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**Essays on household financial  
decision-making:**  
*Evidence from Indian households*

**Kamlesh Kumar**

A dissertation presented for the degree of  
Doctor of Philosophy



Durham University Business School

The University of Durham

United Kingdom

July 2021

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# Dedication

Three years of Ph.D. journey, and I have three achievements to count, Antara, Aakriti, and this newborn dissertation. My special thanks go to my better half Anjana who is credited for bringing Aakriti to my life and more so, blamed for getting this dissertation delayed with her frequent and lengthy phone calls.

Formally, I dedicate this dissertation to my extended family, who were the source of motivation and support throughout this journey through their morning motivational quotes on the family message groups. I also thank them for those fake WhatsApp forwards, which intrigued my insatiable thirst to explore the truth behind the scenes and treating obvious as not-so-obvious.

Finally, I thank my tea musketeers for their small effort to ease global political discourse with their home-cooked fresh conspiracy theories. This work would not be possible without ample cooperation from PGR residents and its spooky computers. At last, I thank whomsoever who cared that I should get a Ph.D.

---

# Acknowledgements

Following the Chinese proverb, the journey of a thousand miles begins with a single step, but the success of the mission is conditioned on rigorous strategic planning and appropriate execution with every following step. I owe several people, organization, and environment, which helped me in my scholarly expedition of addressing the policy questions of global interest.

I feel indebted to my academic supervisors Professor Dennis Philip and Doctor Anurag Narayan Banerjee for their inspirational and dedicated mentoring. The current shape of work would not be possible without the frequent discussion sessions and valuable real-time comments on my work throughout my doctoral studies. They helped me to identify my scholarly weaknesses and dedicated their time in transforming those weaknesses into academic assets. It was and continues to be a privilege to learn from their experiences in the domain. The journey of my doctoral studies goes hand-in-hand with my personal life transformation from a husband to a caring father. In this transformation, both my supervisors continuously cared about my physical and mental health. I would also like to express my gratitude to academic reviewers Doctor David Chiver, Doctor John Moffat, and Professor Riccardo Scarpa for their feedback and suggestions during the progression reviews.

It would not have been possible for me to pursue this PhD degree without the generous funding support from Durham University Business School and the National Centre for Financial Education (NCFE), India for sharing the benchmark survey data on financial knowledge and financial inclusion. I also thank Sandip Biswal, GP Garg and Sandip Ghose for hosting me at the National Institute of Securities Markets (NISM) in helping me to get the better understanding of data procurement procedure which was instrumental in designing the appropriate empirical models.

Finally, I would like to thank Ustinov College and Durham University Business School for their research facilities during the tenure of my research work. The helping hand from University support staffs were very helpful in putting those expertly crafted strategies to execution.

## Abstract

This dissertation aims to understand the role of financial knowledge in India and its role in explaining financial participation within the human development framework. It contributes to the literature on understanding social and behavioral attributes influencing the financial decisions of the households. The dissertation chapters explore the household's financial decisions related to their selection of financial products. Financial product choice has been an intriguing question for household finance experts across the years and has paramount importance in influencing households' lifetime utility. Underlining the socio-economic heterogeneity of an emerging market such as India, the dissertation explores how financial knowledge can help boost financial participation and act as a social enabler in healing societal discrimination.

The dissertation has four substantive chapters. The first of the four chapters examine the role of financial knowledge in helping financial awareness about the existence of financial products in India. The chapter introduces a novel scoring methodology summarizing the understanding of seven dimensions of financial concepts. The empirical results of the chapter show that financial knowledge helps in financial awareness related to the availability of financial products. It further helps in financial participation. The emergence of financial markets and the adoption of financial austerity by governments worldwide have shifted the financial responsibility on the households. In the backdrop of their increased role in financial decision-making, households' financial knowledge and financial awareness have gained paramount importance in shaping their lifetime utility by helping them in financial participation. The chapter concludes by underscoring financial knowledge as a policy instrument in boosting financial participation.

The second chapter examines the role of financial unawareness in impeding financial participation. It characterizes the conditions for conscious and unconscious non-participation decisions using a theoretical framework. The framework classifies the overall awareness of a household into two components. The first component is innate awareness, which household acquires as an outcome of their natural ability to pay attention. The second component of awareness is

acquired awareness, which households receive at a cost by investing their physical endowments such as financial knowledge. The framework characterizes two scenarios of financial non-participation, namely conscious non-participation, and unconscious non-participation. In the case of conscious non-participation, household consciously chooses not to hold the financial product when they are sufficiently aware of the financial product's costs and benefits. In unconscious non-participation, the household lacks the necessary knowledge about the cost and benefits of the products. Due to a lack of sufficient awareness about the product, they do not participate. Also, they choose not to acquire additional awareness by selling their physical endowments as they think that even after selling their physical endowment, they cannot acquire sufficient awareness about the cost and benefits of the products. As a result, they remain out of financial markets due to insufficient financial awareness. In the backdrop of these two scenarios of non-participation, the chapter has a policy implication about reducing the cost of acquiring financial knowledge, so households have to sell less to earn financial awareness and avoid non-participation due to lack of awareness.

The third chapter of the dissertation examines the role of financially literate women in managing their household finances. The empirical results show that responsible, financially literate men and women constitute a healthy decision-making team when they work to their strength. Jointly men and women outperform the other decision-making peers such as sole men or women. The responsible, financially literate women participate more in saving schemes, insurance products, and alternative investments and are less involved in saving money at home/informally and borrowing money from money lenders. On the other hand, financially literate male decision-makers participate more in investment products, stocks/shares, and debt products. The chapter observes considerable heterogeneity in the role of women in household decision-making across castes. It finds financial literacy's effective gains diminish going down the caste hierarchy from the privileged caste to lower caste households, where cultural norms are more binding. The chapter recommends a policy intervention to equip women with financial literacy and encourage a husband-and-wife team to manage their household's financial portfolios jointly.

The fourth chapter investigates how the caste-based discrimination in economic outcomes (namely, financial awareness and product holdings) hinders the financialization of the administrative districts. The empirical results show the districts with a higher level of caste-based discrimination suffer from a lower degree of financialization. The chapter considers crime reporting in India as a measure of institutional development as there are independent studies which suggest that a majority of crime incident does not get reported in India. Empirical results from the chapter show that caste-based discrimination fuels caste-based riots and discourages the reporting of general crimes such as burglary, cheating, dacoity, forgery, kidnapping, robbery, and theft. Together with the earlier three chapters, the dissertation advocates financial knowledge as a policy tool that not only helps individuals attain their full economic potential but also helps the social and institutional development of society.

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# Statement of Originality

This is to certify that to the best of my knowledge that the content of this dissertation is my work. This dissertation has not been submitted for any degree or other purposes.

I certify that the intellectual content of this dissertation is the product of my own work and that all the assistance received in preparing this dissertation and sources have been acknowledged.

Kamlesh Kumar.

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# Nomenclature

**Financial literacy/Financial knowledge :** OECD (2017) defines financial literacy as a combination of awareness, knowledge, skill, attitude, and behavior necessary to make sound financial decisions and ultimately achieve individual financial well being. In this dissertation, we interchangeably use financial knowledge as financial literacy.

**Financial participation/ Financial inclusion:** We use the term financial participation as the conscious ownership of financial product following Guiso and Jappelli (2005). We use financial participation to consider the household's decision to own a financial product. On the other hand, we use the term financial inclusion while studying the economic infrastructure to bring the families into the financial mainstream.

**Financial holding/ Financial ownership:** We define financial holding or financial ownership as the conscious decision of owning a financial product.

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# Introduction

*Finance is widely viewed as an activity that promotes inequality. But financial institutions can be democratizing and can reduce inequality if they are set upright. Finance is not merely about making money. It's about achieving our deep goals and protecting the fruits of our labor. It's about stewardship and therefore, about achieving the good society.*

Robert J. Shiller on the launch of his book “*Finance and the Good Society*.”

The collapse of the global financial system during the 2008 financial crisis has attracted unprecedented attention to the studies related to the way households use financial markets to achieve their business objectives. In this regard, the preliminary analysis by Diamond and Rajan (2009) points towards the impulsive financial decisions of households related to their participation in already inflated housing market. Across the developed markets, encouraged with central banks' extremely accommodative monetary policy, the marginal-credit-quality borrowers contemplated impulsive housing decisions, culminating in the widespread mortgage defaults. The spillover effect of the crisis also plagued the emerging markets across the globe. Against the backdrop of this experience, financial experts opine an urgency in understanding the household's financial decision-making to foster a resilient global economy. The importance primarily stems from the increased

exposure of families to volatility in financial markets. Recent economic events witness the volatility in financial markets is at an all-time high under the threat of global austerity drives in government spending, privatization of pensions and liberalization of loan markets.

The role of financial prudence in nourishing financial welfare was recognized as early as the late 18th century, when John Adams, the first vice president and second president of the United States of America (USA), wrote to Thomas Jefferson, highlighting the role of financial illiteracy in exasperating the financial distress of American households. He wrote, “*all the perplexities, confusions, and distresses in America arise, not from defects in their constitution or confederation, not from a want of honor or virtue, so much as from downright ignorance of the nature of coin, credit, and circulation*” (Adams, 1853, pp. 447). Despite that, it took almost two centuries for household finance to establish itself as a thriving, vibrant, self-standing financial economics branch. Household finance is a self-standing subject that was mostly unknown until 2006 (see Campbell, 2006; Guiso and Sodini, 2013) and in meanwhile, it survived as a part of asset pricing theory within the financial economics domain.

In 2006, during his presidential address to the American Financial Association, John Campbell elaborates the term *household finance* as a self-sustaining branch of financial economics studying the household’s use of financial instruments to attain their financial objectives. He further asserts that households’ observed economic behavior deviates from their predicted financial behavior during his speech. For instance, the Merton (1969) model instructs all investors to participate in the risky asset market and should invest in the market portfolio, but this implication fails in reality when we analyze the actual holdings of an investor. Hence, the household does not behave as the theory predicts and holds substantially fewer risky assets in their portfolio. For instance, the Haliassos and Bertaut (1995) show only 25 percent of US households participate in capital markets, while Guiso et al. (2003) report that the stock market participation in Western European countries

(namely, Netherlands, Italy, France and Germany) ranges between 15 to 25 percentage points. There is extant literature studying this market participation anomaly, also known as *stock market participation puzzle* (see Mankiw and Zeldes, 1991). The discrepancy between predicted homogeneity in the household market portfolio to the observed heterogeneity in the household market portfolio is intriguing. Campbell (2006) categorizes the studies related to predicted financial behavior, which conforms to the asset pricing theory as *normative household finance* while the literature related to the observed financial behavior that at time contradicts the asset pricing theory as *positive household finance*. This dissertation's chapters are closely related to the second strand of household finance, which is *positive household finance*.

In general, households use a variety of financial products to carry out their daily activities. To carry out these activities efficiently, they require knowledge and information related to the financial products' suitability and accessibility. There are two ways by which they can acquire this capability, either by investing in human capital or delegating the financial decisions to the external experts. In either way, the commission of rational financial decisions requires extra financial resources that may work as a constraint to the households with limited physical endowments. In addition to the financial constraints, the financial product selection also suffers from behavioral biases of decision-makers, which often deviates from normative outcomes (see Haliassos and Bertaut, 1995). Cumulatively, the observed financial choices do not always conform to normative economic arguments backed by literature from asset pricing and corporate finance theory. The studies related to households' decision-making require attention not only because of the curious decision-making process but also because of the size of the global household economy. According to the Global Wealth Report (2018) by Credit Suisse, the total global household wealth estimated during mid-2018 is \$317 Trillion<sup>1</sup>. Only in the USA, the total

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<sup>1</sup>We use Global Wealth Report (2018) by Credit Suisse accessed on June 06, 2019, which is available at <https://www.credit-suisse.com/about-us/en/reports-research/global-wealth-report.html> to estimate the global household wealth.

value of assets held by only US households is \$109 Trillion. In terms of relative share, they hold 30% of total domestic non-financial debt<sup>2</sup>. Thus, considering the household economy's value, the household's financial decisions are crucial for overall financial stability. Therefore, it is pivotal for overall financial stability to examine the reasons that shape sub-optimal financial decisions of the households.

The direct effect of financial knowledge on a household's financial product holdings decisions has been studied previously in the context of developed nations with well-organized financial systems. The studies of Lusardi and Mitchell (2007); Banks et al. (2010); Bucher-Koenen and Lusardi (2011); Almenberg and Säve-Söderbergh (2011); Fornero and Monticone (2011); Hastings et al. (2017); Clark et al. (2017) show that the financial knowledge helps households in retirement planning in the context of developed markets where the households are well informed about the existence and importance of pensions in financial planning. Another stream of literature explores the non-participation puzzle in stock markets (Haliassos and Bertaut, 1995; Van Rooij et al., 2011; Balloch et al., 2015; Yoong, 2017). Studies of Hilgert et al. (2003); Guiso and Jappelli (2009) explores the role of financial knowledge in the household's portfolio management practices. Using the US household survey, Engels et al. (2019) shows financial knowledge helps detect fraudulent activities. Apart from Cole and Shastry (2009) and Cole et al. (2011) which explores the role of financial knowledge in an emerging market context, all of the above studies focus on developed markets, which is institutionally different from emerging markets in terms of access and information.

This dissertation adds to the literature of household financial decision-making in the emerging market using an extensive sample survey from India. Every region has its unique cultural and institutional settings that often influence its residents' financial decisions, ultimately resulting in the variation of overall economic outcomes. Interestingly, India, a union of culturally, financially, and demographically

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<sup>2</sup>We use press release of FED accessed on June 06, 2019, which is available at <https://www.federalreserve.gov/releases/z1/20190606/z1.pdf> to derive the share of households in non-financial debt.

disparate regions, provides a natural setting for such studies. The Indian economy has witnessed a healthy growth rate after the 1990's globalization push. The economy is growing at a healthy pace utilizing the unprecedented access to the global supply chain, cross-border trade, and their rapidly growing service sector. As a result, hundreds of millions of Indians being lifted out of poverty and transformed themselves into aspirational middle class exploring their full economic potential by utilizing a variety of financial instruments<sup>3</sup>. India is the second-most populous country with a 1.33 billion population and the world's third-largest country in purchasing power parity terms. Further, India has witnessed a 6.21% average growth rate from 1951 until 2019 and has turned into a \$2.726 trillion economy. On the contrary, India still hosts 175 million poor as per the 2015 International poverty following the work of Ferreira et al. (2016) which categorizes a respondent as poor if he survives on an earning less than 1.90 dollars per day. Owing to India's significance in helping global financial stability, we consider Indian household survey data for addressing the empirical questions of global interest. Although dissertations' results are using Indian data, we can extend the research findings to any emerging countries with similar country profiles.

The dissertation uses India's first national benchmark survey for financial literacy and inclusion for empirical estimations. The survey is fielded in 2014 by the National Centre for Financial Education (NCFE), jointly with the Indian regulators, including the Reserve Bank of India (RBI), Securities and Exchange Board of India (SEBI), Insurance Regulatory and Development Authority of India (IRDAI), Pension Fund Regulatory and Development Authority (PFRDA) and National Institute of Securities Markets (NISM).

The benchmark survey data consists of 76,762 respondents collected from the national level representative survey among Indian households. It captures all five

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<sup>3</sup>Between the period of 2011-2015, 90 Million Indians escaped extreme poverty and improved their living standards. We use World bank data accessed on August 8, 2019, which is available at [https://databank.worldbank.org/data/download/poverty/33EF03BB-9722-4AE2-ABC7-AA2972D68AFE/Globa1\\_POVEQ\\_IND.pdf](https://databank.worldbank.org/data/download/poverty/33EF03BB-9722-4AE2-ABC7-AA2972D68AFE/Globa1_POVEQ_IND.pdf)

administrative zones and a total of 150 administrative districts. Unlike the previous studies related to household decision-making, considering a large sample size provides a scientific and representative foundation for studying choices of decision-making. The data is rich not only in coverage, but it also captures broad socio-economic attributes such as caste, academic attainment, employment, and income. It records the level of financial knowledge using multiple-choice questions based on OECD guidelines testing the respondents' understanding of the seven different financial knowledge dimensions. The study uses 28 Indian financial products with varying sophistication levels right from the savings account to future market products to capture financial awareness and product ownership. Considering a large sample size with rich demographic attributes helps overcome the challenges in understanding research questions concerning the population as a whole and the focus population groups.

This dissertation attempts to bridge the gap in understanding the financial decision-making in informationally constrained financial markets. The dissertation set out to explore how the knowledge of the underpinnings of financial concepts shapes a household's economic outcomes in the context of emerging markets right from product awareness, product holdings, and financial decision-making. Emphasizing the role of heterogeneity in household characteristics, we investigate how financial decision-making, financial management-practices, and participation varies across gender and social identity. The preliminary research on literature shows the researchers predominately focuses on developed markets where they explore the role of financial knowledge in retirement saving, credit and debt management, stock market participation, and portfolio diversification. The developed markets enjoy better economic infrastructure that helps to delegate financial awareness and ensure financial accessibility even in the villages that are geographically distant from the regional financial centers.

On the contrary, the emerging markets are informationally deficient with poor financial infrastructure, magnifying the challenges related to financial awareness

and financial access. We acknowledge the differences in the quality of institutions between developed and emerging markets. Hence, we can not extend the research findings using the observations from developed markets to the emerging markets without further testing the findings using the observations from emerging markets. This dissertation attempts to bridge this gap and uses research designs that control the informational deficiency and financial access challenges and explore the financial decision-making in emerging markets.

In terms of structure, the dissertation's research chapters revolve around three research themes: first, financial knowledge and its relationship with financial awareness and product ownership. The second theme studies how this relationship evolves under the lens of gender and caste. The third theme of the dissertation studies the social cost of caste-based discrimination. It examines how caste-based discrimination is related to the districts' inferior institutional development, which we measure in terms of financialization and crime-reporting.

More specifically, research question of the second chapter is related to the dimensions of financial knowledge and its relationship with the financial awareness about the existence of financial products in the market. The household's financial awareness is measured using their level of awareness related to the existence of financial products in the market. The survey captures the financial knowledge of the respondents using seven multiple-choice questions. The chapter develops a unique scoring methodology summarizing households' knowledge on the seven dimensions of financial knowledge, which is sensitive to the difficulty level of financial concepts. The difficulty level of questions is determined using the sample responses to the financial questions. The methodology puts higher weight on a question if fewer respondents manage to answer this question correctly. The chapter examines if the understanding of financial concepts' underpinnings is related to the level of awareness about the existence of financial products in the markets. It further derives the sophistication level of financial products using the minimum level of financial knowledge required to be aware of the existence of the financial products. After

exploring the relationship between financial knowledge and financial awareness, it delves into studying the relationship between financial knowledge and financial product holdings. This chapter's empirical finding shows a piece of new evidence that, although a positive relationship between financial knowledge and financial holding exists, to a large extent, the significance comes from the effect of financial knowledge on households' acquisition of awareness to the prevailing financial products. Thus, more financially knowledgeable households are more aware of the existence of the financial products and, empowered with awareness, such households have a significantly high probability of owning even some advanced financial products such as insurance and capital market products.

The third chapter characterizes a framework of the acquisition of financial awareness. The framework characterizes financial awareness into two components: acquired cogito and innate cogito. Acquired cogito is the awareness that can be attained at a cost such as education and investment in financial knowledge, while the innate cogito is congenital. The framework further shows the respondent's overall awareness depends on the innate cogito and their physical endowments via acquired cogito. It derives conditions for voluntary and involuntary non-participation in financial markets. In voluntary non-participation, the households know the cost and benefits of the financial products (financially aware), but they optimally think that the offered product is not a suitable product for their requirement and they optimally choose not to hold that product. In non-voluntary participation, when the households have limited physical endowments, acquiring cogito can be costly for them, and they choose not to acquire it and remains unaware and hence, remains non-participated. Next, the chapter performs a thought experiment to demonstrate the relationship between low cognition and weaker demographic attributes. The thought experiment illustrates the unawareness is not a chance but an outcome of broad demographic characteristics. Therefore, the unaware households possessing insufficient endowments willingly choose not to invest in the acquisition of financial awareness because they know that they cannot cross the required awareness thresh-

old even after investing their limited endowments in acquiring financial awareness. Owing to their insufficient financial awareness, they remain out of financial markets. Hence, the research finding elicits targeted awareness programs towards the focus households, who are involuntarily non-included from financial products due to unawareness, by reducing the cost of acquisition of financial awareness.

The fourth chapter of the dissertation analyzes the role of financially literate women in household financial decision-making. Using India's national benchmark survey for financial literacy and inclusion, the chapter observes a step-change in financially literate women who take on higher levels of responsibility in managing their households' finances. When financially literate women are responsible, they participate more in saving schemes, insurance products, and alternative investments and are less involved in saving money at home/informally and borrowing money from money lenders. On the other hand, financially literate male decision-makers participate more in investment products, stocks/shares, and debt products. Further, households with financially literate women who are jointly responsible for managing finances with their spouse have the most significant probability of holding various financial products. Thus, the chapter highlights policy interventions about equipping women with financial literacy and encouraging a husband-and-wife team to manage their household's financial portfolios jointly. Financial literacy's practical gains diminish down the caste hierarchy from the privileged caste to lower caste households, where cultural norms are more binding.

The last chapter of the dissertation studies caste-based discrimination in India. The discriminatory role of caste extends to financial awareness and financial holdings. Utilizing the sample data of 150 districts from India, the chapter shows that a representative respondent from a marginalized caste attains a higher level of financial awareness and financial holdings when the respondent gets treated as a general caste respondent. The chapter's empirical findings show that caste-based discrimination impedes the districts' financialization and adversely affects the crime reporting rates in the districts. Consequently, the districts with a higher level of

caste-based discrimination suffer from lower financialization and abysmal crime-reporting rates. Research findings from the independent think-tank suggest only a small fraction of actual crime gets reported in India. Therefore, higher crime rates do not signify the higher level of real crime, but respondents' greater confidence to approach police administration. Further, the research findings observe that districts with a higher level of caste-based discrimination observe caste-based riots more frequently. The chapter's policy implication highlights the requirement of bringing more effective measures to discourage caste-based discrimination.

The dissertation is structured to highlight how the four studies contribute to the expansion of scholarship in financial decision-making and its importance in shaping household's economic outcomes in emerging markets. The second chapter discusses the summary statistics of India's financial knowledge and inclusion survey at the outset, which captures some essential socio-demographic information and several indicators of the country's financial sector. After setting the contextual background, the chapter studies the relationship between financial knowledge and financial awareness. The third chapter of the dissertation addresses the role of financial unawareness in keeping households out of financial markets. Following that, chapter four studies women's role in financial decision-making and show the jointly responsible financial literate men and women as a pair outperform other decision-makers. Chapter five explores the financial and social consequences of caste-based discrimination in India. Finally, chapter six summarizes this dissertation's overall contribution and concludes by discussing the related policy implications and future research questions.

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# Financial Knowledge and Financial Awareness

## 2.1 Introduction

Recent market liberalization processes have provided a variety of financial instruments to households to smooth their lifetime utility. With the changing complexity of financial markets and increasing household responsibility, a household's ability to make informed financial decisions has become of paramount importance. The empirical research from developed as well as developing countries shows that many households know little about the financial concepts as well as the existence of financial products commensurate to their financial requirement (see Hastings et al., 2013). The paucity of financial knowledge along with behavior biases often affect financial decisions. For instance, households do not hold stocks, despite having a record of higher expected returns on stocks than on risk-free assets, and there is emergent literature studying this behavioral anomaly known as the "non-participation puzzle". Mankiw and Zeldes (1991); Haliassos and Bertaut (1995); Mylonidis et al. (2017) explores the non-participation for the US households, Atanasio et al. (2002) for the UK households, and Hurd et al. (2011) for Dutch households. Utilizing the cross-country evidence, Honohan (2008) shows that households'

financial participation is even more scarce in emerging countries than in developed countries.

There is well-founded evidence that the low financial market participation impedes the development of a country's financial system, which is crucial for fostering economic growth, reducing inequality, and eliminating absolute poverty (Levine et al., 2016; Beck et al., 2007; Levine and Zervos, 1998; King and Levine, 1993). However, the work of Makhoul et al. (2020) shows that financial development helps reducing inequality in the short run while in long run, it leads to more income inequality. As a result, the policies should not only target improving financial participation of poor but also on ensuring the longevity of participation benefits. Therefore, while studying the non-participation households, it crucial to consider friction in participation due to inadequate information along with fixed participation costs. Addressing these two impediments in participation, the first strand of literature, such as Fischer and Jensen (2014) studies the non-participation arising from participation cost, while the second strand of literature studies the participation barriers arising from information cost (see Brown et al., 2008). Our work is in line with the second strand of literature, which examines the role of basic financial understanding in mitigating the cost of acquiring financial awareness.

This chapter explores two research questions that have been so far overlooked in household finance studying financial non-participation. The first question of the chapter explores if the awareness of financial products among households depends upon the degree of sophistication of the financial product. The second question of the chapter investigates how the understanding of the underpinnings of financial concepts is related to the level of awareness about the availability of Indian financial products in the market. The understanding of the underpinnings of the financial concept is the conceptual understanding of finance. While the awareness about the availability of financial products in the market is the cognizance about the availability of Indian financial products. Both research questions have obvious policy relevance in an inherently incomplete and informationally deficient mar-

ket. Considering the limited human capital and poor institutional infrastructure of emerging markets, this chapter's research findings can help in setting financial literacy goals.

The informational deficiency is not only limited to the emerging markets but also in developed markets. Guiso and Jappelli (2005) uses Italian household data to show the role of awareness in financial participation. Their study finds the supply of financial awareness through media and financial bulletins can encourage financial participation. Utilizing the fact that financial awareness is key to financial participation, we construct the financial knowledge threshold levels, which is the level of financial knowledge required to become aware of the existence of a given financial product. The empirical evidence of this chapter first shows the better financially knowledgeable households are more aware of the existence of the financial product, and also, they are more likely to hold a variety of financial products.

Thus, the chapter builds on the growing evidence that there is a strong relationship between understanding of financial concepts and financial holding. Recent literature shows that the understanding of concepts helps the households to better understand the cost and benefits related to the product-holding and it assist them in taking informed ownership decisions. For instance, Lusardi and Mitchell (2007), Lusardi and Mitchell (2008), Lusardi and Mitchell (2009), Banks et al. (2010), Bucher-Koenen and Lusardi (2011) and Almenberg and Säve-Söderbergh (2011) document that the more financially knowledgeable households have a higher propensity of planning ahead for their retirement. Similarly, financial knowledge has been shown to be a significant factor explaining the pension market participation Clark et al. (2017), Fornero and Monticone (2011) and Hastings et al. (2017), household's portfolio management practices Hilgert et al. (2003), Guiso and Jappelli (2009), solving non-participation puzzle in stock markets Cole and Shastri (2009), Van Rooij et al. (2011), Balloch et al. (2015), and Yoong (2017) and household's credit and debt choices Lusardi and Tufano (2015), Disney and Gathergood (2013).

The literature on financial awareness and its role in the demand for financial services is more focused on well-developed financial markets that enjoy a relatively high level of financial awareness. On the contrary, the emerging markets suffer from resource limitations and informationally incomplete market structure. In emerging markets, the awareness about financial products' existence becomes a key enabler in permeating the benefits of conceptual understanding to financial ownership decisions, which is equivalent to financial holding in the framework of this chapter. Existing research work does not explicitly distinguish the difference between financial knowledge and financial awareness. Financial knowledge is understanding the underpinnings of financial concepts while financial awareness is knowledge about the availability of financial products in the market. Therefore, a respondent can be financially aware despite being weak in financial knowledge. More specifically, the chapter considers financial knowledge and financial awareness as two different entities which is a refinement over the existing literature and studies how financial knowledge helps in financial holding through the linkage of financial awareness. In other words, financially knowledgeable households first become financially aware, and following financial awareness they decide to own the financial product. Except Cole and Shastry (2009); Cole et al. (2011); Bönnte and Filipiak (2012), majority of the studies utilize data from developed countries that are structurally different from emerging markets. Using the field experiment data from India and Indonesia, Cole and Shastry (2009) show that financial literacy is a strong predictor of the demand for financial services.

Access to financial markets enables households to realize their full economic potential, but more importantly, it is the suitability of the financial product that matters the most. The household should have the full information about the cost and benefit of the financial product to make an informed decision about the financial product's ownership. The importance of awareness related to the availability of the financial product has been identified as a crucial barrier in financial holding (see Merton, 1987). On closer observation, we can identify that the awareness about

the existence of financial products may depend on the supply of information from financial product vendors and the pursuit of households to explore more about their requirement and suitability of the offered financial products. At the same time, we also acknowledge that other sources such as peer-learning and effective marketing campaigns can influence the level of awareness of the financial product.

In this chapter, we focus on the role of knowledge about the financial concepts and the demographic attributes of households in explaining the level of financial awareness. We further consider that the demographic endowments of a household can also influence their level of financial awareness. Therefore, we consider the role of residual financial knowledge, which is the part of the financial knowledge of the households which is not explained by their demographic attributes. The use of residual financial knowledge can help separate the role of financial knowledge (acquired entity) from the household's demographic attributes (endowed entity).

We use India's first national benchmark survey for financial literacy and inclusion for empirical estimations. The survey is fielded in 2014 by the National Centre for Financial Education (NCFE), jointly with the Indian regulators, including the Reserve Bank of India (RBI), Securities and Exchange Board of India (SEBI), Insurance Regulatory and Development Authority of India (IRDAI), Pension Fund Regulatory and Development Authority (PFRDA) and National Institute of Securities Markets (NISM).

Using national benchmark survey data of India, we empirically test the relationship between the understanding of financial concepts, financial awareness, and financial holding using an extensive benchmark survey data of 76,762 Indian households, with granular information on their financial knowledge and socio-economic characteristics. The survey used the multi-stage cluster sampling technique to represent India's demographic and socio-economic heterogeneity. It captures the household responses through face-to-face interviews. The survey utilizes seven financial knowledge questions capturing seven distinct dimensions of financial understanding: time value of money, interest paid on a loan, simple interest calculation, compound in-

terest calculation, risk and return, diversification, and understanding of inflation to measure the level of financial knowledge of households. These dimensions are analogous to the OECD (2016) questionnaire on adult financial literacy. The survey asks respondents to specify whether they are aware of a particular financial product, and if aware, whether they own the product to capture the level of awareness and ownership? The survey records the information on households' awareness and ownership status corresponding to 28 financial products from 5 different product segments: savings, debt, insurance, pensions, and capital markets. To capture the level of financial access, along with the spatial distribution of bank branches, it records the availability of banking correspondent in the respondent's neighborhood.

We propose a new score construction methodology using the responses to seven financial knowledge questions to compare households' financial understanding. Following the OECD (2016) questionnaire on adult financial literacy, they use an equally-weighted score construction methodology to compare respondents' financial competence level in the survey. Although their methodology yields a single score, it does not distinguish between the difficulty level of financial survey questions. We propose a new score construction methodology where the weights corresponding to financial concepts are derived using the distribution of financial knowledge among survey respondents. This methodology awards comparatively higher scores to the respondents presenting correct responses to the difficult questions from the list of survey questions.

After constructing the financial knowledge score, we estimate the level of financial knowledge required to become aware of the existence of financial product, which we term "financial knowledge threshold" with controlling for the demographic attributes and the level of financial access to the households. As a result, the calculated financial knowledge threshold eclipses the effect of demographic attributes that may influence the financial knowledge and their awareness related to the existence of financial products. Next, we consider residual financial knowledge to eliminate the effect of demographic attributes and financial access. The residual fi-

financial knowledge is the unexplained part of financial knowledge by the household's demographic attributes and financial access. Then, we construct the "residual financial knowledge threshold", which is the minimum level of residual financial knowledge required to be aware of a financial product. The residual financial knowledge threshold reflects the net effect of understanding financial concepts in the pursuit of financial awareness. Based on the required financial knowledge score for awareness, we classify the Indian financial products into three categories: basic, median, and advanced financial products. The empirical results show the advanced financial products such as specialized insurance, futures, and IPO require a higher level of financial knowledge for awareness than basic financial products such as savings bank account and life insurance.

Our empirical results show that, although a positive relationship between the dimensions of financial knowledge and financial holding exists, to a large extent, the significance comes from the effect of the financial knowledge on households' awareness of the prevailing financial products. The marginal effect of financial knowledge is higher on financial awareness as compared to financial holding in the case of sophisticated financial products. However, the pure decision of ownership of a basic financial product is not the effect of financial knowledge alone but also demographic attributes such as financial access and the household's demographic attributes. It implies the importance of financial knowledge in emerging markets is to enhance financial awareness, and hence it helps the aware households to take a conscious decision about the ownership of the financial products.

This chapter contributes to the existing literature in the following aspects. First, it introduces a score construction methodology to measure the financial knowledge of the households. Second, the chapter shows the role of financial knowledge in helping the level of financial awareness. Third and last, the chapter highlights the intermediate role of financial awareness in helping financial holding. It further shows that the level of financial awareness and holding increases with the financial competency of households.

The remainder of the chapter is organized as follows. Section 2.2 discusses the survey data and the construction financial knowledge score. Following this, Section 2.3 presents the empirical results from various econometric models. Finally, we conclude in Section 2.4.

## 2.2 Data and variable construction

### 2.2.1 Indian household-level survey data

The study uses India's first national benchmark survey for financial literacy and inclusion, fielded in 2014 by the National Centre for Financial Education (NCFE), jointly with the Indian regulators, including the Reserve Bank of India (RBI), Securities and Exchange Board of India (SEBI), Insurance Regulatory and Development Authority of India (IRDAI), Pension Fund Regulatory and Development Authority (PFRDA) and National Institute of Securities Markets (NISM). The survey coverage spans over 150 districts to ensure adequate representation of India's 28 states and seven union territories at the time of survey administration. The survey employs a multistage cluster sampling plan to capture Indian households' awareness and holdings of the different financial products. Under the proposed sampling plan, the survey targets households in selected non-overlapping clusters followed by filtration at multiple stages using various socio-demographic and socio-economic criteria. The sampling plan also ensures representation from all sections of society to capture the correct scenario at the national level. The sampling plan's overall framework involves primary steps such as the selection of district,<sup>1</sup> selection of cluster, selection of household, and the respondent. The survey records the responses of households in a paper-based face-to-face questionnaire.

Among socio-demographic indicators, the survey captures the age, gender, and

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<sup>1</sup>The district is an administrative division of the Indian states. The districts are a collection of sub-divisions, and sub-divisions are a collection of *Tehsil* or *Taluka*. The Tehsil is the collection of several villages.

caste of respondents. Among spatial attributes, it captures their rural residency status and subnational administrative units of residence called zones. It records the education, employment status, and their self-declared income brackets to determine the socio-economic attributes of the survey participants. The survey uses the availability of banking correspondents<sup>2</sup> to the respondents as one of the proxies for financial access of the respondents. The second proxy of financial access we consider in the chapter is the bank branch density, the average number of banks per thousand district population. The Reserve Bank of India (RBI) which is the central bank of India annually publishes the list of commercial bank branches across India on its website. We source bank-branch data from the RBI website and district-level count of residents in India from census 2011 data. Using the name of administrative districts as key, I matched the RBI bank-branch data with our survey data and calculated the average number of bank branches per thousand residents of the district.

Following the Atkinson and Messy (2012), the survey uses seven multiple-choice financial knowledge questions to discern the financial knowledge of the households. We report the detailed wordings of survey financial knowledge questionnaire in Appendix A. All the seven survey questions offer an option as “Cannot say” to avoid the blind guess from the survey respondents. The first two questions invite dichotomous responses from the respondents about the concept of the time value of money and the interest paid on loan, while the next two questions require an understanding of basic numeracy and the concept of interest rate with/without compounding. The last three questions are true-false questions testing respondents’ knowledge around the concept of risk & return, diversification, and understanding of inflation. The survey records a respondent’s awareness of each financial product, and conditional on awareness, their ownership status related to the financial product.

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<sup>2</sup>Banking Correspondents are agencies and individuals appointed by banks, under the guidelines set out by the Reserve Bank of India, to provide basic banking services in locations where there is limited access to bank branches and ATMs. The Banking Correspondents model was rolled out by the Reserve Bank of India in 2006 to target the 65% un-banked or under-banked households in the country.

For recording financial awareness of the respondent, the survey asks:

- Are you aware of any of these types [list of financial products] of financial products?

Following an affirmative response to the above question to capture the ownership status conditional on awareness, the survey further asks:

- If your answer to the awareness question is yes, whether you currently hold any of these types [list of financial products] of products (personally/jointly)?

The survey utilizes 28 different financial products covering the 5 product segments, namely savings, debt, insurance, pensions, and capital markets to capture the overall level of financial product awareness and holdings.

## **2.2.2 Demographic characteristics of survey participants**

Table 2.1 reports the summary statistics (size and percentage) of demographic and socio-economic attributes of the survey participants. For instance, the survey records the age of respondents into four age groups. First, the youngest age group sizing 19.69% of the survey participants captures the respondents aged 18 to 24 years. The second, middle-age group, which captures the respondents aged between 25 to 49 years, forms the largest age group amounting to 58.51% of the survey participants. The third group consists of respondents aged between 50 and 64 years, who are on the verge of their retirement. The fourth and final group captures the respondents aged between 65 and 80 years. 56.15% of the survey respondents are men, and the remaining 43.85% are women.

The survey captures the adequate representation from all the four castes to account for caste-based socio-economic heterogeneity. Consideration of caste is crucial because a respondent inherits the caste by birth and limits their inter-caste social

mobility. Moreover, social discrimination by caste also extends to economic discrimination in terms of landholdings, occupation, and partner-selection (see Thorat and Neuman, 2012; Deshpande and Darity, 2016). Although the Indian constitution of 1950 eradicated the caste system and further got weakened by increased globalization during the 1990s after the fall of the Soviet Union and recently, it is on a decline with the acceptance of inter-caste marriages. However, it persists as an essential determinant of social identity, dividing Indians into four mutually exclusive hereditary groups, ranked by ritual status. The Indian government runs several welfare schemes targeting society's socially marginalized sections to bring them into the social mainstream overcoming the historical discrimination based on caste. The welfare scheme may push more information to these targeted castes, ultimately affecting their awareness about the financial products. Acknowledging the role of these policies, the sample has representation from all four castes. 50.12% of respondents are from General Castes, which captures the caste groups who are socially privileged, while the remaining sample represents socially marginalized castes, namely Other Backward Castes (OBC), Scheduled Castes (SC), and Scheduled Tribes (ST). The marginalized castes Other Backward Castes (OBC), Scheduled Castes (SC), and Scheduled Tribes (ST) forms 25.10%, 11.56%, and 13.22% of the respondent population, respectively.

Among spatial characteristics, the survey captures 52.32% of rural respondents to maintain a rural-urban balance in the survey. Under the State Reorganization Act (1956), India consists of six sub-national administrative units, called zones, namely, North, North-East, East, Central, West, and South. The survey ensures adequate representation from all six zones in proportion to their overall population. The highest numbers of respondents belong to the North zone sizing 20.95% of the survey participants, while the smallest group belongs to the North-East zone sizing 12.92% of the survey participants. The percentage of participation from the other four zones ranges between 16% and 17%.

Among socio-economic characteristics, the survey captures education, employment

status, and the income of respondents. The survey records the academic achievement in seven non-overlapping academic degree levels, right from illiterate to university degrees. In Table 2.1, we map the household's academic achievement to the minimum years of schooling required to earn those academic levels under the Indian education system. The majority of survey participants sizing 24.52% have some university education. 19.03% of respondents are educated up to senior secondary level while 18.02% are educated only up to the secondary level. To make the survey representative, 13.88% of respondents are illiterate.

The survey captures the occupation of survey participants in ten categories. One-fourth of survey participants (25.84%) are housewives which form the biggest section of survey participants in terms of occupation. The second biggest group sizing 17.24% of the participants are self-employed professionals working in the non-agricultural domain. 13.75% of the survey respondents are salaried workers in the private sector while 12.17% of the respondents are involved in agriculture. The student population in the survey is close to 11.30%. Owing to 26% housewives and 11% of students, 42% respondents report themselves unemployed. On closer investigation of data, we find there are some respondents who are employed in casual jobs, but they report themselves as unemployed. For example, the respondents who are employed as street hawkers, temple-priest, and political-workers are reporting themselves as unemployed. In the sample, only 58.95% of survey participants are reporting to have a job.

Considering the participation of respondents from various income groups, the majority of respondents (39.80%) report no income, which includes homemakers, students, disabled and unemployed respondents. 26.77 % of respondents in the survey have an income below ₹50,000 per year. A considerable 6.21% of respondents earn less than ₹10,001 per year, which is equivalent to around \$135 under the prevailing exchange rate accessed on December 2020. Moreover, the World Bank<sup>3</sup> data on

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<sup>3</sup>The poverty threshold for India was accessed on August 04, 2017, from the World Bank website (<http://povertydata.worldbank.org/poverty/country/IND>).

poverty shows the poverty threshold for India is \$1.9 per day, which is equivalent to ₹51,171 in a year at Purchasing Power Parity, 2011. Hence, more than one-fourth of survey participants live below the official poverty line.

Financial intermediation is important to sustainable and inclusive growth (see Calice and Zhou, 2018). To understand the respondent's access to financial intermediaries, the survey captures whether they have access to Banking Correspondents in their neighborhood. Banking Correspondents are agencies and individuals appointed by banks, under the guidelines set out by the Reserve Bank of India, to provide basic banking services in locations where there is limited access to bank branches and ATMs. The Banking Correspondents model was rolled out by the Reserve Bank of India in 2006 to target the 65% unbanked or underbanked households in the country. As a second measure of financial access, we consider bank branch density at the district-level, which is calculated as the total number of bank branches per thousand households within a district. Table 2.2 reports the percentage of respondents in the NCFE survey having access to Banking Correspondents and the number of bank branches per thousand households, both aggregated at the administrative zone level. The South is observed to have the highest financial access, with 5.34% of respondents having access to Banking Correspondents within the sample and around two bank branches per thousand households. The lowest level of access to bank branches is observed in the Eastern and Central regions of India.

### **2.2.3 Financial knowledge summary statistics**

The survey adopts the guidelines prescribed by the International Network on Financial Education (OECD) framework (see Atkinson and Messy, 2012) to measure the financial knowledge of respondents. It employs seven multiple-choice questions related to an understanding of seven core financial concepts, namely, *time value of money*, *interest paid on loan*, *simple interest calculation*, *compound interest calculation*, *risk and return*, and *diversification of risk* and *understanding of inflation*.

Appendix A reports the detailed wording and response choice of the survey questions

Table 2.3 presents the summary statistics of households' responses to seven financial knowledge questions across the demographic segments. In context to global evidence (see OECD, 2016, pp. 23), the level of financial knowledge of Indian households lag behind their global peers. The global sample of OECD (2016) includes many developed countries having a higher human development index. Existing evidence shows the respondents from developed countries are more financially knowledgeable than their emerging market peers. (see Xu and Zia, 2012). The results show Indian respondents lags behind the global average knowledge across the seven dimensions of financial knowledge. For instance, the global average of the understanding about risk and return relationship is 81% while only 58% Indian respondents answers this question correctly. Compared to global evidence, the sample performance of Indian households is more in line with respondents from emerging countries.

At the aggregate level, the summary statistics show that 8.61% of respondents answer all the seven questions correctly, while 5.60% of the respondents are those respondents who did not manage to answer even a single question correctly. Among the seven questions, the respondent's understanding of the question on *interest paid on loan* is better than any other question, and overwhelmingly, 75.30% of respondents managed to answer it correctly. In contrast, the respondents show the least understanding of the concept about interest compounding, i.e., *compound interest calculation*. Only 30.54% of the respondents answers it correctly. Poor knowledge of interest compounding is inline with global evidence. Hastings et al. (2013) suggests that the compound interest question is relatively tricky and requires not only an understanding of the concept of interest compounding but also a modest level of numeracy. In summary, 39.46% of respondents correctly answers the question on the time value of money, 55.21% simple interest calculation, 58.08% risk and return 58.15% diversification, 61.90% inflation.

Summary statistics of financial knowledge across demographic attributes show considerable heterogeneity among respondents. Millennials outperform other age groups across the five dimensions of financial knowledge while they lag other age groups in the understanding of the concept of diversification. Regarding interest paid on loan, the millennials lag behind the 25-49 Years age group. Higher than any other age group, the 9.53% of millennials answer all the seven questions correctly while 5.33% of millennial respondents did not answer even a single question correctly, which is lower than any age group. The correct response to the compound interest question declines with the age of the respondents. Only 28.90% of retirees managed to answer the question on compound interest calculation correctly. The financial knowledge score that summarizes respondents' overall competency level (detailed score construction methodology is available in the following next section) shows the overall financial knowledge of respondents declines with the respondents' age.

Based on the responses to survey questions, the summary statistics show a gender gap in financial knowledge, which is in line with global evidence (Lusardi and Mitchell, 2008; Bucher-Koenen et al., 2017; Lusardi and Mitchell, 2017). Across all the seven dimensions of financial knowledge, the percentage of men's correct responses is better than women. Almost 9.17% of men answer all the seven questions correctly, while the same for women is 7.91%. Not only this, across the seven dimensions of financial knowledge, men show a better understanding of financial concepts as compared to women.

The caste system in India is an important social determinant, dividing Indians into four mutually exclusive hereditary groups, ranked by ritual status (Munshi and Rosenzweig, 2006; Munshi, 2019). Based on the strong inter-generational persistence in human capital, the available evidence indicates intense discrimination based on caste exists in education, jobs, and politics (UNDP, 2010; Siddique, 2011; Das and Kapoor, 2012). The summary statistics of financial knowledge questions also show a gap in the level of financial knowledge inline with the caste hierar-

chy. The respondents from historically privileged General Castes outperform the respondents from any other caste by a considerable margin. For instance, 11.30% of General Castes respondents answers all the seven financial knowledge questions correctly, while only 6.23% Other Backward Castes (OBC), 5.65% Scheduled Castes (SC), and 5.56% Scheduled Tribes (ST) manages to answer all the seven questions correctly. However, the summary statistics also show a considerable heterogeneity within the general caste respondents. Around 4.64% of general caste, respondents do not manage to answer even a single question correctly, while the same for OBC, SC, and ST are 5.74%, 6.75%, and 7.95%, respectively. There is a big gap between the respondents from general castes and other castes to get all the seven responses correct, but the gap narrows down when we consider the percentage of respondents not getting even a single question correctly. The summary evidence shows although some of the general caste respondents are more financially knowledgeable than their peers from other castes while a sizeable section of general caste respondents is not very different from the respondents from other castes.

Considering the spatial attributes, the summary shows a stark difference in rural and urban respondents in terms of financial knowledge. 12.40% of urban respondents answers all the seven questions correctly, which is two and half times greater than the percentage (i.e., 5.17%) of rural respondents who answer all the seven questions correctly. Simultaneously, 6.12% rural respondents do not answer even a single question correctly, while the same percentage for urban respondents is 4.14.

India has six sub administrative units, which are the union of states based on geographic proximity. The north zone is the best performing zone among the six zones. Around 12.70% of respondents have answered all the seven questions correctly in the north zone, while in the west zone, 11.11% of respondents answer all the seven questions correctly. The zone's ranking based on the overall financial knowledge score is west, north, south, north-east, central and eastern at an aggregated level. Considering specific dimensions of financial knowledge, only 24.52% of respondents from the eastern zone struggle to find the correct response to the

time value of money question compared to any other zone. Across the zones, the respondent struggles to answer the question on interest compounding - for instance, only 38.13% of respondents from the south zone answer the question on interest compounding correctly.

The academic attainment of respondents improves their performance on financial knowledge questions. The summary result shows that 14.39% respondents with more than fourteen years of education answer all the seven questions correctly, whereas it is 3.56% for the respondents with zero years of schooling. The summary results show that the financial knowledge of the respondent improves with the years of schooling. Except for the “Time value of money” question, the unemployed respondent more correctly answers the other six questions of financial knowledge as compared to employed peers. As Table 2.1 show the unemployed population consists of housewives and students. The participant students are college-educated as we find the education is positively correlated with financial knowledge, therefore the presence of student population in the unemployed segment of respondents makes them financially more knowledgeable. The financial knowledge of respondents increases with their income level. There is no significant difference in the financial understanding of household segments having income more than ₹500,001 per year, around 20% of respondents earning more than half a million rupees per year answers all the seven financial knowledge questions correctly.

#### **2.2.4 Construction of financial knowledge score**

Following the guidelines prescribed by the International Network on Financial Education (OECD) framework (see OECD, 2016, 2018) the survey employs seven multiple-choice questions related to an understanding of seven core financial concepts- *the time value of money, interest paid on loan, simple interest calculation, compound interest calculation, risk and return, and diversification of risk and understanding of inflation.*

The practice of using survey questions to measure the financial knowledge of respondents is not new. Before this Almenberg and Säve-Söderbergh (2011), Bucher-Koenen and Lusardi (2011) and Lusardi and Mitchell (2017) also uses financial knowledge questions to measure the financial competency of the households. They utilize the questions testing the households' understanding of the concept of interest rate, inflation, risk, and diversification to measure respondents' financial competency level. Leveraging these approaches Atkinson and Messy (2012) uses additional questions capturing the idea of interest rate, interest compounding calculations, inflation, diversification, and risk & return to determine the level of understanding about the concept of interest.

Hung et al. (2009) provides a literature review of the financial knowledge measurement strategies. Applying Pearson correlation, they show an extent of congruence across different index construction methodologies. Earlier methodologies such as Volpe et al. (1996), Lusardi and Mitchell (2007) construct the score as the sum of correct responses to financial knowledge questions. Although, an equally weighted index helps to compare the competency level of households albeit it ignores the relative difficulty level of questions. Following that Lusardi and Mitchell (2009) uses principal component analysis (PCA) to derive weights of the literacy question and report the weighted average as the financial literacy index of the households. Further, Hung et al. (2009) uses Chronbach alpha to test the construct validity and internal consistency of the PCA based methodology. They find a considerable evidence in favour of the construct validity and internal consistency of the methodology. Refining these approaches, Balloch et al. (2015) uses categorical principal component analysis (CATPCA) to accommodate nominal and ordinal responses of the financial knowledge questions for score construction. However, both of these methodologies suffer from the usual problem of interpreting the factor weights of the components, which tries to orthogonalise the variance covariance matrix, assuming that the component variance is finite. The variance is a good measure of spread in symmetric distributions but it fails to capture the skewed and asymmetric dis-

tributions. Therefore, we devise an alternative methodology having interpretable weights for score construction.

As an example, consider the case of two households A and B. Household A answers correctly about the understanding of *Interest paid on loan* but wrongly answers the question about the *Compound interest calculation*, Household B does the reverse. The rest of the answers are same for the both individuals. Table 2.3 shows that 75% of individuals get the answer to *Interest paid on loan* correct but only 30% get the answer to *Compound interest calculation* correct. Next, the evidence from Chi-squared test shows that sample performance on seven questions are not homogeneous and corresponding p-value is close to zero. As a result, an equally weighted index will value both households the same, but we argue that Household B should get a greater value than Household A since she gets the more difficult question correct.

Acknowledging the ability to answer a financial knowledge question correctly depends upon the knowledge of the respondent. Mathematically, we consider financial knowledge as a continuous latent random variable  $\alpha_q$ , which are independently distributed for each of the financial knowledge questions  $q = 1, \dots, 7$  follows an exponential probability distribution function  $F_q(\alpha)$ . To answer question  $q$  correctly, a household needs to have the required financial knowledge. Therefore, we consider for each of the questions  $q$ , there exist a minimum financial knowledge threshold  $\underline{\alpha}_q$  such that a household  $n$  answers question  $q$  correctly if their financial knowledge level crosses the threshold.

Next, the observed financial knowledge answer vector  $A^n = (a_1^n, \dots, a_7^n)$  corresponding to respondent  $n$  consists of binary response  $a_q^n$  which takes value one when respondent  $n$  answers question  $q$  correctly, and zero otherwise. Following the latent financial knowledge distribution, the answer response  $a_q^n = I(\alpha_q^n > \underline{\alpha}_q)$  is an indicator function. As a result, the probability of answering question  $q$  correctly is  $p_q = Pr(a_q^n) = 1 - F(\underline{\alpha}_q)$ . Using the probability distribution of financial knowledge, we construct the aggregated financial knowledge score corresponding to household

$n$  as the mean of required financial knowledge of the correctly responded financial knowledge questions. In other words, we construct aggregate financial knowledge score corresponding to household  $n$  with the response set  $A^n$  as the sum of all the minimum knowledge thresholds  $\underline{\alpha}_q$  corresponding to each question  $q$ :

$$FK_n \equiv FK(A^n) = \frac{1}{7} \sum_{q=1}^7 \underline{\alpha}_q a_q^n, \quad \forall n = 1, 2, \dots, N. \quad (2.1)$$

Further, the latent financial knowledge  $\alpha_q$  is exponentially distributed and it is easy to show that

$$p_q = Pr(a_q^n = 1) = 1 - F(\underline{\alpha}_q) = 1 - (1 - e^{-\alpha_q}) = e^{-\alpha_q}.$$

Taking log on both side

$$\underline{\alpha}_q = -\log(p_q)$$

Substituting the required financial knowledge in Equation 2.1

$$FK_n \equiv FK(A^n) = -\frac{1}{7} \sum_{q=1}^7 \log(p_q) a_q^n, \quad \forall n = 1, 2, \dots, N.$$

However, in the actual construction of the score, we replace  $p_q$  with its sample equivalent.

$$\hat{p}_q = \frac{1}{N} \sum_{n=1}^N a_q^n, \quad \forall q = 1, 2, \dots, 7.$$

Further, it is noticeable that the score construction is not specific to a probability distribution, and altering the probability distribution will not alter the score qualitatively.

## 2.2.5 Financial awareness and financial holding summary statistics

Survey records awareness and conditional on awareness, the ownership status corresponding to 28 financial products representing five different product segments: savings, debt, insurance, pensions, and capital market products. The consideration

of a wide variety of financial products helps understand the variability in awareness and ownership status of respondents having the heterogeneous level of affordability, financial knowledge, and accessibility. We report a short description of all the financial products in Appendix B.

The global evidence compiled by OECD (2016) uses country-specific financial products to measure the level of financial awareness and financial holding of the respondents. The 28 financial products used in the survey are not always comparable to the financial products used by OECD (2016) to capture the level of financial awareness and financial holdings in various countries. Therefore, it is difficult to compare the level of financial awareness and financial holdings at the level of financial products. To overcome this inconsistency, we consider the nature of financial products used in the survey. Globally, OECD (2016) reports 58% of respondents to hold a saving or retirement product and 50% own an insurance product. Further, close to 53% of respondents have access to credit products. In comparison, 77% of respondents in the survey hold a savings bank account and 41% own a life insurance product. Considering the credit products, 13% own a government-subsidized debt scheme, 17% other bank loans and 15% own a credit card.

In order to avoid product level inconsistencies, we categorize the financial products into product segments (nature of products) based on their perceived use by Indian respondents. For example, *life insurance* is an insurance product, but most Indian households use it as a savings product rather than an insurance product. According to *Insurance Regulatory Agency of India* (IRDAI), the sum assured insurance products are the most popular ‘life insurance’ product in India, and the investors buy this product as a short-term saving plan. Therefore, we categorize the *life insurance* product as a savings product throughout this chapter.

Table 2.4 reports the summary statistics of financial awareness and product holdings about the twenty-eight financial products considered in the survey. The summary statistics show Savings bank account is the most popular product in the Indian financial market. Approximately 92.86% of the respondents are aware of

a Savings bank account, and more so, 76.87% of these aware respondents hold an account. Life insurance is the second most popular financial product on the list. About 84.19% of respondents are aware of it, whereas 40.55% of these aware respondents own it. Motor insurance is mandatory for on-road vehicles in India. Therefore, summary statistics show 67.07% of respondents are aware of the Motor insurance while only 20.85% of the aware respondent holds Motor insurance. The difference between awareness and ownership percentage grows with the complexity of financial products. For instance, more than half of households aware of a Savings bank account also own it, while in the case of Energy futures, only 1.76% of aware respondents own an Energy future. In the case of Specialized insurance such as (Travel insurance, Mobile insurance, Fire insurance, Accidental insurance), the awareness level is meager (0.16%), but almost one third (29.41%) of the aware respondents choose to hold these products. Therefore, awareness plays an essential role in helping financial product ownership.

Next, we construct the financial awareness score as of the financial products about which the respondent is aware of its existence in the market. Similarly, a respondent's financial holding score is the count of financial products about which the respondent is not only aware of, but also holds.

We plot the average financial awareness score and average financial holding score corresponding to four quartiles of financial knowledge in Figure 2.1 to illustrate the relationship of financial knowledge with financial awareness and financial holdings and Table 2.5 provides corresponding summary statistics. The summary statistics show the level of financial awareness and financial holding increases with an increase in understanding financial concepts. The relationship between financial knowledge and financial awareness is concave, while the relationship between financial knowledge and financial holding is convex. In other words, with an increasing level of financial sophistication, the financial holding shows a steeper relation with financial knowledge as compared with financial awareness. On average, the respondents corresponding to the first quartile of financial knowledge score are aware of 7.93

financial products, while then own, on an average, 1.73 financial products. On the other hand, the respondents corresponding to the fourth quartile of financial knowledge are aware of 11.56 financial products, while they own on an average 2.89 financial products.

## 2.3 Empirical analysis

### 2.3.1 Required financial knowledge for awareness

We perform additional empirical analysis for determining the minimum level of financial knowledge required to be aware of the financial products to estimate the sophistication level of financial products. We define *financial knowledge threshold* as the minimum level of financial knowledge necessary to be aware of a financial product. The threshold construction idea stems from the construction of thresholds to model the ordered outcomes as in Becker and Kennedy (1992). The class of ordered outcomes changes when the value of the latent variable crosses the estimated thresholds. Similarly, the household gets aware of a product when the latent value of awareness becomes greater than zero. Using a similar analogy, we construct *residual financial knowledge threshold*. we need a residual financial knowledge threshold to understand the net effect of financial knowledge in help product awareness. As we understand the financial knowledge of a household may depend upon its demographic attributes. To dissociate the effect of demographics attributes on their financial knowledge, we consider the part of financial knowledge which is not explained by the demographic attributes of the household as residual financial knowledge. Similarly, we term *residual financial knowledge threshold* as the minimum level of residual financial knowledge required to be aware of a financial product to control the bias induced by socio-demographic and socio-economic attributes of households. Summing it together, the financial knowledge threshold and residual financial knowledge threshold are unique for each product, and together they present the sophistication level of financial products. Using the finan-

cial knowledge threshold, we rank the complexity of financial products into three categories: basic, median, and advanced financial products based on the quartile distribution of financial knowledge thresholds.

We estimate the intercept  $\hat{\alpha}_i$  and slope  $\hat{\beta}_i$  to calculate the financial knowledge threshold corresponding to the financial product  $i$  using the following model specification

$$P(FA_{i,n} = 1|FK_n) = \Phi(\alpha_i + \beta_i FK_n), \quad \forall i = 1, 2, \dots, 28. \quad (2.2)$$

The dependent variable  $FA_{i,n}$  takes value one if the respondent  $n$  is aware of the financial product  $i$ , and zero otherwise. The independent variable  $FK_n$  is the aggregate financial knowledge score of respondent  $n$  summarizing his performance on the seven dimensions of financial knowledge.

Considering the symmetric nature of Gaussian distribution, the probability of a household being aware of a financial product is greater than or equal to a half is equivalent to the sum of linear predictors of probit regression being greater than or equal to zero. i.e.

$$P(FA_{i,n} = 1|FK_n) = \Phi(\hat{\alpha}_i + \hat{\beta}_i FK_n) \geq 0.5 \iff \hat{\alpha}_i + \hat{\beta}_i FK_n \geq 0. \quad (2.3)$$

Leveraging the positive sign of the estimated slope  $\hat{\beta}_i$  and financial knowledge score, we calculate financial knowledge threshold corresponding to financial product  $i$  (See Appendix 2.6 for the sign of  $\hat{\beta}_i$ )

$$\widehat{FK}_i^* = -\frac{\hat{\alpha}_i}{\hat{\beta}_i}, \quad \forall i = 1, 2, \dots, 28. \quad (2.4)$$

To calculate the residual financial knowledge threshold, we first calculate the residual financial knowledge, which is unexplained financial knowledge by the respondent's demographic attributes and financial access. To estimate the residual financial knowledge, we consider following regression

$$FK_n = c + \delta x_n + \varepsilon_n. \quad (2.5)$$

The dependent variable is the financial knowledge score of the respondent, and the independent variable  $x_n$  sums up demographic attributes, namely, age, gender, caste, education, employment status, income, rural-residency status, the macro-geographic region of residence and financial access of the respondent which covers access to banking correspondent and the number of bank branches per thousand households in the district of the respondent. The estimation results show the estimate of intercept  $c$  is 0.284\*\*\* significant, which means that there is a part of financial knowledge that cannot be explained by the respondent's demographic attributes and financial access. Therefore, the residual financial knowledge of respondent  $n$  is

$$\widetilde{FK}_n = FK_n - (\hat{c} + \hat{\delta} x_n + \hat{\theta} y_n).$$

Next, we set a probit regression to calculate the residual financial knowledge threshold corresponding to a financial product  $i$

$$P(FA_{i,n} = 1 | \widetilde{FK}_n) = \Phi(\alpha_i + \beta_i \widetilde{FK}_n), \quad \forall i = 1, 2, \dots, 28. \quad (2.6)$$

The dependent variable  $FA_{i,n}$  takes value one if the respondent  $n$  is aware of the financial product  $i$ , and zero otherwise and the independent variable  $\widetilde{FK}_n$  is the residual financial knowledge. Similar to the construction of financial knowledge threshold, we construct residual financial knowledge threshold

$$\widetilde{FK}_i^* = -\frac{\tilde{\alpha}_i}{\tilde{\beta}_i}, \quad \forall i \in 1, 2, \dots, 28. \quad (2.7)$$

Table 2.6 reports the estimation results for corresponding to model specification in Equation 2.4 and 2.7. We rank the sophistication of financial products using the level of financial knowledge required for awareness into basic, median, and advanced financial products. We term financial products corresponding to the first quantile of financial knowledge threshold distribution as *basic financial products*. The *median financial products* are the financial products corresponding to the second and third quantile of the financial knowledge thresholds. *Advance financial products* corresponds to the fourth quantile of the distribution of financial knowledge thresholds.

Figure 2.2 plots the financial products in the space of financial knowledge threshold and residual financial knowledge threshold for the relative comparison. The 45° solid black line represents the financial sophistication baseline that shows the relative importance of financial knowledge to households' demographic, socio-economic, and financial access attributes. The products lying above the baseline are the products where financial knowledge plays a role over and above the socio-demographic, socio-economic, and financial access attributes of the households and vice-versa.

Overall, we define financial products' sophistication based on the required financial knowledge to be aware of the financial products. The results show the basic financial products such as savings bank account and life insurance require a lower level of financial knowledge, and for the awareness of these financial products, the demographic attributes matter much more than the household's financial knowledge. On the other hand, the awareness of advanced financial products such as specialized insurance and Agri futures requires a relatively higher financial knowledge level. Moreover, the financial knowledge matters much more than demographic attributes and financial access of respondents.

### 2.3.2 Does financial knowledge helps financial awareness?

The main aim of this section is to explore the role of financial knowledge in helping financial awareness. To estimate the coefficient of interest corresponding to seven dimensions of financial knowledge, we set a Poisson regression with the dependent variable as the count of financial products about which the respondents are aware of.

$$\ln(\Lambda) = c_n + \gamma FK_n + \delta x_n, \quad (2.8)$$

$$P(FA = k) = \frac{\exp(-\Lambda) \Lambda^k}{k!}, \quad (2.9)$$

where  $k$  is the sum of financial products about which the households are aware of their market availability. To avoid the estimation bias, we control the respondents' demographic attributes, namely, age, gender, caste, education, employment status,

income, rural residency status, the geographic zone of residence, access to banking correspondent, and bank branch density in the district of households.

We report the estimation results in Table 2.7. The estimation results show that the understanding of the underpinnings of financial concepts helps acquire the functional knowledge related to the availability of financial products in the market. To explore the role of the seven dimensions of financial knowledge, we consider the empirical model involving one dimension at a time. The empirical results show that financial knowledge dimensions are associated with financial knowledge at the 1% level of significance. Further, the estimation results show across all the seven dimensions, the understanding of financial concepts helps in the acquisition of awareness related to the availability of financial products. However, the extent of association between understanding the financial concept and financial awareness varies across the seven dimensions. More specifically, it is the time value of money and the understanding of risk and returns which is more strongly associated with the acquisition of awareness about the existence of the financial product in the market than any other dimension of financial knowledge. Our findings from the empirical model support the descriptive evidence in Figure 2.1, which shows the level of financial awareness increases with the understanding of financial concepts' underpinnings.

Among control variables, age, education, and income help acquire financial awareness, while women and the respondents from marginalized castes have a lower level of awareness than men and respondents from general castes. Among administrative zones, the respondents from the west zone have a relatively higher level of awareness than any other zone. The role of a banking correspondent is insignificant for financial awareness. However, the density of financial institutions in respondents' neighborhoods helps raise their financial awareness level, which has an important policy implication.

### 2.3.3 Does financial knowledge helps financial holding?

In this section, we explore the role of financial knowledge in helping financial holding. To estimate the coefficient of interest corresponding to seven dimensions of financial knowledge, we set a Poisson regression with dependent variable as the count of financial products about which the respondents hold as the measure of financial holding.

$$\ln(\Lambda) = c_n + \gamma FK_n + \delta x_n, \quad (2.10)$$

$$P(FH = k) = \frac{\exp(-\Lambda) \Lambda^k}{k!}, \quad (2.11)$$

where  $k$  is the sum of financial products that the households own, similar to the regression estimating the relationship between financial knowledge and financial awareness, we control for households' demographics and financial access attributes to correct estimation bias.

Table 2.8 reports the estimation results, which shows financial knowledge across the dimensions and also at an overall level helps the financial holding at 1% level of significance. Among the dimensions of financial knowledge, the extent of association for the time value of money is most significant among the seven dimensions of financial knowledge, which is closely followed by the understanding of inflation and the concept of compound interest calculation.

Among demographic characteristics, age, education, and income help in getting financially included. In contrary to financial awareness, gender discrimination is insignificant for financial holding. However, the respondents from marginalized castes have a lower level of financial holding than respondents from general caste with similar demographic attributes. The discrimination based on caste is in line with the evidence from financial awareness. Although the banking correspondent has an insignificant role in financial awareness, their availability helps in financial holding. It highlights the need for proper training of banking correspondents to convince households about the available financial products and the potential

benefits of owning those financial products. Similarly to financial awareness, the availability of economic infrastructure (bank branches) helps raise the levels of financial holding.

In other words, the understanding of the underpinnings of financial concepts helps the households in assessing their financial requirement. As an anticipation of the assessment, they seek available financial products in the market and attain a relatively higher financial awareness level. Following the acquisition of awareness, they even decide to hold the financial product.

### 2.3.4 Additional robustness checks

Following the findings from the last section, our aim in this section is to explore the role of financial knowledge in helping financial awareness and financial holding related to specific product segments rather than the overall financial awareness level and financial holding. To explore this relationship, we first construct the segment level financial awareness and financial holding indicators. A household is aware of corresponding to a product segment if he is aware of at least one product from that segment then the segment level awareness takes value one, and zero otherwise.

Following the characterization of financial awareness and financial holding at segment level, we set up a probit regression with segment level financial awareness as dependent variable

$$P(FA_{i,n} = 1 | FK_n, x_n) = \Phi(c_n + \gamma_i FK_n + \delta_i x_n), \quad \text{where, } i = 1, 2, \dots, 5. \quad (2.12)$$

In above specification the independent variable  $FK_n$  is financial knowledge score of the respondents while control variable  $x_n$  captures the demographic attributes and financial access of the respondents.

Similarly, we construct the segment level indicator variable for financial holding. In other words, a household holds a product segment if he holds at least one product from the segment given he is also aware of at least one product from that

segment. We further notice that the survey records the ownership of financial products conditional on their response to the awareness question. It leads to a non-random selection of respondents for the ownership question in the survey. As a result, the ownership response of households suffers from selection bias. To correct the specification error resulting from selection bias in estimating the role of financial knowledge in financial product ownership, we introduce an additional explanatory variable that is a transformation of the predicted awareness probability in model Equation 2.12. We follow Van de Ven and Van Praag (1981) that extends the bias correction device (Heckman correction) of Heckman (1979) to dichotomous responses. To apply Heckman correction, we assume there is some common omitted variable (such as institutional efficiency) in the survey that affects the awareness and the ownership status of financial products. As a result, the error term in the probit model of the ownership decision model correlates with the error term in the awareness decision model. For simplification of algebra, we also assume that these individual error terms' standard deviation is one.

Using the probit specification in Equation 2.12, we introduce the correction factor (inverse Mills ratio), which a function of the linear estimators of financial awareness as an additional explanatory variable

$$\lambda_{i,n} \equiv \lambda_{i,n}(B_{i,n}) = \frac{\phi(B_{i,n})}{1 - \Phi(B_{i,n})}, \quad B_{i,n} = -[c_n + \gamma_i FK_n + \delta_i x_n]$$

while estimating the relationship between financial knowledge and financial holding. The  $\phi$  and  $\Phi$  stands for standard normal density and distribution function, respectively. For the unbiased estimation of the coefficient of interest  $\hat{\kappa}_i$ , we consider probit specification for all the five product segments.

$$P(FH_{i,n} = 1 | FK_n, x_n, \lambda_{i,n}) = \Phi(c_i + \kappa_i FK_n + \delta_i x_n + \rho_i \lambda_{i,n}), \quad \forall i = 1, 2, \dots, 5, \quad (2.13)$$

For the marginal effect of financial knowledge on financial awareness, we consider

$$\widehat{ME}_{i,FK_n} P(FA_{i,n} = 1 | FK_n, x_n) = \hat{\gamma}_i \phi(\hat{c}_n + \hat{\gamma}_i FK_n + \hat{\delta}_i x_n), \quad \forall i = 1, 2, \dots, 5. \quad (2.14)$$

and for the marginal effect of financial knowledge of the financial holding, we consider

$$\begin{aligned} \widehat{ME}_{i,FK_n} P(FH_{i,n} = 1 | FK_n, x_n, \lambda_{i,n}) \\ = \phi(D_{i,n}) \left( \hat{\kappa}_i - \hat{\rho}_i \hat{\gamma}_i \lambda_{i,n} [2 B_{i,n} + \lambda_{i,n}] \right), \forall i = 1, 2, \dots, 5, \end{aligned} \quad (2.15)$$

where  $D_{i,n}$  is the linear estimate in Equation 2.13 and  $B_{i,n}$  is the linear estimate from Equation 2.12:

$$\begin{aligned} D_{i,n} &= c_i + \kappa_i FK_n + \delta_i x_n + \rho_i \lambda_{i,n} (B_{i,n}) \\ B_{i,n} &= [c_n + \gamma_i FK_n + \delta_i x_n] \end{aligned}$$

The detailed derivation of marginal effects in Equations 2.12 and 2.13 is reported in Appendix D. The estimation results corresponding to the Equations 2.12 and 2.13, and corresponding marginal effects is reported in Table 2.9.

The empirical evidence confirms our previous findings that financial knowledge helps in financial awareness across the financial product segments at 1% level of significance. However, with the unit increase in understanding the financial concept, households get more aware of the products from the insurance segment than any other product segments, namely, savings, debt, pensions, and capital market products.

On the other hand, understanding financial concepts help the ownership of financial product across the financial products segments, but the corresponding marginal effect is only significant in three product segments: savings, insurance, and capital market products. The marginal effect is insignificant in debt and insurance products, which requires additional eligibility for participation such as credit check for debt and availability of a formal income source to participate in a pension scheme.

In general, the marginal effect of financial knowledge is stronger for financial awareness than financial holding across the product segments. As the participation barrier for savings products is comparatively lower than any other product segments,

the difference in the marginal effect of financial knowledge on financial awareness and financial holding is milder in case of savings products. For the rest of other four product segments, the marginal effect of financial knowledge is relatively stronger on financial awareness as compared to financial holding.

Our finding from an emerging economy is in line with existing literature that shows the understanding of the underpinnings of financial concepts helps financial holding in developed markets. More importantly, the evidence from a large emerging market (i.e., India) shows that understanding financial knowledge helps households seek the availability of financial products in the market that is informationally deficient compared to developed markets.

Overall, the understanding of financial knowledge helps households to assess their financial requirement. Following the assessment, they seek available financial instruments to mitigate their financial need, which adds to their financial awareness level. After acquiring financial awareness, the financial knowledge further helps them decide to own the available financial product commensurate to their financial requirement. Our findings have important policy implications in the context of emerging markets. First, the understanding of financial concepts can raise awareness, which can reduce the search cost of the required financial product. Hence, cost-effective financial knowledge has the potential to bring a sizeable population to the economic mainstream. Second, the availability of financial institutions such as bank branches or the alternative financial access scheme such as banking correspondents helps raise the level of financial holding in the emerging market context.

## 2.4 Conclusion

In this chapter, we analyze the relationship of the understanding of the underpinnings of financial concepts with the functional knowledge about the availability of the financial product in the informationally deficient market context and its ownership decisions. The data we adopt from a large sample of Indian households

provide us with a rich set of information to take the opportunity to closely investigate the effect of financial knowledge on financial awareness related to the existence of financial products. We rank the complexity level of financial products based on the financial knowledge required to know about the existence of product in the Indian financial market. Our further investigation across the dimensions of financial knowledge finds the concept of the time value of money is most important from raising the level of financial awareness and financial holding among households. Ultimately, we investigate whether the level of financial knowledge always directly and positively helps households' participation in emerging financial markets, or it depends upon the nature of the financial product. Our empirical findings shed light on a new channel called financial awareness through which financial holding is influenced in connection with previous studies that show a strong link between financial knowledge and financial holding. The channel sets financial awareness as the intermediate step and then shows that financial knowledge on holding behavior is actually from the impact of financial knowledge on financial awareness. Financial knowledge is a modest predictor for financial ownership but a strong predictor of financial awareness in emerging markets. This concludes that financial knowledge empowers households to make informed decisions about ownership, although it does not explain why people hold a particular financial product. As the literature shows the emerging markets are informationally and institutionally weaker than the developed markets. Building a comparable infrastructure to ensure financial participation can be expensive. The results of the chapter show that financial knowledge can help in building financial capability by enabling households own financial products. Our work will help policymakers to adopt financial knowledge as a policy tool in building financial capability in context of emerging markets. The financial knowledge as a policy tool has a potential of overcoming the institutional weakness and informational deficiency that prevail in emerging markets. Therefore, the analysis in this chapter is relevant for policymakers interested in promoting financial participation in emerging markets.

## 2.5 Figures

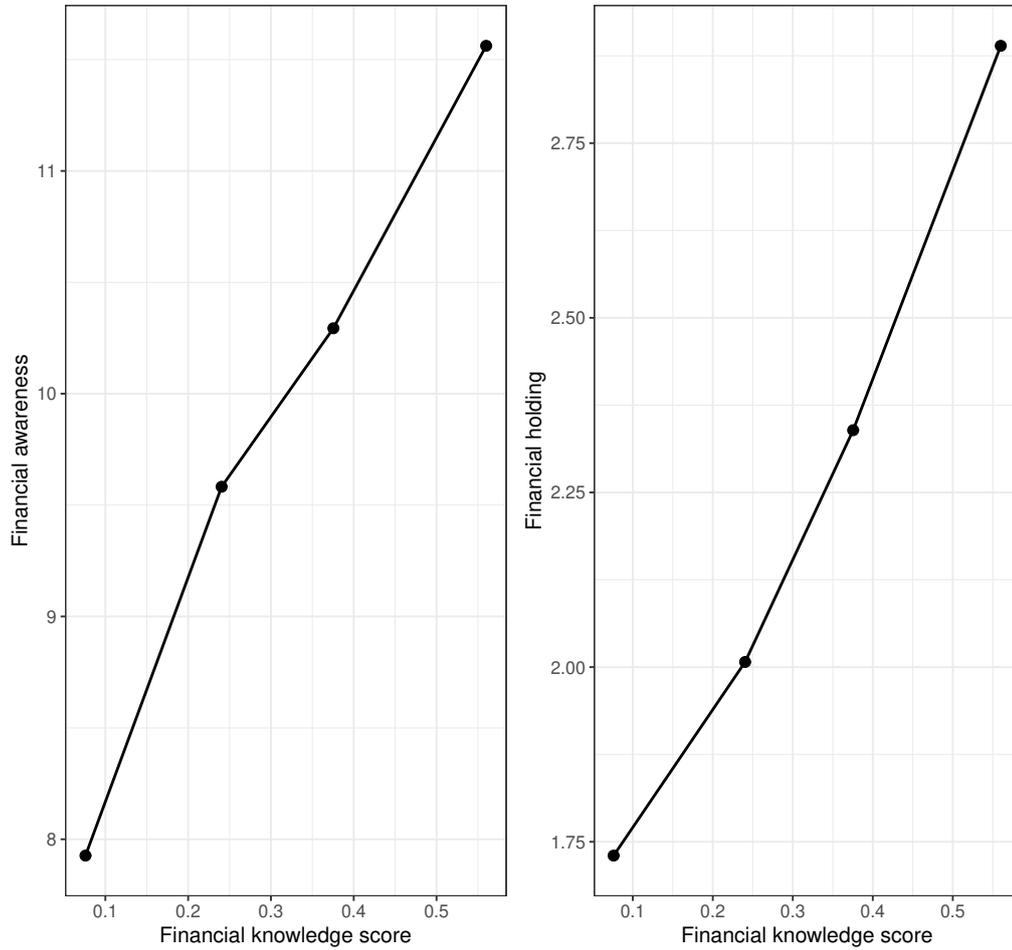


Figure 2.1: **Relationship of financial awareness and financial holding with financial knowledge score.** On the left, we plot financial awareness against financial knowledge score. The four dots in the left figure present the average financial awareness corresponding to four quartiles of financial knowledge distribution. The four dots in the right figure present the average financial holding corresponding to four quartiles of financial knowledge distribution. We present the summary of score corresponding to two plots in Table 2.5.

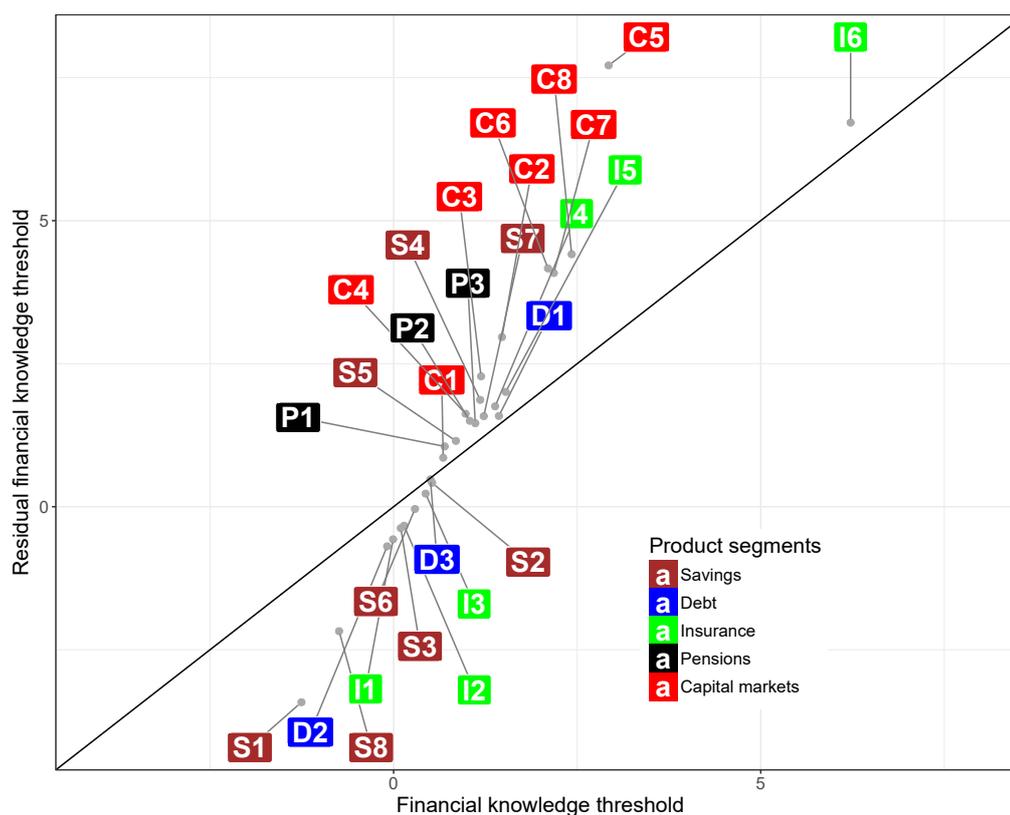
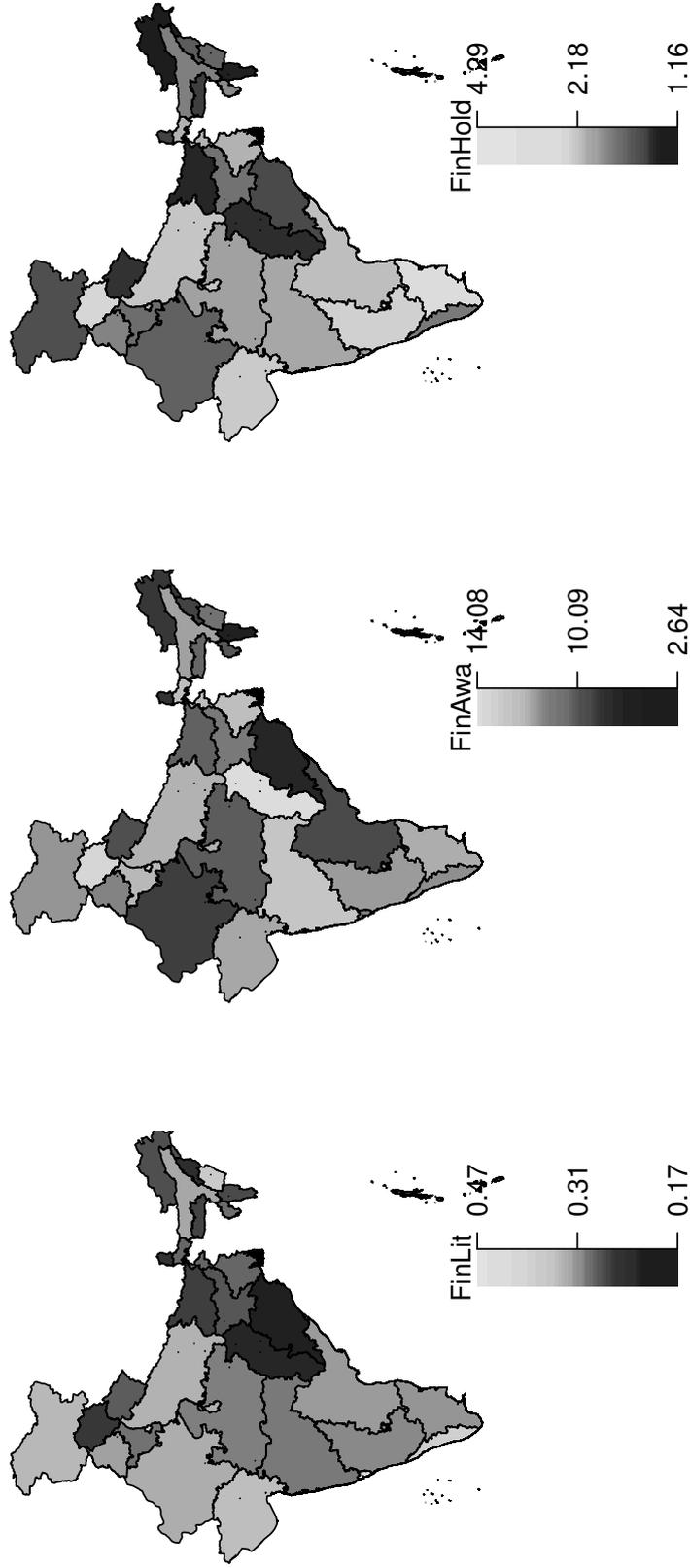


Figure 2.2: **The financial knowledge threshold of Indian financial products.** This figure plots Indian financial products in the space of financial knowledge threshold and residual financial knowledge thresholds. The background colour of the text-boxes presents the product segments. In the awareness of financial products where financial knowledge plays a role over and above the demographic attributes of households lies above the 45\*ine and vice versa. The financial knowledge threshold of products are derived using Equation 2.4 and the residual financial knowledge threshold using the Equation 2.7. The list of products are given below and the estimates of thresholds of the financial products are tabulated in Table 2.6.

#### Product list

■	<b>Savings</b>	■	<b>Insurance</b>	■	<b>Capital markets</b>
S1	Savings bank account/ No frill account	I1	Motor insurance	C1	Shares/Stocks
S2	Recurring deposit	I2	Health insurance	C2	Initial public offering (IPO)
S3	Fixed deposit	I3	Home insurance	C3	Bonds/Debentures
S4	Overdraft facility	I4	Crop insurance	C4	Mutual fund
S5	Public provident fund	I5	Cattle/Livestock insurance	C5	Agri futures
S6	Post office savings scheme	I6	Specialized insurance	C6	Bullion futures
S7	National savings certificate/ Kisan vikas patra			C7	Metal futures
S8	Life insurance			C8	Energy futures
■	<b>Debt</b>	■	<b>Pensions</b>		
D1	Government subsidized debt scheme	P1	Employee provident fund (EPF)		
D2	Other bank loans	P2	National pension scheme (NPS)		
D3	Credit card	P3	Family/ Employee pension scheme		



a) Financial knowledge

b) Financial awareness

c) Financial holdings

**Figure 2.3: Comparative plot of the Indian states on financial knowledge, financial awareness and financial holdings.** From left to right, the plots compare the level of financial knowledge, financial awareness and financial holdings of respondents from those states. The level of financial knowledge, financial awareness and financial holding increases along the brightness of the colour and the mapping between average score of state with colour band is reported in the index. For the financial knowledge, the score construction methodology has been discussed in Section 2.2.4. Financial awareness score and financial holding score of a state is average of the financial awareness score and financial holding score of the respondents from that state, respectively.

## 2.6 Tables

Table 2.1: **Household level summary statistics.** This table reports the summary statistics (counts and percentages) of the demographic and socio-economic characteristics of the sample.

	Segments	Counts	Percentage
Age	18-24 Years	15,114	19.69
	25-49 Years	44,915	58.51
	50-64 Years	12,020	15.66
	65-80 Years	4,713	6.14
Gender	Men	43,098	56.15
	Women	33,664	43.85
Castes	General castes (GEN)	38,472	50.12
	Other backward castes (OBC)	19,266	25.10
	Scheduled castes (SC)	8,874	11.56
	Scheduled tribes (ST)	10,150	13.22
Location	Urban	36,602	47.68
	Rural	40,160	52.32
Zones	North	16,081	20.95
	North-east	9,919	12.92
	Eastern	12,499	16.28
	Central	12,686	16.53
	West	12,936	16.85
	South	12,641	16.47
Education (years of schooling in parentheses)	Illiterate (<5 Years)	10,656	13.88
	Primary (5-7 Years)	6,770	8.82
	Upper Primary (8-9 Years)	10,255	13.36
	Secondary (10-11 Years)	13,830	18.02
	Senior Secondary (12-13 Years)	14,610	19.03
	Diploma (14-17 Years)	1,819	2.37
	Graduate and above (>17 Years)	18,822	24.52
	Occupation	Self-employed (Agriculture)	5,717
Labourer (Agriculture)		3,626	4.72
Self-employed (Non-agriculture)		13,231	17.24
Labourer (Non-agriculture)		5,911	7.70
Salaried (Private)		10,555	13.75
Salaried (Public servants)		4,328	5.64
Student		8,677	11.30
Housewife		19,838	25.84
Retired person		3,368	4.39
Others		1,511	1.97
Employment status		Employed	44,490
	Unemployed	32,272	42.05

Table 2.1 contd.

	Segments	Counts	Percentage
Income bracket (per year)	$\leq$ ₹ 10,000	4,769	6.21
	₹ 10,001-50,000	15,786	20.57
	₹ 50,001-200,000	18,075	23.55
	₹ 200,001-500,000	6,160	8.02
	₹ 500,001-10,00,000	1,187	1.55
	$\geq$ ₹ 10,00,001	221	0.29
	No income	30,554	39.80
	Confidential	10	0.01
Total number of respondents		76,762	100

**Table 2.2: Financial access sample statistics.** This table reports the average level of financial access (percentage of respondents with access to banking correspondents in their neighborhood, number of bank branches per thousand households in respondent's district) across the various administrative zones of India. Banking Correspondents are agencies and individuals appointed by banks, under the guidelines set out by the Reserve Bank of India, to provide basic banking services in locations where there is limited access to bank branches and ATMs.

Zone	Percentage with access to banking correspondents	Number of bank branches per thousand households
North	3.61	1.89
North East	2.04	1.35
Eastern	4.04	1.30
Central	2.22	1.31
West	1.48	1.91
South	5.34	2.04
All zones	3.20	1.66

**Table 2.3: Summary of financial knowledge across demographic segments.** This table presents a summary of financial knowledge across the demographic segments on the seven dimensions of financial knowledge questions. Under the panel 'Financial knowledge questions', the column numbers (1) to (7) report the percentage of respondents who correctly answer financial knowledge questions, namely, (1)-Time value of money, (2)-Interest paid on loan, (3)-Simple interest calculation, (4)-Compound interest calculation, (5)-Risk and return, (6)-Diversification and (7)-Understanding of inflation. Column (8) reports the percentage of households answering all the seven questions correctly, while column (9) reports the percentage of households, who do not answer even a single question correctly. The last column (10) reports the average financial knowledge score (FK) of respondents across demographic segments. The detailed wording of the financial knowledge question is reported in Appendix A. All values in the table are rounded up to two places of decimal.

	Financial knowledge questions correct responses (in %)							Correct responses (in%)				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	All	None	FK		
Global evidence (OECD, 2016)	63.00	85.00	58.00	42.00	81.00	64.00	78.00	-	-	-		
Performance by full sample	39.46	75.30	55.21	30.54	58.08	58.15	61.90	8.61	5.60	3.79		
Performance by household groups												
Age												
	18-24	Years	42.31	74.96	56.19	31.43	58.48	57.79	63.05	9.53	5.33	3.84
	25-49	Years	39.12	75.64	55.47	30.48	58.20	58.37	61.69	8.27	5.45	3.79
	50-64	Years	37.91	74.68	53.62	30.28	57.40	57.78	61.76	8.84	6.45	3.73
	65-80	Years	37.58	74.71	53.64	28.90	57.44	58.16	60.60	8.38	5.67	3.71
Gender												
	Men		40.85	75.85	57.20	31.70	59.24	59.19	63.31	9.17	5.17	3.87
	Women		37.69	74.59	52.66	29.06	56.60	56.82	60.09	7.91	6.15	3.68
Castes												
	General castes	(GEN)	45.39	77.45	57.96	33.69	60.97	61.15	67.01	11.30	4.64	4.04
	Other backward castes	(OBC)	34.15	74.06	54.30	29.17	57.27	56.86	59.77	6.23	5.74	3.66
	Scheduled castes	(SC)	35.35	72.64	51.13	27.68	55.25	53.34	57.67	5.65	6.75	3.53
	Scheduled tribes	(ST)	30.67	71.78	50.07	23.72	51.17	53.46	50.25	5.56	7.95	3.31
Location												
	Urban		47.94	78.91	59.00	35.89	61.66	61.79	67.84	12.40	4.14	4.13
	Rural		31.74	72.00	51.75	25.66	54.83	54.83	56.49	5.17	6.92	3.47

Table 2.3 contd.

	Financial knowledge questions correct responses (in %)						Correct responses (in%)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Zones	54.42	74.03	54.79	32.21	58.45	59.75	71.49	12.70	5.66	4.05
North	38.33	74.74	59.06	27.51	54.63	55.06	54.15	5.42	3.64	3.63
North-east	24.52	75.93	51.48	23.77	59.03	55.36	52.36	5.60	7.94	3.42
Eastern	37.32	69.00	57.64	27.01	52.54	50.83	61.97	6.59	5.07	3.56
Central	46.25	78.90	50.55	33.37	62.79	65.31	70.19	11.11	3.86	4.07
West	31.31	79.36	58.74	38.13	60.14	61.31	56.66	8.39	7.04	3.86
South	29.19	70.54	44.07	20.66	50.79	50.37	50.75	3.56	8.94	3.16
Illiterate	33.32	74.79	48.86	23.59	55.94	54.15	57.37	5.97	7.53	3.48
Primary	33.78	72.09	52.80	28.92	53.72	56.33	57.79	5.69	6.54	3.55
Upper primary	38.11	75.95	54.71	29.49	58.55	58.51	63.01	7.86	5.49	3.78
Secondary	40.60	75.59	57.74	31.83	58.71	58.47	63.62	8.47	4.48	3.87
Senior secondary	49.70	74.60	59.54	37.77	61.02	64.87	66.90	11.71	4.45	4.14
Diploma	49.71	79.27	63.09	38.59	64.25	63.82	69.45	14.39	3.55	4.28
Graduate & above	39.50	74.33	53.89	29.50	56.70	57.04	61.51	8.70	5.76	3.72
Employed	39.44	75.99	56.17	31.29	59.09	58.95	62.18	8.55	5.48	3.83
Unemployed	24.97	74.06	47.20	23.86	48.82	52.86	50.74	3.42	8.18	3.23
< ₹10000	34.07	72.93	51.91	27.37	56.39	56.85	57.67	6.25	6.57	3.57
₹10001-50000	42.38	77.47	58.51	33.70	61.14	60.58	65.02	9.27	4.54	3.99
₹50001-200000	53.38	80.13	64.95	36.54	65.54	63.70	71.88	15.23	3.12	4.36
₹200001-500000	55.86	79.02	67.57	45.41	68.07	67.31	75.40	21.06	3.20	4.59
₹500001-1000000	52.04	81.00	64.71	37.56	61.99	63.80	71.49	20.36	3.62	4.33
>= INR 1000001	39.26	74.27	53.69	29.52	56.68	56.69	61.37	8.37	5.92	3.71
No Income	40.00	60.00	80.00	10.00	60.00	60.00	70.00	0.00	10.00	3.80
Confidential										

Table 2.4: **Summary of awareness and holding of financial products.** This table reports the percentage of awareness and holding of Indian financial products along with their product segments. All the percentage values appearing in the table are rounded up to two places of decimal.

	Product segment	Percentage aware (in%)	Percentage aware who holds (in%)
Saving bank accounts/ No frill account	Savings	92.86	76.87
Recurring deposit	Savings	41.38	22.38
Fixed deposit	Savings	60.27	23.69
Overdraft facility	Savings	21.65	7.13
Public provident fund	Savings	27.84	13.36
Post office savings scheme	Savings	50.77	15.23
National savings certificate/ Kisan vikas patra	Savings	19.89	7.76
Life insurance	Savings	84.19	40.55
Government subsidized debt scheme	Debt	38.15	13.40
Other bank loans	Debt	67.16	16.58
Credit card	Debt	40.97	15.20
Motor insurance	Insurance	67.07	31.08
Health insurance	Insurance	58.62	21.05
Home insurance	Insurance	44.25	5.89
Crop insurance	Insurance	27.27	4.23
Cattle/ Livestock insurance	Insurance	23.56	2.07
Specialized insurance	Insurance	0.16	29.41
Employee provident fund (EPF)	Pensions	38.00	17.33
National pension scheme (NPS)	Pensions	35.89	14.58
Family/ Employee pension scheme	Pensions	30.33	7.55
Shares/ Stocks	Capital markets	33.24	8.38
Mutual fund	Capital markets	21.24	8.11
Initial public offering (IPO)	Capital markets	11.31	4.55
Bonds/ Debentures	Capital markets	16.56	4.58
Agri futures	Capital markets	10.33	4.38
Bullion futures	Capital markets	8.78	3.92
Metal futures	Capital markets	7.30	2.96
Energy futures	Capital markets	5.63	1.76

**Table 2.5: Summary statistics of financial knowledge with financial awareness and financial holding.** This table presents average financial awareness, and average financial holding corresponding to four quartiles of financial knowledge score. All values in the table are rounded up to two places of decimal.

Financial knowledge quartile	Financial knowledge	Financial awareness	Financial holding
First quartile	0.08	7.93	1.73
Second quartile	0.24	9.58	2.01
Third quartile	0.38	10.29	2.34
Fourth quartile	0.56	11.56	2.89

**Table 2.6: Estimates of financial knowledge thresholds for financial awareness.** This table reports the financial knowledge required for the awareness of 28 financial products. The dependent variable is the financial awareness corresponding to a financial product. The independent variables in the panel ‘Financial knowledge’ and ‘Residual financial knowledge’ are financial knowledge score and residual financial knowledge score, respectively. In both panels, the ‘Rank’ column presents the ranking of corresponding estimated thresholds. Similarly, in both panels  $\hat{\alpha}/\tilde{\alpha}$  column presents the estimates of intercept; and the column  $\hat{\beta}/\tilde{\beta}$  presents the estimates of slope associated with financial knowledge in the respective probit models. The thresholds columns  $\widehat{FK}^*/\widetilde{FK}^*$  in both panels is the negative of the ratio of estimated intercept  $\hat{\alpha}/\tilde{\alpha}$  and slope  $\hat{\beta}/\tilde{\beta}$  for each of the financial product. For the estimates under panel ‘Financial knowledge’, we use probit model 2.4; and for the estimates under panel ‘Residual financial knowledge’, we use probit model 2.7. We list the details of financial products in Appendix B. The standard errors corresponding to estimates are in the parentheses. The stars \*\*\*, \*\* and \* denote level of significance at 1, 5 and 10 percent respectively.

	Product segment	Financial knowledge			Residual financial knowledge				
		Rank	$\hat{\alpha}$	$\hat{\beta}$	$\widehat{FK}^*$	Rank	$\tilde{\alpha}$	$\tilde{\beta}$	$\widetilde{FK}^*$
<b>Basic financial products</b>									
Savings bank account/ No frill account	Savings	1	1.191*** (0.013)	0.949*** (0.039)	-1.255	1	1.470*** (0.007)	0.430*** (0.039)	-3.418
Life insurance	Savings	2	0.716*** (0.01)	0.964*** (0.03)	-0.742	2	1.006*** (0.005)	0.462*** (0.031)	-2.175
Other bank loans	Debt	3	0.099*** (0.009)	1.131*** (0.025)	-0.088	3	0.447*** (0.005)	0.646*** (0.026)	-0.692
Motor insurance	Insurance	4	0.010 (0.009)	1.427*** (0.026)	-0.007	4	0.446*** (0.005)	0.782*** (0.026)	-0.57
Fixed deposit	Savings	5	-0.121*** (0.009)	1.236*** (0.025)	0.098	5	0.262*** (0.005)	0.702*** (0.026)	-0.374
Health insurance	Insurance	6	-0.187*** (0.009)	1.311*** (0.025)	0.143	6	0.219*** (0.005)	0.662*** (0.026)	-0.332
Post office savings scheme	Savings	7	-0.247*** (0.009)	0.85*** (0.024)	0.291	7	0.019*** (0.005)	0.49*** (0.025)	-0.039

Table 2.6 contd.

	Product segment	Financial knowledge			Residual financial knowledge				
		Rank	$\hat{\alpha}$	$\hat{\beta}$	$\widehat{FK}^*$	Rank	$\tilde{\alpha}$	$\tilde{\beta}$	$\widehat{FK}^*$
<b>Median financial products</b>									
Home insurance	Insurance	8	-0.531*** (0.009)	1.22*** (0.024)	0.436	8	-0.146*** (0.005)	0.635*** (0.025)	0.229
Credit card	Debt	9	-0.627*** (0.009)	1.251*** (0.025)	0.501	10	-0.229*** (0.005)	0.479*** (0.026)	0.478
Recurring deposit	Savings	10	-0.553*** (0.009)	1.055*** (0.025)	0.524	9	-0.219*** (0.005)	0.525*** (0.026)	0.417
Shares/Stocks	Capital markets	11	-0.832*** (0.01)	1.233*** (0.025)	0.675	11	-0.435*** (0.005)	0.508*** (0.026)	0.856
Employee provident fund (EPF)	Pensions	12	-0.563*** (0.009)	0.808*** (0.025)	0.696	12	-0.306*** (0.005)	0.29*** (0.026)	1.054
Public provident fund	Savings	13	-0.954*** (0.01)	1.126*** (0.026)	0.848	13	-0.59*** (0.005)	0.513*** (0.027)	1.151
Mutual fund	Capital markets	14	-1.205*** (0.011)	1.229*** (0.028)	0.98	18	-0.801*** (0.005)	0.493*** (0.029)	1.625
National pension scheme (NPS)	Pensions	15	-0.52*** (0.009)	0.501*** (0.024)	1.038	15	-0.362*** (0.005)	0.241*** (0.025)	1.502
Family/Employee pension scheme	Pensions	16	-0.723*** (0.009)	0.65*** (0.025)	1.112	14	-0.516*** (0.005)	0.353*** (0.026)	1.46
Overdraft facility	Savings	17	-1.085*** (0.01)	0.92*** (0.027)	1.179	20	-0.786*** (0.005)	0.421*** (0.029)	1.868
Bonds/Debentures	Capital markets	18	-1.35*** (0.011)	1.133*** (0.029)	1.191	22	-0.975*** (0.005)	0.428*** (0.031)	2.279
National savings certificate/ Kisan vikas patra	Savings	19	-1.154*** (0.011)	0.939*** (0.028)	1.228	16	-0.85*** (0.005)	0.537*** (0.029)	1.583
Crop insurance	Insurance	20	-0.787*** (0.01)	0.569*** (0.026)	1.383	19	-0.606*** (0.005)	0.345*** (0.027)	1.755
Government subsidized debt scheme	Debt	21	-0.386*** (0.009)	0.269*** (0.024)	1.434	17	-0.302*** (0.005)	0.19*** (0.025)	1.586

Table 2.6 contd.

	Product segment	Financial knowledge			Residual financial knowledge				
		Rank	$\hat{\alpha}$	$\hat{\beta}$	$\widehat{FK}^*$	Rank	$\tilde{\alpha}$	$\tilde{\beta}$	$\widetilde{FK}^*$
<b>Advanced financial products</b>									
Initial public offering (IPO)	Capital markets	22	-1.568*** (0.013)	1.062*** (0.033)	1.476	23	-1.214*** (0.006)	0.409*** (0.034)	2.966
Cattle/Livestock insurance	Insurance	23	-0.913*** (0.01)	0.598*** (0.026)	1.526	21	-0.722*** (0.005)	0.36*** (0.028)	2.007
Bullion futures	Capital markets	24	-1.609*** (0.013)	0.765*** (0.033)	2.102	25	-1.357*** (0.006)	0.326*** (0.034)	4.166
Metal futures	Capital markets	25	-1.717*** (0.014)	0.787*** (0.034)	2.182	24	-1.457*** (0.007)	0.357*** (0.036)	4.085
Energy futures	Capital markets	26	-1.841*** (0.015)	0.759*** (0.038)	2.425	26	-1.59*** (0.007)	0.36*** (0.039)	4.413
Agri futures	Capital markets	27	-1.421*** (0.012)	0.485*** (0.031)	2.928	28	-1.264*** (0.006)	0.164*** (0.033)	7.714
Specialized insurance	Insurance	28	-3.129*** (0.06)	0.503*** (0.145)	6.224	27	-2.967*** (0.029)	0.442*** (0.138)	6.714

Table 2.7: **Relationship of financial awareness with the dimensions of financial knowledge.** This table reports the Poisson regression estimates where the dependent variable is the financial awareness score. The financial awareness score for a respondent is the count of products about which the respondent is aware. The independent variables are seven dimensions of financial knowledge and financial knowledge score. In all the eight models, we control for demographic attributes of the respondent and their financial access. The robust standard errors corresponding to estimates are in the parentheses. The stars \*\*\*, \*\* and \* denote level of significance at 1, 5 and 10 percent respectively.

Dependent variable: Financial awareness score							
Time value of money	0.115*** (0.005)						
Interest paid on loan	0.046*** (0.005)						
Simple interest calculation	0.049*** (0.004)						
Compound interest calculation	0.064*** (0.005)						
Risk and return	0.113*** (0.004)						
Diversification	0.086*** (0.004)						
Understanding of inflation	0.090*** (0.005)						
Financial knowledge score	0.363*** (0.012)						
Age	0.039*** (0.007)	0.038*** (0.007)	0.038*** (0.007)	0.037*** (0.007)	0.037*** (0.007)	0.037*** (0.007)	
Female	-0.065*** (0.005)	-0.067*** (0.005)	-0.065*** (0.005)	-0.066*** (0.005)	-0.066*** (0.005)	-0.066*** (0.005)	-0.065*** (0.005)

Table 2.7 contd.

Rural	-0.070*** (0.005)	-0.082*** (0.005)	-0.081*** (0.005)	-0.079*** (0.005)	-0.078*** (0.005)	-0.080*** (0.005)	-0.077*** (0.005)	-0.067*** (0.005)
Caste: SC	-0.058*** (0.008)	-0.061*** (0.008)	-0.060*** (0.008)	-0.061*** (0.008)	-0.059*** (0.008)	-0.058*** (0.008)	-0.058*** (0.008)	-0.053*** (0.007)
Caste: ST	-0.294*** (0.009)	-0.303*** (0.009)	-0.301*** (0.009)	-0.300*** (0.009)	-0.296*** (0.009)	-0.301*** (0.009)	-0.296*** (0.009)	-0.287*** (0.009)
Caste: OBC	-0.052*** (0.005)	-0.057*** (0.005)	-0.057*** (0.005)	-0.056*** (0.005)	-0.055*** (0.005)	-0.055*** (0.005)	-0.055*** (0.005)	-0.050*** (0.005)
Education	0.051*** (0.001)	0.052*** (0.001)	0.051*** (0.001)	0.051*** (0.001)	0.051*** (0.001)	0.051*** (0.001)	0.051*** (0.001)	0.050*** (0.001)
Income	0.027*** (0.001)	0.028*** (0.001)	0.028*** (0.001)	0.028*** (0.001)	0.027*** (0.001)	0.027*** (0.001)	0.027*** (0.001)	0.027*** (0.001)
Employed	-0.171*** (0.010)	-0.174*** (0.010)	-0.174*** (0.010)	-0.174*** (0.010)	-0.172*** (0.010)	-0.172*** (0.010)	-0.172*** (0.010)	-0.169*** (0.010)
North	-0.090*** (0.006)	-0.080*** (0.006)	-0.083*** (0.006)	-0.080*** (0.006)	-0.076*** (0.006)	-0.075*** (0.006)	-0.083*** (0.006)	-0.083*** (0.006)
North-east	-0.221*** (0.009)	-0.223*** (0.009)	-0.230*** (0.009)	-0.222*** (0.009)	-0.217*** (0.009)	-0.215*** (0.009)	-0.213*** (0.009)	-0.218*** (0.009)
East	-0.165*** (0.007)	-0.184*** (0.007)	-0.186*** (0.007)	-0.181*** (0.007)	-0.182*** (0.007)	-0.176*** (0.007)	-0.172*** (0.007)	-0.168*** (0.007)
Central	-0.108*** (0.008)	-0.108*** (0.008)	-0.116*** (0.008)	-0.110*** (0.008)	-0.102*** (0.007)	-0.100*** (0.007)	-0.108*** (0.008)	-0.104*** (0.008)
South	-0.231*** (0.007)	-0.250*** (0.007)	-0.253*** (0.007)	-0.252*** (0.007)	-0.246*** (0.007)	-0.245*** (0.007)	-0.236*** (0.007)	-0.242*** (0.007)

Table 2.7 contd.

BC_Access	0.014 (0.013)	0.006 (0.013)	0.003 (0.013)	0.002 (0.013)	0.001 (0.013)	0.001 (0.013)	0.001 (0.013)	-0.003 (0.013)
Bank_Density	0.018*** (0.002)	0.023*** (0.002)	0.022*** (0.002)	0.021*** (0.002)	0.024*** (0.002)	0.023*** (0.002)	0.022*** (0.002)	0.018*** (0.002)
Constant	1.632*** (0.027)	1.646*** (0.027)	1.659*** (0.027)	1.666*** (0.027)	1.616*** (0.027)	1.633*** (0.027)	1.626*** (0.027)	1.576*** (0.027)
Observations	76,762	76,762	76,762	76,762	76,762	76,762	76,762	76,762
Pseudo R-squared	0.135	0.132	0.133	0.133	0.135	0.134	0.134	0.137

**Table 2.8: Relationship of financial holding with the dimensions of financial knowledge.** This table reports the Poisson regression estimates where the dependent variable is the financial holding score. The financial holding score for a respondent is the count of financial products that he owns from the list of 28 Indian financial products. The independent variables are seven dimensions of financial knowledge and financial knowledge score. In all the eight models, we control for demographic attributes of the respondent and their financial access. The robust standard errors corresponding to estimates are in the parentheses. The stars \*\*\*, \*\* and \* denote level of significance at 1, 5 and 10 percent respectively.

Dependent variable: Financial holding score							
Time value of money	0.120*** (0.007)						
Interest paid on loan	0.087*** (0.008)						
Simple interest calculation	0.074*** (0.007)						
Compound interest calculation	0.105*** (0.007)						
Risk and return	0.089*** (0.007)						
Diversification	0.085*** (0.007)						
Understanding of inflation	0.113*** (0.007)						
Financial knowledge score	0.430*** (0.018)						
Age	0.302*** (0.010)	0.300*** (0.010)	0.301*** (0.010)	0.302*** (0.010)	0.300*** (0.010)	0.300*** (0.010)	0.299*** (0.010)
Female	-0.012 (0.008)	-0.013 (0.008)	-0.013 (0.008)	-0.011 (0.008)	-0.013 (0.008)	-0.013 (0.008)	-0.012 (0.008)
Rural	-0.177*** (0.007)	-0.187*** (0.007)	-0.183*** (0.007)	-0.186*** (0.007)	-0.186*** (0.007)	-0.187*** (0.007)	-0.181*** (0.007)

Table 2.8 contd.

Rural	-0.177*** (0.007)	-0.187*** (0.007)	-0.186*** (0.007)	-0.183*** (0.007)	-0.186*** (0.007)	-0.187*** (0.007)	-0.181*** (0.007)	-0.171*** (0.007)
Caste: SC	-0.159*** (0.012)	-0.162*** (0.012)	-0.161*** (0.012)	-0.161*** (0.012)	-0.161*** (0.012)	-0.160*** (0.012)	-0.159*** (0.012)	-0.154*** (0.012)
Caste: ST	-0.228*** (0.012)	-0.235*** (0.012)	-0.233*** (0.012)	-0.230*** (0.012)	-0.232*** (0.012)	-0.235*** (0.012)	-0.229*** (0.012)	-0.215*** (0.012)
Caste: OBC	-0.144*** (0.008)	-0.149*** (0.008)	-0.149*** (0.008)	-0.147*** (0.008)	-0.148*** (0.008)	-0.148*** (0.008)	-0.147*** (0.008)	-0.142*** (0.008)
Education	0.077*** (0.001)	0.078*** (0.001)	0.078*** (0.001)	0.078*** (0.001)	0.078*** (0.001)	0.078*** (0.001)	0.078*** (0.001)	0.076*** (0.001)
Income	0.059*** (0.001)							
Employed	-0.070*** (0.013)	-0.073*** (0.013)	-0.072*** (0.013)	-0.073*** (0.013)	-0.071*** (0.013)	-0.071*** (0.013)	-0.070*** (0.013)	-0.067*** (0.013)
North	-0.131*** (0.010)	-0.121*** (0.010)	-0.126*** (0.010)	-0.121*** (0.010)	-0.118*** (0.010)	-0.116*** (0.010)	-0.125*** (0.010)	-0.125*** (0.010)
North-east	-0.248*** (0.013)	-0.253*** (0.013)	-0.263*** (0.013)	-0.252*** (0.013)	-0.248*** (0.013)	-0.245*** (0.013)	-0.239*** (0.013)	-0.245*** (0.013)
East	-0.115*** (0.012)	-0.134*** (0.012)	-0.139*** (0.012)	-0.129*** (0.011)	-0.133*** (0.012)	-0.127*** (0.012)	-0.121*** (0.012)	-0.114*** (0.012)
Central	-0.135*** (0.012)	-0.134*** (0.012)	-0.146*** (0.012)	-0.136*** (0.012)	-0.132*** (0.012)	-0.128*** (0.012)	-0.135*** (0.012)	-0.130*** (0.012)
South	0.049*** (0.011)	0.027* (0.011)	0.024* (0.011)	0.024* (0.011)	0.032** (0.011)	0.034** (0.011)	0.045*** (0.011)	0.038*** (0.011)

Table 2.8 contd.

Employed	-0.070*** (0.013)	-0.073*** (0.013)	-0.072*** (0.013)	-0.073*** (0.013)	-0.071*** (0.013)	-0.071*** (0.013)	-0.071*** (0.013)	-0.070*** (0.013)	-0.067*** (0.013)
BC_Access	0.435*** (0.016)	0.425*** (0.016)	0.421*** (0.016)	0.419*** (0.016)	0.422*** (0.016)	0.421*** (0.016)	0.421*** (0.016)	0.419*** (0.016)	0.415*** (0.016)
Bank_Density	0.035*** (0.003)	0.040*** (0.003)	0.040*** (0.003)	0.037*** (0.003)	0.041*** (0.003)	0.040*** (0.003)	0.040*** (0.003)	0.039*** (0.003)	0.034*** (0.003)
Constant	-1.480*** (0.041)	-1.495*** (0.042)	-1.467*** (0.041)	-1.456*** (0.041)	-1.483*** (0.041)	-1.479*** (0.041)	-1.479*** (0.041)	-1.499*** (0.041)	-1.554*** (0.041)
Observations	76,762	76,762	76,762	76,762	76,762	76,762	76,762	76,762	76,762
Pseudo R-squared	0.161	0.160	0.160	0.161	0.161	0.161	0.161	0.161	0.163

Table 2.9: **Heckman corrected relationship of financial knowledge with financial awareness and financial holding across the financial product segments.** This table reports the estimate of the coefficients corresponding to financial knowledge and related marginal effect in helping financial awareness and financial holding. The dependent variable in columns (1) and (2) is financial awareness of the product segments which takes value one if the respondent is aware of at least one product from that segment and zero otherwise. The model specification for columns (1) and (2) is in Equation 2.12. The dependent variable in columns (3) and (4) is the financial holding of the product segments which takes value one if the respondent owns at least one product from that segment conditional on awareness about at least one product from that segment, and zero otherwise. We use Heckman correction to deal with unobserved variable bias in estimating the relationship of financial knowledge with financial holding. Equation 2.13 presents the model specification for estimates in columns (3) and (4). In both models, we control for demographic characteristics of the respondents, namely, age, gender, caste, education, income, rural residency status, the geographic zone of residence, availability of banking correspondent in the neighborhood of respondent and bank branch density in the district of the respondent. The robust standard errors corresponding to the estimated coefficients are reported in parentheses. The stars \*\*\*, \*\* and \* denote level of significance at 1, 5 and 10 percent respectively.

Dependent variable:	Financial awareness		Financial holding	
	(1)	(2)	(3)	(4)
Product segments	$\beta_{FK}$	$ME_{FK}$	$\beta_{FK}$	$ME_{FK}$
Savings	0.530*** (0.05)	0.050*** (0.004)	0.642*** (0.035)	0.080*** (0.04)
Debt	0.679*** (0.029)	0.195*** (0.008)	0.966*** (0.057)	-0.063 (0.07)
Insurance	0.901*** (0.029)	0.254*** (0.008)	1.103*** (0.051)	0.025*** (0.09)
Pensions	0.358*** (0.026)	0.132*** (0.009)	0.063 (0.092)	-0.030 (0.025)
Capital markets	0.525*** (0.027)	0.168*** (0.009)	1.122*** (0.107)	0.045*** (0.088)

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# Unaware of Being Unaware and Financial Non-participation

## 3.1 Introduction

While explaining the financial non-participation, the second chapter of the dissertation examines the role of financial knowledge in helping financial awareness and next how the lack of financial awareness act as a barrier to financial participation. Taking a cue from the role of financial awareness in financial participation, this chapter attempts to characterize a conceptual framework modeling the acquisition of financial awareness. To do so, it considers two components of financial awareness, the first component which it considers as the endowed level of financial awareness, which is innate in nature, and in the framework of this chapter, we consider that this part of financial awareness cannot be altered using policy interventions such as schooling and financial literacy. While the second component of financial awareness is acquired by households as a result of financial training. This component of financial awareness can be altered using policy interventions such as schooling and financial literacy. The aim of the chapter is to extend the work in the first chapter where we explore how the lack of financial knowledge can impede financial awareness and hence, financial participation. As the second chapter considers the decision of product ownership is followed by the awareness about the financial product. Therefore, the financial awareness of the household is a required pre-condition for financial participation. Underscoring the crucial role of financial awareness in financial participation, this chapter examines theoretically and empirically how financial awareness as a policy intervention may charge the

level of financial participation at *ceteris paribus*.

Financial unawareness is an important barrier to financial participation, which is observed not just in the context of less developed markets for basic financial products such as savings accounts, but also among the developed markets with sophisticated financial products such as stocks and shares.<sup>1</sup> This chapter investigates the role of financial unawareness from the demand side, leading households to self-exclude themselves from owning financial products. In our approach, we model the demand-side of awareness where the acquisition of awareness is a choice for the household conditional on their physical endowments and ingrained neuroanatomy (cognitive ability). Our theoretical framework is empirically evaluated to study the extent to which unawareness presents itself as an important barrier to financial participation. The empirical investigation uses the large benchmark survey data of Indian households consisting of 76,762 respondents, with granular detail on their product awareness and ownership status for 28 financial products across 5 different product segments, namely savings, debt, insurance, pensions, and capital markets. This is the same survey which we use in Chapter 2 for empirical estimations. Therefore, we advise the reader to consult Section 2.2 of Chapter 2 for data and variable construction.

Following Guiso and Jappelli (2005), we define financial awareness as the cognitive ability to conceptualize and understand the possibility of the existence of financial products and services catering to one's present as well as future needs. In our model, we confer on a household both physical endowments and a level of financial cognition (referred as innate cogito), which relates to the intrinsic ability that makes one conscious enough to pay attention to one's financial situation, leading to a search for potential solutions. The notion of cognition stems from the 17<sup>th</sup> century French philosopher René Descartes, who coined the term, "cogito ergo sum" ("I think, therefore I am")." Cognition is based on the ability to, first, observe or pay attention to something; second, to question its existence; and finally, to act upon the findings. Thus, in our context, the model predicts that only when innate

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<sup>1</sup>For instance, Guiso and Jappelli (2005) finds that a significant fraction of Italian households were unaware of the existence of financial products such as stocks and mutual funds, and observes that lack of awareness can explain the non-participation observed in financial markets. Also, OECD (2017) reports large differences in awareness across the G20 countries. For example, in Indonesia, fewer than four in ten adults (37%) were aware of the existence of at least five different financial products. Similar evidence of financial unawareness is observed in the sample of Indian households we study in this chapter, wherein we observe that despite an increased effort by the Government of India to enhance financial inclusion, a sizable proportion of households do not participate in basic products – 28.61% of the total respondents in the survey do not own a savings bank account, of which 7.14% of the respondents were oblivious of the existence of savings bank accounts (see Table 2.4). The awareness of more advanced financial products is even lesser.

cogito is sufficiently high, the household will search for a financial solution to cater to their needs and this will lead to financial awareness. we acknowledge that innate cognition is a philosophical concept which nativists assert as the origin of our knowledge about the world (Beer, 1992; Samet and Zaitchik, 2017). This is the part of our knowledge independent of experience-based learning. In the context of the chapter, innate cogito presents the part of financial awareness (cognition) which is endowed in nature and remains unexplained by socioeconomic endowments of the household.

Thus, for a given financial product, a household can be aware or unaware. An aware household has an adequate level of information regarding the financial product to be able to make a conscious decision whether to own the financial product (i.e. make a *conscious participation* or *conscious non-participation choice*). An unaware household can be of two types. The first type is consciously unaware of the financial product, either because they are aware that they can possess information partially with their limited endowments, or because they choose to remain unaware since they believe that they will not be able to own the product even after being aware, due to their lower physical endowments. Such households make a conscious decision to exclude themselves from owning the product (a case of *conscious non-participation*). The second type is an unconsciously unaware household, who is oblivious to the existence of the financial product and cannot make a conscious decision whether to own the product (a case of *unconscious non-participation*).

To illustrate, consider two farmers A and B from a cyclone-prone district in Orissa, whose farm had been hit by cyclones several years in a row. We observe that farmer A had bought insurance against cyclone damage, but farmer B did not. Why? One obvious rational reason for this difference may be that farmer B is poorer (less endowed) than farmer A and therefore farmer B consciously decides not to buy the insurance product. Thus, the lack of participation by farmer B is conscious non-participation. Alternatively, farmer B may have physical (observable) endowments at the same level as that of farmer A, but farmer B is unaware of the existence of insurance products. This can arise if the farmer B has low innate cogito, when he or she will never be able to comprehend the need for financial solutions to reduce his or her plight due to the cyclone, never doubt the nonexistence of financial solutions, never search for any potential solutions, and therefore unconsciously will not participate in the insurance market. Under this scenario, even if farmer A and B have a similar level of physical endowments, farmer B, due to a lower innate cogito does not participate in the financial market. This will be a case of unconscious non-participation.

We extend the framework to the case where households can enhance their level of awareness through financial knowledge, which is acquired at a cost to their physical endowments thus making the choice of processing information structure endogenous. We refer to this as acquired cogito. Here, financial knowledge provides the households with attentiveness to their financial well-being needs. Although acquiring cogito reduces their level of physical endowments, it enables households to be further financially aware and empowers them to make a further informed (conscious) choice.

In the model, a household may choose to remain unaware and not acquire awareness if they believe that they will not be able to own a product even after being aware due to their lower physical endowments. Also, an aware household may choose not to hold a financial product if their physical endowments are too low. Both these cases lead to conscious non-participation.

In the empirical section, we take the unaware agents of the model to the data, with the following thought experiment. Consider a situation where the unaware households become aware (say, through policy interventions such as financial literacy programs) of the existence of a financial product. We ask the question: will such households necessarily hold the financial product that they are now aware of? In the thought experiment, we elicit the socio-economic characteristics of households and weigh the characteristics of unaware households by the same weights of the aware households, who have consciously decided whether to hold the product. We then predict the probability of product ownership of the unaware households, considering them as aware. The results show that the ownership distribution of the unaware households is strictly dominated by the aware households, for the case of all the 28 financial products across the five different product segments, namely, savings, debt, insurance, pensions, and capital markets. This demonstrates that unaware households, by and large, have lower demographic attributes as compared to the aware households. Therefore, the unaware households may have made the decision not to be aware of financial markets due to their lower endowment levels and may have deliberately chosen to remain unaware.

While this result is true at the population level, we find that there exists a sizable proportion of unaware households who have crossed the estimated minimum threshold required for financial participation but are not participating in financial markets. We identify such individual households as those with an estimated probability of participation higher in

terms of population observables such as gender, education, income, employment status, caste, and their rural residency status, after controlling for supply-side characteristics such as bank branch density and the presence of banking correspondents in the neighborhood. The results show that such unaware household groups are mostly from the scheduled tribe caste, based predominantly in rural areas, and have low proportions of banking correspondents in their neighborhood. Unequal awareness levels for various financial products are also observed across different zones in the country, with different product-specific discriminatory characteristics defining the unaware group. The thought experiment results can be used by the Government of India to formulate targeted policy responses for effectively raising financial awareness across the nation.

This chapter builds on the literature on unawareness and inattention. Unawareness has been studied in the context of uncertainty, where it has been argued unawareness is not a state as understood by a standard state-space (see Dekel et al., 1998). Thus, the choices made under unawareness are not the same as assigning probability zero to the event (see Li, 2009). This strand of literature differs from Guiso and Jappelli (2005), where agents buy financial instruments based on the signals received from sellers to increase awareness. However, in our case, the financial cognition of respondents depends upon their physical endowments. The literature on inattention argues that lack of awareness is due to inattention (Gabaix, 2019). Here, the possible case of non-processing of signals makes the ownership probability zero. In this chapter, we employ the idea of partial (un)awareness (Li, 2008) due to inattention (Gabaix, 2019) and propose that agents, by investing part of their endowments (time, money), can learn about the state of nature (good or bad) and also be aware of the existence of financial instruments to leverage or insure against such states.

The remainder of the chapter is organized as follows. In Section 3.2, we introduce the theoretical framework for financial awareness and financial inclusion. Following this, Sections 3.3 to 3.5 present the empirical results of the various econometric analyses. Finally, we conclude in Section 4.4.

## 3.2 A framework for financial participation

In this section, we provide a theoretical motivation to understand financial market participation and the role that financial awareness plays in financial ownership decision-making. The model we use is based on Leland (1978) two-period consumer saving model where household saves in period one anticipating the income uncertainties in the second period. Let's consider a household who lives for two periods  $t = 0, 1$ . Each household ( $n$ ) has a profile which consists of a utility function ( $u$ ) at each period such that:

$$u(x) = 1 - \exp(-\lambda_n x),$$

where  $\lambda_n$  is the value of constant risk aversion for the household  $n$ . Households are also endowed with a sequence of physical endowments  $X_n = (X_{b,n}, X_{g,n})$  such that the household receives  $X_{b,n}$  in *bad* state  $b$  with probability  $\pi_n$ , and with probability  $1 - \pi_n$ , they receive  $X_{g,n}$  in the good state  $g$ . Without loss of generality, assume  $X_{b,n} < X_{g,n}$  and the probability of the bad state is given by  $\pi_n \simeq F(\pi)$ .

The household  $n$  is also 'born-with' a level of *innate cogito*  $\Delta_n^e \in (0, 1]$ , where 0 denotes complete lack of financial cogito, and 1 complete financial cogito. The financial cogito denotes the degree of financial comprehension related to their financial future, by generating awareness about their future financial risk and corresponding risk mitigation alternatives. In related literature, awareness of the states of nature by decision-makers under uncertainty has been studied by Li (2009) and Heinsalu (2014). In connection with this literature of awareness,  $\Delta_n$  less than one represents a form of partial financial cogito, where households are not fully aware of the costs and benefits associated with their product-holding. This has also been called rational inattentiveness by Sims (2003), how it impedes information processing. Gabaix (2019) provides an excellent review of state of the literature on inattention.

We analyze and clarify the idea of *innate cogito* and its relation to awareness in the next section by considering the case of an insurance product where the household is not aware of the benefits of the insurance scheme.

## Cognition to awareness

We model an economy serviced by a financial product provider (Bank), who sells a product in the first period at a cost of Indian rupee (₹) 1 and the product provides a benefit of ₹ $B$  in the next period. Let a household  $n$  be endowed with innate financial cognition of  $\Delta_n^e$  and physical endowment  $X_n = (X_{g,n}, X_{b,n})$ , where the household receives  $X_{g,n}$  during good times and  $X_{b,n}$  when times are bad, i.e.,  $X_{g,n} > X_{b,n}$ . The household  $n$  buys  $y$  units of insurance when times are good ( $g$ ) and subsequently gets paid  $By$  when the times are bad ( $b$ ). We further assume that the household's decision of investing in acquiring financial cogito is independent of the investment in an insurance product. Based on their level of financial cogito  $\Delta_n$  which is the sum of their innate and acquired financial cogito  $\Delta_n = \Delta_n^e + \Delta_n^a$ , they perceive a benefit of  $\Delta_n By$  in bad times ( $b$ ). Thus, their perceived utility is given by:

$$V(y; \Delta_n, X_n) = u(X_{g,n} - y) + [\pi_n u(X_{b,n} + \Delta_n By) + (1 - \pi_n)u(X_{g,n})]. \quad (3.1)$$

If the perceived marginal benefit is greater than the marginal cost of the financial product, then the household buys the product, implying the marginal benefit of holding the product is:

$$V'(y; \Delta_n, X_n) = -u'(X_{g,n} - y) + \pi_n \Delta_n B u'(X_{b,n} + \Delta_n By). \quad (3.2)$$

Note that as  $\Delta_n \rightarrow 0$ , the marginal benefit becomes negative. Therefore, there exists a minimum threshold for cogito,

$$\underline{\Delta}_n(X_n) > 0, \quad (3.3)$$

below which the household will not hold the financial product, i.e.  $y = 0$ . We notice that the threshold is not only household-specific, but also specific to the financial product.

So, the household becomes *aware* when his partial financial cogito exceeds the cogito threshold, i.e.  $I(\Delta_n > \underline{\Delta}_n(X_n)) = 1$ . Therefore, the probability of the household becoming aware is given by  $q_n = \Pr(\Delta_n > \underline{\Delta}_n(X_n))$ . Following the same characterization, the household will remain unaware when their partial financial cognition remains below the cogito threshold and we term such a case of non-participation as *unconscious non-participation*. Thus, the probability of unconscious non-participation of a household is  $1 - q_n$ .

### Acquiring cogito to become aware

Suppose the level of *innate cogito*  $\Delta_n^e$  is low. In such a situation, the households can also acquire cogito at a unit cost  $c$  (in terms of time and effort). As a result, the household spends  $c\Delta_n^a$  to acquire additional cogito regarding the product which they are going to buy, and hence the total cogito level of the household is  $\Delta_n = \Delta_n^e + \Delta_n^a$ . Using the two components of cogito, the utility of household  $n$  can be written as:

$$V(y, \Delta_n; X_n, c) = u(X_{g,n} - c\Delta_n^a - y) + [\pi_n u(X_{b,n} + \Delta_n B y) + (1 - \pi_n)u(X_{g,n})]. \quad (3.4)$$

The households choose to acquire the optimal level of acquired cogito  $\Delta_n^a$ , by solving for the first order conditions as before and we get

$$u'(X_{g,n} - c\Delta_n^a - y) = \pi_n \Delta_n B u'(X_{b,n} + \Delta_n B y),$$

which gives us the optimal level of *acquired cogito* as  $\Delta^a(X_n)$  and thus the total cognition level is given by  $\Delta^a(X_n) + \Delta_n^e$ .

Using Topkis theorem, we obtain:

$$\begin{aligned} \text{sign}\left(\frac{\partial \Delta_n^a}{\partial X_{g,n}}\right) &= \text{sign}\left(\frac{\partial^2 V(y, \Delta_n^a; X_n, c)}{\partial X_{g,n} \partial \Delta_n^a}\right) > 0 \\ \text{and } \text{sign}\left(\frac{\partial \Delta_n^a}{\partial c}\right) &= \text{sign}\left(\frac{\partial^2 V(y, \Delta_n^a; X_n, c)}{\partial \rho \partial \Delta_n^a}\right) < 0. \end{aligned}$$

It implies that increasing physical endowment in the good state will increase the level of acquired cogito. When the optimal level of total awareness  $\Delta_n^* = \Delta_n^a(X_n) + \Delta_n^e$  falls below  $\underline{\Delta}_n(X_n)$  (as in Equation 3.3), the household makes a choice not to acquire any additional cogito, thus choose not to participate in financial market due to lack of sufficient awareness.

So, not only does innate cogito, but also the demographic characteristics, have an important effect on the probability of their financial participation. In other words, the acquired financial cogito necessary for financial participation  $\Delta_n^a = \Delta_n^* - \Delta_n^e(X_n)$  which is inversely related the level of their innate cogito. Thus, the model demonstrates that when the cost of acquiring cogito (say, cost of financial knowledge) increases and the level of innate cogito is low, as a result the total cogito  $\Delta_n$  fall below the threshold  $\Delta_n^*$ . In this condition, the household do not participate in financial market because of insufficient total cogito and we term such non-participation as unconscious non-participation.

### 3.2.1 Conscious non-participation

As discussed before, when the cogito of the household is above the minimum threshold  $\Delta_n^*$ , the household makes a conscious decision regarding the ownership of the product by optimizing their utility function. The first order condition to calculate the optimal cogito is given by:

$$u'(X_{g,n} - c\Delta_n^e - y) = \pi_n \Delta_n B u'(X_{b,n} + \Delta_n^* B y).$$

Solving we get:

$$y = \frac{\log(\pi_n \Delta_n^* B)}{\lambda(1 + \Delta_n^* B)} + \frac{(X_{g,n} - X_{b,n}) - \rho(\Delta_n^* - \Delta_n^e)}{(1 + \Delta_n^* B)}. \quad (3.5)$$

It is easy to see, if the probability of the bad state  $n$  decreases or the endowment differences for  $(X_{g,n} - X_{b,n})$  decreases then  $y$ , the amount of the product holding decreases as well. In other words, when the probability of realization of the bad state is low, as well as the households, are indifferent about the endowments in the good and bad state, they do not need the insurance. This is purely an endowment effect and the household makes a rational decision of conscious non-participation simply because the offered product does not adequately address their financial requirement. Also, it is noticeable that the indirect effect of the cost of acquiring cogito decreases with the amount of product holding. Therefore, households with lower innate cogito and/or lower physical endowment may not participate in the financial market. The non-participation of households is a conscious decision hence we term such non-participation as unconscious non-participation

The above framework illustrates the two possible cases of non-participation namely, conscious and unconscious non-participation. In the case of the unconscious non-participation, the total cogito level of the household remains below the threshold, which in turn discourages the financial searching for the insurance product, leading to the non-participation in the financial market. In the case of conscious non-participation, the households choose not to participate in the financial market despite being aware of the existence of financial products addressing their financial requirement.

There is extant literature that highlights the constraints of financial non-participation, such as affordability and (endowment effect, decreasing  $X_{g,n}$  reduces  $y$ ), lack of trust (Georgarakos and Pasini, 2011; Balloch et al., 2015), and product complexity (Carbo et al.,

2007; Cole et al., 2011; Bönnte and Filipiak, 2012) from the demand side and outreach (Beck et al., 2007), lack of timeliness (bureaucratic delays) from the supply side. Such constraints can act as noticeable impediments of financial participation alongside the channels of cogito described in the above framework for financial participation.

Although this analysis is performed in the context of an insurance product catering to the lack of cogito regarding the cost and benefits of the product, the analytical framework can be easily extended to other financial product types and a variety of cogito failures in households.

### 3.3 Empirically estimating innate and acquired cogito for financial products

The theoretical model in Section 3.2 predicts households with lower innate cogito and/or lower physical endowment may not participate in the financial market, consciously or unconsciously. We propose an empirical model of financial awareness to elicit latent cogito. We classify the latent cogito into innate and acquired cogito. The acquired cogito is attained by a household in accordance with their observable endowments, which includes their demographic attributes namely, age, gender, and caste, and their attained qualities, namely academic achievement, employment, and income. On the other hand, the latent innate cogito of a household refers to the human neuroanatomy and reflects their inner ability to question predetermined notions and employ their deductive logic to seek a possible explanation for intriguing observations.

In the data, we observe households  $n = 1, \dots, N$  and their dichotomous response related to awareness of Indian financial products, say  $i = 1, \dots, 28$ . Therefore, following our discussion on the theoretical model, let  $\Delta_{i,n}$  be the latent cogito level of household  $n$  for the product  $i$  be normally distributed, and let  $\underline{\Delta}_i$  be the threshold of awareness for product  $i$ .

We say a household  $n$  is aware of financial product  $i$  when his level of financial awareness is greater than the minimum level of awareness required for the financial product  $i$ , i.e.  $FA_{i,n} = I(\Delta_{i,n} > \underline{\Delta}_i^*)$  where,  $FA_{i,n}$  is the financial awareness indicator function related to the financial product  $i$  for respondent  $n$ , taking the value one if the respondent  $n$  is

aware of financial product  $i$ , and zero otherwise. We estimate the probit regression,

$$\hat{q}_{i,n} = \Pr(\Delta_{i,n} \geq \underline{\Delta}_i) = \Phi(\hat{\delta}_i x_n), \quad (3.6)$$

The variable  $x_n$  captures the demographic attributes of the respondent, namely age, gender, social status, academic achievement, employment, income, rural residency status and zone of residence and also supply-side attributes such as the level of financial access, by the number of bank branches per thousand households in the respondent's district of respondent and the availability of banking correspondents in their neighborhood.

Therefore, using the prediction of the model in Equation (3.6), we obtain acquired cogito as:

$$\hat{\Delta}_{i,n}^a = \Phi^{-1}(\hat{\delta}_i x_n), \quad (3.7)$$

which is explained by the demographic characteristics of the households. Recall  $\Delta_{i,n} = \hat{\Delta}_{i,n}^a + \Delta_{i,n}^e$ , thus the estimates of residuals  $\Delta_{i,n}^e$  in probit regression (3.6) explain part of financial cogito that is not explained by the demographic attributes, i.e. *innate cogito*.

Notice that the distribution of classical residuals, which is the difference between the latent awareness  $FA_{i,n}$  and the corresponding fitted probabilities  $\hat{q}_{i,n}$  will not be able to retrieve  $\hat{\Delta}_{i,n}^e = \Delta_{i,n} - \hat{\Delta}_{i,n}^a$ , the *innate cogito*. Therefore, following Albert and Chib (1995), we consider the posterior distribution of residuals conditional on the observed event of awareness, to characterize the estimate  $\Delta_{i,n}^e$ . The resultant *innate cogito* is the posterior residual in the probit regression, following a continuous truncated standard normal distribution. The shape of this distribution depends upon the linear predictor of *acquired cogito* and the latent *total cogito*. We characterize the expectation of posterior distribution residuals in the probit regression as *innate cogito*,

$$\hat{\Delta}_{i,n}^e = E(\varepsilon_{i,n} | FA_{i,n}, \hat{\delta}_i). \quad (3.8)$$

where  $\varepsilon_{i,n}$  is the error term from the probit regression. Using the results of Albert and Chib (1995) (see p. 750 onwards) and using the above expression, we can calculate the mean and the variance of *innate cogito* and *acquired cogito*.

Table 3.1 reports the estimated average innate and acquired cogito corresponding to 28 financial products in the survey, while Figure 3.1 plots these products into the space of *innate cogito* and *acquired cogito*. The plot shows that the innate cogito related to 24 financial products is higher than the corresponding acquired cogito. It shows a significant

part of the cogito of financial products is not explained by the observed household characteristics. However, in the case of basic financial products namely, savings account, life insurance, motor insurance, and other bank loans, a significant part of cogito is explained by the household characteristics. In the awareness of these financial products, the role of acquired cogito exceeds the innate cogito. Moreover, the overall level of cogito of complex financial products is low, hence we find that complex products such as specialized insurance and future products lie closer to the origin in the plot.

### 3.4 Awareness and portfolio choice decisions

In this section, we explore the portfolio choice by aware households and predict the choices of unaware individuals using a thought experiment.

#### 3.4.1 Financial participation of unaware households: A thought experiment

Suppose that through some policy intervention all the unaware households become aware, will it change their status of financial holding? To elucidate the above point, we explore how many of these financially unaware households will participate in financial markets if they become financially aware. We also investigate whether their status of unawareness is related to their demographic attributes, making them less likely to be aware of the financial products they do not need?

Consider a “ $\Delta$ -aware” originally aware household whose level of awareness lies above the threshold  $\Delta_n^{aw} > \Delta(X_n)$ . Similarly, there is another “ $\Delta$ -unaware” originally unaware household with endowments such that the threshold  $\Delta_n^{un} < \Delta(X_n)$ . Further, we consider whether the aware household has a demand for financial product  $y$ . As a result, the “ $\Delta$ -unaware” household by definition will not participate in the financial market, unconsciously because the household has an insufficient level of financial awareness.

Next, think of a policy intervention that moves the level of awareness of the unaware household  $\Delta_n^{un}$  to the same level of awareness of  $\Delta_n^{aw}$ , either through financial knowledge or ensuring financial access through supply-side intervention such as bank branches and

banking correspondents. Then, the demand for financial products for both aware and unaware households would be the same as if the demographic characteristics are the same.

Therefore, the estimated probability of financial participation of an aware household is  $\hat{p}^{aw} = \Phi(\hat{\beta}x_{aw})$ , where  $\hat{\beta}_i$  are the characteristic weights. To demonstrate the impact of policy intervention, we consider  $\hat{p}^{aw} = \Phi(\hat{\beta}x_{aw})$  is the estimated probability of participation of an aware household.

We further consider an aware and an unaware household with the same demographic characteristics  $x_{aw}$  and  $x_{un}$ , respectively, such that  $x_{aw} \equiv x_{un}$ . If we make the unaware households aware through policy intervention, the probability of financial participation of originally unaware households will be the same as the probability of financial participation of aware households. Thus, under the null hypothesis that awareness plays no role in financial participation, the distribution of financial participation ( $F_{un}$ ) of unaware households should be the same as the distribution of financial participation ( $F_{aw}$ ) of aware households. Alternatively, if aware and unaware households have different demographics characteristics, i.e.  $\beta x_{aw} > \beta x_{un}$ , this means  $F_{aw}$  stochastically dominates the  $F_{un}$ . This would imply that awareness of the unaware might not help in financial participation given that the unaware households have weaker demographic characteristics than aware households.

#### **Implementation algorithm**

We consider a simplified EM algorithm following Dempster et al. (1977) to find the distribution of inclusion by the aware and unaware households.

- 1) Consider the households who are aware of the product and estimate the:

$$\Pr(\text{Own}_{i,n}|x_n, FA_{i,n} = 1) = p_{i,n}^{(aw)} = \Phi(\beta_i^{aw} x_n), \quad (3.9)$$

where  $\text{Own}_{i,n} = 1$  if the respondent  $n$  owns product  $i$ , and zero otherwise.

- 2) Estimate the propensity  $\hat{p}^{aw}$  of financial participation for aware households. Let  $F_{aw}$  be the distribution of financial participation probabilities of the aware households.
- 3) Using the model generated from 2) predict the event of financial participation for unaware households as if they were aware.
- 4) We define an unaware household  $n$  as pseudo-participating in the financial market if  $\hat{p}_n^{un} > \hat{p}_{(0.7)}^{aw}$ , where  $\hat{p}_{(0.7)}^{aw}$  is the 70<sup>th</sup> percentile for the probability of financial

participation of the aware households, obtained from  $F_{aw}$ .<sup>2</sup> We indicate pseudo-participated households by the indicator function  $I_n^p \left( \hat{p}_n^{un} > \hat{p}_{(0.7)}^{aw} \right)$ .

- 5) Estimate the propensity of financial participation using all the households, including the aware as well the unaware households, using the binary dependent variable defined in 4.
- 6) Perform tasks 2, 3, and 4 until the estimates converge.
- 7) Then considering the probability of financial participation between the original aware and unaware households, find the empirical distributions  $F_{aw}$  and  $F_{un}$ .

To test the difference in the empirical distribution of the probability of financial participation between aware and unaware households formally, we perform a one-sided Kolmogorov-Smirnov (K-S) test. Under the null hypothesis, we test whether the distributions of the empirical probability of financial participation is the same for aware and unaware households. To show the difference in inclusion probabilities of the aware and unaware, we also calculate the Kulback-Leibler (K-L) divergence measure using a bootstrapped-sample of the probability of financial participation of aware and unaware households. We interpret the K-L divergence as a measure of the “mutual information” difference between the aware and unaware households.

We report the median probability of financial participation for aware and unaware households along with K-S test statistics and K-L divergence between the distribution of the probability of financial participation of aware and unaware households in Table 3.2. The results from the K-S test show that the probability of financial participation of the aware households dominates the financial participation probability of the unaware households, across the 28 financial products, at the 1% level of significance.

To visualize the relative empirical distribution of the probability of financial participation between originally aware and originally unaware households, we create a comparative box-plot for the probability of financial participation corresponding to 28 financial products in Figure 3.2. The figure shows that the quantiles of the probability of financial participation for aware households are greater than the quantiles of the probability of financial participa-

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<sup>2</sup>For robustness, we also consider the 50<sup>th</sup> and the 60<sup>th</sup> percentiles as the cut-off levels, above which households are classified as pseudo-included. The results for these alternative cut-offs levels are reported in Appendix E. We observe a very similar pattern in terms of household characteristics.

tion of unaware households. The relative difference between the quantiles of the probability of financial participation gets wider with the sophistication of financial products.

The lower cost of awareness related to basic financial products such as savings bank accounts can lead to the awareness of even households with weaker demographic characteristics. For instance, the boxplot corresponding to the savings product shows a thick lower quantile whisker. Thick lower quantile whiskers indicate that there exist some households who are fully aware of a savings bank account, but their predicted probability of owning a savings bank account is relatively small as compared to other aware households. In other words, a strong supply-side push can bring the households with considerably lower endowments into the banking framework.

The product-level boxplots also indicate an endowment gap between aware and unaware households, which keeps them away from the financial market despite receiving the treatment of awareness. Further, unawareness as an impediment for financial participation is more prominent in the case of complex financial products such as the national savings certificate, where the upper quantile whiskers in the boxplot of unaware households are relatively thicker. The thicker whiskers imply the existence of households that are demographically equivalent to their peers who are already participating in the financial markets, but not participating due to insufficient awareness. To sum up, the thought experiment shows that awareness can raise the level of financial participation among unaware households; however, their participation is constrained by their physical endowments as well as their innate cogito. Our findings remain consistent over the other product segments, namely, debt, insurance, pensions, and capital market products.

### **3.4.2 Pseudo-participation of respondents and their demographic characteristics**

In this section, we explore how the financially unaware households that can potentially participate in the financial market after acquiring sufficient cogito are different from their peers who are originally aware as well as participating in the financial markets. To study these differences we consider all the five product segments, namely, savings, debt, insurance, pensions, and capital markets. We consider the household to be participating in a given financial product segment if the respondent is aware of the existence of at least one product from the segment and consciously chooses to own that product.

Table 3.3 reports in descending order the percentage differences in the average characteristics between the two groups. In particular, for a given household characteristic, the percentage difference is calculated as the average of the pseudo-participating households minus the average of the participating households divided by the average of the pseudo-participating households. We sort the average characteristics in descending order of the percentage differences in order to highlight the predominant household characteristics that characterizes the unaware and pseudo-participating households as compared to the aware and financial participating household. We report the average demographic characteristics of households for different cut-off levels in Appendix E.

For savings products, we observe that the pseudo-participated households are predominantly from the scheduled tribe caste and from the North East and the South as compared to the aware and participated households, with average differences of 53%, 38%, and 23%, respectively. The other administrative zones and castes show greater awareness and financial participation in comparison to the unaware households. Strikingly, the pseudo-included have 1641% less access to banking correspondents than the aware and participating households. This result suggests access to banking correspondents as one of the significant differentiating factors for financial participation in savings products between the aware and the unaware. In terms of demographic profile differences, we observe that the pseudo-participated households have a higher average of innate and acquired cogito as compared to the aware and participating households. Also, the pseudo-participated households have 16.48% more income on average, they are older in age and more educated.

When considering the debt market products, the scheduled tribe is ranked as the number one characteristic differentiating the pseudo-participated from the aware and participating households. We observe that a greater proportion of aware and participating households, as compared to the pseudo-participating households, reside in the North and the West, with the inverse true for all other zones. The East zone has 40.13% more pseudo-participating households and is ranked as the second-highest discriminatory characteristic. Further, a high average percentage difference is observed for rural areas and those with higher access to banking correspondents. This result indicates that banking correspondents could be employed in raising awareness of debt products in their local areas. The aware and participating households are also observed to have a 25.75% greater number of banking correspondents on average as compared to the unaware and pseudo-participating households.

For insurance market products, we observe that the pseudo-participating households have on average 65.59% more banking correspondents in their neighborhood as compared to the aware and participating households, and the pseudo-participating households are more prevalent in the rural areas. In contrast, the concentration of the aware and participating households is observed predominantly in the North-East and the East zones, with the reverse observed for the South. In the case of financial participation in insurance products, unlike other products, caste is not observed to be a strong discriminator.

For the probability of participation in pension products, a greater proportion of pseudo-participated households are observed to be from the scheduled tribe (46.96%) and the South and North-East zones. The reverse is true for the other zones, with more aware and participating households observed in the North and the Central zone.

When we consider the capital market products, we observe that belonging to the scheduled tribe caste and access to banking correspondents discriminate significantly between the pseudo-participating and actually participating respondents. Innate cogito is observed to be the weakest differentiating characteristics between aware and participating, and unaware and pseudo-participating households.

Overall, we observe some clear patterns in the results across various product segments. First, the unaware households with a higher pseudo-participation probability are observed to be from the scheduled tribes and belonging to rural pockets of India. Second, access to banking correspondents plays a prominent role for financial participation among aware households for savings products and is also an important discriminatory factor that explains pseudo-participation. Table 2.2 shows states with a lower bank density also have a lower number of banking correspondents. Therefore, policymakers need to focus on the states with a lower density of bank branches and employ more banking correspondents to facilitate financial access in those states. Also they can empower and provide the necessary training to the existing banking correspondents to raise awareness about not just savings products, but also products from the other product markets. Third, there is a clear discriminatory divide observed across the various zones in the country, showing that there is unequal financial awareness across the country. Fourth, gender turns out a key differentiator in the case of insurance and pension products. The policymakers should leverage the women focused government and non-government and help them to become more informed about the availability of financial products in the market. Empowering women can help

the financial future of families. Fifth, a one-size-fits-all policy approach to raising awareness and financial participation will be ineffective, as the findings suggest that there exist different discriminatory factors influencing the pseudo-participation of households across different product segments. Thus, in designing interventions to raise awareness and financial participation, the discriminatory results above can be used by policymakers to devise targeted interventions.

### **3.5 Reasons of non-participation in financial markets**

In this section, we discuss the reasons for non-participation reported by aware survey respondents. Table 3.4 reports the summary statistics of the reasons behind the non-participation of aware respondents for five product segments, namely savings, debt, insurance, pensions, and capital markets. For the product segments savings and debt, the survey captures the reasons for non-participation jointly. To understand the reasons behind the financial non-participation of financially aware households, the survey asks respondents to choose from multiple options characterizing potential reasons behind non-participation corresponding to five financial product segments. The detailed question and mapping of the reasons in ten broad categories are tabulated in Appendix F. Across the product segments, the survey shows that affordability is the prime reason behind non-participation of aware respondents. The non-participation of aware respondents is in-line with the condition of conscious non-participation, which shows that households with lower endowments chose to remain away from financial markets because the offered product is not the suitable product for their financial requirements. The aware respondents cite affordability as a reason for not participating in various product segments, with 52.32%, 52.32%, 49.61%, 31.21%, and 29.00% of respondents giving this reason for not participating in savings and debt, insurance, pensions, and capital markets, respectively. Summary statistics show choice as the first or second most prominent reason behind non-participation, which highlights the lack of sufficient awareness about the consequence of non-participation among Indian households. Specifically, 46.23% of aware respondents do not participate in the pensions market by choice. Interestingly, census 2011 data shows that 86.6% of Indian households have three or more members (see Dommaraju, 2015, Table 1) in their family. Therefore, several respondents have also indicated that they are dependent on kinship support for their retirement maintenance.

The summary results show that the lack of sufficient financial knowledge is the prime reason behind the non-participation of aware respondents from capital markets, with approximately 37.44% of aware respondents not participating in the capital markets as a result of poor financial knowledge. Further, 20.84% of aware respondents do not participate in the pensions product segment due to lack of financial knowledge. In the context of insurance products, 16.90% of aware respondents do not participate due to a lack of financial knowledge. Unfortunately, the survey does not offer the choice to choose financial knowledge as a reason behind non-participation from the savings and debt product segment.

Trust in general is not an issue for the basic product segments, namely savings and debt, as only less than 1% of respondents are not participating in these two product segments due to lack of trust. In the case of insurance, 3.74% of respondents report that they are not participating due to lack of trust. However, in the case of capital markets, a sizeable 11.13% of aware respondents do not participate due to lack of trust. Other marginal reasons behind financial non-participation are accessibility, complexity, religious beliefs, and low returns on investment. For savings and debt products, 30.37% of respondents have indicated miscellaneous reasons behind non-participation which we capture in the others category. Therefore, the summary results show that affordability, choice, and financial knowledge are the top three reasons behind the non-participation of aware respondents from various financial product segments.

## **3.6 Conclusion**

Lack of awareness of the existence of financial products inevitably leads to financial non-participation. We observe high levels of unawareness among Indian households for 28 financial products from different product segments, including savings, debt, insurance, pensions, and capital markets. In this chapter, we study household unawareness both theoretically and empirically. We provide a theoretical framework for awareness, where a household's financial cognition enables them to be attentive enough to be aware of the existence of financial products and awareness will, in turn, empower households to make informed choices on whether to hold a financial product. In the theoretical model, households are endowed with innate cogito, which is the inborn ability to understand finance,

and households can also gain acquired cogito at a cost, by investing their physical endowments to obtain knowledge about finance. Thus a household's financial awareness is a function of their innate cogito and acquired cogito. We show that financial unawareness can lead to financial non-participation of two types, namely conscious non-participation, and unconscious non-participation. Conscious non-participation occurs when a household is sufficiently aware of the costs and benefits of the financial product and consciously chooses to not hold the financial product. Unconscious non-participation occurs when a household lacks the necessary awareness of the financial product and hence does not participate in the financial market. We show that when the endowment levels are low, households may choose not to acquire additional awareness and do not participate in financial markets, as they know that being aware will not make them hold the financial product due to lower endowments.

Using the financial product awareness and ownership information from the national benchmark survey of 76,762 Indian households, we test the predictions of the model. Comparing the aware and unaware households, we find that unaware households have weaker demographic characteristics than the aware households. The gap in awareness grows with the sophistication in the financial product. To understand the role of awareness for financial participation, we perform a thought experiment by treating unaware households with awareness, whilst keeping their demographic attributes constant. The evidence from the experiment reveals that the treatment of awareness enables households in financial participation; however, across the various financial products, their financial participation is always dominated by that of aware households. Comparing the demographic attributes of aware and participating households to that of the unaware non-participating households, we find that financial access, such as the presence of a banking correspondent in the neighborhood plays an important role for financial participation. Also, lowering the cost of acquisition of financial awareness and a targeted approach to raise awareness of specific types of financial products in specific districts can further help bridge the product ownership gaps. Besides awareness, affordability, choice due to lower endowments, and financial knowledge are observed to be important reasons for financial non-participation among financially aware households. The results have important implications for a public policy aiming to raise financial awareness and financial participation, particularly in light of the 2030 UN agenda for sustainable development.

## 3.7 Figures

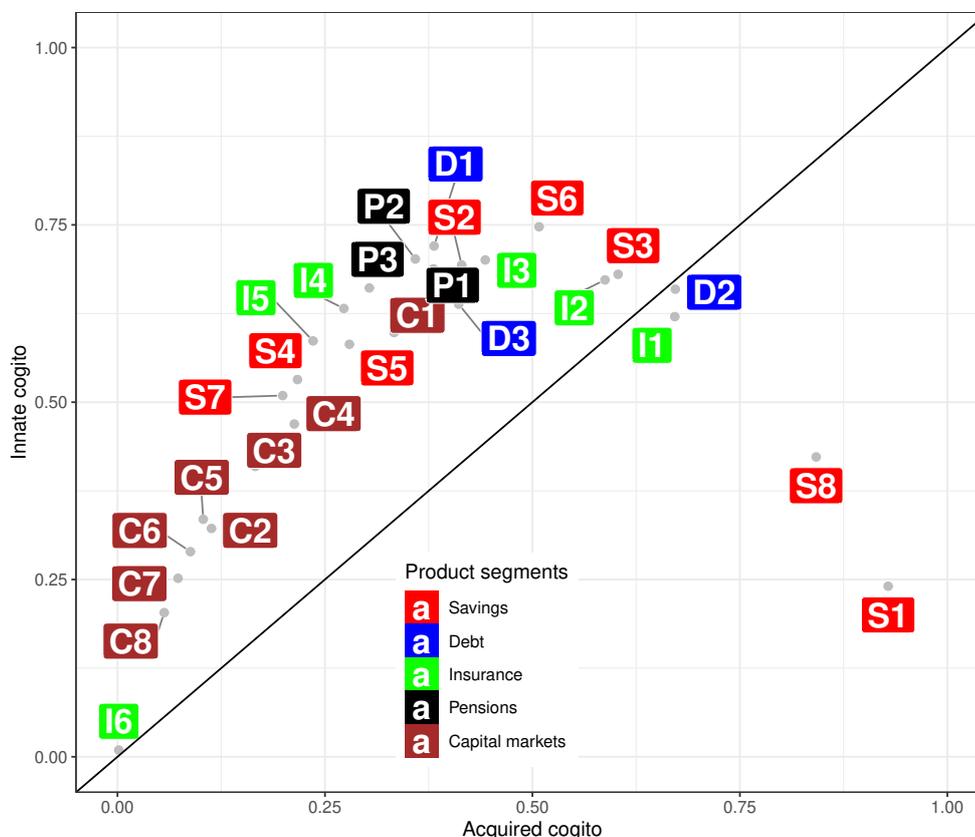


Figure 3.1: **Innate and acquired cogito of Indian financial products.** This figure plots 28 Indian financial products in the space of innate and acquired cogito. The x-component of the dot corresponding to the financial product presents the estimated average acquired cogito, while the y-component presents the estimated average innate cogito. The background colour of text-boxes presents the product segments corresponding to the financial product. In the awareness of financial products where innate cogito plays a role over and above the acquired cogito of the households lies above the 45° line and vice versa. The acquired cogito of financial products has been calculated using Equation 3.7 and innate cogito using Equation 3.8. The list of products are given below and the corresponding estimates are tabulated in Table 3.1.

Product list		
<p><span style="color: brown;">■</span> <b>Savings</b></p> <p>S1 Savings bank account/ No frill account</p> <p>S2 Recurring deposit</p> <p>S3 Fixed deposit</p> <p>S4 Overdraft facility</p> <p>S5 Public provident fund</p> <p>S6 Post office savings scheme</p> <p>S7 National savings certificate/ Kisan vikas patra</p> <p>S8 Life insurance</p>	<p><span style="color: green;">■</span> <b>Insurance</b></p> <p>I1 Motor insurance</p> <p>I2 Health insurance</p> <p>I3 Home insurance</p> <p>I4 Crop insurance</p> <p>I5 Cattle/Livestock insurance</p> <p>I6 Specialized insurance</p>	<p><span style="color: red;">■</span> <b>Capital markets</b></p> <p>C1 Shares/Stocks</p> <p>C2 Initial public offering (IPO)</p> <p>C3 Bonds/Debentures</p> <p>C4 Mutual fund</p> <p>C5 Agri futures</p> <p>C6 Bullion futures</p> <p>C7 Metal futures</p> <p>C8 Energy futures</p>
<p><span style="color: blue;">■</span> <b>Debt</b></p> <p>D1 Government subsidized debt scheme</p> <p>D2 Other bank loans</p> <p>D3 Credit card</p>	<p><span style="color: black;">■</span> <b>Pensions</b></p> <p>P1 Employee provident fund (EPF)</p> <p>P2 National pension scheme (NPS)</p> <p>P3 Family/ Employee pension scheme</p>	

3.7. Figures

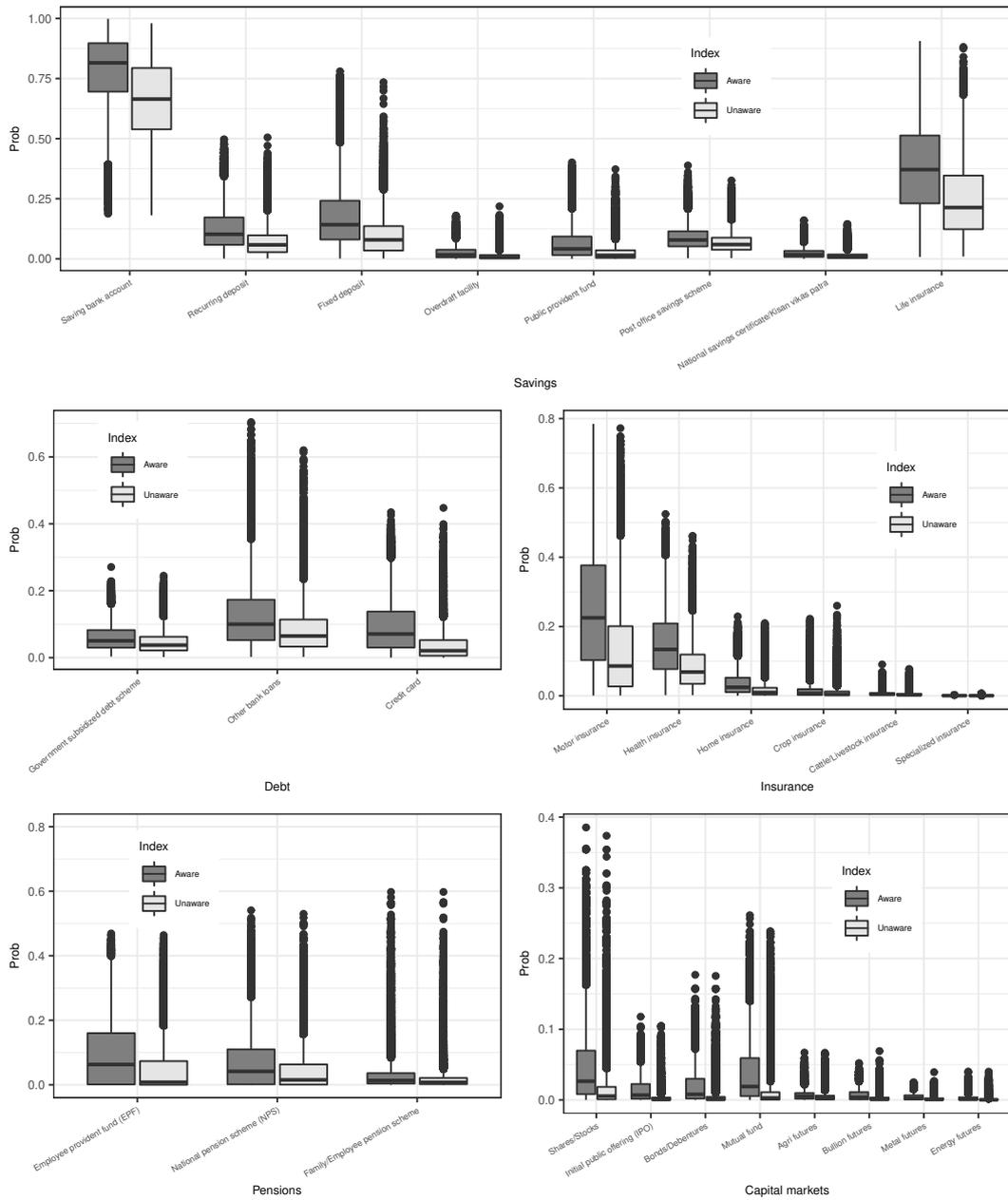


Figure 3.2: **Comparative boxplots of financial participation probabilities between aware and unaware households.** This figure plots the comparative boxplots of financial participation probabilities between aware and unaware households corresponding to five product segments. In the pair of boxplots, grey corresponds to aware households, while the watercolour corresponds to the unaware households. The y-axis presents the predicted financial participation probability using the convergent model in Section 3.4.1. The labels on the x-axis report the financial product related to the pair of boxplots.

### 3.8 Tables

Table 3.1: **Average acquired and innate cogito of Indian financial products.** This table reports the average acquired and innate cogito corresponding to 28 financial products. The first two columns report the product name corresponding product segment. The acquired cogito of financial products has been calculated using Equation 3.7 and innate cogito using Equation 3.8. All values appearing in the table are rounded up to three places of decimal.

	Product segment	Acquired cogito	Innate cogito
Savings bank account/ No frill account	Savings	0.929	0.241
Recurring deposit	Savings	0.415	0.694
Fixed deposit	Savings	0.603	0.680
Overdraft facility	Savings	0.217	0.532
Public provident fund	Savings	0.279	0.582
Post office savings scheme	Savings	0.508	0.747
National savings certificate/ Kisan vikas patra	Savings	0.199	0.509
Life insurance	Savings	0.842	0.423
Government subsidized debt scheme	Debt	0.381	0.720
Other bank loans	Debt	0.672	0.659
Credit card	Debt	0.411	0.638
Motor insurance	Insurance	0.672	0.621
Health insurance	Insurance	0.587	0.672
Home insurance	Insurance	0.443	0.701
Crop insurance	Insurance	0.273	0.632
Cattle/ Livestock insurance	Insurance	0.236	0.586
Specialized insurance	Insurance	0.002	0.010
Employee provident fund (EPF)	Pensions	0.381	0.688
National pension scheme (NPS)	Pensions	0.359	0.702
Family/Employee pension scheme	Pensions	0.303	0.661
Shares/ Stocks	Capital markets	0.333	0.598
Initial public offering (IPO)	Capital markets	0.113	0.322
Bonds/ Debentures	Capital markets	0.166	0.409
Mutual funds	Capital markets	0.213	0.469
Agri futures	Capital markets	0.103	0.335
Bullion futures	Capital markets	0.088	0.289
Metal futures	Capital markets	0.073	0.252
Energy futures	Capital markets	0.056	0.203

**Table 3.2: Comparing financial participation probability of aware and unaware respondents.** This table compares the financial participation probability of aware and unaware households. Second and third column reports the median financial participation for aware and unaware respondents, respectively. Fourth and fifth column reports the Kolmogorov-Smirnov test statistics (K-S Stat.) and Kulback-Leibler divergence (K-L Div.) testing difference of financial participation probability of aware and unaware respondents. The stars \*\*\*, \*\* and \* denote level of significance at 1, 5 and 10 percent, respectively. All figures in the table are rounded up to three places of decimal.

	Median financial participation probability			
	Aware	Unaware	K-S Stat.	K-L Div.
Product segment - Savings				
Savings bank account/ No frill account	0.815	0.664	0.319***	0.057
Recurring deposit	0.102	0.058	0.280***	0.600
Fixed deposit	0.142	0.079	0.280***	0.638
Overdraft facility	0.017	0.006	0.279***	1.338
Public provident fund	0.041	0.014	0.296***	1.350
Post office savings scheme	0.078	0.059	0.190***	0.323
National savings certificate/ Kisan vikas patra	0.017	0.009	0.248***	0.908
Life insurance	0.371	0.213	0.311***	0.394
Product segment - Debt				
Government subsidized debt scheme	0.050	0.037	0.158***	0.463
Other bank loans	0.100	0.065	0.200***	0.634
Credit card	0.071	0.021	0.356***	1.232
Product segment - Insurance				
Motor insurance	0.225	0.086	0.316***	0.928
Health insurance	0.134	0.068	0.320***	0.529
Home insurance	0.025	0.010	0.286***	1.207
Crop insurance	0.007	0.004	0.120***	1.701
Cattle/ Livestock insurance	0.004	0.003	0.157***	0.945
Specialized insurance	0.000	0.000	0.172***	1.033
Product segment - Pensions				
Employee provident fund (EPF)	0.063	0.008	0.221***	3.019
National pension scheme (NPS)	0.042	0.015	0.152***	2.442
Family/Employee pension scheme	0.013	0.008	0.147***	1.935
Product segment - Capital markets				
Shares/ Stocks	0.027	0.005	0.349***	1.975
Initial public offering (IPO)	0.007	0.001	0.393***	2.554
Bonds/ Debentures	0.008	0.001	0.395***	2.654
Mutual fund	0.019	0.003	0.390***	2.235
Agri futures	0.005	0.002	0.205***	1.139
Bullion futures	0.004	0.001	0.272***	1.977
Metal futures	0.002	0.001	0.278***	1.691
Energy futures	0.001	0.000	0.311***	2.636

**Table 3.3: Comparing demography of participating and pseudo-participating respondents across the financial product segments.** This table compares the demographic attributes of participating and pseudo-participating respondents across the five product segments where pseudo-participation is constructed using 70<sup>th</sup> percentile of the probability of financial participation of aware respondents. Under the product segment columns, the numbers appearing adjacent to a demographic attribute presents the percentage difference between participating and pseudo-participating respondents corresponding to that demographic attribute. The demographic difference between participating and pseudo-participating respondents are sorted in descending order for all the five product segments.

	Savings		Debt		Insurance		Pensions		Capital Markets	
Caste: ST	53.185	Caste: ST	46.231	BC_Access	65.589	Caste: ST	46.962	Caste: ST	71.821	
Innate cogito	45.026	East	40.134	Rural	36.780	South	34.731	BC_Access	63.608	
North-east	38.117	Rural	32.296	South	35.933	North-east	29.070	Central	34.868	
South	23.246	BC_Access	25.751	Caste: OBC	27.712	BC_Access	26.831	South	31.782	
Income	16.482	South	24.805	Female	26.827	Rural	12.546	North-east	31.182	
Age	14.566	Central	20.630	Central	18.636	Female	10.083	Rural	27.707	
Education	6.381	Innate cogito	20.272	Innate cogito	17.675	Age	4.826	Caste: SC	17.054	
Acquired cogito	2.468	Caste: OBC	9.540	Caste: SC	17.312	Caste: SC	-4.977	Income	5.429	
West	2.262	Income	8.308	Caste: ST	15.499	Bank_Density	-6.377	Age	-0.558	
Caste: GEN	-0.560	Age	4.453	Age	6.321	Income	-6.410	North	-8.443	
Central	-4.542	North-east	3.867	North	-3.066	East	-8.653	Education	-10.439	
Bank_Density	-4.856	Caste: SC	1.700	Income	-9.521	Education	-8.961	Caste: OBC	-11.449	
Female	-13.000	Education	-9.395	Acquired cogito	-14.528	Caste: OBC	-9.001	Bank_Density	-20.173	
East	-13.187	Acquired cogito	-11.805	West	-16.687	Acquired cogito	-10.581	Caste: GEN	-27.160	
Caste: SC	-36.255	Bank_Density	-18.771	Bank_Density	-18.416	Innate cogito	-18.453	Acquired cogito	-27.767	
Rural	-52.546	Caste: GEN	-26.424	Education	-18.543	West	-28.382	Female	-54.604	
Caste: OBC	-75.983	Female	-30.618	Caste: GEN	-24.884	Caste: GEN	-30.429	West	-57.632	
North	-105.280	North	-79.563	East	-83.723	Central	-38.023	East	-73.103	
BC_Access	-1640.688	West	-178.231	North-east	-301.365	North	-76.038	Innate cogito	-99.892	

**Table 3.4: Non-participation reasons.** This table reports the reasons for non-participation among financially aware respondents for various product segments. The survey records the reasons behind financial non-participation corresponding to product segments savings and debt, jointly. Respondents are allowed to choose multiple reasons from a list of reasons. Panel A reports the percentages corresponding to aware but non-participating respondents. Panel B reports the counts of awareness and participation corresponding to five product segments. The detailed wording of the survey question and mapping of non-participation reasons are tabulated in Appendix F. All figures in Panel A are rounded up to two places of decimal.

Panel A: Percentage of aware and non-participating respondents.				
Non-participation reasons	Savings and Debt	Insurance	Pensions	Capital markets
Affordability	52.32	49.61	31.21	29.00
Accessibility	2.07	1.06	9.00	-
Complexity	6.51	3.26	-	10.09
Knowledge	-	16.90	20.84	37.44
Trust	0.89	3.74	-	11.13
Religion	0.71	1.50	1.20	1.68
Choice	30.71	21.97	46.23	29.81
Low returns	-	-	-	14.67
Kinship support	-	-	4.86	-
Other reasons	30.37	4.16	0.89	0.35
Panel B: Count of respondents				
Count of aware but not-participating respondents	15,770	34,913	28,411	25,574
Count of participating respondents	56,936	20,951	9,128	3,159
Count of aware respondents	72,706	55,864	37,539	28,733
Total number of respondents	76,762	76,762	76,762	76,762

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# Growing Financial Power of Women and Financial Literacy

## 4.1 Introduction

Women are increasingly more active in the workforce and have become greater contributors to household income. Women own 27 percent of global wealth, with the highest annual growth observed in Asia (excluding Japan), reaching nearly 30 percent in 2009 (Damisch et al., 2010). However, women’s involvement in household financial decision-making is still minimal. A recent survey conducted by UBS Global Wealth Management reveals that the majority of women worldwide leave investing and financial planning decisions to their spouse, and less than one-in-four (only 23 percent) are willing to take a lead on making long-term planning decisions (UBS, 2019). This leaves women exposed to significant financial risks, especially when faced with unexpected family crises. Several important reasons may contribute to why women are participating less in household financial decision-making, such as gender identity norms (KE, 2021), cultural norms prescribing gender-specific roles (Guiso and Zaccaria, 2020), and a gender gap in financial knowledge. We focus on the latter – there is extensive evidence that women possess lower levels of financial literacy than men (Lusardi and Mitchell, 2008; Bucher-Koenen et al., 2017; Lusardi and Mitchell, 2017). This leads to the policy question whether women’s non-participation in financial investments and financial planning can be influenced by financial literacy interventions targeted toward women, and secondly, what broader impact this would have on household finances for society as a whole.

As a step toward answering this policy question, in this chapter we firstly investigate whether women who are financially literate are more likely to take on higher levels of responsibility in managing their household finances. Secondly, if indeed financially literate women are willing to take on more responsibility of their households' decision-making, does this translate into "better" financial portfolio holdings for households? This research question is important since higher levels of responsibility in managing money do not necessarily mean that households led by women decision-makers will participate more in financial markets or own more financial products. We also study any participation benefits of husband-and-wife teams jointly responsible in leading household finances. Previous studies document that financial literacy can provide the knowledge, skills and confidence to be involved in better financial decision-making (Lusardi and Mitchell, 2014). As such, this chapter is the first to study whether households involving female decision-makers are better at participating in financial products and services, and study any differential effects from being financially literate.

We use broad benchmark survey data of Indian households, with granular information on their role in financial decision-making, together with their financial literacy levels, and financial product awareness and holdings in a large portfolio of financial products. The survey consists of 76,762 respondents, selected using a multi-stage cluster sampling approach to capture the demographic and socio-economic heterogeneity in India. This chapter's research question involves the role of respondents in the financial decision-making of their household. But, the survey captures the respondents from singleton families, nuclear families, nuclear families with elders, and joint families.<sup>1</sup> Therefore, we are only considering the respondents from nuclear families, joint families, and the nuclear family with elders. As a result, the sample for the empirical investigations for this chapter consists of 59,405 respondents. Our data records the gender of each respondent and captures their level of financial and money management responsibility within the household. We observe three levels of decision-making responsibility: (i) sole responsibility for making the household financial decisions; (ii) joint responsibility with spouse; and (iii) no responsibility for household financial decision-making. The descriptive evidence from the Indian sample of households

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<sup>1</sup>A nuclear family is a family unit that includes two married people of opposite gender and their biological or adopted children living in the same residence while a joint family is a household arrangement consisting of many generations living under the same roof. A joint family is an extension of the nuclear family (parents and dependent children), and it typically grows when children of one sex do not leave their parents' home at marriage but bring their spouses to live with them.

shows that 27 percent of men and 19 percent of women are solely responsible for financial decision-making. A greater percentage of women (20 percent) than men (16 percent) share their financial decision-making responsibility with their spouse and, as expected, a higher percentage of women as compared to men are not involved in financial decision-making.

We estimate ordered probit models to capture the ordered categorical nature of financial responsibility and measure the effects of financial literacy, after controlling for a large array of household and individual characteristics, supply-side characteristics (access to Banking Correspondents in neighborhood, number of bank branches in the district) and state fixed effects. While the estimation results confirm that women generally have a significantly lower probability of taking on joint and sole responsibilities as compared to men, the findings reverse for the case of financially literate women. That is, we observe a strong positive association between financially literate women and their likelihood of taking greater responsibility in managing household finances. Interestingly, marginal effects show that the likelihood of being involved in managing their household's financial decisions is around 35-38% more for financially literate women than it is for financially literate men. Men do not require to be financially literate to take on greater levels of responsibility for their household finances, which reflects gender norms in society. The findings emphasize the benefits of financial literacy in empowering women to be involved in managing their household finances.

Next, we assess whether the positive benefits of financial literacy on the increased levels of women's financial responsibility within their households translate into overall better household participation in owning different financial products and services. Therefore, we examine the portfolio holdings of households led solely by women/men or jointly-led and model their probability of owning financial products from six different product categories, including savings schemes, investment products, shares/stocks, insurance products, loans and credit cards, and alternative investment products. We take into account the ownership decisions of eighteen different financial products within the six different product categories, including recurring and fixed deposits, post office savings schemes, Kisan Vikas Patra, public provident fund, mutual funds, bonds, shares/stocks, life insurance, health insurance, home insurance, cattle and crop insurance, personal loans, (subsidized) credit cards, loans from micro-finance institutions, chit-funds, collective deposit schemes, investment in gold/silver, and investment in property. We also consider respondents' informal banking activities using survey questions that ask respondents whether they save money

at home, save money informally and have loans from money lenders.

In the empirical estimation, we jointly model the ordered responsibility levels and the probability of holding financial products with a structural equation. This enables us to accommodate for endogenous treatment effects arising from the fact that both financial responsibility levels and the decision to own financial products are influenced by financial literacy and therefore could confound our estimates. We investigate whether men and women are better as sole decision-makers or whether they benefit from being jointly responsible and working together in managing their household finances.

The analysis reveals that financially literate men and women possess higher probabilities of owning financial products and services from all six different types of product categories, for both sole and joint responsibility levels. Higher marginal effects are seen predominantly for financially literate female as opposed to male respondents, especially when women are jointly responsible with their spouse. We also observe that both financially literate men and, more particularly, women have a significantly negative probability of engaging in informal banking activities, such as saving informally and taking loans from money lenders. Interestingly, greater levels of financial responsibility (joint or sole responsibility) are not observed to be significant for ownership decisions, once we model the levels of individuals' financial literacy. Therefore, we find that increasing the responsibility levels per se does not have an impact on the portfolio holdings of households. The results suggest that financial literacy interventions targeting women can empower them to take on higher levels of financial responsibility within their households and help reduce the gender gap observed in financial market participation. The results substantiate the important role of financial literacy in reducing the barriers to owning financial products, as also documented by previous studies (see, for example, Van Rooij et al., 2011; Van Rooij et al., 2012; Almenberg and Dreber, 2015; Balloch et al., 2015).

When we consider households where financially literate men and women are jointly responsible with their spouse for financial decision-making, we observe that such households are more likely to hold financial products and considerably less likely to engage in informal banking than those with one solely responsible decision-maker. Thus, working as a husband-and-wife team is more beneficial for households participating in financial products than acting alone. Greater marginal gains are observed for women – it appears that the support of their husbands in financial decision-making not only helps financially literate

women to benefit from men's preference for higher risk-return products (e.g. investment products, stocks/shares), but also emboldens them to play to their strengths and maintain a balance by investing even more in the security-focused products (e.g. saving schemes, insurance products) favored by women. Among financially literate male respondents, the addition of their wives in financial decision-making has the greatest influence on their holdings of insurance products and savings schemes, thus benefiting from women's focus on security.

Social identity grouping and gender norms play an important role in the level of responsibility women take on within their households (Guiso and Zaccaria, 2020; KE, 2021). Historically, Indian women's economic mobility and participation in household decisions has been dictated by social rules and norms within their caste networks (Deshpande, 2000; Munshi and Rosenzweig, 2006). India's caste hierarchy consists of four major groupings in order of privilege, namely General, Other Backward Caste, Scheduled Caste and Scheduled Tribe. Women in India, particularly in the lower castes, may display a lack of interest in being involved in household financial decision-making to preserve the social status within networks. Therefore, we test the marginal effects of financial literacy on the probability of owning financial products across various castes. The results show that, across all the castes, the product-holding probabilities are significantly higher among financially literate female decision-makers than among financially literate male decision-makers for savings schemes, insurance products, and alternative investments, irrespective of their responsibility levels. For the remaining product categories, namely investment products, shares/stocks and debt market products, significantly higher probabilities are observed when financially literate women are jointly responsible with their husbands. The results highlight that the benefits of husband-and-wife teamwork in financial decision-making apply universally across the different castes. However, noticeably, the magnitude of the marginal effects for financial literacy decreases as we move down the caste hierarchy from General to other castes, with a little less variation between the two lowest castes, Scheduled Castes and Scheduled Tribes. The findings highlight the greater focus on tradition and wariness toward changing societal norms among the lower castes. Thus, government interventions to increase financial literacy levels should consider the caste hierarchy and in particular take policy steps to reduce the participation gap observed across the lower castes.

To understand non-participation reasons among financial decision-makers for the product markets of savings, insurance, pensions, and capital markets, the survey asks respondents

to identify the various reasons behind their decision to not hold these financial products. We assess the response options such as accessibility, affordability, personal choice, complexity, kinship support, lack of knowledge, bad returns, religion, and trust, for the various product markets. Among financially literate female decision-makers, choice is seen to be an important barrier for not participating in various financial products, while accessibility, affordability, complexity, religion, trust are not significant reasons for non-participation in financial products. The results testify to the general benefits of financial literacy for empowering financial decision-making. Varying reasons for non-participation have been given by male and female decision-makers for the various product markets. For instance, several significant barriers to participation have been highlighted for capital markets – among financially literate male decision-makers, we find affordability, choice, complexity, bad returns and trust as important barriers for non-participation, while among financially literate women, it is personal choice, lack of knowledge and bad returns. Overall, the reasons vary according to product market, and are different among male and female decision-makers, thus highlighting the need for targeted interventions to increase participation rates in financial products and services.

Our study contributes both to the existing academic literature as well as informing recent policy discussions on the gender gap in financial literacy and participation in financial products (Lusardi and Mitchell, 2008, 2014). Further, it contributes to the existing body of literature on the gender norms in financial decision-making (KE, 2021) and how empowering women changes the financial decision-making dynamics within households (see Duflo, 2012; Jensen, 2012; Bertrand et al., 2015; Almås et al., 2018). Our findings firstly demonstrate that empowering women with financial literacy encourages them to take on more dominant roles in household financial decision-making. Secondly, both male and female decision-makers who are financially literate actively participate in financial markets, by being more likely to hold formal financial products and less likely to engage in informal banking activities. The third important finding is that when financially literate women are jointly responsible with their spouse for managing their household finances, we observe the highest positive gains in terms of participation in financial products: the likelihood of participation in all types of financial products is significantly higher. The increase in participation rate is particularly pronounced for investments and stocks, which are more appealing to men. Similarly, when financially literate men lead with their spouse, we observe higher probabilities of participation in savings schemes and insurance products,

which are more favored by women. In both cases, joint leadership in managing household finances, where at least one spouse is financially literate, significantly reduces the likelihood of engaging in informal banking practices. Our results are therefore of particular relevance to the policy discussions concerning empowering women with financial literacy to reduce the gender gap in financial product holdings and increase household participation in financial product markets.

## 4.2 Data and variables

### 4.2.1 Data and sample characteristics

Our primary data source is the nationally representative survey of financial literacy and inclusion in India, fielded in 2014 by the National Centre for Financial Education (NCFE). The survey used a multistage cluster sampling design and records responses from face-to-face interviews. The sample used in this chapter only considers the respondents from nuclear families, joint families, and the nuclear family with elders. Therefore, the reduced sample has 59,405 respondents as compared to samples used in Chapters 2 and 3 consisting of 76,762 respondents. Table 4.1 presents the descriptive characteristics of the sampled data. The respondents in the sample are aged 18-80 years, with the majority of respondents (64%) belonging to the age group 25-49 years. This reflects the young demographic profile of India. Men constitute 54% of the sample and women 46%. The Indian caste system still persists as an important determinant of social identity, dividing Indians into four mutually exclusive hereditary groups, ranked by ritual status. The survey covers respondents from all four castes, namely General, Other Backward Caste, Scheduled Caste and Scheduled Tribe, accounting for 50%, 26%, 12% and 12% of the sample, respectively. The sample is also spatially diverse, with an urban-rural split of 48% to 52%, and covers all six sub-national administrative zones. Thus, the sample accommodates for the geographical and administrative diversity of the country.

In terms of socio-economic characteristics, 16% of the respondents in the sample are illiterate, while 23% of respondents have a minimum of 14 years of schooling. The percentage of respondents with secondary and senior-secondary education are 19% and 17%, respectively. The survey also captures diverse occupation types, categorized into six different

types, namely self-employed, housewife, laborer, salaried and retired. Among the respondents, 31% are housewives, 29% self-employed, 22% salaried professionals, 14% laborers and the remaining minority are retired. The survey also records self-reported income categories. Apart from 8 respondents who declined to disclose their income, we observe diverse income levels among the sample of respondents. Considering the World Bank poverty threshold for India, which translates to annual incomes lower than Rs 50,000 in our income categories, we observe that around 30% of respondents' income lies below the official poverty line.

## 4.2.2 Measuring key variables

### *Financial literacy*

To measure financial literacy of respondents, the survey adopts the guidelines of OECD (2016) and uses seven survey questions eliciting the respondents' comprehension of basic financial concepts, encompassing time value of money, interest paid on loan, simple interest, compound interest, risk and return, diversification and understanding of inflation. The actual wordings of the survey questions along with the response choices to each of the questions are reported in Appendix A. To measure the overall financial literacy level of a respondent, we consolidate their responses on the seven financial literacy questions through a weighted average score. The weight for each question is derived from the difficulty level of that question, which is based on how many respondents within the sample correctly answered the question. Section 2.2.4 of Chapter 2 outlines the methodology used in the score construction.

Table 4.4 reports the responses of men and women on the different financial literacy questions. Across all the seven questions, the percentage of correct responses from women is significantly lower than from men. This is in line with previous global evidence of a gender gap in financial literacy (see, for example, Lusardi and Mitchell, 2008; Bucher-Koenen et al., 2017). All respondents find the question on compound interest calculation as most difficult. Only 29% of female respondents correctly answer the question on compound interest calculation, as compared to 32% of male respondents. We observe that there are more of women than men in the survey who got none of the questions correct – 9% of men and 8% of women answer all the seven questions correctly, while 6% of women and 5% of men get all seven questions wrong. The financial literacy average score of men is calculated

to be 0.32, while for women it is 0.30. Further, we see that more women than men tend to choose “don’t know” as their responses to all the financial literacy questions asked.

#### *Financial responsibility*

Financial responsibility is an ordered response variable, which captures the role of the respondent in the household’s financial decision-making. To derive the response variable, the respondents were asked:

*Who is responsible for financial and money management in your household?*

Respondents were offered five choices of answers: (1) Yourself, (2) Yourself and your spouse, (3) Yourself and other member, (4) Another family member, and (5) Others. Those choosing option (1) receive the highest score of 3, reflecting sole financial decision-making responsibility; those choosing options (2) receive a score of 2, reflecting joint responsibility for financial decision-making with someone else in the household; and the remainder of the respondents receive a score of 1, reflecting no financial decision-making responsibility. Table 4.2 reports the summary statistics of financial responsibility. The sample statistics of financial responsibility considered according to the gender of respondents show that 23% of respondents are solely responsible for financial decision-making in their households. 9% of women share joint responsibility for financial decision-making, which is higher than in the case of men (8.7%). Overall, considering sole and joint responsibility, 43% of men and 39% of women respondents in the sample have some role in household financial decision-making.

## **4.3 Empirical analysis**

### **4.3.1 Gender differences in responsibility levels of managing household finances**

The first component of our investigation is a respondent’s degree of responsibility in managing their household finances and the presence of any gender-associated differences. Our main interest is to evaluate whether the strength and direction of the above relationship

is moderated by individuals' financial literacy. Due to distinctive preferences and cultural orientations, men and women may have varying degrees of willingness to take on the responsibility of managing their households' money matters. We use ordered probit regressions, where the latent continuous variable captures the underlying ordinal responses we observe on responsibility levels. The full model specification is as follows:

$$\begin{aligned} \text{Responsibility}_i^* &= \alpha_0 + \alpha_1(\text{FinLit}_i \times \text{Men}_i) + \alpha_2(\text{FinLit}_i \times \text{Women}_i) \\ &+ \alpha_3\text{Women}_i + \alpha_4\text{Controls}_i + \lambda_S + \varepsilon_i, \end{aligned} \quad (4.1)$$

$$\text{Responsibility}_i = \begin{cases} 1 & \text{if } -\infty < \text{Responsibility}_i^* \leq C_1 \\ 2 & \text{if } C_1 < \text{Responsibility}_i^* \leq C_2 \\ 3 & \text{if } C_2 < \text{Responsibility}_i^* < \infty \end{cases}$$

where  $\text{FinLit}_i$  is the financial literacy score of individual  $i$ ;  $\text{Women}_i$  is the gender indicator variable equal to 1 for female respondents, and 0 otherwise;  $\text{Controls}_i$  denotes controls for age, caste classification, family structure, education, employment status, income, occupation type, respondent's access to Banking Correspondents in their neighborhood and bank branch density at the district-level; and  $\lambda_S$  stands for state fixed effects.  $\text{Responsibility}_i$  takes the values 1, 2, or 3, corresponding to the three levels of financial responsibility, with ranking 1 for no responsibility, 2 for joint responsibility with spouse and 3 for sole responsibility.  $C_1$  and  $C_2$  are the threshold values to be estimated at which the response of the outcome variable  $\text{Responsibility}_i$  are changing. Alternatively, we can interpret these constants as threshold that divide the range of latent variable  $\text{Responsibility}_i^*$  into number of segments equal to the number of ordered outcome where each segment correspond to an observed outcome. Appendix C reports the exact definitions of all the independent variables. Our key variables of interest are  $\text{Women}_i$  and its interaction with  $\text{FinLit}_i$ , which enables us to measure any gender differentials in the degree of responsibility and the associated moderating effects of financial literacy.

Table 4.5 reports the coefficient estimates and the marginal effects for the key variables of interest. In column (1), we consider the financial literacy and gender of respondents separately, before interacting these variables. We find a positive and strongly significant estimate for financial literacy, indicating that as financial literacy levels increase, individuals are more likely to be take on greater levels of responsibility in managing their household finances. In terms of gender, we find a negative and significant coefficient for female respondents as compared to male respondents in the reference category. That is, as

responsibility levels rise from no responsibility to sole responsibility, there is a fall in the number of women responsible for household finances. The evidence shows a stark gender difference in who makes financial decisions in households – female respondents are observed to take on lower levels of financial responsibility than male respondents.

Next, we examine the interaction between financial literacy and gender. The ordered probit regression estimates in column (2) show that financially literate women have higher levels of responsibility in managing their household finances than financially literate men, with the coefficient estimates for women strongly significant and higher than those of men. In this regression, the indicator variable for women remains negative and significant. The results indicate that overall, women as compared to men are less involved in making household financial decisions; however, when women are financially literate, the gender difference reverses, with women becoming significantly more responsible for making financial decisions in the household, as compared to financially literate men. That is, empowering women with financial literacy has a greater impact than empowering men with financial literacy, when it comes to taking on the responsibility for household financial decision-making. To gauge the economic magnitude differences in responsibility levels for financially literate men and women, we report marginal effects in the bottom of the table. First, both men and women with financial literacy have a negative likelihood of taking no responsibility in their households' money matters:  $-23.3\%$  for women versus  $-16.9\%$  for men. Second, financially literate women have greater joint and sole responsibility levels, as compared to financially literate men, with the highest difference for taking on sole responsibility. This indicates that financially literate women are taking on more sole responsibility than joint responsibility of their household money matters, as compared to financially literate men. Therefore, in summary, we find that financial literacy plays an important role in reducing the gender difference observed in terms of financial decision-making responsibility within a household.

### **4.3.2 Differences in financial portfolios holdings of households led by men and women**

Having established that the degree of responsibility men and women are taking on in managing their household finances is strongly associated with financial literacy, we proceed to investigate whether there is a difference in the financial portfolio holdings of households

led by men and women, either individually or jointly. We use the respondents' survey records on their portfolio holdings (i.e. whether or not they own) for a large set of eighteen mainstream financial products and alternative investment products, which can be broadly classified into six financial product categories, namely (i) savings schemes, including recurring and fixed deposits, post office savings schemes and Kisan Vikas Patra; (ii) investment products, including public provident fund, mutual funds and bonds/debentures; (iii) shares/stocks; (iv) insurance products, including life insurance, health insurance, home insurance, cattle and crop insurance; (v) loans and credit cards, including personal loans, (subsidized) credit cards and loans from micro-finance institutions; and (vi) alternative investment products, including chit-funds, collective deposit schemes, investment in gold/silver, and investment in property. Additionally, we consider the respondents' informal banking activities using survey questions that ask respondents whether they save money at home, save money informally and have loans from moneylenders.

Using this financial portfolio information, we examine the relationship between financial literacy and the probability of owning financial products for households led by women (i.e. a female respondent is solely responsible), by men (i.e. a male respondent is solely responsible) and jointly-led (i.e. men and women are jointly responsible). For the case of joint responsibility, in the survey we observe men and women respondents jointly leading with their spouse, but we are not given any survey information on the spouse.

To investigate the research question, it is important that we jointly model the ordered responsibility levels and the probability of holding financial products. This is to ensure that the results are not driven endogenously, since the probability of holding financial products is conditional on the level of responsibility taken by individuals, which is in turn strongly correlated with their financial literacy. Additionally, jointly modelling the responsibility levels and portfolio holdings enables us to gauge whether it is the financial literacy levels in individuals or the increased level of responsibility in managing household finances that is significantly associated with increased ownership of financial products.

Therefore, we estimate the following structural model:

$$\begin{aligned} \text{Responsibility}_i^* &= \gamma_0 + \gamma_1(\text{FinLit}_i \times \text{Men}_i) + \gamma_2(\text{FinLit}_i \times \text{Women}_i) \\ &\quad + \gamma_3\text{Women}_i + \gamma_4\text{Controls}_i + \lambda_S + \varepsilon_i, \end{aligned} \quad (4.2)$$

$$\text{Holdings}_i^* = \delta_0 + \delta_1\text{Responsibility}_i + \delta_2\text{Controls}_i + \lambda_S + \nu_i, \quad (4.3)$$

where,  $(\varepsilon_i, \nu_i)' \sim N(0, \Sigma)$  and  $\Sigma = \begin{pmatrix} 1 & \rho \\ \rho & 1 \end{pmatrix}$ .

where Equation (4.2) is an ordered probit specification, with  $\text{Responsibility}_i$  taking the values  $r = 1, 2, 3$  as described in the previous section. Equation (4.3) is a standard probit model, where  $\text{Holdings}$  is a dichotomous variable taking the value of 1 if the respondent holds at least one product in the particular financial product category being considered, and zero otherwise.

$$\text{Holdings}_i = \begin{cases} 0 & \text{if } -\infty < \text{Holdings}_i^* \leq 0 \\ 1 & \text{if } 0 < \text{Holdings}_i^* < \infty \end{cases}$$

We consider the holdings information on the six different financial product categories discussed above and respondents' involvement in informal banking activities.  $\text{Controls}$  includes the demographic and financial access variables as in the previous section and  $\lambda_S$  denotes the state fixed effects.<sup>2</sup>

Our main interest is to compute the expected (average) marginal effects of financial literacy on product holdings through the channel of financial responsibility levels respondents take on within households and gauge the differences between men and women. For this, we calculate the cross-marginal effects from Equations (4.2) and (4.3) to study the effect of changes in the propensity to own a financial product ( $\widehat{\text{Pr}}(\text{Holdings}_i = 1)$ ) when the financial literacy scores ( $\text{FinLit}$ ) increases for both men and women. In the above system of equations, the cross-marginals are the product of two marginals – first, the effect of increasing financial literacy on the propensity to take greater levels of responsibility ( $\widehat{\text{Pr}}(\text{Responsibility}_i = r)$ ) within the household, i.e., taking sole responsibility ( $r = 3$ ) or joint ( $r = 2$ ) responsibility, and second, the effect of changes in responsibility levels on the probability of holding particular types of financial products.

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<sup>2</sup>We estimate the system of equations using the command *eprobit*, which is part of the suite of extended regression methods in the Stata 16 software package Roodman (2011); StataCorp (2019).

The first average marginal effects are obtained from Equation (4.2) for the case of female respondents as:

$$E_W \left( \widehat{MR}_r^{(1)} \right) \equiv \frac{1}{\#women} \sum_{i=1}^{\#women} \frac{\partial \widehat{\Pr}(Responsibility_i = r)}{\partial FinLit_i}. \quad (4.4)$$

Analogously, we define  $E_M \left( \widehat{MR}_r^{(1)} \right)$  for men. Panel A of Table 4.6 reports the average marginal effects for changes in responsibility levels of male and female respondents, for the case of different financial product categories. A few noticeable observations are as follows. First, we find that, for both male and female respondents, the financial literacy marginal effects are positive and significant, which holds for all six categories of financial products. Secondly, for financially literate male and female respondents, the probability of jointly leading household money matters with their husband or wife is greater than respondents taking sole responsibility. And finally, we see that both financially literate men and women take significantly lower levels of responsibility in households that are participating in informal banking activities.

Next, we consider the second average marginal effects, which is the increase in responsibility levels on the propensity to own a financial product. We calculate the marginal effects for women from Equation (4.3) as:

$$E_W \left( \widehat{MR}_r^{(2)} \right) \equiv \frac{1}{\#women} \sum_{i=1}^{\#women} \frac{\partial \widehat{\Pr}(Holdings_i = 1)}{\partial \widehat{\Pr}(Responsibility_i = r)}. \quad (4.5)$$

Similarly, we define  $E_M \left( \widehat{MR}_r \right)$  for men. Panel B of Table 4.6 reports the average marginal effects of the changes in ownership with respect to changes in the responsibility levels of male and female respondents for the different financial product categories. We find that, for both male and female respondents, the average marginal effects are insignificant for all categories of products, except for holding alternative investments such as gold and silver, and investment properties. The results indicate that additional levels of financial responsibility per se have no significant relationship with the increased probability of holding financial products.

Finally, we calculate the cross-marginal effects of changes in the probability of owning a financial product for changes in financial literacy scores. For female respondents, this is

defined as:

$$E_W \left( \widehat{MR}_{FinLit_i} | Responsibility_i = r \right) \quad (4.6)$$

$$= \frac{1}{\#women} \sum_{i=1}^{\#women} \frac{\partial \widehat{\Pr}(Holdings_i = 1 | Responsibility_i = r)}{\partial FinLit_i}$$

$$= \frac{1}{\#women} \sum_{i=1}^{\#women} \frac{\partial \widehat{\Pr}(Holdings_i = 1)}{\partial \widehat{\Pr}(Responsibility_i = r)} \frac{\partial \widehat{\Pr}(Responsibility_i = r)}{\partial FinLit_i}. \quad (4.7)$$

In a similar way, we define  $E_M \left( \widehat{MR}_{FinLit_i} | Responsibility_i = r \right)$  for men. The average cross-marginals of *Holdings* with respect to *Finlit* is the “covariance” of marginals of *Responsibility* with respect to *FinLit* and the marginals of *Holdings* with respect to *Responsibility*. We separately estimate the cross-marginals for different responsibility levels to examine whether men and women are better as sole decision-makers or whether they benefit from being jointly responsible and working together in managing their household finances. The differences in marginal effects between sole ( $Responsibility_i = 3$ ) and joint ( $Responsibility_i = 2$ ) responsibility levels for women are estimated as:

$$\frac{E_W \left( \widehat{MR}_{FinLit_i} | Responsibility_i = 2 \right) - E_W \left( \widehat{MR}_{FinLit_i} | Responsibility_i = 3 \right)}{E_W \left( \widehat{MR}_{FinLit_i} | Responsibility_i = 3 \right)}. \quad (4.8)$$

Analogously, we estimate the differences in marginal effects for men. Panel C of Table 4.6 reports the results for the cross marginal effects for the different financial product categories, separately for men and women. For all six financial product categories, the marginal effect of financial literacy on financial holdings is positive and statistically significant at the one-percent level, whether the respondent is male or female, assumes sole responsibility or shares joint responsibility with their spouse in financial decision-making. This shows that the probability of holdings are higher for those with financial literacy. In the area of informal banking activities, we find there is a consistent decrease (again statistically significant at the one-percent level) across all types of respondent. This finding is entirely to be expected, since informal banking activities such as savings money at home or saving informally is an insecure form of saving that effectively when we account for inflation brings depreciation in value; hence we would expect financially literate decision-makers to invest their money in more formal banking products and services. The uniform increase in holdings of every other product type shows that this is indeed the case. Overall, we conclude that, for every product type, equipping the decision-maker(s) with financial literacy has significant marginal gains on their likelihood of holding such products.

When comparing the holdings of financially literate men and women who are solely responsible for their household financial decisions (row *FinLit* → *Holdings (Sole responsible)*), we observe different levels for different product types. More specifically, men display greater holdings in the product areas with higher risk-return, namely, investment products and stocks/shares, while women – who are known to be more risk-averse (Barber and Odean, 2001; Almenberg and Dreber, 2015) – show a greater focus on security by investing more in savings schemes and insurance products. The financially literate women also hold more alternative investments and engage less in informal banking than their financially literate male counterparts.

When we consider the results where financially literate men and women are jointly responsible for financial decision-making, in the majority of cases, the addition of a spouse in financial decision-making has a statistically significant effect on financial holdings (see row *Differences in marginals*). We observe that, in general, men and women who are jointly responsible are more likely to hold the various products than those with sole responsibility. The results are consistently significant for women, but not always significant for men. The only exception concerns stocks and shares, with a marginal decrease in holdings by men who are jointly responsible with their wives as compared to men acting alone, though this decrease is not statistically significant. Interestingly, for the case of informal banking activities, when men and women are jointly responsible for financial decisions, they are considerably less likely to engage in such practices than those who act alone, with results statistically significant at the one-percent level. Overall, it seems then that, when equipped with financial literacy, working as a husband-and-wife team is more beneficial in financial decision-making than acting alone, both in terms of holding more profitable products and of reducing engagement in informal banking.

There is a further point to be noted, concerning the extent of the impact of husband-and-wife teamwork as compared to men acting alone and women acting alone. We observe that, with the exception of informal banking, the addition of a financially literate spouse in decision-making has a greater effect on financially literate women than it does on financially literate men, with statistical significance in differences in marginals for women invariably at the five- or one-percent level. Perhaps unsurprisingly, the greatest effects among women are seen for the products where financial literacy is more significant with men than with women: investment products (an increase of 90.37% for women acting jointly with their husbands as opposed to women acting alone) and stocks and shares (an increase of 72.08%). However,

even when we turn to products where financial literacy is more significant among women than among men – savings schemes, insurance products and alternative investments – we find that the difference in marginals for women acting jointly with their spouse as opposed to assuming sole responsibility are greater than those for the sole/joint comparison among men. For instance, the effect on holding savings products is particularly pronounced: an increase of 44.06% among women as opposed to 20.82% among men. It appears that the support of their husbands in financial decision-making not only helps financially literate women to benefit from men’s preference for higher risk-return products, but also emboldens them to play to their strengths and maintain a balance by investing even more in the security-focused products favored by women.

Among financially literate male respondents, the addition of their wives in financial decision-making has the greatest influence on their holdings of insurance products (an increase of 26.4%, statistically significant at the five-percent level) and savings schemes (an increase of 20.82%, statistically significant at the ten-percent level), and reducing their engagement in informal banking practices (a decrease of 34.26%, statistically significant at the one-percent level). Hence the addition of their wives in financial decision-making allows financially literate men to benefit from women’s focus on security and moreover the involvement of women in financial decision-making of households promotes growth (see Doepke and Tertilt, 2019).

Overall, we draw the following main conclusions. Firstly, financial literacy invariably results in significantly greater (at the one-percent level) holdings of all types of financial product as well as significantly lower (again at the one-percent level) involvement in informal banking activities such as saving money at home/informally and borrowing from money lenders. Secondly, for the financially literate working jointly with a spouse, as opposed to making financial decisions alone, these results are magnified: their holdings of most products increase, while they engage significantly less (at the one-percent level) in informal banking. Moreover, the advantages of husband-and-wife teamwork go above and beyond simply benefiting from each other’s strengths – a preference for higher risk-return products among men and security-focused products among women. The strength of working as a team almost invariably emboldens them to take on more of the profitable financial products and to engage less in informal banking. This effect of teamwork is particularly pronounced when comparing financially literate women acting alone versus jointly with their husbands, indicating that men – who traditionally would take on the role of financial decision-maker and are moreover more likely to be financially literate on average – still

exert a greater influence in financial decision-making on their wives than vice-versa.

### 4.3.3 Gender differences across caste identity groupings

The caste hierarchy in India is most influential in defining one’s social status and governs the implicit division of responsibilities between men and women within households. Recent papers document that gender norms play an important role in household decision-making (Guiso and Zaccaria, 2020; KE, 2021). In this section, we explore the gender differences in financial product holdings and in the importance of financial literacy across the various social identity groupings in India, where we take into account the caste profiles of respondents. India’s caste hierarchy consists of four major groupings in order of privilege, namely General, Other Backward Caste, Scheduled Caste and Scheduled Tribe.

To assess the marginal effects of financial literacy on the probability of owning financial products across various castes, we calculate the cross marginal effects defined in Equation (4.7) separately for the different caste grouping. The differences in marginal effects between sole ( $Responsibility_i = 3$ ) and joint ( $Responsibility_i = 2$ ) responsibility levels for women, given her caste grouping, are estimated as:

$$\frac{E_{W,D} \left( \widehat{MR}_{FinLit_i} | Responsibility_i = 2 \right) - E_{W,D} \left( \widehat{MR}_{FinLit_i} | Responsibility_i = 3 \right)}{E_{W,D} \left( \widehat{MR}_{FinLit_i} | Responsibility_i = 3 \right)}, \quad (4.9)$$

where  $D$  is the different cultural environment of respondents, defined by the caste they belong to. The differences in marginals are analogously calculated for men.

Table 4.7 shows the marginal effects of financial holding with respect to financial literacy across various castes. We find several interesting observations. Firstly, comparing the levels of holdings across castes, we generally see a gradual decrease going down the caste hierarchy, with a little less variation between the two lowest castes, Scheduled Castes and Scheduled Tribes. These marginal effects control for supply-side factors and may reflect a greater focus on tradition and wariness toward changing societal norms among the lower castes. Secondly, products with a higher risk-return – investment products and stocks and shares – have considerably greater holdings among the General Castes than among the three lower caste groups. Again, this may reflect greater wariness toward participating in financial products in the lower castes. With investment products, there is little variation

among the remaining three castes, while for stocks and shares cases decline drastically going down the caste hierarchy. Thirdly, for insurance products, holdings are lower among male decision-makers acting alone from the Scheduled Tribes, with little variation among men with sole responsibility in the top three castes. All other types of decision-makers show a gradual decrease going down the caste hierarchy, consistent with what we find for the majority of other products. Fourthly, in the participation of informal banking, we observe a similar pattern in the marginal effects of financial literacy across the various castes. What is interesting, however, is that the addition of a spouse in financial decision-making invariably results in a statistically significant decrease (mostly at the one-percent level) in being involved in informal banking activities, confirming that the benefits of husband-and-wife teamwork in financial decision-making apply universally.

The magnitude of the marginal effects for financial literacy decreases as we move down the caste hierarchy from General to other castes, with a little less variation between the two lowest castes, Scheduled Castes, and Scheduled Tribes. The findings highlight the greater focus on tradition and wariness toward changing societal norms among the lower castes. Thus, government interventions to increase financial literacy levels should consider the caste hierarchy and in particular take policy steps to reduce the participation gap observed across the lower castes. Currently, the government runs several social empowerment schemes especially focusing on caste-based discrimination such as special opportunities in government-funded academic institutions, quota in the public sector jobs, financial help in securing an education loan, reserved seat for political representation. Such schemes have been successful in improving the socio-economic condition of households belonging to marginalized castes. However, a majority of these schemes are gender-neutral for marginalized castes. The findings from the chapter show if policymakers can ensure the special opportunity for women from marginalized castes, it may help them to bring closer to at par with men from marginalized castes likewise their privileged castes peers.

#### **4.3.4 Gender differences across the rural-urban split**

The rural-urban split of India shows a strong variation in education, financial access, and gender norms. Apart from this, we find a glaring disparity between rural and urban India in terms of income, consumption, and quality of life. This disparity between rural and urban India intrigued us to explore how the marginal effects of financial holding with respect to

financial literacy differ across the rural-urban split.

Table 4.8 reports the financial literacy marginal effects for product holdings across the rural-urban split. Across the rural-urban divide, the marginal effects for product holdings are higher for women as compared to men across the all-product segments except for investment products, share and stocks, and loan and credit cards. This result has an important policy implication that financial literacy not only empowers urban women but it is also an effective tool to empower women in rural India where gender norms are relatively strict. However, the marginal effects for product holdings are way stronger for the urban respondents. Next, when the rural women make the joint financial decisions with their spouses the relative benefit of the financial decisions is way stronger than the urban women. In other words, the financial literacy marginal effects for product holding are stronger for urban respondents, but the relative benefit of joint decisions for women is stronger for rural women. Therefore, the results suggest that financially literate rural women together with their spouses can outperform any other decision-makers in product holding decisions.

Overall, India is largely a patriarchal society where women have witnessed the long endured social discrimination. With an increase in education and their participation in the formal workforce, they are increasingly getting involved in the financial decision-making of their household (see Arora, 2012; Barcellos et al., 2014; Dhar et al., 2015). However, the summary statistics show women are observed to take a lower level of responsibility than men on average, this pattern reverses for financially literate women. Moreover, when financially literate women are jointly responsible for financial decisions along with their spouses, the probability of holding financial products increases even further. Therefore, the important takeaway of equipping women with financial literacy and encourage them to take an active part in family financial decision making. To do so, policymakers can provide the tax incentives which is largely successful in the real-estate sector in driving land ownership among women. Currently, for purchasing a real estate property Indian government offers a discount in registration fee when the first owner of the property is a woman. Hence, financial knowledge has the potential to work as a policy tool to bring women as a contributor to family financial decisions.

### 4.3.5 Reasons for non-participation in financial products

In this section, we utilize the survey questions asking respondents when they are aware of, but do not hold, any financial products from a particular product segment to choose the reasons for not holding such products. The reasons for non-participation in the four product segments – namely, savings, insurance, pensions and capital markets – are elicited. Respondents are presented with various choice options for a given product segment and asked to choose the various reasons behind their decision to not hold any products. The choice options can be categorized into accessibility, affordability, personal choice, complexity, kinship support, lack of knowledge, bad returns, religion, trust and other reasons. The actual wordings of the survey questions along with the response choices for the four product segments are reported in Appendix F.

To study the reasons given by financial decision-makers for not participating in various product markets and the role of financial literacy, we estimate probit regressions, where the dependent variable, *Reason*, captures whether the respondent has chosen a particular reason for not holding a financial product. We classify respondents as those with low (high) financial literacy if their individual financial literacy scores are below (above) the median score. More specifically, we estimate the following:

$$\begin{aligned}
 Reason_i^* &= \theta_0 + \theta_1(LowFinLit_i \times Men_i) + \theta_2(HighFinLit_i \times Men_i) \\
 &+ \theta_3(LowFinLit_i \times Women_i) + \theta_4(HighFinLit_i \times Women_i) \\
 &+ \theta_5Women_i + \beta'Controls_i + \lambda_S + \tau_i,
 \end{aligned} \tag{4.10}$$

$$Reason_i = \begin{cases} 0 & \text{if } -\infty < Reason_i^* \leq 0 \\ 1 & \text{if } 0 < Reason_i^* < \infty \end{cases}$$

We calculate the marginal effects of financial literacy on the likelihood of choosing a particular reason for non-participation among male and female financial decision-makers in their households. Table 4.9 reports these marginal effects for the various products types, namely savings, insurance, pension and capital markets.

In Panel A, we find that financially literate women are significantly less likely to pick affordability as a reason for not holding savings products, which suggests that they are better-off than those with low financial literacy. Complexity is observed to be a significant barrier for non-participation among women with low financial literacy, but not among the

highly financial literate. On the other hand, all male decision-makers are less likely to pick choice as a reason for non-participation, but complexity is observed to be a significant barrier. Further, the men with low financial literacy choose accessibility as a reason for non-participation in savings products. Next, we consider insurance products in Panel B. Among women with high financial literacy, choice is the only significant reason for not holding insurance products. Men with low financial literacy, in contrast, do not pick choice as an important reason; however, affordability is observed to be a significant reason for non-participation, suggesting that the financially literate are better-off. Further, men with high financial literacy are do not pick complexity and religion as significant barriers for non-participation, which suggests better understanding of insurance products. In Panel C, where we now study pension products, we find choice as the significant and only reason for non-participation among both male and female decision-makers, irrespective of their financial literacy levels. Panel D considers capital market products. We find that financially literate male decision-makers have a significantly higher likelihood of choosing affordability, choice, complexity, bad returns and trust as important barriers for non-participation. In a similar vein, financially literate women are more likely to have choice, knowledge and bad returns as significant reasons for not holding capital market products. Among women, we see that affordability, complexity, religion and trust are not significant barriers for non-participation. For men with low financial literacy, choice, bad returns and trust are observed to be marginally important reasons for not holding capital market products.

Overall, we identify important barriers driving the non-participation of households in financial products markets. For instance, we see that affordability is generally far more of an issue among men than women decision-makers. Also, among the high financially literate women, choice seems to be a significant reason for non-participation in most financial products. The results testify to the general benefits of financial literacy for empowering decision-making. The reasons vary according to product market, and are different among male and female decision-makers, thus highlighting the need for targeted interventions to increase participation rates in financial products and services.

#### **4.3.6 Endogeneity and robustness**

There is a simultaneity between financial responsibility and financial literacy. Financial literacy helps households to become financially responsible and in turn, the financial re-

sponsibility gives them exposure to financial concepts which may positively impact their level of financial understanding. As a result of this mechanism, the estimation suffers from an endogeneity problem. For robustness check, we are performing a two-step estimation by joining considering the estimation of financial responsibility and product holdings. We can also use the instrumental variable approach for the robustness check. The instrumental variable approach helps in overcoming endogeneity, but finding a perfect instrumental variable is again a challenge.

## **4.4 Conclusion**

Recent surveys highlight that globally women play a marginal role in financial decision-making within households, especially when in the case of investment decisions for the future and making long-term planning decisions. At the same time, studies have documented lower levels of financial literacy among women than men. Given the above, this chapter sets out to investigate the role of financial literacy in empowering women to actively participate in household decision-making. Our granular cross-sectional data is from India's national benchmark survey for financial literacy and inclusion, covering 59,406 respondents. We observe three levels of financial responsibility that a respondent can take on when managing their household finances, namely sole responsibility for making financial decisions, joint responsibility with spouse, and no responsibility at all. Using this information, we also investigate the portfolio holdings of households that are run by male and female sole financial decision-makers and those that are run by husband-and-wife teams jointly responsible for making their households' financial decisions.

As expected, women are observed to take on lower levels of responsibility than men on average; however, this pattern reverses for financially literate women. We find that financially literate women have a significantly greater likelihood of taking on higher levels of responsibility in managing their households' financial matters. Additionally, the increased level of responsibility for managing finances by women translates to higher participation of households in financial products, with marginal gains greater than for men. When we consider households where financially literate men and women are jointly responsible with their spouse for financial decision-making, the probability of holding financial products increases even further, particularly where it is the wife who is financially literate.

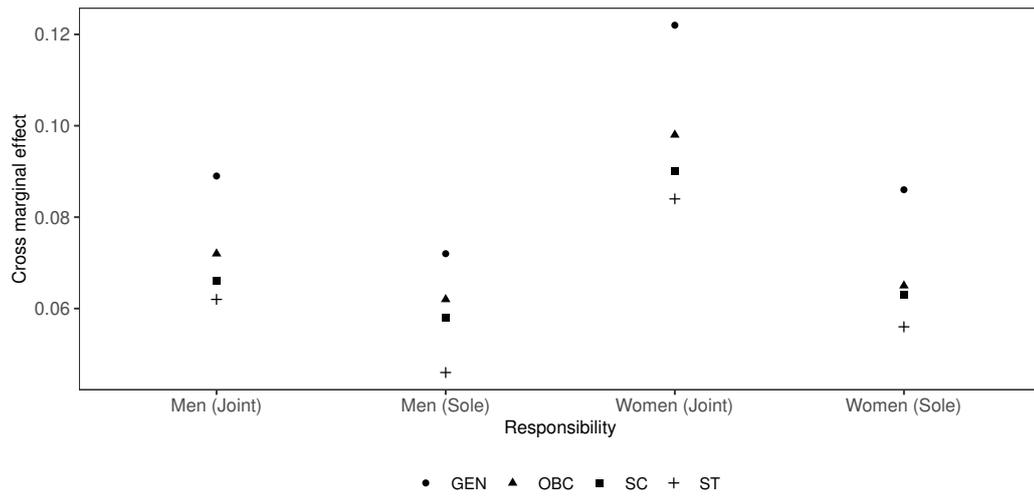
In this regard, we study households' holdings in eighteen different financial products, which are classified into six different product categories, including savings schemes, investment products, shares/stocks, insurance products, loans and credit cards and alternative investment products. We also take into account households' informal banking activities; that is, whether they save money at home, save money informally and have borrowed from money lenders. The findings reveal that financially literate female decision-makers have a higher probability of investing in security-focused products such as saving schemes, insurance products and alternative investments, and are less involved in informal banking activities, while financially literate male decision-makers have a higher probability of holding higher risk-return products such as investment products and stocks/shares. When financially literate women are jointly responsible with their spouse for managing their households' finances, we observe the highest participation rates in all financial products. Thus, encouraging financially literate women to be jointly responsible in managing household finances with their spouse is optimal in enhancing participation in financial product markets.

When we consider marginal gains of financial literacy across the caste hierarchy and social norms in India, we find that financially literate women across the caste hierarchy in India continue to participate more in financial products and services; however, the marginal gains of financial literacy is more pronounced among the more privileged castes, as compared to the lower castes. Thus, government interventions to increase financial literacy levels should consider the caste hierarchy and the participation gap in the lower castes.

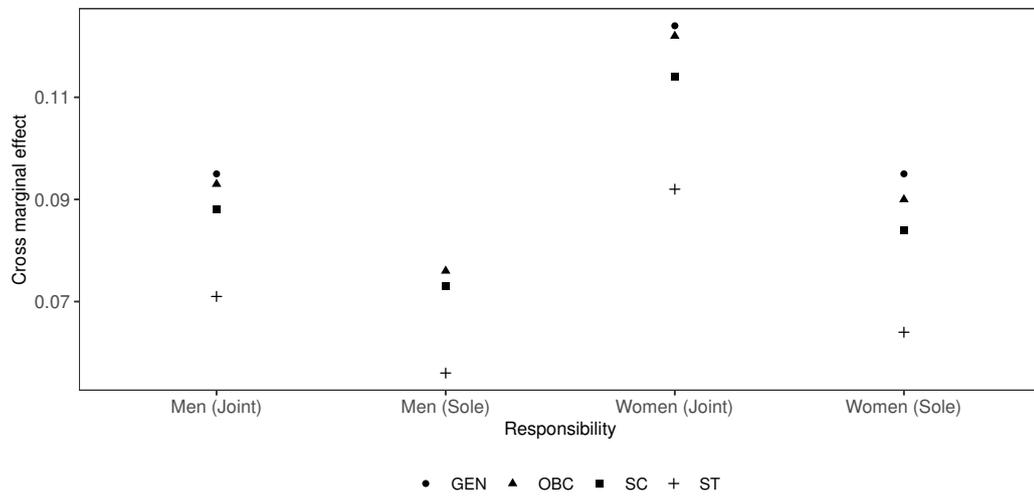
Overall, as witnessed by literature, women are increasingly taking more responsibilities in their household money matters. However, still they lag behind men in terms of financial literacy and level of financial responsibility in household decision-making. Constrained by gender norms, women need a policy framework to bring themselves on par with men. Addressing these challenges, the chapter shows the financial literacy can work as a policy tool to make them more responsible in household decisions. Financial literacy not only helps women take a more responsible role in their household decision but also when they make these decisions jointly with their spouses they outperform any other decision-makers. Therefore, the central theme of this chapter documents that empowering decision-makers with financial literacy has the potential for improving households' financial decision-making abilities and can also serve as an important intervention tool to increase gender equality and social parity.

## 4.5 Figures

Figure 4.1: **Financial portfolio choices across caste.** In the picture, the dots are the cross marginal effects of financial literacy on the likelihood of holding a financial product.

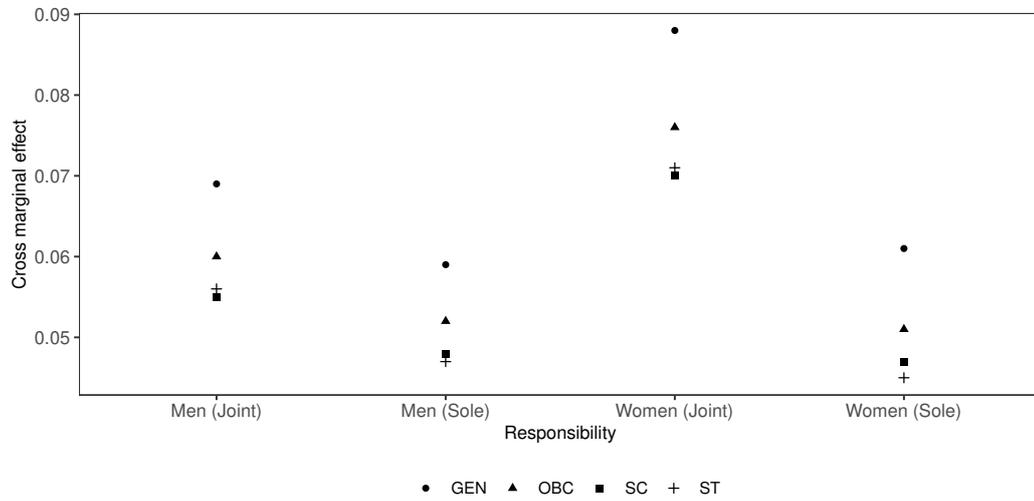


a) Savings products.

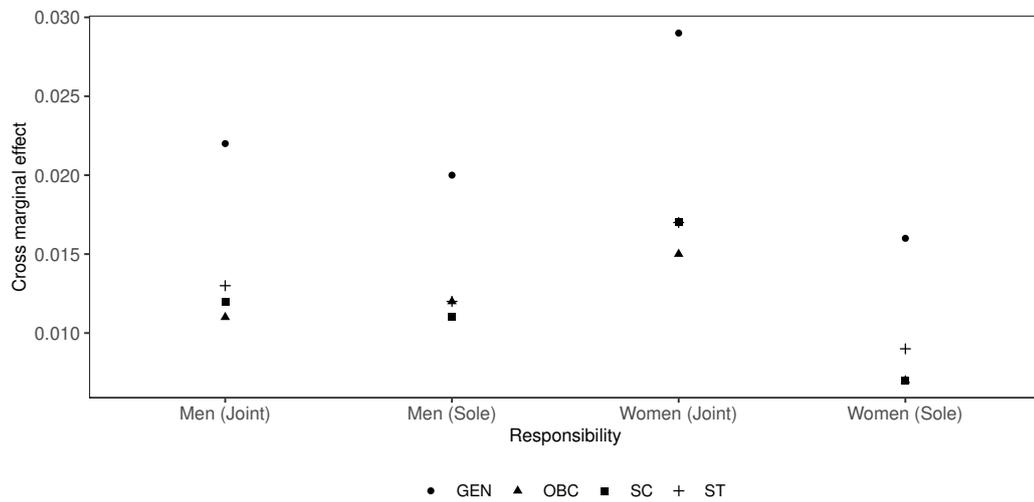


b) Insurance products.

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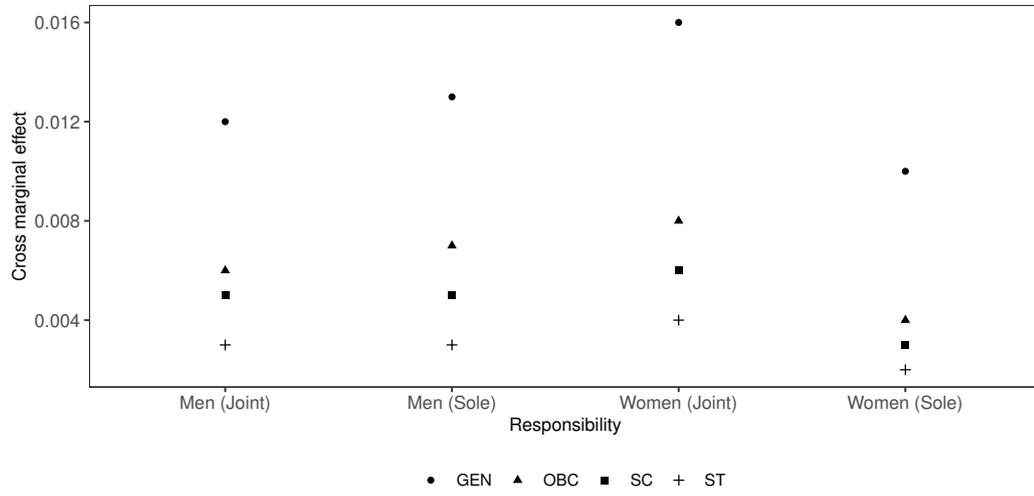


c) Loan and credit products.

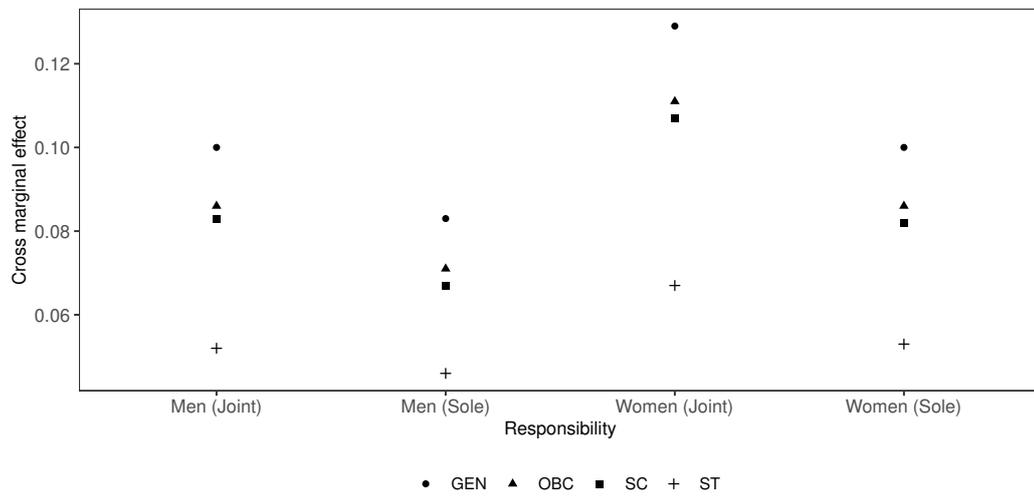


d) Investment products.

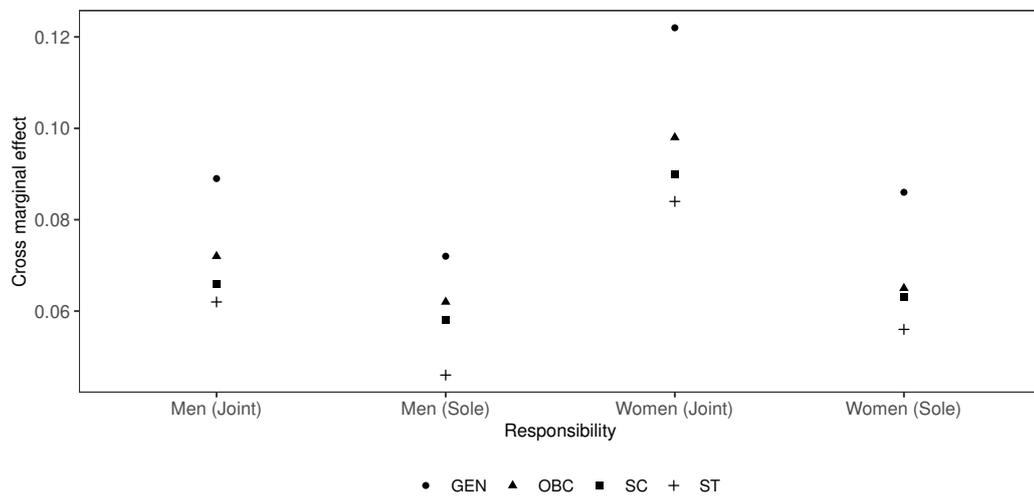
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e) Shares and stocks.



f) Alternative investments.



g). Informal banking.

## 4.6 Tables

Table 4.1: **Summary statistics.** This table reports the summary statistics (counts and percentages) of the demographic and socio-economic characteristics of the sample.

	Segments	Counts	Percentages
Age	18-24 Years	6,469	10.89
	25-49 Years	38,137	64.20
	50-64 Years	10,617	17.87
	65-80 Years	4,182	7.04
Gender	Men	32,236	54.26
	Women	27,169	45.74
Castes	General castes	29,829	50.21
	Other backward castes	15,255	25.68
	Scheduled castes	6,973	11.74
	Scheduled tribes	7,348	12.37
Family structure	Nuclear family	28,844	48.55
	Nuclear family with elders	6,547	11.02
	Joint family	24,014	40.42
Location	Urban	28,280	47.61
	Rural	31,125	52.39
Zones	North	12,394	20.86
	North-east	6,853	11.54
	Eastern	9,647	16.24
	Central	10,245	17.25
	West	9,959	16.76
	South	10,307	17.35
Education (years of schooling in parentheses)	Illiterate (<5 Years)	9,450	15.91
	Primary (5-7 Years)	5,899	9.93
	Upper Primary (8-9 Years)	8,796	14.81
	Secondary (10-11 Years)	11,513	19.38
	Senior Secondary (12-13 Years)	9,952	16.75
	Diploma (14-17 Years)	1,170	1.97
	Graduate and above (>17 Years)	12,625	21.25
Employment status	Employed	38,086	64.11
	Unemployed	21,319	35.89
Occupation	Self-employed	16,901	28.45
	Housewife	18,217	30.67
	Labourers	8,257	13.90
	Salaried	12,959	21.81
	Retired	3,071	5.17
Income bracket (per year)	< ₹ 10,000	4,132	6.96
	₹ 10,001-50,000	13,354	22.48
	₹ 50,001-200,000	15,756	26.52
	₹ 200,001-500,000	5,281	8.89
	₹ 500,001-10,00,000	1,027	1.73
	≥ ₹ 10,00,001	189	0.32
	No income	19,658	33.09
Confidential	8	0.01	
Total number of respondents		59,405	100

Table 4.2: **Financial responsibility summary statistics.** This table reports the summary statistics (counts and percentages) the financial responsibility of respondents in the financial decision-making of their household.

	Men		Women		Overall	
	Counts	(%)	Counts	(%)	Counts	(%)
Sole responsible	8,563	(62.65)	5,105	37.35	13,668	23.01
Joint responsible	5,179	(49.04)	5,382	50.96	10,561	17.78
Not responsible	18,494	(52.58)	16,682	47.42	35,176	59.21
Total	32,236	(54.26)	27,169	45.74	59,405	100.00

Table 4.3: **Financial access sample statistics.** This table reports the average level of financial access (percentage of respondents with access to banking correspondents in their neighborhood, number of bank branches per thousand households in respondent's district) across the various administrative zones of India. Banking Correspondents are agencies and individuals appointed by banks, under the guidelines set out by the Reserve Bank of India, to provide basic banking services in locations where there is limited access to bank branches and ATMs.

Zone	Percentage with access to banking correspondents	Number of bank branches per thousand households
North	3.61	1.89
North East	2.04	1.36
Eastern	4.04	1.30
Central	2.22	1.31
West	1.48	1.91
South	5.34	2.04
All zones	3.20	1.66

Table 4.4: **Financial literacy differences according to gender.** This table reports male and female respondents' levels of financial literacy as percentages. Seven survey questions capture respondents' comprehension of basic financial concepts, encompassing time value of money, interest paid on loan, simple interest, compound interest, risk and return, diversification and understanding of inflation. Appendix A provides the detailed wording of the survey questions.

	Correct (in %)			Don't know (in %)		
	Men	Women	t-value	Men	Women	t-value
Panel A: Comparison of responses across different financial literacy questions						
Time value of money	41.20	37.23	9.89***	27.93	31.34	-9.06***
Interest paid on loan	76.16	74.73	4.03***	15.01	16.38	-4.56***
Simple interest calculation	56.80	51.76	12.26***	30.29	35.36	-13.11***
Compound interest calculation	31.74	29.01	7.21***	42.08	46.66	-11.20***
Risk and return	59.32	56.26	7.54***	21.51	24.84	-9.57***
Diversification	59.56	56.58	7.32***	22.02	24.76	-7.84***
Understanding of inflation	63.81	59.94	9.68***	21.97	25.88	-11.13***
Panel B: Comparison of aggregate responses						
	Men	Women	t-value			
All the seven questions are correct	9.39	7.80	6.92***			
None of the seven questions are correct	5.22	6.26	-5.45***			
Average financial literacy score (count)	3.89	3.66	14.31***			
Average financial literacy score (FinLit)	0.32	0.30	14.30***			

**Table 4.5: Financial responsibility and financial literacy.** This table reports the ordered probit regression results for the relationship between levels of financial responsibility and financial literacy. The dependent variable is an ordered response variable taking the values of 1, 2 or 3, corresponding to the respondent's level of responsibility in financial and money management of the family, namely, no responsibility, joint responsibility or sole responsibility, respectively. Control variables include age, caste classification, family structure, education, employment status, income, occupation type, respondent's access to Banking Correspondents in their neighborhood and bank branch density at the district-level. Definitions of all variables are provided in Appendix C. Panel B reports the marginal effects using the estimated model in column (2). Robust standard errors are provided in parentheses. \*\*\*, \*\* and \* indicate statistical significance at 1, 5 and 10 percent, respectively.

	(1)	(2)
Panel A: Estimation results		
FinLit	0.527*** (0.028)	
FinLit × Men		0.451*** (0.037)
FinLit × Women		0.622*** (0.040)
Women	-0.118*** (0.015)	-0.173*** (0.022)
Demographic controls	Yes	Yes
Financial access controls	Yes	Yes
State fixed effects	Yes	Yes
Financial responsibility $\geq 1$	0.650*** (0.090)	0.623*** (0.090)
Financial responsibility $\geq 2$	1.173*** (0.090)	1.147*** (0.090)
Observations	59,406	59,406
Pseudo R-squared	0.025	0.025
Panel B: Marginal effects		
FinLit × Women → No Responsibility		-0.233*** (0.015)
FinLit × Men → No Responsibility		-0.169*** (0.014)
FinLit × Women → Joint Responsibility		0.050*** (0.003)
FinLit × Men → Joint Responsibility		0.037*** (0.003)
FinLit × Women → Sole Responsibility		0.183*** (0.012)
FinLit × Men → Sole Responsibility		0.133*** (0.011)

**Table 4.6: Financial holding, financial responsibility and financial literacy.** This table reports the marginal effects from the joint modeling of responsibility levels and financial portfolio holdings. Marginal effects estimated from Equation (4.2) are reported in Panel A and from Equation (4.3) in Panel B. The dependent variable in Panel A is an ordered response variable taking the values of 1, 2 or 3, corresponding to the respondent's level of responsibility in financial and money management of the family, namely, no responsibility, joint responsibility or sole responsibility, respectively. The dependent variable in Panel B is a dichotomous variable taking the value of 1 if the respondent holds at least one product in the particular financial product category being considered, and zero otherwise. Holdings information on six different financial products categories and informal banking products are considered separately. Panel C reports the cross-marginal effects of financial literacy on product holdings, for different responsibility levels. Regression models in Panels A and B control for age, caste classification, family structure, education, employment status, income, occupation type, respondent's access to Banking Correspondents in their neighborhood and bank branch density at the district-level. Definitions of all control variables are provided in Appendix C. The row of differences in marginals reports the relative percentage differences, as in Equation (4.8). The stars in square brackets report the significance levels for the differences between sole responsibility and joint responsibility marginals. Standard errors of marginal effects are reported in parentheses. \*\*\*, \*\* and \* indicate statistical significance at 1, 5 and 10 percent, respectively.

	Savings schemes		Investment products		Share/stocks		Insurance products		Loans and credit cards		Alternative investments		Informal banking	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Panel A: Marginal effects of financial literacy on the predicted responsibility levels														
FinLit → Sole responsibility	0.060*** (0.005)	0.082*** (0.006)	0.013*** (0.002)	0.017*** (0.003)	0.007*** (0.002)	0.009*** (0.002)	0.071*** (0.005)	0.092*** (0.005)	0.049*** (0.005)	0.063*** (0.005)	0.070*** (0.008)	0.090*** (0.010)	-0.072*** (0.006)	-0.095*** (0.006)
FinLit → Joint responsibility	0.078*** (0.006)	0.106*** (0.007)	0.016*** (0.002)	0.022*** (0.002)	0.008*** (0.001)	0.011*** (0.002)	0.092*** (0.006)	0.119*** (0.007)	0.064*** (0.005)	0.082*** (0.006)	0.085*** (0.008)	0.110*** (0.010)	-0.096*** (0.007)	-0.127*** (0.008)
Panel B: Marginal effects of predicted responsibility on financial holdings														
Sole responsibility → Holdings	0.009 (0.023)	0.001 (0.019)	-0.001 (0.009)	-0.001 (0.009)	0.004 (0.013)	0.001 (0.006)	0.012 (0.022)	0.002 (0.020)	0.014 (0.025)	0.004 (0.019)	0.043*** (0.013)	0.031** (0.012)	0.013 (0.027)	0.018 (0.027)
Joint responsibility → Holdings	0.027 (0.015)	0.010 (0.012)	0.000 (0.006)	0.000 (0.006)	0.003 (0.009)	0.000 (0.004)	0.029* (0.014)	0.009 (0.012)	0.025 (0.016)	0.008 (0.012)	0.045*** (0.010)	0.028** (0.009)	0.006 (0.015)	0.019 (0.015)
Panel C: Cross-marginal effects of financial literacy on product holdings, for different responsibility levels														
FinLit → Holdings (Sole responsible)	0.065*** (0.005)	0.074*** (0.006)	0.016*** (0.003)	0.012*** (0.002)	0.009*** (0.002)	0.006*** (0.002)	0.072*** (0.005)	0.089*** (0.005)	0.055*** (0.005)	0.055*** (0.005)	0.074*** (0.008)	0.088*** (0.010)	-0.071*** (0.005)	-0.096*** (0.006)
FinLit → Holdings (Jointly responsible)	0.078*** (0.006)	0.107*** (0.007)	0.017*** (0.002)	0.022*** (0.002)	0.008*** (0.001)	0.011*** (0.002)	0.091*** (0.006)	0.118*** (0.007)	0.063*** (0.005)	0.081*** (0.006)	0.088*** (0.008)	0.113*** (0.010)	-0.095*** (0.007)	-0.125*** (0.008)
Differences in marginals	20.82% [*]	44.06% [***]	3.17% [∅]	90.37% [***]	-12.66% [∅]	72.08% [**]	26.40% [***]	33.69% [***]	14.46% [∅]	47.23% [***]	18.66% [∅]	28.78% [***]	34.26% [***]	30.15% [***]
Observations	59,406	59,406	59,406	59,406	59,406	59,406	59,406	59,406	59,406	59,406	59,406	59,406	59,406	59,406

**Table 4.7: Financial literacy marginal effects for product holdings across the caste hierarchy.** This table reports the marginal effects of financial literacy on product holding, derived from the joint modeling of responsibility levels and financial portfolio holdings (Equations (4.2) and (4.3)). The caste hierarchy consists of four major groupings in order of privilege, namely General, Other Backward Caste, Scheduled Caste and Scheduled Tribe. The row of differences in marginals reports the relative percentage differences between the estimated marginal effect of sole and joint responsibility as in Equation 4.9. The stars in square brackets report the significance of differences between marginals. Standard errors of marginal effects are reported in parentheses. \*\*\*, \*\* and \* indicate statistical significance at 1, 5 and 10 percent, respectively.

	Savings schemes		Investment products		Share/stocks		Insurance products		Loans and credit cards		Alternative investments		Informal banking	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
General castes (Sole responsible)	0.072*** (0.005)	0.086*** (0.006)	0.020*** (0.003)	0.016*** (0.003)	0.013*** (0.002)	0.010*** (0.002)	0.073*** (0.005)	0.095*** (0.005)	0.059*** (0.005)	0.061*** (0.005)	0.083*** (0.005)	0.100*** (0.010)	-0.069*** (0.005)	-0.093*** (0.006)
General castes (Jointly responsible)	0.089*** (0.007)	0.122*** (0.007)	0.022*** (0.003)	0.029*** (0.003)	0.012*** (0.002)	0.016*** (0.002)	0.095*** (0.006)	0.124*** (0.007)	0.069*** (0.006)	0.088*** (0.006)	0.100*** (0.009)	0.129*** (0.011)	-0.090*** (0.007)	-0.119*** (0.007)
Differences in marginals	24.54% [*]	41.62% [***]	7.95% []	81.79% [***]	-7.26% []	64.87% [**]	30.10% [***]	30.77% [***]	15.88% []	44.41% [***]	20.09% []	29.26% [°]	31.58% [**]	28.18% [***]
Other backward castes (Sole responsible)	0.062*** (0.005)	0.065*** (0.006)	0.012*** (0.002)	0.007*** (0.002)	0.007*** (0.002)	0.004*** (0.001)	0.076*** (0.005)	0.090*** (0.006)	0.052*** (0.005)	0.051*** (0.005)	0.071*** (0.008)	0.086*** (0.010)	-0.074*** (0.006)	-0.102*** (0.007)
Other backward castes (Jointly responsible)	0.072*** (0.006)	0.098*** (0.007)	0.011*** (0.002)	0.015*** (0.002)	0.006*** (0.001)	0.008*** (0.001)	0.093*** (0.006)	0.122*** (0.007)	0.060*** (0.005)	0.076*** (0.005)	0.086*** (0.008)	0.111*** (0.010)	-0.100*** (0.007)	-0.132*** (0.008)
Differences in marginals	15.88% []	50.65% [***]	-4.31% []	118.72% [***]	-18.58% []	96.84% [**]	23.34% [**]	35.58% [***]	13.67% []	50.33% [***]	20.71% []	29.24% [°]	35.85% [***]	29.80% [***]
Scheduled castes (Sole responsible)	0.058*** (0.005)	0.063*** (0.006)	0.011*** (0.002)	0.007*** (0.002)	0.005*** (0.001)	0.003*** (0.001)	0.073*** (0.005)	0.084*** (0.006)	0.048*** (0.005)	0.047*** (0.005)	0.067*** (0.008)	0.082*** (0.010)	-0.073*** (0.006)	-0.096*** (0.007)
Scheduled castes (Jointly responsible)	0.066*** (0.005)	0.090*** (0.007)	0.012*** (0.002)	0.017*** (0.002)	0.005*** (0.001)	0.006*** (0.001)	0.088*** (0.006)	0.114*** (0.007)	0.055*** (0.005)	0.070*** (0.005)	0.083*** (0.009)	0.107*** (0.010)	-0.099*** (0.007)	-0.131*** (0.008)
Differences in marginals	14.75% []	43.14% [***]	9.96% []	134.65% [***]	-13.25% []	98.08% [**]	20.50% [°]	36.11% [***]	13.96% []	48.42% [***]	23.52% []	30.63% [°]	36.64% [***]	36.70% [***]
Scheduled tribes (Sole responsible)	0.046*** (0.005)	0.056*** (0.006)	0.012*** (0.002)	0.009*** (0.002)	0.003*** (0.001)	0.002*** (0.001)	0.056*** (0.004)	0.064*** (0.005)	0.047*** (0.005)	0.045*** (0.005)	0.046*** (0.006)	0.053*** (0.008)	-0.071*** (0.005)	-0.097*** (0.006)
Scheduled tribes (Jointly responsible)	0.062*** (0.005)	0.084*** (0.006)	0.013*** (0.002)	0.017*** (0.002)	0.003*** (0.001)	0.004*** (0.001)	0.071*** (0.005)	0.092*** (0.006)	0.056*** (0.005)	0.071*** (0.005)	0.052*** (0.007)	0.067*** (0.008)	-0.096*** (0.007)	-0.126*** (0.008)
Differences in marginals	32.95% [**]	49.71% [***]	6.74% []	91.40% [***]	-0.89% []	113.67% [**]	26.02% [**]	43.70% [***]	17.86% []	57.22% [***]	12.05% []	25.88% []	35.81% [***]	30.58% [***]
Observations	59,406	59,406	59,406	59,406	59,406	59,406	59,406	59,406	59,406	59,406	59,406	59,406	59,406	59,406

**Table 4.8: Financial literacy marginal effects for product holdings across the rural-urban split.** This table reports the marginal effects of financial literacy on product holding, derived from the joint modeling of responsibility levels and financial portfolio holdings (Equations (4.2) and (4.3)). The row of differences in marginals reports the relative percentage differences between the estimated marginal effect of sole and joint responsibility. The stars in square brackets report the significance of differences between marginals. Standard errors of marginal effects are reported in parentheses. \*\*\*, \*\*, \* and \* indicate statistical significance at 1, 5 and 10 percent, respectively.

	Savings schemes		Investment products		Share/stocks		Insurance products		Loans and credit cards		Alternative investments		Informal banking	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Rural (Sole responsible)	0.055*** (0.005)	0.058*** (0.005)	0.010*** (0.002)	0.006*** (0.001)	0.005*** (0.001)	0.003*** (0.001)	0.070*** (0.005)	0.078*** (0.005)	0.050*** (0.005)	0.044*** (0.004)	0.065*** (0.007)	0.073*** (0.009)	-0.071*** (0.005)	-0.097*** (0.007)
Rural (Jointly responsible)	0.064*** (0.005)	0.086*** (0.006)	0.010*** (0.001)	0.013*** (0.002)	0.004*** (0.001)	0.005*** (0.001)	0.084*** (0.006)	0.107*** (0.006)	0.055*** (0.005)	0.070*** (0.005)	0.074*** (0.008)	0.095*** (0.009)	-0.096*** (0.007)	-0.125*** (0.008)
Differences in marginals	16.00% [***]	49.33% [***]	-2.84% []	111.80% [***]	-23.94% [***]	92.14% [***]	20.43% [***]	38.18% [***]	9.29% [***]	59.39% [***]	14.50% [***]	31.31% [***]	34.77% [***]	29.60% [***]
Urban (Sole responsible)	0.065*** (0.005)	0.079*** (0.006)	0.022*** (0.003)	0.017*** (0.003)	0.014*** (0.003)	0.010*** (0.002)	0.059*** (0.005)	0.089*** (0.005)	0.067*** (0.005)	0.067*** (0.006)	0.087*** (0.008)	0.106*** (0.011)	-0.068*** (0.005)	-0.091*** (0.006)
Urban (Jointly responsible)	0.082*** (0.006)	0.109*** (0.007)	0.024*** (0.003)	0.031*** (0.003)	0.013*** (0.002)	0.017*** (0.002)	0.091*** (0.006)	0.116*** (0.007)	0.078*** (0.006)	0.098*** (0.006)	0.106*** (0.009)	0.137*** (0.011)	-0.090*** (0.007)	-0.119*** (0.007)
Differences in marginals	25.07% [***]	39.17% [***]	5.80% []	80.21% [***]	-7.80% []	66.58% [***]	31.82% [***]	29.86% [***]	15.14% [***]	46.29% [***]	21.69% [***]	29.29% [***]	33.18% [***]	30.52% [***]
Observations	59,406	59,406	59,406	59,406	59,406	59,406	59,406	59,406	59,406	59,406	59,406	59,406	59,406	59,406

**Table 4.9: Reasons for non-participation in financial products.** This table reports from probit regressions the marginal effects of financial literacy for the reasons of non-participation in the product segments, namely, savings, insurance, pensions and capital markets. The sample consists of only respondents who are either sole or joint financial decision-makers in their households, aware of the product segment, but do not hold, any products from that product segment. The dependent variable captures whether or not the respondent has chosen a reason for not holding a financial product. We classify respondents as those with low (high) financial literacy if their individual financial literacy scores are below (above) the median score. The regressions control for age, caste classification, family structure, education, employment status, income, occupation type, respondent's access to Banking Correspondents in their neighborhood and bank branch density at the district-level. Definitions of the control variables are provided in Appendix C. Standard errors of marginal effects are reported in parentheses. \*\*\*, \*\* and \* indicate statistical significance at 1, 5 and 10 percent, respectively.

Panel A: Reasons for non-participation in savings products

	Accessibility	Affordability	Choice	Complexity	Others
LowFinLit × Men	−0.096** (0.036)	0.177 (0.126)	−0.337** (0.112)	0.151* (0.064)	0.043 (0.116)
HighFinLit × Men	−0.030 (0.017)	−0.029 (0.055)	−0.136** (0.050)	0.076** (0.029)	0.043 (0.049)
LowFinLit × Women	−0.011 (0.034)	0.062 (0.109)	−0.069 (0.099)	0.131* (0.051)	0.055 (0.099)
HighFinLit × Women	−0.002 (0.016)	−0.161** (0.050)	0.015 (0.045)	0.044 (0.024)	0.215*** (0.043)
Demographic controls	Yes	Yes	Yes	Yes	Yes
Financial access	Yes	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	4,708	5,804	5,843	5,307	5,843

Panel B: Reasons for non-participation in insurance products

	Affordability	Choice	Complexity	Others	Religion	Trust
LowFinLit × Men	0.242** (0.081)	−0.157* (0.065)	−0.026 (0.031)	−0.026 (0.034)	−0.010 (0.020)	0.000 (0.034)
HighFinLit × Men	−0.023 (0.034)	−0.049 (0.027)	−0.038** (0.014)	−0.005 (0.015)	−0.019* (0.010)	−0.003 (0.014)
LowFinLit × Women	0.136 (0.080)	−0.061 (0.064)	−0.029 (0.030)	0.004 (0.028)	−0.017 (0.022)	0.027 (0.033)
HighFinLit × Women	−0.043 (0.035)	0.069* (0.028)	0.004 (0.013)	0.005 (0.012)	−0.008 (0.009)	0.016 (0.015)
Demographic controls	Yes	Yes	Yes	Yes	Yes	Yes
Financial access	Yes	Yes	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,950	13,950	13,656	13,655	12,227	13,457

4.6. Tables

Panel C: Reasons for non-participation in pension products

	Accessibility	Affordability	Choice	Kinship	Knowledge
LowFinLit × Men	0.034 (0.029)	0.063 (0.047)	0.242*** (0.056)	0.014 (0.020)	0.051 (0.032)
HighFinLit × Men	0.003 (0.012)	0.025 (0.020)	0.117*** (0.023)	-0.005 (0.009)	0.026 (0.014)
LowFinLit × Women	0.007 (0.032)	0.081 (0.050)	0.132* (0.060)	0.012 (0.023)	0.016 (0.034)
HighFinLit × Women	-0.006 (0.014)	0.023 (0.022)	0.131*** (0.025)	0.009 (0.010)	-0.013 (0.016)
Demographic controls	Yes	Yes	Yes	Yes	Yes
Financial access	Yes	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	19,899	20,844	20,844	20,308	20,844

Panel D: Reasons for non-participation in capital market products

	Affordability	Choice	Complexity	Knowledge	Bad returns	Religion	Trust
LowFinLit × Men	0.061 (0.037)	0.092* (0.039)	0.028 (0.025)	-0.045 (0.041)	0.072* (0.028)	0.008 (0.011)	0.067* (0.027)
HighFinLit × Men	0.043** (0.015)	0.048** (0.015)	0.028** (0.009)	0.007 (0.016)	0.047*** (0.011)	-0.005 (0.005)	0.043*** (0.011)
LowFinLit × Women	0.014 (0.045)	0.086 (0.046)	0.046 (0.029)	0.128** (0.049)	0.044 (0.035)	-0.014 (0.017)	0.013 (0.031)
HighFinLit × Women	0.008 (0.019)	0.057** (0.019)	0.012 (0.012)	0.084*** (0.020)	0.034* (0.015)	0.000 (0.005)	0.010 (0.013)
Demographic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Financial access	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	22,520	22,719	22,520	22,719	22,719	19,801	22,174

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# Caste Based Discrimination and its Effect on Financialization and Crime Reporting

## 5.1 Introduction

Caste plays a pivotal role in shaping Indian's economic life (Munshi and Rosenzweig, 2006; Munshi, 2019). Caste is an important determinant of India's social identity, dividing Indians into mutually exclusive four hereditary groups, ranked by ritual status. Based on the strong inter-generational persistence in human capital, the available evidence indicates intense discrimination based on caste in education, jobs, and politics (UNDP, 2010; Siddique, 2011; Das and Kapoor, 2012). Our aim in this chapter is to explore if the influence of caste extends to the shaping of economic outcomes of the households? In this chapter, we measure economic outcomes in terms of two indicators: first, the household's awareness about the availability of financial products (i.e., financial awareness), and second, the ownership of financial products (i.e., financial holding). Following Munshi (2019), we divide the survey sample into two groups: the first group consists of households from General caste, and the second group includes respondents from marginalized castes, namely, Other backward Caste (OBC), Scheduled Caste (SC), and Scheduled Tribe (ST). Unlike the respondents from marginalized castes, General caste respondents enjoyed the superior ritual status historically, and as a result of that they had access to unconstrained economic opportunities compared to their counterparts.

Considering the cost of acquiring information, the economic agents predict other economic agents based on limited available information about them, which leads to economic discrimination between agents despite having comparable demographic attributes (see Akerlof, 1970). Statistical discrimination is a phenomenon where an economic agent (let's say a bank branch manager) makes an economic assessment about another economic agent (a bank customer) using limited observable characteristics such as physical traits that are used to categorize their gender and caste, as a proxy for other unobservable characteristics which are outcome relevant. Therefore, in absence of sufficient information about the customer's credit history, educational qualification, and criminal background, the bank manager may substitute these attributes of the customer with the real or imagined group averages or stereotypes to fill the information gap. Following this, Phelps (1972), and Arrow (1971) theorize the discrimination in behavior by observing the behavior of another member of society (i.e., *statistical discrimination*).

As a result of this, the customers get prejudiced based on the aggregate characteristics of the customer's gender and caste. Next, Becker (1971) argues the presence of employer's prejudice in hiring leads to labor market discrimination (i.e., *taste-based discrimination*). In either of the above discrimination, the discriminator is consciously discriminate agents based on his taste and experience, in contrary Bertrand et al. (2005) terms *implicit discrimination*, which is the form of discrimination where the discriminator is unaware of his act of discrimination and his action of discrimination is unintentional. Fang and Moro (2010) provides an excellent survey of discrimination literature. We suppose considering the intergenerational nature of caste and the availability of rich documentation around the respondent's caste profile reveals respondents' caste identity to financial service providers. Therefore, we argue if the financial service providers discriminate against the agents in delivering financial services is "statistical" in nature. We assert that assessing the agents' trust and creditworthiness is prone to the service-providers inherent bias about the caste of the service-seeking agent.

Apart from studying the influence of caste-based discrimination on financial awareness and product holdings, our interest is to explore the social cost of caste-based discrimination. We consider two socio-economic indicators to study the cost of caste-based discrimination in economic outcomes, namely, financialization and crime-reporting. First, we explore how the extent of caste-based discrimination in economic outcomes impedes the financialization of administrative districts. Second, we evaluate the effect of caste-based discrimination in

economic outcomes on the crime-reporting rates and inter-caste harmony. The financialization of administrative districts is directly related to the residents' financial access, and as we explored in previous chapters, financial access helps the financial participation. Next, the rate of crime reporting positively correlates with the quality of institutional development (see Soares, 2004). A significant amount of crime incidents goes unreported in India (see IDFC, 2017). Having more crime reporting indicates improved confidence in the district administration. Together with financialization, the crime reporting rates work as a proxy for the quality of social development, and findings addressing the above two social development issues has obvious policy relevance.

We use financial literacy and inclusion survey fielded in 2014 for empirical investigation. Chapter 2 discusses the survey design and summary statistics for the data. For the bank branch data, we use the RBI bank branch database, and we source the district level population from the open access databank of the Indian government. We use India's National Crime Records Bureau (NCRB) database to procure the sample districts' crime reporting for 2014.

Empirically, we first examine the caste-based discrimination in economic outcomes, namely, financial awareness and financial holdings. We estimate discrimination by testing the marginalized caste respondents' fitted economic outcomes with the predicted economic outcomes when they get treated as general caste respondents. After establishing a presence of discrimination, we further explore the household attributes which drive this caste-based discrimination. Next, we aggregate the level of discrimination in economic outcomes across the administrative districts. Using these aggregated levels of discrimination, we further explore the relationship between the estimated caste-based discrimination with social indicators of the quality of institutions across administrative districts, namely, financialization and crime-reporting. Out of samples 150 administrative districts, we find a comparable sample of respondents belonging to the general castes and marginalized castes only in 143 districts. Hence, we limit our social-impact study to these 143 districts.

The chapter's empirical results show that the respondents' financial knowledge, academic achievement, and income helps them attain financial awareness and hold a diverse financial portfolio cutting across the caste lines. However, when we assess the extent of the association at the caste-level, we find the respondents from general castes leverages the demographic attributes much more efficiently than marginalized caste in attaining financial awareness and increasing the diversification in product holdings. We assert the gap

in the extent of association between general caste and marginalized caste due to caste-based discrimination. The respondents from general castes get unconstrained access to financial opportunities encouraged by their historically superior ritual status against the respondents from marginalized castes. The weaker association of demographic attributes of marginalized castes with the economic outcome may be due to the stigma of their lower caste status, or it may be related to the caste-based prejudice of financial service providers. We are leaving this elucidation for the future. Among demographic attributes, the empirical results show the employment, financial knowledge, zone of residence, income, and gender of the respondents are the key attributes that discriminate the general castes to their marginalized counterpart in helping the financial awareness and diversification in their financial portfolio.

Utilizing the empirical evidence from 143 districts, the empirical results of the chapter show that caste-based discrimination is related to substandard financialization and subdued crime reporting in the administrative districts. Therefore, caste-based discrimination not only impedes the economic opportunities available to the marginalized caste respondents but also it adversely affects the quality of institution in administrative districts. This chapter's findings add to the existing literature studying the socio-economic cost of the caste system in India. The chapter underlines the requirement of a policy initiative to counter caste-based discrimination, which is still prevailing despite having several interventions targeting marginalized castes from India's government, including abolishing untouchability caste-based reservations in education jobs and the introduction of laws targeting violence against marginalized castes.

The remainder of the paper is organized as follows. Section 5.2 summarizes the current literature studying the effect of caste on economic outcomes. Section 5.3 discusses the survey data along with data on financialization and crime. Section 5.4 presents the construction and measurement of key variables. Following this, Section 5.5 analyses the empirical results from various econometric models. Finally, we conclude in Section 5.6.

## 5.2 Literature survey: Economic effects of caste

Caste in India is a key determinant of occupational choice and human capital allocation. The work of Vallabhaneni (2015) briefly covers the historical origin and transformation of the caste system in India. The caste rules dictate not only behavior but also the punish-

ment for infractions. The caste system rewards economically the agents who follow the caste customs and those who fail to comply, suffer from the stigma of out-caste which is considered severe in the context of India. In spite of getting outlawed by the Indian constitution of 1950, using the statistical discrimination model Akerlof (1976) show caste system works spontaneously without direction from any individual or organization because it rewards economically to the agent who obeys it. However, the caste barriers erode when breaking the caste codes can bring profits, and therefore it is less binding for the agents with high social position. In general, Akerlof (1980) shows that the fear of losing social position may prevent individuals from making economically optimal choices in the labor market if such choices imply deviating from social norms. As a result of this, there is a strong intergenerational transmission of caste norms. There is an extant literature that show the intergenerational transmission of caste norms is remarkably strong for education (Huang et al., 2015), occupation (Kumar et al., 2002; Deshpande and Palshikar, 2008; Vaid, 2012; Hnatkovska et al., 2013; Iversen et al., 2017; Sinha, 2018) and partner selection (Banerjee et al., 2013). The work of (Kumar et al., 2002; Vaid, 2012; Sinha, 2018) document that castes play an important role in the intergenerational transmission of occupation and it is not weakening rather very slowly over time.

There is a growing literature that studies the role of caste identity in education and occupation (Akerlof and Kranton, 2000; Deshpande, 2000; Munshi and Rosenzweig, 2006) that ultimately shapes their economic outcomes. Studying the education choices of Mumbai residents, Munshi and Rosenzweig (2006) finds the lower castes discourage their men from pursuing high skill occupations in order to preserve strong social networks in low skill traditional occupations. Also, the intergenerational transmission of occupation reduces their job search cost and they find it optimal to stick with their traditional occupation instead of getting educated and explore the economic opportunity in the labor market. Examining the role of community ties, Banerjee and Munshi (2004) show the community ties help the garment workers in securing capital investments which prevent them to explore work in other labor markets. Cassan et al. (2021) examines the role of identity in the selection of occupation and shows that the traditionally agricultural castes are more productive in farm occupations as compared to other castes.

Exploring the role of caste in enduring economic inequality in India, Bapuji (2020) show the three caste-driven elements, namely, uneven dispersion in resource endowments, uneven access to productive resources and uneven opportunity causes the caste driven economic

inequality. Using an experimental setup, Hoff and Pandey (2014) shows caste identity also influences the social and economic behavior of the agents. Uneven endowment and opportunities together with intergenerational transmission of caste norms significantly affect the economic outcomes of the lower castes. Further, the stigma of lower caste affiliation, social discrimination, and their comfort with traditional occupation choices keeps them away from exploring the optimal economic opportunities that affect them economically. Utilizing the cross-section pan-India survey data, we show how the caste identity affects the level of financial awareness and financial holdings of the households. We further examine how caste-based discrimination affects the financialization and crime reporting of the administrative districts.

### **5.3 Data and variable construction**

We use household-level data from India's financial literacy and inclusion survey for our empirical investigations. Chapter 2 discusses the survey design and sample statistics of the survey respondents. We use the self-reported caste of the respondents to study caste-based discrimination. The Indian caste system is a complex social structure wherein their inherited hierarchy constrains individuals' social roles in the caste pyramid. The survey sample has 50% respondents from general caste, and in the rest of the 50%, it captures the respondents from marginalized castes belonging to three major caste segments, namely, Other Backward Caste (OBC), Scheduled Caste (SC), and Scheduled Tribe (ST), respectively.

## **5.4 Constructing key variables**

### **5.4.1 Financial awareness score**

The chapter uses the survey design discussed in Section 2.2.1 of the Chapter 2 to assess the respondents' level of financial awareness. The financial awareness score is the count of financial products about which the respondent is aware of their existence in the Indian financial market. The survey captures the respondents' awareness around twenty-eight financial products; therefore, a respondent's financial awareness score can range between zero to twenty-eight. Figure 5.1 plots the histogram of the financial awareness score.

## **5.4.2 Financial holding score**

The financial holding score of a respondent is the count of financial products available in the Indian financial market about which the respondent is not only aware but also holds that product in his portfolio. By construction, the financial holding score of a respondent is bounded above by his financial awareness score. Likewise, financial awareness score the financial holding score of a respondent can range between zero to twenty-eight.

## **5.4.3 Financial knowledge score**

The chapter uses the Section 2.2.4 of Chapter 2 to measure respondents' financial knowledge. Chapter 2 also provides the summary statistics of financial knowledge in India.

## **5.4.4 Financialization of districts**

The chapter utilizes the survey responses to the availability of banking correspondent question and bank-branch data to construct variables measuring the financialization of districts. The Reserve Bank of India rolled out the Banking Correspondents model in 2006 to target the 65% unbanked or underbanked households in the country. As a second measure of financial access, we consider bank branch density at the district level. The bank-branch density is the total number of bank branches per thousand households within a district. Table 5.1 reports the percentage of respondents in the NCFE survey having access to Banking Correspondents and the number of bank branches per thousand households, both aggregated at the administrative zone level. The South zone has the highest financial access, with 5.66% of the respondent having access to Banking Correspondents within the survey and 2.05 bank branches per thousand households. Eastern and Central part of India has the lowest level of bank branch density.

## **5.4.5 Crime reporting across administrative districts**

The chapter uses the National Crime Records Bureau (NCRB), Government of India's database on crime-reporting, to capture the crime-reporting rates across sampled 150 districts for 2014. Crime data captures the reported crimes into 88 detailed categories that can further consolidate into 12 broad categories: burglary, caste-riot, cheating, counterfeiting, dacoity dacoity-preparation, extortion, forgery, kidnapping, robbery, rape, and theft. We provide a short description of reported crimes in Appendix G following the 77th

amendment in Indian Penal Code(1860) by Parliament of India. Figure 5.5 plots the histogram of the count of average crime reporting per thousand respondents in India's sample 150 districts. Considering the reported types of crime, the reported theft, burglary, and cheating incidents outnumber any other crime types. However, we acknowledge the crime reporting rate is the fraction of the total number of crimes reported to the police, which is minuscule in number compared to the actual number of crime incidents. To illustrate the abysmal rate of crime reporting, we rely on survey findings by research think tanks. For instance, according to Mumbai based think tank IDFC (2017), only 6-8% of victims of theft in four major Indian cities have lodged an FIR (first information report) with the police. Therefore, a remaining 92-94% of crime incidents do not get reported in any official record. In certain cases, the victims themselves refrained from approaching the police, and hence those crime incidents go unreported. Therefore, we consider the crime-reporting as a measure of trust in district administration.

## 5.5 Empirical analysis

### 5.5.1 Caste-based discrimination in financial awareness

Our analysis aims to study the relationship between the respondents' financial awareness and their demographic attributes and how this relationship lead to discrimination. There are potentially two competing causes of the inferior outcome of the agent from the discriminated group. First, the decision-makers optimally make a judgment of the economic agents based on their asymmetric beliefs and stereotypes about the agent. Second, the agents enter into a self-enforcing cycle of discrimination due to the stigma of belonging to an inferior group. Ultimately, the agents are discouraged to compete with other agents because the assumed return on investment from those activities is expected to be lower than the non-discriminated group. We assert that the caste identity of economic agents is the revealed identity to the financial service providers. The respondents from lower castes are expected to be at the receiving end of discrimination from either part of the competing explanation of statistical discrimination based on caste. First, they get discriminated against at a financial literacy camp, and second, the stigma of belonging from a lower caste will hold them at status quo.

The financial awareness score is a variable measuring respondents' awareness level that can range between zero and twenty-eight. We assume the awareness about the financial

products is independent of each other. Also, the data show that several respondents in the sample are entirely unaware. In other words, the financial awareness score is a non-negative count variable having a considerable mass at zero. As a result, we find the Poisson distribution appropriately captures the financial awareness score's distributional properties. We use Poisson regression to explore the relationships between the respondents' financial awareness score and their financial knowledge under the above considerations. The next goal of our model is to illustrate a framework capturing caste-based discrimination. In order to show the caste-based discrimination, we divide the sample into two non-overlapping subsamples. The first subsamples include all the respondents from the general caste, and the second subsample includes the respondents from marginalized castes. We estimate the parameter of interest  $\theta'_c$  where  $c \in [G, M]$ , where  $\theta'_G$  is the estimate using the sample of general caste respondents, while  $\theta'_M$  is estimate using the sample of marginalized caste respondents. While estimating the parameter of interest  $\theta'_c \mathbf{X}_c$  for demographic and socioeconomic attributes. The model parameter corresponding to caste  $c$  is  $\theta_c = (\theta_{0,c}, \dots, \theta_{d,c}, \dots, \theta_{k,c})$  stacks all slope corresponding to  $k$  demographic attributes including financial knowledge in the following equation:

$$\log\left(\mathbb{E}(FAS_c | \mathbf{X}_c)\right) = \theta'_c \mathbf{X}_c, \text{ where, } c \in [G, M]. \quad (5.1)$$

The dependent variable ( $FAS$ ) in both sub-samples is the financial awareness score. The financial knowledge score is the key explanatory variable of interest. We control for demographic attributes of the respondents namely, age, gender, education, employment status, income, rural residency status, the geographic zone of residence, access to banking correspondent and bank branch density in the district of households. For the clarity of presentation, we use  $\mathbf{X}_c$  to stack the respondents' financial knowledge and other demographic attributes.

The estimated parameter of interest  $\theta_G$  using the observations from general caste respondents captures the loading of demographic attributes when the respondents belong to general castes. In other words,  $\theta_G$  reports the slopes of demographic attributes for a general caste respondent. Therefore, the predicted financial awareness score using  $\theta_G$  considers the respondents caste as general caste. Similarly,  $\theta_M$  captures the loading of demographic attributes for the respondents from marginalized castes.

Table 5.2 reports the estimation results of model Equation 5.1 corresponding to general and marginalized castes. In Panel A, the table reports the estimated slopes of  $\theta_c$  along with corresponding marginal effects. The estimation results show that financial knowledge

is positively associated with the respondents' financial awareness cutting across the caste lines. However, marginalized caste respondents are 21% more likely to be aware of financial products with a unit increase in financial knowledge as compared to general castes. On the other hand, with a unit increase in years of schooling, the general caste respondents are 48% more likely to be aware of financial products than marginalized caste respondents. Across the caste lines, women are less financially aware in comparison to their male counterparts, but the degree of unawareness is more severe among women from general castes. The respondents' income positively helps in attaining financial awareness across the caste lines, but general caste respondents make the most out of the increase in their income to attain financial awareness. The urban respondents are more aware than their rural counterparts, but general caste respondents benefit more from urbanization than marginalized castes. To sum up, the general caste respondents leverages the benefits of demographic attributes more efficiently than marginalized caste respondents. On the contrary, when we consider financial knowledge, it is a marginalized caste respondent who utilizes financial knowledge more efficiently than general caste respondents in attaining financial awareness.

Next, we compare the predicted financial awareness  $\mathbb{E}(FAS|\theta_c)$  of marginalized caste respondents using the model estimated using the observations from general caste respondents with the fitted financial awareness score of the model estimated using marginalized caste respondents. Comparing the mean predicted financial awareness score, we find evidence of statistical discrimination based on the respondents' caste identity, reflecting higher mean predicted financial awareness scores of the marginalized caste respondents when the model treats them as general caste respondents keeping their other demographic attributes at *ceteris paribus*. i.e.

$$\mathbb{E}(FAS|\theta_G) > \mathbb{E}(FAS|\theta_M) \quad (5.2)$$

Figure 5.3 plots the density of predicted financial awareness score of marginalized caste respondents using the estimated parameter  $\theta'_G$  along with the predicted financial awareness score using the estimated model parameter  $\theta'_M$ . The figure shows the bi-modal predicted financial awareness score of marginalized caste respondents. The marginalized caste respondents' predicted awareness score shifts to the right when the model treats them as general caste respondents keeping their all other socio-demographic attributes at *ceteris paribus*. The right shift of distribution shows caste-based discrimination in financial awareness as the utility of their demographic attributes goes up when the model considers them

as general caste respondents. There could be two competing theories that may explain this discrimination. First, the stigma of being born in a marginalized caste family may discourage them from approaching financial awareness sources. Second, the services providers or the sources of awareness might discriminate against them, imparting financial awareness because of their marginalized caste status. We are leaving the examination of these two competing theories for future research.

Following the visual interpretation, we formally test the null hypothesis that the fitted financial awareness of marginalized caste is the same as the predicted financial awareness of marginalized caste when the model treats them as general caste respondents. Panel B of Table 5.2 report the test results. On average, the respondents from marginalized castes improve their financial awareness score by 0.983 when the model treats them as general caste respondents. The statistical evidence from the Kolmogorov-Smirnov test and Student's t-statistics shows that the distribution of financial awareness scores significantly changes when the respondents from marginalized castes get treated as general caste respondents. The statistical evidence from either is significant at a 1% degree of significance. After establishing the evidence that the distribution of financial awareness score changes with respondents' caste identity, we next explore the direction of divergence using Kulback-Liebler divergence (KLD), which is also called relative entropy. In mathematical terms, the Kullback–Leibler divergence is a measure of how one distribution is different from another reference distribution with directional interpretation. The Kulback-Liebler divergence (KLD) measures the directed divergence between the distribution of fitted financial awareness scores to the predicted financial awareness of marginalized caste respondents when the model considers them as general caste respondents keeping all their demographic attributes at *ceteris paribus*.

$$KLD(\mathbb{P}(FAS|\theta_M)||\mathbb{P}(FAS|\theta_G)) = - \sum_{j=1}^{N_2} \mathbb{P}(FAS/\theta_M)_j \log\left(\frac{\mathbb{P}(FAS/\theta_G)_j}{\mathbb{P}(FAS/\theta_M)_j}\right), \quad (5.3)$$

where  $\mathbb{P}(FAS|\theta_c)$  is the distribution of predicted financial score using parameter of interest  $\theta_c$ . The calculated directed divergence between the above two distributions is 0.011. In other words, the marginalized caste respondents positively get discriminated (better-off) when the model treats them as general caste respondents.

After establishing the existence of directed divergence in the predicted financial awareness based on caste, our interest is to identify the demographic attributes that play a pivotal role in driving that discrimination. We compare the fitted financial awareness score of

the marginalized caste respondents with the predicted financial awareness score using a model estimated using marginalized caste respondents except for the said attribute's slope is replaced by the estimated slope of the said attribute from the model estimated using general caste respondents. For instance, we only replace the  $\theta_{Income,M}$  by  $\theta_{Income,G}$  to estimate the component of directional divergence in financial awareness score driven by the income of the respondents. In general, the directed divergence in financial awareness corresponding to demographic attribute  $d$  is

$$KLD_d(\mathbb{P}(FAS|\boldsymbol{\theta}_M)||\mathbb{P}(FAS|(\theta_{0,m}, \dots, \theta_{d,g}, \dots, \theta_{k,m}))) = - \sum_{j=1}^{N_2} \mathbb{P}(FAS|\boldsymbol{\theta}_M)_j \log\left(\frac{\mathbb{P}(FAS|(\theta_{0,m}, \dots, \theta_{d,g}, \dots, \theta_{k,m}))_j}{\mathbb{P}(FAS|\boldsymbol{\theta}_M)_j}\right), \quad (5.4)$$

where  $\mathbb{P}(FAS|\boldsymbol{\theta}_c)$  is the distribution of predicted financial score using parameter of interest  $\boldsymbol{\theta}_c$ . Table 5.3 reports the estimated directional divergence corresponding to twelve demographic attributes besides the divergence for estimated intercept. The results show the financial knowledge is the second most important driver of directional divergence behind the employment status, which is the most important discriminator in financial awareness of marginalized caste and general caste respondents. The supporting statistics such as Kolmogorov-Smirnov statistics and Student-t statistics also support the presence of statistical discrimination across all the twelve demographic attributes at a 1% degree of significance.

### 5.5.2 Caste-based discrimination in financial holdings

In this section, we estimate the caste-based discrimination in financial holdings. Following the methodology used in estimating caste-based discrimination in financial awareness, we first test the relationship between financial knowledge and financial holdings using the restricted samples consisting of general caste and other marginalized caste respondents. Similar to the model setting used in the last section, we control the respondents' socio-economic and demographic attributes. Utilizing the model assumptions in the last section, we set Poisson regression for both sub-samples consisting of general castes and marginalized castes:

$$\log\left(E(FHS_c|\mathbf{X}_c)\right) = \boldsymbol{\lambda}'_c \mathbf{X}_c, \text{ where, } c \in [G, M] \quad (5.5)$$

The dependent variable in both sub-samples is the financial holding score ( $FHS$ ), which counts the financial products that the respondent holds. The estimated model parameter

corresponding to caste  $c$  is denoted as  $\lambda_c = (\lambda_{0,c}, \dots, \lambda_{d,c}, \dots, \lambda_{k,c})$  which stacks the  $k$  slopes corresponding to  $k$  demographic attributes, namely, age, gender, education, income, employment status, rural residency status, and census region to control the respondents' socio-economic and demographic attributes. The dependent variable can take any integer value from zero to twenty-eight, having a considerable mass at zero. Similar to the case of awareness, the financial knowledge score is the key explanatory variable of interest.

In Panel A of Table 5.4, we report the estimation results along with marginal effect for the sub-samples consisting of general castes and marginalized caste respondents studying the relation between financial knowledge and financial holdings. Estimation results show the financial knowledge is positively associated with financial holdings for general and marginalized caste respondents. However, general caste respondents are 12% more likely to hold additional financial products with a unit increase in financial knowledge than marginalized castes. The impact of financial knowledge in driving discrimination in financial holding is contrary to the evidence we estimated while studying financial awareness. In financial awareness, the respondents from marginalized castes were 21% more likely to be aware of the financial products than the general caste respondents. Also, with a unit increase in years of schooling of the general caste respondents, they are 78% more likely to hold additional financial products than marginalized caste respondents. Unlike financial awareness, gender does not count as a discriminator in financial holdings. As expected, the income helps hold more financial products for general and marginalized castes, but it is general caste respondents who are 37% more likely to hold additional financial products with a unit increase in income. Urban respondents hold more financial products as compared to rural respondents. However, it is the general caste that is reaping the advantage of the urban residency. To sum up, the general caste respondents leverages the benefits of demographic attributes to boost their financial holding more efficiently than the marginalized caste respondents.

We compare the predicted financial holding score of marginalized caste respondents using the model estimated from the general caste observations with the fitted financial holding score of the model estimated using marginalized caste respondents. Comparing the mean predicted financial holding score, we find caste-based discrimination among respondents, reflecting higher mean predicted financial holding for marginalized caste respondents when the model treats them as a general caste respondent keeping all their demographic

attributes at ceteris paribus.

$$\mathbb{E}(FHS|\lambda_G) > \mathbb{E}(FHS|\lambda_M) \quad (5.6)$$

In Panel B of Table 5.4, we report formal test statistics comparing the discrimination in financial holdings based on caste. We find the predicted financial holding (PFH) of marginalized caste using the model estimated on general caste respondents is greater than the fitted financial holdings of marginalized caste respondents using the model trained on marginalized caste respondents' observations. On average, the marginalized caste respondents are likely to hold additional 0.321 products when the model treats them as general caste respondents.

Figure 5.4 plots the density of predicted financial holding of marginalized caste respondents using the model trained on general caste observations with the fitted financial holding of the model trained using observations from marginalized caste respondents. The figure shows bi-modal predicted financial holding of marginalized caste respondents using a model estimated from general caste observations and a significant positive shift in predicted financial holding compared to fitted financial holding of marginalized caste respondents. The results show a similar kind of discrimination in financial holding as we have found in financial awareness.

We use the Kolmogorov-Smirnov test and Student t-statistics to show if the distribution of predicted holding scores of marginalized caste respondents change when the model treats them as general caste respondents. The results show the caste-based discrimination in financial holding score. At a 1% degree of significance, the distribution of the fitted financial holding score of marginalized caste respondents is different from the distribution of predicted financial holding score the respondents get treated as general caste respondents. We use Kulback-Liebler divergence (KLD) to estimate directional divergence between two predicted distributions.

$$KLD(\mathbb{P}(FHS|\lambda_M)||\mathbb{P}(FHS|\lambda_G)) = - \sum_{j=1}^{N_2} \mathbb{P}(FHS|\lambda_M)_j \log\left(\frac{\mathbb{P}(FHS|\lambda_G)_j}{\mathbb{P}(FHS|\lambda_M)_j}\right) \quad (5.7)$$

The directed divergence of predicted financial holding using model estimated on general caste observations with the fitted score of the model trained using marginalized caste respondents is 0.005.

After establishing the presence of a non-zero directed divergence in the financial holding based on caste-related discrimination, our interest is in determining the demographic

attributes that play a pivotal role in driving that discrimination. We estimate the directional divergence corresponding to a demographic attribute  $d$  by comparing the predicted financial holding score of the respondents from marginalized castes to that of the distribution of predicted financial holding score using a model where we only replace the slope for demographic attribute  $d$  in the model estimated using observations from marginalized castes with the slope from model estimated using the observations from general castes. The directed divergence in financial awareness corresponding to demographic attribute  $d$  is

$$\begin{aligned}
 & KLD_d(\mathbb{P}(FHS|\boldsymbol{\lambda}_M) || \mathbb{P}(FHS|(\lambda_{0,m}, \dots, \lambda_{d,g}, \dots, \lambda_{k,m}))) = \\
 & - \sum_{j=1}^{N_2} \mathbb{P}(FHS|\boldsymbol{\lambda}_M)_j \log \left( \frac{\mathbb{P}(FHS|(\lambda_{0,m}, \dots, \lambda_{d,g}, \dots, \lambda_{k,m}))_j}{\mathbb{P}(FHS|\boldsymbol{\lambda}_M)_j} \right) \quad (5.8)
 \end{aligned}$$

Table 5.5 reports the estimated directional divergence in financial holding corresponding to twelve demographic attributes besides the divergence for estimated intercept. The results show the financial knowledge is the fourth most crucial driver of directional divergence. The south zone residency turns out to be the most significant discriminator in financial holding. The respondent's employment status is the second most influential discriminator in marginalized caste and general caste respondents' financial holding. The supporting statistics such as Kolmogorov-Smirnov statistics and Student-t statistics also support the presence of statistical discrimination across all the twelve demographic attributes at a 1% degree of significance.

### 5.5.3 Caste-based discrimination in financial awareness and financialization of administrative districts

Our aim in this section is to explore how caste-based discrimination in financial awareness and financial holding are related to the financialization of administrative districts. Out of 150 administrative districts in the sample, we have samples from 143 districts which are heterogeneous in caste profile. In other words, there are 143 districts where we have comparable survey observations from general and marginalized castes, and hence we can effectively calculate the directional Kullback-Liebler divergence based on caste in financial awareness and financial holdings. We also calculate caste-based discrimination at administrative districts based on seven main demographic characteristics: financial knowledge, age, gender, rural residency status, education, income, and employment status.

5.5.3. *Caste-based discrimination in financial awareness and financialization of administrative districts*

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Following the discussion in Section 5.4.4, we measure the financialization of administrative districts in bank branch density per thousand households and the average number of households in the district having access to banking correspondent. We use the ordinary least square model to estimate the relationship between caste-based discrimination and the demographic attributes with the financialization of districts. First, we estimate the relationship between bank branch density of the district ( $\overline{BD}^{dist}$ ) with the prevailing caste-based discrimination along with the demographic attributes in financial awareness using ordinary least square specification:

$$\overline{BD}^{dist} = C_{BD}^{FA,d} + \beta_{BD}^{FA,d} \overline{KLD}_d^{dist}(FA) + \varepsilon^{dist}, \quad (5.9)$$

where dependent variable is average number of bank branches per thousand households in the district and independent variable is mean discrimination in financial awareness along the demographic attribute  $d$  which is

$$\overline{KLD}_d^{dist}(FA) = - \sum_{\mathcal{H} \in dist} \mathbb{P}(FAS|\boldsymbol{\theta}_M)_j \log\left(\frac{\mathbb{P}(FAS|(\theta_{0,m}, \dots, \theta_{d,g}, \dots, \theta_{k,m}))_j}{\mathbb{P}(FAS|\boldsymbol{\theta}_M)_j}\right)$$

$C_{BD}^{FA,d}$  stands for intercept and  $\varepsilon^{dist}$  follows standard normal distribution. Our variable of interest is  $\beta_{BD}^{FA,d}$ , which estimates the relation between bank branch density and caste-based discrimination along with the demographic attribute  $d$  at the district level.

Similarly, we estimate the variable of interest  $\beta_{BC}^{FA,d}$  studying the relationship between the average availability of banking correspondent ( $\overline{BC}^{dist}$ ) to the caste based discrimination in financial awareness

$$\overline{BC}^{dist} = C_{BC}^{FA,d} + \beta_{BC}^{FA,d} \overline{KLD}_d^{dist}(FA) + \varepsilon^{dist}. \quad (5.10)$$

Table 5.6 reports the estimation results corresponding to model Equation 5.9 in Panel A and the results corresponding to model Equation 5.10 in Panel B. The estimation results show that the caste-based discrimination in financial awareness adversely affects districts' financialization in general. We find that the discrimination in financial awareness along the dimension of financial knowledge negatively affects the bank branch density and availability of banking correspondents with a 5% degree of significance. With each unit increase in discrimination in financial awareness reduces the bank branch density by 9.3 times and availability of banking correspondent by 0.4 times. Similarly, a unit increase in overall discrimination in financial awareness reduces the bank branch density by 1.2 times and the availability of banking correspondents by 0.04 times.

Along with the demographic attributes, we find discrimination in financial awareness and age, gender, and education negatively affect the financialization of districts. The discrimination in financial awareness along the component of income and employment status is insignificant for the availability of banking correspondents, while the discrimination along the component of rural residency is insignificant for bank-branch density. To sum up, we find the discrimination in financial awareness harms the financialization of administrative districts.

#### 5.5.4 Caste-based discrimination in financial holding and financialization of administrative districts

Following the model specification in the last section, we estimate the variable of interest  $\beta_{BD}^{FH,d}$  studying the relationship between the density of bank branches in the district and caste-based discrimination in financial holding along with the demographic attribute  $d$  using ordinary least square specification:

$$\overline{BD}^{dist} = C_{BD}^{FH,d} + \beta_{BD}^{FH,d} \overline{KLD}_d^{dist}(FH) + \varepsilon^{dist}, \quad (5.11)$$

where dependent variable is average number of bank branches per thousand households in the district and independent variable is mean discrimination in financial holding along the demographic attribute  $d$  which is

$$\overline{KLD}_d^{dist}(FH) = - \sum_{\mathcal{H} \in dist} \mathbb{P}(FHS|\boldsymbol{\lambda}_M)_j \log\left(\frac{\mathbb{P}(FHS|(\lambda_{0,m}, \dots, \lambda_{d,g}, \dots, \lambda_{k,m}))_j}{\mathbb{P}(FHS|\boldsymbol{\lambda}_M)_j}\right)$$

$C_{BD}^{FH,d}$  stands for intercept and  $\varepsilon^{dist}$  follows standard normal distribution.

Similarly, we estimate the variable of interest  $\beta_{BC}^{FH,d}$  studying the relationship between the availability of banking correspondent in the district of the respondent with caste-based discrimination in financial holding using

$$\overline{BC}^{dist} = C_{BC}^{FH,d} + \beta_{BC}^{FH,d} \overline{KLD}_d^{dist} + \varepsilon^{dist}. \quad (5.12)$$

Table 5.7 reports the estimation results corresponding to Model 5.11 in Panel A and the results corresponding to Model 5.12 in Panel B. The estimation results show that the caste-based discrimination in financial holding adversely affects the financialization of the districts. We find that the discrimination in financial holding along the dimension of financial knowledge is significant for bank branch density while insignificant for the availability of banking-correspondent. A unit increase in discrimination in financial holding along the

dimension of financial knowledge reduces the bank branch density by 2.2 times. Among demographic attributes, we find the discrimination in financial holding and the demographic attributes, namely, age, gender, and employment status, negatively affect the bank branch density and the availability of banking correspondent significantly. However, the relationship is insignificant corresponding to the rural residency status of respondents for the bank branch density.

On the other hand, the relationship between the discrimination in financial holding corresponding to demographic attributes, namely, rural residency status, education, and income, is insignificant for the availability of banking correspondents. Overall, a unit increase in caste-based discrimination in financial holding reduces the bank branch density by 1.01 times and the availability of banking correspondents by 0.02 times. To sum up, we find the discrimination in financial holding negatively affects the financialization of administrative districts.

### 5.5.5 Caste-based discrimination and crime reporting in administrative districts

This section aims to explore how the overall caste-based discrimination in financial awareness affects the crime reporting in the administrative districts. Following the model specification in studying the relationship between the caste-based discrimination and financialization of administrative districts, we set an ordinary least square regression with the dependent variable as the number of reported crime incidents per thousand households in the district ( $\overline{CR}^{dist}$ )

$$\overline{CR}^{dist} = C_{CR}^{FA} + \beta_{CR}^{FA} \overline{KLD}^{dist}(FA) + \varepsilon^{dist}, \quad (5.13)$$

and district-level caste-based discrimination in financial awareness which is

$$\overline{KLD}_d^{dist}(FA) = - \sum_{\mathcal{H} \in dist} \mathbb{P}(FAS/\theta_M)_j \log\left(\frac{\mathbb{P}(FAS/\theta_G)_j}{\mathbb{P}(FAS/\theta_M)_j}\right),$$

$C_{CR}^{FA}$  stands for intercept and  $\varepsilon^{dist}$  follows the standard normal distribution. Our variable of interest is  $\beta_{CR}^{FA}$ , which estimates the relationship between the average crime reporting of the district and overall caste-based discrimination in the district.

Similarly, we estimate the variable of interest  $\beta_{CR}^{FH}$  studying the relationship between crime-reporting in the administrative districts and the caste-based discrimination in financial holding. We use ordinary least-square specification where the dependent variable, which is

the number of reported crime per thousand households of the district

$$\overline{CR}^{dist} = C_{CR}^{FH} + \beta_{CR}^{FH} \overline{KLD}^{dist}(FH) + \varepsilon^{dist}, \quad (5.14)$$

and independent variable is

$$\overline{KLD}_d^{dist}(FH) = - \sum_{\mathcal{H} \in dist} \mathbb{P}(FHS|\lambda_M)_j \log\left(\frac{\mathbb{P}(FHS|\lambda_G)_j}{\mathbb{P}(FHS|\lambda_M)_j}\right)$$

$C_{CR}^{FH}$  stands for intercept and  $\varepsilon^{dist}$  follows the standard normal distribution.

Table 5.8 reports the estimation results corresponding to Model 5.13 in Panel A and the results corresponding to Model 5.14 in Panel B. The estimation results show that the caste-based discrimination in financial awareness adversely discourages the reporting of crime incidents except for the caste-based riot incidents. In other words, the caste-based discrimination in financial awareness has a significant adverse effect in the reporting of crime incidents, namely, cheating, decoity-preparation, forgery, kidnapping, theft, and overall crime reporting statistics. On the contrary, caste-based discrimination fuels the caste-based riots in the districts, which is a remarkable finding. It shows that unit increase in discrimination invigorates the incidents of caste riots by 2%.

Similar to the discrimination in financial awareness based on caste, the caste-based discrimination in financial holding is negatively associated with reporting crime incidents. The empirical result shows the negative association of discrimination in financial holding is significant in reporting crime incidents, namely, burglary, cheating, counterfeiting, decoity-preparation, forgery, kidnapping, robbery, and theft. We find a unit increase in caste-based discrimination in financial holding reduces the crime reporting by 1.4 times, while a unit increase in the caste-based discrimination in financial awareness reduces the crime reporting by 2.8 times, which is almost twice.

### 5.5.6 Robustness of results

The empirical design to estimate statistical discrimination leverages Poisson regression that uses aggregated financial awareness and financial holding score. For robustness check, we can consider the product-specific discrimination based on caste. We can estimate the probit estimates corresponding to financial awareness and financial holding for all the 28 financial products using the sample from general and marginalized castes and can test if the discrimination exists across the band of financial products. Alternatively, we can construct a dichotomous financial awareness and financial holding dummy in a way such

that it takes value one if the respondent's aggregated level of awareness is above the median awareness of the population. Again, using this newly constructed dichotomous response, we can compare the estimated slopes of general and marginalized castes from the subsample estimation. The above two alternative estimation approaches will establish the robustness of the estimate.

## 5.6 Conclusion

In this chapter, we analyze the caste-based discrimination in financial awareness and financial holdings. The Indian caste system persists as an essential determinant of social identity, dividing Indians into mutually exclusive hereditary groups, ranked by ritual status. The empirical results from the chapter show significant statistical discrimination based on caste. There are potentially two competing causes of the inferior outcome of the agent from the discriminated group. First, the decision-makers optimally make a judgment of the economic agents based on their asymmetric beliefs and stereotypes about the agent. Second, the agents enter into a self-enforcing cycle of discrimination due to the stigma of belonging to an inferior group. Ultimately, the agents are discouraged to compete with other agents because the assumed return on investment from those activities is expected to be lower than the non-discriminated group. We assert that the caste identity of economic agents is the revealed identity to the financial service providers. The respondents from lower castes are expected to be at the receiving end of discrimination from either part of the competing explanation of statistical discrimination based on caste. The study finds that marginalized castes show a significantly different level of awareness and holding when the model treats them as general caste respondents. Their awareness and the financial holding score go up when they overcome the stigma and prejudice based on caste. The chapter does not elicit the reason for discrimination and leaves it for the future course of research. The chapter further shows that the demographic attributes have a differential effect in driving caste-based discrimination. Household attributes such as employment status, financial knowledge, and residence zone are the key contributors to the level of discrimination between general and marginalized castes. The study further explores how this discrimination affects the financialization and crime reporting of the administrative districts. Our empirical results from the chapter show that caste-based discrimination is counterproductive for the financialization of districts. Next, the chapter studies the effect

of caste-based discrimination in economic outcomes on the crime reporting rates of the districts. There are independent studies which suggest that a majority of crime incident does not get reported in India. Therefore, a healthy crime reporting rate suggests the confidence of households in district administration. The above two empirical pieces of evidence conclude that caste-based discrimination not only affects the level of financial awareness and financial holdings, but it has adverse social implications in financialization and crime reporting rates. Also, the current literature shows the caste barrier becomes subtle once the agents from maritized caste rise in social ranks. The results from the chapter show that the marginal effect of financial literacy is stronger for marginalized caste respondents. Therefore, as part of a multi-pronged approach financial literacy can work as an important policy tool in overcoming caste-based discrimination.

## 5.7 Figures

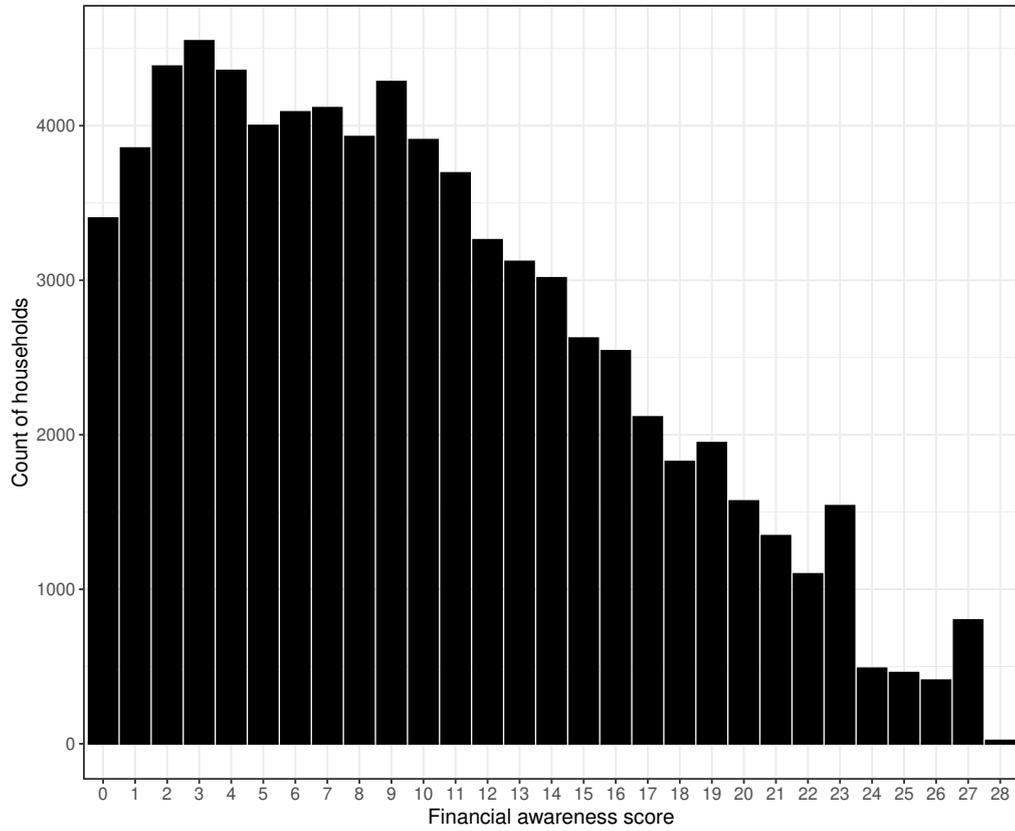


Figure 5.1: **Count of financial awareness score.** This figure plots the count of financial awareness score of the respondents that can range between zero to twenty eight.

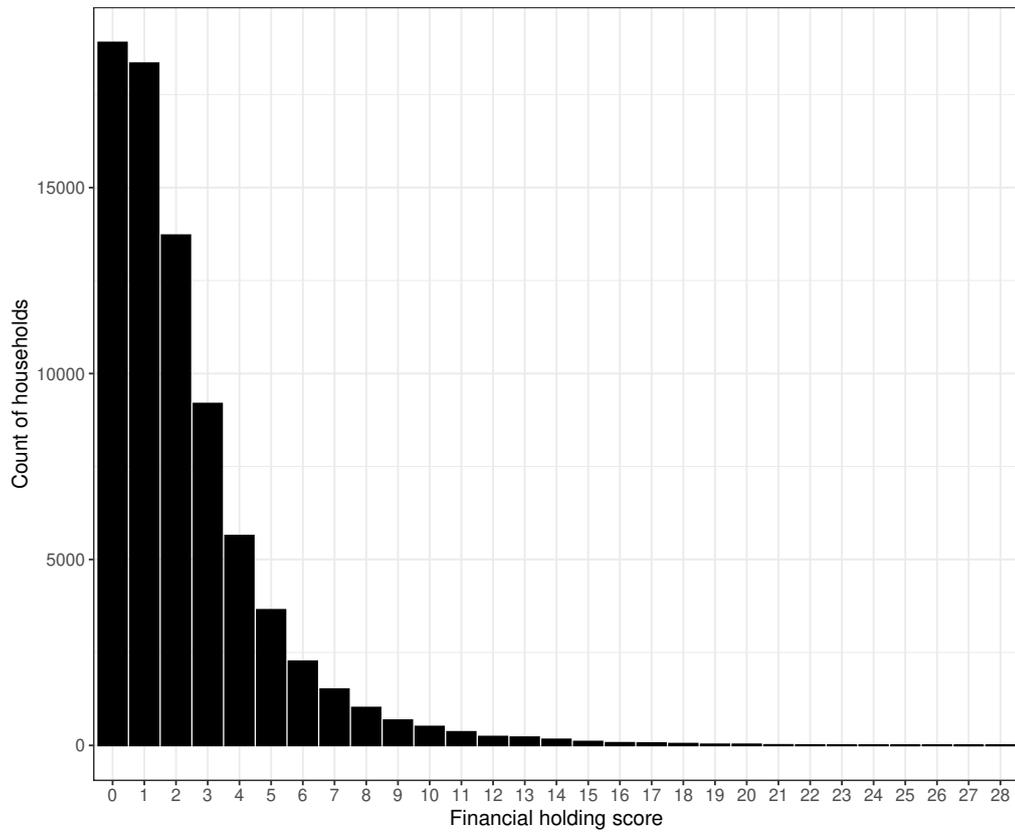


Figure 5.2: **Count of financial holding score.** This figure plots the count of financial holding score of the respondents that can range between zero to twenty eight.

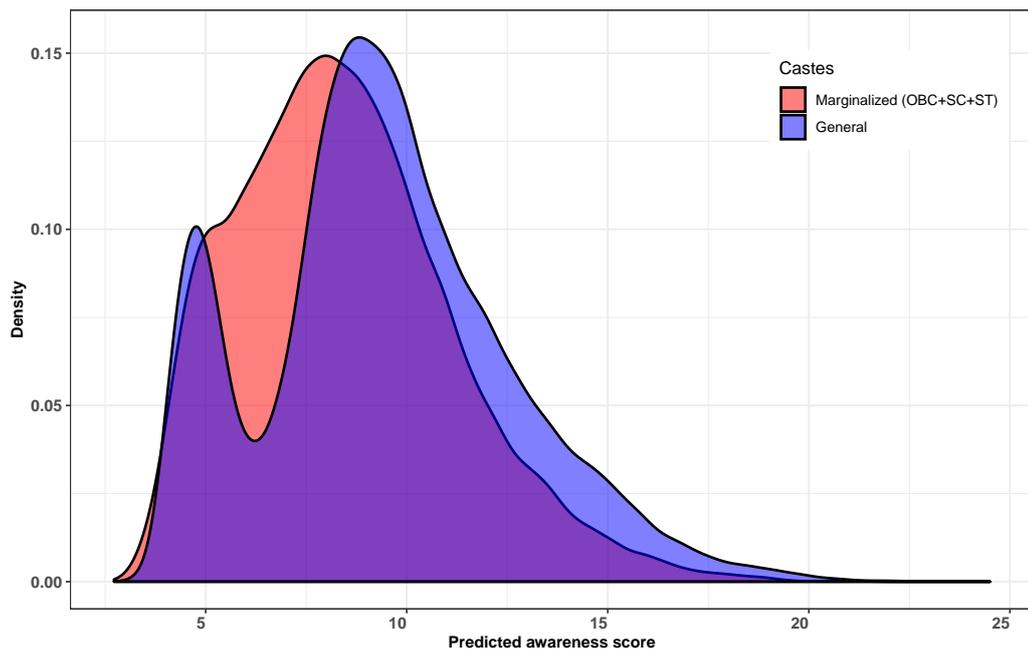
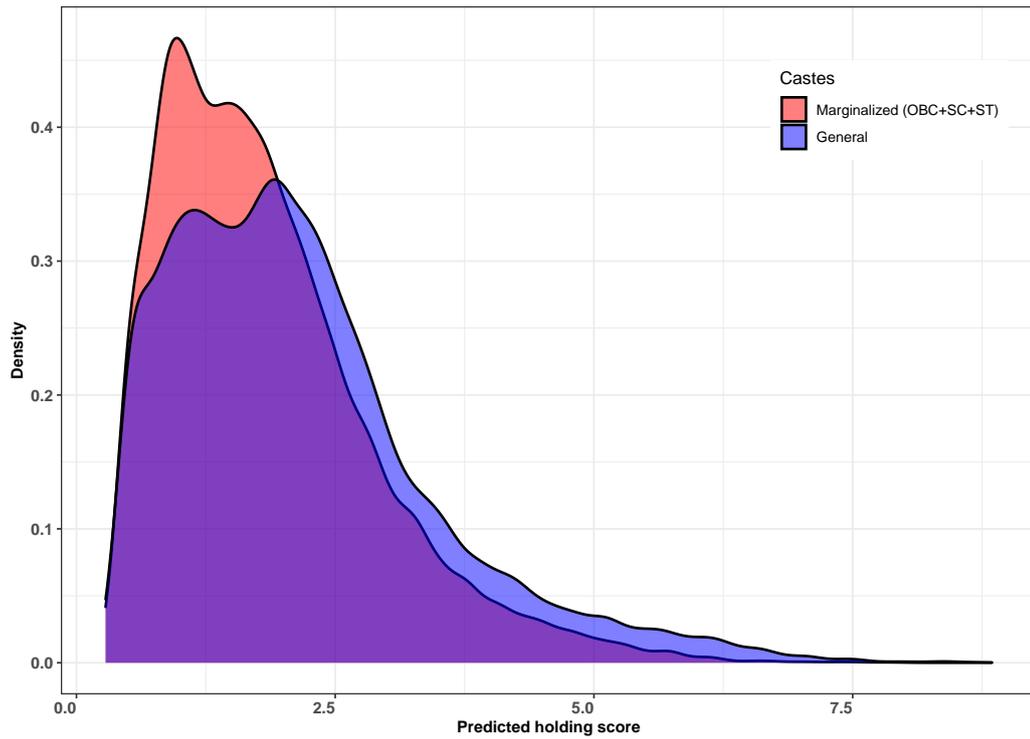


Figure 5.3: **Statistical discrimination in financial awareness based on caste.** This figure plots the comparative density plot of predicted financial awareness scores of marginalized caste respondents using the model estimated from marginalized caste respondents' observations and general caste respondents. The curve filled with red color presents the predicted awareness score of marginalized caste respondents using the estimated model from marginalized caste observations. The curve filled with blue color presents the predicted awareness score of marginalized caste respondents using the estimated model from general caste observations. The y-axis presents the height of the density plot, while the x-axis presents the predicted awareness score.



**Figure 5.4: Statistical discrimination in financial holdings based on caste.** This figure plots the comparative density plot of the predicted financial holding score of marginalized caste respondents using the model estimated from the observations from the marginalized caste respondents and the general caste respondents. The curve filled with red color presents the predicted holding score of marginalized caste respondents using the estimated model from marginalized caste observations. The curve filled with blue color presents the predicted holding score of marginalized caste respondents using the estimated model from general caste observations. The y-axis presents the height of the density plot, while the x-axis presents the predicted holding score.

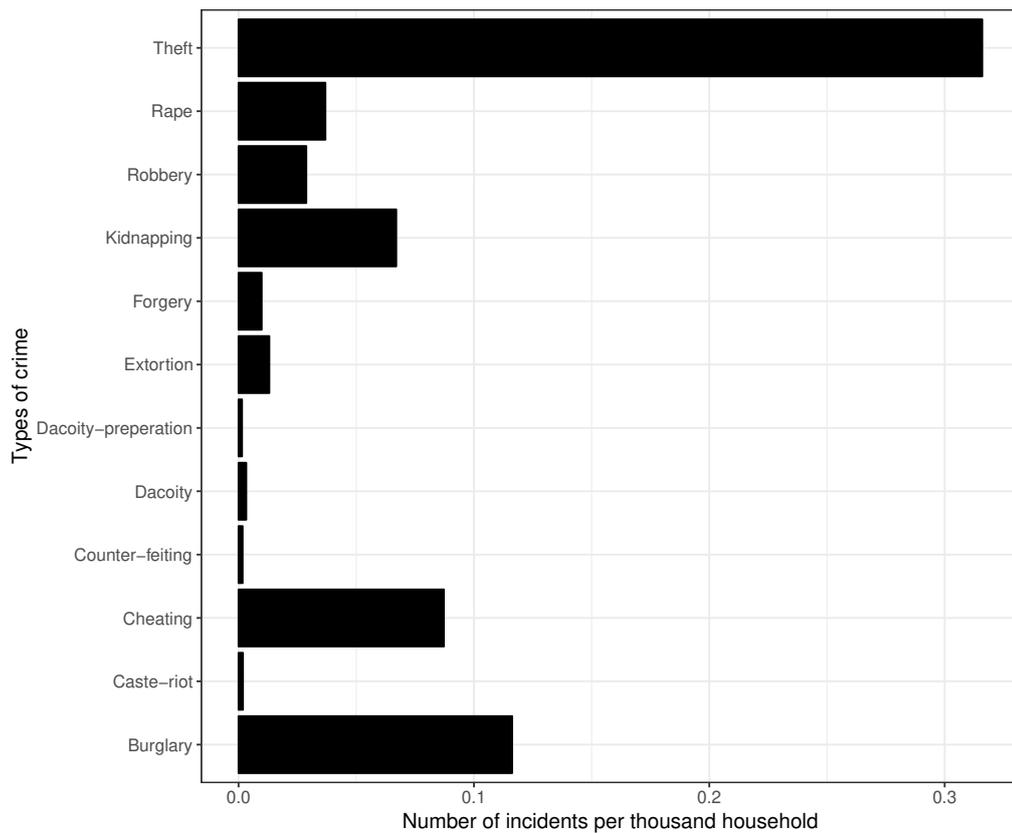


Figure 5.5: **Average reported crime across 150 districts.** This figure plots the average reported crime incidents per thousand households across 150 districts. On the y-axis, the figure reports the type of crime incidents, and the x-axis reports the average count of crime incidents.

## 5.8 Tables

Table 5.1: **Summary of financial access variable.** This table reports the summary of financial access variables at the zone level. The second column in the table reports the percentage of households from each zone having access to banking correspondents. The third column reports the average number of bank branches per thousand households in the zone. All percentage values are rounded up to two places of decimal.

Zone	Percentage with access to banking correspondents	Number of bank branches per thousand households
North	3.64	1.90
North-east	2.22	1.34
Eastern	3.76	1.31
Central	2.31	1.31
West	1.63	1.83
South	5.66	2.05

Table 5.2: **Comparing the effect of demographics attributes on the financial awareness.** In Panel A, we report the Poisson regression results estimating the effect of demographic attributes on financial awareness for the respondents from general caste and marginalized caste. In Panel B, we report the comparative statistics for statistical discrimination between general caste and marginalized caste regarding financial awareness. Columns (1) and (3) report the estimated slope, and columns (2) and (4) report the respective marginal effects for general caste and marginalized caste respondents, respectively. The dependent variable is the count of financial products that the households are aware of, while the independent variables are financial knowledge, age, gender, education, income, employment status, rural residency status, and residence zone. The robust standard errors are reported in parentheses, and the stars **\*\*\***, **\*\*** and **\*** denote the level of significance at 1, 5, and 10 percent, respectively.

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Panel A: Poisson regression estimates for financial awareness

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	General castes		Marginalized castes	
	Estimated slope	Marginal effect	Estimated slope	Marginal effect
	(1)	(2)	(3)	(4)
Financial knowledge	0.308*** (0.015)	3.222*** (0.153)	0.487*** (0.019)	3.909*** (0.153)
Age	0.033*** (0.008)	0.347*** (0.089)	0.040*** (0.011)	0.323*** (0.088)
Female	-0.064*** (0.006)	-0.667*** (0.066)	-0.066*** (0.008)	-0.530*** (0.067)
Education	0.054*** (0.001)	0.567*** (0.007)	0.047*** (0.001)	0.381*** (0.006)
Income	0.030*** (0.001)	0.316*** (0.011)	0.024*** (0.002)	0.196*** (0.012)
Employed	-0.199*** (0.012)	-2.109*** (0.127)	-0.156*** (0.016)	-1.270*** (0.135)
Rural	-0.093*** (0.006)	-0.972*** (0.062)	-0.053*** (0.007)	-0.427*** (0.060)
North	-0.057*** (0.007)	-0.585*** (0.075)	-0.142*** (0.011)	-1.081*** (0.083)

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5.8. Tables

Panel A: Poisson regression estimates for financial awareness contd.

	General castes		Marginalized castes	
	Estimated slope	Marginal effect	Estimated slope	Marginal effect
	(1)	(2)	(3)	(4)
North-east	-0.152*** (0.01)	-1.493*** (0.096)	-0.418*** (0.012)	-2.954*** (0.074)
East	-0.195*** (0.009)	-1.913*** (0.085)	-0.166*** (0.011)	-1.263*** (0.08)
Central	-0.180*** (0.01)	-1.772*** (0.089)	-0.030** (0.012)	-0.237** (0.092)
South	-0.170*** (0.009)	-1.674*** (0.087)	-0.311*** (0.011)	-2.279*** (0.074)
Constant	1.580*** (0.034)		1.511*** (0.044)	
Observations	38,472		38,290	
Pseudo R-squared	0.705		0.577	

Panel B: Comparing predicted financial awareness score of marginalized caste respondents

	$\mathbb{E}(FAS \theta_G)$	$\mathbb{E}(FAS \theta_M)$
Mean	9.437	8.454
Null hypothesis:	$\mathbb{E}(FAS \theta_G) = \mathbb{E}(FAS \theta_M)$	
Kolmogorov–Smirnov test statistics		0.161***
Student’s t-statistics		-46.311***
Kullback-Leibler divergence		0.011

**Table 5.3: Demographics attributes driving the statistical discrimination in financial awareness.** This table reports the ranking of demographic attributes driving the statistical discrimination in financial awareness between general and marginalized castes based on Kullback-Leibler (K-L) divergence. The table also reports the Kolmogorov–Smirnov (K-S) and Student’s t-test statistics of implied statistical discrimination based on demographic attributes. The tests consider the null hypothesis such that the predicted financial awareness of marginalized caste respondents when they get treated as general caste respondent stochastically dominates over his predicted financial awareness as a marginalized caste respondent. The stars \*\*\*, \*\* and \* denote level of significance at 1, 5 and 10 percent, respectively.

	K-L divergence	K-S statistics	Student’s t-statistics
Employed	0.803	0.617***	266.835***
Financial knowledge	0.564	0.621***	280.847***
East	0.563	0.617***	265.265***
Female	0.563	0.617***	263.541***
North	0.563	0.617***	260.264***
Age	0.563	0.619***	271.329***
Education	0.563	0.617***	262.922***
Constant	0.563	0.616***	243.504***
Rural	0.562	0.617***	265.966***
Income	0.558	0.617***	244.994***
North-east	0.557	0.616***	256.016***
Central	0.556	0.617***	274.596***
South	0.504	0.617***	261.691***

Table 5.4: **Comparing the effect of demographics attributes on the financial holdings.** In Panel A, we report the Poisson regression results estimating the effect of demographic attributes on financial holdings for the respondents from general caste and marginalized caste. In Panel B, we report the comparative statistics for statistical discrimination between general caste and marginalized caste. Columns (1) and (3) report the estimated slope, and columns (2) and (4) report the respective marginal effects for general caste and marginalized caste respondents, respectively. The dependent variable is the count of financial products that the household owns, while the independent variables are financial knowledge, age, gender, education, income, employment status, rural residency status, and residence zone. The robust standard errors are reported in parentheses, and the stars \*\*\*, \*\* and \* denote the level of significance at 1, 5, and 10 percent, respectively

Panel A: Poisson regression estimates for financial holdings

	General castes		Marginalized castes	
	Estimated slope	Marginal effect	Estimated slope	Marginal effect
	(1)	(2)	(3)	(4)
Financial knowledge	0.418*** (0.025)	0.958*** (0.057)	0.539*** (0.028)	0.854*** (0.045)
Age	0.290*** (0.014)	0.665*** (0.033)	0.352*** (0.016)	0.558*** (0.025)
Female	-0.013 (0.011)	-0.029 (0.025)	-0.018 (0.012)	-0.029 (0.019)
Education	0.088*** (0.001)	0.202*** (0.003)	0.072*** (0.001)	0.113*** (0.002)
Income	0.062*** (0.002)	0.142*** (0.004)	0.065*** (0.002)	0.103*** (0.003)
Employed	-0.089*** (0.018)	-0.206*** (0.042)	-0.088*** (0.02)	-0.140*** (0.033)
Rural	-0.166*** (0.01)	-0.379*** (0.023)	-0.143*** (0.011)	-0.229*** (0.018)
North	-0.119*** (0.014)	-0.267*** (0.03)	-0.18*** (0.019)	-0.267*** (0.027)
North-east	-0.289*** (0.018)	-0.590*** (0.033)	-0.346*** (0.018)	-0.493*** (0.022)

Panel A: Poisson regression estimates for financial holdings contd.

	General castes		Marginalized castes	
	Estimated slope	Marginal effect	Estimated slope	Marginal effect
	(1)	(2)	(3)	(4)
East	-0.179*** (0.016)	-0.387*** (0.033)	-0.118*** (0.018)	-0.180*** (0.027)
Central	-0.151*** (0.017)	-0.328*** (0.035)	-0.171*** (0.019)	-0.257*** (0.027)
South	0.003 (0.016)	0.007 (0.037)	0.067*** (0.016)	0.108*** (0.027)
Constant	-1.559*** (0.057)		-1.832*** (0.065)	
Observations	38,472		38,290	
Pseudo R-squared	0.622		0.472	

Panel B: Comparing predicted financial holdings score of marginalized caste respondents

	$\mathbb{E}(FHS \lambda_G)$	$\mathbb{E}(FHS \lambda_M)$
Mean	2.170	1.849
Null hypothesis:	$\mathbb{E}(FHS \lambda_G) = \mathbb{E}(FHS \lambda_M)$	
Kolmogorov–Smirnov test statistics		0.122***
Student's t-statistics		-38.083***
Kullback-Leibler divergence		0.005

Table 5.5: **Demographics attributes driving the statistical discrimination in financial holdings.** This table reports the ranking of demographic attributes driving the statistical discrimination in financial holdings between general and marginalized castes based on Kullback-Leibler (K-L) divergence. The table also reports the Kolmogorov–Smirnov (K-S) and Student’s t-test statistics of implied statistical discrimination based on demographic attributes. The null hypothesis tests that the fitted financial holding score of marginalized caste respondents is the same as when the respondent is treated as a general caste respondent. The stars \*\*\*, \*\* and \* denote the level of significance at 1, 5 and 10 percent, respectively.

	K-L divergence	K-S statistics	Student’s t-statistics
South	0.307	0.567***	197.328***
Employed	0.293	0.560***	195.147***
Age	0.290	0.645***	225.700***
Income	0.289	0.571***	200.620***
Financial knowledge	0.289	0.572***	200.457***
Female	0.288	0.556***	193.907***
Education	0.288	0.553***	193.006***
North	0.288	0.554***	192.847***
Constant	0.287	0.434***	146.743***
Rural	0.287	0.559***	194.924***
North-east	0.287	0.553***	193.443***
Central	0.287	0.556***	193.713***
East	0.286	0.561***	195.958***

Table 5.6: **Effect of statistical discrimination in awareness on the financialization of administrative districts.** This table reports linear regression estimates where the dependent variable is the number of bank branches per thousand households in the district. The independent variables are Kullback-Liebler divergence in the distribution of predicted level of awareness of marginalized households using model estimated using the observations from marginalized castes and general castes across demographic attributes. The robust standard errors are reported in parentheses, and the stars \*\*\*, \*\* and \* denote the level of significance at 1, 5, and 10 percent, respectively.

Panel A - Dependent variable: Bank branch density								
KLD (Financial knowledge)	-9.379** (4.587)							
KLD (Age)	-4.133*** (0.913)							
KLD (Female)	-3.470*** (1.214)							
KLD (Rural)	0.316 (1.362)							
KLD (Education)	-5.526*** (1.458)							
KLD (Income)	-0.329*** (0.111)							
KLD (Employed)	-0.415*** (0.153)							
KLD (Overall)	-1.236*** (0.406)							
Constant	1.506*** (0.084)	1.493*** (0.080)	1.499*** (0.081)	1.431*** (0.082)	1.515*** (0.082)	1.492*** (0.080)	1.495*** (0.081)	1.521*** (0.085)
R-squared	0.009	0.007	0.012	0.000	0.018	0.007	0.008	0.016
Adjusted R-squared	0.002	0.000	0.005	-0.007	0.011	0.000	0.001	0.009
Observations	143	143	143	137	143	143	143	143

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Panel B - Dependent variable: Availability of banking correspondent

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KLD (Financial knowledge)	-0.410**							
	(0.192)							
KLD (Age)	-0.191**							
	(0.088)							
KLD (Female)	-0.106**							
	(0.050)							
KLD (Rural)	-0.153*							
	(0.079)							
KLD (Education)	-0.234**							
	(0.106)							
KLD (Income)						0.003		
						(0.006)		
KLD (Employed)						-0.001		
						(0.007)		
KLD (Overall)								-0.042*
								(0.021)
Constant	0.036***	0.035***	0.035***	0.037***	0.036***	0.034***	0.035***	0.036***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
R-squared	0.002	0.002	0.002	0.003	0.005	0.000	0.000	0.003
Adjusted R-squared	-0.005	-0.005	-0.005	-0.004	-0.002	-0.007	-0.007	-0.004
Observations	143	143	143	137	143	143	143	143

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Table 5.7: **Effect of statistical discrimination in financial holdings on the financialization of administrative districts.** This table reports linear regression estimates where the dependent variable is the number of bank branches per thousand households in the district. The independent variables are Kullback-Liebler divergence in the distribution of predicted level of financial holdings of marginalized households using model estimated using the observations from marginalized castes and general castes across demographic attributes. The robust standard errors are reported in parentheses, and the stars \*\*\*, \*\* and \* denote the level of significance at 1, 5, and 10 percent, respectively.

Panel A- Dependent variable: Bank-branch density								
KLD (Financial knowledge)	-2.199*** (0.740)							
KLD (Age)	-6.897*** (2.390)							
KLD (Female)	-3.396*** (0.840)							
KLD (Rural)	-0.467 (1.757)							
KLD (Education)	-7.001*** (1.445)							
KLD (Income)	-0.577*** (0.203)							
KLD (Employed)	-0.337** (0.137)							
KLD (Overall)	-1.013*** (0.245)							
Constant	1.501*** (0.080)	1.524*** (0.086)	1.545*** (0.086)	1.440*** (0.086)	1.567*** (0.085)	1.536*** (0.088)	1.515*** (0.084)	1.564*** (0.088)
R-squared	0.018	0.013	0.036	0.000	0.038	0.022	0.016	0.038
Adjusted R-squared	0.011	0.006	0.030	-0.007	0.031	0.015	0.009	0.032
Observations	143	143	143	137	143	143	143	143

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Panel B - Dependent variable: Availability of banking correspondent

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KLD (Financial knowledge)	-0.019							
	(0.038)							
KLD (Age)	-0.436**							
	(0.208)							
KLD (Female)	-0.102***							
	(0.031)							
KLD (Rural)	0.179							
	(0.231)							
KLD (Education)	-0.0002							
	(0.210)							
KLD (Income)	-0.008							
	(0.014)							
KLD (Employed)	-0.014***							
	(0.005)							
KLD (Overall)	-0.020**							
	(0.010)							
Constant	0.035***	0.038***	0.037***	0.034***	0.035***	0.035***	0.036***	0.036***
	(0.006)	(0.007)	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
R-squared	0.000	0.008	0.005	0.004	0.000	0.001	0.004	0.002
Adjusted R-squared	-0.007	0.001	-0.002	-0.003	-0.007	-0.006	-0.003	-0.005
Observations	143	143	143	137	143	143	143	143

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**Table 5.8: Effect of statistical discrimination in awareness and holding of the marginalized castes on the reported crime rate of the administrative districts.** This table reports linear regression estimates where the dependent variable is the total number of reported crime incidents per thousand households in the district. The independent variable in Panel A is Kullback-Liebler divergence in distribution of the predicted financial awareness score of marginalized households using a model estimated using the observations from marginalized castes and general castes. In Panel B, the independent variable is Kullback-Liebler divergence in distribution of the predicted level of financial holding score of marginalized households using model estimated using the observations from marginalized castes and general castes. The robust standard errors are reported in parentheses, and the stars \*\*\*, \*\* and \* denote the level of significance at 1, 5, and 10 percent, respectively.

Panel A : Statistical discrimination in the financial awareness of the marginalized castes													
Dependent variable:	Burglary	Caste-riot	Cheating	Counter-feiting	Dacoity	Dacoity-preparation	Extortion	Forgery	Kid-napping	Robbery	Rape	Theft	Total
KLD (Overall)	-0.068 (0.087)	0.023** (0.011)	-0.131*** (0.034)	-0.001 (0.002)	-0.002 (0.003)	-0.004** (0.002)	0.010 (0.021)	-0.013*** (0.005)	-0.092*** (0.026)	-0.058*** (0.023)	-0.007 (0.033)	-0.433* (0.243)	-2.783*** (0.710)
Constant	0.118*** (0.010)	0.001 (0.001)	0.095*** (0.009)	0.002*** (0.0005)	0.003*** (0.0003)	0.002*** (0.0003)	0.011*** (0.002)	0.010*** (0.002)	0.072*** (0.005)	0.031*** (0.005)	0.037*** (0.003)	0.407*** (0.056)	2.480*** (0.150)
R-squared	0.003	0.088	0.014	0.000	0.002	0.008	0.001	0.002	0.021	0.012	0.000	0.005	0.025
Adjusted R-squared	-0.004	0.082	0.007	-0.007	-0.005	0.001	-0.006	-0.005	0.014	0.005	-0.007	-0.002	0.018
Observations	143	143	143	143	143	143	143	143	143	143	143	143	143
Panel A : Statistical discrimination in the financial holding of the marginalized castes													
KLD (Overall)	-0.059** (0.026)	0.005 (0.005)	-0.095*** (0.025)	-0.002** (0.0009)	0.0001 (0.002)	-0.002** (0.0006)	-0.002 (0.005)	-0.011*** (0.004)	-0.042*** (0.011)	-0.030*** (0.010)	0.001 (0.015)	-0.352*** (0.012)	-1.360*** (0.426)
Constant	0.121*** (0.010)	0.001* (0.0006)	0.099*** (0.010)	0.002*** (0.001)	0.003*** (0.0003)	0.002*** (0.0004)	0.011*** (0.002)	0.011*** (0.002)	0.072*** (0.006)	0.031*** (0.005)	0.037*** (0.003)	0.422*** (0.057)	2.496*** (0.156)
R-squared	0.009	0.017	0.026	0.003	0.000	0.006	0.000	0.006	0.016	0.012	0.000	0.011	0.022
Adjusted R-squared	0.002	0.010	0.019	-0.004	-0.007	-0.001	-0.007	-0.001	0.009	0.005	-0.007	0.004	0.015
Observations	143	143	143	143	143	143	143	143	143	143	143	143	143

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## Conclusion

This dissertation studies the financial non-participation in emerging markets. Most of the existing literature on financial non-participation scrutinizes the role of a household's capability in making financial decisions in well-developed markets. In contrast to developed markets, the household's endowments, access to information, and financial accessibility are considerably limited in emerging markets. The theories and empirical evidence explaining financial non-participation cannot be extended to emerging markets without thorough empirical scrutiny because the emerging markets suffer from systematic challenges in delivering the financial service, unlike the developed countries. This dissertation attempts to address this knowledge gap by exploring the financial non-participation in emerging markets. Extant literature studies the financial decision-making in developed markets, exploring the questions on stock-market participation, retirement planning, debt choices, and portfolio selection. There is another stream of literature that explores why the implied normative logic of financial theories do not always reflect households' financial decisions. In the same line of argument, we analyze how understanding the underpinnings of financial concepts helps households in financial decision-making.

The intrigue about the individual financial decision-making of household magnifies into an overall macroeconomic stability question in the backdrop of The Great Recession. Considering the household economy's market size, understanding a household's financial decision-making is key to global financial stability. The literature also shows that a significant part of the household's financial decision does not pass the financial rationality test. Hence, the dissertation explores the role of a household's financial knowledge and its demographic attributes in driving those sub-optimal financial decisions in emerging markets plagued by informational deficiency and infrastructural constraints. Considering the systematic

constraints in the emerging markets, investment in human capital to acquire additional financial decision-making capability gets interesting. One of this dissertation's main contributions is the characterization of conditions where investment in financial knowledge can help develop financial capabilities, improve financial decision-making, and ultimately nurture overall social equity. In contrast, the dissertation also characterizes a condition where financial illiteracy (a condition describing zero financial knowledge) can be an optimal household choice.

This dissertation uses India's first national benchmark survey for financial literacy and inclusion, fielded in 2014 by the National Centre for Financial Education (NCFE), jointly with the Indian regulators, including the Reserve Bank of India (RBI), Securities and Exchange Board of India (SEBI), Insurance Regulatory and Development Authority of India (IRDAI), Pension Fund Regulatory and Development Authority (PFRDA) and National Institute of Securities Markets (NISM). The survey coverage spans over 150 districts to ensure adequate representation of all the 28 states and seven union territories of India. The survey records the responses of households in a paper-based face-to-face questionnaire. Among socio-demographic indicators, the survey captures the age, gender, and caste of respondents. Among spatial attributes, it captures their rural residency status and subnational administrative units of residence called zones. The survey records the education, employment status, and income to capture the socio-economic attributes of the respondents. It captures the availability of banking correspondents to measure the level of financial access to the respondents. It utilizes 28 different financial products covering the 5 product segments, namely savings, debt, insurance, pensions, and capital markets, to capture the respondents' level of financial awareness and financial holding. The dissertation also uses RBI bank branch data to construct the density of bank branches at the district-level. For the crime data, the survey uses the National Crime Records Bureau (NCRB), Government of India's database on crime-reporting, to capture the crime-reporting rates across sampled 150 districts for the year 2014.

At the outset, the dissertation begins with analyzing the relationship between financial knowledge and the financial awareness related to the availability of financial products. The chapter develops a financial knowledge score summarizing households' knowledge along seven financial concepts to study the relationship. Contrary to past scoring methodology, the score construction utilizes the distribution of financial knowledge among survey respondents to construct the weights reflecting the difficulty level of survey questions. Such

scoring methodology is essential considering the observed population heterogeneity in India. Therefore, the constructed score using easily interpretable weights explains a household's level of financial awareness and helps devise measuring the complexity of prevailing Indian financial products in the market.

The empirical evidence shows a strong association between financial knowledge and financial awareness of the respondents. After controlling the omitted variable bias due to financial unawareness, the empirical results show the financial knowledge helps take ownership of financial products. Although the findings from empirical models show the financial knowledge empowers households to make informed financial decisions related to financial holding, it does not explain why people hold a particular financial product in general. Ultimately, the chapter has a policy implication that identifies the role of financial knowledge in overcoming the institutional constraints and developing financial capability among households in emerging markets.

The third chapter of the dissertation studies the acquisition of financial awareness in an emerging market and the role of financial unawareness in keeping the households away from financial markets. Considering the mediating role of financial awareness in helping financial holdings, the investment in the acquisition of financial awareness seems to be innocuous in improving the households' overall welfare. On the contrary, the chapter characterizes a theoretical condition where investment in financial awareness acquisition can be a choice that may depend upon the households' endowments. The chapter's empirical results show that the households with weaker demographic attributes also pose low financial cognition. As a result, even after selling a considerable amount of their limited endowments, households cannot attain the required level of financial cognition to become an aware household and remain out of financial markets. Therefore, such households optimally choose to remain financially illiterate.

The chapter illustrates using a thought experiment that paucity of financial awareness among households is not a chance but a reflection of their comprehensive demographic profile. In the thought experiment, the chapter predicts the ownership choice of unaware respondents by treating them with financial awareness and comparing their ownership decisions of originally unaware respondents to an originally aware respondent. The experiment shows that the financial ownership probability of originally financially aware households stochastically dominates that of originally unaware households despite getting financial awareness as a treatment of the experiment. However, the results also show a sizable sec-

tion of originally unaware respondents who show a high probability of participation when they get financially aware. This suggests that moderating the cost of financial knowledge can help a considerable section of households in financial participation who have endowments but require a little assistance in getting financially aware. The chapter concludes with a policy recommendation of identifying targeted financial literacy programs to foster the financial capability among the households with limited resources.

The fourth chapter of the dissertation explores the role of financially literate women in household decision-making. The chapter observes a step-change in financially literate women, who take on higher levels of responsibility in managing their households' finances. The empirical results show when financially literate women are responsible, they participate more in saving schemes, insurance products, and alternative investments and are less involved in saving money at home/informally and borrowing money from money lenders. On the other hand, financially literate male decision-makers participate more in investment products, stocks/shares, and debt products. Further, households with financially literate women who are jointly responsible for managing finances with their spouse have the greatest probability of holding different types of financial products. Thus, the chapter highlights that for an impactful increase in financial products' participation, policy interventions should target equipping women with financial literacy and encouraging a husband-and-wife team to manage their household's financial portfolios jointly. Financial literacy's practical gains diminish going down the caste hierarchy from the privileged caste to lower caste households, where cultural norms are more binding.

The fifth chapter of the dissertation studies the economic and social impact of caste-based discrimination in India. Despite globalization, good economic progress during the last three decades, and the abolition of the caste system, the inherited caste is still the most vital determinant of an individual's economic opportunity in India. The chapter's empirical results show significant caste-based discrimination in financial awareness and financial holdings among respondents. The chapter shows that the respondents from marginalized castes improve their financial awareness and financial holdings when the model treats them as general caste respondents keeping all their demographic attributes at *ceteris paribus*. The empirical results from the chapter identify demographic attributes such as income, employment status, and financial knowledge of respondents are the key demographic attributes that drive the discrimination between general and marginalized castes. It further shows that the impact of caste-based discrimination is limited to an individual's economic

outcomes, but it also affects the social indicators in respondents' neighborhoods. Using the district level financial access data from 150 districts shows that caste-based discrimination adversely affects administrative districts' financialization levels. The results also show that the districts having a higher level of caste-based discrimination show a lower crime-reporting rate. Because a sizeable amount of crime incident goes unreported in India, the crime-reporting rate shows institutional development quality. The chapter also finds the districts with a higher level of caste-based discrimination are more prone to caste-based riots. The chapter concludes with a policy recommendation of identifying the effective measure to annihilate caste-based discrimination.

Overall, this dissertation's findings reflect that financial decision-making is crucial in fostering economic capability among households overcoming the institutional challenges specific to emerging markets and social challenges spurred by traditional racial and gender bias. Using the interpretable financial knowledge scoring methodology, the dissertation studies investigate the crucial role of financial unawareness in impeding the households from owning the financial products in emerging markets plagued with informational constraints owing to low institutional setup compared to developed markets. The study mainly focuses on race and gender in determining the economic outcomes measured in terms of awareness and ownership of financial products. The dissertation has four-chapters, which are four independent academic articles. Also, in all those four chapters, a clear policy implication emerges, which advocates the requirement of a focused financial literacy program intending for socially marginalized sections of society. The results show that financial knowledge helps develop overall financial capability and helps narrow the intra-societal gaps caused by racial and gender bias. Thus, this dissertation contributes to the academic literature and appeals to the policy discussions in the areas of market participation, women empowerment, and racial discrimination.

The following research to this work should consider understanding the long-term effect of financial knowledge as a policy instrument. The study requires multiple waves of data to illustrate the causal interpretation of the above policy recommendations. Having such a dataset will allow us to look at the mechanism through which financial knowledge shapes economic outcomes. The second theme of research is related to the quality of financial decisions. It is well established in the literature that the household's decision often conflicts with rationale from economic theories. It would be interesting to explore the key differences in the quality of financial decision-making based on theoretical financial knowledge

compared to the experience-based instinctive financial decisions in an experimental setup. Further, how the financial decision based on relegated financial advice from independent sources stands as compared to the above two mechanisms of financial decision-making during that experiment? The third stream of studies can advance the finding of this dissertation by considering bias in financial decisions due to the respondents' cultural and religious affiliations. Future research in this area includes studying the overall impact of households' socio-religious attributes on wealth accumulation and retirement planning in the absence of institutional social-security mechanisms. Ultimately, the robust financial management of the household's financial resources boosts the overall economy's growth and stability. In connection to the dissertation finding that suggests that the subsidization in acquiring financial knowledge helps build financial capability among households, the dissertation-work does not elicit any methodology to quantify the return. It would be interesting to estimate the amount of wealth creation with every dollar investment in financial knowledge as a policy instrument. Such studies can help understand the efficacy of financial knowledge as a policy intervention in mitigating the challenges related to the global economy's overall stability.

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## Financial Knowledge Survey

### Questions- Chapters Two to Five

No.	Question	Question wording	Responses
1	Time value of money	Imagine if someone has to wait for one year to get a sum of ₹50,000 and inflation stays at 5%. In one year's time will he be able to buy fewer things than he can buy it today?	1) Yes 2) No 3) Don't know/ Can't say
2	Interest paid on loan	You lend ₹50,000 to your brother one evening and he gives you ₹50,000 back the next day. Did he pay any interest on this loan?	1) Yes 2) No 3) Don't know/ Can't say
3	Simple interest calculation	Suppose you put ₹1,000 into a deposit account with a guaranteed simple interest rate of 10% per year. You don't make any further payments into this account and you don't withdraw any money. How much would there be in the account at the end of the first year, including interest?	1) More than ₹1,100 2) Exactly ₹1,100 3) Less than ₹1,100 4) Don't know/ Can't say

*A. Financial Knowledge Survey Questions- Chapters Two to Five*

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No.	Question	Question wording	Responses
4	Compound interest calculation	Suppose you put ₹1,000 into a deposit account with a guaranteed compound interest rate of 10% per year. You don't make any further payments into this account and you don't withdraw any money. How much would there be in the account at the end of the fifth year, including interest?	1) More than ₹1,500 2) Exactly ₹1,500 3) Less than ₹1,500 4) Don't know/ Can't say
5	Risk and return	True or False – An investment with a high return is likely to be of high risk.	1) True 2) False 3) Don't know/ Can't say
6	Diversification	True or False - It is better to invest your money in more than 1 financial product for safety.	1) True 2) False 3) Don't know/ Can't say
7	Understanding of inflation	True or False – High inflation means that the cost of living increases.	1) True 2) False 3) Don't know/ Can't say

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## Financial Product Glossary-

### Chapters Two to Five

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No.	Product name	Definition and utility of the product
<b>Savings</b>		
1.	Saving bank account/ No frill account	Saving bank accounts are interest-bearing deposit accounts at a financial institution or bank. The depositor's balance remains liquid and attracts a modest interest rate. However, depositors must maintain a balance above a threshold defined by the financial institution to keep their account active. No frill account is a saving bank account with a focus on low-income groups. The depositors can keep their account active even with a zero balance in the account. These accounts offer elementary banking facilities. The banks only allow a limited number of deposits and withdrawals for these account holders.
2.	Recurring deposit	Recurring deposits are a special kind of term deposits offered by Indian banks where people can deposit fixed amounts (installments) at regular intervals. Generally, it offers a better interest rate than savings accounts. The premature withdrawal of funds, as well as delay in installments, can attract a predefined penalty.

No.	Product name	Definition and utility of the product
3.	Fixed deposit	The fixed deposit is a financial instrument provided by Indian banks in which it provides investors a higher rate of risk-free return compared to a regular savings account with a predefined maturity date. However, premature withdrawal of funds can attract a penalty.
4.	Overdraft facility	The overdraft facility is a credit enhancement service for account holders to withdraw more money than the account's available balance. In general, the overdrawn credit limit is decided by the banks based on the credit history of the account holder. The banks also charge interest on the overdrawn amount. Although it is a debt product associated with a saving product, the thesis considers it in the savings product category.
5.	Public provident fund	Public provident fund scheme (PPF) is a popular long-term investment and tax-saving scheme with a minimum tenure of 15 years, facilitated by the Indian Government. The PPF deposits and return fully exempted from tax. The investment value ranges from a minimum of ₹500 to a maximum ₹1,50,000 (₹1,00,000 at the time of the survey) in one financial year.
6.	Post office savings scheme	Post office savings scheme provides savings account facilities to Indians with too modest participation norms. The scheme relies on the extensive coverage of India's postal system and provides an alternative to the formal financial institution in unbanked remote areas.

No.	Product name	Definition and utility of the product
7.	National savings certificate/ Kisan Vikas Patra	National savings certificates (NSC) is a tax saving instrument offered by India's postal department. The saving instruments are available for five and ten years of maturity. The savings under NSC attracts tax exemption under Section 80(C) of Income-tax act (1961). Further, the savings under NSC can also work as collateral for availing loans. The literal English translation of <i>Kisan Vikas Patra</i> (KVP) is 'Farmer development letter.' Initially, it was meant for farmers to enable them save for long term. This scheme's main aim is to safeguard the small investors in semi-urban and rural areas, who fall prey to Ponzi schemes. This is a tax-saving investment scheme. The encashment of KVP before the maturity of policy attracts a tax. KVP is a saving instrument offered by the Postal Department of India that promises to double the investment in 100 months. The encashment of KVP before 100 months of policy attracts a tax.
8.	Life insurance	Life insurance is a kind of insurance contract that pays out a lump sum to the dependent during the contract term. The money-back policies are the most popular life insurance policies in India. These policies primarily get utilized as a tax-saving instrument rather than an insurance instrument as it attracts tax benefit under Section 80(C) and a fixed return at maturity.

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#### Debt

9.	Other bank loans (Home, Education, Vehicle and Personal loans, etc.)	The other bank loans include all kinds of loans that a financial institution offers to borrowers after a rigorous credit analysis. The Indian Government provides tax incentives on several loans, such as home loan attracts a tax relief on interest. Further, the education loans are also subsidized for socially marginal class and religious minorities.
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No.	Product name	Definition and utility of the product
10.	Credit card	The credit card is a short-term financing instrument where card-holder has the option to borrow fund at the point of sale. The credit limit and interest-free borrowing period depend upon the borrower's credit score and predefined terms and conditions by the card-issuing financial firm.
11.	Government subsidized debt scheme (Kisan credit card, Artisan credit card, Laghu Udyami Card, Swarojgar credit card, Weaver's card)	<p>These are the micro-credit scheme to ensure short-time subsidized credit to farmers and non-farming artisans. The scheme aims to safeguard the farmers and non-farming craftsman residing in rural and semi-urban areas from money lenders. There are several products with a focus on farming and micro-enterprises.</p> <ul style="list-style-type: none"> <li>i. Kisan credit card: The literal English translation of <i>Kisan credit card</i> (KCC) is 'Farmer credit card,' a government-supported subsidized debt scheme for farmers. It provides collateral and documentation-free credit delivery to farmers to meet immediate credit needs.</li> <li>ii. Artisan credit card: The Artisan credit card is the credit scheme for handicraft professionals supported by India's Textile ministry. The card ensures collateral and interest-free micro-credit with a limit of ₹25,000 to shield them from money lenders.</li> <li>iii. Laghu Udyami Card: The literal English translation of <i>Laghu Udyami</i> card is 'Small entrepreneur card'. The card provides a credit limit of up to ₹10,00,000 with a subjective collateral requirement to meet the credit requirements of small business units, retail traders, artisans, cottage industries, and professionally self-employed.</li> </ul>

No.	Product name	Definition and utility of the product
		<p>iv. Swarojgar credit card: The literal English translation of <i>Swarojgar credit card</i> is ‘Self-employed credit card’. This scheme ensures adequate and timely credit to small artisans such as handloom weavers, service sector professionals, fishers, rickshaw owners, and other micro-entrepreneurs. The credit limit under this scheme is ₹25,000.</p> <p>v. Weaver’s card: The weaver’s card is a government-supported credit scheme that provides interest-free micro-credit to artisans from the weaver’s community. The credit offered in this scheme ranges from a modest ₹25,000 to a maximum credit limit of ₹200,000. Any credit above the threshold of ₹25,000 attracts a nominal interest from the beneficiaries.</p>

### Insurance

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12.	Motor insurance	Motor insurance is vehicle owners insurance that compensates the vehicle owner and the vehicle against accidental damages. Vehicle insurance is mandatory for all on-road vehicles in India.
13.	Health insurance	Health insurance is a type of insurance coverage that pays for the medical and surgical expenses of the person insured. Health insurance is optional in India. There are many public as well as private health insurance providers in India. Moreover, the Indian Government also offers a premium-free health insurance scheme for low-income classes with limited coverage. The respondents who are covered under the employer health insurance package in the survey are considered as included in the survey.

No.	Product name	Definition and utility of the product
14.	Home insurance	The home insurance is homeowners insurance that compensates the residents and the house against accidental damages. Home insurance is optional in India, but it is mandatory for house owners, who buy the house with a home loan.
15.	Crop insurance	Crop insurance is an insurance product for farmers that protect them against crop loss due to natural disasters and price crash situations. The Government of India provides subsidies on crop insurance. However, it is optional for farmers in India.
16.	Cattle/ Livestock insurance	The cattle/livestock insurance policy provides coverage for losses due to the death or injury of policy holder's livestock. The coverage under the livestock includes accidents, acts of God, and theft.
17.	Specialized insurance	This specialized insurance product covers other insurance products excluding life, health, home, motor, crop, and livestock insurance products in the survey. The specialized insurance products include relatively sophisticated insurance products such as travel insurance, personal accident insurance, welfare insurance from Church, shop insurance, gold insurance, mobile insurance, marine insurance, fire insurance, etc.
<b>Pensions</b>		
18.	Employee provident fund (EPF)	The employee provident fund is a mandatory contribution from employer and employee towards the retirement, disability, sickness, and unemployment. EPF contribution is mandatory for a salaried class in India.
19.	National pension scheme (NPS)	The national pension scheme is launched by the Indian Government in 2004 to initiate a contribution based pension system in India where the pension account holder can choose the option to invest from a list of financial instruments with diverse risk exposure. Participation in this scheme is voluntary to an Indian citizen.

No.	Product name	Definition and utility of the product
20.	Family/Employee pension scheme (EPS)	The employee pension scheme is a mandatory interest-free retirement saving scheme with a lock-in period. In this scheme, the employer contributes a minimum of 8.33% of the basic salary of the employee and ₹1,250. Further, India's Government also contributes 1.66% of the basic salary for the low-income salaried class, whose income is less than ₹15,000 per month, but nothing for the salaried people with monthly income above the threshold. Before the age of 56 years, the employee can only withdraw this saving only under extreme circumstances.

### Capital markets

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21.	Share/Stocks	The shares or stocks are units of ownership of any company. India boasts two well-functioning stock exchanges, namely the Bombay stock exchange and the National stock exchange. The households can participate in the stock market through a particular account called the Demat account.
22.	Mutual fund	A mutual fund is an investment tool that pools the funds collected from many retail investors to invest in securities at some margin.
23.	Initial Public Offering (IPO)	An initial public offering (IPO) is the first sale of a private company available for the public on a security exchange.
24.	Bonds/Debentures	The bonds and debenture are capital market products. These are debt products, and they get traded on a stock exchange. Therefore, we classify it as the capital market product in the survey.

- Bonds: A bond is a debt investment in which an investor loans his money to a private enterprise or a government entity at a variable or fixed interest rate.
- Debentures: A debenture is a debt instrument that is not secured by physical assets or collateral. It is only backed by the creditworthiness and reputation of the issuer.

*B. Financial Product Glossary- Chapters Two to Five*

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No.	Product name	Definition and utility of the product
25.	Agri futures	The Agri futures is a legal agreement to buy or sell agricultural goods at a predetermined price and time in the future.
26.	Bullion futures	The bullion futures is a legal agreement to buy or sell gold or silver at a predetermined price and time in the future.
27.	Metal futures	The metal futures is a legal agreement to buy or sell metals such as copper, steel, nickel, aluminum at a predetermined price and time in the future.
28.	Energy futures	The energy futures is a legal agreement to buy or sell energy goods such as crude oil, natural gas, diesel at a predetermined price and time in the future.

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## Chapter Four Variable Definitions

Variable name	Variable description
Responsibility	The role of the respondent in household financial decisions on an ordered scale that takes the value of 3 for sole responsibility, 2 for joint responsibility and 1 for no responsibility.
FinLit	A weighted index summarizing the performance of respondents on seven financial literacy questions, where weights are derived from the distribution of knowledge among respondents (refer to Appendix A for the list of questions).
Control variables:	
Age	Log median year of the reported age group of respondents.
Women	Dummy takes the value of 1 if the respondent is female, and 0 otherwise.
Caste: OBC	Dummy takes the value of 1 if the respondent belongs to Other Backward Caste, and 0 otherwise. The General Caste is the base Caste in the Table 4.5
Caste: SC	Dummy takes the value of 1 if the respondent belongs to Scheduled Caste, and 0 otherwise.
Caste: ST	Dummy takes the value of 1 if the respondent belongs to Other Scheduled Tribe, and 0 otherwise.
Nuclear family	Dummy takes the value of 1 if the respondent lives in a nuclear family, and 0 otherwise.
Nuclear family with elders	Dummy takes the value of 1 if the respondent lives in a nuclear family with elders, and 0 otherwise.

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*C. Chapter Four Variable Definitions*

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Education	Minimum number of years of schooling required to attain the degree. That is, Illiterate (=0), Primary (= 5), Upper Primary (=8), Secondary (=10), Senior Secondary (=12), Diploma (=14), Graduate and above (=17).
Employed	Dummy takes the value of 1 if the respondent is employed part time or full-time, and 0 otherwise.
Income	Log median income of the reported income groups of respondents.
Self-employed	Dummy takes the value of 1 if the respondent is self-employed, and 0 otherwise.
Housewife	Dummy takes the value of 1 if the respondent is a housewife, and 0 otherwise.
Labourers	Dummy takes the value of 1 if the respondent is a (non-agricultural or agricultural) labourer, and 0 otherwise.
Salaried	Dummy takes the value of 1 if the respondent is a salaried professional (in the public or private sector with a regular salary), and 0 otherwise.
Retired	Dummy takes the value of 1 if the respondent is retired, and 0 otherwise.
Rural	Dummy takes the value of 1 if the respondent lives in a rural area, and 0 otherwise.
BC Access	Dummy takes the value of 1 if the respondent has access to a banking correspondent, and 0 otherwise.
BC Density	Average number of bank branches per thousand households in the respondent's district.

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# Marginal Effects Calculation in Chapter Two

## D.1 Marginal effect of financial knowledge on financial awareness

We use probit regression to estimate the coefficient of interest related to financial knowledge score.

$$P(FA_{i,n} = 1|FK_n, x_n) = \Phi(c_n + \gamma_i FK_n + \delta_i x_n), \quad \forall i = 1, 2, \dots, 5. \quad (D.1)$$

By construction of probit model, the conditional probability of awareness depends on the financial knowledge. Therefore, using chain rule and employing the fact that partial derivative of a normal distribution function is density function, the marginal effect of financial knowledge score on financial awareness is

$$\begin{aligned} \widehat{ME}_{i,FK_n} P(FA_{i,n} = 1|FK_n, x_n) &= \frac{\partial}{\partial FK_n} P(FA_{i,n} = 1|FK_n, x_n) \\ &= \hat{\gamma}_i \phi(\hat{c}_n + \hat{\gamma}_i FK_n + \hat{\delta}_i x_n), \quad \forall i = 1, 2, \dots, 5. \end{aligned} \quad (D.2)$$

The density function of a normal distribution is always positive. Therefore, the sign of marginal effect coincides with the sign of estimated coefficient in probit regression.

$$\frac{\partial \Phi(x)}{\partial x} = \phi(x) \geq 0.$$

### D.1.1 Computation

Following the methodology Dowd et al. (2014), we report the marginal effect of financial knowledge on financial awareness in the chapter as the sample mean of marginal effect calculate in Equation D.2.

$$\widehat{\overline{ME}}_{i,FK_n} P(FA_{i,n} = 1|FK_{i,n}, x_n) = \frac{1}{N} \sum_{n=1}^N \widehat{ME}_{i,FK_n} P(FA_{i,n} = 1|FK_n, x_n)$$

We calculate standard error of the marginal effect using delta method. We employ *probitmfx* routine from *mfx* package in statistical software R (see R Core Team, 2016).

## D.2 Marginal effect of financial knowledge on financial participation

We employ Heckman probit model to estimate the impact of financial knowledge on the financial participation. The construction of Heckman probit model uses the assumption that there exist some common omitted variables in the regression related to estimation of the relationship between financial knowledge and financial awareness, the regression related to estimation of relationship with financial knowledge and financial participation. As result, it leads to non-zero correlation between the error terms in two regression models. Therefore, the conditional participation probability depends on the hazard function of the linear predictors regression related to relationship between financial knowledge and financial awareness which is known as *inverse Mills ratio*. The explicit expression of inverse Mills ratio is

$$\lambda_{i,n} \equiv \lambda_{i,n}(B_{i,n}) = \frac{\phi(B_{i,n})}{\Phi(B_{i,n})}, \quad \forall i = 1, 2, \dots, 5. \quad (D.3)$$

where,  $B_{i,n} = [c_n + \gamma_i FK_n + \delta_i x_n]$  is calculated from model D.1 and the function  $\phi$  and  $\Phi$  stands for standard normal density and distribution function. After inclusion of the bias correction factor, inverse Mills ratio, the estimation equation of Heckman probit model becomes

$$P(FI_{i,n} = 1|FK_n, x_n, y_n) = \Phi(c_i + \kappa_i FK_n + \delta_i x_n + \rho_i \lambda_{i,n}), \quad \forall i = 1, 2, \dots, 5. \quad (D.4)$$

By construction of estimation model, the conditional financial participation probability involves two covariates namely  $FK_n$  and  $\lambda_{i,n}$  that depends on financial knowledge of households. Therefore, by chain rule the marginal effect of financial knowledge depends on the

derivative of these two terms.

$$\begin{aligned}\widehat{ME}_{i,FK_n} P(FH_{i,n} = 1|FK_n, x_n, \lambda_{i,n}) &= \frac{\partial}{\partial FK_n} P(FH_{i,n} = 1|FK_n, x_n) \\ &= \phi(D_{i,n})[\hat{\kappa}_i + \hat{\rho}_i \frac{\partial}{\partial FK_n} \lambda_{i,n}(B_{i,n})], \quad \forall i = 1, 2, \dots, 5,\end{aligned}$$

where,  $D_{i,n} = c_i + \kappa_i FK_n + \delta_i x_n + \rho_i \lambda_{i,n}(B_{i,n})$  and  $B_{i,n} = [c_n + \gamma_i FK_n + \delta_i x_n]$ . Substituting  $\frac{\partial \phi(x)}{\partial x} = -2x\phi(x)$  and after some simplification, the marginal effect of financial knowledge score on the conditional participation probability becomes

$$\widehat{ME}_{i,FK_n} P(FH_{i,n} = 1|FK_n, x_n, \lambda_{i,n}) = \phi(D_{i,n})\left(\hat{\kappa}_i - \hat{\rho}_i \hat{\gamma}_i \lambda_{i,n}[2B_{i,n} + \lambda_{i,n}]\right), \quad \forall i = 1, 2, \dots, 5. \quad (D.5)$$

### D.2.1 Computation

We report marginal effect of financial knowledge on financial participation in the chapter as sample mean of marginal effect calculated in Equation D.5.

$$\overline{\widehat{ME}}_{i,FK_n} P(FH_{i,n} = 1|FK_n, x_n, \lambda_{i,n}) = \frac{1}{N'} \sum_{n=1}^{N'} \widehat{ME}_{i,FK_n} P(FH_{i,n} = 1|FK_n, x_n, \lambda_{i,n})$$

The  $N'$  is the number of households participating in the estimation model. We report the standard error as the sample standard error of marginal effects calculated in Equation D.5. We calculate p-values using thresholds from t-distribution with  $N'$  degree of freedom. We code using *glm* routine in statistical software R (see R Core Team, 2016).

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## Comparing Participating and Pseudo-participating Households in Chapter Three

The comparative summary statistics tables E.0.1, E.0.2, E.0.3, E.0.4 and E.0.5 compares the demographic attributes between the participating and pseudo-participating households for the product segments savings, debt, insurance, pensions and capital markets, respectively. In each of the tables, we term household as participating he is aware of the existence of the financial product and holds that product in his portfolio. We term an unaware household as a pseudo-participating household for a product if his predicted probability of participation for the given product exceeds the  $x^{th}$  decile of predicted probability of participation of aware households for that product. In each of the tables, the second column reports the average demographic attribute of aware and participating households. In contrast, the next three columns report the average of the demographic attribute of unaware but pseudo-participating households corresponding to  $5^{th}$ ,  $6^{th}$  and  $7^{th}$  decile of the probability of participation for aware households, respectively. In all tables, the t-statistics in the parenthesis correspond to the null hypothesis that the averages of aware and participating households' average demographic attributes are equal to the average demographic attributes of unaware and pseudo-participating households. The stars \*\*\*, \*\* and \* denote level of significance at 1, 5 and 10 percent, respectively. All figures in the tables are rounded up to three places of decimal.

*E.0.1. Comparing demography of participating and Pseudo-participating households for savings product segment*

**E.0.1 Comparing demography of participating and Pseudo-participating households for savings product segment**

Household attributes	Aware & holds	Pseudo-participating households		
		5th decile	6th decile	7th decile
Acquired cogito	0.525	0.485*** (13.356)	0.509*** (4.551)	0.538*** (-3.019)
Innate cogito	0.547	0.885*** (-54.491)	0.933*** (-52.501)	0.994*** (-46.345)
<b>Panel A: Demographic characteristics</b>				
Age	39.216	42.673*** (-8.192)	44.265*** (-9.452)	45.902*** (-9.336)
Female	0.395	0.423* (-1.897)	0.367 (1.526)	0.349* (1.937)
Caste: GEN	0.532	0.409*** (8.154)	0.457*** (4.027)	0.529 (0.121)
Caste: OBC	0.244	0.147*** (8.946)	0.147*** (7.372)	0.139*** (6.193)
Caste: SC	0.104	0.082*** (2.631)	0.075*** (3.009)	0.077** (2.121)
Caste: ST	0.120	0.363*** (-16.543)	0.321*** (-11.642)	0.256*** (-6.358)
Education	11.637	11.482* (1.849)	11.921*** (-2.827)	12.431*** (-6.227)
Income	7.406	7.611 (-1.371)	8.351*** (-5.66)	8.868*** (-6.994)
<b>Panel B: Financial access</b>				
BC_access	0.042	0.002*** (25.682)	0.001*** (25.216)	0.002*** (15.486)
Bank_density	1.713	1.563*** (6.868)	1.573*** (5.273)	1.634** (2.328)
<b>Panel C: Spatial characteristics</b>				
Rural	0.489	0.42*** (4.575)	0.405*** (4.582)	0.321*** (7.34)
North	0.216	0.117*** (9.969)	0.116*** (8.419)	0.105*** (7.326)
North-east	0.127	0.263*** (-10.082)	0.253*** (-7.806)	0.206*** (-3.952)
East	0.157	0.125*** (3.204)	0.133* (1.877)	0.139 (1.077)
Central	0.145	0.114*** (3.134)	0.122* (1.855)	0.139 (0.371)
West	0.180	0.138*** (3.925)	0.151** (2.18)	0.184 (-0.219)
South	0.174	0.243*** (-5.196)	0.224*** (-3.233)	0.227** (-2.567)
Observations	56,936	46,473	38,605	29,879

**E.0.2 Comparing demography of participating and pseudo-participating households for debt product segment**

Household attributes	Aware & holds	Pseudo-participating households		
		5th decile	6th decile	7th decile
Acquired cogito	0.551	0.466*** (48.799)	0.479*** (38.636)	0.493*** (28.539)
Innate cogito	0.651	0.770*** (-44.431)	0.793*** (-48.705)	0.816*** (-50.103)
<b>Panel A: Demographic characteristics</b>				
Age	40.386	40.979*** (-3.502)	41.620*** (-6.709)	42.268*** (-9.025)
Female	0.333	0.357*** (-3.955)	0.300*** (5.097)	0.255*** (11.03)
Caste: GEN	0.566	0.434*** (20.44)	0.436*** (18.685)	0.448*** (15.032)
Caste: OBC	0.234	0.241 (-1.352)	0.248** (-2.253)	0.259*** (-3.588)
Caste: SC	0.093	0.096 (-0.869)	0.090 (0.657)	0.094 (-0.347)
Caste: ST	0.107	0.229*** (-24.653)	0.227*** (-22.171)	0.199*** (-15.467)
Education	12.535	10.730*** (29.327)	11.125*** (21.511)	11.459*** (15.007)
Income	8.786	8.183*** (9.618)	8.911** (-1.971)	9.582*** (-12.555)
<b>Panel B: Financial access</b>				
BC_Access	0.071	0.059*** (3.603)	0.072 (-0.493)	0.095*** (-5.458)
Bank_Density	1.810	1.512*** (25.488)	1.528*** (22.791)	1.524*** (21.178)
<b>Panel C: Spatial characteristics</b>				
Rural	0.450	0.631*** (-28.362)	0.641*** (-27.788)	0.665*** (-28.242)
North	0.208	0.141*** (13.713)	0.141*** (12.928)	0.116*** (16.763)
North-east	0.074	0.134*** (-14.812)	0.118*** (-10.314)	0.077 (-0.707)
East	0.149	0.219*** (-13.713)	0.22*** (-12.685)	0.249*** (-15.318)
Central	0.139	0.161*** (-4.761)	0.163*** (-4.757)	0.175*** (-6.142)
West	0.195	0.074*** (28.463)	0.072*** (27.652)	0.070*** (26.001)
South	0.236	0.271*** (-6.249)	0.287*** (-8.276)	0.313*** (-10.832)
Observations	13,817	50,291	42,337	32,629

**E.0.3 Comparing demography of participating and pseudo-participating households for insurance product segment**

Household attributes	Aware & holds	Pseudo-participating households		
		5th decile	6th decile	7th decile
Acquired cogito	0.434	0.345*** (74.127)	0.365*** (52.219)	0.379*** (36.836)
Innate cogito	0.524	0.576*** (-26.344)	0.612*** (-39.736)	0.637*** (-44.259)
<b>Panel A: Demographic characteristics</b>				
Age	38.903	41.341*** (-15.582)	41.288*** (-13.642)	41.528*** (-13.285)
Female	0.295	0.476*** (-32.525)	0.435*** (-22.73)	0.404*** (-15.68)
Caste: GEN	0.607	0.452*** (27.29)	0.493*** (18.078)	0.486*** (17.004)
Caste: OBC	0.233	0.295*** (-12.3)	0.299*** (-11.713)	0.322*** (-13.643)
Caste: SC	0.087	0.112*** (-7.089)	0.108*** (-5.386)	0.106*** (-4.235)
Caste: ST	0.073	0.141*** (-18.432)	0.100*** (-7.286)	0.087*** (-3.396)
Education	13.049	9.885*** (57.715)	10.479*** (43.099)	11.008*** (30.935)
Income	8.61	6.592*** (33.772)	7.204*** (21.595)	7.862*** (10.553)
<b>Panel B: Financial access</b>				
BC_Access	0.039	0.065*** (-9.998)	0.086*** (-14.438)	0.113*** (-17.72)
Bank_Density	1.831	1.526*** (29.68)	1.519*** (27.974)	1.546*** (22.854)
<b>Panel C: Spatial characteristics</b>				
Rural	0.386	0.587*** (-35.748)	0.597*** (-33.91)	0.611*** (-32.25)
North	0.229	0.199*** (6.336)	0.215*** (2.605)	0.222 (1.142)
North-east	0.089	0.060*** (9.839)	0.033*** (20.562)	0.022*** (24.744)
East	0.115	0.131*** (-4.146)	0.095*** (5.251)	0.063*** (13.972)
Central	0.162	0.205*** (-9.741)	0.209*** (-9.476)	0.199*** (-6.607)
West	0.197	0.138*** (14.179)	0.157*** (8.572)	0.169*** (5.186)
South	0.209	0.267*** (-11.837)	0.291*** (-14.82)	0.325*** (-17.982)
Observations	20,951	56,851	47,431	38,255

**E.0.4 Comparing demography of participating and pseudo-participating households for pensions product segment**

Household attributes	Aware & holds	Pseudo-participating households		
		5th decile	6th decile	7th decile
Acquired cogito	0.454	0.378*** (49.381)	0.392*** (38.106)	0.411*** (24.16)
Innate cogito	0.791	0.616*** (80.663)	0.638*** (65.951)	0.668*** (47.201)
<b>Panel A: Demographic characteristics</b>				
Age	41.738	42.021* (-1.726)	42.859*** (-6.445)	43.854*** (-10.871)
Female	0.27	0.301*** (-5.233)	0.307*** (-5.885)	0.301*** (-4.471)
Caste: GEN	0.547	0.444*** (16.068)	0.429*** (17.383)	0.419*** (17.154)
Caste: OBC	0.197	0.225*** (-5.25)	0.209** (-2.183)	0.181*** (2.774)
Caste: SC	0.088	0.104*** (-4.151)	0.094 (-1.41)	0.084 (0.993)
Caste: ST	0.167	0.228*** (-11.948)	0.268*** (-18.219)	0.315*** (-23.337)
Education	13.635	11.398*** (43.894)	11.895*** (32.739)	12.514*** (19.447)
Income	11.403	9.922*** (40.211)	10.191*** (31.187)	10.716*** (17.518)
<b>Panel B: Financial access</b>				
BC_Access	0.039	0.048*** (-3.51)	0.049*** (-3.743)	0.053*** (-4.533)
Bank_Density	1.854	1.663*** (14.625)	1.713*** (10.291)	1.743*** (7.441)
<b>Panel C: Spatial characteristics</b>				
Rural	0.38	0.503*** (-19.412)	0.459*** (-11.821)	0.434*** (-7.394)
North	0.205	0.137*** (13.804)	0.123*** (16.004)	0.117*** (16.246)
North-east	0.182	0.192** (-2.041)	0.215*** (-6.21)	0.256*** (-12.019)
East	0.155	0.164* (-1.803)	0.152 (0.556)	0.143** (2.313)
Central	0.126	0.113*** (2.898)	0.1*** (5.793)	0.091*** (7.44)
West	0.153	0.163** (-2.131)	0.146 (1.495)	0.119*** (6.597)
South	0.179	0.231*** (-10.135)	0.262*** (-15.012)	0.274*** (-15.208)
Observations	9,128	40,132	32,208	23,795

**E.0.5 Comparing demography of participating and pseudo-participating households for capital market product segment**

Household attributes	Aware & holds	Pseudo-participating households		
		5th decile	6th decile	7th decile
Acquired cogito	0.274	0.177*** (44.614)	0.195*** (35.379)	0.215*** (25.442)
Innate cogito	0.739	0.309*** (74.096)	0.338*** (68.469)	0.369*** (62.124)
<b>Panel A: Demographic characteristics</b>				
Age	40.918	40.132*** (3.252)	40.538 (1.519)	40.691 (0.868)
Female	0.242	0.211*** (3.719)	0.175*** (7.968)	0.156*** (9.85)
Caste: GEN	0.714	0.492*** (24.829)	0.518*** (21.067)	0.562*** (15.537)
Caste: OBC	0.16	0.190*** (-4.108)	0.169 (-1.159)	0.144** (2.152)
Caste: SC	0.065	0.098*** (-6.675)	0.089*** (-4.793)	0.078** (-2.492)
Caste: ST	0.061	0.221*** (-29.688)	0.224*** (-28.148)	0.217*** (-24.604)
Education	14.650	12.299*** (33.97)	12.735*** (26.804)	13.265*** (18.57)
Income	10.675	10.603 (0.988)	11.031*** (-4.93)	11.288*** (-8.507)
<b>Panel B: Financial access</b>				
BC_Access	0.047	0.075*** (-6.622)	0.097*** (-10.798)	0.128*** (-15.255)
Bank_Density	1.939	1.626*** (15.583)	1.616*** (15.598)	1.614*** (15.015)
<b>Panel C: Spatial characteristics</b>				
Rural	0.258	0.436*** (-20.341)	0.388*** (-14.381)	0.357*** (-10.42)
North	0.238	0.195*** (5.206)	0.197*** (4.809)	0.220** (2.078)
North-east	0.065	0.147*** (-15.903)	0.126*** (-11.419)	0.094*** (-5.334)
East	0.129	0.098*** (4.834)	0.087*** (6.308)	0.074*** (8.152)
Central	0.146	0.203*** (-8.112)	0.212*** (-8.92)	0.225*** (-9.945)
West	0.279	0.167*** (13.156)	0.181*** (11.132)	0.177*** (11.22)
South	0.144	0.190*** (-6.562)	0.196*** (-7.174)	0.211*** (-8.626)
Observations	3,159	32,504	24,909	18,413

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## Survey Questions Recording the Reasons Behind Non-participation in to Financial Markets Corresponding to Chapter Four

Responses	Section
1. What are the reasons for not opening a bank account? ( <b>Savings/Debt</b> )	
a). No need for bank account	Choice
b). Not enough money	Affordability
c). Someone else in the family already has account	Included
d). Banks are too far away	Accessibility
e). Do not have necessary documents /KYC <sup>1</sup>	Complexity
f). Do not trust bank	Trust
g). Complicated/difficult procedure	Complexity
h). Religious reasons	Religion
i). Others	Others
2. What are the reasons why you do not have insurance? ( <b>Insurance</b> )	
a). Lack of knowledge about insurance	Knowledge
b). Not enough earning/money	Affordability
c). Do not have necessary documents	complexity
d). Religious reasons	Religion
e). Covered in someone else's policy	Included

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<sup>1</sup>Know your customer (KYC) form is the application form for opening a savings bank account in India.

*F. Survey Questions Recording the Reasons Behind Non-participation in to Financial Markets Corresponding to Chapter Four*

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f). Do not trust insurance company	Trust
g). Insurance are costly	Affordability
h). I am healthy physically/financially	Choice
i). Do not have access to insurance companies	Accessibility
j). Confused about choices	Knowledge
k). No need felt	Choice
l). Others	Others
3. What are the reasons why you do not have a pension account? <b>(Pensions)</b>	
a). I am too young to think about retirement	Knowledge
b). Not enough earning/money	Affordability
c). Have invested in other financial products	Affordability
d). Children would support	Kinship support
e). Product and services are not available	Accessibility
f). Not required/No need felt	Choice
g). Religious reasons	Religion
h). Others	Others
3. What are the reasons why you do not invest in shares/stocks, bonds and mutual funds? <b>(Capital markets)</b>	
a). Lack of knowledge about stock market	Knowledge
b). Not enough earning/money	Affordability
c). Complicated and difficult procedure	Complexity
d). Religious reasons	Religion
e). Demands a lot of time	Complexity
f). Do not find it trustworthy	Trust
g). Do not generate sufficient returns	Return
h). Fear of losing money	Return
i). Lack of ethics in market place	Trust
j). Not required/No need felt	Choice
k). Others	Others

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## Definition of Reported Crime Incidents Used in Chapter Five

No.	Type of crime	Description of crime
1.	Burglary	<p>Burglary is defined by law as the entering of a building as a trespasser through violent or forcible means and committing any of the following crimes:</p> <ul style="list-style-type: none"> <li>• Stealing or attempting to steal from it.</li> <li>• Inflicting or attempting to inflict grievous bodily harm to anyone in it.</li> <li>• Making trespassing entry to a building with the intent to steal, intent to inflict or intent to do unlawful damage</li> </ul> <p>It is different from theft, where the trespasser gets access to property or valuables without using any forcible means.</p>
2.	Caste-riot	<p>Caste-riot is a violent offense against public order involving three or more people based on caste level discrimination. The discrimination can range from civil, political, economic, social, and cultural rights to the population segments. The law also considers the unlawful assembly of caste groups resulting in the breakdown of public order under the pretext of caste-based discrimination.</p>
3.	Cheating	<p>Cheating is the fraudulent way of obtaining someone's property through a false symbol or token or by deceitful or illegal practices.</p>

*G. Definition of Reported Crime Incidents Used in Chapter Five*

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4. Counterfeiting                      Counterfeiting is the criminal act of passing of counterfeited product as genuine. In general, counterfeit products are made to take advantage of the value of the imitated product.
  5. Dacoity                              Dacoity is a robbery where the persons committing the robbery are five or more in number.
  6. Dacoity-preparation              Dacoity preparation is a crime where five or more persons conjointly committing or attempting to commit a robbery
  7. Extortion                            Extortion is the unlawful extraction of money or property from the wrongful use of actual or threatened force, violence, or fear, or under the color of official right.
  8. Forgery                              Forgery is a crime about making, drawing, or altering a document with the intent to defraud without taking due permission from the owner of the content.
  9. Kidnapping                         Kidnapping is an attack on or infringement of personal liberty, consisting of taking or carrying away one person by another, by force or fraud, without the consent of the person taken or carried away without lawful excuse.
  10. Robbery                            Robbery is defined as taking the property of another, with the intent to permanently deprive the person of that property, employing force or fear. It is a theft accomplished by an assault.
  11. Rape                                 Rape is an invasion of a woman's body without her consent in which her private, personal inner space is violated.
  12. Theft                                 Theft intends to take dishonestly any movable property out of the possession of any person without that person's consent. In theft is different from Burglary, as, in theft incidents, the criminal does not use forcible means to access the property.
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## Colophon

*This dissertation explores financial decision-making in the context of emerging markets. Using representative cross-section survey data from India, the dissertation empirically evaluates the role of financial literacy in helping financial awareness and financial holdings. After identifying the role of financial literacy in helping financial participation, it further evaluates how financial literacy works as a policy tool in mediating the discrimination based on gender and caste. The results from empirical chapters show that financial literacy not only ensures financial participation but also mediates the long-enduring challenges of caste and gender-based discrimination. PhD completed 2021.*