(20.923)			(34.130)	(38.951)	(41.046)	(21.129)			(14.830)	(16.537)
Designated as Poor	-41.570*	-41.280*	-43.803*	-30.945*	-48.422*	-49.431*	-53.679*	-40.183*	-41.278*	-21.806	159.469	156.568	160.184	162.380
	(22.348)	(22.750)	(24.213)	(16.884)	(28.377)	(28.946)	(31.263)	(23.570)	(24.456)	(14.291)	(148.847)	(147.482)	(148.337)	(155.710)
Trust				-8.781				-22.628	-25.377	-26.948				25.348
				(20.582)				(15.472)	(16.520)	(17.682)				(27.756)
Mean Loss									-0.024					
									(0.241)					
Loss										0.169				
										(0.396)				
Constant	-372.783**	-368.719**	-387.063**	-417.395**	-536.945	-550.372	-597.981	-601.220	-648.940	-208.442	521.649	504.795	524.171	533.271
	(162.140)	(163.646)	(169.366)	(178.941)	(422.141)	(429.992)	(457.063)	(460.724)	(488.634)	(156.069)	(363.364)	(355.350)	(359.568)	(351.159)
Observations	8,033	8,033	8,033	8,033	9,061	9,061	9,061	8,985	8,365	7,513	8,386	8,386	8,386	8,386
R-squared	0.01	0.01	0.011	0.012	0.01	0.011	0.012	0.013	0.014	0.012	0.004	0.004	0.004	0.004
Number of UID	2,403	2,403	2,403	2,403	2,642	2,642	2,642	2,620	2,424	2,345	2,418	2,418	2,418	2,418
Household FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Commune Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using VARHS data on Stata14.
Notes: Standard Errors clustered at commune level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1
For variables in logs, all values reported as zero replaced by 1 to avoid missing observation.

Table 3.16: Different Specifications for risk premium estimated from recent losses (Current and last period as shown in Table 3.11)

Variables	Differential	Differential	Differential	Differential	WTP	WTP	WTP	WTP	WTP	WTP	Risk Premium	Risk Premium	Risk Premium	Risk Premium
Log of Net Total Income	21.667**	20.996**	20.654*	20.847**	27.443	27.614	26.612	27.171	18.754	11.149	-12.653	-12.016	-11.009	-11.318
	(10.747)	(10.632)	(10.578)	(10.599)	(22.183)	(22.294)	(21.690)	(22.029)	(13.924)	(8.075)	(29.920)	(30.041)	(29.977)	(30.037)
Educational Grade Obtained	8.357	8.263	8.305	8.481	13.650*	13.622*	13.643*	13.884*	14.232*	11.898	2.252	1.856	1.700	1.436
	(7.294)	(7.241)	(7.262)	(7.344)	(7.403)	(7.376)	(7.368)	(7.429)	(7.629)	(7.777)	(12.853)	(12.624)	(12.595)	(12.498)
Age of Household Head	-2.633	-2.606	-2.574	-2.234	-1.460	-1.453	-1.424	-1.057	-1.512	-2.123	1.366	1.223	1.146	1.207
	(2.493)	(2.500)	(2.489)	(2.253)	(1.900)	(1.912)	(1.910)	(1.757)	(1.892)	(1.837)	(2.320)	(2.230)	(2.206)	(2.384)
Farmer Union Membership	63.162*	63.197*	61.781*	59.896*	48.432*	48.021*	46.312*	46.702*	52.167*	55.960*	17.102	16.637	19.305	18.862
	(34.609)	(34.366)	(33.573)	(34.519)	(26.981)	(26.795)	(26.244)	(27.098)	(29.703)	(31.756)	(26.398)	(26.335)	(26.456)	(25.556)
Private Transfer Receipt	-56.160*	-55.384*	-56.531*	-55.073*	-64.546**	-64.800**	-66.090**	-65.094**	-65.828**	-58.619*	88.110	83.558	86.790	86.962
	(32.556)	(33.060)	(33.637)	(32.788)	(31.263)	(31.459)	(32.064)	(31.436)	(32.557)	(31.219)	(72.675)	(71.430)	(72.766)	(73.519)
Log Gamble Value	3.857	3.720	3.672	3.318	5.891*	5.943*	5.909*	5.689*	5.670*	5.461*	8.541**	8.885**	8.867**	9.212**
	(3.118)	(3.126)	(3.136)	(3.028)	(3.064)	(3.077)	(3.089)	(3.043)	(3.013)	(3.011)	(3.909)	(3.987)	(3.982)	(4.114)
Log of Pesticide Investment				4.167				1.147	1.230	-2.125				-1.893
				(2.763)				(1.890)	(2.073)	(1.310)				(2.434)
Risk Coping 1: Borrow		-93.219*	-105.360**	-103.695**		2.249	-12.359	-10.718	-7.977	-7.733		103.032*	137.514**	137.382**
		(49.019)	(48.257)	(48.184)		(11.914)	(11.226)	(11.157)	(12.038)	(14.104)		(59.008)	(56.036)	(55.749)
Risk Coping 2: Sold land		-11.195	-12.344	-2.016		-37.090	-37.019	-30.569	-33.032	-37.179		-82.997	-75.438	-80.424
		(34.563)	(34.170)	(33.765)		(25.527)	(24.616)	(24.766)	(24.883)	(23.344)		(59.523)	(55.862)	(53.813)
Risk Coping 3: Use Savings		2.551	2.328	8.873		-10.400	-10.326	-4.639	-23.492	16.047		63.894	64.835	66.043
		(23.315)	(23.258)	(25.549)		(23.281)	(23.165)	(23.013)	(37.993)	(18.320)		(66.504)	(66.627)	(63.606)
Risk Coping 4: Did Nothing		18.888	17.889	18.291		40.588	39.212	39.627	35.025	23.730		76.484	79.743	83.007
		(28.045)	(27.414)	(27.795)		(29.984)	(29.202)	(30.022)	(27.776)	(25.221)		(99.983)	(100.885)	(104.042)
Public Transfer Receipt				-50.317				-52.721	-51.700	-40.173				-6.264
				(43.692)				(40.351)	(42.559)	(45.369)				(50.892)
Borrowing Activity			30.492	32.183			36.144	38.257	38.783	27.750			-85.078*	-84.855*
			(24.617)	(25.731)			(22.480)	(23.739)	(24.076)	(22.175)			(47.378)	(46.905)
Any Insurance			11.397	19.704			47.355	56.805	62.053	19.905			-11.521	-12.531
			(17.187)	(23.006)			(34.130)	(38.951)	(44.598)	(21.129)			(15.888)	(17.773)
Designated as Poor	-49.133**	-48.112**	-50.788**	-36.246*	-48.422*	-49.431*	-53.679*	-40.183*	-44.481	-21.806	232.186	228.172	234.806	236.077
	(23.656)	(24.026)	(25.626)	(19.027)	(28.377)	(28.946)	(31.263)	(23.570)	(27.141)	(14.291)	(215.619)	(213.537)	(215.542)	(226.340)
Trust				0.955				-22.628	-29.816*	-26.948				86.951
				(29.186)				(15.472)	(17.429)	(17.682)				(81.640)
Mean Loss									0.037					
									(0.083)					
Loss										0.169				
										(0.396)				
Constant	-446.547**	-434.866**	-455.096**	-494.509**	-536.945	-550.372	-597.981	-601.220	-484.363	-208.442	189.247	161.550	194.434	161.336
	(198.381)	(201.246)	(209.016)	(216.220)	(422.141)	(429.992)	(457.063)	(460.724)	(306.369)	(156.069)	(427.376)	(418.355)	(418.597)	(412.875)
Observations	7,936	7,936	7,936	7,936	9,061	9,061	9,061	8,985	8,000	7,513	8,287	8,287	8,287	8,287
R-squared	0.009	0.01	0.011	0.012	0.01	0.011	0.012	0.013	0.013	0.012	0.003	0.004	0.004	0.004
Number of UID	2,406	2,406	2,406	2,406	2,642	2,642	2,642	2,620	2,405	2,345	2,430	2,430	2,430	2,430
Household FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Commune Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using VARHS data on Stata14.
Notes: Standard Errors clustered at commune level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1
For variables in logs, all values reported as zero replaced by 1 to avoid missing observation.

3.C Robustness Checks for Assumptions in the Chapter

This appendix presents different robustness checks associated with (i) no starting bid assumption for those who failed to play the game, (ii) the assumption around the calculation of relative risk aversion using actual BDM game observations and means only for missing years, (iii) non-responses to the WTP question when we consider missing values to be the same as not interested or zero valuation (iv) relaxing the assumption regarding the behavioural factors for missing years.

Table 3.17: Main results (as discussed in Table 3.10) without the assumption of starting bid of 1000 VND (Households who never play the BDM game are excluded)

Variables	**Differential**	**WTP**	**Risk Premium**
Log of Net Total Income	12.066	41.926	-40.685
	(10.754)	(34.590)	(31.749)
Educational Grade Obtained	5.486	13.945*	4.928
	(4.188)	(7.764)	(4.361)
Age of Household Head	-3.037	-2.319	1.456
	(3.180)	(3.514)	(1.630)
Designated as Poor	-20.228	-42.778	227.147
	(17.480)	(39.056)	(220.680)
Farmer Union Membership	70.009*	50.853	15.264
	(41.012)	(42.249)	(14.939)
Log of Pesticide Investment	4.019	0.431	-2.980
	(3.559)	(2.849)	(2.358)
Risk Coping 1: Borrow	-29.602	-11.960	51.100
	(23.656)	(14.876)	(41.965)
Risk Coping 2: Sold land	-35.726	-38.414	-19.467
	(29.554)	(32.298)	(30.292)
Risk Coping 3: Use Savings	7.703	-9.039	55.660
	(25.054)	(30.311)	(45.221)
Risk Coping 4: Did Nothing	7.025	16.058	112.740
	(42.203)	(41.103)	(100.945)
Private Transfer Receipt	-63.881**	-81.538**	30.078
	(29.282)	(35.539)	(27.699)
Public Transfer Receipt	-32.993	-63.541	-21.242
	(38.835)	(49.769)	(39.982)
Borrowing Activity	18.063	31.495	-35.007
	(22.528)	(28.971)	(26.348)
Any Insurance	16.203	71.696	-16.642
	(17.554)	(49.373)	(18.622)
Mean Loss		0.048	
		(0.279)	
Trust	-14.106	-34.971	43.879
	(23.624)	(22.935)	(35.355)
Log Gamble Value	6.364	11.147**	3.451
	(3.870)	(4.844)	(2.241)
Constant	-259.764	-951.905	748.191
	(219.123)	(738.202)	(488.074)
Observations	6,280	5,541	6,591
R-squared	0.011	0.016	0.006
Number of UID	1,973	1,606	1,997
Household FE	Yes	Yes	Yes
Commune Controls	Yes	Yes	Yes
Time FE	Yes	Yes	Yes

Source: Author calculation using VARHS data on Stata14.
Notes: Standard Errors clustered at commune level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1
Values reported as zero replaced by 1 before deriving logs
Relative Risk Aversion used as a regressor for WTP but omitted in regression.

Table 3.18: Results derived using the alternate approach taking Relative risk aversion as observed values for households who play the gamble and means only in the years when the Gamble was not played. This is different from the earlier approach because there the RRA was always taken as the mean across all the years.

Variables	**Differential**	**WTP**	**Risk Premium**
Log of Net Total Income	17.369*	28.648	-26.025
	(9.134)	(23.380)	(25.010)
Educational Grade Obtained	11.022	14.801*	-1.666
	(7.063)	(7.865)	(6.085)
Age of Household Head	-1.645	-1.145	0.838
	(1.850)	(1.902)	(1.628)
Designated as Poor	-31.736*	-41.490*	162.286
	(16.934)	(24.578)	(155.725)
Farmer Union Membership	55.902*	48.409*	7.267
	(30.255)	(28.203)	(11.347)
Log of Pesticide Investment	3.976	1.042	-3.331
	(2.834)	(1.942)	(2.052)
Risk Coping 1: Borrow	-93.084**	-11.424	111.291**
	(40.270)	(11.700)	(46.358)
Risk Coping 2: Sold land	-19.575	-36.420	-31.991
	(26.293)	(26.488)	(27.882)
Risk Coping 3: Use Savings	-0.033	-5.321	49.202
	(21.360)	(24.356)	(33.068)
Risk Coping 4: Did Nothing	20.365	40.765	66.903
	(26.090)	(30.666)	(72.395)
Private Transfer Receipt	-59.452*	-69.373**	30.416
	(32.161)	(33.385)	(24.197)
Public Transfer Receipt	-36.597	-56.133	-20.284
	(42.707)	(42.855)	(32.926)
Borrowing Activity	33.920	41.213	-40.306*
	(22.774)	(25.393)	(23.513)
Any Insurance	9.671	58.998	3.499
	(20.155)	(40.659)	(17.056)
Trust	-18.028	-24.899	33.514
	(23.726)	(16.416)	(30.336)
Log Gamble Value	3.755	6.295*	4.027*
	(3.061)	(3.310)	(2.137)
Relative Risk Aversion		31.630	
		(33.709)	
Mean Loss		-0.021	
		(0.242)	
Constant	-445.631**	-709.330	549.702
	(180.938)	(537.303)	(353.176)
Observations	8,033	8,365	8,386
R-square	0.012	0.014	0.004
Number of UID	2,403	2,424	2,418
Household FE	Yes	Yes	Yes
Commune Controls	Yes	Yes	Yes
Time FE	Yes	Yes	Yes

Source: Author calculation using VARHS data on Stata14.
Notes: Standard Errors clustered at commune level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1
Values reported as zero replaced by 1 before deriving logs
Relative Risk Aversion used as a regressor for WTP but omitted in regression.

Table 3.19: Results similar to the results in Table 3.18 (alternate approach of taking observed RRA and means RRA for missing years) without the assumption of starting bid of 1000 VND (Households who never play the BDM game are excluded)

Variables	**Differential**	**WTP**	**Risk Premium**
Log of Net Total Income	17.369*	28.648	-26.025
	(9.134)	(23.380)	(25.010)
Educational Grade Obtained	11.022	14.801*	-1.666
	(7.063)	(7.865)	(6.085)
Age of Household Head	-1.645	-1.145	0.838
	(1.850)	(1.902)	(1.628)
Designated as Poor	-31.736*	-41.490*	162.286
	(16.934)	(24.578)	(155.725)
Farmer Union Membership	55.902*	48.409*	7.267
	(30.255)	(28.203)	(11.347)
Log of Pesticide Investment	3.976	1.042	-3.331
	(2.834)	(1.942)	(2.052)
Risk Coping 1: Borrow	-93.084**	-11.424	111.291**
	(40.270)	(11.700)	(46.358)
Risk Coping 2: Sold land	-19.575	-36.420	-31.991
	(26.293)	(26.488)	(27.882)
Risk Coping 3: Use Savings	-0.033	-5.321	49.202
	(21.360)	(24.356)	(33.068)
Risk Coping 4: Did Nothing	20.365	40.765	66.903
	(26.090)	(30.666)	(72.395)
Private Transfer Receipt	-59.452*	-69.373**	30.416
	(32.161)	(33.385)	(24.197)
Public Transfer Receipt	-36.597	-56.133	-20.284
	(42.707)	(42.855)	(32.926)
Borrowing Activity	33.920	41.213	-40.306*
	(22.774)	(25.393)	(23.513)
Any Insurance	9.671	58.998	3.499
	(20.155)	(40.659)	(17.056)
Trust	-18.028	-24.899	33.514
	(23.726)	(16.416)	(30.336)
Log Gamble Value	3.755	6.295*	4.027*
	(3.061)	(3.310)	(2.137)
Relative Risk Aversion		31.630	
		(33.709)	
Mean Loss		-0.021	
		(0.242)	
Constant	-445.631**	-709.330	549.702
	(180.938)	(537.303)	(353.176)
Observations	8,033	8,365	8,386
R-square	0.012	0.014	0.004
Number of UID	1,973	1,606	1,997
Household FE	Yes	Yes	Yes
Commune Controls	Yes	Yes	Yes
Time FE	Yes	Yes	Yes

Source: Author calculation using VARHS data on Stata14.
Notes: Standard Errors clustered at commune level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1
Values reported as zero replaced by 1 before deriving logs
Relative Risk Aversion used as a regressor for WTP but omitted in regression.

Table 3.20: Results estimated for the assumption for non-response in WTP. All missing WTPs (6 percent) are assumed to be not interested/zero valuation. Results here include assumption for starting bid of 1000 VND.

Variables	**Differential**	**WTP**	**Risk Premium**
Log of Net Total Income	31.223**	30.574	-25.762
	(14.835)	(22.954)	(24.932)
Educational Grade Obtained	8.726	12.449*	0.669
	(6.586)	(7.015)	(6.076)
Age of Household Head	-1.366	-1.059	1.018
	(1.795)	(1.809)	(1.618)
Designated as Poor	-55.907	-45.798	162.380
	(35.652)	(28.604)	(155.710)
Farmer Union Membership	53.521*	45.661*	5.396
	(28.832)	(26.156)	(11.332)
Log of Pesticide Investment	0.758	-0.029	-2.942
	(3.283)	(1.873)	(1.918)
Risk Coping 1: Borrow	-60.370**	-11.486	80.624**
	(30.392)	(11.092)	(40.012)
Risk Coping 2: Sold land	-26.978	-36.302	-36.773
	(33.926)	(27.591)	(26.541)
Risk Coping 3: Use Savings	4.021	-2.896	42.401
	(22.440)	(22.165)	(32.995)
Risk Coping 4: Did Nothing	36.240	40.667	64.159
	(28.270)	(29.865)	(72.357)
Private Transfer Receipt	-68.789**	-69.453**	29.642
	(33.785)	(33.411)	(24.006)
Public Transfer Receipt	-40.915	-49.280	-12.544
	(39.996)	(38.641)	(33.090)
Borrowing Activity	44.625*	43.056*	-41.034*
	(23.595)	(24.678)	(22.845)
Any Insurance	64.217**	71.521**	-7.714
	(31.787)	(35.802)	(16.537)
Trust	-8.897	-25.076	25.348
	(19.966)	(15.905)	(27.756)
Log Gamble Value	4.640	5.574*	4.187**
	(2.964)	(3.060)	(2.005)
Mean Loss		-0.042	
		(0.234)	
Constant	-724.002**	-669.141	533.271
	(302.644)	(466.632)	(351.159)
Observations	8,363	8,700	8,386
R-square	0.013	0.013	0.004
Number of UID	2,414	2,432	2,418
Household FE	Yes	Yes	Yes
Commune Controls	Yes	Yes	Yes
Time FE	Yes	Yes	Yes

Source: Author calculation using VARHS data on Stata14.
Notes: Standard Errors clustered at commune level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1
Values reported as zero replaced by 1 before deriving logs
Relative Risk Aversion used as a regressor for WTP but omitted in regression.

Table 3.21: Regressions for only the sample reporting positive losses, having loss as the current value and not the mean

Variables	**Differential**	**WTP**	**Risk Premium**
Log of Net Total Income	37.736*	6.750	-130.025
	(20.348)	(13.225)	(91.979)
Educational Grade Obtained	1.271	4.133**	5.023
	(4.189)	(2.071)	(11.544)
Age of Household Head	-0.782	-5.168	-4.649**
	(4.413)	(4.036)	(2.361)
Designated as Poor	-13.318	2.649	17.986
	(27.277)	(5.301)	(42.401)
Farmer Union Membership	26.586	9.630	-17.939
	(19.783)	(12.571)	(24.882)
Log of Pesticide Investment	4.253	-0.500	-26.020
	(5.928)	(0.813)	(21.220)
Risk Coping 1: Borrow	-52.254	-44.697	277.827
	(50.816)	(31.099)	(204.503)
Risk Coping 2: Sold land	-32.324	5.028	-18.840
	(93.827)	(20.671)	(125.628)
Risk Coping 3: Use Savings	7.675	25.628	203.149
	(39.095)	(21.731)	(208.548)
Risk Coping 4: Did Nothing	12.814	-8.957	-41.789
	(16.214)	(8.094)	(55.027)
Private Transfer Receipt	-33.052**	-6.465	-21.703
	(15.966)	(5.081)	(49.227)
Public Transfer Receipt	-9.514	-5.379	153.376
	(17.813)	(6.880)	(229.553)
Borrowing Activity	25.514	35.947	-108.892
	(35.291)	(24.235)	(152.056)
Any Insurance	-68.252	-29.059	-5.082
	(58.000)	(48.883)	(65.642)
Savings Activity	4.323	-13.444	107.766
	(28.539)	(12.490)	(179.739)
Mean Loss		4.413	
		(2.860)	
Constant	928.326	1,768.374	2,920.140*
	(1,647.871)	(1,577.691)	(1,714.324)
Observations	2,069	2,092	2,167
R-squared	0.127	0.290	0.022
Number of UID	1,286	1,303	1,336
Household FE	Yes	Yes	Yes
Commune Controls	Yes	Yes	Yes
Time FE	Yes	Yes	Yes

Source: Author calculation using VARHS data on Stata14.
Notes: Standard Errors clustered at commune level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1
Values reported as zero replaced by 1 before deriving logs
Relative Risk Aversion used as a regressor for WTP but omitted in regression.

Table 3.22: Results estimated on original values for behavioural factors. Here, the results relax the assumption made for taking mean values for behavioural variables in 2008 and 2016.

Variables	**Differential**	**WTP**	**Risk Premium**
Trust	-13.516	-28.560	8.872
	(21.645)	(18.705)	(20.900)
Log of Gamble Value	3.883	6.378*	4.911**
	(3.067)	(3.432)	(2.289)
Constant	83.423	-673.352	-428.152
	(238.662)	(740.930)	(475.456)
Observations	5,292	5,470	5,502
R-squared	0.021	0.025	0.018
Number of UID	2,311	2,341	2,337
Household Controls	Yes	Yes	Yes
Household FE	Yes	Yes	Yes
Commune Controls	Yes	Yes	Yes
Time FE	Yes	Yes	Yes

Source: Author calculation using VARHS data on Stata14.
Notes: Standard Errors clustered at commune level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1
Values reported as zero replaced by 1 before deriving logs

Lastly, due to the nature that substantial mass of WTP data is centred at zero, an additional Tobit regression is conducted. The tobit regression is left-censored with 98.58 percent observations in the dependent variable. The robustness check is in line with the main results in Table 3.10 and confirm that WTP is positively related to the measure of over-confidence, denoted by the log of gamble value and negatively related to the receipt of private transfers.

Table 3.23: Tobit Results for Willingness to Pay

	WTP (1)
Log of Net Total Income	348.469
	(293.821)
Educational Grade Obtained	341.062***
	(85.539)
Age of Household Head	10.310
	(19.276)
Designated as Poor	-756.866
	(968.181)
Farmer Union Membership	478.562
	(481.375)
Log of Pesticide Investment	-13.060
	(48.793)
Risk Coping 1: Borrow	734.604
	(1,119.581)
Risk Coping 2: Sold land	2,107.027
	(3,196.549)
Risk Coping 3: Use Savings	-421.900
	(997.638)
Risk Coping 4: Did Nothing	-221.143
	(637.988)
Private Transfer Receipt	-1,378.104***
	(475.834)
Public Transfer Receipt	-877.640*
	(521.362)
Borrowing Activity	642.140
	(491.887)
Any Insurance	-172.894
	(927.567)
Trust	-810.387
	(694.437)
Log Gamble Value	249.620***
	(88.717)
Mean Loss	-19,401.282***
	(6,629.072)
Observations	8,702
Commune Controls	Yes
Time FE	Yes

Source: VARHS data. Standard error in parentheses. ***, **, * represent significance at the 1%, 5% and 10%, respectively.

Chapter 4

Conned by a Cashback? Disclosure, Nudges and Consumer Rationality in Mortgage Choice

4.1 Introduction

Cashback offers are employed by banks to encourage consumers to sign-up to mortgages and credit cards. Cashback is a form of upfront payment in cash as a reward given to consumers choosing a mortgage or credit card from a particular bank. Cashback benefits are a feature of 44 percent of mortgage products in Canada, 51 percent of mortgages in Ireland and 54 percent of mortgages in the United Kingdom (UK), while the proportion of credit cards with a cash back feature ranged between 40 percent and 85 percent in Australia, Canada, New Zealand, the UK and the United States.[1] However, products with cashback features are typically associated with higher interest rates and higher total cost of borrowing. We study consumer preferences for expensive cashback mortgages in Ireland, where the average cashback mortgage is €32,000 more expensive over 30 years.[2] To do this, we conduct a series of parallel experiments with an online representative panel. This enables us to explore the behavioural causes of mortgage choice, and estimate the impact of advanced, behaviourally informed disclosures, and bank marketing on consumer preferences.

The standard expected utility model assumes that informed rational consumers evaluate all options available in the market and choose an option that results in the lowest overall cost, implying that

[1] A survey of products from Australia, Canada, Ireland, New Zealand, the UK and the US was conducted in the summer of 2018. Specifically, we surveyed six top banks in Canada, all banks in Ireland and thirteen top mortgage providers in the UK.

[2] This difference is estimated for a mortgage of €300,000 for house price of €350,000 using interest rates prevailing in Irish mortgage market in July, 2018.

banks, aware of consumer rationality, will compete to provide the lowest cost products (Barr et al., 2008). However, the mortgage market is the perfect setting for asymmetric information and information failures, where not-so-informed consumers interact with skilled and well-informed sellers (Woodward and Hall, 2012). Differences in consumer knowledge, search costs, or ability to comparison shop can lead to a multi-price market equilibrium in which less-informed consumers pay higher average prices than more-informed consumers (Salop and Stiglitz, 1977; Salop, 1977; Wilde and Schwartz, 1979; Gabaix and Laibson, 2006).

The negative effect of information mismatch between mortgage buyers and sellers is aggravated by cognitive behavioural biases. As suggested by De Meza et al. (2008), financial capabilities and literacy do not guarantee pareto-efficient outcomes because the decision of people regarding financial options may severely depend on their behavioural and psychological attributes. Even with a full set of information, consumers make sub-optimal long-run decisions; often getting lost in overwhelming amount of market options, and making predictable mistakes (Thaler, 1985; Barr et al., 2008; Estelami, 2001). Other customers engage in heuristic decision making by picking the most striking attribute of a loan (Perry and Lee, 2012). Compounding this, the presence of mandated disclosure sometimes leads consumers to make a strong assumption that the state has undertaken all necessary steps to protect their interests (Warren, 2008).

Exacerbating these consumer heuristics is behaviourally informed marketing by banks. Advertising can encourage consumers to become distracted by certain product characteristics, such as cashback benefits, without proper comparison of the total cost of products, leading to costlier product choice (Rowe et al., 2015; CCP, 2017). By focusing the minds of customers on cashbacks, and the supposed personal and emotional benefits of such cashbacks, often through attractive television or internet advertising, banks engage in a form of negative nudging that may take advantage of low levels of financial literacy. Evidence exists on the effectiveness of marketing practices that use enticing terminology to obscure terms and conditions of the products (Caskey, 1994; Mendel, 2005; Bertrand et al., 2006).

The sophisticated and well research marketing campaigns by banks stands in contrast to the hands-off approach to information framing by regulators, who pursue a policy of mandatory disclosure. Disclosure policy is designed to achieve informed customers though mandatory disclosure of product attributes and conditions at the point of sale, and typically extend to a number of pages of dense text (Sunstein, 1998; Lacko and Pappalardo, 2010; Agarwal and Mazumder, 2013). The evidence on the effectiveness of current mandatory disclosures is weak. The randomised experiment conducted by Shu (2010) reveals that few participants were able to answer questions about future expected monthly payments when given information as per the Truth in Lending Act (TILA) disclosure in the US. Further, an assessment conducted by UK's Financial Services Authority in 2005 suggested that consumers do not read the Key Features Document (KFD); the document that explains the main points of a financial product. The FSA concluded that this may be due to factors such as; uncertainty

regarding the exact role of KFD document, consumer perception that the KFD is boring, impenetrable and confusing, and consumer preferences for simple verbal advice (FSA, 2005).

In contrast, emerging research has shown that advanced well-designed disclosures, informed by behavioural economics, can help consumers towards better decision-making. Lacko and Pappalardo (2010) provide experimental evidence on the performance of a simplified prototype disclosure against the mandated disclosure under the guidelines of Truth in Lending Act (TILA) and Good Faith Estimate of Settlement Costs (GFE) in the US.[3] Individuals who were treated with a simplified prototype disclosure answered 70 percent of mortgage questions correctly, as compared to only 29 percent correct answers for participants with the TILA and GFE disclosure documents.

Employing choice experiments, the literature shows that behaviourally informed disclosures, often very simple, that are presented at the point of purchase affect consumer decision making. Bertrand and Morse (2011) suggests that cost of payday loans displayed in simple monetary terms reduced the take-up of payday loans by 10 percent. Hastings and Tejeda-Ashton (2008) found that presenting fees for consumers' public pension accounts in pesos instead of annual percentage rates allowed financially illiterate participants in Mexico to select funds with lower average fees. Agarwal et al. (2014) found, using a difference in difference design, that the US CARD Act requirement to disclose the interest savings from paying off balances in 36 months rather than only making minimum payments, improvement repayment.

In this paper, we conduct three parallel mortgage choice experiments on a representative online sample in Ireland. A total of 3,000 adults are surveyed, and we define an important subsample, prospective buyers, as those who declare themselves within 15 years of buying a house or taking out a mortgage. Comprising 1,135 respondents, this subsample is of particular interest from a regulatory policy perspective. In the first experiment the mortgage cashback is 2 percent at the point of drawdown. In the second experiment, the cashback is 2 percent at the point of drawdown, but the amount of deposit for no-cashback mortgage is adjusted downwards so that both mortgage choices in the experiment are effectively identical from a short-term liquidity perspective. In experiment three, the cashback is broken down into to 1 percent immediately and 1 percent 12 months after drawdown, again mirroring a product on the Irish mortgage market. Before moving to the core questions addressed in this paper, consumer choices of hypothetical mortgages in the experiment allows us to explore whether; (i) consumers suffer from behavioural biases (present bias, overconfidence, and riskiness) when choosing mortgages, (ii) if limited attention bias increases the likelihood that expensive mortgage is chosen, and (iii) if framing in marketing towards staggered payment of cashback is effective against one-time cashback.

[3]The TILA statement discloses annual percentage rate, finance charge, amount financed, total payments and payment schedule, charges for optional credit insurance, any late payment fees, and any pre-payment penalty that might apply. The GDE discloses several dozen individual settlement costs (Lacko and Pappalardo, 2010).

The core of this chapter attempts to explore the impact of two treatments in the choice of cashback mortgage. Treatment 1 assesses the impact of advanced disclosure on the choice of cashback mortgage. This intervention mirrors the efforts of some price comparison websites to indicate directly the lowest cost option and present cost differential with the cheapest for each loan. We provide this information at the point of decision and term this an 'advanced disclosure' as it would take an upgrading of current disclosure regulation to force banks and mortgage brokers to provide a comparison table, either physically or electronically, of all products available. On the other hand, Treatment 2 is very basic promotional marketing that is expected to encourage respondents to choose cashback mortgage. We call this negative marketing nudge, more commonly referred to as 'sludge' that can encourage self-defeating behaviour, such as investing in a deal that is too good to be true (Thaler, 2018).

The chapter tests two main hypotheses; (i) advanced disclosure alters consumer preferences towards non-cashback mortgage, and (ii) promotional marketing acts as a negative nudge towards the choice of cashback mortgage. Furthermore, the exogenous variation generated in the experiments allow us to explore four sub-hypotheses to test if the treatments have heterogeneous effect across different behavioural or demographic features of the respondents. The four sub-hypotheses fall under the Hypothesis 1 and 2 and are as follows; (i.i) advanced disclosure is significantly more effective on respondents who are present bias and not for those who are cash-constrained, (i.ii) advanced disclosure is significantly more effective on respondents identified as suffering from limited-attention bias, (ii.i) negative nudge is significantly more effective on respondents who suffer from present-bias, and (ii.ii) negative nudge is significantly more effective on respondents who are younger.

The chapter finds evidence for the effectiveness of Treatment 1, where advanced financial disclosure is effective in turning consumers away from costly cashback mortgages. We believe our findings provide a rationale for regulators to engage in behaviourally informed advanced disclosure interventions. For the second hypothesis on marketing negative nudge, we find that this 'sludge' is significantly more effective at encouraging prospective house buyers into choosing cashback mortgages. We consider this a lower bound affect, as our text-based negative nudge simply cannot compete with expensive video-based advertising on television or the internet used by banks. Moreover, by exploiting the heterogeneous variation across different behavioural and demographic attributes, we confirm that both treatments are more effective on present bias respondents. We find no evidence if the degree of cash-constrain or age affects the choice of cashback mortgage when respondents are treated with advanced disclosure and negative marketing nudge respectively. However, age is found to be a significant predictor for the effectiveness of advanced disclosure on the choice of cashback mortgage.

In addition to these core results, the chapter suggests significant relationship across different socioeconomic, demographic and behavioural factors with the choice of cashback mortgage. First, we find that consumers who are younger and less educated are more likely to choose a cashback mortgage.

Behaviourally, we find robust evidence that consumers who suffer present bias are more likely to choose costly cashback mortgages. Second, we find that consumers who demonstrate limited attention bias have a positive relationship with the choice of cashback mortgage irrespective of the fact that immediate financial position of the consumer remains unaffected by opting the offer of cashback benefit. Third, we find that framing of one single cashback into two smaller cashbacks, with half delayed for one year increases the likelihood for choice of cashback mortgage.[4] Further, we find that the choice of mortgage offering one-time cashback against staggered cashback payment (half delayed by one year) is sensitive to the gender of respondent.

This paper contributes to the literature on consumer protection and advanced disclosure. Building on assessments of the effectiveness of first generation disclosure policy (e.g. TILA, GFE, KFD, etc.), this paper adds to the aforementioned literature on advanced disclosure (Lacko and Pappalardo, 2010; Bertrand and Morse, 2011; Shu, 2010). The study is also closely related to experiments testing the comprehensibility of information presentation and its impact on consumer choice (Hastings and Tejeda-Ashton, 2008; Seira et al., 2017; Anagol et al., 2017). Moreover, the effectiveness of advanced disclosure indicates that the mere availability of information under mandated disclosure does not guarantee informed decision making because psychological attributes and market competition deviate consumers from the neo-classical predictions of rational choice.

We contribute to empirical literature on the role of behavioural biases in the choice of financial products. Our results corroborate with the findings of Gathergood and Weber (2017); Agarwal et al. (2016) and Miles (2004), each of which highlight the role of present-bias in mortgage choice. Of particular interest is the similarity of our results with the findings of Gathergood and Weber (2017), where present-bias and financial literacy are recorded as key determinants for the choice of expensive Alternative Mortgage Products (AMP) in the UK. Further, our assessment of limited attention bias as a determinant of sub-optimal financial choice contributes to the literature on the limited processing power of consumers in making financial decisions, as highlighted in Hirshleifer and Teoh (2003); Brown et al. (2010); Einav et al. (2014); Gabaix and Laibson (2006) and Maines (1995).

Lastly, our findings contribute to the literature on financial stability. The financial crisis that began in the US in 2007 was, in part, caused by poor regulation of the mortgage market at the point of sale. Literature has documented how misaligned incentives and poor decision making played a key role for the sub-prime crisis in the US (Agarwal and Mazumder, 2013; Frydman and Camerer, 2016). While the central role of sub-prime mortgages in the US crisis is well established, mortgages sold in Greece, Ireland, Hungary, the Philippines, Mexico and Thailand played a role in undermining financial stability; each having average default rates between 2000 and 2014 of greater than 5 percent (Stanga et al., 2017). Irrespective of what lies behind the different default rates, and a different strand

[4]This result holds for the analysis conducted on the full sample and sub-sample of *mortgage market* (respondents who have purchased/or are interested to purchase house/mortgage in +/-15 Years). However, the results do not hold for the subsample of *prospective buyers* (respondents who report to purchase house/mortgage in next 15 years).

of the literature explores this very question, what is undeniable is that the financial stability of the household sector is directly linked to the overall stability of the financial system. In situations, were sizable portions of customers, and in this case customers with lower levels of financial capability, are unduly choosing higher priced mortgages, risk is being concentrated in certain mortgage types. In situations as in Canada, Ireland and the UK where some banks are offering only cashback mortgages, risk is being concentrated in certain, perhaps systemically important banks.

The remainder of this paper is organised as follows. In Section 4.2, we discuss the background of cashback financial products in Ireland and elsewhere. In Section 4.3, we discuss the conceptual framework for the mechanisms behind mortgage choice and the role of behavioural biases. The study design and methodology is discussed in Section 4.4, and Section 4.5 reports the summary statistics obtained from the survey. The results of the study are discussed in Section 4.6, and the paper concludes in Section 4.8.

4.2 Background

4.2.1 Mortgages

Cashback features play a dominant role in the mortgage markets of Canada, Ireland and the United Kingdom.[5] Cashback benefits were a feature of 44 percent of mortgage products in Canada, 51 percent of mortgages in Ireland and 54 percent of mortgages in the UK.[6] In Canada, cashback benefits typically involved between 0.6 percent to 7 percent of the loan amount, while in Ireland cashback benefits typically involved 2 percent of the loan amount.[7] As compared to Canada and Ireland, cashback benefits were lower in the UK, ranging from £250 to £1,000; however, cashback offers have been rising between 2017 and 2018.

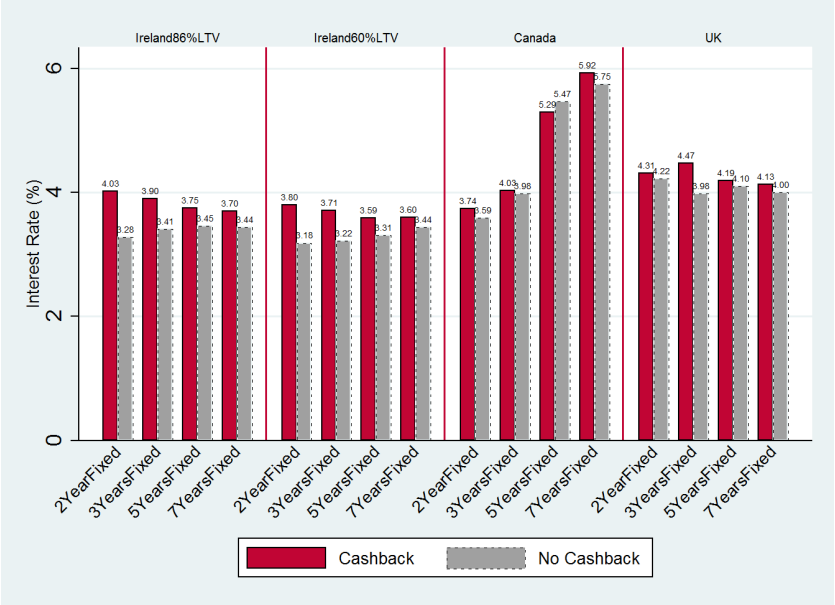
Analysis of mortgage rates in each country in the summer of 2018 showed that cashback mortgages are characterised by higher interest rates and higher total costs over the lifetime of the mortgage. We found that interest rates for cashback mortgages were on average 0.05 percent higher in Canada, 0.40 percent higher in Ireland and 0.20 percent higher in the UK. Figure 4.1 provides an overview of interest rates by mortgage type for the set of banks that make up over 80 percent of market share in Canada, Ireland and the UK, differentiated by whether the mortgage had a cashback feature. We present the interest rates for 60 percent loan-to-value (LTV) and 86 percent LTV for Ireland.

[5] We did not find this feature in other markets although there was evidence of cashback mortgages in India offered by ICICI bank.

[6] A survey of products from Australia, Canada, Ireland, New Zealand, the UK and the US was conducted in the summer of 2018. Specifically, we surveyed six top banks in Canada, all banks in Ireland and thirteen top mortgage providers in the UK.

[7] Source: Author's recording of cashback features from bank websites during the summer of 2018.

Figure 4.1: Mean interest rates for Cashback and non-Cashback products in Canada, Ireland and the UK



Source: Author's recording of cashback features from bank websites during the summer of 2018.

The interest rates charged leads to significantly higher overall costs for cashback mortgages. For a representative mortgage[8] in each country we found that the average cash back product was CAN $6,729 more expensive in Canada, €32,207 more expensive in Ireland, and £10,635 more expensive in the UK for the overall period of mortgage, as shown by the simple difference between the mean total amount payable between cashback and non-cashback mortgage (see Table 4.1).[9] The cost analysis for different categories of fixed rate mortgages provides further disaggregation of cost differential between cashback and non-cashback loans. As shown in Table 4.1, the mean difference can be as high as €54,615 for 1 year fixed rate loans in Ireland, £31,300 for 3 year fixed rate loans in the UK, and CAN $18,180 for 4 year fixed rate loans in Canada.

Moreover, the difference between the mean total amount payable for cashback and non-cashback mortgages, taking into account the current and net present value of cashback with mean lending rates to €25,500 and €21,262 for Ireland, and £10,260 and £9,974 for the UK respectively.[10] Our

[8]The representative mortgage in each country includes the average cost of mortgages across all types of mortgage products offered in the market (eg: 1 Year Fixed, 2 Year Fixed, etc.). The duration of these mortgages is 30 years and mortgage amount is 300,000 (LTV of 86 percent) in respective currencies for the countries considered.

[9]The numbers represent 86 percent Loan to Value for a loan of 300,000 in respective currencies over 30 years.

[10]The net present value of cashbacks is calculated with average lending rates derived from the mean of mortgage interest rates for all categories in Canada, Ireland, and the UK available in July, 2018. For Ireland, the category of 'variable mortgages' was also used in the calculations (in addition to fixed rate categories of mortgage). The NPV of cashback represents the cost of loan if the same amount of loan as cashback is borrowed for 30 years.

Table 4.1: Cost Differential between Cashback and Non-cashback products in Canada, Ireland and the UK compiled by authors in the Summer of 2018

Country and Loan Attributes		**Simple Difference (No Cashback)**			**Difference Including cashback Benefits**	
Country	**Mortgage term**	**Mean Total Amount Payable (Cashback)**	**Mean Total Amount Payable (Non-Cashback)**	**Simple Difference**	**Difference including Cashback Benefits***	**Difference Including NPV of Cashback**
Average across All Mortgage Categories						
Canada	All Categories	$569,185.90	$562,457.10	$6,728.75	-$6,390.36	-$17,907.91
Ireland	All Categories	€511,675.81	€479,467.87	€32,207.96	€25,499.40	€21,262.17
UK	All Categories	£532,230.50	£521,595.70	£10,634.79	£10,259.74	£9,974.53
1 Year Fixed						
Canada	1 Year Fixed	$484,365.60	$479,649.10	$4,716.50	-$11,284.00	-$25,330.39
Ireland	1 Year Fixed	€520,333.10	€465,717.40	€54,615.72	€47,562.39	€42,985.59
UK	1 Year Fixed	NA	NA	NA	NA	NA
2 Year Fixed						
Canada	2 Year Fixed	$499,552.20	$487,542.30	$12,009.84	-$3,990.16	-$18,037.05
Ireland	2 Year Fixed	€517,341.10	€479,503.80	€37,837.34	€30,855.31	€26,324.83
UK	2 Year Fixed	£534,787.20	£528,135.40	£6,651.81	£6,225.25	£5,900.864
3 Year Fixed						
Canada	3 Year Fixed	$515,337.00	$514,606.10	$730.88	-$12,602.50	-$24,308.2
Ireland	3 Year Fixed	€512,441.70	€483,686.50	€28,755.22	€21,826.99	€17,331.75
UK	3 Year Fixed	£546,433.10	£515,132.80	£31,300.38	£30,944.13	£30,673.21
4 Year Fixed						
Canada	4 Year Fixed	$558,836.30	$540,655.90	$18,180.38	$7,680.38	-$1,537.895
Ireland	4 Year Fixed	€487,365.30	€480,320.40	€7,044.91	€1,044.91	-€2,848.40
UK	4 Year Fixed	NA	NA	NA	NA	NA
5 Year Fixed						
Canada	5 Year Fixed	$599,071.70	$615,929.60	-$16,857.90	-$28,857.90	-$39,393.04
Ireland	5 Year Fixed	€505,753.40	€483,475.10	€22,278.25	€15,338.21	€10,834.99
UK	5 Year Fixed	£528,811.00	£522,349.90	£6,461.06	£6,068.64	£5,770.21
7 Year Fixed						
Canada	7 Year Fixed	$642,187.40	$630,262.90	$11,924.50	-$75.50	-$10,610.67
Ireland	7 Year Fixed	-	€490,463.10	-	-	-
UK	7 Year Fixed	£525,012.60	£521,410.40	£3,602.13	£3,302.13	£3,073.98
10 Year Fixed						
Canada	10 Year Fixed	$684,951.00	$668,553.90	$16,397.06	$4,397.06	-$6,138.10
Ireland	10 Year Fixed	€514,341.30	€484,143.5	€30,197.84	€24,197.84	€20,304.54
UK	10 Year Fixed	£526,108.40	£520,949.80	£5,158.56	£4,758.56	£4,454.38
Variable Interest Rates						
Canada**	Variable	NA	NA	NA	NA	NA
Ireland	Variable	€524,154.80	€479,428.40	€44,726.41	€37,670.13	€33,901.88
UK***	Variable	NA	NA	NA	NA	NA

Canadian Figures are in Canadian Dollar (CAN $)
*: Any small benefits offered with non-cashback mortgages are not included. If included, this would lead to cashback products being even less attractive.
**: All cashback mortgages in Canada were fixed term mortgages.
***: As only one variable mortgage product offered cashback in the UK, the comparison was deemed invalid

analysis shows that cashbacks play a different role in the Canadian mortgage market. In Canada, when the value of the cashback is taken into consideration, cashback mortgages are cheaper by CAN $6,390 and by CAN $17,908 when the net present value is used. While this suggests that cashbacks play a different role in Canada, it may not be surprising given that Canadian mortgage market is heavily dominated by cashback offers.

One-time cashbacks at drawdown are not the only rewards offered by banks. In Ireland, Permanent TSB offers 2 percent cashback on the monthly deposits until 2027, in addition to 2 percent cashback on the total amount of mortgage at drawdown. Further, Bank of Ireland (BOI) operates a loyalty scheme for its customers where BOI account holders receive 1 percent additional cashback at the end of five years. Other banks such as KBC and Ulster do not offer immediate cashback; though provide benefits such as legal fees and home insurance. Table 4.2 describes the full set of mortgage offers in Ireland in the summer of 2018, where three banks (BOI, PTSB, EBS) offer cashbacks on their mortgages and three do not (KBC, Ulster, and AIB).

Table 4.2 illustrates that Banks that do not engage in cashback mortgages do offer other smaller benefits. For a €300,000 mortgage with 2 percent cashback the consumer receives €6,000 in cash at drawdown, and this compares to possible benefits in the range of €1,500 to €3,000 for some of the other banks.

Table 4.2: Mortgage Options in Ireland, Summer 2018

Bank	**Mortgages in Ireland, Summer 2018**
	Cashback
BOI	2% Immediately and 1% at the end of 5 years +€2,000 interest top-up on Savings (Only for FTBs)
EBS	2% cashback.
PTSB	2% Immediately +2% on monthly cashback on payments every month until 2027
	No-Cashback
Ulster Bank	€1,500 towards the legal fees.
KBC	No immediate cashback. €3,000 towards the legal fees and 50% off on Home Insurance for 1 Year (new residential mortgages)
AIB	No cashback for buyers. €2,000 bonus for switching your mortgage.

Regulatory authorities have raised concerns about cashback mortgages.[11] However, initial concerns have focused on the potential for using cashbacks to circumvent loan-to-value guidelines. In Canada, the office of Superintendent of the Financial Institutions (OSFI) warned in 2017 that cashbacks should not be considered as part of down payment, recommending that mortgage default insurers should not underwrite loans that use cash back for a down payment. In Ireland, when cashbacks emerged in the market in 2015, the first concern of the Central Bank was whether banks were turning to cashbacks to help customers overcome the new limits on LTV ratios.

Concern has been expressed in the UK about consumer inability to choose the lowest cost mortgages when subjected to marketing about cashback mortgages. In a review of the mortgage market in 2015,

[11] Our research found multiple mentions of concerns on the impact of cashback mortgages on consumers in the media in Canada, Ireland and the UK.

the UK Financial Conduct Authority (FCA) suggested that such is consumer appetite for cashbacks and rewards that many consumers were willing to consider mortgage products without understanding the full cost of the mortgage (Rowe et al., 2015).

In 2017 a report commissioned by the Irish Competition and Consumer Protection Commission (CCPC) argued that consumers cannot properly assess mortgage product and often make poor choices, an issue exacerbated by the introduction of additional elements such as up-front cashback offers and loyalty discounts (CCP, 2017). Despite calls within political circles in Ireland to ban cashback mortgages, the furthest regulators have gone is the tightening up of the marketing rules around cashback mortgages.

It is possible that sophisticated consumers choose cashback mortgages before switching to other products when their contract allows. While we cannot rule out this strategic behaviour, we have reasons to believe that this phenomenon is likely to be very small. First, households that choose a cashback mortgage have lower levels of financial literacy and lower levels of attention. Second, very few Irish households switch mortgages; the Market Monitoring Survey 2015 from the European Commission[12] showed that 3.3 per cent of mortgage holders in Ireland switched their mortgage in 2014. Third, and related to the previous point, levels of mortgage switching are more likely motivated by notable differences in new advertised interest rates, often within the same bank, that do not automatically apply to existing mortgages.

In our data we find that around 27 percent respondents stated their willingness to change mortgage in first two years. However, willingness to change mortgage was uncorrelated with the choice of cashback. Furthermore, there is a significant and positive correlation between willingness to change mortgage and desire to avoid paperwork related to household bills. This indicates that although there is a preference for changing mortgage in first two years for some respondents, the level of subsequent switching may be less significant.

4.2.2 Credit Cards

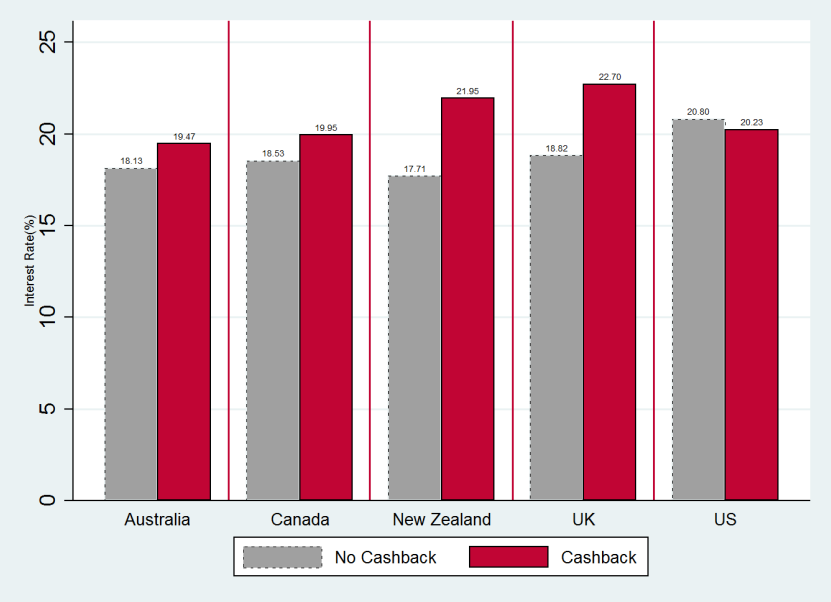
We examined credit card markets in six countries, focusing on credit cards from banks that enjoyed between 80 and 90 percent of the total market, and found a similar pattern of more expensive products with cashback features in most of the countries we looked at. Cards were deemed to have a cashback feature if they offer cashback as a percentage of purchases or points that can be used to redeem cash. All other cards including cards that offered points redeemable on airlines or for hotel groups are included in the non-cashback category. Interest rates were higher for cash back credit cards in Australia (1.34% higher)[13], Canada (1.42% higher), New Zealand (4.24% higher) and the UK

[12] 2015 Consumer Market Monitoring Survey Report. Retrieved from: http://ec.europa.eu/consumers/consumer_evidence/consumer_scoreboards/market_monitoring/index_en.htm

[13] Australian rewards cards use a points system whereby points are rewarded when the card is used on eligible purchases. Depending on the card, you can redeem the points for items such as travel and shopping discounts, gift cards as well as cash. Other cards offer cashback as a percentage of your spending, in the same manner as the rest of the countries do.

(3.92% higher). The US is the exception to the rule, with cashback credit cards slightly cheaper than non-cashback cards. Bank-customer relationships in the US are much more hierarchal than in other countries with more and more benefits, including lower interest rates, offered to credit worthy high-end clients (see Figure 4.2)[14]

Figure 4.2: Mean interest rates for Cashback and non-Cashback Credit cards in selected Countries



Source: Author's recording of cashback features from bank websites during the summer of 2018.

Cashback credit cards raise a concern for consumer protection as one of the hidden agendas for banks is to encourage consumers to spend more on purchases, often leading to excessive and addictive spending.[15] For a particular cashback credit card in the US, it was found that for an average cashback benefit of $25, the average card spending increased by $68 per month for the first quarter the cashback programme was introduced. As a consequence the average level of debt on cards increased by $115 (Agarwal et al., 2010).[16] Furthermore, the increase in spending and debt on cashback credit cards was persistent in the long-run, averaging around $67 and $197, per month over the nine month period after the introduction of cashback cards.

[14] Are elite Cards worth it? by Tony Mecia, published in creditcards.com on August, 21, 2016. Retrieved from: https://www.creditcards.com/credit-card-news/elite-credit-cards-1277.php.

[15] 'Think About It: Why Would The Credit Card Company Give You Cash Back?' by Jim Wang. Retrieved from: https://www.businessinsider.com/are-cash-back-credit-cards-worth-it-2012-1?IR=T

[16] Agarwal et al. (2010) used a proprietary account-level data, taken from a large US financial institution that issues credit cards nationally (name not disclosed).

4.3 Theories of Mortgage Choice

4.3.1 Classical Economic Theory

The standard expected utility model assumes that rational consumers evaluate all options available in the market and choose an option that results in the lowest overall cost. The implication of this assumption in the housing mortgage market is that banks, aware of consumer rationality, will compete to provide more and more low-cost mortgages that shall increase competition and drive out inferior options, thus improving overall welfare. A rational consumer will choose mortgage '*x*', where we assume that the preferences of a consumer can be represented by a time-separable intertemporal utility function '$U(.)$'. This implies that the utility function is additive for '$t = 0, 1, 2, 3, \ldots, T$', as shown in Equation 4.2.

Equation 4.1 shows the utility function in time period '*t=0*', where 'v' is instantaneous utility a person gets from choosing mortgage 'x', and '$d(t)$' is the discount factor being 1 for time period '$t = 0$', representing time consistency in preferences (O'Donoghue and Rabin, 2001).

$$U(v) = v(x).d(t) \quad \text{where} \quad d(t) = 1 \quad \text{for} \quad t = 0 \tag{4.1}$$

Of course, an inter-temporally maximising consumer has "time consistent" impatience, prioritising access to money in the short run, thus discounting future consumption with standard discount rate 'δ', where '$0 < \delta < 1$'. In this case, the discount rate ('δ') devalues all future events ('$t > 0$') relative to the present ('$t = 0$'), as shown in the one-parameter exponential-discounting model in Equation 4.2.

$$U^t(v_t) = \sum_{t=0}^{T} v_t(x).\delta^t \quad \text{where} \quad d(t) = \delta^t \quad \text{for} \quad t > 0 \tag{4.2}$$

4.3.2 Behavioural Economic Theory

The era of behavioural economics has taught us that consumers do not necessarily act rationally (as shown in Equation 4.1 and 4.2). There may be a range of behavioural biases that affect the decision making of customers, leading them to choose products that may not represent the lowest cost option. The chances that behavioural biases play a key role in decision making is increased by the fact that many people tend to get lost in overwhelming amount of market options (Thaler, 1985; Barr et al., 2008; Estelami, 2001) and are influenced by well thought out marketing campaigns designed to distract customers from rational comparison of products. Understanding these tendencies, banks often engage in confusing marketing practices to reap benefits of the false beliefs and poor understanding of borrowers (Bertrand et al., 2006). In this chapter, we consider four behavioural factors; present bias, overconfidence and riskiness, tunnelling and heuristics, and inattention.

Present Bias

Most people will have positive discount rates, valuing more highly goods or money today than in the future. While acknowledging the existence of a continuum with no obvious threshold point for intertemporally 'normal' consumers, the more extreme version of this phenomenon can be termed present bias. A number of studies show that present bias phenomenon leads to higher credit card borrowings (Laibson, 1997; Fehr, 2002; Meier and Sprenger, 2007; Heidhues and Kőszegi, 2010).

For mortgages, present-bias leads to the choice of expensive products that offer short-term benefits at the expense of long-run costs. This is demonstrated in the experiment conducted by Gathergood and Weber (2017) where present-bias is found to dominate the choice of expensive Alternative Mortgage Products (AMP) with back-loaded payments. The choice of AMP is attractive to consumers because one of the key features of AMP is that initial payments are small, thus allowing higher consumption in the short-run. Further, Miles (2004) suggests disproportionate focus of consumers on the initial loan costs, as one of the reasons for the popularity of Adjustable Rate Mortgages (ARM) in the UK.[17] In our context, consumer myopia due to present-bias in mortgage market may explain the choice of high-interest cashback mortgage products, where consumers find immediate upfront cash-bonuses more attractive. This is suggested by the findings of CCPC (2017) and Rowe et al. (2015) on consumer preference for cashback mortgage products in Ireland and the UK.

Overconfidence and Riskiness

Individuals who are overly optimistic and confident about the future, either regarding their own susceptibility to risk, or future income streams, are said to have overconfidence. Overconfidence leads people to systematically underestimate the likelihood of suffering an adverse event (Kilborn, 2005). In the literature of finance, over-confidence is described partly as a result of "better than average effect", where people have unrealistic views about themselves that they are better than the rest (Glaser and Weber, 2007). This is closely related to risk-attitudes when individuals tend to take more risk as a result of the confidence in their own performance, as shown by Murad et al. (2016). Over-confident investors underestimate the variance of the risky assets, as shown in the over-confidence modelling of investors by Benos (1998); Kyle and Wang (1997) and Wang (2009).[18]

The implications of over-confidence and riskiness extend beyond the financial markets and affect consumer decision making. Grubb (2015) highlights that banks naturally prefer consumers to over-value contracts and therefore react by introducing complicated pricing features- one of the key aspects employed in the marketing of expensive cashback mortgages. Likewise, the focus group discussion by Lacko and Pappalardo (2007) showed that many borrowers were optimistic that they had selected good mortgages but became less happy when they progressed to understand their mortgages more

[17]Time inconsistency also explains consumer choices in the mortgage markets where present-bias consumers are associated with higher rate of defaults (Agarwal et al., 2016), while consumers who are more likely to delay immediate rewards are associated with higher credit-worthiness (Meier and Sprenger, 2010).

[18]These phenomena explain financial activities such as over-trading, greater trading costs, and riskiness in the stock market (Odean, 1999)

fully.[19] Bucks and Pence (2008) show that in the case of ARMs, borrowers underestimate the extent to which the interest rates can increase, thus disposing them to believe that they are unlikely to experience bad financial events as a result of interest rate hikes in the future.

Heuristics (Tunelling)

Gigerenzer and Gaissmaier (2011) define heuristics as a strategy that ignores part of the information with the goal of making decisions more quickly, frugally, and/or accurately than more complex methods. As a result, consumers tend to use some simplifying heuristics or rules of thumbs in their decision rather than extensive algorithm processing (Gilovich et al., 2002).

Heuristic decision making by consumers have been found to be influenced by decision-making complexity (Bettman and Park, 1980; Johnson et al., 1989; Payne et al., 1988), time pressure (Johar et al., 1997; Payne et al., 1988), and product knowledge and experience (Johar et al., 1997; Green et al., 1977). In the credit market, heuristics lead consumers to often use linear function of deposit and monthly payments when making loan choices, without calculating the product of monthly payments and number of payments, or using discounted values (Herrmann and Wricke, 1998). Homburg et al. (2014) shows that price complexity negatively affects consumer perceptions of price fairness due to increase in cognitive burden caused by complex prices. Thus, consumers in certain situations do not invest much effort in evaluating total costs and directly apply heuristics to infer high cost from more complex prices as a rule of thumb (Carlson and Weathers, 2008).

In addition to heuristic decision making, borrowers lead themselves into the practice of 'tunnelling' and pick the most striking attribute of a loan that leads to sub-optimal outcomes in the long-run.[20] Shafir and Mullainathan (2013) document how tunnelling can lead to debt-traps for consumers from an experiment on low-income traders in India. The phenomena of tunnelling can occur in mortgage market when consumers put too much focus on finalising a house such that it distracts or inhibits them to process mortgage related information, and a loan appears just an obstacle to overcome as quickly as possible (Perry and Blumenthal, 2012; Perry and Lee, 2012).

Inattention

There is growing evidence on the role played by inattention in consumer decision making. Evidence suggests that consumers fail to weigh non-salient information such as eBay shipping fees (Brown

[19] Other examples include, the seminal study by Svenson (1981) finds that 82 percent of a group of students in the US and Sweden ranked themselves amongst the 30 percent drivers with highest driving safety, indicating strong tendency to believe that they are highly skilled. In another study by Lusardi and Mitchell (2007) over 16 percent of respondents who subjectively assessed their own financial literacy in the top quartile tested in the bottom quartile.

[20] Tunnelling as defined by Mazer et al. (2014) is a situation when a single need becomes so important that an individual focuses disproportionate amount of attention on addressing one issue, at the expense of other related issues.

et al., 2010; Einav et al., 2014), hidden fees of a product (Gabaix and Laibson, 2006), and demonstrate inattention to the commodity taxes not included in the posted prices (Chetty et al., 2009).

Inattention can be explained as a consequence of two distinct cognitive processes; first, the process which executes quickly with little conscious deliberation; and second, the process which is slower and more reflective (Sloman, 1996; Frederick, 2005; Kahneman and Frederick, 2002). These two processes have generally become known as "System 1" and "System 2" processes, a terminology first suggested by Stanovich and West (2000). Frederick (2005) developed the Cognitive Reflection Test (CRT) to distinguish between these two processes. CRT results have been found to be significantly related to maximising strategies on probabilistic prediction tasks, endorsement of profit maximising strategies, and performance calibration (Liberali et al., 2012; Mata et al., 2013; Pennycook et al., 2012).

These behavioural biases can be represented in our utility equation by transforming the one-parameter exponential-discounting model (as shown in Equation 4.2 with parameter 'δ') with two parameters, as explained under quasi-hyperbolic time-discounting function (QTD) by O'Donoghue and Rabin (2001). The two parameter QTD utility function is shown in Equations 4.3, where in addition to "time consistent" discount rate ('δ'), there exists a second parameter 'β' which represents "time-inconsistent" preference for immediate gratification. For '$\beta < 1$', at any given moment the person has an "extra bias" for now over future and therefore the model generates a conflict between earlier and later selves. In simple words, β can be considered a measure of present bias affecting the intertemporal utility maximisation of consumer (Atlas et al., 2017).

We further modify the QTD utility function by adding two more parameters 'b' and 'z'. The parameter 'b' represents other behavioural biases such as overconfidence, riskiness, heuristics, inattention or tunnelling that affect consumer utility U, and 'z' represents "information" which can affect consumer utility either positively or negatively, depending on the nature of information (welfare enhancing disclosure or misleading marketing practise).

$$U^t(v_t) = \sum_{t=0}^{T} v_t(x, b, z).\beta\delta^t \quad \text{where} \quad d(t) = \beta\delta^t \quad \text{for} \quad t > 0 \tag{4.3}$$

Role of Marketing

Marketing campaigns encourage consumers towards sub-optimal and costly products ranging from alcohol, predatory mortgages, high-interest credit-cards, pay-day loans, rent-to-own, and several other fringe banking schemes (Mendel, 2005; Caskey, 1994; Bertrand et al., 2006). Sunstein et al. (2016) points to manipulation by private banks with evidence of deception, often where people are treated as uninformed puppets (Wilkinson, 2013). Conversely, less effort has been made to promote

superior options; a discrepancy explained by Bertrand et al. (2006) often as a result of differences in market power.

For mortgages, the manipulation manifests through clever marketing, distraction, and lack of transparency from lenders through initial teaser rates, extended loan maturities, balloon clauses, adjustable rates, and cashbacks (McCoy, 2005; Rowe et al., 2015). A particular example of manipulation is a type of framing where banks offer two discrete discounts instead of one, even if both approaches are financially equivalent.[21] This allows predatory marketing to tunnel consumer's attention on product attributes to the advantage of the bank.

4.4 Experiment, Data, and Methodology

4.4.1 Experiment Design

Our research involves three distinct, but related, experiments. Each experiment involves an advanced disclosure treatment and a marketing negative nudge treatment, as well as a control group. In notation it can be described as a $(1 + 2) * 3$ design. In each experiment, respondents choose between a hypothetical high cost cashback mortgage and a lower cost hypothetical non-cashback mortgage. The particulars of each hypothetical mortgage choices can be considered representative of options on the Irish mortgage market in the summer of 2018.

The cashback product we use is €30,101 more expensive for the term of 30 years. We consider it economically rational, for customers with typical discount rates, to choose the loan product with the lowest cost. The possible exception to this is from consumers who are particularly liquidity constrained in the short term and are confident about their long-term financial future. We control for this in our experiment by capturing information on the self-perceived level of cash-constrain, income-category, and socio-economic status.

In the first experiment the cashback is 2 percent at the point of drawdown. In the second experiment, the cashback is 2 percent at the point of drawdown, but the amount of deposit for the non-cashback mortgage is adjusted downwards so that both mortgage choices in experiment two are effectively identical from a short-term liquidity perspective. In experiment three, the cashback is broken down into 1 percent immediately and 1 percent 12 months after drawdown, again mirroring a product on the Irish mortgage market. All mortgage options are based on a mortgage amount of €300,000 for 30 years and a property value of €350,000.

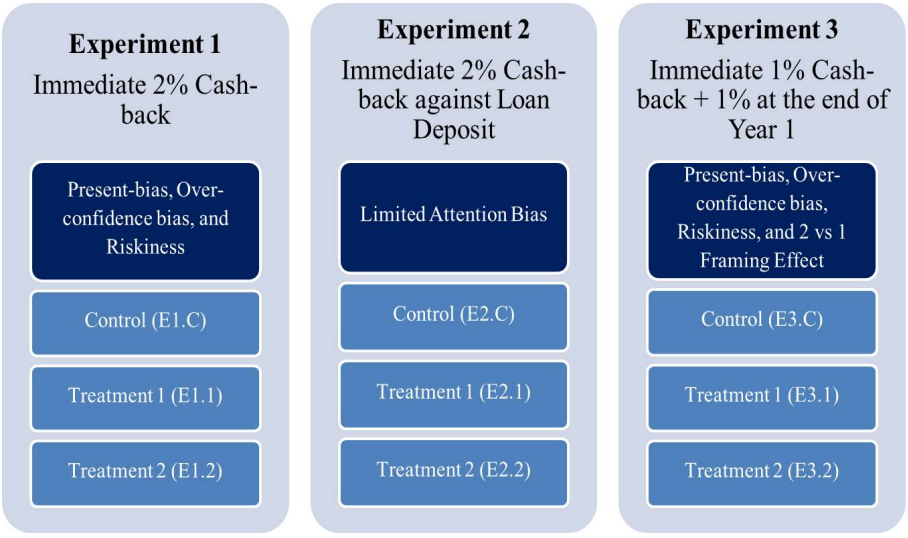
Figure 4.3 outlines the nature of our experiment and the underlying behavioural biases that can be captured from each experiment.[22] Specifically, the design of experiment 1 and 3 allows us to explore

[21] Differentiating Discounts by Alain Samson in Psychology Today, published on September 10, 2012. Retrieved from: https://www.psychologytoday.com/us/blog/consumed/201209/differentiating-discounts

[22] In each experiment mortgage option A is consistently the high-cost cashback mortgage, while B is always a low-cost non-cashback mortgage. Survey respondents are presented these choices and were urged to devote some time considering their preference.

the role of behavioural biases (present bias, overconfidence, and riskiness) on choice of mortgages, experiment 2 allows us to assess the relationship between limited attention bias on the choice of mortgage, and finally, the choice of staggered cashback over one-time cashback in experiment 3 gives us insights on the the framing effects in the market.

Figure 4.3: Design of the Experiment



Experiment 1

In experiment 1, the cashback mortgage A provides 2 percent cashback (€6,000), while the alternative low-cost non-cashback mortgage B has no cashback feature. Both mortgage options have deposits of €50,000 (86% loan to value – LTV). The mortgages normally differ on other characteristics such as interest rates, monthly payment, and the total amount repayable; all of which are higher for the cashback mortgage. The mortgage options presented in experiment 1 are shown in Figure 4.4. The ordering of the loan attributes was designed to mirror how price comparison websites present loan information to consumers. The control represents the situation where a consumer chooses between mortgage options with information at hand as mandated under Irish Banking disclosure regulations. The respondent's choice in the control group of Experiment 1 (arm E1.C) allows us to test hypothesis 1.

Following piloting on Amazon M-Turk, we settled on an evidence-based form of advanced disclosure treatment. First, we highlighted in the first row the total cost of each loan product. Second, we added in an additional row clearly specifying the cost differential between the lowest cost product and the more expensive product.[23] Many price comparison websites across a number of countries provide this explicit comparison for car insurance and internet/TV bundles, often with a function

[23]This simplification of disclosure with context to mortgages relates to the "channel factors" which are minor situational changes but can have large impact. Coined by Lewin et al. (1951), the term "channel factors" relates to certain behaviours that may be triggered by opening up a channel. At the same time certain behaviours can be blocked by closing a channel (Barr et al., 2008).

Figure 4.4: Mortgage options for Control Group in Experiment 1 (E1.C)

Price of House: €350,000	**Option A**	**Option B**
Immediate Cash-Back (€)	€6,000	€0
Term (Years)	30	30
Loan Amount (€)	€300,000	€300,000
Interest Rate	3.73%	3.23%
Monthly Payments (€)	€1,385	€1,302
Deposit (€)	€50,000	€50,000
Total Amount Repayable (€)	€498,939	€468,838

for ranking by total cost. Although most mortgage price comparison websites only record the total amount repayable without either the cost differential being made explicit or a function for ranking, this functionality could easily be included. The advanced disclosure treatment for experiment 1 (arm E1.1) is shown in Figure 4.5.

Figure 4.5: Mortgage options for Treatment 1 in Experiment 1 (arm E1.1)

Price of House: €350,000	**Option A**	**Option B**
Total Amount Repayable (€)	**€498,939**	**€468,838**
Cost Difference (€)	**+€30,101**	**Lowest Cost**
Immediate Cash-Back (€)	€6,000	€0
Term (Years)	30	30
Loan Amount (€)	€300,000	€300,000
Interest Rate	3.73%	3.23%
Monthly Payments (€)	€1,385	€1,302
Deposit (€)	€50,000	€50,000

Figure 4.6: Mortgage options for Treatment 2 in Experiment 1 (arm E1.2)

Price of House: €350,000	**Option A**	**Option B**
Immediate Cash-Back	€6,000	€0
Option A Bonus: Benefit immediately from €6,000 cash in your pocket and like many others continue to enjoy the things you love.		
Term (Years)	30	30
Loan Amount (€)	€300,000	€300,000
Interest Rate	3.73%	3.23%
Monthly Payments (€)	€1,385	€1,302
Deposit (€)	€50,000	€50,000
Total Amount Repayable (€)	€498,939	€468,838

For our marketing or negative nudge treatment, we took inspiration directly from the marketing of banks in Ireland who used emotive imagery and video focused on enjoying life with a cashback ben-

efit. Our message imbedded in row two of the list of mortgage attributes reads "*Option A Bonus: Benefit Immediately from €6,000 cash in your pocket and like many others continue to enjoy the things you love.*" We acknowledge that our attempt to influence consumers would not win any marketing industry prizes, although we did test different messages on Amazon M-Turk, and as a result we can interpret any treatment affect as a lower bound of the possible effects of more sophisticated marketing. Treatment 2 in experiment 1 (arm E1.2) is shown in Figure 4.6.

Experiment 2

The underlying loan products are the same in experiment 2 but with one exception. The deposit payment in option B reduces from €50,000 to €44,000, increasing the loan amount from €300,000 to €306,000. This modification allows us to capture the limited attention of consumers (hypothesis 2). At the point of drawdown, the two products are financially equivalent, so choice of cashback cannot be attributed to present bias, over-confidence or an appetite for taking risk. The mortgage options presented to respondents in the control group of experiment 2 (arm E2.C) are shown in Figure 4.7. Treatment 1 and treatment 2 for the second experiment (arms E2.1 and E2.2) follow the same structure as in experiment 1 and are shown in Figure 4.8 and 4.9 respectively.

Figure 4.7: Mortgage options for Control Group in Experiment 2 (arm E2.C)

Price of House: €350,000	**Option A**	**Option B**
Immediate Cash-Back (€)	€6,000	€0
Term (Years)	30	30
Loan Amount (€)	€300,000	€306,000
Interest Rate	3.73%	3.23%
Monthly Payments (€)	€1,385	€1,328
Deposit (€)	€50,000	€44,000
Total Amount Repayable (€)	€498,939	€478,215

Figure 4.8: Mortgage options for Treatment 1 in Experiment 2 (arm E2.1)

Price of House: €350,000	**Option A**	**Option B**
Total Amount Repayable (€)	**€498,939**	**€478,215**
Cost Difference (€)	**+€20,724**	**Lowest Cost**
Immediate Cash-Back (€)	€6,000	€0
Term (Years)	30	30
Loan Amount (€)	€300,000	€306,000
Interest Rate	3.73%	3.23%
Monthly Payments (€)	€1,385	€1,328
Deposit (€)	€50,000	€44,000

Figure 4.9: Mortgage options for Treatment 2 in Experiment 2 (arm E2.2)

Price of House: €350,000	**Option A**	**Option B**
Immediate Cash-Back	€6,000	€0
Option A Bonus: Benefit immediately from €6,000 cash in your pocket and like many others continue to enjoy the things you love.		
Term (Years)	30	30
Loan Amount (€)	€300,000	€306,000
Interest Rate	3.73%	3.23%
Monthly Payments (€)	€1,385	€1,328
Deposit (€)	€50,000	€44,000
Total Amount Repayable (€)	€498,939	€478,215

Experiment 3

Finally, for experiment 3, we examine the impact of dividing up the cashback into discrete units reflecting a marginal change in the cashback amount, in present value terms, of mortgage A. Mirroring the marketing strategies of certain banks, the one-time immediate cashback of €6,000 from previous experiments is split into two smaller cashbacks of €3,000 each, paid at drawdown and at the end of year 1.

Figure 4.10: Mortgage options for Control Group in Experiment 3 (arm E3.C)

Price of House: €350,000	**Option A**	**Option B**
Immediate Cash-Back (€)	€3,000	€0
End of Year Cash-Back (€)	€3,000	€0
Term (Years)	30	30
Loan Amount (€)	€300,000	€300,000
Interest Rate	3.73%	3.23%
Monthly Payments (€)	€1,385	€1,302
Deposit (€)	€50,000	€50,000
Total Amount Repayable (€)	€498,939	€468,838

Figure 4.11: Mortgage options for Treatment 1 in Experiment 3 (arm E3.1)

Price of House: €350,000	**Option A**	**Option B**
Total Amount Repayable (€)	**€498,939**	**€468,838**
Cost Difference (€)	**+€30,101**	**Lowest Cost**
Immediate Cash-Back (€)	€3,000	€0
End of Year Cash-Back (€)	€3,000	€0
Term (Years)	30	30
Loan Amount (€)	€300,000	€300,000
Interest Rate	3.73%	3.23%
Monthly Payments (€)	€1,385	€1,302
Deposit (€)	€50,000	€50,000

Figure 4.12: Mortgage options for Treatment 2 in Experiment 3 (arm E3.2)

Price of House: €350,000	**Option A**	**Option B**
Immediate Cash-Back	€3,000	€0
End of Year Cash-Back	€3,000	€0
Option A Bonus: Benefit immediately from €3,000 in cash plus €3,000 at the end of Year 1 and like many others continue to enjoy the things you love.		
Term (Years)	30	30
Loan Amount (€)	€300,000	€300,000
Interest Rate	3.73%	3.23%
Monthly Payments (€)	€1,385	€1,302
Deposit (€)	€50,000	€50,000
Total Amount Repayable (€)	€498,939	€468,838

The split of cashback in experiment 3 is done to capture the 2 versus 1 framing effect with the hypothesis that two cashbacks appear more attractive and appealing than having just one, irrespective of being financially equivalent or indeed less attractive in the presence of a positive discount rate (hypothesis 3). Further, responses for experiment 3 are pooled with experiment 1 to test hypothesis 1. The images for the control (arm E3.C), treatment 1 (arm E3.1), and treatment 2 (arm E3.2) are shown in Figure 4.10, 4.11, and 4.12 respectively.

The experimental design randomly allocating respondents into control and treatment groups allow us to deduce the Average Treatment Effect of advanced consumer disclosure and marketing negative nudge on the choice of cashback mortgage. Specifically, we test the following hypotheses:

Hypothesis 1: Advanced disclosure alters consumer preferences towards non-cashback mortgage.

Hypothesis 1.1: Advanced disclosure is significantly more effective on respondents who are present bias and not for those who are cash-constrained.

Hypothesis 1.2: Advanced disclosure is significantly more effective on respondents identified as suffering from limited-attention bias.

Hypothesis 2: Promotional marketing acts as a negative nudge towards the choice of cashback mortgage.

Hypothesis 2.1: Negative nudge is significantly more effective on respondents identified as suffering from present-bias.

Hypothesis 2.2: Negative nudge is significantly more effective on respondents who are younger.

4.4.2 Data

The experiment is implemented through a nationally representative online survey of 3,000 adults randomly chosen using interlocking quotas for age, gender, social class and region, from a panel of 60,000 individuals. The panel was developed through open enrolment and by invitation only recruitment campaigns with a special effort made, such as behavioural and attitudinal profiling, to include hard-to-reach population segments. Each of our nine experiment arms, containing approximately 333 respondents are representative for social class classification.

We ask respondents about their housing and mortgage history as well as their future plans. 37.23 percent of the sample is interested in taking out a mortgage in the next 15 years, with 44.97 percent planning on purchasing a house in the same period. These percentages fall to 17.97 percent for a mortgage and 23 percent for purchasing a house in the next five years. For this study we focus on three distinct samples as follows; a) all respondents (100%), b) within plus or minus 15 years of a house or mortgage purchase (65.55%), a group we term *the mortgage market*, and c) prospective consumers planning on buying a house or taking out a mortgage in the next 15 years (46.5%), a group we term *prospective buyers*. An argument could be made to focus on those consumers thinking of taking out a mortgage in the next 5 years, but we were unable to get to this level of analysis due to small sample size.

In addition to their choice of mortgage product, our online survey recorded information on demographic variables such as gender, education, monthly household income, and employment status. We captured information on the financial position of the household with questions such as the proportion of income that respondents are able to save, the degree to which they are cash-constrained, what financial obligations they faced in the next two years, number of loans, expectations around inherited income, and credit card repayment behaviour. We also ask questions related to their attitudes regarding financial planning, spending, and purchase decisions.

We capture behavioural biases through a series of questions that are directly related to present bias, riskiness, over-confidence, and limited attention. We identify present-bias by constructing a scale 1 to 5 for capturing patience, where choice 1 applies to '*Very Impatient*' and choice 5 is '*Very Patient*'. Although self-perceived measures are frequently used in experimental studies, we are conscious of the reporting biases associated with such responses. In order to limit this issue, we also captured present-bias through revealed preference measure of Individual Discount Factor (IDF) using the approach similar to Meier and Sprenger (2010).[24] As an illustrative example, if an individual prefers

[24]Respondents are given two price-lists where they decide to choose between a smaller reward (€X) in period 't' and a larger reward (€Y>€Y) in period 'τ'. In the first price-list, 't' is the present ($t = 0$) and 'τ' is one month ('$\tau = 1$'), while in price list 2 't' is three months from the present ($t = 3$) and 'τ' is four months from the present ('$\tau = 4$'). The delay 'δ' is one month in both price-lists and the value for Y is fixed at €100 and the value for X varies from €95 to €60. The individual discount factor (IDF) is measured by observing the point given in the price list X^* where the individual switches from opting for the smaller, earlier payment to larger, later payment. This implies that the discount factor is taken from the last point where the individual would prefer an earlier, smaller payment, assuming $X^* \approx IDF^{\delta} * Y$, where $\delta = 1$.

€90 today as compared to €100 in a month, but prefers €100 in one month over €85 today, then we take €90 as the switching point and calculate the monthly IDF as $(90/100)^1 \approx 0.90$. Present bias is derived from the IDF in two price lists by comparing dynamic inconsistency of individuals across the two-time frames; (i) immediate reward versus reward after one month, and (ii) reward after 3 months versus reward after 4 months. The principle of dynamic inconsistency implies that an individual suffers present bias if he is less patient (lower IDF) for a smaller earlier payment in the present ($t = 0$). Thus, we classify an individual suffering from present bias if $IDF_{0,1} < IDF_{3,4}$.

For riskiness, the respondents' willingness to accept risks in financial decisions is derived using self-perceived measure on a scale from 1 to 5, where option 1 was '*Not willing to take any financial risk*' and option 5 was '*Take substantial financial risk expecting to earn substantial returns*'. Once again, we obtain a revealed preference measure of financial riskiness by asking the preference of individuals amongst the following options; first, a guaranteed payment of €50 and second, a 10 percent chance of winning €750. Further, we also ask for the respondent's willingness to pay for a lottery that offers 10 percent chance of winning €200.

Closely related to riskiness is over-confidence bias that is captured by series of questions in which respondents answer by entering a numeric range.[25] After recording these ranges as answers, we derive the proxy of over-confidence by a follow-up question that asks respondents to state the number of questions which they were confident of having answered correctly. The measurement of confidence based on range estimates has been widely used in the literature (Soll and Klayman, 2004; Russo and Schoemaker, 1992; Teigen and JØrgensen, 2005).

Finally, we capture limited attention bias by providing cognitive reflection test (CRT) to the respondents, described first by psychologist Shane Fredrick in 2005. Cognitive reflection test emphasizes the distinction between two cognitive biases; first, those executed quickly with little conscious deliberation, and second, those that are slower and more reflective (Kahneman and Frederick, 2002; Frederick, 2005). The CRT questions developed by Frederick (2005) are:

Question 1: If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets?

Question 2: A Hurley and a Sliotar cost €1.10 in total. The Hurley costs €1.00 more than the Sliotar. How much does the Sliotar cost?[26]

[25]The four questions that we ask in the survey are: Question1: I am 90% sure that the population of the World in 2016 (in billions) is between A and B billions. Question 2: I am 90% sure that the population of European Union in 2016 (in millions) is between A and B million. Question 3: I am 90% sure that the distance between Dublin and Sydney (in km) is between A and B km. Please input your response for A (lower estimate) and B (higher estimate) (numbers only) Question 4: I am 90% sure that the shortest distance (as the crow flies) between the Republic of Ireland and Wales in km is between A (lower estimate) and B (higher estimate) square kms.

[26]In the original question developed by Frederick (2005) the price was asked for a bat and ball instead of a hurley and sliotar. We changed this question to make it more suitable with Irish context as Hurling is the most popular sports in Ireland.

Question 3: In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?

The intuitive answers that spring quickly under S1 (process that executes quickly) are 100 minutes, 10 cents, and 24 days, which was confirmed by a study done in Princeton, as mentioned in Frederick (2005).[27] Thus respondents answering CRT questions correctly are designated as attentive and we derive an index of attentiveness by adding the number of correct responses.

In addition to these behavioural biases, we also capture debt-use by asking respondents if they would like to purchase a mobile phone/tablet by (i) using an option of loan at the interest rate of 3 percent for 12 months, or (ii) accumulate enough savings in next 6 months to pay for the device. Lastly, we also capture financial literacy of respondents by asking two questions that involve some knowledge of borrowings, similar to Gathergood and Weber (2017). We weigh the responses for each question as 0.50 and derive index of financial literacy as the sum of the correct weighted responses (taking the value as 1 and zero otherwise). The financial literacy questions are as follows:

Question 1: Suppose a 10-year mortgage and a 20-year mortgage have the same Annual Percentage Rate, and the same borrowed amount. The total amount repaid will be: a) Higher for the 10-year mortgage, b) Higher for the 20 year mortgage, c) The total amount repaid will be the same for both mortgages, d) Can't Say.

Question 2: Suppose you owe €100,000 in a mortgage at Annual Percentage Rate of 5%. If you didn't make any payment on this mortgage, how much would you owe in total after 5 years? a) Less than €120,000, b) Between €120,000 and €125,000, c) More than €125,000, d) Can't Say.

To confirm the success of our randomisation process, Table 4.3 presents the p-values from the difference of means t-test. The results confirm that there is no significant difference between the participants in control, treatment 1, and treatment 2 arms for no more variables than we would randomly expect. Thus, it can be deduced that the random allocation of participants in survey arms was successful in terms of obtaining a balanced sample. Balance tables for each individual experiment are available in the Appendix 4.B (See Table 4.17, 4.18, and 4.19).

4.4.3 Methodology

The average treatment effect of advanced disclosure and marketing negative nudge on the choice of mortgages, as postulated in hypothesis 1 and 2, is obtained from regression Equation 4.4. From the three experiments pooled across the three samples ($x = 1, 2, 3$), we use the data from respective control (E1.C, E2.C, and E3.C) and treatment groups (*Treatment 1*: E1.1, E2.1, and E3.1 and *Treatment 2*: E1.2, E2.2, and E3.2). The regression is estimated using a simple univariate probit

[27] The correct answers are 5 minutes, 5 cents and 47 days.

Table 4.3: Balance in the Control, Treatment 1 and Treatment 2

	Control Group Versus Treatment 1 (N=2000)				**Control Group Versus Treatment 2 (N=2000)**			
	Mean (N=1000) (Control)	**Mean (N=1000) (T1)**	**Diff.**	**P-value**	**Mean (N=1000) (Control)**	**Mean (N=1000) (T2)**	**Diff.**	**P-value**
1=Male, 0=Female	0.48	0.49	-0.01	0.59	0.48	0.51	-0.04	0.11
Exact Age	44.44	44.75	-0.31	0.65	44.44	43.81	0.63	0.34
Occupational Group	5.63	5.61	0.03	0.87	5.63	5.44	0.19	0.21
Social Class: A to F	3.73	3.82	-0.08	0.22	3.73	3.71	0.02	0.74
1=Urban 0=Rural	0.73	0.73	0.00	0.96	0.73	0.71	0.02	0.25
Marital Status	2.25	2.31	-0.06	0.43	2.25	2.31	-0.06	0.41
Number of Children	0.86	0.89	-0.03	0.56	0.86	0.88	-0.02	0.7
Employment Status	3.34	3.23	0.12	0.29	3.34	3.19	0.15	0.18
Purchased House	3.7	3.71	0.00	0.95	3.7	3.67	0.03	0.66
Purchased Mortgage	3.99	4.04	-0.05	0.37	3.99	3.97	0.02	0.72
Plan Mortgage	3.16	3.16	0.00	0.97	3.16	3.13	0.04	0.52
Plan House Purchase	2.96	2.97	-0.01	0.8	2.96	2.92	0.04	0.45
Education	4.43	4.47	-0.03	0.65	4.43	4.46	-0.02	0.77
Household Income	2.69	2.73	-0.03	0.65	2.69	2.64	0.05	0.47
Proportion of Income Saved	2.76	2.72	-0.04	0.59	2.76	2.8	-0.04	0.52
Cash Constrained Intensity	2.87	2.83	-0.04	0.55	2.87	3.03	-0.16**	0
Foresee large expense	0.38	0.39	-0.01	0.85	0.38	0.38	0.00	0.85
Total Number of Loans	0.65	0.65	0.00	0.92	0.65	0.62	0.03	0.39
Has Credit Card?	0.64	0.65	-0.01	0.64	0.64	0.66	-0.02	0.3
Present Bias detected	0.29	0.24	0.05**	0.01	0.29	0.24	0.05**	0.01
Level of Impatience	3.29	3.38	-0.09	0.09	3.29	3.36	-0.07	0.14
Financial Riskiness	2.47	2.49	-0.01	0.78	2.47	2.49	-0.02	0.68
Debt-Use	0.17	0.17	0.00	0.95	0.17	0.17	0.00	0.81
Confidence	1.53	1.53	0.00	0.99	1.53	1.62	-0.08	0.2
Index of Fin. Literacy	0.46	0.43	0.03*	0.08	0.46	0.45	-0.01	0.7
Index on Attentiveness	0.66	0.7	-0.05	0.27	0.66	0.62	0.04	0.38

regression where the main variable of interest is *Treatment*; taking the value as 1 if the respondent is in the treatment group and zero for the control group in respective experiments. The regression does not control for any other factors recorded in the survey as the sample is fairly balanced on the socioeconomic, demographic, and behavioural factors (see Table 4.3).

$$Pr(Mortgage)_i = \alpha_i + \beta(Treatment)_{i,x} + \epsilon_i \tag{4.4}$$

In order to draw evidence for the heterogeneous effect arising from the treatments across different behavioural and demographic features (sub-hypotheses 1.1, 1.2, 2.1, and 2.4), we estimate regression shown in Equation 4.5. The key variable of interest is 'δ' and the marginal effects is obtained using 'inteff' command on stata. This is done due to concerns regarding the wrong estimation of marginal effects of interaction variables from the command 'margins' for non-linear regressions (Norton et al., 2004; Brambor et al., 2006)

$$Pr(Mortgage)_i = \alpha_i + \beta(Treatment)_i + \theta(Indi.Factor)_i + \delta(Treatment * Indi.Factor)_i + \epsilon_i \tag{4.5}$$

In addition to the ATE of the treatments, we explore the role of behavioural biases on the choice of cashback mortgage by estimating Equation 4.6 using the responses obtained from experiments 1 and 3. The dependent variable '*Mortgage*' takes the value as 1 if the respondent '*i*' choses a high-cost mortgage option A and zero if option B is chosen. The key variables of interest are behavioural variables; *Present Bias*, *Overconfidence*, and *Riskiness*. In addition to these revealed preference measures, we also use the self-perceived responses for these cognitions, captured in the vector *MISC*. Control variables include vectors *DEMO*; capturing the demographic profile of respondents, *FIN*;

capturing the financial position, and *LIT*; capturing the financial literacy. Since '*Mortgage*' is binary in nature; therefore, results of Equation 4.6 are presented as post estimation marginal effects.

$$Pr(Mortgage)_i = \alpha_i + \beta(PresentBias)_i + \theta(Overconfidence)_i + \sigma(Riskiness)_i + (\boldsymbol{DEMO})_i\gamma + (\boldsymbol{FIN}_i)\mu + (\boldsymbol{LIT}_i)\pi + (\boldsymbol{MISC}_i)\delta + \epsilon_i \tag{4.6}$$

The regression Equation 4.7 is estimated to assess the role of limited attention bias on the choice cashback mortgage where the dependent variable takes values from the data recorded in the control group of experiment 2 (arm E2.C). The variable of interest is *Attention*. The regression is estimated using probit estimation and results are obtained through marginal effects; with an additional vector of co-variates *BEHAV* controlling for other behavioural biases recorded in the survey.

$$Pr(Mortgage)_i = \alpha_i + \beta(Attention)_i + (\boldsymbol{DEMO})_i\gamma + (\boldsymbol{FIN}_i)\mu + (\boldsymbol{LIT}_i)\pi + (\boldsymbol{BEHAV})_i\sigma + \epsilon_i \tag{4.7}$$

The comparison of 2 versus 1 framing effect of two cash-backs of €3,000 against single cashback of €6,000 is examined through Equation 4.8. The choice response data for mortgages A and B in the control groups of experiment one and three are combined (arms E1.C and E3.C). The main variable of interest is '$2v1$' which takes the value as 1 ($x = 1$) if the mortgage response is made from experiment three and zero ($x = 0$) for the response derived from experiment one. The framing effect is significant if the coefficient β on $2v1$ is positive and statistically significant.

$$Pr(Mortgage)_i = \alpha_i + \beta(2v1)_{i,x=0,1} + \sigma(PresentBias)_i + \theta(Overconfidence)_i + \phi(Riskiness)_i + \psi(Attention)_i + (\boldsymbol{DEMO})_i\gamma + (\boldsymbol{FIN}_i)\mu + (\boldsymbol{LIT}_i)\pi + \epsilon_i \tag{4.8}$$

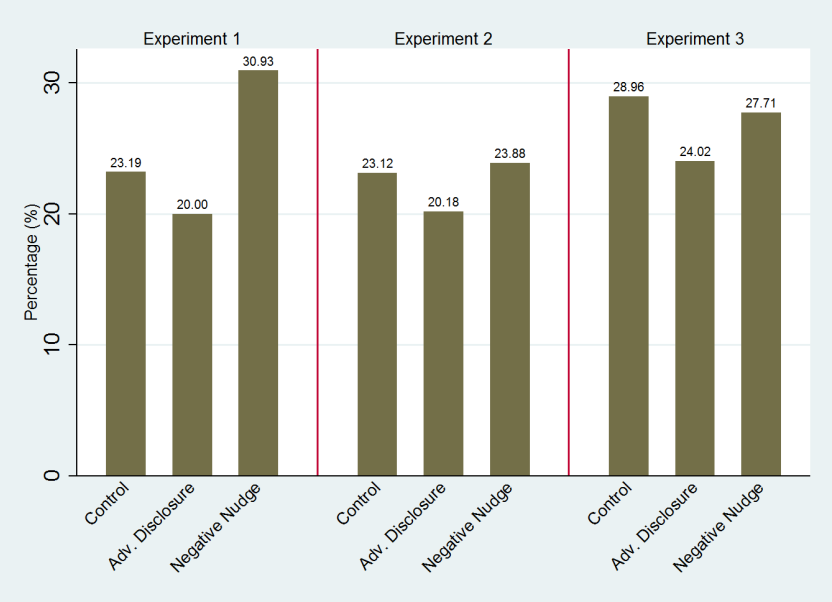
4.5 Data Description

The first finding that emerges from the data is how consistent preferences for expensive cashback mortgages are. Across the three experiments, when respondents don't receive a treatment, preferences for the expensive cashback mortgage ranged between 23 percent and 29 percent (see Figure 4.13). The second finding that emerges, relates to the effectiveness of the advanced disclosure, and while we depend on the multivariate analysis to decipher the true impact of the treatment, it is noticeable from a comparison of means that the disclosure reduced preferences for the expensive cashback by on average of 4 percentage points. This was a little surprising to us as we felt the advanced disclosure made it clear, in no uncertain terms, how much more expensive the cashback mortgage was. Even though we find a meaningful treatment effect from our advanced disclosure (see later discussion in Section 4.7), we interpret this as evidence of how challenging it might be for a disclosure agenda to dramatically reduce demand for expensive cashback products.[28]

[28]The difference of means t-test for advanced disclosure across the choice of cashback and non-cashback mortgage shows that respondents who choose cashback mortgages are more urban, have more loans, are

The third finding that emerges from the data is the effectiveness of our unsophisticated marketing message. Respondents who were subjected to our negative nudge were on average 3 percentage points more likely to choose the expensive cashback mortgage, although this average hides some heterogeneity in the results.

Figure 4.13: Cashback choice in each Experiment across respective Arms



Crucially, we find that respondents who choose expensive cashback mortgages have a distinct profile. The results from Table 4.4, which presents the difference of means t-test for all arms of the experiments pooled together, illustrate that respondents with a preference for the expensive cashback mortgage, belong to urban areas, have more children below 18 years of age, save higher proportion of income, and are more cash-constrained. Saving higher proportion of income and being cash-constrained are counter-intuitive; therefore, we explore this further by obtaining difference of means t-test across our subsamples of interest; *mortgage market* and *prospective buyers* (See Table 4.24 and 4.25 in Appendix 4.B). The results suggest that savings status does not hold any significance for the sub-groups and it is only the degree of cash-constrain which differs between cashback and non-cashback group. This implies that the proportion of respondents choosing cashback is significantly more cash constrained as compared to respondents who do not choose cashback mortgage.[29]

Further, the tests shows that the proportion of respondents choosing cashback are present biased, have credit card, perceive taking more financial risk, are debt-users, expect inheritance, are affected by

more risk-taking, possess credit-card, are more likely to use loans, tend to live for today, are more affected by advertising and opinion of others, and find more satisfying to spend money. There were no statistical differences in terms of present-bias, cash-constrain, and income (see Table 4.20 in Appendix 4.B).

[29]The difference of means for advanced disclosure in subsamples of mortgage market and prospective buyers show that there were no statistical difference for degree of cash constrain across cashback and no-cashback group (See Table 4.24 and 4.25 in Appendix 4.B)

Table 4.4: Difference of Means t-test between cashback and no-cashback mortgage choice

Variables	**Mean (No-cashback) (N=2,260)**	**Mean (Cashback) (N=740)**	**Difference Diff.**	**(P-value)**
1=Male, 0=Female	0.49	0.5	-0.01	0.79
Exact Age	45.22	41.62	3.60***	0.00
Social Class: A to F	3.73	3.82	-0.09	0.14
1=Urban 0=Rural	0.71	0.77	-0.06***	0.00
Marital Status	2.27	2.33	-0.05	0.42
Number of Children below 18 Years	0.81	1.08	-0.27***	0.00
Employment Status	3.35	2.97	0.38***	0.00
Highest level of Education	4.48	4.38	0.1	0.13
Household Income (Increasing)	2.7	2.64	0.06	0.38
Proportion of Income Saved (Increasing)	2.73	2.86	-0.13*	0.04
Cash Constrained Intensity (1: Great Deal, 5: None)	2.96	2.74	0.22***	0.00
Foresee large expense in coming Years	0.38	0.4	-0.02	0.32
Total Number of Loans	0.6	0.74	-0.13***	0.00
Has Credit Card?	0.63	0.71	-0.08***	0.00
If Present Bias detected from Choice Questions	0.24	0.31	-0.07***	0.00
Level of Impatience (Decreasing, Increasing for Patience)	3.35	3.33	0.02	0.72
Financial Riskiness (Increasing)	2.39	2.78	-0.40***	0.00
Accumulate Savings to Buy, 1: Use loan option (Debt-Use)	0.13	0.31	-0.19***	0.00
Confidence Based on Total Correct Answers (Increasing)	1.57	1.53	0.04	0.52
Index of Fin. Literacy based on weights (Increasing)	0.48	0.32	0.16***	0.00
Index on attentiveness using (Increasing)	0.75	0.39	0.36***	0.00
Expect Inheritance, 0:No, 1:Yes	0.27	0.33	-0.06***	0.00
How much does Advertising affect your purchase? (Increasing)	3.1	3.68	-0.58***	0.00
Tend to Live for today without thinking of tomorrow (Increasing)	3.35	3.89	-0.54***	0.00
Carefully consider purchases (Increasing)	5.15	4.84	0.32***	0.00
Keep close watch on Spending (Increasing)	5.63	5.24	0.39***	0.00
Set Long Term Financial Goals (Increasing)	4.7	4.66	0.04	0.54
Have Household Budget (Increasing)	4.79	4.82	-0.03	0.63
How much does opinion of others affect your behaviour? (Increasing)	3.05	3.56	-0.51***	0.00
More satisfying to spend money then save (Increasing)	3.46	3.93	-0.47***	0.00

advertising, tend to live for today, are affected by opinion of others, and who find it more satisfying to spend money rather than save. In contrast, preferences for non-cashback mortgages are significantly lower for respondents that are employed in stable jobs, have higher financially literacy score, are more attentive, carefully consider purchasing decisions, and keep close watch on personal spending (see Table 4.4).

The significance of these factors remains unchanged when the difference of means t-test is obtained across control and treatment groups of the three experiments separately, as shown in Appendix 4.B (see Table 4.20, 4.21, 4.22, and 4.23). Moreover, we find same results when the sample is restricted to *mortgage market* and *prospective buyers* for three experiments combined across control and treatment arms (see Table 4.24 and 4.25 in Appendix 4.B).

The cashback choice for different categories of housing and mortgage choice is shown in Figure 4.14. It can be seen from the graph that the proportion of cashback choice is highest for respondents who purchased mortgage or house in last 15 years or have any prospective plans in the next 15 years, ranging between 28-32 percent. Further, the choice of cashback is least attractive for respondents who purchased a house or mortgage over 16 years ago, average around 18 percent.

The results from Figure 4.14 are further disaggregated for the three arms across all experiment, as shown in Figure 4.15. It can be inferred that cashback choice is most attractive for respondents in treatment 2; the marketing nudge, ranging between 28-36 percent for all categories of house (mortgage) purchase or plan. Moreover, in relation to the effectiveness of advanced disclosure, the results

Figure 4.14: Choice of cashback in Housing and Mortgage Decision

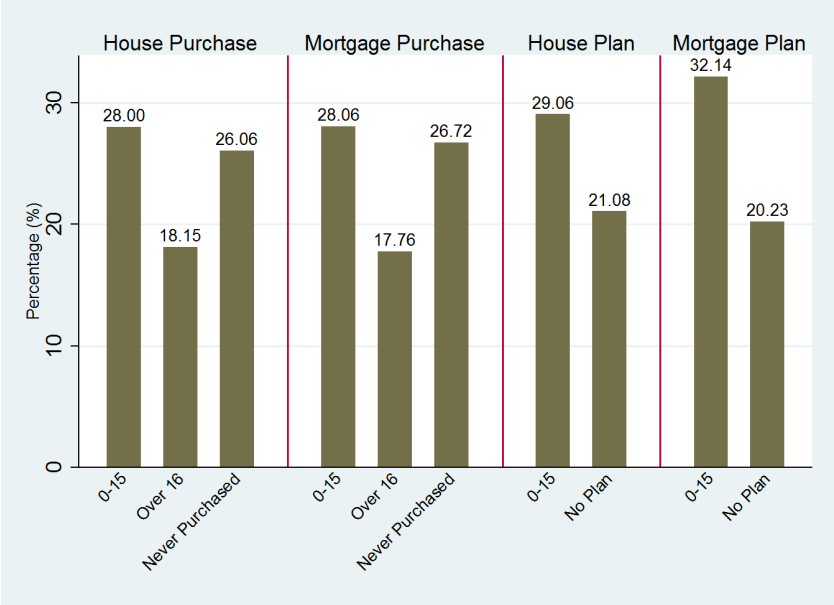


Figure 4.15: Choice of cashback in Housing and Mortgage Decision

reflect the findings from Figure 4.13 with choice of cashback being least attractive for respondents across different categories of house (mortgage) purchase or plan.

4.6 Stylised Facts arising from the Experiments

4.6.1 Stylised Fact 1: Present Bias, Riskiness, Overconfidence

Systematic evidence is found that adults and prospective house/mortgage purchasers are more likely to choose expensive cashback mortgages if they are characterised by present bias. The univariate analysis suggests that the revealed preference measure of present bias (using the methodology of Meier and Sprenger (2010)) is related to the choice of expensive cashback mortgages for both experiment one and three.[30],[31] The multivariate analysis (see Table 4.5) finds that present bias, is statistically significant at the 1 percent level across all specifications for all adults (see Appendix 4.C for all specifications), with the effect size ranging around 8 percent.[32] Intuitively, this means that tendency to be present-bias is positively correlated with the choice of expensive cashback mortgage. Present bias is also a predictor of choice of cashback mortgage for our subsamples of mortgage market and prospective buyers. We also find statistically significant results for both experiments one and three separately (see Table 4.6).[33],[34]

Confidence, as mentioned earlier, is captured as personal belief on how many challenging confidence interval questions a respondent answered correctly. In univariate analysis, we do not find evidence is confidence is significantly correlated with the choice of mortgage. A higher appetite for financial risk, whether measured through revealed preferences in lottery or a self-reported measure, is statistically related in univariate tests to the choice of mortgage.[35] However, in our multivariate analysis, irrespective of the specification, we do not find significant evidence that either confidence or financial risk is correlated with cashback mortgage choice. In addition, the coefficients for confidence and financial risk preferences are insignificant for different subsamples and across different specifications, as shown in Appendix 4.C, 4.D, and 4.E.

[30] Refer to Table 4.4 and difference of means t-test results in Table 4.21 and 4.23 in Appendix 4.B.

[31] For the self-reported measure of present-bias, captured by the variable impatience, we do not find any significant difference between the mortgage choice for either of the experiments or the pooled sample (see Table 4.5 and Table 4.6).

[32] The multivariate probit regressions control for location fixed effects and demographic controls with standard errors clustered for regions. The regression is controlled for income, cash-constrained, and savings proportion in only one specification because inclusion of these controls leads to significant loss of observations due to many respondents choosing 'Not Willing to Respond' for these variables.

[33] The results from different specifications, shown in Appendix 4.C, 4.D, and 4.E are consistent with the full regression models from main analysis, and each subsamples respectively.

[34] The univariate analysis of present bias (see Table 4.26 in Appendix 4.B) reveals that respondents detected for present bias are less educated, have less income, are more cash-constrained, foresee a large expense in the future, value cash-back mortgages, and tend to live for today without much attention for future.

[35] For univariate analysis on confidence and appetite for risk (self-perceived or lottery), see results in Table 4.4 and difference of means t-test results in Table 4.21 and 4.23 in Appendix 4.B.

In terms of other behavioural biases, we find that the choice of expensive cashback option A is positively and significantly correlated with tendency towards debt-use. In contrast, the choice of cashback is negatively related with increasing levels of attentiveness, as captured by the number of correct responses from CRT.

For demographic factors, the choice of cashback is reduced with increasing levels of education, and age of the respondent. These results indicate how being older, and more educated bears negative relationship with the likelihood of a respondent to prefer the expensive cashback mortgage. Interestingly, we also find that the choice of a larger single cashback mortgage is positively related with the respondent being male (experiment one result in Table 4.6); however, the result is opposite when the cashback is split into two, with half delayed for one year (experiment three results in Table 4.6). This implies the efficacy of staggered and delayed cashback being more appealing to women, given that female respondents in our experiment report significantly more careful nature for long-term outcomes as compared to males.[36]

Table 4.5: Stylised Fact 1 arising from Control groups pooled in Experiment 1 and 3 (E1.C and E3.C)

	Main Analysis		Mortgage Market		Prospective Buyers	
Variables	**(1) Cash Back E1.C&E3.C**	**(2) Cash Back E1.C&E3.C**	**(3) Cash Back E1.C&E3.C**	**(4) Cash Back E1.C&E3.C**	**(5) Cash Back E1.C&E3.C**	**(6) Cash Back E1.C&E3.C**
Present Bias	0.083***	0.082***	0.054**	0.083*	0.125***	0.188***
	(0.015)	(0.029)	(0.026)	(0.046)	(0.036)	(0.050)
Confidence	0.001	0.003	0.003	0.003	0.013	0.013
	(0.009)	(0.010)	(0.019)	(0.012)	(0.028)	(0.030)
Lottery	-0.020	-0.025*	-0.031	-0.031	-0.043	-0.043
	(0.018)	(0.014)	(0.042)	(0.035)	(0.083)	(0.076)
Impatience	0.007	0.013	0.019	0.033**	0.023	0.019**
	(0.012)	(0.016)	(0.018)	(0.014)	(0.022)	(0.010)
Financial Risk (Self-perceived)	0.028	0.001	0.020	-0.015	0.011	-0.016
	(0.022)	(0.021)	(0.017)	(0.028)	(0.020)	(0.028)
Debt Use	0.175***	0.213***	0.211**	0.268**	0.283***	0.355***
	(0.055)	(0.065)	(0.085)	(0.107)	(0.064)	(0.120)
Fin. Lit. Index	-0.054	-0.004	-0.042	0.012	0.071	0.082
	(0.048)	(0.050)	(0.051)	(0.071)	(0.079)	(0.063)
Attentive	-0.087***	-0.076***	-0.088***	-0.075	-0.075***	-0.094**
	(0.022)	(0.026)	(0.033)	(0.046)	(0.026)	(0.044)
Gender	0.046**	0.039**	0.091***	0.084***	-0.008	-0.022
	(0.022)	(0.016)	(0.009)	(0.030)	(0.050)	(0.083)
Age	-0.006***	-0.008***	-0.007***	-0.010***	-0.011***	-0.014***
	(0.002)	(0.002)	(0.002)	(0.004)	(0.003)	(0.003)
Urban	0.010	0.036	0.040	0.097	-0.018	0.146
	(0.021)	(0.034)	(0.060)	(0.091)	(0.127)	(0.175)
Education	-0.018***	-0.019**	-0.031**	-0.026*	-0.037***	-0.007
	(0.007)	(0.009)	(0.013)	(0.015)	(0.013)	(0.014)
Credit Card (1=Yes)	0.089***	0.083***	0.045	0.017	0.131***	0.127**
	(0.023)	(0.023)	(0.034)	(0.036)	(0.030)	(0.063)
Saving Proportion		0.010		0.004		-0.026**
		(0.015)		(0.027)		(0.011)
Cash Constrained		-0.000		0.009		0.029
		(0.032)		(0.026)		(0.057)
Income		-0.013*		-0.009		-0.014
		(0.008)		(0.009)		(0.012)
Observations	653	508	410	320	236	183
Demography Controls	Yes	Yes	Yes	Yes	Yes	Yes
Location FE	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using experiment data on Stata14.
Notes: Standard Errors clustered at regional (5 in total) level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1
Main Analysis: All categories for House/Mortgage Purchase or Plan
Mortgage Market: Respondents purchased a House or Mortgage in 15 Years or plan to purchase a House or Mortgage in next 15 Years
Prospective Buyers: Respondents planning to purchase a House or a Mortgage in next 15 Years.

[36]The mean for the variable 'careless for long run' (increasing scale from 1 to 7) is 3.02 for Females and 3.20 for males (Men:1 and Women:0), significant at 5 percent level.

Table 4.6: Stylised Fact 1 arising from Control groups in Experiment 1 and 3 (E1.C and E3.C separately)

	Experiment 1						Experiment 3					
	Main Analysis		Mortgage Market		Prospective Buyers		Main Analysis		Subsample 1		Subsample 2	
Variables	(1) Cash Back E1.C	(2) Cash Back E1.C	(3) Cash Back E1.C	(4) Cash Back E1.C	(5) Cash Back E1.C	(6) Cash Back E1.C	(7) Cash Back E3.C	(8) Cash Back E3.C	(9) Cash Back E3.C	(10) Cash Back E3.C	(11) Cash Back E3.C	(12) Cash Back E3.C
Present Bias	0.096***	0.138***	0.178***	0.165**	0.224***	0.270***	0.113**	0.173***	0.002	0.267***	0.042	-0.042
	(0.031)	(0.038)	(0.056)	(0.070)	(0.062)	(0.039)	(0.045)	(0.038)	(0.085)	(0.078)	(0.060)	(0.061)
Confidence	-0.024	-0.027**	0.006	0.011	-0.006	-0.050	0.026*	0.026	0.060***	0.045***	0.087***	0.140***
	(0.017)	(0.013)	(0.013)	(0.013)	(0.030)	(0.030)	(0.015)	(0.028)	(0.019)	(0.014)	(0.023)	(0.051)
Lottery	0.018	-0.122***	-0.039	-0.085	0.084	0.108	-0.037	-0.035	-0.149	-0.180***	-0.109	-0.204**
	(0.033)	(0.028)	(0.052)	(0.078)	(0.089)	(0.110)	(0.069)	(0.076)	(0.097)	(0.054)	(0.168)	(0.101)
Impatience	0.008	0.012	-0.004	-0.015	-0.002	-0.003	0.006	0.023	0.053**	0.095***	0.034	0.114***
	(0.008)	(0.017)	(0.033)	(0.046)	(0.032)	(0.024)	(0.017)	(0.024)	(0.022)	(0.030)	(0.052)	(0.029)
Financial Risk (Self-perceived)	0.046**	0.053**	0.029	0.046***	0.070	0.023	0.016	-0.044***	0.014	-0.002	0.075*	0.086**
	(0.018)	(0.027)	(0.031)	(0.016)	(0.046)	(0.017)	(0.033)	(0.015)	(0.041)	(0.055)	(0.043)	(0.040)
Debt Use	0.184***	0.230**	0.333***	0.380***	0.469***	0.511***	0.202***	0.242***	0.270**	0.360**	0.155***	0.256***
	(0.066)	(0.098)	(0.088)	(0.069)	(0.070)	(0.126)	(0.067)	(0.088)	(0.117)	(0.141)	(0.060)	(0.098)
Fin. Lit. Index	-0.034	0.001	0.077	0.115	0.275***	0.248***	-0.066**	-0.059	-0.119	-0.053	0.003	-0.078
	(0.085)	(0.093)	(0.122)	(0.119)	(0.098)	(0.065)	(0.029)	(0.060)	(0.108)	(0.048)	(0.087)	(0.087)
Attentive	-0.050	-0.022	-0.088***	-0.063***	-0.108***	-0.099**	-0.130***	-0.124***	-0.199***	-0.133**	-0.144***	-0.126***
	(0.041)	(0.036)	(0.020)	(0.019)	(0.034)	(0.039)	(0.012)	(0.025)	(0.049)	(0.066)	(0.055)	(0.030)
Gender	0.108**	0.132***	0.292***	0.274***	0.178*	0.277***	-0.021	-0.076***	-0.130***	-0.183***	-0.171***	-0.361***
	(0.047)	(0.050)	(0.085)	(0.043)	(0.102)	(0.066)	(0.022)	(0.029)	(0.040)	(0.070)	(0.040)	(0.077)
Age	-0.009***	-0.011***	-0.014**	-0.015***	-0.006**	-0.015***	-0.004	-0.006	-0.002	-0.005	-0.001	0.001
	(0.002)	(0.003)	(0.006)	(0.006)	(0.003)	(0.001)	(0.005)	(0.005)	(0.005)	(0.009)	(0.008)	(0.011)
Urban	0.059**	0.111***	0.057	0.053	0.080	0.167	-0.043*	-0.029	-0.038	0.091	-0.015	0.201
	(0.024)	(0.028)	(0.152)	(0.112)	(0.134)	(0.147)	(0.025)	(0.044)	(0.089)	(0.081)	(0.101)	(0.235)
Education	-0.031***	-0.049**	-0.049*	-0.056	-0.064**	-0.077***	-0.011**	-0.009	-0.025***	0.001	-0.011	-0.038
	(0.009)	(0.020)	(0.029)	(0.038)	(0.031)	(0.021)	(0.005)	(0.013)	(0.009)	(0.024)	(0.018)	(0.030)
Credit Card (1=Yes)	0.091**	0.108**	0.061	0.100	0.154	0.181***	0.054**	0.027	-0.137*	-0.076	0.020	0.020
	(0.035)	(0.044)	(0.064)	(0.064)	(0.129)	(0.057)	(0.026)	(0.075)	(0.071)	(0.076)	(0.095)	(0.146)
Saving Proportion		-0.001		0.033		-0.056		0.033		0.033		-0.083***
		(0.017)		(0.042)		(0.037)		(0.030)		(0.030)		(0.017)
Cash Constrained		-0.040***		-0.013		0.018		-0.017		0.035		0.118
		(0.008)		(0.022)		(0.025)		(0.048)		(0.052)		(0.078)
Income		0.022**		0.019		-0.038		-0.040***		0.011		0.034
		(0.010)		(0.032)		(0.025)		(0.012)		(0.016)		(0.023)
		-0.01		-0.032		-0.025		-0.012		-0.016		-0.023
Observations	325	257	173	127	95	79	297	206	177	129	118	89
Demography Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Location FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using experiment data on Stata14.
Notes: Standard Errors clustered at regional (5 in total) level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1
Main Analysis: All categories for House/Mortgage Purchase or Plan
Mortgage Market: Respondents purchased a House or Mortgage in 15 Years or plan to purchase a House or Mortgage in next 15 Years
Prospective Buyers: Respondents planning to purchase a House or a Mortgage in next 15 Years.

4.6.2 Stylised Fact 2: Limited Attention Bias

To isolate the relationship of limited attention bias with choice of cashback mortgage and eliminate the role of present bias, over confidence and short-term liquidity constraints, experiment two presents mortgage options that are financially equivalent at the point of drawdown. Both mortgages in experiment two have upfront costs of €44,000, while the cashback mortgage is more expensive over the term of the loan (total cost and monthly cost) due to higher interest rates. The univariate analysis shows that respondents that choose expensive cashback mortgage option A score significantly low on the Cognitive Reflection Tests (CRT) and financial literacy questions, with the differential being significant at 1 percent level.[37]

Table 4.7: Stylised Fact 2 for Limited Attention Bias arising from Control Group in Experiment 2 (E2.C)

	Main Analysis		Mortgage Market		Prospective Buyers	
Variables	**(1) Cashback E2.C**	**(2) Cashback E2.C**	**(3) Cashback E2.C**	**(4) Cashback E2.C**	**(5) Cashback E2.C**	**(6) Cashback E2.C**
Attentive	-0.078***	-0.069**	-0.058***	-0.194***	-0.034	-0.071***
	(0.026)	(0.034)	(0.019)	(0.067)	(0.045)	(0.023)
Fin. Lit. Index	-0.224***	-0.178**	-0.297***	-0.307**	-0.309**	-0.243*
	(0.069)	(0.073)	(0.085)	(0.127)	(0.123)	(0.126)
Present Bias	0.008	0.097*	-0.037	0.147	-0.138*	0.102
	(0.048)	(0.058)	(0.079)	(0.129)	(0.072)	(0.084)
Confidence	0.024***	0.039***	0.013	0.063***	0.037***	0.051***
	(0.007)	(0.010)	(0.022)	(0.012)	(0.007)	(0.015)
Lottery	0.045	0.109	0.024	0.283***	0.234***	0.279**
	(0.070)	(0.082)	(0.061)	(0.059)	(0.064)	(0.117)
Careful In Purchase	-0.015***	-0.019	-0.010	-0.058***	0.065***	0.019
	(0.006)	(0.019)	(0.016)	(0.017)	(0.019)	(0.043)
Impatience	0.016	0.056	0.033	0.176**	-0.067**	-0.041
	(0.014)	(0.040)	(0.024)	(0.081)	(0.031)	(0.045)
Financial Risk (Self-perceived)	0.062***	0.053***	0.103***	0.171***	0.034	0.017
	(0.016)	(0.018)	(0.038)	(0.050)	(0.022)	(0.047)
Debt Use	0.183***	0.229***	0.211***	0.064	0.425***	0.306**
	(0.043)	(0.010)	(0.045)	(0.116)	(0.091)	(0.124)
Gender	0.024	-0.003	-0.108***	-0.132**	-0.209**	-0.109
	(0.031)	(0.054)	(0.032)	(0.063)	(0.103)	(0.166)
Age	-0.002***	-0.002	-0.001	-0.000	0.002	-0.002
	(0.001)	(0.001)	(0.001)	(0.004)	(0.001)	(0.006)
Urban	0.040	0.022	0.046**	0.176**	-0.011	-0.063
	(0.030)	(0.059)	(0.023)	(0.075)	(0.154)	(0.176)
Education	-0.021*	-0.057***	-0.033***	-0.077***	-0.050**	-0.038
	(0.013)	(0.009)	(0.007)	(0.012)	(0.020)	(0.028)
Credit Card (1=Yes)	0.110*	0.102	0.128**	0.081	0.139**	0.245***
	(0.059)	(0.079)	(0.063)	(0.089)	(0.055)	(0.091)
Saving Proportion		0.045**		0.073***		-0.003
		(0.019)		(0.025)		(0.014)
Cash Constrained		-0.057***		-0.074**		0.006
		(0.018)		(0.034)		(0.029)
Income		-0.021		0.005		0.001
		(0.034)		(0.053)		(0.035)
Observations	293	200	169	120	131	96
Demography Controls	Yes	Yes	Yes	Yes	Yes	Yes
Location FE	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using experiment data on Stata14.
Notes: Standard Errors clustered at regional (5 in total) level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1
Main Analysis: All categories for House/Mortgage Purchase or Plan
Mortgage Buyers: Respondents purchased a House or Mortgage in 15 Years or plan to purchase a House or Mortgage in next 15 Years
Prospective Buyers: Respondents planning to purchase a House or a Mortgage in next 15 Years.

In the multivariate analysis (see Table 4.7), attentiveness and financial literacy are negatively related with the choice of expensive cashback mortgage for our sample of 3,000 adults (significant at 1% and 5% level). The results hold for both subsamples of mortgage market and prospective buyers; however, the result for financial literacy is slightly more robust as compared to attentiveness for the subsample

[37]Refer Table 4.4 and Table 4.22 in Appendix 4.B.

of prospective buyers. It is reasonable to suspect that loss in the significance of attentiveness for prospective buyers is due to small sample size.

Intuitively, these results suggest that there is negative correlation between choice of expensive cashback mortgage with increasing levels of attentiveness, as recorded in the CRT questions. For financial literacy, the marginal effects suggest that with unit increase in the number of literacy questions answered correctly, there is an associated positive relationship with the choice of cashback mortgage A.

4.6.3 Stylised Fact 3: 2 versus 1 Framing Effect

Some mortgage products in Ireland offer staggered cashback payments into the future. We assess the relative preferences for a split cashback (1 percent immediately and 1 percent after 1 year). To achieve this, we use pooled data from the control groups of experiment one and three (E1.C and E3.C) to compare if two cashbacks of €3,000 each, offered in experiment three, significantly affect the cashback choice against a single cashback of €6,000, offered in experiment one. The results for the framing effect of two cashbacks against one shall provide evidence if respondent preference for cashbacks is positively correlated with the marketing strategy of some banks that provide combination of immediate and delayed cashbacks to lure consumers in opting cashback mortgages.

We find that splitting one cashback into two, with half delayed for one year, increases the likelihood of adoption of expensive cashback mortgage (see Table 4.8). This result holds for the main analysis and sample of mortgage market at the 10 percent level of significance. It is interesting to consider if the choice of delayed cashback is affected by the degree of liquidity issues or income; however controlling for these factors does not explain any significant relationship with choice of cashback. Also, the results remain unaffected by the inclusion of controls for income, savings and degree of cash-constrained. This result can be explained from the argument given in Section 4.3.2 that a particular example of marketing manipulation is a type of framing where banks offer two discrete discounts instead of one, even if both approaches are financially equivalent, thus allowing predatory marketing to tunnel consumer's attention on product attributes to the advantage of the bank. [38]

Lastly, these results re-confirm the positive role of present-bias and negative role of attentiveness for the choice of cashback mortgage (as discussed earlier in sub-section 4.6.1 and 4.6.2).

[38] Differentiating Discounts by Alain Samson in Psychology Today, published on September 10, 2012. Retrieved from: https://www.psychologytoday.com/us/blog/consumed/201209/differentiating-discounts

Table 4.8: Stylised Fact 3 on 2 versus 1 Framing Effect arising from Control Group in Experiment 1 and 3 (E1.C and E3.C)

	Main Analysis		Mortgage Buyers		Prospective Buyers	
Variables	**(1) Cashback E2.C**	**(2) Cashback E2.C**	**(3) Cashback E2.C**	**(4) Cashback E2.C**	**(5) Cashback E2.C**	**(6) Cashback E2.C**
2v1	0.049*	0.047*	0.051*	0.048*	0.009	-0.020
	(0.025)	(0.027)	(0.026)	(0.029)	(0.038)	(0.035)
Present Bias	0.081***	0.079***	0.053**	0.088*	0.124***	0.191***
	(0.014)	(0.028)	(0.024)	(0.046)	(0.037)	(0.053)
Confidence	0.002	0.005	0.005	0.006	0.013	0.012
	(0.010)	(0.011)	(0.019)	(0.015)	(0.028)	(0.030)
Lottery1	-0.015	-0.022	-0.024	-0.025	-0.042	-0.045
	(0.019)	(0.015)	(0.044)	(0.043)	(0.087)	(0.074)
Impatience	0.007	0.012	0.017	0.029*	0.023	0.020*
	(0.012)	(0.016)	(0.018)	(0.016)	(0.023)	(0.011)
Financial Risk (Self Perceived)	0.028	0.001	0.018	-0.013	0.011	-0.016
	(0.023)	(0.022)	(0.018)	(0.032)	(0.020)	(0.027)
Debt Use	0.174***	0.210***	0.209**	0.263**	0.283***	0.357***
	(0.053)	(0.065)	(0.083)	(0.114)	(0.067)	(0.121)
Fin Lit Index	-0.051	-0.004	-0.044	0.001	0.071	0.082
	(0.050)	(0.050)	(0.052)	(0.064)	(0.079)	(0.062)
Attentive	-0.086***	-0.076***	-0.086***	-0.070	-0.075***	-0.095**
	(0.022)	(0.026)	(0.033)	(0.046)	(0.024)	(0.045)
Gender	0.044**	0.039**	0.087***	0.081**	-0.008	-0.022
	(0.020)	(0.018)	(0.011)	(0.034)	(0.049)	(0.083)
Age	-0.006***	-0.007***	-0.007***	-0.008	-0.011***	-0.014***
	(0.002)	(0.002)	(0.002)	(0.014)	(0.004)	(0.003)
Urban	0.008	0.034	0.043	0.090	-0.016	0.144
	(0.022)	(0.037)	(0.059)	(0.089)	(0.119)	(0.173)
Education	-0.019***	-0.018*	-0.032**	-0.024	-0.037***	-0.006
	(0.007)	(0.010)	(0.013)	(0.017)	(0.013)	(0.013)
Credit Card (1=Yes)	0.089***	0.083***	0.043	0.027	0.130***	0.130**
	(0.021)	(0.022)	(0.033)	(0.026)	(0.031)	(0.060)
Saving Proportion		0.009		0.008		-0.027***
		(0.015)		(0.026)		(0.010)
Cash Constrained		-0.001		0.012		0.029
		(0.031)		(0.027)		(0.057)
Income		-0.014*		-0.016		-0.015
		(0.008)		(0.011)		(0.011)
Observations	653	508	410	320	236	183
Demography Controls	Yes	Yes	Yes	Yes	Yes	Yes
Location FE	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using experiment data on Stata14.
Notes: Standard Errors clustered at regional (5 in total) level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1
Main Analysis: All categories for House/Mortgage Purchase or Plan
Mortgage Market: Respondents purchased a House or Mortgage in 15 Years or plan to purchase a House or Mortgage in next 15 Years
Prospective Buyers: Respondents planning to purchase a House or a Mortgage in next 15 Years.

4.7 Results

4.7.1 Hypothesis 1: Effectiveness of Advanced Consumer Disclosure

The marginal effects from the univariate probit regressions in Table 4.9 suggests that advanced disclosure significantly reduces the likelihood of choosing a high cost cashback mortgage with effect size of 3.7 percent, 6.5 percent and 6.6 percent across the three sub-samples respectively (significant at 1 percent level). Table 4.9 provides results when three experiments are pooled together for the main analysis, and subsamples of mortgage market and prospective buyers.[39]

Table 4.9: Hypothesis 1: Average Treatment effect of Advanced Prototype disclosure (Treatment 1) on Choice of Cashback Mortgage

	(1) Main Analysis	(2) Mortgage Buyers	(3) Prospective Buyers
ATE of Advanced Disclosure	-0.037***	-0.065***	-0.066***
	(0.011)	(0.011)	(0.016)
Controls	No	No	No
Observations	2,000	1,298	917

Source: Author calculation using experiment data on Stata14. Notes: Standard Errors clustered at regional (5 in total) level, shown in brackets. *** p<0.01, ** p<0.05, * p<0.1 Main Analysis: All categories for House/Mortgage Purchase or Plan Mortgage Market: Respondents purchased a House or Mortgage in 15 Years or plan to purchase a House or Mortgage in next 15 Years Prospective Buyers: Respondents planning to purchase a House or a Mortgage in next 15 Years.

Intuitively, the marginal effect of around 6.5 percent associated with the advanced disclosure for sub-sample of mortgage buyers implies an overall reduction of 2 percent in the choice of cashback mortgages.[40] Similarly, the associated decline with marginal effect of 6.6 percent in the subsample of prospective buyers is estimated around 1.7 percent. Mirroring this result with the current status of mortgage market in Ireland leads us to conclude that with almost 14,939 mortgages drawn in 2017,[41] the advanced disclosure had ability to reduce drawdown of around 250 expensive cashback mortgages. Although, not huge in terms of the total volume, the result confirms how an informed policy action towards transparency in mortgage market has potential to increase rational consumer decision making.

The heterogeneous effects of advanced disclosure across the three samples are shown in Table 4.10, 4.11, and 4.12. We find that present-bias holds positive relationship with the choice of cashback mortgage; a result similar in terms of magnitude and direction to the stylised facts as shown in 4.5

[39] The effect size of advanced disclosure ranges between 4 percent and 10 percent for the main analysis and subsample of *mortgage market* and *prospective buyers*.

[40] 32 percent respondents for subsample of mortgage market choose cashback mortgage option A in the control group and treatment 1. Therefore, effect-size of 6.5 percent out of a total of 32 percent approximates to 2 percent ($0.065 * 0.32 = 0.02$)

[41] Banking and Payments Federation Ireland (BPFI) Mortgage Drawdowns Report Q2 (2017).

and 4.6. However, once interacted with the treatment of advanced disclosure, the coefficient turns positive and is found to be significant for the full-sample and the sample for mortgage market. [42] This result is an important finding and validates first half of Hypothesis 1.1 implying that although occurrence of present-bias in respondents leads them to make costly loan choice in the wake of immediate rewards, this behaviour could be significantly reversed if timely and precise disclosure is provided at the point of sale. Moreover, the insignificance of the interaction term with the degree of cash-constrain fully validates Hypothesis 1.1. This further implies that advanced disclosure could be a helpful tool to over-come behavioural biases; however may be rendered inefficient if faced by cash-constrain issues.

We do not find any significant impact of treatment 1 on attentiveness; even though there is a negative correlation between the choice of cashback mortgage and degree of attentiveness as shown in the stylised facts in 4.7. In addition to these core hypotheses, we also investigate the effectiveness of treatment 1 across other behavioural and demographic factors. Of these, we find significant evidence that advanced disclosure is more effective in reducing the choice of cashback mortgage for rural respondents. The coefficient on the interaction term is negative and found significant for all the three sub-samples. Moreover, we find that age when interacted with treatment 1 yields a significant and positive coefficient. This result implies that advanced consumer disclosure is significantly more effective on younger respondents as compared to older respondents. Lastly, another important finding that emerges from this heterogeneous analysis is in relation to the perception of the importance of cashback amongst the respondents. We find that while this measure holds positive and significant relationship for the choice of cashback mortgage in general, interaction with advanced disclosure leads to a negative and significant coefficient. This result implies that although the belief that cashback is important could be a positive driver for the choice of such mortgages, this behaviour could be effectively reversed if treated with a simple consumer disclosure.

[42] The result for present bias loses significance for the sub-sample of prospective buyers and this is most likely due to reduction in sample size, as the coefficient does not vary by much as compared to the other two regression results.

Table 4.10: Hypothesis 1: Heterogeneous Effects of Advanced Disclosure on Choice of Cashback (Main Sample)

	(1) CashBack	(2) CashBack	(3) CashBack	(4) CashBack	(5) CashBack	(6) CashBack	(7) CashBack	(8) CashBack	(9) CashBack	(10) CashBack	(11) Cashback
Advanced Disclosure	-0.037***	-0.020*	-0.135*	-0.037	-0.038***	-0.046*	-0.015***	0.072**	-0.046	-0.038**	-0.232***
	(0.011)	(0.012)	(0.071)	(0.031)	(0.007)	(0.028)	(0.007)	(0.033)	(0.037)	(0.016)	0.064)
Present Bias		0.076***									
		(0.018)									
Present Bias*Adv. Disc.		-0.0555***									
		(0.016)									
Cash Constrained (Inverse Scale)			-0.034*								
			(0.020)								
Cash Constrained*Adv. Disc			0.035								
			(0.027)								
Financial Lit. Index				-0.180***							
				(0.035)							
Financial Lit. Index*Adv. Disc.				0.003							
				(0.065)							
Attentiveness					-0.096***						
					(0.014)						
Attentiveness*Adv. Disc.					0.016						
					(0.019)						
Gender: Male						0.013					
						(0.016)					
Male*Adv. Disc.						0.016					
						(0.043)					
Rural							-0.015				
							(0.032)				
Rural* Adv. Disc.							-0.076**				
							(0.034)				
Importance of Cashback								0.319***			
								(0.041)			
Imp of Cashback*Adv. Disc.								-0.140**			
								(0.033)			
Education									-0.009		
									(0.007)		
Education*Adv. Disc.									0.002		
									(0.007)		
Income										-0.003	
										(0.010)	
Income*Adv. Disc.										-0.002	
										(0.006)	
Age											-0.004*
											(0.002)
Age*Adv. Disc.											0.004*
											(0.002)
Observations	2,000	2,000	1,859	2,000	2,000	2,000	2,000	2,000	2,000	1,692	2,000
Controls	No	No	No	No	No	No	No	No	No	No	No

Source: Author calculation using experiment data on Stata14. Notes: Standard Errors clustered at regional (5 in total) level, shown in brackets. *** p<0.01, ** p<0.05, * p<0.1
Main Sample: All categories for House/Mortgage Purchase or Plan

Table 4.11: Hypothesis 1: Heterogeneous Effects of Advanced Disclosure on Choice of Cashback (Mortgage Market)

	(1) CashBack	(2) CashBack	(3) CashBack	(4) CashBack	(5) CashBack	(6) CashBack	(7) CashBack	(8) CashBack	(9) CashBack	(10) CashBack	(11) Cashback
Advanced Disclosure	-0.065***	-0.050***	-0.136**	-0.083*	-0.056***	-0.060	-0.044***	0.052	-0.088	-0.049**	-0.244***
	(0.011)	(0.019)	(0.058)	(0.046)	(0.017)	(0.040)	(0.006)	(0.037)	(0.088)	(0.025)	(0.059)
Present Bias		0.055									
		(0.034)									
Present Bias*Adv. Disc.		-0.053*									
		(0.029)									
Cash Constrained (Inverse Scale)			-0.038**								
			(0.019)								
Cash Constrained*Adv. Disc.			0.023								
			(0.021)								
Financial Lit. Index				-0.180***							
				(0.043)							
Financial Lit. Index*Adv. Disc.				0.058							
				(0.098)							
Attentiveness					-0.098***						
					(0.020)						
Attentiveness* Adv. Disc.					0.003						
					(0.024)						
Gender: Male						0.020					
						(0.030)					
Male*Adv. Disc.						-0.012					
						(0.083)					
Rural							-0.004				
							(0.032)				
Rural*Adv. Disc.							-0.074**				
							(0.041)				
Importance of Cashback								0.327***			
								(0.041)			
Importance of Cashback*Adv. Disc.								-0.156***			
								(0.038)			
Education									-0.014		
									(0.012)		
Education*Adv. Disc.									0.006		
									(0.020)		
Income										-0.001	
										(0.010)	
Income*Adv. Disc.										-0.006	
										(0.009)	
Age											-0.004*
											(0.002)
Age*Adv. Disc.											0.004*
											(0.002)
Observations	1,298	1,298	1,208	1,298	1,298	1,298	1,298	1,298	1,298	1,106	1,298
Controls	No	No	No	No	No	No	No	No	No	No	No

Source: Author calculation using experiment data on Stata14. Notes: Standard Errors clustered at regional (5 in total) level, shown in brackets. *** p<0.01, ** p<0.05, * p<0.1
Mortgage Market: Respondents purchased a House or Mortgage in 15 Years or plan to purchase a House or Mortgage in next 15 Years

Table 4.12: Hypothesis 1: Heterogeneous Effects of Advanced Disclosure on Choice of Cashback (Prospective Buyers)

	(1) CashBack	(2) CashBack	(3) CashBack	(4) CashBack	(5) CashBack	(6) CashBack	(7) CashBack	(8) CashBack	(9) CashBack	(10) CashBack	(11) Cashback
Advanced Disclosure	-0.066***	-0.054**	-0.146*	-0.089*	-0.070***	-0.063*	-0.054*	0.067**	-0.091	-0.068*	-0.300***
	(0.016)	(0.024)	(0.087)	(0.052)	(0.019)	(0.038)	(0.023)	(0.033)	(0.116)	(0.036)	(0.031)
Present Bias		0.040									
		(0.048)									
Present Bias*Adv. Disc.		-0.041									
		(0.039)									
Cash Constrained (Inverse Scale)			-0.041**								
			(0.018)								
Cash Constrained*Adv. Disc.			0.028								
			(0.026)								
Financial Lit. Index				-0.192***							
				(0.059)							
Financial Lit. Index*Adv. Disc.				0.071							
				(0.133)							
Attentiveness					-0.108***						
					(0.016)						
Attentiveness* Adv. Disc.					0.024						
					(0.024)						
Gender: Male						0.018					
						(0.043)					
Male*Adv. Disc.						-0.009					
						(0.099)					
Rural							-0.010				
							(0.028)				
Rural*Adv. Disc.							-0.055*				
							(0.035)				
Importance of Cashback								0.370***			
								(0.047)			
Importance of Cashback*Adv. Disc.								-0.170***			
								(0.028)			
Education									-0.015		
									(0.018)		
Education*Adv. Disc.									0.006		
									(0.028)		
Income										0.008	
										(0.014)	
Income*Adv. Disc.										-0.004	
										(0.014)	
Age											-0.005*
											(0.002)
Age*Adv. Disc.											0.006***
											(0.001)
Observations	917	917	849	917	917	917	917	917	917	790	917
Controls	No	No	No	No	No	No	No	No	No	No	No

Source: Author calculation using experiment data on Stata14. Notes: Standard Errors clustered at regional (5 in total) level, shown in brackets. *** p<0.01, ** p<0.05, * p<0.1
Prospective Buyers: Respondents planning to purchase a House or a Mortgage in next 15 Years.

4.7.2 Hypothesis 2: Effectiveness of Marketing Negative Nudge

Promotional marketing through behaviourally informed advertising has a positive and significant impact on the choice of expensive cashback mortgage for prospective buyers. The marginal effect from univariate probit regressions in Table 4.13 confirm that the choice of expensive cashback mortgage increases by almost 2.4 percent (significant at 5 percent level) for prospective buyers, as a result of marketing negative nudge.[43] Overall, this implies an increase of 1 percent for cashback mortgages across all choices made by prospective buyers of house/mortgage.[44] Furthermore, this result mirrors an increase of 143 cashback mortgages drawn in Ireland in 2017. Again, this result is only a lower bound affect, as our text-based negative nudge simply cannot compete with expensive video-based advertising on television or the internet used by banks.

Table 4.13: Hypothesis 2: Average Treatment effect of Negative Marketing Nudge (Treatment 2) on Choice of Cashback Mortgage

	(1) Main Analysis	(2) Mortgage Buyers	(3) Prospective Buyers
ATE of Negative Marketing Nudge	0.021	0.003	0.024**
	(0.017)	(0.015)	(0.011)
Controls	Yes: Living Status	Yes: Living Status	Yes: Living Status
Observations	2,000	1,315	931

Source: Author calculation using experiment data on Stata14. Notes: Standard Errors clustered at regional (5 in total) level, shown in brackets. *** p<0.01, ** p<0.05, * p<0.1 Main Analysis: All categories for House/Mortgage Purchase or Plan Mortgage Market: Respondents purchased a House or Mortgage in 15 Years or plan to purchase a House or Mortgage in next 15 Years Prospective Buyers: Respondents planning to purchase a House or a Mortgage in next 15 Years.

We do not find any significant impact of marketing nudge on the full sample (Main Analysis) and sample of Mortgage Market. This may potentially be related to the issue of insufficient power to capture significance for relatively smaller differential for the choice of cashback between the control and treatment 2 group for these subsamples. However, it is important to explore the underlying question regarding why the differential is found to be smaller in the first place. In simple words, it is worth exploration why the choice of cashback mortgage is not significantly different in the sample for full data-set and mortgage market and is only significant when collapsed to a sub-set of prospective buyers. We believe that part of this explanation lies in the fact that our marketing nudge is not sophisticated enough to attract attention of all the groups contained in the sample. The only sub-group which responds positively to this nudge is the one which is probably more aware of the promotions around the cashback product. Also, this group is arguably the most important and main subject of interest for the study, since an important take-away from the experiment is to understand

[43] The univariate regressions control only for 'Living Status' of the respondents as this particular characteristic was found to be significant different between the control and treatment 2 group at 1 percent level

[44] 31.97 percent respondents for subsample of prospective buyers choose cashback mortgage option A in the control group and treatment 2. Therefore effect size of 3.1 percent out of a total of 31.97 percent approximates to 1 percent ($0.024 * 0.3197 = 0.00768$).

the role of disclosure policy and marketing on the population which is the target audience of the banks.

The heterogeneous effects of negative nudge across the three samples are shown in Table 4.14, 4.15, and 4.16 respectively. The interaction of treatment 2 with present-bias behaviour of respondents yields a positive and significant coefficient for the sub-sample of mortgage market and prospective buyers. This result validates hypothesis 2.1 that negative marketing nudge can exacerbate the likelihood for respondents who suffer from present-bias. The policy implication for this result is similar to the assertions from Rowe et al. (2015) and CCP (2017) that bank marketing can take advantage of consumer heuristics and behavioural biases by distracting them using certain product characteristics, such as cashback.

We do not find robust heterogeneous impact of negative nudge on the age of respondents, neither are we able to ascertain if financial literacy, education, income, or cash-constrained exacerbate the likelihood for the choice of cashback option. The insignificance of many of these factors can be traced back to the limited strength of our marketing attempt, hence the results should be inferred as only a lower bound estimate.

Table 4.14: Hypothesis 2: Heterogeneous Effects of Negative Marketing Nudge on Choice of Cashback (Main Sample)

	(1) CashBack	(2) CashBack	(3) CashBack	(4) CashBack	(5) CashBack	(6) CashBack	(7) CashBack	(8) CashBack	(9) CashBack	(10) CashBack	(11) Cashback
Negative Nudge	0.021	0.025*	0.054	0.036**	0.002	0.046	0.038*	0.052	0.011	0.037	0.026
	(0.017)	(0.013)	(0.069)	(0.018)	(0.012)	(0.031)	(0.022)	(0.038)	(0.053)	(0.056)	(0.068)
Present Bias		0.081***									
		(0.018)									
Present Bias*Negative Nudge		0.018									
		(0.023)									
Cash Constrained (Inverse Scale)			-0.037*								
			(0.022)								
Cash Constrained*Negative Nudge			-0.010								
			(0.027)								
Financial Lit. Index				-0.192***							
				(0.038)							
Financial Lit. Index*Negative Nudge				-0.041							
				(0.041)							
Attentiveness					-0.104***						
					(0.015)						
Attentiveness* Negative Nudge					0.035*						
					(0.019)						
Gender: Male						0.013					
						(0.017)					
Male*Negative Nudge						-0.045					
						(0.060)					
Rural							-0.015				
							(0.034)				
Rural*Negative Nudge							-0.051				
							(0.045)				
Importance of Cashback								0.330***			
								(0.043)			
Importance of Cashback*Negative Nudge								-0.005			
								(0.016)			
Education									-0.010		
									(0.007)		
Education*Negative Nudge									0.002		
									(0.009)		
Income										-0.003	
										(0.011)	
Income*Negative Nudge										-0.003	
										(0.024)	
Age											-0.004*
											(0.002)
Age*Negative Nudge											-0.000
											(0.002)
Control: Living Status	Yes	No	No	No	No	No	No	No	No	No	No
Observations	2,000	2,000	1,856	2,000	2,000	2,000	2,000	2,000	2,000	1,670	2,000
Controls	No	No	No	No	No	No	No	No	No	No	No

Source: Author calculation using experiment data on Stata14. Notes: Standard Errors clustered at regional (5 in total) level, shown in brackets. *** p<0.01, ** p<0.05, * p<0.1
Main Sample: All categories for House/Mortgage Purchase or Plan

Table 4.15: Hypothesis 2: Heterogeneous Effects of Negative Marketing Nudge on Choice of Cashback (Mortgage Market)

	(1) CashBack	(2) CashBack	(3) CashBack	(4) CashBack	(5) CashBack	(6) CashBack	(7) CashBack	(8) CashBack	(9) CashBack	(10) CashBack	(11) Cashback
Negative Nudge	0.003	-0.016	0.028	0.022	-0.019	0.039	0.019	0.019	-0.084	-0.020	0.038
	(0.015)	(0.017)	(0.053)	(0.028)	(0.024)	(0.032)	(0.013)	(0.033)	(0.067)	(0.055)	(0.070)
Present Bias		0.059									
		(0.036)									
Present Bias*Negative Nudge		0.090*									
		(0.050)									
Cash Constrained (Inverse Scale)			-0.041**								
			(0.020)								
Cash Constrained*Negative Nudge			-0.008								
			(0.022)								
Financial Lit. Index				-0.191***							
				(0.046)							
Financial Lit. Index*Negative Nudge				-0.045							
				(0.048)							
Attentiveness					-0.106***						
					(0.022)						
Attentiveness* Negative Nudge					0.042						
					(0.036)						
Gender: Male						0.022					
						(0.032)					
Male*Negative Nudge						-0.073					
						(0.066)					
Rural							-0.004				
							(0.034)				
Rural*Negative Nudge							-0.060*				
							(0.035)				
Importance of Cashback								0.336***			
								(0.045)			
Importance of Cashback*Negative Nudge								-0.000			
								(0.027)			
Education									-0.015		
									(0.013)		
Education*Negative Nudge									0.018		
									(0.013)		
Income										-0.001	
										(0.011)	
Income*Negative Nudge										0.011	
										(0.021)	
Age											-0.005*
											(0.002)
Age*Negative Nudge											-0.000
											(0.002)
Controls: Living Status	Yes	No	No	No	No	No	No	No	No	No	No
Observations	1,315	1,316	1,224	1,316	1,316	1,316	1,316	1,316	1,316	1,117	1,316
Controls	No	No	No	No	No	No	No	No	No	No	No

Source: Author calculation using experiment data on Stata14. Notes: Standard Errors clustered at regional (5 in total) level, shown in brackets. *** p<0.01, ** p<0.05, * p<0.1
Mortgage Market: Respondents purchased a House or Mortgage in 15 Years or plan to purchase a House or Mortgage in next 15 Years

Table 4.16: Hypothesis 2: Heterogeneous Effects of Negative Marketing Nudgee on Choice of Cashback (Prospective Buyers)

	(1) CashBack	(2) CashBack	(3) CashBack	(4) CashBack	(5) CashBack	(6) CashBack	(7) CashBack	(8) CashBack	(9) CashBack	(10) CashBack	(11) Cashback
Negative Nudge	0.024**	-0.010	0.087	0.032	-0.000	0.044	0.026	0.045	-0.070	-0.013	0.003
	(0.011)	(0.026)	(0.072)	(0.022)	(0.027)	(0.035)	(0.019)	(0.042)	(0.075)	(0.064)	(0.091)
Present Bias		0.043									
		(0.051)									
Present Bias*Negative Nudge		0.112*									
		(0.061)									
Cash Constrained (Inverse Scale)			-0.044**								
			(0.020)								
Cash Constrained*Negative Nudge			-0.023								
			(0.025)								
Financial Lit. Index				-0.204***							
				(0.060)							
Financial Lit. Index*Negative Nudge				-0.045							
				(0.043)							
Attentiveness					-0.117***						
					(0.017)						
Attentiveness* Negative Nudge					0.032						
					(0.032)						
Gender: Male						0.019					
						(0.046)					
Male*Negative Nudge						-0.054					
						(0.092)					
Rural							-0.011				
							(0.030)				
Rural*Negative Nudge							-0.036				
							(0.046)				
Importance of Cashback								0.380***			
								(0.050)			
Importance of Cashback*Negative Nudge								0.000			
								(0.036)			
Education									-0.016		
									(0.019)		
Education*Negative Nudge									0.018		
									(0.018)		
Income										0.008	
										(0.015)	
Income*Negative Nudge										0.013	
										(0.022)	
Age											-0.005*
											(0.002)
Age*Negative Nudge											0.000
											(0.002)
Controls: Living Status	Yes	No	No	No	No	No	No	No	No	No	No
Observations	931	932	864	932	932	932	932	932	932	796	932
Controls	No	No	No	No	No	No	No	No	No	No	No

Source: Author calculation using experiment data on Stata14. Notes: Standard Errors clustered at regional (5 in total) level, shown in brackets. *** p<0.01, ** p<0.05, * p<0.1
Prospective Buyers: Respondents planning to purchase a House or a Mortgage in next 15 Years.

4.8 Conclusion

Marketeers have distracted consumers for centuries with discounts and special offers. Sometimes consumers get good deals and sometimes the so-called deal is not as good as it seems. We have documented how in recent years cashbacks have become a prominent of mortgage and credit card markets across a number of countries. Crucially, we find that in many contexts (Ireland and the UK for mortgages and Australia, Canada, New Zealand and the UK for credit cards) cashbacks are used to attract consumers to higher cost financial products, and while there is some evidence that regulators are aware of this, little has been done to protect consumers.

In this paper, through an experiment on the Irish mortgage market we show that behaviourally informed comparative product price information at the point of sale is effective in changing consumer preferences away from expensive cashback mortgages. We suggest this is rationale for a more interventionist form of regulation, where behavioural insights are used to help consumers make better long-term financial decisions. We also find evidence that simple marketing works to attract more vulnerable groups into cashback mortgages. This finding heightens the rationale for greater consumer protection.

Protection of consumers from expensive cashback offers, through policy, can take a number of forms. One extreme is the prohibition of cashback mortgages, a direction that has been mooted in Ireland among policy makers in early 2018. Regulators, who typically prefer to regulate the flow of information between financial institutions and consumers, may instead prefer to heed the direct conclusion of this paper that price comparison information at the point of sale alters consumer preference away from expensive cashback mortgages. For cashback mortgages, mortgage switching regulations also matter. Policies that encourage mortgage switching help cashback mortgage holders move off higher interest rate products.

4.A Variables used in the Chapter

1) Gender: Dummy variable taking the value as one if Male and zero if Female.

2) Age: The age of respondents (in Years).

3) Social Class: The categorical variable taking values from 1 to 7 for the following social classes; 1: A, 2: B, 3:C1, 4:C2, 5: D, 6: E, 7:F50+, and 8: F<50. The entire population of Ireland is distributed into one of the following groups. A: Professional Workers, B: Managerial and Technical, C: Non-manual, D: Skilled manual, E: Semi-skilled, and F: Unskilled.

4) Urban: Dummy variable taking value one if the respondent belongs to a city or town, and zero if from rural area.

5) Civil Status: Categorical Variable taking following values; 1: Married, 2: Widowed/Separated/Divorced, 3: Living with a Partner, 4: Single 5: Single Parent, 6: In relationship but not living together, and 7: Other.

6) Total Children: Number of children below 18 years of age.

7) Employment Status: Categorical variable taking the following values; 1: Full-time, 2: Part-time, 3: Full-time Student, 4: Look after Home, 5: Student in Part time employment, 6: Unemployed looking for a job, 7: Retired, 8: Self-employed, and 9: Other.

8) Occupation: Categorical variable taking the following values; 1: Higher managerial/ professional/ administrative, 2: Intermediate managerial/ professional/ administrative, 3: Supervisory or clerical/ junior manager, 4: Student, 5: Skilled Manual Labour, 6: Semi or unskilled manual work, 7: Casual worker – not in permanent employment, 8: Looking after home and family full time, 9: Retired (state pension only), 10: Self-employed, 11: Unemployed or not working due to long term illness, 12: Farmer (50+ Acres), 13: Farmer (<50 Acres), and 14: Retired (private pension – contributory)

9) Education: Categorical variable taking values from 1 to 8 on an increasing scale; 1: No formal Education, 2: Completed Primary, 3: Completed Secondary, 4: Technical/vocational/certificate, 5: Ordinary Bachelor's Degree, 6: Honours Bachelor's Degree, 7: Postgraduate diploma or degree, and 8: Doctorate (Ph. D.).

10) Income: categorical variable taking values from 1 to 10 on an increasing scale; 1: 0-20,000, 2: 21,000-40,000, 3: 41,000-60,000, 4: 61,000-80,000, 5: 81,000-100,000, 6: 101,000-120,000, 7: 121,000-140,000, 8: 141,000-160,000, 9: 161,000-180,000, and 10: Over 180,000.

11) Proportion of Income Saved: Categorical variable taking values from 1 to 6 on an increasing scale, 1: 0%, 2: 1-5%, 3: 6-10%, 4: 11-20%, 5: 21-30%, and 6: Over 30%.

12) Foresee Large Expenses: Dummy variable taking the value as one if respondent foresees large expenses such as Car, College Fees, Starting a Family, Wedding, Large Gift, Home Renovation, and Other expenses in coming years.

13) Loans: Total number of loans with the respondent.

14) Credit Card: Dummy variable taking the value as one of the respondent has a credit card, and zero otherwise.

15) Present-bias: Dummy variable taking the value as one if intertemporal discount factor for smaller immediate reward is higher in the first price list as compared to the second price, and zero otherwise (Time-consistent or Future Biased). Revealed preference measure for present bias.

16) Impatience: Self-perceived measure of present-bias taking values on a decreasing scale from 1 to 5; 1: Very Patient, 2, 3, 4 5: Very Patient.

17) Financial Risk: Self-perceived measure indicating financial riskiness on an increasing scale from 1 to 5; 1: Not willing to take Risk, 2, 3, 4, 5: Take substantial risk for substantial returns.

18) Debt-Use: Dummy variable taking the value as one if a respondent prefers a loan at the interest rate of 3 percent for purchasing a table/mobile phone instead of saving for 6 months.

19) Confidence: Variable recording the individual perception of total number of correct answers in the range questions asked in the survey. Total questions asked=5.

20) Financial Literacy Index: Variable recording total number of correct answers for the financial literacy questions. The variable gives weight of 0.50 for each correct answer.

21) Attentiveness: Variable recording total number of correct answers for the questions on Cognitive Reflection Test (CRT).

22) Lottery: Dummy variable taking the value as one if a respondent agrees to play a lottery of €750 with a 10% chance and takes the value as zero if the respondents prefers to take a certain pay-off of €50. Used as a revealed preference measure for appetite for risk.

23) Cash-constrained: Categorical variable taking the value from 1 to 5 on a decreasing scale; 1: A Great Deal, 2: A lot, 3: Moderately, 4: A little, 5: None.

24) Living Status: Categorical variable taking the followings values, 1: With partner with NO children living at home, 2: With partner with children living at home, 3: With children, without a partner, 4: Multi-generational household with grandparents, parents, children or other relatives in

the home, 5: Live with parents and/or siblings, 6: Apartment or house share – that is living with adults to whom you are not related, 7: Living alone, 8: Others.

25) Expect Inheritance: Dummy variable taking value as one if expect inheritance and zero otherwise.

26) Tend to live for today: Increasing scale from 1 to 7 where 1: Do not Agree and 7: Strongly agree.

27) Advertising affects your purchase: Increasing scale from 1 to 7 where 1: Do not Agree and 7: Strongly agree.

28) Carefully consider purchases: Increasing scale from 1 to 7 where 1: Do not Agree and 7: Strongly agree.

29) Keep Close watch on Spending: Increasing scale from 1 to 7 where 1: Do not Agree and 7: Strongly agree.

30) Set Long Term Financial Goals: Increasing scale from 1 to 7 where 1: Do not Agree and 7: Strongly agree.

31) Have Household Budge: Increasing scale from 1 to 7 where 1: Do not Agree and 7: Strongly agree.

32) Affected by Opinions of Others: Increasing scale from 1 to 7 where 1: Do not Agree and 7: Strongly agree.

33) Satisfying to spend money rather than save: Increasing scale from 1 to 7 where 1: Do not Agree and 7: Strongly agree.

34) Treatment 1: The treatment variable for advanced disclosure. Takes value one if the respondent belongs to arms E1.1, E2.1, E3.1 and zero if the respondent belongs to E1.C, E2.C, and E3.C.

35) Treatment 2: The treatment variable for negative marketing nudge. Takes value if the respondent belongs to arms E1.2, E2.2, E3.2 and zero if the respondent belongs to E1.C, E2.C, and E3.C.

36) Mortgage Market: Respondents purchased a House or Mortgage in 15 Years or plan to purchase a House or Mortgage in next 15 Years

37) Prospective Buyers: Respondents planning to purchase a House or a Mortgage in next 15 Years.

38) Cashback: Dummy variable taking the value as one if the respondents choose expensive cashback mortgage and zero if the respondent chooses a low-cost mortgage.

4.B Additional Descriptive Statistics

Table 4.17: Balance in the Control, Treatment 1 and Treatment 2 for Experiment 1

	Control Group Versus Treatment 1 (N=667)				Control Group Versus Treatment 2 (N=665)			
	Mean (N=332) (Control)	Mean (N=335) (T1)	Diff.	P-value	Mean (N=332) (Control)	Mean (N=333) (T2)	Diff.	P-value
1=Male, 0=Female	0.47	0.46	0.01	0.79	0.47	0.52	-0.05	0.18
Exact Age	45.54	44.82	0.72	0.52	45.54	43.90	1.64	0.15
Occupational Group	5.67	5.42	0.25	0.35	5.67	5.30	0.37	0.16
Social Class: A to F	3.70	3.77	-0.07	0.53	3.70	3.67	0.03	0.80
1=Urban 0=Rural	0.70	0.74	-0.04	0.31	0.70	0.71	-0.01	0.85
Marital Status	2.25	2.30	-0.05	0.69	2.25	2.19	0.06	0.60
Number of Children	0.90	0.93	-0.02	0.82	0.90	0.91	-0.00	0.97
Employment Status	3.47	3.04	0.43*	0.03	3.47	3.28	0.19	0.33
Purchased House	3.64	3.69	-0.05	0.65	3.64	3.64	0.00	0.99
Purchased Mortgage	3.95	4.01	-0.07	0.49	3.95	3.92	0.03	0.74
Plan Mortgage	3.16	3.15	0.01	0.91	3.16	3.11	0.05	0.61
Plan House Purchase	2.96	2.97	-0.02	0.88	2.96	2.92	0.03	0.74
Education	4.43	4.45	-0.02	0.84	4.43	4.42	0.00	0.97
Household Income	2.67	2.74	-0.07	0.58	2.67	2.66	0.01	0.92
Proportion of Income Saved	2.67	2.70	-0.03	0.79	2.67	2.80	-0.13	0.27
Cash Constrained Intensity	2.83	2.80	0.03	0.75	2.83	3.03	-0.20*	0.04
Foresee large expense	0.39	0.43	-0.04	0.32	0.39	0.33	0.06	0.10
Total Number of Loans	0.71	0.64	0.08	0.24	0.71	0.64	0.07	0.26
Has Credit Card?	0.62	0.64	-0.02	0.68	0.62	0.65	-0.03	0.45
Present Bias detected	0.27	0.24	0.04	0.30	0.27	0.28	-0.01	0.81
Level of Impatience	3.30	3.45	-0.15	0.08	3.30	3.32	-0.02	0.82
Financial Riskiness	2.47	2.47	-0.00	0.98	2.47	2.49	-0.01	0.87
Debt-Use	0.17	0.17	-0.00	0.96	0.17	0.20	-0.04	0.24
Confidence	1.55	1.35	0.21*	0.06	1.55	1.53	0.03	0.80
Index of Fin. Literacy	0.48	0.44	0.05	0.12	0.48	0.46	0.02	0.44
Index on Attentiveness	0.73	0.72	0.01	0.87	0.73	0.61	0.12*	0.09

Table 4.18: Balance in the Control, Treatment 1 and Treatment 2 for Experiment 2

	Control Group Versus Treatment 1 (N=665)				Control Group Versus Treatment 2 (N=668)			
	Mean (N=333) (Control)	Mean (N=332) (T1)	Diff.	P-value	Mean (N=333) (Control)	Mean (N=335) (T2)	Diff.	P-value
1=Male, 0=Female	0.49	0.49	-0.01	0.85	0.49	0.53	-0.04	0.25
Exact Age	44.47	44.07	0.39	0.75	44.47	43.96	0.51	0.66
Occupational Group	5.62	5.61	0.01	0.96	5.62	5.37	0.25	0.33
Social Class: A to F	3.74	3.83	-0.09	0.44	3.74	3.73	0.01	0.95
1=Urban 0=Rural	0.74	0.77	-0.02	0.49	0.74	0.73	0.02	0.63
Marital Status	2.15	2.30	-0.15	0.21	2.15	2.28	-0.12	0.29
Number of Children	0.78	0.94	-0.16*	0.08	0.78	0.88	-0.10	0.25
Employment Status	3.29	3.35	-0.06	0.78	3.29	3.00	0.29	0.13
Purchased House	3.62	3.65	-0.03	0.79	3.62	3.67	-0.04	0.69
Purchased Mortgage	3.93	4.05	-0.12	0.23	3.93	3.95	-0.02	0.80
Plan Mortgage	3.15	3.10	0.06	0.55	3.15	3.13	0.02	0.84
Plan House Purchase	2.93	2.90	0.03	0.78	2.93	2.92	0.01	0.88
Education	4.44	4.56	-0.12	0.32	4.44	4.47	-0.03	0.78
Household Income	2.69	2.69	-0.00	0.99	2.69	2.71	-0.02	0.90
Proportion of Income Saved	2.81	2.79	0.03	0.81	2.81	2.89	-0.07	0.53
Cash Constrained Intensity	2.81	2.85	-0.05	0.63	2.81	3.05	-0.24**	0.02
Foresee large expense	0.39	0.37	0.02	0.54	0.39	0.38	0.01	0.76
Total Number of Loans	0.63	0.69	-0.07	0.34	0.63	0.64	-0.01	0.83
Has Credit Card?	0.66	0.65	0.01	0.85	0.66	0.67	-0.02	0.64
Present Bias detected	0.30	0.25	0.05	0.12	0.30	0.21	0.09**	0.01
Level of Impatience	3.24	3.38	-0.14	0.10	3.24	3.37	-0.14	0.12
Financial Riskiness	2.44	2.52	-0.09	0.32	2.44	2.50	-0.06	0.52
Debt-Use	0.15	0.20	-0.05	0.10	0.15	0.13	0.01	0.63
Confidence	1.55	1.64	-0.09	0.45	1.55	1.67	-0.12	0.28
Index of Fin. Literacy	0.47	0.45	0.02	0.55	0.47	0.47	-0.00	0.99
Index on Attentiveness	0.55	0.72	-0.17**	0.02	0.55	0.67	-0.12	0.10

Table 4.19: Balance in the Control, Treatment 1 and Treatment 2 for Experiment 3

	Control Group Versus Treatment 1 (N=668)				Control Group Versus Treatment 2 (N=667)			
	Mean (N=335) (Control)	Mean (N=333) (T1)	Diff.	P-value	Mean (N=335) (Control)	Mean (N=332) (T2)	Diff.	P-value
1=Male, 0=Female	0.48	0.52	-0.04	0.32	0.48	0.49	-0.01	0.79
Exact Age	43.32	45.36	-2.04*	0.09	43.32	43.56	-0.24	0.84
Occupational Group	5.60	5.79	-0.19	0.49	5.60	5.65	-0.05	0.85
Social Class: A to F	3.76	3.85	-0.08	0.47	3.76	3.73	0.03	0.79
1=Urban 0=Rural	0.74	0.68	0.06*	0.08	0.74	0.68	0.06*	0.09
Marital Status	2.35	2.32	0.03	0.80	2.35	2.45	-0.11	0.38
Number of Children	0.90	0.81	0.09	0.33	0.90	0.85	0.05	0.62
Employment Status	3.27	3.29	-0.02	0.93	3.27	3.31	-0.04	0.84
Purchased House	3.84	3.77	0.06	0.53	3.84	3.71	0.12	0.25
Purchased Mortgage	4.09	4.05	0.04	0.69	4.09	4.04	0.05	0.59
Plan Mortgage	3.17	3.24	-0.07	0.42	3.17	3.13	0.04	0.68
Plan House Purchase	2.99	3.04	-0.05	0.58	2.99	2.91	0.08	0.41
Education	4.44	4.39	0.05	0.69	4.44	4.47	-0.03	0.79
Household Income	2.73	2.76	-0.03	0.85	2.73	2.57	0.16	0.21
Proportion of Income Saved	2.82	2.70	0.11	0.33	2.82	2.73	0.08	0.48
Cash Constrained Intensity	2.98	2.86	0.12	0.24	2.98	3.03	-0.06	0.58
Foresee large expense	0.36	0.36	0.00	0.92	0.36	0.42	-0.06	0.11
Total Number of Loans	0.60	0.62	-0.02	0.69	0.60	0.57	0.03	0.56
Has Credit Card?	0.64	0.67	-0.02	0.55	0.64	0.67	-0.02	0.57
Present Bias detected	0.30	0.23	0.07*	0.05	0.30	0.22	0.08*	0.02
Level of Impatience	3.33	3.30	0.03	0.73	3.33	3.39	-0.06	0.46
Financial Riskiness	2.51	2.46	0.05	0.60	2.51	2.50	0.01	0.93
Debt-Use	0.20	0.14	0.05	0.07	0.20	0.19	0.01	0.74
Confidence	1.50	1.62	-0.12	0.33	1.50	1.66	-0.16	0.17
Index of Fin. Literacy	0.43	0.41	0.02	0.40	0.43	0.43	-0.00	0.90
Index on Attentiveness	0.69	0.67	0.01	0.85	0.69	0.58	0.11	0.14

Table 4.20: Difference of Means t-test between cashback and no-cashback mortgage choice for Control, Treatment 1 and Treatment 2 for Experiments 1, 2, and 3 (Main Analysis 100% Data)

	Experiment 1,2,3: Control (N=1,000)				Experiment 1,2,3: Treatment 1 (N=1,000)				Experiment 1,2,3: Treatment 2 (N=1,000)			
	No-cashback Mean (N=749)	Cashback Mean (N=251)	Difference	P-value	No-cashback Mean (N=786)	Cashback Mean (N=214)	Difference	P-value	No-cashback Mean (N=725)	Cashback Mean (N=275)	Difference	P-value
1=Male, 0=Female	0.47	0.49	-0.02	0.63	0.48	0.52	-0.04	0.26	0.52	0.48	0.04	0.25
Exact Age	45.79	40.41	5.37***	0.00	44.68	45.03	-0.35	0.76	45.22	40.07	5.15***	0.00
Social Class: A to F	3.7	3.83	-0.13	0.25	3.8	3.86	-0.06	0.62	3.68	3.79	-0.1	0.3
1=Urban 0=Rural	0.72	0.74	-0.02	0.62	0.7	0.81	-0.11***	0.00	0.69	0.76	-0.07**	0.03
Marital Status	2.27	2.19	0.08	0.49	2.31	2.28	0.03	0.8	2.24	2.49	-0.25**	0.02
Children below 18 Years	0.76	1.16	-0.40***	0.00	0.9	0.87	0.03	0.74	0.77	1.17	-0.40***	0.00
Employment Status	3.46	2.98	0.48**	0.01	3.27	3.05	0.22	0.25	3.31	2.89	0.41**	0.02
Highest level of Education	4.46	4.35	0.12	0.29	4.49	4.39	0.09	0.43	4.48	4.4	0.08	0.46
Household Income	2.70	2.66	0.03	0.76	2.74	2.67	0.07	0.60	2.66	2.59	0.06	0.57
Proportion of Income Saved	2.72	2.88	-0.15	0.17	2.69	2.84	-0.14	0.19	2.78	2.86	-0.08	0.44
Cash Constrained (Decreasing)	2.94	2.64	0.30***	0.00	2.83	2.83	0.00	0.94	3.13	2.78	0.35***	0.00
Foresee large Expenses	0.37	0.41	-0.04	0.29	0.38	0.42	-0.04	0.24	0.38	0.37	0.01	0.67
Total Number of Loans	0.62	0.74	-0.13**	0.04	0.62	0.76	-0.13**	0.04	0.58	0.72	-0.15**	0.01
Has Credit Card?	0.62	0.72	-0.11***	0.00	0.63	0.72	-0.09**	0.01	0.65	0.69	-0.04	0.27
Present Bias	0.27	0.36	-0.09**	0.01	0.23	0.26	-0.03	0.38	0.21	0.3	-0.09***	0.00
Impatience (Decreasing)	3.3	3.28	0.02	0.84	3.39	3.32	0.08	0.38	3.35	3.39	-0.03	0.66
Fin. Riskiness (Increasing)	2.36	2.82	-0.46***	0.00	2.44	2.66	-0.22**	0.01	2.36	2.84	-0.48***	0.00
Debt-Use	0.11	0.34	-0.23***	0.00	0.14	0.29	-0.15***	0.00	0.13	0.31	-0.18***	0.00
Confidence (Increasing)	1.54	1.53	0	0.99	1.52	1.6	-0.09	0.46	1.67	1.48	0.20*	0.06
Fin. Literacy (Increasing)	0.49	0.34	0.15***	0.00	0.46	0.30	0.16***	0.00	0.50	0.32	0.17***	0.00
Attentiveness (Increasing)	0.76	0.34	0.43***	0.00	0.79	0.39	0.40***	0.00	0.69	0.43	0.26***	0.00
Expect Inheritance	0.27	0.34	-0.06*	0.07	0.27	0.3	-0.03	0.43	0.26	0.34	-0.08**	0.03
Tend to Live for today (Increasing)	3.28	4.08	-0.80***	0.00	3.41	3.75	-0.34**	0.01	3.36	3.83	-0.47***	0.00
Advertising affect your purchase? (Increasing)	3.04	3.77	-0.73***	0.00	3.13	3.57	-0.44***	0.00	3.13	3.68	-0.55***	0.00
Carefully consider purchases (Increasing)	5.16	4.84	0.32***	0.00	5.15	4.86	0.28**	0.01	5.15	4.81	0.34***	0.00
Keep close watch on Spending (Increasing)	5.64	5.2	0.43***	0.00	5.61	5.19	0.43***	0.00	5.63	5.31	0.32***	0.00
Set Long Term Financial Goals (Increasing)	4.69	4.66	0.03	0.78	4.69	4.59	0.1	0.42	4.73	4.72	0.01	0.95
Have Household Budget (Increasing)	4.72	4.84	-0.13	0.31	4.86	4.79	0.08	0.55	4.79	4.84	-0.05	0.66
How much does opinion of others affect your behaviour? (Increasing)	3.02	3.72	-0.70***	0.00	3.03	3.43	-0.41***	0.00	3.1	3.51	-0.41***	0.00
More satisfying to spend money then save (Increasing)	3.41	4.05	-0.64***	0.00	3.52	3.81	-0.29**	0.03	3.45	3.91	-0.46***	0.00

Table 4.21: Difference of Means t-test between cashback and no-cashback mortgage choice for Control, Treatment 1 and Treatment 2 for Experiment 1 (Main Analysis 100% Data)

	Experiment 1: Control (N=332)				Experiment 1: Treatment 1 (N=335)				Experiment 1: Treatment 2 (N=333)			
	No-cashback Mean (N=255)	Cashback Mean (N=77)	Difference	P-value	No-cashback Mean (N=268)	Cashback Mean (N=67)	Difference	P-value	No-cashback Mean (N=230)	Cashback Mean (N=103)	Difference	P-value
1=Male, 0=Female	0.46	0.48	-0.02	0.78	0.47	0.39	0.09	0.21	0.55	0.45	0.11*	0.08
Exact Age	46.81	41.35	5.46***	0.00	45.03	43.97	1.06	0.59	44.96	41.52	3.44*	0.05
Social Class: A to F	3.64	3.88	-0.24	0.22	3.74	3.88	-0.14	0.48	3.57	3.88	-0.31*	0.08
1=Urban 0=Rural	0.69	0.73	-0.03	0.58	0.73	0.78	-0.05	0.42	0.70	0.73	-0.03	0.60
Marital Status	2.23	2.31	-0.08	0.69	2.29	2.34	-0.06	0.79	2.17	2.23	-0.06	0.72
Children below 18 Years	0.75	1.41	-0.65***	0.00	0.96	0.80	0.15	0.35	0.73	1.29	-0.57***	0.00
Employment Status	3.60	3.03	0.58*	0.09	3.03	3.07	-0.04	0.90	3.46	2.86	0.60*	0.05
Highest level of Education	4.48	4.26	0.22	0.27	4.53	4.15	0.38*	0.07	4.41	4.45	-0.03	0.86
Household Income	3.98	3.74	0.24	0.58	3.87	3.79	0.08	0.86	4.20	3.74	0.47	0.25
Proportion of Income Saved	3.04	3.14	-0.11	0.66	3.08	3.61	-0.53**	0.04	3.34	3.40	-0.06	0.80
Cash Constrained (Decreasing)	3.02	2.87	0.15	0.41	3.04	3.09	-0.05	0.80	3.42	3.00	0.42**	0.01
Foresee large Expenses	0.36	0.48	-0.12*	0.07	0.44	0.40	0.03	0.62	0.34	0.31	0.03	0.61
Total Number of Loans	0.68	0.83	-0.15	0.18	0.62	0.69	-0.06	0.58	0.57	0.80	-0.23**	0.02
Has Credit Card?	0.61	0.68	-0.07	0.29	0.62	0.70	-0.08	0.23	0.63	0.69	-0.05	0.34
Present Bias	0.24	0.36	-0.12**	0.04	0.22	0.31	-0.10*	0.09	0.28	0.28	-0.00	0.95
Impatience (Decreasing)	3.33	3.23	0.09	0.52	3.49	3.31	0.17	0.24	3.31	3.36	-0.05	0.71
Fin. Riskiness (Increasing)	2.37	2.81	-0.43***	0.00	2.41	2.73	-0.32*	0.05	2.38	2.72	-0.34**	0.01
Debt-Use	0.12	0.32	-0.20***	0.00	0.14	0.30	-0.16***	0.00	0.16	0.31	-0.15**	0.00
Confidence (Increasing)	1.62	1.34	0.28	0.13	1.37	1.24	0.13	0.49	1.58	1.40	0.18	0.28
Fin. Literacy (Increasing)	0.50	0.37	0.13**	0.02	0.46	0.22	0.24***	0.00	0.48	0.33	0.15***	0.00
Attentiveness (Increasing)	0.82	0.45	0.37***	0.00	0.81	0.39	0.42***	0.00	0.69	0.45	0.24*	0.02
Expect Inheritance	0.26	0.32	-0.05	0.39	0.26	0.31	-0.05	0.46	0.29	0.35	-0.06	0.31
Tend to Live for today (Increasing)	3.18	4.10	-0.93***	0.00	3.31	3.84	-0.53*	0.02	3.33	3.59	-0.26	0.20
Advertising affect your purchase? (Increasing)	2.97	3.45	-0.49**	0.02	3.15	3.54	-0.38*	0.09	3.03	3.53	-0.50**	0.01
Carefully consider purchases (Increasing)	5.18	4.82	0.37*	0.06	5.32	4.75	0.57***	0.00	5.19	4.72	0.47***	0.00
Keep close watch on Spending (Increasing)	5.56	5.19	0.37*	0.05	5.70	5.01	0.69***	0.00	5.62	5.45	0.18	0.28
Set Long Term Financial Goals (Increasing)	4.62	4.44	0.17	0.39	4.81	4.43	0.37*	0.09	4.69	4.72	-0.03	0.89
Have Household Budget (Increasing)	4.69	4.96	-0.27	0.20	4.96	4.69	0.28	0.22	4.78	5.00	-0.22	0.24
How much does opinion of others affect your behaviour? (Increasing)	3.08	3.52	-0.44**	0.03	3.06	3.37	-0.31	0.14	2.97	3.46	-0.49**	0.01
More satisfying to spend money then save (Increasing)	3.37	3.74	-0.37*	0.08	3.42	3.90	-0.47**	0.04	3.30	3.67	-0.37*	0.06

Table 4.22: Difference of Means t-test between cashback and no-cashback mortgage choice for Control, Treatment 1 and Treatment 2 for Experiment 2 (Main Analysis 100% Data)

	Experiment 2: Control (N=333)				Experiment 2: Treatment 1 (N=332)				Experiment 2: Treatment 2 (N=335)			
	No-cashback Mean (N=256)	Cashback Mean (N=77)	Difference	P-value	No-cashback Mean (N=265)	Cashback Mean (N=67)	Difference	P-value	No-cashback Mean (N=255)	Cashback Mean (N=80)	Difference	P-value
1=Male, 0=Female	0.48	0.52	-0.04	0.51	0.47	0.58	-0.11	0.11	0.55	0.49	0.06	0.37
Exact Age	45.85	39.87	5.98***	0.00	43.74	45.37	-1.63	0.44	44.95	40.79	4.17**	0.02
Social Class: A to F	3.77	3.65	0.12	0.54	3.81	3.93	-0.12	0.56	3.75	3.70	0.05	0.80
1=Urban 0=Rural	0.74	0.75	-0.01	0.79	0.74	0.85	-0.11*	0.06	0.69	0.82	-0.13**	0.02
Marital Status	2.19	2.04	0.15	0.45	2.29	2.33	-0.03	0.87	2.22	2.46	-0.24	0.22
Children below 18 Years	0.67	1.16	-0.50***	0.00	0.91	1.07	-0.17	0.34	0.83	1.04	-0.21	0.15
Employment Status	3.41	2.91	0.50	0.13	3.43	3.03	0.40	0.25	3.05	2.83	0.23	0.46
Highest level of Education	4.46	4.35	0.11	0.56	4.54	4.61	-0.07	0.74	4.49	4.41	0.08	0.69
Household Income	3.83	3.43	0.40	0.33	4.07	4.19	-0.13	0.79	4.36	4.47	-0.11	0.81
Proportion of Income Saved	3.34	3.40	-0.06	0.80	3.22	3.45	-0.23	0.38	3.39	3.54	-0.15	0.55
Cash Constrained (Decreasing)	3.14	2.71	0.43**	0.03	3.05	3.19	-0.14	0.47	3.30	3.20	0.10	0.58
Foresee large Expenses	0.38	0.44	-0.06	0.33	0.34	0.48	-0.13*	0.04	0.39	0.35	0.04	0.50
Total Number of Loans	0.56	0.84	-0.28**	0.01	0.68	0.76	-0.09	0.48	0.62	0.72	-0.11	0.29
Has Credit Card?	0.62	0.79	-0.18***	0.00	0.62	0.79	-0.18**	0.01	0.68	0.65	0.03	0.59
Present Bias	0.29	0.32	-0.03	0.60	0.25	0.25	-0.01	0.89	0.19	0.26	-0.07	0.18
Impatience (Decreasing)	3.25	3.21	0.04	0.80	3.35	3.48	-0.12	0.42	3.33	3.50	-0.17	0.24
Fin. Riskiness (Increasing)	2.30	2.90	-0.60***	0.00	2.50	2.63	-0.13	0.38	2.33	3.02	-0.70***	0.00
Debt-Use	0.09	0.35	-0.26***	0.00	0.16	0.33	-0.17***	0.00	0.09	0.26	-0.17***	0.00
Confidence (Increasing)	1.53	1.64	-0.11	0.56	1.59	1.84	-0.24	0.26	1.79	1.31	0.48**	0.01
Fin. Literacy (Increasing)	0.48	0.29	0.19***	0.00	0.46	0.25	0.21***	0.00	0.46	0.32	0.14**	0.01
Attentiveness (Increasing)	0.63	0.27	0.36***	0.00	0.79	0.43	0.36**	0.01	0.73	0.46	0.27**	0.03
Expect Inheritance	0.24	0.27	-0.02	0.70	0.30	0.30	-0.00	1.00	0.27	0.31	-0.04	0.53
Tend to Live for today (Increasing)	3.21	4.04	-0.83***	0.00	3.56	3.61	-0.05	0.82	3.38	3.88	-0.49**	0.02
Advertising affect your purchase? (Increasing)	3.04	3.87	-0.83***	0.00	3.18	3.94	-0.76***	0.00	3.25	3.77	-0.52**	0.01
Carefully consider purchases (Increasing)	5.21	4.68	0.54**	0.01	5.07	5.04	0.03	0.89	5.07	4.81	0.26	0.13
Keep close watch on Spending (Increasing)	5.70	4.94	0.76***	0.00	5.56	5.27	0.29	0.12	5.54	5.20	0.34**	0.04
Set Long Term Financial Goals (Increasing)	4.67	4.47	0.20	0.37	4.63	4.78	-0.15	0.51	4.73	4.72	0.01	0.96
Have Household Budget (Increasing)	4.66	4.58	0.08	0.75	4.78	4.87	-0.08	0.73	4.73	4.85	-0.12	0.56
How much does opinion of others affect your behaviour? (Increasing)	3.04	3.73	-0.69***	0.00	3.11	3.69	-0.57*	0.01	3.21	3.74	-0.53**	0.01
More satisfying to spend money then save (Increasing)	3.27	4.08	-0.81***	0.00	3.61	3.88	-0.27	0.25	3.50	4.08	-0.57**	0.01

Table 4.23: Difference of Means t-test between cashback and no-cashback mortgage choice for Control, Treatment 1 and Treatment 2 for Experiment 3 (Main Analysis 100% Data)

	Experiment 3: Control (N=335)				Experiment 3: Treatment 1 (N=332)				Experiment 3: Treatment 2 (N=332)			
	No-cashback Mean (N=238)	Cashback Mean (N=97)	Difference	P-value	No-cashback Mean (N=253)	Cashback Mean (N=80)	Difference	P-value	No-cashback Mean (N=240)	Cashback Mean (N=92)	Difference	P-value
1=Male, 0=Female	0.48	0.47	0.00	0.94	0.49	0.59	-0.09	0.15	0.47	0.52	-0.05	0.45
Exact Age	44.63	40.10	4.53**	0.01	45.28	45.63	-0.34	0.86	45.76	37.82	7.95***	0.00
Social Class: A to F	3.70	3.93	-0.23	0.18	3.87	3.79	0.08	0.69	3.73	3.76	-0.04	0.84
1=Urban 0=Rural	0.74	0.74	0.00	0.98	0.64	0.81	-0.17***	0.00	0.67	0.73	-0.06	0.28
Marital Status	2.40	2.22	0.18	0.34	2.36	2.19	0.17	0.42	2.33	2.79	-0.47**	0.02
Children below 18 Years	0.87	0.97	-0.10	0.49	0.82	0.76	0.06	0.68	0.75	1.12	-0.38**	0.01
Employment Status	3.37	3.01	0.36	0.24	3.36	3.05	0.31	0.33	3.43	2.99	0.44	0.15
Highest level of Education	4.45	4.41	0.04	0.84	4.38	4.41	-0.03	0.88	4.53	4.33	0.20	0.28
Household Income	4.17	4.05	0.12	0.77	4.19	4.21	-0.03	0.95	4.24	3.43	0.80*	0.06
Proportion of Income Saved	3.28	3.70	-0.42*	0.07	3.27	3.31	-0.04	0.87	3.35	3.45	-0.10	0.70
Cash Constrained (Decreasing)	3.21	3.03	0.18	0.29	3.12	3.23	-0.11	0.58	3.36	3.09	0.27	0.13
Foresee large Expenses	0.37	0.33	0.04	0.45	0.35	0.39	-0.04	0.52	0.41	0.45	-0.03	0.59
Total Number of Loans	0.61	0.59	0.02	0.85	0.57	0.81	-0.25**	0.02	0.54	0.64	-0.10	0.23
Has Credit Card?	0.62	0.70	-0.08	0.17	0.66	0.69	-0.03	0.65	0.64	0.73	-0.09	0.14
Present Bias	0.27	0.38	-0.11**	0.04	0.24	0.23	0.01	0.82	0.17	0.36	-0.19***	0.00
Impatience (Decreasing)	3.32	3.37	-0.06	0.68	3.34	3.19	0.15	0.31	3.42	3.33	0.09	0.48
Fin. Riskiness (Increasing)	2.40	2.77	-0.37***	0.00	2.41	2.63	-0.21	0.15	2.38	2.83	-0.45***	0.00
Debt-Use	0.13	0.35	-0.22***	0.00	0.11	0.25	-0.14***	0.00	0.13	0.34	-0.21***	0.00
Confidence (Increasing)	1.45	1.61	-0.15	0.39	1.58	1.71	-0.13	0.53	1.64	1.71	-0.07	0.70
Fin. Literacy (Increasing)	0.45	0.29	0.168**	0.00	0.38	0.33	0.04	0.39	0.46	0.20	0.26***	0.00
Attentiveness (Increasing)	0.84	0.30	0.55***	0.00	0.77	0.35	0.42***	0.00	0.65	0.38	0.27**	0.01
Expect Inheritance	0.32	0.41	-0.09	0.13	0.26	0.30	-0.04	0.52	0.23	0.35	-0.12**	0.03
Tend to Live for today (Increasing)	3.46	4.08	-0.62***	0.00	3.36	3.79	-0.42*	0.07	3.35	4.04	-0.69***	0.00
Advertising affect your purchase? (Increasing)	3.13	3.94	-0.81***	0.00	3.05	3.29	-0.24	0.27	3.10	3.77	-0.67***	0.00
Carefully consider purchases (Increasing)	5.07	4.98	0.09	0.60	5.05	4.81	0.23	0.21	5.20	4.91	0.29	0.12
Keep close watch on Spending (Increasing)	5.66	5.42	0.23	0.19	5.58	5.26	0.31	0.10	5.74	5.25	0.49***	0.00
Set Long Term Financial Goals (Increasing)	4.81	4.99	-0.18	0.35	4.63	4.56	0.07	0.75	4.75	4.72	0.04	0.85
Have Household Budget (Increasing)	4.81	4.96	-0.15	0.47	4.84	4.80	0.04	0.86	4.85	4.64	0.21	0.33
How much does opinion of others affect your behaviour? (Increasing)	2.95	3.88	-0.93***	0.00	2.90	3.27	-0.38*	0.07	3.12	3.37	-0.25	0.18
More satisfying to spend money then save (Increasing)	3.61	4.28	-0.67***	0.00	3.52	3.67	-0.15	0.49	3.53	4.03	-0.50*	0.02

Table 4.24: Difference of Means t-test between cashback and no-cashback mortgage choice for Control, Treatment 1 and Treatment 2 for experiments 1, 2, and 3 for subsample of Mortgage Market

	Experiment 1,2,3: Control (N=647)				Experiment 1,2,3: Treatment 1 (N=651)				Experiment 1,2,3: Treatment 2 (N=669)			
	No-cashback Mean (N=465)	Cashback Mean (N=182)	Difference	P-value	No-cashback Mean (N=510)	Cashback Mean (N=141)	Difference	P-value	No-cashback Mean (N=479)	Cashback Mean (N=190)	Difference	P-value
1=Male, 0=Female	0.46	0.49	-0.03	0.54	0.48	0.49	-0.01	0.79	0.55	0.48	0.06	0.14
Exact Age	41.06	36.21	4.85***	0.00	40.21	40.20	0.02	0.99	41.50	36.28	5.22***	0.00
Social Class: A to F	3.58	3.68	-0.10	0.45	3.65	3.67	-0.03	0.84	3.54	3.51	0.03	0.78
1=Urban 0=Rural	0.75	0.75	-0.00	0.91	0.73	0.82	-0.09*	0.03	0.71	0.77	-0.06*	0.09
Marital Status	2.44	2.22	0.22	0.12	2.42	2.37	0.05	0.73	2.39	2.53	-0.15	0.29
Children below 18 Years	0.89	1.23	-0.34***	0.00	1.04	1.02	0.02	0.85	0.85	1.27	-0.42***	0.00
Employment Status	3.04	2.57	0.47*	0.02	2.82	2.55	0.27	0.21	2.91	2.41	0.50*	0.01
Highest level of Education	4.71	4.52	0.19	0.17	4.71	4.59	0.12	0.43	4.68	4.72	-0.04	0.75
Household Income	2.88	2.87	0.02	0.92	2.95	2.83	0.12	0.51	2.75	2.85	-0.10	0.46
Proportion of Income Saved	2.94	3.08	-0.14	0.29	2.96	2.94	0.01	0.92	2.98	3.05	-0.07	0.58
Cash Constrained (Decreasing)	2.94	2.65	0.29*	0.01	2.89	2.77	0.13	0.30	3.11	2.76	0.35***	0.00
Foresee large Expenses	0.42	0.47	-0.05	0.29	0.41	0.52	-0.11*	0.02	0.44	0.45	-0.01	0.80
Total Number of Loans	0.66	0.82	-0.17*	0.03	0.65	0.79	-0.14*	0.08	0.62	0.79	-0.17*	0.01
Has Credit Card?	0.62	0.74	-0.12***	0.00	0.63	0.74	-0.11*	0.01	0.65	0.75	-0.10*	0.01
Present Bias	0.27	0.33	-0.06	0.12	0.23	0.23	-0.01	0.87	0.20	0.33	-0.13***	0.00
Impatience (Decreasing)	3.30	3.35	-0.05	0.61	3.42	3.23	0.18*	0.08	3.39	3.42	-0.03	0.75
Fin. Riskiness (Increasing)	2.50	2.95	-0.45***	0.00	2.58	2.83	-0.25*	0.02	2.45	3.05	-0.60***	0.00
Debt-Use	0.12	0.37	-0.25***	0.00	0.14	0.35	-0.21***	0.00	0.12	0.36	-0.24***	0.00
Confidence (Increasing)	1.49	1.53	-0.03	0.78	1.47	1.56	-0.09	0.51	1.73	1.55	0.18	0.15
Fin. Literacy (Increasing)	0.49	0.34	0.15***	0.00	0.44	0.33	0.11***	0.00	0.50	0.33	0.17***	0.00
Attentiveness (Increasing)	0.73	0.34	0.40***	0.00	0.77	0.33	0.45***	0.00	0.69	0.44	0.24***	0.00
Expect Inheritance	0.33	0.41	-0.08*	0.07	3.29	3.82	-0.52***	0.00	0.30	0.40	-0.10*	0.02
Tend to Live for today (Increasing)	3.28	4.15	-0.87***	0.00	0.30	0.35	-0.05	0.34	3.37	3.89	-0.52***	0.00
Advertising affect your purchase? (Increasing)	3.23	4.04	-0.81***	0.00	3.40	3.94	-0.54***	0.00	3.30	3.97	-0.66***	0.00
Carefully consider purchases (Increasing)	5.17	4.86	0.31*	0.02	5.15	4.80	0.34*	0.01	5.20	4.88	0.32*	0.01
Keep close watch on Spending (Increasing)	5.58	5.29	0.30*	0.02	5.56	5.11	0.46***	0.00	5.61	5.25	0.35***	0.00
Set Long Term Financial Goals (Increasing)	4.78	4.86	-0.09	0.54	4.83	4.59	0.24	0.11	4.88	4.93	-0.05	0.67
Have Household Budget (Increasing)	4.67	4.96	-0.29*	0.05	4.88	4.72	0.16	0.32	4.80	4.88	-0.08	0.56
How much does opinion of others affect your behaviour? (Increasing)	3.22	3.97	-0.76***	0.00	3.20	3.74	-0.54***	0.00	3.24	3.75	-0.52***	0.00
More satisfying to spend money then save (Increasing)	3.41	4.10	-0.70***	0.00	3.53	3.99	-0.46***	0.00	3.50	4.02	-0.52***	0.00

Table 4.25: Difference of Means t-test between cashback and no-cashback mortgage choice for Control, Treatment 1 and Treatment 2 for experiments 1, 2, and 3 for subsample of Prospective Buyers

	Experiment 1,2,3: Control (N=454)				Experiment 1,2,3: Treatment 1 (N=463)				Experiment 1,2,3: Treatment 2 (N=478)			
	No-cashback Mean (N=313)	Cashback Mean (N=141)	Difference	P-value	No-cashback Mean (N=350)	Cashback Mean (N=113)	Difference	P-value	No-cashback Mean (N=321)	Cashback Mean (N=157)	Difference	P-value
1=Male, 0=Female	0.46	0.48	-0.02	0.66	0.48	0.50	-0.01	0.81	0.52	0.48	0.04	0.42
Exact Age	36.81	32.97	3.84***	0.00	36.53	37.86	-1.33	0.35	38.03	34.52	3.51*	0.01
Social Class: A to F	3.56	3.59	-0.03	0.86	3.63	3.61	0.02	0.88	3.53	3.42	0.11	0.41
1=Urban 0=Rural	0.79	0.79	-0.01	0.84	0.78	0.84	-0.06	0.18	0.75	0.79	-0.04	0.35
Marital Status	2.78	2.26	0.52***	0.00	2.70	2.47	0.23	0.20	2.69	2.62	0.06	0.71
Children below 18 Years	0.86	1.29	-0.43***	0.00	0.93	1.02	-0.09	0.49	0.86	1.26	-0.39***	0.00
Employment Status	2.78	2.34	0.44*	0.04	2.63	2.30	0.33	0.14	2.82	2.31	0.51*	0.02
Highest level of Education	4.81	4.61	0.20	0.23	4.79	4.66	0.12	0.47	4.77	4.80	-0.03	0.85
Household Income	2.84	2.96	-0.12	0.53	2.91	2.97	-0.06	0.75	2.64	2.86	-0.22	0.16
Proportion of Income Saved	3.21	3.20	0.00	0.99	3.14	3.09	0.06	0.71	3.15	3.12	0.03	0.86
Cash Constrained (Decreasing)	2.93	2.64	0.29*	0.02	2.89	2.78	0.12	0.38	3.11	2.69	0.42***	0.00
Foresee large Expenses	0.46	0.50	-0.04	0.39	0.44	0.55	-0.11*	0.05	0.49	0.49	-0.00	0.98
Total Number of Loans	0.57	0.82	-0.26***	0.00	0.53	0.79	-0.26***	0.00	0.48	0.80	-0.32***	0.00
Has Credit Card?	0.58	0.77	-0.19***	0.00	0.65	0.76	-0.11*	0.03	0.60	0.77	-0.17***	0.00
Present Bias	0.30	0.34	-0.04	0.36	0.23	0.23	-0.00	0.97	0.21	0.34	-0.14***	0.00
Impatience (Decreasing)	3.28	3.40	-0.12	0.30	3.37	3.23	0.14	0.22	3.40	3.45	-0.05	0.64
Fin. Riskiness (Increasing)	2.65	3.11	-0.46***	0.00	2.72	2.96	-0.24*	0.05	2.59	3.10	-0.51***	0.00
Debt-Use	0.12	0.44	-0.32***	0.00	0.16	0.41	-0.25***	0.00	0.12	0.38	-0.25***	0.00
Confidence (Increasing)	1.50	1.66	-0.16	0.25	1.53	1.65	-0.11	0.49	1.78	1.55	0.23	0.10
Fin. Literacy (Increasing)	0.46	0.32	0.14***	0.00	0.42	0.32	0.10*	0.01	0.46	0.31	0.16***	0.00
Attentiveness (Increasing)	0.72	0.32	0.40***	0.00	0.71	0.35	0.35***	0.00	0.67	0.39	0.28***	0.00
Expect Inheritance	0.36	0.44	-0.08	0.14	0.32	0.39	-0.07	0.18	0.34	0.44	-0.10*	0.05
Tend to Live for today (Increasing)	3.34	4.27	-0.93***	0.00	3.43	4.01	-0.58***	0.00	3.36	3.97	-0.62***	0.00
Advertising affect your purchase? (Increasing)	3.31	4.28	-0.96***	0.00	3.46	4.03	-0.57***	0.00	3.46	4.13	-0.67***	0.00
Carefully consider purchases (Increasing)	5.10	4.84	0.25	0.10	5.08	4.84	0.24	0.11	5.21	4.95	0.27*	0.04
Keep close watch on Spending (Increasing)	5.51	5.11	0.40*	0.01	5.43	5.07	0.36*	0.02	5.56	5.20	0.36***	0.00
Set Long Term Financial Goals (Increasing)	4.88	4.92	-0.05	0.77	4.91	4.68	0.23	0.17	4.95	4.99	-0.04	0.79
Have Household Budget (Increasing)	4.71	4.94	-0.23	0.16	4.77	4.70	0.07	0.70	4.82	4.96	-0.15	0.34
How much does opinion of others affect your behaviour? (Increasing)	3.33	4.13	-0.81***	0.00	3.37	3.88	-0.52***	0.00	3.42	3.82	-0.40*	0.01
More satisfying to spend money then save (Increasing)	3.55	4.24	-0.69***	0.00	3.53	4.05	-0.52***	0.00	3.47	4.04	-0.57***	0.00

Table 4.26: Difference of Means t-test between Present-bias and non Present-bias respondents

	No-Present Bias	Present Bias	Difference	(P-value)
Highest level of Education	4.50	4.31	0.19***	0.00
Household Income (Increasing)	2.74	2.54	0.21***	0.00
Cash Constrained Intensity (Decreasing)	2.98	2.73	0.25***	0.00
Foresee large expense in coming Years	0.37	0.41	-0.04*	0.08
Importance of Cash-back (Increasing)	1.71	1.82	-0.12***	0.00
Tend to Live for today without thinking of tomorrow (Increasing)	3.39	3.75	-0.36***	0.00

4.C Full Specification Results for Main Analysis (100% Sample)

Table 4.27: Stylised Fact 1 arising from Control groups pooled in Experiment 1 and 3 (E1.C and E3.C) (Main Analysis)

Variables	**(1) Cash Back E1.C&E3.C**	**(2) Cash Back E1.C&E3.C**	**(3) Cash Back E1.C&E3.C**	**(4) Cash Back E1.C&E3.C**	**(5) Cash Back E1.C&E3.C**	**(6) Cash Back E1.C&E3.C**
Present Bias	0.099***	0.084***			0.083***	0.082***
	(0.020)	(0.016)			(0.015)	(0.029)
Confidence	-0.004	0.003	-0.007	0.002	0.001	0.003
	(0.008)	(0.011)	(0.008)	(0.010)	(0.009)	(0.010)
Lottery	0.074***	-0.008			-0.020	-0.025*
	(0.016)	(0.011)			(0.018)	(0.014)
Impatience			-0.013	0.006	0.007	0.013
			(0.023)	(0.011)	(0.012)	(0.016)
Financial Risk (Self-perceived)			0.059**	0.028	0.028	0.001
			(0.027)	(0.021)	(0.022)	(0.021)
Debt Use		0.182***		0.183***	0.175***	0.213***
		(0.053)		(0.057)	(0.055)	(0.065)
Fin. Lit. Index		-0.053		-0.064	-0.054	-0.004
		(0.051)		(0.046)	(0.048)	(0.050)
Attentive		-0.089***		-0.088***	-0.087***	-0.076***
		(0.025)		(0.022)	(0.022)	(0.026)
Gender		0.057***		0.044*	0.046**	0.039**
		(0.018)		(0.025)	(0.022)	(0.016)
Age		-0.007**		-0.006***	-0.006***	-0.008***
		(0.003)		(0.002)	(0.002)	(0.002)
Urban		0.008		0.009	0.010	0.036
		(0.025)		(0.022)	(0.021)	(0.034)
Education		-0.015*		-0.018**	-0.018***	-0.019**
		(0.008)		(0.008)	(0.007)	(0.009)
Credit Card (1=Yes)		0.093***		0.082***	0.089***	0.083***
		(0.024)		(0.019)	(0.023)	(0.023)
Saving Proportion						0.010
						(0.015)
Cash Constrained						-0.000
						(0.032)
Income						-0.013*
						(0.008)
Observations	656	653	656	653	653	508
Demography Controls	No	Yes	No	Yes	Yes	Yes
Location FE	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using experiment data on Stata14.
Notes: Standard Errors clustered at regional (5 in total) level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 4.28: Stylised Fact 1 arising from Control groups pooled in Experiment 1 and 3 (E1.C and E3.C Separately) (Main Analysis)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Variables	**Cash Back E1.C**	**Cash Back E1.C**	**Cash Back E1.C**	**Cash Back E1.C**	**Cash Back E1.C**	**Cash Back E1.C**	**Cash Back E3.C**	**Cash Back E1.C**	**Cash Back E3.C**	**Cash Back E3.C**	**Cash Back E3.C**	**Cash Back E3.C**
Present Bias	0.088***	0.088***			0.096***	0.138***	0.121***	0.114***			0.113**	0.173***
	(0.024)	(0.029)			(0.031)	(0.038)	(0.047)	(0.044)			(0.045)	(0.038)
Confidence	-0.021*	-0.022	-0.021**	-0.021	-0.024	-0.027**	0.008	0.028*	0.001	0.026	0.026*	0.026
	(0.011)	(0.017)	(0.009)	(0.016)	(0.017)	(0.013)	(0.017)	(0.016)	(0.015)	(0.017)	(0.015)	(0.028)
Lottery	0.112**	0.038			0.018	-0.122***	0.011	-0.032			-0.037	-0.035
	(0.053)	(0.037)			(0.033)	(0.028)	(0.041)	(0.065)			(0.069)	(0.076)
Impatience			-0.020	0.009	0.008	0.012			-0.006	0.006	0.006	0.023
			(0.022)	(0.010)	(0.008)	(0.017)			(0.030)	(0.018)	(0.017)	(0.024)
Financial Risk (Self-perceived)			0.069***	0.044*	0.046**	0.053**			0.058	0.017	0.016	-0.044***
			(0.024)	(0.023)	(0.018)	(0.027)			(0.043)	(0.031)	(0.033)	(0.015)
Debt Use		0.192***		0.195***	0.184***	0.230**		0.205***		0.215***	0.202***	0.242***
		(0.069)		(0.068)	(0.066)	(0.098)		(0.059)		(0.078)	(0.067)	(0.088)
Fin. Lit. Index		-0.023		-0.038	-0.034	0.001		-0.068***		-0.082**	-0.066**	-0.059
		(0.094)		(0.077)	(0.085)	(0.093)		(0.026)		(0.032)	(0.029)	(0.060)
Attentive		-0.058		-0.053	-0.050	-0.022		-0.131***		-0.131***	-0.130***	-0.124***
		(0.050)		(0.041)	(0.041)	(0.036)		(0.010)		(0.015)	(0.012)	(0.025)
Gender		0.123***		0.104**	0.108**	0.132***		-0.013		-0.023	-0.021	-0.076***
		(0.042)		(0.048)	(0.047)	(0.050)		(0.030)		(0.026)	(0.022)	(0.029)
Age		-0.010***		-0.008***	-0.009***	-0.011***		-0.005		-0.004	-0.004	-0.006
		(0.001)		(0.002)	(0.002)	(0.003)		(0.005)		(0.004)	(0.005)	(0.005)
Urban		0.057**		0.062**	0.059**	0.111***		-0.048		-0.051*	-0.043*	-0.029
		(0.026)		(0.026)	(0.024)	(0.028)		(0.037)		(0.028)	(0.025)	(0.044)
Education		-0.022*		-0.033***	-0.031***	-0.049**		-0.010		-0.007	-0.011**	-0.009
		(0.013)		(0.008)	(0.009)	(0.020)		(0.007)		(0.007)	(0.005)	(0.013)
Credit Card (1=Yes)		0.100**		0.092***	0.091**	0.108**		0.056**		0.035	0.054**	0.027
		(0.042)		(0.033)	(0.035)	(0.044)		(0.026)		(0.022)	(0.026)	(0.075)
Saving Prop						-0.001						0.033
						(0.017)						(0.030)
Cash Constrained						-0.040***						-0.017
						(0.008)						(0.048)
Income						0.022**						-0.040***
						(0.010)						(0.012)
Observations	328	325	328	325	325	257	314	297	314	297	297	206
Demography Controls	No	Yes	No	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes
Location FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using experiment data on Stata14.
Notes: Standard Errors clustered at regional (5 in total) level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 4.29: Stylised Fact 2 for Limited Attention Bias arising from Control Group in Experiment 2 (E2.C) (Main Analysis)

Variables	(1) Cashback E2.C	(2) Cashback E2.C	(3) Cashback E2.C	(4) Cashback E2.C	(5) Cashback E2.C	(6) Cashback E2.C	(7) Cashback E2.C	(8) Cashback E2.C
Attentive	-0.097***	-0.064***	-0.078***				-0.078***	-0.069**
	(0.035)	(0.024)	(0.026)				(0.026)	(0.034)
Fin. Lit. Index		-0.196***	-0.239***		-0.217***	-0.256***	-0.224***	-0.178**
		(0.063)	(0.064)		(0.077)	(0.074)	(0.069)	(0.073)
Present Bias		-0.001	-0.005				0.008	0.097*
		(0.046)	(0.056)				(0.048)	(0.058)
Confidence		0.022	0.029***		0.009	0.020***	0.024***	0.039***
		(0.019)	(0.010)		(0.013)	(0.007)	(0.007)	(0.010)
Lottery		0.153**	0.085				0.045	0.109
		(0.074)	(0.072)				(0.070)	(0.082)
Careful In Purchase				-0.044***	-0.027***	-0.021***	-0.015***	-0.019
				(0.014)	(0.010)	(0.006)	(0.006)	(0.019)
Impatience					-0.010	0.015	0.016	0.056
					(0.019)	(0.015)	(0.014)	(0.040)
Financial Risk (Self-perceived)					0.065***	0.064***	0.062***	0.053***
					(0.015)	(0.008)	(0.016)	(0.018)
Debt Use		0.278***	0.229***		0.232***	0.187***	0.183***	0.229***
		(0.038)	(0.045)		(0.045)	(0.047)	(0.043)	(0.010)
Gender			0.062***			0.006	0.024	-0.003
			(0.024)			(0.033)	(0.031)	(0.054)
Age			-0.001			-0.003***	-0.002***	-0.002
			(0.002)			(0.001)	(0.001)	(0.001)
Urban			0.038			0.035	0.040	0.022
			(0.043)			(0.028)	(0.030)	(0.059)
Education			-0.015			-0.022	-0.021*	-0.057***
			(0.010)			(0.015)	(0.013)	(0.009)
Credit Card (1=Yes)			0.133**			0.111*	0.110*	0.102
			(0.061)			(0.061)	(0.059)	(0.079)
Saving Proportion								0.045**
								(0.019)
Cash Constrained								-0.057***
								(0.018)
Income								-0.021
								(0.034)
Observations	296	296	293	296	296	293	293	200
Demography Controls	No	No	Yes	No	No	Yes	Yes	Yes
Location FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using experiment data on Stata14.
Notes: Standard Errors clustered at regional (5 in total) level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 4.30: Stylised Fact 3 for 2 versus 1 Framing Effect arising from Control Group in Experiment 1 and 3 (E1.C and E3.C) (Main Analysis)

Variables	(1) Cash Back E1.C&E3.C	(2) Cash Back E1.C&E3.C	(3) Cash Back E1.C&E3.C	(4) Cash Back E1.C&E3.C	(5) Cash Back E1.C&E3.C	(6) Cash Back E1.C&E3.C	(7) Cash Back E1.C&E3.C
2v1	0.067***	0.052*	0.051**	0.051*	0.053**	0.049*	0.047*
	(0.024)	(0.027)	(0.025)	(0.028)	(0.024)	(0.025)	(0.027)
Present Bias		0.062***	0.081***			0.081***	0.079***
		(0.015)	(0.014)			(0.014)	(0.028)
Confidence		0.011	0.003	0.009	0.003	0.002	0.005
		(0.010)	(0.012)	(0.008)	(0.010)	(0.010)	(0.011)
Lottery1		0.044***	-0.002			-0.015	-0.022
		(0.011)	(0.012)			(0.019)	(0.015)
Impatience				0.001	0.006	0.007	0.012
				(0.016)	(0.011)	(0.012)	(0.016)
Financial Risk (Self Perceived)				0.037	0.028	0.028	0.001
				(0.024)	(0.022)	(0.023)	(0.022)
Debt Use		0.201***	0.181***	0.193***	0.182***	0.174***	0.210***
		(0.061)	(0.051)	(0.065)	(0.055)	(0.053)	(0.065)
Fin Lit Index		-0.061	-0.050	-0.068	-0.061	-0.051	-0.004
		(0.048)	(0.053)	(0.044)	(0.048)	(0.050)	(0.050)
Attentive		-0.079***	-0.088***	-0.080***	-0.087***	-0.086***	-0.076***
		(0.024)	(0.025)	(0.019)	(0.022)	(0.022)	(0.026)
Gender			0.055***		0.042**	0.044**	0.039**
			(0.015)		(0.021)	(0.020)	(0.018)
Age			-0.006**		-0.006***	-0.006***	-0.007***
			(0.003)		(0.002)	(0.002)	(0.002)
Urban			0.006		0.007	0.008	0.034
			(0.026)		(0.023)	(0.022)	(0.037)
Education			-0.016**		-0.019**	-0.019***	-0.018*
			(0.008)		(0.008)	(0.007)	(0.010)
Credit Card (1=Yes)			0.094***		0.083***	0.089***	0.083***
			(0.023)		(0.017)	(0.021)	(0.022)
Saving Proportion							0.009
							(0.015)
Cash Constrained							-0.001
							(0.031)
Income							-0.014*
							(0.008)
Observations	656	656	653	656	653	653	508
Demography Controls	No	Yes	Yes	Yes	Yes	Yes	Yes
Location FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using experiment data on Stata14.
Notes: Standard Errors clustered at regional (5 in total) level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

4.D Full Specification Results for Mortgage Market

Table 4.31: Stylised Fact 1 arising from Control groups pooled in Experiment 1 and 3 (E1.C and E3.C) (Mortgage Market)

Variables	(1) Cash Back E1.C&E3.C	(2) Cash Back E1.C&E3.C	(3) Cash Back E1.C&E3.C	(4) Cash Back E1.C&E3.C	(5) Cash Back E1.C&E3.C	(6) Cash Back E1.C&E3.C
Present Bias	0.068*	0.056**			0.054**	0.083*
	(0.037)	(0.023)			(0.026)	(0.046)
Confidence	0.006	0.007	0.002	0.005	0.003	0.003
	(0.015)	(0.019)	(0.013)	(0.019)	(0.019)	(0.012)
Lottery	0.072***	-0.022			-0.031	-0.031
	(0.016)	(0.043)			(0.042)	(0.035)
Impatience			0.006	0.017	0.019	0.033**
			(0.034)	(0.017)	(0.018)	(0.014)
Financial Risk (Self-perceived)			0.062*	0.023	0.020	-0.015
			(0.034)	(0.017)	(0.017)	(0.028)
Debt Use		0.212***		0.210**	0.211**	0.268**
		(0.077)		(0.085)	(0.085)	(0.107)
Fin. Lit. Index		-0.037		-0.043	-0.042	0.012
		(0.055)		(0.048)	(0.051)	(0.071)
Attentive		-0.091***		-0.088***	-0.088***	-0.075
		(0.034)		(0.033)	(0.033)	(0.046)
Gender		0.101***		0.087***	0.091***	0.084***
		(0.005)		(0.011)	(0.009)	(0.030)
Age		-0.007***		-0.006***	-0.007***	-0.010***
		(0.002)		(0.002)	(0.002)	(0.004)
Urban		0.034		0.029	0.040	0.097
		(0.062)		(0.059)	(0.060)	(0.091)
Education		-0.028**		-0.031**	-0.031**	-0.026*
		(0.014)		(0.013)	(0.013)	(0.015)
Credit Card (1=Yes)		0.049		0.035	0.045	0.017
		(0.034)		(0.033)	(0.034)	(0.036)
Saving Proportion						0.004
						(0.027)
Cash Constrained						0.009
						(0.026)
Income						-0.009
						(0.009)
Observations	415	410	415	410	410	320
Demography Controls	No	Yes	No	Yes	Yes	Yes
Location FE	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using experiment data on Stata14.
Notes: Standard Errors clustered at regional (5 in total) level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 4.32: Stylised Fact 1 arising from Control groups pooled in Experiment 1 and 3 (E1.C and E3.C Separately) (Mortgage Market)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Variables	**Cash Back E1.C**	**Cash Back E1.C**	**Cash Back E1.C**	**Cash Back E1.C**	**Cash Back E1.C**	**Cash Back E1.C**	**Cash Back E3.C**	**Cash Back E1.C**	**Cash Back E3.C**	**Cash Back E3.C**	**Cash Back E3.C**	**Cash Back E3.C**
Present Bias	0.100*	0.175***			0.178***	0.165**	0.101	0.049			0.002	0.267***
	(0.060)	(0.059)			(0.056)	(0.070)	(0.107)	(0.082)			(0.085)	(0.078)
Confidence	-0.009	0.009	-0.008	0.020	0.006	0.011	0.023	0.067***	0.009	0.064***	0.060***	0.045***
	(0.015)	(0.016)	(0.013)	(0.014)	(0.013)	(0.013)	(0.021)	(0.018)	(0.020)	(0.016)	(0.019)	(0.014)
Lottery	0.086*	-0.038			-0.039	-0.085	0.025	-0.068			-0.149	-0.180***
	(0.046)	(0.040)			(0.052)	(0.078)	(0.071)	(0.078)			(0.097)	(0.054)
Impatience			-0.010	-0.012	-0.004	-0.015			0.015	0.049**	0.053**	0.095***
			(0.034)	(0.032)	(0.033)	(0.046)			(0.055)	(0.022)	(0.022)	(0.030)
Financial Risk (Self-perceived)			0.061**	0.025	0.029	0.046***			0.083*	0.008	0.014	-0.002
			(0.025)	(0.032)	(0.031)	(0.016)			(0.045)	(0.041)	(0.041)	(0.055)
Debt Use		0.344***		0.333***	0.333***	0.380***		0.197**		0.261**	0.270**	0.360**
		(0.088)		(0.070)	(0.088)	(0.069)		(0.089)		(0.117)	(0.117)	(0.141)
Fin. Lit. Index		0.077		0.076	0.077	0.115		-0.091		-0.100	-0.119	-0.053
		(0.126)		(0.129)	(0.122)	(0.119)		(0.081)		(0.078)	(0.108)	(0.048)
Attentive		-0.089***		-0.088***	-0.088***	-0.063***		-0.186***		-0.184***	-0.199***	-0.133**
		(0.016)		(0.018)	(0.020)	(0.019)		(0.047)		(0.052)	(0.049)	(0.066)
Gender		0.305***		0.246***	0.292***	0.274***		-0.079		-0.119***	-0.130***	-0.183***
		(0.077)		(0.070)	(0.085)	(0.043)		(0.071)		(0.038)	(0.040)	(0.070)
Age		-0.016***		-0.013**	-0.014**	-0.015***		-0.001		-0.002	-0.002	-0.005
		(0.006)		(0.006)	(0.006)	(0.006)		(0.007)		(0.005)	(0.005)	(0.009)
Urban		0.061		0.086	0.057	0.053		-0.075		-0.048	-0.038	0.091
		(0.157)		(0.099)	(0.152)	(0.112)		(0.105)		(0.073)	(0.089)	(0.081)
Education		-0.047		-0.058*	-0.049*	-0.056		-0.010		-0.021	-0.025***	0.001
		(0.030)		(0.031)	(0.029)	(0.038)		(0.013)		(0.014)	(0.009)	(0.024)
Credit Card (1=Yes)		0.070		0.062	0.061	0.100		-0.046		-0.123*	-0.137*	-0.076
		(0.074)		(0.061)	(0.064)	(0.064)		(0.082)		(0.074)	(0.071)	(0.076)
Saving Prop						0.033						0.033
						(0.042)						(0.030)
Cash Constrained						-0.013						0.035
						(0.022)						(0.052)
Income						0.019						0.011
						(0.032)						(0.016)
Observations	202	173	202	173	173	127	190	177	190	177	177	129
Demography Controls	No	Yes	No	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes
Location FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using experiment data on Stata14.
Notes: Standard Errors clustered at regional (5 in total) level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 4.33: Stylised Fact 2 for Limited Attention Bias arising from Control Group in Experiment 2 (E2.C) (Mortgage Market)

Variables	(1) Cashback E2.C	(2) Cashback E2.C	(3) Cashback E2.C	(4) Cashback E2.C	(5) Cashback E2.C	(6) Cashback E2.C	(7) Cashback E2.C	(8) Cashback E2.C
Attentive	-0.115***	-0.067***	-0.067**				-0.058***	-0.194***
	(0.036)	(0.022)	(0.030)				(0.019)	(0.067)
Fin. Lit. Index		-0.246***	-0.352***		-0.242***	-0.299***	-0.297***	-0.307**
		(0.062)	(0.070)		(0.088)	(0.105)	(0.085)	(0.127)
Present Bias		-0.009	-0.016				-0.037	0.147
		(0.065)	(0.088)				(0.079)	(0.129)
Confidence		-0.000	0.029		-0.012	0.005	0.013	0.063***
		(0.023)	(0.020)		(0.029)	(0.016)	(0.022)	(0.012)
Lottery		0.165**	0.091				0.024	0.283***
		(0.084)	(0.060)				(0.061)	(0.059)
Careful In Purchase				-0.040**	-0.027	-0.011	-0.010	-0.058***
				(0.019)	(0.020)	(0.018)	(0.016)	(0.017)
Impatience					0.001	0.031	0.033	0.176**
					(0.034)	(0.024)	(0.024)	(0.081)
Financial Risk (Self-perceived)					0.074**	0.097***	0.103***	0.171***
					(0.030)	(0.030)	(0.038)	(0.050)
Debt Use		0.321***	0.267***		0.270***	0.209**	0.211***	0.064
		(0.068)	(0.027)		(0.069)	(0.043)	(0.045)	(0.116)
Gender			-0.037			-0.117***	-0.108***	-0.132**
			(0.036)			(0.031)	(0.032)	(0.063)
Age			-0.001			-0.002	-0.001	-0.000
			(0.001)			(0.001)	(0.001)	(0.004)
Urban			-0.046			0.041	0.046**	0.176**
			(0.034)			(0.042)	(0.023)	(0.075)
Education			-0.017***			-0.029***	-0.033***	-0.077***
			(0.006)			(0.005)	(0.007)	(0.012)
Credit Card (1=Yes)			0.213***			0.140**	0.128**	0.081
			(0.051)			(0.071)	(0.063)	(0.089)
Saving Proportion								0.073***
								(0.025)
Cash Constrained								-0.074**
								(0.034)
Income								0.005
								(0.053)
Observations	180	180	169	180	180	169	169	120
Demography Controls	No	No	Yes	No	No	Yes	Yes	Yes
Location FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using experiment data on Stata14.
Notes: Standard Errors clustered at regional (5 in total) level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 4.34: Stylised Fact 3 for 2 versus 1 Framing Effect arising from Control Group in Experiment 1 and 3 (E1.C and E3.C) (Mortgage Market)

Variables	(1) Cash Back E1.C&E3.C	(2) Cash Back E1.C&E3.C	(3) Cash Back E1.C&E3.C	(4) Cash Back E1.C&E3.C	(5) Cash Back E1.C&E3.C	(6) Cash Back E1.C&E3.C	(7) Cash Back E1.C&E3.C
2v1	0.079**	0.061**	0.056**	0.052	0.053**	0.051*	0.048*
	(0.032)	(0.031)	(0.024)	(0.033)	(0.023)	(0.026)	(0.029)
Present Bias		0.031	0.055***			0.053**	0.088*
		(0.042)	(0.021)			(0.024)	(0.046)
Confidence		0.019	0.008	0.015	0.006	0.005	0.006
		(0.018)	(0.019)	(0.016)	(0.019)	(0.019)	(0.015)
Lottery1		0.038**	-0.014			-0.024	-0.025
		(0.018)	(0.044)			(0.044)	(0.043)
Impatience				0.019	0.016	0.017	0.029*
				(0.023)	(0.018)	(0.018)	(0.016)
Financial Risk (Self Perceived)				0.033	0.018	0.018	-0.013
				(0.030)	(0.018)	(0.018)	(0.032)
Debt Use		0.226***	0.209***	0.223**	0.211***	0.209**	0.263**
		(0.087)	(0.075)	(0.098)	(0.081)	(0.083)	(0.114)
Fin Lit Index		-0.040	-0.039	-0.045	-0.048	-0.044	0.001
		(0.071)	(0.056)	(0.060)	(0.048)	(0.052)	(0.064)
Attentive		-0.085**	-0.089***	-0.084**	-0.086**	-0.086***	-0.070
		(0.036)	(0.034)	(0.033)	(0.034)	(0.033)	(0.046)
Gender			0.096**		0.080***	0.087***	0.081**
			(0.008)		(0.009)	(0.011)	(0.034)
Age			-0.007***		-0.006***	-0.007***	-0.008
			(0.003)		(0.002)	(0.002)	(0.014)
Urban			0.038		0.042	0.043	0.090
			(0.061)		(0.057)	(0.059)	(0.089)
Education			-0.029**		-0.031**	-0.032**	-0.024
			(0.014)		(0.013)	(0.013)	(0.017)
Credit Card (1=Yes)			0.046		0.036	0.043	0.027
			(0.033)		(0.031)	(0.033)	(0.026)
Saving Proportion							0.008
							(0.026)
Cash Constrained							0.012
							(0.027)
Income							-0.016
							(0.011)
Observations	415	415	410	415	410	410	320
Demography Controls	No	Yes	Yes	Yes	Yes	Yes	Yes
Location FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using experiment data on Stata14.
Notes: Standard Errors clustered at regional (5 in total) level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

4.E Full Specification Results for Prospective Buyers

Table 4.35: Stylised Fact 1 arising from Control groups pooled in Experiment 1 and 3 (E1.C and E3.C) (Prospective Buyers)

Variables	(1) Cash Back E1.C&E3.C	(2) Cash Back E1.C&E3.C	(3) Cash Back E1.C&E3.C	(4) Cash Back E1.C&E3.C	(5) Cash Back E1.C&E3.C	(6) Cash Back E1.C&E3.C
Present Bias	0.065	0.127***			0.125***	0.188***
	(0.055)	(0.034)			(0.036)	(0.050)
Confidence	0.024	0.013	0.019	0.013	0.013	0.013
	(0.021)	(0.029)	(0.015)	(0.032)	(0.028)	(0.030)
Lottery	0.066*	-0.033			-0.043	-0.043
	(0.040)	(0.080)			(0.083)	(0.076)
Impatience			0.018	0.022	0.023	0.019**
			(0.049)	(0.025)	(0.022)	(0.010)
Financial Risk (Self-perceived)			0.080**	0.014	0.011	-0.016
			(0.038)	(0.019)	(0.020)	(0.028)
Debt Use		0.276***		0.286***	0.283***	0.355***
		(0.052)		(0.061)	(0.064)	(0.120)
Fin. Lit. Index		0.084		0.056	0.071	0.082
		(0.087)		(0.080)	(0.079)	(0.063)
Attentive		-0.078***		-0.079**	-0.075***	-0.094**
		(0.025)		(0.031)	(0.026)	(0.044)
Gender		0.003		-0.018	-0.008	-0.022
		(0.057)		(0.044)	(0.050)	(0.083)
Age		-0.012***		-0.011***	-0.011***	-0.014***
		(0.004)		(0.003)	(0.003)	(0.003)
Urban		-0.019		-0.034	-0.018	0.146
		(0.127)		(0.123)	(0.127)	(0.175)
Education		-0.035**		-0.036***	-0.037***	-0.007
		(0.015)		(0.012)	(0.013)	(0.014)
Credit Card (1=Yes)		0.137***		0.125***	0.131***	0.127**
		(0.030)		(0.024)	(0.030)	(0.063)
Saving Proportion						-0.026**
						(0.011)
Cash Constrained						0.029
						(0.057)
Income						-0.014
						(0.012)
Observations	352	321	352	321	321	250
Demography Controls	No	Yes	No	Yes	Yes	Yes
Location FE	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using experiment data on Stata14.
Notes: Standard Errors clustered at regional (5 in total) level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 4.36: Stylised Fact 1 arising from Control groups pooled in Experiment 1 and 3 (E1.C and E3.C Separately) (Prospective Buyers)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Variables	**Cash Back E1.C**	**Cash Back E1.C**	**Cash Back E1.C**	**Cash Back E1.C**	**Cash Back E1.C**	**Cash Back E1.C**	**Cash Back E3.C**	**Cash Back E1.C**	**Cash Back E3.C**	**Cash Back E3.C**	**Cash Back E3.C**	**Cash Back E3.C**
Present Bias	0.154**	0.218***			0.224***	0.270***	0.052	-0.043			0.042	-0.042
	(0.067)	(0.047)			(0.062)	(0.039)	(0.138)	(0.116)			(0.060)	(0.061)
Confidence	-0.015	-0.013	-0.014	-0.005	-0.006	-0.050	0.071	0.137**	0.051	0.157***	0.087***	0.140***
	(0.030)	(0.024)	(0.027)	(0.029)	(0.030)	(0.030)	(0.043)	(0.064)	(0.034)	(0.040)	(0.023)	(0.051)
Lottery	0.075	0.026			0.084	0.108	0.040	-0.498***			-0.109	-0.204**
	(0.060)	(0.050)			(0.089)	(0.110)	(0.073)	(0.160)			(0.168)	(0.101)
Impatience			0.008	-0.018	-0.002	-0.003			0.030	0.079	0.034	0.114***
			(0.049)	(0.037)	(0.032)	(0.024)			(0.064)	(0.067)	(0.052)	(0.029)
Financial Risk (Self-perceived)			0.073*	0.056*	0.070	0.023			0.127***	-0.005	0.075*	0.086**
			(0.038)	(0.034)	(0.046)	(0.017)			(0.037)	(0.078)	(0.043)	(0.040)
Debt Use		0.494***		0.533***	0.469***	0.511***		0.334***		0.283***	0.155***	0.256***
		(0.080)		(0.063)	(0.070)	(0.126)		(0.091)		(0.071)	(0.060)	(0.098)
Fin. Lit. Index		0.223***		0.227***	0.275***	0.248***		-0.274		-0.175*	0.003	-0.078
		(0.069)		(0.080)	(0.098)	(0.065)		(0.210)		(0.099)	(0.087)	(0.087)
Attentive		-0.108***		-0.131***	-0.108***	-0.099**		-0.272**		-0.211**	-0.144***	-0.126***
		(0.034)		(0.038)	(0.034)	(0.039)		(0.127)		(0.099)	(0.055)	(0.030)
Gender		0.232***		0.167*	0.178*	0.277***		-0.367**		-0.358***	-0.171***	-0.361***
		(0.081)		(0.085)	(0.102)	(0.066)		(0.182)		(0.081)	(0.040)	(0.077)
Age		-0.007***		-0.004*	-0.006**	-0.015***		-0.004		-0.003	-0.001	0.001
		(0.003)		(0.002)	(0.003)	(0.001)		(0.011)		(0.010)	(0.008)	(0.011)
Urban		0.070		0.125	0.080	0.167		-0.207		-0.139	-0.015	0.201
		(0.140)		(0.118)	(0.134)	(0.147)		(0.195)		(0.097)	(0.101)	(0.235)
Education		-0.061*		-0.084**	-0.064**	-0.077***		0.003		-0.032	-0.011	-0.038
		(0.035)		(0.034)	(0.031)	(0.021)		(0.017)		(0.031)	(0.018)	(0.030)
Credit Card (1=Yes)		0.176		0.170	0.154	0.181***		-0.144***		0.019	0.020	0.020
		(0.145)		(0.112)	(0.129)	(0.057)		(0.023)		(0.089)	(0.095)	(0.146)
Saving Prop						-0.056						-0.083***
						(0.037)						(0.017)
Cash Constrained						0.018						0.118
						(0.025)						(0.078)
Income						-0.038						0.034
						(0.025)						(0.023)
Observations	124	95	124	95	95	79	128	91	128	91	118	89
Demography Controls	No	Yes	No	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes
Location FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using experiment data on Stata14.
Notes: Standard Errors clustered at regional (5 in total) level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 4.37: Stylised Fact 2 for Limited Attention Bias arising from Control Group in Experiment 2 (E2.C) (Prospective Buyers)

Variables	(1) Cashback E2.C	(2) Cashback E2.C	(3) Cashback E2.C	(4) Cashback E2.C	(5) Cashback E2.C	(6) Cashback E2.C	(7) Cashback E2.C	(8) Cashback E2.C
Attentive	-0.109***	-0.077***	-0.039				-0.034	-0.071***
	(0.035)	(0.016)	(0.042)				(0.045)	(0.023)
Fin. Lit. Index		-0.239***	-0.335***		-0.219***	-0.231	-0.309**	-0.243*
		(0.058)	(0.081)		(0.082)	(0.000)	(0.123)	(0.126)
Present Bias		-0.046	-0.077				-0.138*	0.102
		(0.081)	(0.084)				(0.072)	(0.084)
Confidence		0.016	0.038***		0.010	0.030	0.037***	0.051***
		(0.016)	(0.012)		(0.027)	(0.000)	(0.007)	(0.015)
Lottery		0.236***	0.199***				0.234***	0.279**
		(0.069)	(0.063)				(0.064)	(0.117)
Careful In Purchase				-0.018	-0.011	0.031	0.065***	0.019
				(0.020)	(0.028)	(0.000)	(0.019)	(0.043)
Impatience					-0.004	-0.041	-0.067**	-0.041
					(0.030)	(0.000)	(0.031)	(0.045)
Financial Risk (Self-perceived)					0.065**	0.044	0.034	0.017
					(0.032)	(0.000)	(0.022)	(0.047)
Debt Use		0.337***	0.292***		0.317**	0.299	0.425***	0.306**
		(0.043)	(0.050)		(0.042)	(0.000)	(0.091)	(0.124)
Gender			-0.155*			-0.156	-0.209**	-0.109
			(0.093)			(0.000)	(0.103)	(0.166)
Age			0.004***			0.002	0.002	-0.002
			(0.001)			(0.000)	(0.001)	(0.006)
Urban			-0.035			-0.079	-0.011	-0.063
			(0.165)			(0.000)	(0.154)	(0.176)
Education			-0.040**			-0.026	-0.050**	-0.038
			(0.016)			(0.000)	(0.020)	(0.028)
Credit Card (1=Yes)			0.198***			0.230	0.139**	0.245***
			(0.051)			(0.000)	(0.055)	(0.091)
Saving Proportion								-0.003
								(0.014)
Cash Constrained								0.006
								(0.029)
Income								0.001
								(0.035)
Observations	132	132	131	132	132	131	131	96
Demography Controls	No	No	Yes	No	No	Yes	Yes	Yes
Location FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using experiment data on Stata14.
Notes: Standard Errors clustered at regional (5 in total) level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 4.38: Stylised Fact 3 for 2 versus 1 Framing Effect arising from Control Group in Experiment 1 and 3 (E1.C and E3.C) (Prospective Buyers)

Variables	(1) Cash Back E1.C&E3.C	(2) Cash Back E1.C&E3.C	(3) Cash Back E1.C&E3.C	(4) Cash Back E1.C&E3.C	(5) Cash Back E1.C&E3.C	(6) Cash Back E1.C&E3.C	(7) Cash Back E1.C&E3.C
2v1	0.103***	0.070***	0.015	0.057***	0.023	0.009	-0.020
	(0.025)	(0.017)	(0.033)	(0.022)	(0.032)	(0.038)	(0.035)
Present Bias		0.030	0.125***			0.124***	0.191***
		(0.056)	(0.035)			(0.037)	(0.053)
Confidence		0.034	0.014	0.029	0.013	0.013	0.012
		(0.028)	(0.029)	(0.024)	(0.032)	(0.028)	(0.030)
Lottery1		0.037	-0.031			-0.042	-0.045
		(0.054)	(0.082)			(0.087)	(0.074)
Impatience				0.037	0.021	0.023	0.020*
				(0.033)	(0.026)	(0.023)	(0.011)
Financial Risk (Self Perceived)				0.040	0.014	0.011	-0.016
				(0.027)	(0.020)	(0.020)	(0.027)
Debt Use		0.294***	0.275***	0.296***	0.284***	0.283***	0.357***
		(0.055)	(0.053)	(0.073)	(0.061)	(0.067)	(0.121)
Fin Lit Index		0.008	0.083	-0.012	0.055	0.071	0.082
		(0.097)	(0.087)	(0.079)	(0.080)	(0.079)	(0.062)
Attentive		-0.080**	-0.077***	-0.074***	-0.077***	-0.075***	-0.095**
		(0.032)	(0.024)	(0.028)	(0.029)	(0.024)	(0.045)
Gender			0.003		-0.018	-0.008	-0.022
			(0.057)		(0.044)	(0.049)	(0.083)
Age			-0.012***		-0.010***	-0.011***	-0.014***
			(0.004)		(0.004)	(0.004)	(0.003)
Urban			-0.016		-0.028	-0.016	0.144
			(0.120)		(0.118)	(0.119)	(0.173)
Education			-0.035**		-0.036***	-0.037***	-0.006
			(0.015)		(0.012)	(0.013)	(0.013)
Credit Card (1=Yes)			0.135***		0.122***	0.130***	0.130**
			(0.031)		(0.025)	(0.031)	(0.060)
Saving Proportion							-0.027***
							(0.010)
Cash Constrained							0.029
							(0.057)
Income							-0.015
							(0.011)
Observations	268	268	236	268	236	236	183
Demography Controls	No	Yes	Yes	Yes	Yes	Yes	Yes
Location FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculation using experiment data on Stata14.
Notes: Standard Errors clustered at regional (5 in total) level, shown in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Chapter 5

Conclusion

This thesis addresses the issue of vulnerability and financial decision-making through three empirical studies in Rwanda, Viet Nam, and Ireland. The thesis contributes to the empirical and experimental literature in the field of development and behavioural economics. First, the assessment focusses on the impact of micro-insurance on vulnerability associated with illness events and household financial decision to save and borrow with context to Rwanda. Second, the thesis examines socio-economic and behavioural factors which affect the valuation of agricultural insurance by farmers in Viet Nam. Third, the thesis provides experimental evidence regarding the role of advanced consumer disclosure and negative marketing nudges on the choice of cashback mortgages in Ireland.

Chapter 2 uses the EICV data-set from Rwanda and confirms that CBHI as a form of micro-insurance acts as a social safety net by providing the extremely poor households access to health insurance. The chapter shows that micro-insurance implemented with the core idea of targeting the most vulnerable overcomes the supply and demand side constraints to health insurance membership in developing countries.

The results confirm increased enrolment of extremely poor households over the years of insurance operation in Rwanda. Further, the results suggest that insurance membership increases health seeking behaviour of households and reduces the total out of pocket medical expenses. With context to the empirical assessment of micro-insurance in developing countries, the results of Chapter 2 contribute to the literature by addressing the issue of self-selection through Instrumental variable analysis; an issue prevalent in a number of earlier studies. Finally, the results from Chapter 2 provide a new evidence for the role of micro-insurance membership on the financial outcomes of households. We conclude that use of micro-insurance increases savings in formal institutions for the extremely poor households, thus confirming the informational or learning effect channel, as suggested by Giesbert et al. (2011). Lastly, we derive evidence of the substitution between micro-insurance membership

and informal borrowings from family, friends and community groups. This result highlights the role of insurance in reducing risk-coping activities such as informal borrowings in developing countries.

Chapter 2 provides important lessons for policy makers for achieving Universal Health Coverage in developing countries. The case of Rwanda highlights that innovation in micro-insurance distribution through community participation and management is pivotal in expanding the coverage of insurance and achieve equity in terms of health seeking behaviour and financial outcomes.

The findings of Chapter 2 leave us with some unaddressed questions, giving opportunity for further research in this area. Specifically, the results for the complementarity and substitution between micro-insurance and outcomes related to savings and borrowings require further confirmation through experimental setup. It will also be interesting to assess the impact of micro-insurance membership on consumption smoothing and welfare measures. This can be achieved through panel studies having sufficient information on consumption and income. Lastly, the assessment of the impact of micro-insurance on real health outcomes such as BMI, nutritional status, and prevelance of diseases would add substantially to the literature in health and development economics.

Chapter 3 employs a novel approach to empirically estimate the factors which affect the valuation of agricultural insurance. The study uses five years of panel data from VARHS survey conducted in Viet Nam and provides evidence for significant undervaluation of agricultural insurance by farmers. The results answer two important questions, first, why the uptake of agricultural insurance is low in developing countries, and second, why is the demand low particularly from the most risk-averse. The findings of Chapter 3 suggest that factors such as private transfers from friends and relatives lead to consumption smoothing, thus reducing the need for agricultural insurance. Further, membership to social groups such as farmer's union increase the likelihood of the valuation of agricultural insurance, thus indicating the importance of existing farming networks in expanding the uptake of agricultural insurance. Moreover, the results provide evidence that certain level of confidence is required to adopt agricultural insurance, given the uncertainty in the pay-out and unviability of many previous agricultural schemes in Viet Nam. Finally, the findings suggest that purchasing power is not the determining factor in agricultural insurance demand. This finding is relevant with respect to the debate around whether subsidies for agricultural insurance might be effective in developing countries

These results highlight that with context to countries such as Viet Nam, where agricultural insurance is not new, the policy makers should focus on financial education, improved claims process, and overall reputation of the sector. These factors shall be central to the sustainability of insurance schemes and result in increased insurance take-up in the medium run.

Chapter 3 provides a starting point for building estimation techniques for the valuation of agricultural insurance in more real settings. Further work on this topic shall require an experimental setup in which WTP can be compared with actual insurance purchase decision of farmers. The experimental

data would help in actual estimation for over/under valuation of insurance by the farmers. Moreover, an experimental setup can also be used to record behavioural biases of farmers, which shall contribute to the existing evidence on demand of insurance with context to behavioural economics. Lastly, an important contribution in this literature is possible by integrating spatial data on rainfall and agricultural yield with the household level data. This will enrich the theoretical model for estimating the economic value of insurance more accurately by taking into account the likelihood of actual covariate shocks.

Chapter 4 finds evidence that mortgages that offer immediate rewards such as cashback are attractive to respondents who suffer behavioural biases related to present-bias and inattention. The choice of expensive cashback mortgage is against the predictions of expected utility theory, which emphasises that individuals evaluate all options in the market and choose the one with the lowest cost. Chapter 4 provides experimental evidence that uptake of expensive cashback mortgages can be reduced if more informed and salient financial disclosure is provided at the point of sale. This results contributes to the literature on the feasibility of comprehensive consumer disclosure in financial markets and confirm the findings from Hastings and Tejeda-Ashton (2008); Seira et al. (2017) and Anagol et al. (2017). Further, the chapter shows that banks engaging in expensive advertising can increase consumer confusion and act as a negative nudge for consumers to choose expensive mortgage choices.

These finding are important with context to consumer protection and calls for the attention of regulators in terms of the current disclosure guidelines. Further, the evidence for negative nudging opens up the debate regarding the code of conduct for banks in terms of their advertising and marketing of expensive mortgages.

The findings from Chapter 4 indicate that transactional data for mortgages and credit card products will be useful to estimate the actual differential of interest rate payments between cashback and non-cashback products. Also, the next logical step from this research would be to develop price comparison tables which can be presented to the consumers at the point of sale. This is possible through an experiment implemented at the level of mortgage brokers, where the effectiveness of advanced consumer disclosure can be assessed by using actual consumer preferences for mortgages.

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