# A Qualitative Choice Analysis:

# Examining the Factors Shaping the Patterns of Mortgage Payment Irregularities

By

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A thesis submitted to the Department of Economics and Social Science in partial

fulfillment of the requirements for the degree of Master of Science in Applied Economics

(MSAE)

Department of Economics and Social Science

BRAC University

December 2023

# ABSTRACT

This thesis examines the factors influencing mortgage payment irregularities among individuals. A positive association between higher financial literacy and irregularities challenges the expected results of a negative correlation. While financial education shows potential long-term impacts, home equity loans exhibit stabilization effects that contribute to regular payments. Risk-taking preferences display anticipated connections with irregularities, but financial goal confidence has a surprisingly positive tie to fluctuations in payments. Though improved financial education emerges as a critical implication, the results reveal complex financial decision dynamics, demanding further investigation into the mechanisms driving mortgage behaviors. The limitations of the data sources, measurements, omitted influences, and evolving risk perceptions highlight the need to refine our understanding through continued research on the intricate factors shaping mortgage payment patterns. Ultimately, unraveling these nuances promises major advancements in literacy programs, policies, and lending practices aimed at greater stability across mortgage and economic landscapes.

# ACKNOWLEDGEMENT

This thesis stands as a testament to the invaluable support and guidance provided by a cohort of individuals who have played pivotal roles in its fruition.

First and foremost, my deepest gratitude extends to Dr. Taufiq Hasan Quadria, my supervisor, whose unwavering support and friendliness created an environment conducive to exploration and growth. His patience in navigating through my numerous revisions, coupled with insightful comments, not only clarified the complexities but also motivated me to refine my thoughts, elevating the caliber of this work.

I extend heartfelt thanks to Dr. Shakil Haider from BRAC University for steering me in the right direction and encouraging me to seize the opportunity to present this thesis. The impact of his guidance has been instrumental in shaping the trajectory of this research.

Special appreciation goes to Dr. Abdul Hannan Chowdhury and Dr. Wasiqur Rahman Khan for their invaluable insights and feedback. Their contributions have added perspective to this study, enriching the overall narrative.

To all those mentioned and the countless others who have played a part, your support has been a cornerstone in the foundation of this academic endeavor.

# DECLARATION

It is hereby declared that

1. The thesis submitted is my own original work while completing degree at BRAC University.
2. The thesis does not contain material previously published or written by a third party, except where this is appropriately cited through full and accurate referencing.
3. The thesis does not contain material which has been accepted, or submitted, for any other degree or diploma at a university or other institution.
4. I have acknowledged all main sources of help.

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# APPROVAL

The thesis/project titled **"A Qualitative Choice Analysis: Examining the Factors Shaping the Patterns of Mortgage Payment Irregularities"** submitted by *Mohammad Hasan Kabir, BRAC University, Id: 22275009* of Fall, 2023 has been accepted as satisfactory in partial fulfillment of the requirement for the degree of Masters of Science in Applied Economics on 17th December, 2023.
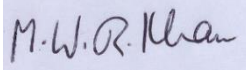
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# CHAPTER 1: INTRODUCTION

## 1.1 Research Motivation

Navigating the intricacies of mortgage payment irregularities is not merely an academic pursuit but a quest for solutions to a pervasive challenge in our financial landscape. In this academic thesis, "Examining the Factors Shaping the Patterns of Mortgage Payment Irregularities," is driven by the imperative to unravel the complex web of relationships between explanatory variables and the pivotal dependent variable, shedding light on the nuanced dynamics of mortgage payment irregularities. As we embark on a journey through various statistical techniques, the primary modeling approach aims not only to estimate relationships but to provide nuanced insights into the magnitude and significance of the factors influencing mortgage payment irregularities. This endeavor holds the promise of not only advancing academic understanding but also sparking real-world implications.

The potential findings of this research stand as beacons guiding transformative change in the realms of financial literacy, policymaking, and lending practices. If this study unveils a positive association between financial literacy and diminished mortgage payment irregularities, it will underscore the critical role of fostering financial education programs.

This thesis, therefore, becomes a call to action, advocating for an informed and empowered borrower base, ultimately contributing to a more stable and resilient mortgage finance sector. In essence, this research is more than an academic pursuit; it is a commitment to shaping a future where financial landscapes are navigated with knowledge, leading to greater economic stability and individual empowerment.

## 1.2 Research Question

The endeavor to uncover the "Pattern of Mortgage Payment Irregularities" among individuals can be condensed into a fundamental investigation:

"What are the most common factors that lead to mortgage payment irregularities?"

# CHAPTER 2: LITERATURE REVIEW

## 2.1 Financial Literacy Category:

**Objective Financial Knowledge & Financial Education Level**

According to Atkinson and Messy (2013), p. 9, one of the 21st century skills required to tackle the issues and challenges of our day is financial literacy. This ability is particularly important for ensuring consumer financial safety. As a result, financial literacy may be seen as a crucial component of financial stability, both for the person and the economy, since it helps to prevent anomalies in mortgage payments. Moore (2003) further demonstrates that consumers who obtained expensive mortgages exhibit a low level of financial knowledge.

Recent research has been done on the subject of mortgage loans and house ownership specifically. These outcomes are outlined in further detail below: For example, Gerardi et al. studied the relationship between financial literacy and high-risk mortgage default from 2010 to 2013. The researchers discovered "a large and statistically significant negative correlation between financial literacy and measures of mortgage delinquency and default" (Gerardi et al. 2010, p. 4), which they attribute in part to a lack of arithmetic skills (one element of financial competence) (Gerardi et al. 2010, p. 5). According to Gerardi et al. (2010), pp. 3, 15, other characteristics like risk aversion or general cognitive capacity did not appear to be as significant. According to the authors' summary of past studies, people frequently lack understanding of even the most fundamental mortgage concepts. Additionally, improved negotiating results and a decreased propensity to be vulnerable to dubious tactics have frequently been associated with stronger cognitive abilities and financial literacy (Gerardi et al. 2013, p. 11267).

Understanding and using financial terms and techniques to arrive at wise financial decisions is known as financial literacy. It contains personal expertise on topics like managing credit cards, knowing when to invest, and how to save. Both subjective and objective financial information is included. Financial literacy, according to Lewellen, Lease, and Schlarbaum (1977), is a crucial consideration when making individual investment decisions that might influence one's financial situation. Better understanding of financial principles increases the likelihood that an investor will manage their money, either successfully or miserably.

The study by Friend, Randolph, and Michael from 1978 similarly links risk with financial literacy. They discovered that investors who had a better grasp of financial concepts were more susceptible to taking financial risks. This is probably due to the fact that investors who are more knowledgeable about finance are more likely to be aware of the benefits and hazards. Additionally, they are more likely to possess the information and abilities necessary to properly manage their risk.

In research conducted for National Westminster Bank in the UK, Noctor, Stoney, and Stradling (1992) defined financial literacy as: The ability to make educated evaluations and knowledgeable judgements on the use and management of transactions. The ability to use money wisely and manage mortgage payments is what they mean by financial literacy.

According to the personal finance literature that is currently published, financial habits and financial literacy are connected. Bernheim (1996) asserts that because Americans lack basic personal financial literacy, they tend to employ sloppy rules of thumb to determine their saving behavior. Numerous empirical studies have revealed a favorable association between financial conduct and personal financial literacy.

In a world where financial complexity is soaring, there is an increasing requirement for financial knowledge and at least fundamental financial talents (Morris 2001). As a consequence of technology improvements, the provision of financial services in New Zealand and across the world has experienced a substantial shift. A wide range of financial services and products are available to the general public, including investment and debt-related items. While there are more benefits, there are also more complex risks involved, including those that may not always be clear to the uninitiated. The variety and complexity of financial choices a person must now make to manage their finances have significantly risen as a result.

Lack of financial literacy, according to Lusardi and Turfano (2009), can make little financial issues seem overwhelming, which can generate financial stress and have an effect on people's general wellbeing.

According to Zinman's (2009) research, people with less financial literacy consistently underestimate interest rates while considering debt. Additionally, those who lack financial literacy are more prone to employ expensive loan instruments, even when their actual circumstances do not call for it (Robb, Babiarz, Woodyard, & Seay, 2015).

**2.2 Home & Mortgages Category:**

**Mortgage on Home**

Numerous worldwide researches have shown elements that affect families' mortgage decision-making. Choosing the best mortgage often appears to be a highly challenging subject (Campbell and Cocco 2003).

The most pertinent work is Chen et al.'s (2020) analysis of how household debt, liquid asset holdings, consumption, and refinancing vary depending on income or debt quintiles of households when macroeconomic conditions shift in ways that resemble those seen before and after the financial crisis.

In a summary, Hullgren and Söderberg (2013) note that characteristics of borrowers that affect decisions especially relate to customers' risk aversion, capacity for handling abrupt rises in mortgage rates, and degree of financial knowledge.

Consumer default is demonstrated via the application of Chatterjee (2012)'s long-maturity unsecured debt framework to a scenario in which long-maturity debt is issued against collateral whose value is subject to vary over time. This extension is used by Luzzetti and Neumuller (2014) to examine how bankruptcy reform and mortgage irregularities interact.

Mortgage irregularities follows a similar format to Kim (2015), which was accepted for publication. When a household decides to stop making mortgage payments, the mortgage lender decreases the mortgage debt principal up to the point when the value of stopping payments and the value of failing on the present mortgage are equal.

**2.3 Financial Attitudes & Behaviors Category:**

**Confidence Ability about Financial Goal**

Despite the fact that very few studies have explicitly looked at interest-only mortgage borrowing behavior, the literature provides valuable insight into the link between financial literacy and mortgage borrowing behavior. Moore (2003) discovered, in keeping with earlier work by Huston (2012), that individuals with lower levels of education had higher rates of costly mortgages. According to a study by Moulton, Loibl, Samak, and Collins (2013), those who are financially confident are more likely to make bad judgments when borrowing money for a mortgage.

**Investment Risk Level Preference**

In research done for National Westminster Bank in the UK, Noctor, Stoney, and Stradling (1992) defined financial concept as: The capacity to make knowing assessments and knowledgeable judgements on the use and management of investments. The ability to make sensible decisions about how to use and manage money is how they describe financial concept.

Financially uneducated people are more prone to utilize expensive loan instruments and engage in bad credit card behavior (Lusardi & Scheresberg, 2013; Xiao, Tang, Serido, & Shim, 2011). Huston (2012) discovered that customers who were financially knowledgeable were more likely to pay debt interest rates that were below average and to choose cost-effective borrowing options.

**Satisfaction Level about Financial Condition**

Young individuals and the elderly are the age groups that make the greatest financial mistakes, according to Agarwal et al. (2009), since they have the lowest levels of cognitive ability.

Hilgert et al. (2003) have also demonstrated a positive association between financial management skill and financial behavior. Campbell (2006) continues by demonstrating how many investors passed up the chance to lower their mortgage interest rates by refinancing. Because a disproportionately high percentage of investors with low levels of education decided against refinancing, this outcome is consistent with uncertainty. According to Gerardi et al. (2013), mortgage defaults were significantly predicted by a lack of financial capabilities.

# CHAPTER 3: METHODOLOGY

## 3.1 Dataset

This research utilized ordered logit models to analyze mortgage payment irregularities as the dependent variable, considering its ordered measurement. Marginal effects were computed to assess the extent of influence on the observed dependent variable. In the context of the model, the measurement of the dependent variable, "**Mortgage Payment Irregularities**" depends on the specific methodology and questions: survey-based measurement. I extracted data and facts from the National Financial Capability Study (NFCS) database of FINRA Foundation which has already developed a questionnaire or survey that includes items or scales designed to assess individuals' investment risk preferences. I have cleaned 7,092 observations from two survey questionnaires "2021 National Financial Capability Study State-by-State Survey Instrument" and "2021 National Financial Capability Study Investor Survey Instrument" using R programming. The respondents were asked to rate their comfort level with different levels of mortgage irregularity of how often they make the payment on time or not.

## 3.2 Variable Notation

### Table 1: Variable Notation

| Label | Variable Elaboration | Source | Variable Type |
|---|---|---|---|
| MP | Mortgage Payment Irregularities | NFCS Database | Dependent Variable |
| HQL | Home Equity Loans | ,, | Primary Explanatory Variable |
| IRPL | Investment Risk Preference Level | ,, | ,, |
| SLFC | Satisfaction Level about Financial Condition | ,, | ,, |
| CAFG | Confidence Ability about Financial Goal | ,, | ,, |
| Fin_ed_yes_part | Financial Literacy: Financial Education offered and participated | ,, | ,, |
| Fin_ed_notpart | Financial Literacy: Financial Education offered but not participated | ,, | ,, |
| OFK | Financial Literacy: Objective Financial Knowledge | ,, | ,, |

### 3.3 Variable Explanation

### 3.3.1 Dependent Variable:

**Mortgage Payment Irregularities**

The variable "Mortgage Payment Irregularities" measures the economic reliability of individuals in fulfilling their mortgage payment obligations. It denotes a three-level scoring system, with a score of 1 indicating a consistent history of timely payments, suggesting financial stability and responsibility. A score of 2 reflects sporadic lateness in mortgage payments, potentially attributable to temporary financial setbacks, while a score of 3 signifies frequent lateness, indicating a recurring pattern of payment irregularities, which could be indicative of financial strain or instability. This variable provides valuable economic insights into the financial health and reliability of mortgage borrowers, allowing for the differentiation between those consistently meeting their obligations, those facing occasional challenges, and those experiencing chronic payment issues, which could have implications for lenders, the housing market, and broader economic stability.

### 3.3.2 Independent Variable:

This qualitative model consists of two kinds of independent variables such as:

**Primary Explanatory Variables**

This variable defines six primary independent variables of the research that I am focused on analyzing how they affect the dependent variable 'Mortgage Payment Irregularities' in this qualitative model.

**Demographic/Control Variables**

These variables are used in the experiments to isolate their effects on other variables. I have used seven control variables in this qualitative analysis.

**Primary Explanatory Variables:**

**Satisfaction Level about Financial Condition**

The "Satisfaction Level about Financial Condition" (SLFC) variable, rated from 1 to 10, serves as a valuable economic indicator of individual financial well-being. It categorizes respondents

into three groups: those with scores of 1-3 indicating low satisfaction, reflective of financial discontent or challenges; scores of 4-7 suggest moderate satisfaction, indicating a reasonably content financial situation; and scores of 8-10 represent high satisfaction, implying a robust and comfortable financial condition. In an economic context, the SLFC variable provides a succinct means to gauge individual financial sentiment, offering insights into consumer confidence, potential economic disparities, and the overall health of the financial landscape. This information can be instrumental for policy-makers, financial institutions, and businesses in tailoring strategies and offerings to address the diverse financial needs and attitudes of the population.

**Investment Risk Preference Level**

The "Investment Risk Preference Level" (IRPL) variable, measured on a scale from 1 to 10, functions as a key determinant in economic analysis, capturing an individual's propensity for timely mortgage payment. It sorts respondents into three sets: those with scores of 1-3 indicating a low-risk preference, reflecting a cautious approach to investments; scores of 4-7 suggesting a moderate risk preference, indicating a balanced willingness to take risks; and scores of 8-10 signifying a high-risk preference, demonstrating a pronounced inclination for risk in investment choices. In the realm of economics, IRPL is a critical factor for understanding investment behavior, financial markets, and risk management strategies. It plays a crucial role in shaping investment strategies, asset allocation, and risk assessment in portfolios, with implications for asset prices, financial stability, and overall economic growth.

**Confidence Ability about Financial Goal**

The "Confidence in Achieving Financial Goals" (CAFG) variable, measured on a scale from 1 to 4, plays a significant role in economic analysis by assessing an individual's level of confidence in their ability to realize their financial objectives. It specifies respondents into three groups: those with scores of 1-2 indicating low confidence, reflecting uncertainties in achieving financial goals; scores of 3 signifying moderate confidence, suggesting a reasonable belief in their capacity to meet these goals; and scores of 4 representing high confidence, demonstrating a strong conviction in their ability to successfully attain financial objectives. From an economic perspective, CAFG is a pivotal indicator influencing consumer behavior, savings, and investment decisions, impacting overall economic growth and financial stability. It helps economists and

policymakers understand the dynamics of consumer sentiment, which, in turn, influences spending patterns, investment trends, and the broader economic landscape.

**Home Equity Loans**

The "Home Equity Loans" (E8) variable, presented as a binary score of 1 or 2, serves as a vital economic indicator by delineating whether an individual possesses a home equity loan. A score of 1 signifies the presence of such a loan, reflecting an individual's engagement with a specific financial instrument tied to their property's equity, which has implications for their borrowing capacity and investment options. In contrast, a score of 2 indicates the absence of a home equity loan, highlighting that the individual does not participate in this particular financial arrangement. From an economic standpoint, this variable provides insights into individuals' borrowing behavior, financial leverage, and potentially their investment in real estate, all of which have significance for the housing market, lending institutions, and the broader economic landscape.

**Financial Education Level**

The "Financial Education Received" (finedu) variable holds significant economic relevance as it quantifies the extent of individuals' involvement in formal or informal financial education programs. This variable, categorized into three sub-categories, distinguishes those who actively participated and received instruction (fin_ed_yes_part), those who attended but did not engage in formal training (fin_ed_yes_notpart), and those who did not partake in financial education (fin_ed_no). In an economic context, finedu reflects the impact of financial literacy initiatives aimed at enhancing individuals' understanding of financial concepts, investment strategies, and risk management. This information is invaluable for economists and policymakers seeking to evaluate the efficacy of financial education programs, their influence on financial decision-making, and their potential to promote economic stability and responsible financial behavior among the populace. It also has implications for consumer financial well-being, savings, investment choices, and the broader financial landscape.

**Financial Literacy: Objective Financial Knowledge**

"Objective Financial Knowledge" (OFK) is a pivotal economic variable that quantifies an individual's factual and technical comprehension of financial concepts, free from personal

experiences or emotions, which forms the bedrock of informed financial decision-making. OFK encompasses the acquisition of concrete information on topics such as investments, financial regulations, interest rates, mathematical calculations, and economic indicators, enabling individuals to make financial decisions based on a solid and unbiased understanding of financial principles. Categorized into low (Category 1), moderate (Category 2), and high (Category 3) objective financial knowledge, the OFK variable plays a crucial role in economics by providing insights into individuals' financial literacy, their capacity to make informed financial decisions, and their potential to contribute to economic stability and growth through responsible financial behavior and investment choices. Policymakers and financial institutions can use this data to tailor financial education programs and support to address gaps in financial knowledge, ultimately shaping economic outcomes and financial well-being.

**Demographic/Control Variables:**

**Age**

The independent variable age under reflection is an individual's age, categorized into three distinct age groups. These categories are designed to provide a simplified framework for assessing age-related effects on various outcomes. The "young" age category includes individuals aged 18 to 34, the "mid-age" category comprises those aged 35 to 54, and the "old" category encompasses individuals aged 55 and above. This grouping enables us to study the potential impact of age on the dependent variable under investigation, allowing for a more manageable and insightful analysis of age-related factors in this research.

**Gender**

In this qualitative study, the independent variable of interest is an individual's gender, which is categorized into two distinct groups. These categories include "g_male" for individuals identifying as male and "g_female" for those identifying as female. This gender division allows for a binary assessment of gender-related effects on the dependent variable being studied, providing a clear and straightforward framework for analyzing potential gender-based influences on our research outcomes.

**Ethnicity**

In this study, the independent variable ethnicity means is an individual's ethnicity, categorized into two distinct groups. The first category is "white," encompassing individuals whose ethnicities are identified as white. The second category is "nonwhite," including individuals whose ethnicities fall outside the white category. This binary classification simplifies the assessment of potential ethnic-related effects on the dependent variable in our study, providing a basis for examining the impact of ethnicity on research outcomes while maintaining clarity and manageability in our analysis.

**Marital Status**

In this analysis, the independent variable at hand reflects an individual's marital status, and it is categorized into three distinct groups. These categories are "m_married," encompassing individuals who are married and residing with their spouses; "m_liv_w_partner," representing individuals who are not married but cohabitating with their partners; and "m_single," covering individuals who are single. This tripartite classification allows for a nuanced examination of marital status in relation to the dependent variable under investigation, offering a comprehensive framework to explore the potential influence of marital status on research outcomes while maintaining clarity and structure in our analysis.

**Employment Status**

The independent variable employment status under examination pertains to an individual's employment status, which is systematically divided into eight distinct subcategories. These subcategories include "w_self_emp" for self-employed individuals, "w_full_time" for those engaged in full-time employment, "w_part_time" for individuals with part-time job commitments, "w_homemaker" encompassing individuals who work from home, "w_ft_student" representing full-time students, "w_perm_disab" for individuals with permanent disabilities, "w_unemp_laidoff" indicating those currently unemployed due to layoffs, and "w_retired" for individuals who are retired from their jobs. This multifaceted classification allows for a comprehensive exploration of the influence of employment status on the dependent variable in our research, enabling us to analyze the potential impact of various employment situations while maintaining clarity and structure in our analysis.

**Education Level**

In this research, the independent variable education level pertains to an individual's level, which is meticulously categorized into seven distinct subcategories. These subcategories encompass a wide spectrum of educational achievements, including "ed_below_high_school" for individuals who did not complete high school, "ed_high_school_regu" for high school graduates with regular diplomas or GED, "ed_high_school_alt" for those with alternative high school credentials, "ed_some_college" covering individuals with some college experience but no degree, "ed_associate_deg" for those whose highest educational level is an associate degree, "ed_bachelor_deg" indicating individuals with a bachelor's degree, and "ed_postgrad" representing those with post-graduate degrees. This comprehensive classification enables us to examine the impact of various levels of education on the dependent variable in our research, allowing for a nuanced analysis of how different educational backgrounds may influence outcomes while maintaining clarity and structure in our analysis.

**Income Status**

In our qualitative analysis, the independent variable in focus pertains to an individual's income status, categorized into three distinct income groups. These categories encompass "low income," which includes individuals with annual incomes below 35k and comprises "income_less15k," "income_15k25k," and "income_25k35k." The "mid income" group comprises individuals with annual incomes ranging from 35k to 100k and includes "income_35k50k," "income_50k75k," and "income_75k100k." Lastly, the "high income" group includes individuals with annual incomes exceeding 100k, encompassing "income_100k150k" and "income_over150k." This classification allows us to investigate the potential impact of income levels on the dependent variable within our research, providing a structured framework to examine how varying income backgrounds may influence research outcomes and enabling us to assess the role of income in a more refined and comprehensive manner.

### 3.4 Hypothesis

### 3.4.1 Financial Literacy: Objective Financial Knowledge

Hypothesis (H1): Individuals with higher levels of financial literacy will exhibit lower levels of mortgage payment irregularities compared to those with lower financial literacy.

### 3.4.2 Financial Education Level

Hypothesis (H1): Individuals who have received a higher level of financial education will demonstrate low magnitude of mortgage payment irregularities compared to those with lower financial education levels.

### 3.4.3 Home Equity Loans

Hypothesis (H1): Individuals with home equity loans will have high frequency of mortgage payment irregularities compared to those without such loans.

### 3.4.4 Satisfaction Level about Financial Condition

Hypothesis (H1): Higher levels of satisfaction with one's financial condition will be associated with low frequency of mortgage payment irregularities.

### 3.5.5 Investment Risk Level Preference

Hypothesis (H1): Individuals with a higher preference for investment risk will exhibit high magnitude of mortgage payment irregularities.

### 3.6.6 Confidence Ability about Financial Goal

Hypothesis(H1): Individuals with higher levels of confidence in their ability to achieve financial goals will exhibit lower frequency in mortgage payment irregularities.

# CHAPTER 4: DESCRIPTIVE STATISTICS

## 4.1 Summary Statistics

A Summary of our Primary variables is given below:

**Table 2: Descriptive Statistics**

|  | Minimum | Median | Mean | Maximum |
|---|---|---|---|---|
| **CAFG_new** | 1 | 2 | 2.207587 | 3 |
| **IRPL_new** | 1 | 2 | 1.993513 | 3 |
| **SLFC_new** | 1 | 2 | 2.247779 | 3 |
| **OFK_new** | 1 | 2 | 2.163024 | 3 |
| **fin_ed_yes_notpart** | 0 | 0 | 0.1156 | 1 |
| **fin_ed_yes_part** | 0 | 0 | 0.2696 | 1 |
| **fin_ed_no** | 0 | 1 | 0.6147 | 1 |
| **HQL** | 1 | 2 | 1.826118 | 2 |

Table-2 provides the summary statistics table provides key insights into the distribution of various variables in your dataset. Let's discuss the main findings:

**Confidence Ability about Financial Goal:** This variable ranges from a minimum of 1 to a maximum of 3, with a median of 2 and a mean of approximately 2.208. It indicates an average satisfaction level with financial conditions among the respondents.

**Investment Risk Preference Level:** Similar to CAFG_new, this variable also ranges from 1 to 3, with a median of 2 and a mean of approximately 1.994. It represents the investment risk preference level, with a relatively moderate mean.

**Satisfaction Level about Financial Condition:** Ranging from 1 to 3, with a median of 2 and a mean of approximately 2.248, SLFC_new denotes an average satisfaction level with financial goals. It appears to be slightly higher on average.

**Objective Financial Knowledge:** Similar to SLFC_new, this variable also ranges from 1 to 3, with a median of 2 and a mean of approximately 2.163. OFK_new reflects the objective financial knowledge of the respondents.

**Financial Education**: In summary, within the dataset, three binary variables are related to financial education. "fin_ed_yes_notpart," with a mean of 0.1156, designates whether financial education was offered but not participated in, signifying that about 11.56% of respondents chose not to participate despite the opportunity. "fin_ed_yes_part," with a mean of 0.2696, represents active participation in offered financial education by approximately 26.96% of respondents. Notably, "fin_ed_no" has the highest mean at 0.6147, indicating that around 61.47% of the sample did not receive any form of financial education, making it the most prevalent category. These variables collectively provide valuable insights into the extent of participants' engagement with financial education programs, showcasing the distinctions between those who actively participated, those who had the opportunity but did not partake, and those who received no financial education.

**Home Equity Loans:** Ranging from 1 to 2, with a median of 2 and a mean of approximately 1.826, HQL represents the housing quality level and appears to have a relatively high average.

Conclude to the summary statistics table offers an overview of the central tendencies and ranges of key variables in your dataset, allowing for a quick assessment of the distribution and characteristics of the data. This information is valuable for understanding the data's basic properties and can guide further analysis and interpretation.

### 4.2 Correlation Matrix

The correlation matrix table shown in Table 3 denotes insights into the relationships between various variables in the dataset. Here is a summary of the key findings:

**Table 3: Correlation Matrix**

|  | CAFG _new | IRPL_ new | SLFC _new | OFK_ new | fin_ed_yes _notpart | fin_ed_yes_ part | fin_ed_ no | HQL |
|---|---|---|---|---|---|---|---|---|
| **CAFG_new** | **1.000** | 0.276 | 0.515 | 0.088 | 0.071 | 0.131 | -0.166 | -0.096 |
| **IRPL_new** | 0.276 | **1.000** | 0.299 | 0.082 | 0.155 | 0.083 | -0.178 | -0.191 |
| **SLFC_new** | 0.515 | 0.299 | **1.000** | 0.069 | 0.097 | 0.102 | -0.157 | -0.128 |
| **OFK_new** | 0.088 | 0.082 | 0.069 | **1.000** | -0.071 | 0.097 | -0.042 | 0.129 |
| **fin_ed_yes_notp art** | 0.071 | 0.155 | 0.097 | -0.071 | **1.000** | -0.220 | -0.457 | -0.190 |
| **fin_ed_yes_part** | 0.131 | 0.083 | 0.102 | 0.097 | -0.220 | **1.000** | -0.767 | -0.083 |
| **fin_ed_no** | -0.166 | -0.178 | -0.157 | -0.042 | -0.457 | -0.767 | **1.000** | 0.200 |
| **HQL** | -0.096 | -0.191 | -0.128 | 0.129 | -0.190 | -0.083 | 0.200 | **1.000** |

**Confidence Ability about Financial Goals:** CAFG exhibits a moderate positive correlation with SLFC (Satisfaction Level with Financial Condition) at 0.515, indicating that individuals who are satisfied with their financial condition tend to be satisfied with their financial goals. It also has a weaker positive correlation with IRPL (Investment Risk Preference Level) at 0.276, suggesting a mild association between financial satisfaction and risk preference. However, it has a weak negative correlation with fin_ed_no (No Financial Education), with a coefficient of -0.166, indicating that those not receiving financial education tend to report higher satisfaction with their financial condition. There is also a weak negative correlation with HQL (Home Equity Loans) at -0.096.

**Investment Risk Preference Level:** IRPL has a mild positive correlation with SLFC at 0.299, indicating that individuals with a higher risk preference tend to be more satisfied with their financial goals. It also has a weak positive correlation with fin_ed_yes_part (Financial Education with Participation) at 0.083 and fin_ed_yes_notpart (Financial Education without Participation) at 0.155, suggesting that those who participated or didn't participate in financial education tend to have slightly higher risk preferences. However, it has a weak negative correlation with

fin_ed_no at -0.178, indicating that those who did not receive financial education have slightly higher risk preferences. IRPL has a stronger negative correlation with HQL at -0.191, implying that individuals with a higher risk preference tend to report lower housing quality.

**Satisfaction Level about Financial Condition:** SLFC exhibits a moderate positive correlation with CAFG at 0.515 and a mild positive correlation with IRPL at 0.299, indicating that individuals who are satisfied with their financial condition and have higher risk preferences also tend to be satisfied with their financial goals. It has a weak positive correlation with fin_ed_yes_part at 0.102 and fin_ed_yes_notpart at 0.097, suggesting that both participants and non-participants in financial education tend to have slightly higher satisfaction with their financial goals. There's a weak negative correlation with fin_ed_no at -0.157, implying that those who did not receive financial education tend to have slightly lower satisfaction with their financial goals. SLFC also has a weak negative correlation with HQL at -0.128.

**Objective Financial Knowledge:** OFK has a very weak positive correlation with CAFG at 0.088, indicating a subtle association between objective financial knowledge and satisfaction with financial condition. It has a very weak positive correlation with IRPL at 0.082 and SLFC at 0.069. There's a very weak negative correlation with fin_ed_yes_notpart at -0.071, suggesting that those who didn't participate in financial education tend to have slightly higher objective financial knowledge. OFK has a very weak positive correlation with fin_ed_yes_part at 0.097 and a very weak negative correlation with fin_ed_no at -0.042. It has a mild positive correlation with HQL at 0.129.

**Financial Education:** Both fin_ed_yes_part and fin_ed_yes_notpart have a weak negative correlation with CAFG, IRPL, SLFC, and OFK, suggesting that individuals participating or not participating in financial education tend to have slightly lower satisfaction with financial conditions, risk preferences, financial goals, and objective financial knowledge. Both these variables also have a strong negative correlation with each other, as expected. Conversely, fin_ed_no has a weak negative correlation with CAFG and a weak positive correlation with IRPL, indicating that individuals who did not receive financial education tend to have slightly higher satisfaction with their financial condition but slightly higher risk preferences.

**Home Equity Loans:** HQL has a weak positive correlation with OFK at 0.129, suggesting that individuals with higher objective financial knowledge tend to report slightly higher housing quality. HQL has a weak negative correlation with CAFG, IRPL, SLFC, fin_ed_yes_notpart, and fin_ed_yes_part, indicating that individuals with lower satisfaction with financial conditions, higher risk preferences, lower satisfaction with financial goals, and participation in financial education tend to have slightly lower housing quality.

These correlations provide valuable insights into the relationships between the variables in the dataset and can guide further analyses and interpretations.
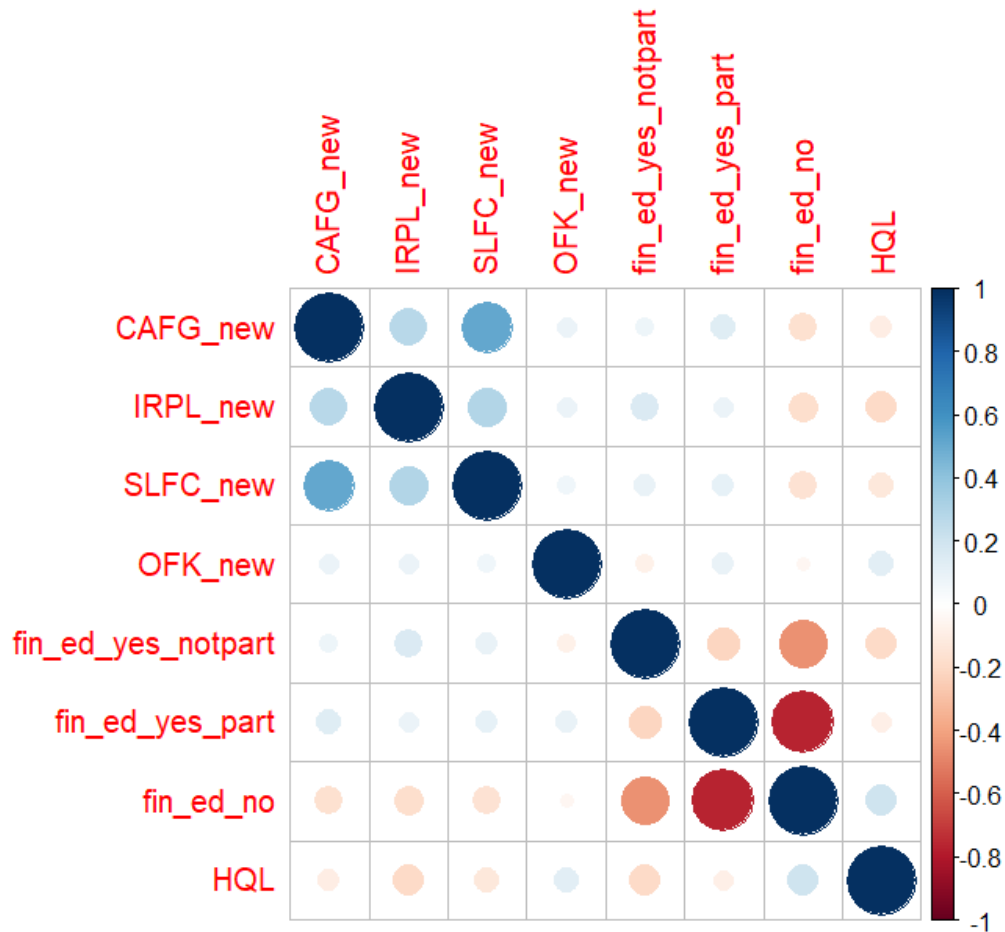


**Graph 1: Correlation Matrix of Explanatory Variables**

The color outline in the Graph 1 depicts the nature of correlations among the variables. In this visualization, blue indicates a positive correlation, while red represents a negative correlation between the variables. Notably, the diagonal elements are perfectly correlated with themselves, which is why they appear blue. The heatmap serves as a graphical representation in Graph 2 which to provide a clear and intuitive way to visualize the relationships and strengths of correlation among the various variables in the dataset, aiding in the understanding of how they interact with one another.
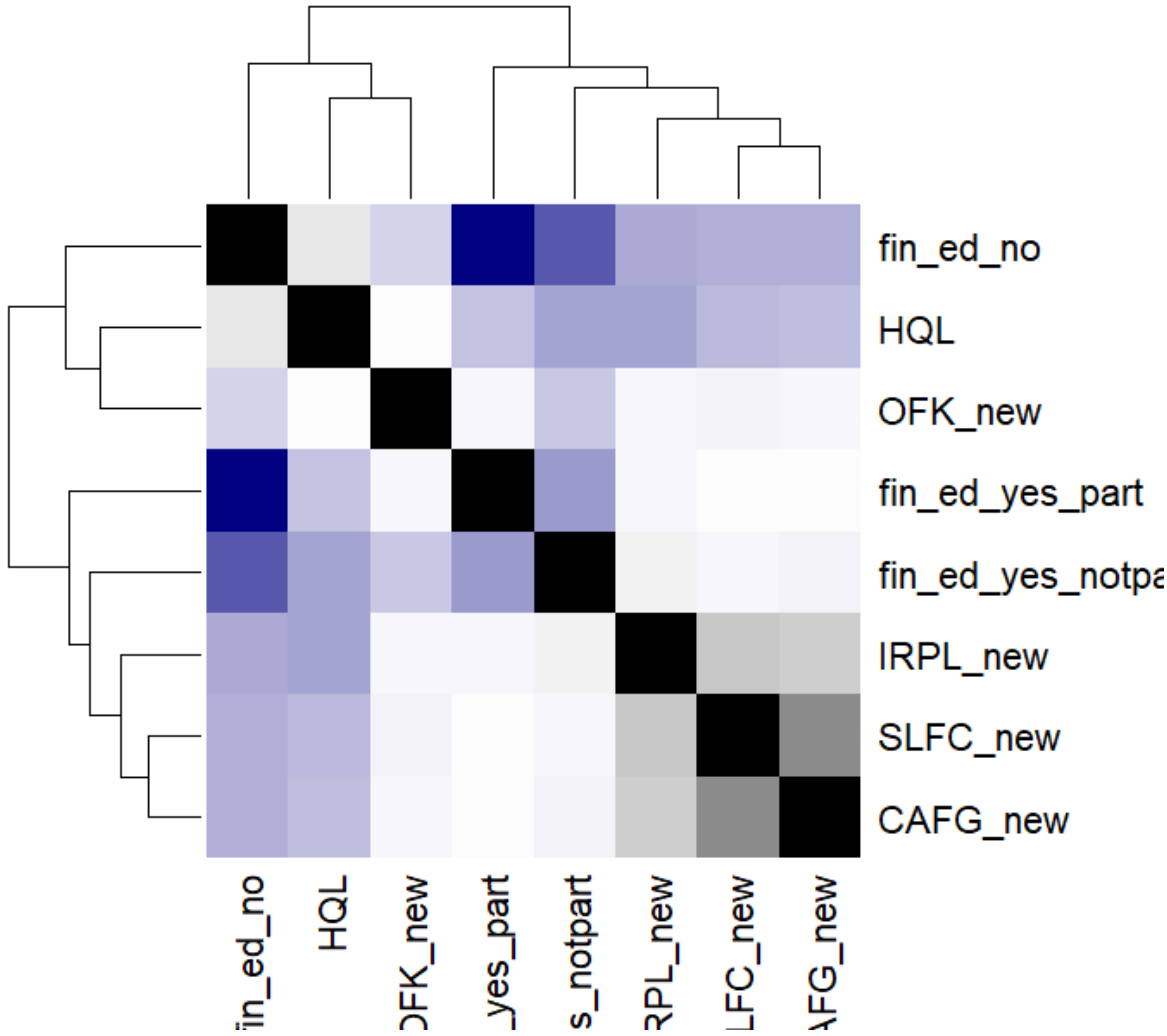
**Graph 2: Heat Map of Explanatory Variables**

## 4.3 Multicollinearity

In the "Ordered Logit Model" paper, the model labeled as "Model_MP_revised" demonstrated no noteworthy multicollinearity according to the examination conducted using the 'vif' function.
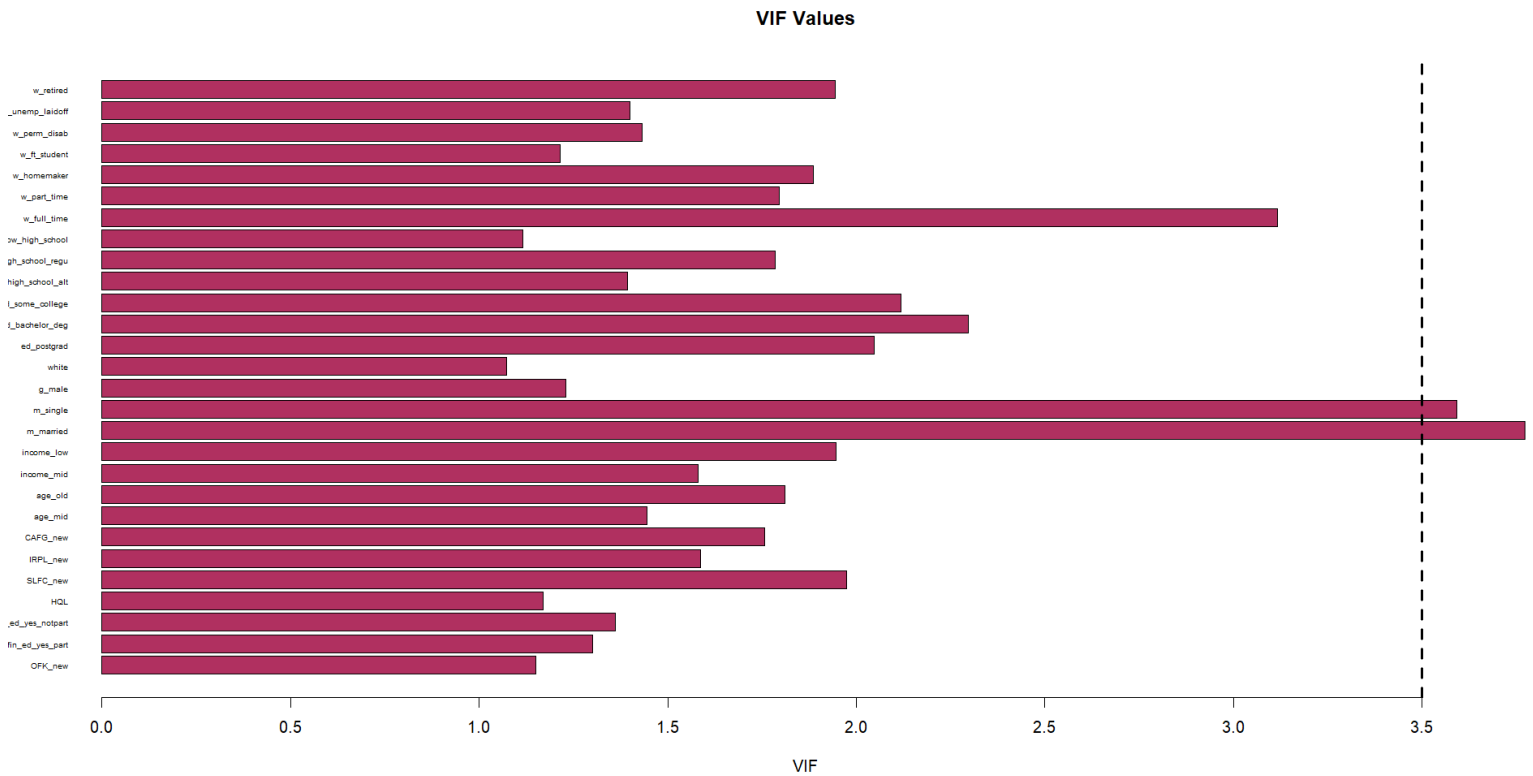
**VIF Values**



**Graph 3: Multicollinearity of Explanatory Variables**

The computed Variance Inflation Factor (VIF) scores for all variables consistently stay comfortably below the widely accepted threshold of 5. The highest VIF value, at 3.77, indicates the absence of significant multicollinearity which illustrated in Graph 3.

**4.4 Regression: Ordered Logit Model**

The general form of ordered logit regression is:

Logit $(P(Y \leq j)) = \beta_0 + \beta_1*$Financial Literacy $+ \beta_2*$Financial Education Received$+ \beta_3*$Home Equity Loans$+ \beta_4*$Satisfaction Level about Financial Condition$+ \beta_5*$Confidence Ability about Financial Goals$+ \beta_6*$Investment Risk Preference Level

Where: Y is the mortgage payment irregularities, which is an ordinal variable with three categories: never occurred, only once, and frequently. $P(Y \leq j)$ is the probability that Y is less than or equal to j. $\beta_0$ is the intercept and $\beta_1$, $\beta_2$, $\beta_3$, $\beta_4$, $\beta_5$ and $\beta_6$ are the coefficients for the independent variables in the log-odds ratio representing an individual's mortgage payment frequency being never happen. Only once less than or frequently to a particular category (j) is a linear function of the independent variables Financial Literacy is the Objective Financial Knowledge of the individual. Financial Education Received is the amount of financial education that the individual has received.

In this case, j would be 1, 2, or 3, corresponding to the never, only once, and frequent mortgage payment irregularities categories. The equation would be estimated using a dataset of individuals with their mortgage payment irregularity frequency, financial literacy, financial education received, home equity loans, satisfaction level about financial condition, confidence ability about financial goals, investment risk preference level.

"Model_MP" initially faced multicollinearity issues with all independent variables, causing instability in coefficients. To address this, I mitigated the problem by removing one sub-categorized variable from each independent variable, resulting in the improved "Model_MP_revised" without multicollinearity issues. In the revised model, coefficients were initially log odds ratios, later converted to "Relative Risk Ratios." I calculated "Marginal Effects" for a meaningful interpretation. Notably, in this ordered logit model, the "OFK" low subcategories served as reference categories for comparison. These adjustments enhance the reliability and interpretability of the model's results.

# CHAPTER 5: ORDERED LOGIT MODEL: RELATIVE RISK RATIO (INTERPRETATIONS OF THE LOGIT COEFFICIENTS)

## 5.1 Financial Literacy: Objective Financial Knowledge (OFK)

When all other variables are held constant, there is a noteworthy relationship between an individual's Objective Financial Knowledge (OFK) and their likelihood of experiencing irregularities in mortgage payments. For those with moderate OFK, a one-unit increase in OFK corresponds to a 0.337 times higher likelihood of mortgage payment irregularities frequency compared to the reference category of low OFK, and this relationship is statistically significant at the 1% level. Similarly, for every unit increase in OFK relative to low OFK, the chance of mortgage payment irregularities increases by 0.703 times for those with high OFK compared to those with low OFK. This difference is significant at the 1% level. Consequently, the Relative Risk Ratio for Mortgage Payment Irregularities increases as Objective Financial Knowledge increases, indicating a positive correlation or association between an individual's OFK and their risk of experiencing mortgage payment irregularities.

## 5.2 Financial Education (fin_ed)

In summary, when all other variables are held constant, two distinct scenarios show a substantial and significant positive relationship with an increased likelihood of mortgage payment irregularities. Firstly, individuals who participated in financial education have a 2.105 times higher likelihood of experiencing irregularities in mortgage payments frequency compared to those for whom financial education was not offered, and this association is statistically significant at the 1% level. Secondly, individuals to whom financial education was offered but did not participate exhibit a 2.336 times higher likelihood of mortgage payment irregularities in comparison to the reference category of "financial education not offered," also with statistical significance at the 1% level. Therefore, it can be concluded that both participating in financial education and being offered financial education but not participating are significantly associated with a higher likelihood of mortgage payment irregularities.

## 5.3 Home Equity Loans (HQL)

While keeping all other variables constant, a one-unit increase in the independent variable "a person who has no home equity loans" is linked to a 0.412 times higher likelihood of being irregular when it comes to mortgage payment frequency, in comparison to the reference category 'a person who has home equity loans. The coefficient for this variable is statistically significant at the 1% level, indicating a negative correlation between having home equity loans and mortgage payment irregularities. It means that, all else being equal, having home equity loans is associated with a reduced likelihood of experiencing irregularities in mortgage payments.

## 5.4 Satisfaction Level about Financial Condition (SLFC)

When all other variables are held constant, individuals who report being "satisfied about their financial condition" are 0.661 times more likely to exhibit irregularities in mortgage payments compared to those in the reference category of "not satisfied about financial condition." Furthermore, those who claim to be "extremely satisfied about their financial condition" are 1.375 times more likely to experience irregular mortgage payments in comparison to the reference category. Both of these associations are statistically significant at the 1% level.

## 5.5 Investment Risk Level Preference (IRPL)

In instant, when all other variables are held constant, there is a discernible positive correlation between an individual's investment risk preference level and the likelihood of experiencing irregularities in mortgage payments. Specifically, a one-unit increase in the variable "investment risk preference level willingly" is associated with a 2.033 times higher likelihood of mortgage payment irregularities compared to the reference category of "not willing," with statistical significance at the 1% level. Similarly, a one-unit increase in the variable "investment risk preference level very willingly" results in a 1.369 times higher likelihood of irregular mortgage payments in comparison to the reference category of "not willing," also statistically significant at the 1% level. Hence, it is evident that an individual's willingness to take investment risks is positively correlated with the likelihood of being irregular in mortgage payments.

**5.6 Confidence Ability about Financial Goal (CAFG)**

When all other variables remain constant, there is a contrasting correlation between an individual's confidence in their financial goals and the likelihood of experiencing irregularities in mortgage payments. Specifically, a one-unit increase in the variable "confident about financial goal" is associated with a 0.584 times higher likelihood of mortgage payment irregularities compared to the reference category of "not confident about financial goal," with statistical significance at the 1% level. Conversely, for those who are "very confident about financial goal," a one-unit increase in this variable leads to a 1.246 times higher likelihood of irregular mortgage payments in comparison to the reference category of "not confident about financial goal," also statistically significant at the 1% level. This suggests that the level of confidence in one's financial goals plays a significant role in understanding the likelihood of mortgage payment irregularities.

# CHAPTER 6: ORDERED LOGIT MODEL: MARGINAL EFFECTS

Marginal effect of determinants on financial literacy, financial education, home equity loans, satisfaction level about financial condition and investment risk preference level.

## 6.1 Marginal Effects when "No Mortgage Payment Irregularities"

### 6.1.1 Financial Literacy: Objective Financial Knowledge (OFK)

- Keeping all other factors unchanged, if an individual's Objective Financial Knowledge is at a medium level, a one-unit increase in OFK increases the likelihood of observing no mortgage payment delay by 8.9%, in comparison to the reference where the individual's OFK is low.

- Keeping all other factors unchanged, if an individual's Objective Financial Knowledge is at a high level, a one-unit increase in OFK increases the likelihood of observing no mortgage payment delay by 2.9%, in comparison to the reference where the individual's OFK is low.

### 6.1.2 Financial Education (fin_ed)

- Keeping all other factors unchanged, if an individual to whom financial education was offered and participated (fin_ed_yes_part), a one-unit increase in fin_ed_yes_part decreases the likelihood of observing no mortgage payment delay by 7.1%, in comparison to the reference where the individuals to whom financial education not offered.

- Keeping all other factors unchanged, if an individual to whom financial education was offered and not participated (fin_ed_yes_notpart), a one-unit increase in fin_ed_yes_notpart decreases the likelihood of observing no mortgage payment delay by 9.1%, in comparison to the reference where the individuals to whom financial education not offered.

### 6.1.3 Home Equity Loans (HQL)

- Keeping all other factors unchanged, if a person who has no home equity loans, a one-unit increase in HQL increases the likelihood of observing no mortgage payment delay by 7.3%, in comparison to the reference where a person has home equity loans.

### 6.1.4 Satisfaction Level about Financial Condition (SLFC)

- Keeping all other factors unchanged, if a person satisfied about his/her financial condition, a one-unit increase in SLFC increases the likelihood of observing no mortgage payment delay by 3.4%, in comparison to the reference where a person has no satisfaction about financial condition.

- Keeping all other factors unchanged, if a person extremely satisfied about his/her financial condition, a one-unit increase in SLFC decreases the likelihood of observing no mortgage payment delay by 2.6%, in comparison to the reference where a person has no satisfaction about financial condition.

### 6.1.5 Investment Risk Level Preference (IRPL)

- Keeping all other factors unchanged, if a person's investment risk preference level is willing, a one-unit increase in IRPL decreases the likelihood of observing no mortgage payment delay by 5.8%, in comparison to the reference where a person has no willingness taking investment risk.

- Keeping all other factors unchanged, if a person's investment risk preference level is very willing, a one-unit increase in IRPL decreases the likelihood of observing no mortgage payment delay by 2.6%, in comparison to the reference where a person has no willingness taking investment risk.

### 6.1.6 Confidence Ability about Financial Goal (CAFG)

- Keeping all other factors unchanged, if a person's who is somewhat confident to achieve financial goal, a one-unit increase in CAFG increases the likelihood of observing no mortgage payment delay by 4.4%, in comparison to the reference where a person has no confidence at all.

- Keeping all other factors unchanged, if a person's who is very confident to achieve financial goal, a one-unit increase in CAFG decreases the likelihood of observing no mortgage payment delay by 1.8%, in comparison to the reference where a person has no confidence at all.

**6.2 Marginal Effects when "Mortgage Payment Irregularities Only Once"**

**6.2.1 Financial Literacy: Objective Financial Knowledge (OFK)**

- Keeping all other factors unchanged, if an individual's Objective Financial Knowledge is at a medium level, a one-unit increase in OFK decreases the likelihood of observing mortgage payment irregularities occurred once by 5%, in comparison to the reference where the individual's OFK is low.
- Keeping all other factors unchanged, if an individual's Objective Financial Knowledge is at a high level, a one-unit increase in OFK decreases the likelihood of observing mortgage payment irregularities occurred once by 1.6%, in comparison to the reference where the individual's OFK is low.

**6.2.2 Financial Education (fin_ed)**

- Keeping all other factors unchanged, if an individual to whom financial education was offered and participated (fin_ed_yes_part), a one-unit increase in fin_ed_yes_part increases the likelihood of observing mortgage payment irregularity only once by 3.9%, in comparison to the reference where the individuals to whom financial education not offered.
- Keeping all other factors unchanged, if an individual to whom financial education was offered and not participated (fin_ed_yes_notpart), a one-unit increase in fin_ed_yes_notpart increases the likelihood of observing mortgage payment irregularity only once by 4.9%, in comparison to the reference where the individuals to whom financial education not offered.

### 6.2.3 Home Equity Loans (HQL)

- Keeping all other factors unchanged, if a person who has no home equity loans, a one-unit increase in HQL decreases the likelihood of observing mortgage payment irregularity only once by 4.1%, in comparison to the reference where a person has home equity loans.

### 6.2.4 Satisfaction Level about Financial Condition (SLFC)

- Keeping all other factors unchanged, if a person satisfied about his/her financial condition, a one-unit increase in SLFC decreases the likelihood of observing mortgage payment irregularity only once by 1.9%, in comparison to the reference where a person has no satisfaction about financial condition.

- Keeping all other factors unchanged, if a person extremely satisfied about his/her financial condition, a one-unit increase in SLFC increases the likelihood of observing mortgage payment irregularity only once by 1.5%, in comparison to the reference where a person has no satisfaction about financial condition.

### 6.2.5 Investment Risk Level Preference (IRPL)

- Keeping all other factors unchanged, if a person's investment risk preference level is willing, a one-unit increase in IRPL increases the likelihood of observing mortgage payment irregularity only once by 3.3%, in comparison to the reference where a person has no willingness taking investment risk.

- Keeping all other factors unchanged, if a person's investment risk preference level is very willing, a one-unit increase in IRPL increases the likelihood of observing mortgage payment irregularity only once by 1.4%, in comparison to the reference where a person has no willingness taking investment risk.

### 6.2.6 Confidence Ability about Financial Goal (CAFG)

- Keeping all other factors unchanged, if a person's who is somewhat confident to achieve financial goal, a one-unit increase in CAFG decreases the likelihood of observing mortgage payment irregularity only once by 2.5%, in comparison to the reference where a person has no confidence at all.

- Keeping all other factors unchanged, if a person's who is very confident to achieve financial goal, a one-unit increase in CAFG increases the likelihood of observing mortgage payment irregularity only once by 1%, in comparison to the reference where a person has no confidence at all.

## 6.3 Marginal Effects when "Mortgage Payment Irregularities Frequently"

### 6.3.1 Financial Literacy: Objective Financial Knowledge (OFK)

- Keeping all other factors unchanged, if an individual's Objective Financial Knowledge is at a medium level, a one-unit increase in OFK decreases the likelihood of observing mortgage payment irregularities arisen frequently by 4%, in comparison to the reference where the individual's OFK is low.

- Keeping all other factors unchanged, if an individual's Objective Financial Knowledge is at a high level, a one-unit increase in OFK decreases the likelihood of observing mortgage payment irregularities arisen frequently by 1.3%, in comparison to the reference where the individual's OFK is low.

### 6.3.2 Financial Education (fin_ed)

- Keeping all other factors unchanged, if an individual to whom financial education was offered and participated (fin_ed_yes_part), a one-unit increase in fin_ed_yes_part increases the likelihood of observing mortgage payment irregularities frequently by 3.2%, in comparison to the reference where the individuals to whom financial education not offered.

- Keeping all other factors unchanged, if an individual to whom financial education was offered and not participated (fin_ed_yes_notpart), a one-unit increase in fin_ed_yes_notpart increases the likelihood of observing mortgage payment irregularities frequently by 4.2%, in comparison to the reference where the individuals to whom financial education not offered.

### 6.3.3 Home Equity Loans (HQL)

- Keeping all other factors unchanged, if a person who has no home equity loans, a one-unit increase in HQL decreases the likelihood of observing mortgage payment irregularities frequently by 3.2%, in comparison to the reference where a person has home equity loans.

### 6.3.4 Satisfaction Level about Financial Condition (SLFC)

- Keeping all other factors unchanged, if a person satisfied about his/her financial condition, a one-unit increase in SLFC decreases the likelihood of observing mortgage payment irregularities frequently by 1.5%, in comparison to the reference where a person has no satisfaction about financial condition.

- Keeping all other factors unchanged, if a person extremely satisfied about his/her financial condition, a one-unit increase in SLFC increases the likelihood of observing mortgage payment irregularities frequently by 1.2%, in comparison to the reference where a person has no satisfaction about financial condition.

### 6.3.5 Investment Risk Level Preference (IRPL)

- Keeping all other factors unchanged, if a person's investment risk preference level is willing, a one-unit increase in IRPL increases the likelihood of observing mortgage payment irregularities frequently by 2.6%, in comparison to the reference where a person has no willingness taking investment risk.

- Keeping all other factors unchanged, if a person's investment risk preference level is very willing, a one-unit increase in IRPL increases the likelihood of observing mortgage payment irregularities frequently by 1.1%, in comparison to the reference where a person has no willingness taking investment risk.

### 6.3.6 Confidence Ability about Financial Goal (CAFG)

- Keeping all other factors unchanged, if a person's who is somewhat confident to achieve financial goal, a one-unit increase in CAFG decreases the likelihood of observing mortgage payment irregularities frequently by 2%, in comparison to the reference where a person has no confidence at all.

- Keeping all other factors unchanged, if a person's who is very confident to achieve financial goal, a one-unit increase in CAFG increases the likelihood of observing mortgage payment irregularities frequently by 0.8%, in comparison to the reference where a person has no confidence at all.

# CHAPTER 7: DISCUSSION

**7.1 Explanatory Variables association with hypothesis**

**7.1.1 Financial Literacy: Objective Financial Knowledge**

Financial literacy, identified as a crucial 21st-century skill, is pivotal for ensuring consumer financial safety and preventing irregularities in mortgage payments. Moore (2003) links limited financial knowledge to costly mortgages, highlighting the connection between financial literacy and responsible financial decisions. Recent studies by Gerardi et al. (2010-2013) reveal a significant negative correlation between financial literacy and subprime mortgage delinquency, emphasizing the need for improved understanding of basic mortgage concepts.

As suggested by the hypothesis, the analysis of the relative risk ratio and marginal effects sheds important light on the connection between irregular mortgage payments and financial literacy.

Contrary to the expected negative correlation between financial literacy and irregularities, the relative risk ratio reveals an unexpected positive association. As Objective Financial Knowledge (OFK) increases, the likelihood of mortgage payment irregularities also rises. This unexpected trend challenges the hypothesis, suggesting that higher financial literacy may not necessarily translate to lower levels of irregularities.

Further exploration through marginal effects sheds light on specific scenarios. For individuals with moderate OFK, an increase is associated with an 8.9% higher likelihood of observing no mortgage payment delay, while for those with high OFK, the increase is 2.9%. However, when considering irregularities occurring only once, the marginal effects indicate a decrease for both moderate and high OFK levels, challenging the overall positive trend.

**Observation for contradiction**

Possible reasons for this unexpected finding could include overconfidence among individuals with higher financial literacy, leading to riskier financial behavior. Additionally, the complexity of financial decisions may introduce more opportunities for errors even among those with higher financial knowledge. This necessitates a more thorough investigation of the underlying variables

affecting the correlation between financial literacy and the probability of irregular mortgage payments.

## 7.1.2 Financial Education Level

The concept of financial literacy involves comprehending and applying financial terms and strategies for informed decision-making. Lewellen, Lease, and Schlarbaum (1977) emphasize its critical role in individual investment decisions, impacting overall financial well-being. Collectively, this research underscores the multifaceted nature of financial literacy and its profound influence on consumer behavior, reinforcing its importance for sound financial management.

The examination of both the relative risk ratio and marginal effects yields significant findings that deviate from the original hypothesis. The initial proposition suggested that individuals with enhanced financial education would exhibit reduced instances of mortgage payment irregularities. Nevertheless, both the relative risk ratio and marginal effects unveil unforeseen patterns in the data.

In terms of the relative risk ratio, individuals who participated in financial education or were offered financial education but did not participate exhibit significantly higher likelihoods of mortgage payment irregularities. Specifically, participants in financial education show a 2.105 times higher likelihood, and those offered but not participating exhibit a 2.336 times higher likelihood, both statistically significant at the 1% level.

The marginal effects provide additional insights. Despite the higher relative risk ratios, there appears to be a positive impact on avoiding delays in mortgage payments for both groups. The decreases in the likelihood of no mortgage payment delay are 7.1% for participants in financial education and 9.1% who are not participants in financial education. However, concerning trends emerge when examining irregularities occurring only once and frequently. Both participants and non-participants in financial education exhibit increases in the likelihood of irregularities occurring only once (3.9% for participants and 4.9% for non-participants) and frequently (3.2% for participants and 4.2% for non-participants).

**Observation for contradiction**

This unexpected positive relationship between financial education and higher likelihoods of mortgage payment irregularities prompts further consideration. Possible reasons for this disparity may include the effectiveness of financial education programs, unaccounted variables influencing mortgage payment behavior, and challenges in sustaining positive financial behaviors over time.

### 7.1.3 Home Equity Loans (HQL)

Chen et al. (2020) conducted a study examining the impact of changes in macroeconomic conditions resembling those before and after the financial crisis on household debt, liquid assets, consumption, and refinancing, particularly in relation to the income or debt quintiles of households.

The examination of both the relative risk ratio and marginal effects offers intriguing insights into the relationship between individuals with home equity loans and the frequency of mortgage payment irregularities, as posited by the hypothesis. Contrary to expectations, the relative risk ratio indicates a negative correlation—individuals with home equity loans exhibit a reduced likelihood of mortgage payment irregularities. Specifically, a one-unit increase in the variable representing "a person who has no home equity loans" is associated with a 0.412 times higher likelihood of irregularities compared to those with home equity loans. This statistically significant result at the 1% level suggests that home equity loans are linked to a lower likelihood of mortgage payment irregularities.

Possible explanations for this unanticipated outcome include the likelihood of greater financial stability among individuals with home equity loans and the presence of structured repayment plans that often accompany such loans, fostering disciplined financial commitments.

Supporting these findings, the marginal effects analysis reveals consistent trends. For individuals without home equity loans, a one-unit increase in the variable decreases the likelihood of observing no mortgage payment delay by 7.3%, aligning with the negative trend observed in the relative risk ratio. Moreover, individuals without home equity loans show a 4.1% decrease in the

likelihood of observing irregularities occurring only once for a one-unit increase in the variable, indicating a lower likelihood of occasional irregularities. The negative marginal effect for the likelihood of observing mortgage payment irregularities frequently, a 3.2% decrease for a one-unit increase in the variable, further reinforces the idea that individuals with home equity loans are less likely to experience frequent irregularities.

**Observation for contradiction**

This implies a potential positive impact on financial stability and disciplined repayment behavior among individuals with home equity loans, prompting further exploration into the underlying mechanisms contributing to these observed trends.

**7.1.4 Satisfaction Level about Financial Condition (SLFC)**

Existing literature provides valuable insights into the correlation between financial literacy and mortgage borrowing behavior, with specific focus on interest-only mortgages being relatively underexplored. Moore (2003) discovered a link between financial illiteracy and expensive mortgages, aligning with findings from prior studies by researchers like Huston (2012). Interestingly, Moulton, Loibl, Samak, and Collins (2013) highlighted that individual with high financial confidence are more susceptible to poor mortgage borrowing decisions. Notably, research conducted for the National Westminster Bank in the UK by Noctor, Stoney, and Stradling (1992) defines financial literacy as the capacity to make informed assessments and judgments about investments and the prudent management of money. These insights collectively emphasize the significance of financial literacy in shaping mortgage borrowing behavior, particularly in the context of interest-only mortgages.

The analysis reveals that satisfaction with financial condition correlates with mortgage payment irregularities, supporting the hypothesis. Contrary to expectations, individuals satisfied or extremely satisfied are 0.661 and 1.375 times more likely to experience irregularities, respectively, with statistical significance at the 1% level.

Further exploration through marginal effects adds nuance to the analysis. While satisfaction is positively associated with avoiding delays, extreme satisfaction shows a counterintuitive

negative impact. Moreover, the marginal effects indicate a nuanced relationship, with satisfaction linked to a reduced likelihood of frequent irregularities but an increased likelihood for extreme satisfaction. Overconfidence and unaccounted variables may contribute to these disparities. The nuanced nature of the marginal effects suggests that the level of satisfaction plays a complex role in predicting mortgage payment behavior, prompting a need for a more in-depth exploration of the underlying dynamics.

**Observation for contradiction**

Possible explanations for this divergence include the potential for overconfidence among those satisfied or extremely satisfied, leading to a higher likelihood of irregularities. Additionally, the hypothesis may not account for other variables influencing mortgage payment behavior, contributing to these unexpected results.

**7.1.5 Investment Risk Level Preference (IRPL)**

Individuals with lower financial literacy tend to use expensive loan instruments and exhibit poor credit card behavior (Lusardi & Scheresberg, 2013; Xiao, Tang, Serido, & Shim, 2011). In contrast, financially knowledgeable consumers, as found by Huston (2012), are more likely to secure lower debt interest rates and opt for cost-effective borrowing options. Agarwal et al. (2009) highlight that age groups with lower cognitive ability, such as young people and the elderly, are more prone to making financial mistakes.

Both the relative risk ratio and marginal effects consistently support the hypothesis that individuals with a higher preference for investment risk will exhibit higher levels of mortgage payment irregularities.

According to the relative risk ratio, there is a visible positive correlation between an individual's investment risk preference level and the likelihood of experiencing irregularities in mortgage payments. A one-unit increase in the variable indicating a willingness to take investment risks is associated with a 2.033 times higher likelihood of mortgage payment irregularities. Similarly, a one-unit increase in the variable denoting a very high willingness to take investment risks results in a 1.369 times higher likelihood. These associations are statistically significant at the 1% level,

affirming a robust positive relationship between an individual's risk preference and the likelihood of encountering irregularities in mortgage payments.

Further exploration through marginal effects provides nuanced insights across various scenarios. For individuals inclined to take investment risks, there is a 5.8% decrease in the likelihood of observing no mortgage payment delay for a one-unit increase in the investment risk preference level. Similarly, those very willing to take risks exhibit a 2.6% decrease in the likelihood. In terms of observing irregularities only once, the likelihood increases by 3.3% for individuals willing to take investment risks, and for those very willing to take risks, the increase is 1.4%. Regarding frequent irregularities, individuals with a willingness to take investment risks face a 2.6% increase in the likelihood, and for those very willing to take risks, the increase is 1.1%.

This positive correlation suggests that a willingness to embrace investment risks may contribute to a heightened likelihood of facing challenges in maintaining regular mortgage payments, potentially due to the financial volatility associated with riskier investments or individuals with a higher risk appetite being more susceptible to financial instability.

### 7.1.6 Confidence Ability about Financial Goal (CAFG)

Hilgert et al. (2003) demonstrated a positive association between financial management capability and financial behavior. Campbell (2006) highlighted that many investors, particularly those with low education levels, missed the chance to refinance their mortgages during periods of declining interest rates, indicating a lack of financial certainty. Gerardi et al. (2013) further identified that a lack of financial capability was a significant predictor of mortgage defaults.

The examination of relative risk ratio and marginal effects provides intriguing insights into the correlation between individuals' confidence in achieving financial goals and the occurrence of mortgage payment irregularities, as posited in the hypothesis.

Contrary to the expected negative correlation, the relative risk ratio indicates a contrasting relationship. A one-unit increase in the variable "confident about financial goal" is associated with a 0.584 times higher likelihood of mortgage payment irregularities, and for those "very

confident about financial goal," the increase is 1.246 times. Both associations are statistically significant at the 1% level, revealing that higher confidence is linked to an elevated likelihood of irregular mortgage payments.

Exploring the marginal effects adds depth to this understanding across different scenarios. For individuals somewhat confident in achieving financial goals, a one-unit increase in confidence is associated with a 4.4% higher likelihood of observing no mortgage payment delay. However, for those very confident, the increase is 1.8%. In terms of observing irregularities only once, somewhat confident individuals exhibit a 2.5% decrease in likelihood for a one-unit increase, while very confident individuals show a 1% increase. Regarding frequent irregularities, somewhat confident individuals experience a 2% decrease, while very confident individuals face a 0.8% increase.

**Observation for contradiction**

The divergence from the hypothesis suggests a nuanced relationship between financial goal confidence and mortgage payment stability. Possible explanations may include overconfidence leading to riskier financial behavior or unaccounted factors influencing payment consistency. The findings underscore the complexity of financial decision-making and prompt a reconsideration of the assumed negative correlation between confidence in financial goals and mortgage payment irregularities. Further research is warranted to delve into the underlying dynamics influencing this unexpected association.

**7.2 Limitation**

The study provides valuable insights into the complex relationship between various financial factors and mortgage payment irregularities. However, several limitations need consideration to interpret the findings accurately.

**Limited Database**

The study's reliance on data from the National Financial Capability Study (NFCS), which is specific to the United States, introduces a limitation in terms of generalizability. Extrapolating the findings to a global context may not be appropriate, as the financial behaviors and conditions

in other countries or regions may differ significantly from those in the U.S. Therefore, caution is warranted when applying these results to broader populations beyond the studied demographic or geographic region.

**Measurement Bias**

The accuracy of the study's results is susceptible to measurement bias due to the self-reported nature of financial information. Participants might provide responses influenced by social desirability or may not accurately assess their financial situations. This introduces a potential source of error that could impact the reliability of the observed associations between financial variables and mortgage payment irregularities.

**Omitted Variables**

The study's failure to account for all relevant variables influencing mortgage payment behavior introduces the risk of omitted variable bias. Unobserved factors not considered in the analysis may confound the relationships under investigation, potentially leading to incomplete or inaccurate conclusions regarding the factors influencing mortgage payment irregularities.

**Evolution of Financial Education**

The study's static assessment of financial education may not fully capture its dynamic nature over time. The effectiveness of financial education programs is subject to evolution, and the study's snapshot approach may overlook changes in these programs and their long-term impact on mortgage payment behaviors. Considering the evolving landscape of financial education is essential for a comprehensive understanding of its role.

**Risk Preference Dynamics**

While the study assumes a consistent relationship between individuals' risk preferences and mortgage payment irregularities, it may overlook the dynamic nature of risk assessment. Individuals can reassess and alter their risk preferences over time, potentially influencing the observed associations. Acknowledging this dynamic aspect is crucial for a more nuanced understanding of how risk preferences relate to mortgage payment behaviors.

Conceding these limitations is crucial for refining future research efforts and ensuring a more nuanced interpretation of the observed associations. Additionally, addressing these limitations could contribute to a more comprehensive understanding of the factors influencing mortgage payment irregularities.

# CHAPTER 8: CONCLUSION

In conclusion, the analysis of various financial factors in relation to mortgage payment irregularities has yielded nuanced and unexpected findings. While higher financial literacy, measured by Objective Financial Knowledge (OFK), was anticipated to correlate negatively with irregularities, the results reveal a positive association, suggesting a more intricate relationship. Financial education, though influencing the avoidance of payment delays, presents contradictory trends in irregularities, warranting a deeper understanding of its long-term impact. Contrary to expectations, individuals with home equity loans exhibit a negative correlation with irregularities, indicating potential positive effects on financial stability. The complex dynamics of satisfaction with financial condition introduce unexpected patterns, possibly driven by overconfidence. The anticipated positive correlation between a willingness to take investment risks and irregularities aligns with expectations, but confidence in achieving financial goals surprisingly shows a positive association with irregularities, challenging assumed negative correlations. These unexpected trends underscore the intricate nature of financial decision-making. However, the study has limitations, including database restrictions, measurement bias, omitted variables, and the dynamic nature of risk preferences and financial education effectiveness. Further research is essential to explore underlying mechanisms, refine our understanding, and provide more comprehensive insights into the factors influencing mortgage payment behaviors.

## 8.1 Future Ideas

Exploring future perspectives can enhance the depth and significance of this investigation into irregularities in mortgage payments. This approach opens avenues for further research, allowing a more profound exploration and comprehension of the intricate factors influencing individuals' financial choices.

## Regional and Demographic Variances

Conducting research across diverse geographic locations and demographic groups is essential to uncover variations in the relationship among financial literacy, education, satisfaction level, investment risk preference level, confidence ability towards financial objectives, home equity loans and mortgage payment irregularities. Different cultural and contextual factors can

significantly impact how individuals perceive and manage their finances. For instance, variations in economic conditions, housing markets, and sociocultural norms may influence the effectiveness of financial choices programs and their correlation with mortgage payment behaviors. Analyzing these regional and demographic variances allows for a more nuanced understanding of the complex interactions between financial education and mortgage-related outcomes.

**Institutional and Policy Analysis**

Exploring the role of financial institutions and policy interventions is crucial in understanding and potentially mitigating mortgage payment irregularities. Institutions offering financial products, support mechanisms, and government policies can play a significant role in shaping individuals' financial behaviors. Evaluating the effectiveness of specific financial products or interventions, such as affordable housing programs or mortgage assistance policies, provides insights into how institutional and policy-level factors contribute to or alleviate challenges in mortgage payment consistency. This analysis can inform policymakers and financial institutions about potential areas for improvement or innovation in promoting financial stability.

**Psychological and Behavioral Insights**

Conducting qualitative research, including in-depth interviews and surveys, is instrumental in uncovering the psychological and behavioral aspects influencing financial decision-making. The unexpected positive correlation between confidence in achieving financial goals and mortgage payment irregularities requires a deeper exploration of individuals' perceptions, motivations, and decision-making processes. Qualitative insights can reveal underlying factors such as overconfidence, risk perception, or financial stress that may not be fully captured by quantitative measures alone. Understanding these psychological and behavioral dimensions is essential for designing targeted interventions that address the root causes of irregular mortgage payments.

**Cross-Country Comparative Analysis**

Conducting a cross-country comparative analysis of the relationship between financial literacy, education, satisfaction levels, investment risk preferences, confidence in financial objectives, home equity loans, and mortgage payment irregularities offers a comprehensive understanding of

the diverse factors influencing these dynamics across varied economic, financial, and cultural contexts. Different nations exhibit unique financial landscapes shaped by distinct educational systems, regulatory frameworks, and socioeconomic structures. This research approach allows for the identification of common trends as well as the recognition of country-specific nuances, contributing to the generalizability and applicability of findings. Insights gained from cross-country comparisons enable policymakers, educators, and financial institutions to tailor interventions that are sensitive to the cultural and institutional intricacies of each region, fostering more effective financial literacy initiatives and targeted strategies for mitigating mortgage payment irregularities on a global scale. Moreover, such analyses pave the way for the development of universally applicable best practices that can be adapted to diverse cultural and economic settings, promoting more resilient financial ecosystems worldwide.

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# CHAPTER 9: APPENDIX

| vif(model_MP_revised) | |
|---|---|
| GVIF | |
| OFK_new | 1.150484 |
| fin_ed_yes_part | 1.300921 |
| fin_ed_yes_notpart | 1.360428 |
| HQL | 1.168627 |
| SLFC_new | 1.974509 |
| IRPL_new | 1.586582 |
| CAFG_new | 1.756021 |
| age_mid | 1.445733 |
| age_old | 1.809876 |
| income_mid | 1.579636 |
| income_low | 1.946477 |
| m_married | 3.773532 |
| m_single | 3.592882 |
| g_male | 1.230266 |
| white | 1.072731 |
| ed_postgrad | 2.047506 |
| ed_bachelor_deg | 2.297224 |
| ed_some_college | 2.117809 |
| ed_high_school_alt | 1.392985 |
| ed_high_school_regu | 1.785023 |
| ed_below_high_school | 1.116803 |
| w_full_time | 3.115948 |
| w_part_time | 1.794756 |
| w_homemaker | 1.885576 |
| w_ft_student | 1.214163 |
| w_perm_disab | 1.433085 |
| w_unemp_laidoff | 1.399572 |
| w_retired | 1.944795 |

Appendix 1: Multicollinearity (VIF)

| Dependent variable | MP |
|---|---:|
| OFK_new.L | 0.337*** |
| OFK_new.Q | 0.703*** |
| fin_ed_yes_part | 2.105*** |
| fin_ed_yes_notpart | 2.336*** |
| HQL.L | 0.412*** |
| SLFC_new.L | 0.661*** |
| SLFC_new.Q | 1.375*** |
| IRPL_new.L | 2.033*** |
| IRPL_new.Q | 1.369*** |
| CAFG_new.L | 0.584*** |
| CAFG_new.Q | 1.246*** |
| age_mid | 0.595*** |
| age_old | 0.259*** |
| income_mid | 1.222** |
| income_low | 1.750*** |
| m_married | 1.308* |
| m_single | 1.258 |
| g_male | 1.249*** |
| white | 0.798*** |
| ed_postgrad | 0.993 |
| ed_bachelor_deg | 0.670*** |
| ed_some_college | 0.825 |
| ed_high_school_alt | 1.025 |
| ed_high_school_regu | 0.934 |
| ed_below_high_school | 1.343 |
| w_full_time | 0.784* |
| w_part_time | 0.951 |
| w_homemaker | 0.743 |
| w_ft_student | 0.901 |
| w_perm_disab | 1.298 |
| w_unemp_laidoff | 0.668 |
| w_retired | 0.440*** |

Appendix 2: Relative Risk Ratio (Coefficients of the variables)

| Marginal Effects of All Variables | | | |
|---|---|---|---|
| | effect.1 | effect.2 | effect.3 |
| OFK_new.L | 0.089 | -0.05 | -0.04 |
| OFK_new.Q | 0.029 | -0.016 | -0.013 |
| fin_ed_yes_part | -0.071 | 0.039 | 0.032 |
| fin_ed_yes_notpart | -0.091 | 0.049 | 0.042 |
| HQL.L | 0.073 | -0.041 | -0.032 |
| SLFC_new.L | 0.034 | -0.019 | -0.015 |
| SLFC_new.Q | -0.026 | 0.015 | 0.012 |
| IRPL_new.L | -0.058 | 0.033 | 0.026 |
| IRPL_new.Q | -0.026 | 0.014 | 0.011 |
| CAFG_new.L | 0.044 | -0.025 | -0.02 |
| CAFG_new.Q | -0.018 | 0.01 | 0.008 |
| age_mid | 0.042 | -0.023 | -0.018 |
| age_old | 0.101 | -0.056 | -0.045 |
| income_mid | -0.016 | 0.009 | 0.007 |
| income_low | -0.055 | 0.03 | 0.025 |
| m_married | -0.021 | 0.012 | 0.009 |
| m_single | -0.02 | 0.011 | 0.009 |
| g_male | -0.018 | 0.01 | 0.008 |
| white | 0.02 | -0.011 | -0.009 |
| ed_postgrad | 0.001 | 0 | 0 |
| ed_bachelor_deg | 0.031 | -0.017 | -0.014 |
| ed_some_college | 0.015 | -0.008 | -0.007 |
| ed_high_school_alt | -0.002 | 0.001 | 0.001 |
| ed_high_school_regu | 0.006 | -0.003 | -0.002 |
| ed_below_high_school | -0.027 | 0.015 | 0.012 |
| w_full_time | 0.02 | -0.011 | -0.009 |
| w_part_time | 0.004 | -0.002 | -0.002 |
| w_homemaker | 0.022 | -0.012 | -0.01 |
| w_ft_student | 0.008 | -0.005 | -0.004 |
| w_perm_disab | -0.024 | 0.013 | 0.011 |
| w_unemp_laidoff | 0.028 | -0.016 | -0.012 |
| w_retired | 0.055 | -0.031 | -0.024 |

Appendix 3: Marginal Effects of all category