Assessing the Influence of Loss Framing on Insurance Consumption: A Game-Simulated Analysis Examining the Interplay with Socioeconomic Status

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CERTIFICATE

This is to certify that work presented in this thesis proposal titled **Assessing the Influence of Loss Framing on Insurance Consumption: A Game-Simulated Analysis Examining the Interplay with Socioeconomic Status** by *Kunal Lahoti* has been carried out under my supervision and is not submitted elsewhere for a degree.

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Abstract

Insurance plays a vital role in safeguarding individuals and businesses against various risks. Understanding the factors that influence insurance consumption is crucial for policymakers, insurance companies, and consumers alike. This thesis examines various aspects of insurance demand, focusing on understanding consumer behaviour related to insurance purchase decisions. Two studies were conducted in this work.

The first study investigated the influence of wealth level on insurance consumption behavior using a game application. The results showed a nonlinear correlation between wealth and insurance consumption, increasing with increasing wealth and achieving a negative correlation after a threshold.

The second study used a game-like application to determine how various behavioral characteristics, such as risk tolerance and loss framing, affect the decision to purchase insurance. The study focused on university students aged 18 to 25 with no income and working-class people aged 35 to 55. The results showed that the effect of loss framing on insurance consumption depends on the particular insurance policy, even if participants are aware of the loss.

The studies explore data collection methods using surveys and game-like applications for studying insurance consumption behavior. Surveys can lead to dishonest responses, misunderstandings, and errors in interpretation. Gaming applications offer a more authentic and ecologically valid context, framing, capturing real-time behaviors and decision-making. These applications capture various aspects of insurance consumption behavior, such as decision-making processes, choices, and engagement patterns. The findings can be directly extrapolated or modeled to predict human behavior in real-life situations.

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Chapter 1

Introduction

1.1 Background

In the most recent fiscal year, insurance investments accounted for about a quarter of Indian families' financial resources, totalling over $26 trillion (IRDAI annual report). As a result, the insurance sector is massive and will only expand in the future. Understanding customer behaviour and how it influences purchase decisions is crucial for all players in the sector.

Property loss, income, and assets owing to property damage, legal responsibility, disability, retirement, and mortality. The costs of legal risks, workers' compensation programs, and health care have become major issues for business leaders. Individuals seeking professional and personal protection have comparable worries (Rejda, 2008). Insurance is a type of risk management that organisations and people generally utilise to protect themselves against unforeseeable and uncertain losses. Individuals can also get insurance to safeguard their dependents financially in the case of their untimely death. They also meet people's savings and financial needs to participate in mutual funds or the stock market.

According to customers, insurance has a diverse connotation in different parts of the world. Insurance is considered risks like fire, accident, health, or life. As a result, insurance is classified into two types: Non-life insurance, such as health, vehicle, and accident insurance, is regarded as a vital commodity worldwide(Capgemini, 2008). Non-life insurance includes health, fire, theft, and agriculture (AKI, 2013). Depending on the economy, community cultural elements, income levels, and national regulations, life and non-life insurance are seen and valued differently (World insurance: inflation risks front and centre).

Given the long-term benefits of insurance, these products are expected to have high consumption rates according to neoclassical economics (Jurkovicova, 2014), specifically on utility maximization, while considering all restrictions (Nyman, 2001). One expects to weigh the risks, the probability of an unfortunate event and the subsequent loss to make the rational choice. However, as demonstrated in experiments conducted by behavioural economists (Simon, 1982; Thaler & Benartzi,2002; Kahnemann & Tversky, 1979; Madrian et al.,2014), it has been shown that cognitive bias based on under-estimating the probability of risks (Johnson et al., 1993; Fehr-Duda & Fehr, 2016; Friedl et al.,2014), search costs in information gathering (Kunreuther & Pauly, 2004) and low self-experiences of facing an unfortu-

nate event (Robinson & Botzen, 2019) lead to decisions that classical rational choice theories cannot explain. There is also an effort to comprehend the aspects impacting financial decision-making as a function of cognitive processing load, socioeconomic-cultural influences, and individual risk-taking proclivity. Companies and governments utilise contextual framing and rewards to eliminate prejudice or openly position the risk for greater situational awareness (Muireann, 2013). Currently, the most common techniques of communicating risk are visual aids with plainly presented probabilities of an incident or surveys. Traditional surveys or publicly accessible data from insurance firms infer the elements impacting insurance (for example, framing).

In India, unlike in other developed countries, social security or government compensation schemes are only available to a small fraction of the population (Shira et al.,2022). Most people save and invest via bank deposits, time deposits, and postal savings accounts. Insurance is critical to the economic well-being of a broad population because of a lack of access to formal financial markets and a lack of education and financial awareness. It is critical for rural and underserved populations. The Indian insurance consumer market is modest but increasing, with a 4.2% penetration (FY2021). Life insurance is the most popular product, accounting for 3.2% of total consumption, whereas non-life insurance accounts for 1% (Sayeda, 2020). Awareness (Kusuma et al., 2018), individual risk-taking level, continued faith in institutions, financial literacy (Dalkilic & Kirkbesoglu,2015), and access to the financial market are suggested as reasons for poor penetration.

Rejda (2004) states that insurance firms must resolve conflicts and process claims more quickly. Delays erode client confidence in insurance businesses, resulting in poor development in the industry, particularly in India. Long-term insurance plans are also problematic because of the uncertainty surrounding insurance payouts, lapsing, and premium hikes (Boyer et al., 2017). Another aspect is the low-key marketing of the primarily government-owned insurance companies, particularly for medical insurance, which witnessed a rise in coverage due to government-provided subsidies. Even though insurance is a long-term gain product, the Indian population with strong savings habits (Devidas,2019) is more interested in precious metals such as gold or real estate.

Consumer behaviour in the insurance industry is mainly unexplored. Given the low prevalence of insurance and its crucial role in enhancing financial well-being, understanding Indian insurance purchase behaviours is critical. We developed two experiments in this thesis to better understand the impact of factors influencing insurance consumer behaviour. We focus on wealth level, risk tolerance, and loss framing factors. We investigate various insurance plans, such as life, health, and accident insurance.

1.2 Decision-making and insurance consumption

Perception, attention, memory, reasoning, and judgement are all involved in decision-making. Our decisions are influenced by how we receive and interpret information, process it, retain it, and reason and judge based on it. The impact of emotions on how we perceive, pay attention to, and assess information

is a fundamental component of decision-making. Fear or anger, for example, can lead to more cautious actions, but enthusiasm or optimism can lead to more risky ones (Habib et al., 2015).

According to research findings, cognitive variables considerably affect insurance consumption decisions (Kusev et al., 2009). The study found that both experience-based judgements and descriptions impact risk choice. People's experiences with events permeate insurance decisions even when normative risk information is supplied (Kusev et al., 2009). Respondents overestimated the danger of accessible utilitarian events in memory, suggesting that heterogeneity in decision content causes variation in risk preferences (Kusev & van Schaik, 2011). People perceive risks differently based on their experiences, beliefs and emotions (Peak & Hove, 2017). For example, a person in a car accident may perceive the risk of getting into another accident as higher than someone who has never been involved. This can affect their decision to buy car insurance. Decision bias is an essential factor in determining insurance use. People, for example, might be too optimistic and underestimate the likelihood of adverse events. This might result in underinsurance or a lack of protection against possible dangers. Furthermore, cognitive limitations such as a short attention span, difficulties understanding complicated insurance contracts, and time restrictions may influence insurance purchase decisions (Hanoch & Rice, 2016). As a result, people may make inferior judgements or mno decisions. Using behavioural economics concepts, insurers may simplify their policies, give clear and straightforward information, and encourage individuals to make better educated and optimum judgements to enhance consumer spending decisions. In addition, increasing financial literacy and education can help people better understand their insurance needs and make more informed decisions.

1.3 Behavioral economics view of the insurance market

Behavioural economics offers a unique perspective on the insurance market by examining how people's cognitive biases and behavioural habits influence their purchasing and insurance decisions (Jurkovicova, 2014). Behavioural economics recognises that individuals often make decisions based on heuristics, rules of thumb, and cognitive shortcuts rather than comprehensively analysing all available information (Shivakumar,2014). In the insurance context, this can lead to individuals overestimating or underestimating their risks and insurance needs. People, for example, may underinsure themselves against low-probability, high-consequence disasters (e.g., floods or earthquakes) due to the availability heuristic, which causes individuals to base their judgements on their capacity to recollect such occurrences occurring in the past. According to behavioural economics, people value losses more than profits of the same magnitude; this might influence people's desire to buy insurance. People may be more likely to get insurance for a severe and uncommon incident, such as a significant vehicle accident, than for a more common but less severe event, such as a fender bender, because the damage caused by the former is more significant. According to Morgan and Tarbi (2019), prospect theory suggests that people prefer to stick with the default option even if it is not their most significant alternative.

In the context of insurance, this might impact people's decisions to enrol in insurance plans offered by employers or other groups. Employees, for example, may pay greater attention to insurance given by their company, even if it does not provide ideal coverage or cost, just because it is the default choice presented to them. Behavioural economics understands that people tend to overestimate their strengths while underestimating their hazards, which is consistent with Excepted Utility Theory; this might impact individuals' judgements regarding how much insurance to purchase. Individuals, for example, may assume they are less likely than others to face a negative occurrence, such as sickness or accident, resulting in underinsurance. In the insurance market. By combining insights from behavioural economics, policymakers and insurers can develop more effective insurance policies, communication strategies and interventions that help people make informed decisions about their insurance needs.

1.3.1 Expected utility theory

The Expected Utility Theory (EUT) is a decision-making theory in economics and finance used to analyse choices under uncertainty. It gives a mathematical model that enables people to make decisions based on their preferences and the probability of different situations.

The Expected Utility Theory may be used in insurance decisions since it helps people balance the risks and benefits of getting insurance. According to EUT, people make decisions based on the projected utility of various outcomes. Davis and Hands (1998) define utility as sat people's joy or value rent outcomes.

People consider the potential losses they may incur if they do not have insurance against the cost of insurance premiums when deciding whether or not to get insurance. They consider factors such as the chance of loss, the potential amount of loss, and their risk preferences (Einav & Finkelstein, 2011).

Individuals are more likely to choose insurance coverage when the expected utility of getting insurance than the expected utility of not getting insurance. Their risk aversion or risk tolerance influences their decision. Risk-averse individuals who value the security of not losing money are more inclined to purchase insurance, even if the expected value of premiums paid exceeds the expected value of potential losses (Abraham, 2015). Risk-averse individuals may buy less insurance or self-insure (Jus, 2013).

1.3.2 Prospect theory

Prospect Theory is a theory that, like Expected Utility Theory (EUT), explains how individuals make decisions in the face of risk and uncertainty. It was proposed by psychologists Daniel Kahneman and Amos Tversky in 1979. In contrast to EUT, Prospect Theory holds that individuals make decisions based on the predicted value of outcomes. It incorporates reference points, loss aversion, and framing effects.

Prospect Theory contends that when applied to insurance decisions, individuals evaluate potential rewards and losses about a reference point. The individual's current situation, prior experiences, or social comparisons may all influence this reference point (Fox & Poldrack, 2009). According to this

theory, people are more sensitive to losses than equivalent gains and evaluate potential advantages and losses differently (Nickerson, 2022).

Prospect Theory underlines that psychological factors such as loss aversion, framing effects, reference points, probability weighting, and predicted reward influence individuals' insurance decisions. Understanding these elements can help insurers customise their products and communications to the decision-making individuals' decision-making biases and preferences in behavioural finance

1.4 Theories in behavioural finance

The decision to purchase insurance is complicated. When investigating variations in insurance usage, various factors must be considered, including risk, family history, financial security, etc. Several theories in behavioural economics have been proposed that use one or more of these elements to describe individual decisions. The insurance consumption behaviour found in our study is described using these ideas.

1.4.1 Loss framing

Loss framing is a cognitive bias that impacts how people perceive and assess decisions or outcomes depending on how prospective losses are framed rather than potential advantages. Understanding loss framing is essential in many fields, including behavioural economics, marketing, and psychology, since it explains how individuals perceive and respond to risks and possible losses in decision-making processes. It accentuates an action's negative implications or hazards, eliciting emotional responses such as anxiety, concern, or regret. Loss framing can influence decision-making by emphasising losses more than prospective rewards (Seo et al., 2010). Individuals tend to be more averse to losses than motivated by equivalent gains, leading them to make different choices when presented with options framed in terms of losses. Marketers and advertisers often utilise loss framing to emphasise the potential adverse outcomes of not using a product or service, creating a sense of urgency and motivating individuals to act (Chang et al., 2015).

Although it is well known that loss framing works in the laboratory (Hannan et al., 2005), research on its applicability to field or real-world contexts is lacking. A few field studies have been conducted to see if loss framing may be used to influence desirable behaviour. Volpp et al. (2008) allow participants in weight loss study treatment groups to deposit money into a deposit contract, which is then repaid to the person if they meet their weight reduction goals. According to the scientists, the treatment group shed much more weight than the control group, demonstrating that behavioural biases may be used to enhance health practices.

Fryer et al. (2012) analysed loss versus gain framing and found that teachers respond more positively when "pay for performance" incentives are portrayed as a loss. Teachers in the "loss" treatment were given $4,000 (the estimated worth of the incentive) at the start of the school year and committed to returning part or all of the funds if their children's maths ability did not improve sufficiently. Teach-

ers who participated in the "gain" therapy were rewarded at the school year's conclusion. When the incentive was presented as a loss, it was associated with considerably better maths performance, which the authors attribute to loss aversion. Similarly, Levitt et al. (2016) deploy a variety of treatment arms inspired by behavioural research to reward exam accomplishment among Chicago-area students. One group of students was offered an incentive before taking the exam and told they would have to return the incentive if they did not improve. Another group of children were not given the reward immediately but were told they would receive it if their exam grades improved. The authors discover that incentives expressed as a loss have bigger impact sizes, although differences in responsiveness are not statistically significant. They interpret the evidence as hinting, but not showing, that loss aversion may be employed to boost responsiveness to incentives.

Another field experiment related to the one described above (Hossain & List, 2012) involves productivity incentives for workers in the Chinese electronics sector. Some workers in the study were given a bonus that would be withdrawn at the end of the week if they did not meet certain performance requirements (loss frame). Other staff were given an ex-post bonus if they reached the targets. The real incentive payment was given to both groups of workers simultaneously, as in our experiment, but the framing was different. The results suggest that teams respond more favourably when the reward is a loss. Most research suggests that loss aversion will likely explain loss framing's effectiveness. According to a laboratory study, the perceived possibility of receiving an incentive may impact decision-making. According to Ericson and Fuster (2011), when people are informed that they have a better chance of getting something, they place a higher value on it. In general, the social context can impact experimental outcomes.

1.4.2 Risk attitude

People's attitudes towards risk vary, causing them to behave differently regardless of their point of view; hence, risk attitude partly influences risk behaviour. Risk seeking and risk aversion are well-known personality traits. An extreme risk seeker is willing to accept any risk in exchange for a marginal increase in reward. In contrast, a risk-averse person is hesitant to accept any risk regardless of the increase in value. However, the terms risk aversion and risk seeking may be misinterpreted. It also refers to some constant personality traits that apply to any activity, regardless of context. The fundamental strategies in the present risk attitude study are drawn from the Expected Utility theory (Pennings & Garcia, 2001). The core paradigm for examining risk preference (or attitude) is the notion of Expected Utility (EU). The utility function is built from a succession of previous occurrence selections, each with its probability and utility, and it represents the relationship between probability and predicted utility. In the EU paradigm, risk attitudes are essentially choice patterns (Dyer & Sarin, 1982). Dyer and Sarin's (1982) relative risk attitude distinguishes between marginal and uncertainty values. If they were separated, a risk attitude based only on uncertainty would follow because both may affect the eventual behaviour of a rational decision-maker. Again, this is typically seen as a consistent personality trait and is taken for granted when evaluating optimal risk behaviour.

Risk attitude is generally seen as a stable personality trait, suggesting that it will apply regardless of the situation, risk, or repercussions involved. Risk attitude in this way is measured by confronting the subject with some choices concerning risks with a different uncertainty and return, and from this, a risk attitude is derived. In the face of any newly presented risk, the purportedly consistent personal risk attitude is considered ideal behaviour. This approach to comprehending and interpreting risk behaviour presents many problems concerning risk management in practice. First, it has been demonstrated that risk attitude is context-dependent (Penning & Garcia, 2001). This means different persons will have different risk attitudes or face different threats in diverse scenarios. To be more exact, risk attitude is influenced by risk perception as well as other factors. Indeed, assessing threat indicators that have not been seen is impossible. As a result, disparities in risk-taking behaviour across persons, or even within individuals, in different settings may not always reflect differences in risk attitude, but may be caused by a difference in risk perception. Second, optimal behaviour should foster rather than examine a personal risk attitude. While the difference appears minor, it is rather significant. If farmers' risk attitudes are read as observable risk behaviour, and the observed activity is insufficient to manage the risk, it should be possible to change their risk attitudes. Hillson and Webster (2007) illustrate how this is sometimes achievable and even desired.

1.4.3 Context-based risk aversion

Humans and other animals are thought to prefer risk-free and undiscovered paths of action; for example, while foraging for food, more accessible and safer patches are preferred (Kacelnik & Bateson, 1996; Myerson et al., 2003). However, this safety-seeking behaviour is very contextual: In many circumstances, the plan of action with the lowest risk or uncertainty cannot best meet the current goals. For example, while an animal may prefer to seek small, uncomplicated prey early in the day if the little prey does not supply enough sustenance for the night, larger prey must be sought, with all the risks that entail (McNamara & Houston, 1992; Kacelnik & Bateson, 1996). Humans have done many studies on risk proneness and risk aversion personality traits. However, like with animals, the choice for risky or safe actions is non-static; instead, it tends to change in response to the circumstances. While much research has been done in animal behaviour (Caraco et al., 1980, 1990; Cartar & Dill, 1990; Kacelnik & Bateson, 1996) and anthropology and related fields (Winterhalder & Smith, 2000), it appears that relatively few studies have been conducted in human subjects (Kolling et al., 2012; Mobbs et al., 2013; Houston et al., 2014). One possibility might be that studying a person's risk aversion dynamics is notoriously tricky (Kellen et al., 2016). Risk aversion must be quantified in the presence of risk and uncertainty. The subject's behaviour is stochastic (Rieskamp, 2008), which may make it challenging to process behavioural data. To avoid this issue, experimenters have employed experimental manipulations to indirectly assess or openly ask for the subject's preferences or uncertainty (Hey and Orme, 1994), which has limitations (Charness et al., 2013). Other methods, such as (Kolling et al., 2014; Economides et al., 2015; Schwartenbeck et al., 2015; Walasek & Stewart, 2015; Kellen et al., 2016), rely on averaging behaviour

across many decisions and inferring how behaviour changes on average as a function of context. The downside of this method is that it is blind to changes in decision preference between subjects and trials.

1.4.4 Consumption smoothing

One of the most compelling theories for explaining variance in insurance purchasing is consumption smoothing. Insurance enables consumers to shift their consumption from a low marginal utility phase to a high marginal value phase. Individuals strive to mitigate the effect of unplanned losses, which is where insurance comes in. One of the best methods to explain insurance purchases is through insurance theory, which says that individuals would completely insure themselves to balance demand across several states (Jonathan Gruber (2013)). Consumption smoothing research was pioneered by Raj Chetty and Adam Looney (2006). They investigate the effects of consumption smoothing behaviour in risk-averse and risk-seeking people in the case of a loss. This study found that risk-averse households will go to any length to avoid a significant decline in consumption. (For example, by pulling their children out of school). A high-risk aversion coefficient, on the surface, appears to make consumption losses exceedingly costly, and the agent expends more effort in the unemployed state to maintain consumption at the employment level. Bailey (1978) and Chetty (1980) observed similar outcomes when they investigated insurance as a type of welfare benefit in the case of a loss. According to these studies, the welfare benefit from social insurance is calculated by combining the percentage decline in consumption induced by the shock and the coefficient of relative risk aversion. As a result, risk-averse households will go to tremendous lengths to ensure a smooth spending path.

1.4.5 Choice architecture

Choice architecture is the design and presentation of alternatives in a way that influences people's decisions. It recognises that how alternatives are framed and presented may significantly impact people's preferences and behaviours. Changes in the setting in which choices are made might influence individuals to make specific decisions while keeping their freedom of choice.

The idea behind choice architecture is that humans do not always make reasonable and consistent decisions. Various factors influence people, including default alternatives, how options are presented, option framing, and the ease or complexity of decision-making processes. In behavioural economics, marketing, public policy, and healthcare, choice architecture is frequently employed (Redelmeier & Kao, 2021; Stembridge, 2021; Thaler & Sunstein, 2008). Employers, for example, can use default enrollment in retirement savings schemes to enlist employees automatically unless they opt out. This method increases involvement by capitalising on people's tendency to stick with the default option.

Similarly, product placement and shelf organisation influence consumer purchasing decisions in supermarkets. To encourage healthy choices, nutritious food should be presented at eye level or at the checkout desk. People may be influenced to make socially acceptable judgements through choice architecture. People may be more motivated to exercise if prominent signs encouraging them to use the stairs are posted near lifts.

Choice architecture aims to help people make better decisions that keep with their long-term goals and well-being. Understanding how the presentation of alternatives affects decision-making may help choice architects positively change behaviours and outcomes in various sectors.

1.5 Relevance to insurance

1.5.1 Loss Framing and insurance consumption

Loss framing is a cognitive bias that defines how people perceive and react to alternatives or outcomes regarding potential losses or gains. It means that when faced with the prospect of loss, people become more risk-averse rather than risk-seeking (Zhang et al., 2017).

Loss framing can impact people's insurance purchasing decisions. Insurance is commonly used to safeguard against losses such as accidents, sickness, property damage, or other unforeseeable disasters.

Loss framing can cause consumers to perceive a lack of insurance as a potential loss, increasing their motivation to obtain insurance. Assume that customers view not having health insurance as a potential loss due to high medical costs in the event of an illness or injury. Individuals may be more inclined to obtain health insurance in such cases.

Insurance companies typically use loss-framing strategies in their marketing and communication efforts to emphasise the negative consequences of not having insurance. They may include stories or facts about people who faced significant financial burdens due to unforeseeable disasters and did not have insurance to cover such losses. By framing insurance in terms of loss prevention, insurance companies attempt to increase the perceived value of their products and induce individuals to purchase them.

1.5.2 Choice Architecture and Insurance

Insurance companies typically use loss framing strategies in their marketing and communication efforts to emphasise the negative consequences of not having insurance. They may include stories or facts about people who faced significant financial burdens due to unforeseeable disasters and did not have insurance to cover such losses. By framing insurance in terms of loss prevention, insurance companies attempt to increase the perceived value of their products and induce individuals to purchase them. Choice design, in theory, broadens the number of alternatives accessible to consumers. Sunstein (2018) and Thaler and Sunstein (2008). Defaults, for example, can make it easier to make informed decisions by minimising the need for significant consideration. Brown and Krishna (2004) are two examples. Parallel to this, recent rapid improvements in large-scale data availability, artificial intelligence, and machine-learning-based algorithms are ushering in a new era in which marketers can more precisely foresee which insurance products will best meet the demands of a particular client. Chintagunta, Hanssens, and Hauser 2016; Ghose, Ipeirotis, and Li 2012). Customers may pick the best insurance plan for them by

combining this fact with option design. It can also provide new business opportunities while increasing customer satisfaction with the chosen product.

1.5.3 Consumption Smoothing and insurance consumption

Consumption smoothing and insurance are terms that relate to the management of financial risks and uncertainties in order to maintain a steady standard of living throughout time. Consumption smoothing aims to reduce extreme fluctuations in consumption levels by saving during periods of high income or windfalls and using those savings during low income or unexpected bills. Individuals can better manage their financial resources and avoid unexpected variations in their standard of life by smoothing out their spending.

Consumption smoothing and insurance are closely linked since insurance is essential for consumption smoothing. Individuals can protect their financial well-being and maintain their preferred level of consumption in the face of unanticipated catastrophes by transferring the risk of potential losses to an insurance provider. As an example, consider health insurance. By acquiring health insurance, individuals can lessen the financial risks associated with medical costs. If they have an unexpected illness or accident, the insurance company will pay a significant portion of their medical bills, reducing the impact on the individual's financial resources. This allows consumers to keep spending without depleting their savings or entering debt.

1.5.4 Risk Perception and insurance consumption

The bulk of insurance is related to situations with a low probability of occurring, which does not match an experience. As a result, people's risk assessments may diverge, resulting in incorrect insurance selection or avoidance. Eisner and Strotz believe individuals overpay for flight insurance (Eisner & Strotz, 1963). Karapiperis et al. (2017) state that people only purchase flood insurance when it is subsidised, and insurance premiums are far lower than realistic estimates. The general public's impression of a danger's frequency and possibility can be altered. Several of Lichtenstein's studies, in which participants were asked to judge the likelihood of various causes of death, indicated that some were inflated while others were underestimated. A person who feels the risk is larger than science has discovered will be compelled to obtain more comprehensive insurance. Recognising that people's opinions are not rational, flawed, or easily swayed might serve as the basis for new legislation prohibiting certain insurance sales practices.

1.6 Research Questions

The thesis addresses a number of objectives. The first goal was to investigate the wealth insurance association using data gathered through a gaming application and the influence of loss framing on insurance consumption rather than collecting data through a survey (Heo et al., 2013). Survey data collection

has several limitations, such as asking direct questions, which leads to socially acceptable replies, inaccuracies owing to language understanding, a lack of standard format, and, most importantly, many view a survey as tiresome search that concentrates on whole-life or term-life insurance choices, including analysis for within-subject differential insurance choices and temporal variations in demand within the same household (Nyman, 2001; Jurkovicova, 2014; Costa-Font & Rovira-Forns, 2008). There has been no research into an individual's response to various insurance products as a function of risk attitude. Second, research on insurance consumption in Western nations (Millo & Carmeci, 2015; Kjosevski, 2012) may not immediately apply in other countries. As a result, it is critical to assess placed situations while considering inequalities in socioeconomic conditions. To our knowledge, no study has explicitly presented real-life occurrences as situational placement. This study evaluates the theories on willingness to acquire insurance using a game-like application displaying real-world life events.

The main focus of this study was to understand insurance purchase decisions from a consumer behaviour perspective. Two studies were conducted to understand insurance buying behaviour. These two studies were based on the following themes: (i) understanding the effect of wealth level on insurance demand and (ii) the effect of loss framing and risk-taking on insurance purchasing behaviour.

The first study was conducted to ascertain the effect of wealth level and uncertainty on insurance purchasing. Data were gathered using an online game in which IIIT Hyderabad students participated. To add uncertainty to the game, a simulated dice toss was used. Participants were given the task of rolling a die and estimating its value. If the participant's guess is correct, they will get a multiple of the wager; otherwise, the bet value will be withdrawn from their existing balance. The die roll value was generated randomly to imitate life's unpredictability. Setting up the scenario to mimic real-life situations in which people face uncertainty without notice allowed us to study the influence of uncertainty on insurance purchasing. Our results show that the relationship between wealth and insurance usage is not linear.

The second study is conducted to understand the impact of loss framing and risk behaviour on insurance consumption. Utility theory and prospect theory provided the theoretical foundation for this study. Experimental data were collected using a realistic game showing different aspects of life, from starting a new job to retirement. Primary data were collected from three groups of participants, university students and older participants with family responsibilities, divided by annual income and education. Results show that the insurance option influences the effect of loss framing on insurance purchases. The correlation with risk attitude was insignificant for investment products such as life insurance. Health and accident insurance showed a negative correlation with risk attitude for younger participants, while a positive correlation with accident insurance was observed for older participants.

Chapter 2

Understanding the effect of wealth level on insurance purchase decisions – using a game-like interface

2.1 Introduction

Insurance is an important component of most households' financial portfolios since it protects people and families against financial losses caused by unforeseeable occurrences such as accidents, diseases, natural disasters, or death. Insurance acts as a safety net, assisting individuals and families in managing financial risks and uncertainties. However, evidence of how people make insurance-related decisions is scarce. There is a substantial body of theoretical work on this issue, including classic models like Mossin (1968) and Lewis (1989), as well as more recent models like Gollier (2003) and Koijen, Van Nieuwerburgh, and Yogo. (2016). According to these theories, wealth is a primary driver for insurance purchases. There have been few attempts to address these concerns openly. Zietz (2003) investigated 12 studies examining the relationship between wealth (i.e., net worth) and life insurance demand. While most research found a correlation between insurance use and wealth, the findings were inconsistent. Some researchers observed a negative relationship between life insurance demand and wealth, while others discovered non-significant relationships. According to Fischer (1973), home wealth appears to act as a form of self-insurance, reducing the need for insurance over time. To further complicate matters, others, such as Eisenhauer and Halek (1999), observed a link between wealth and risk aversion but concluded that wealthier households are more inclined to obtain insurance. It is also plausible that insurance consumption decisions are not autonomous, and that wealthy customers are just as likely as poor customers to buy insurance (Mayers & Smith, 1983).

We investigate the insurance consumption habits of university students aged 18 to 25, because studying college students' purchasing habits provides valuable data that can shape insurance companies' strategies, improve products and services, and contribute to better financial outcomes for young consumers. It also contributes to regulatory and policy activities to protect consumers and promote financial literacy. There is little empirical research on what variables influence insurance purchasing; most of this evidence is survey-based. In this study, we look at how an individual's wealth affects insurance purchases using a game-like application. Participants are requested to play a web-based game with a set

starting wealth and a fluctuating wealth level as the game progresses. Insurance options are presented at various wealth levels to investigate the influence of wealth on insurance consumption.

Prior research on the association between wealth and insurance revealed that risk aversion decreases with wealth (Arrow,1984), and affluent people are more likely to be insured than less wealthy persons. Wealthier persons may purchase more insurance since they know they face greater risk in life expectancy and unfavorable property shocks (Gropper & Kuhnen,2021). However, there is a wealth level at which insurance no longer offers adequate protection for a particular amount of wealth and insurance contract (Lee et al., 2013), and as wealth grows, the effect of insurance becomes insufficient and keeps on decreasing. Thus, we describe the study's key finding: the association between wealth level and insurance consumption is non-linear, and there is a threshold level beyond which there is a negative correlation between wealth level and insurance consumption.

2.2 Methodology

2.2.1 Participants

The subjects were all between the ages of 18 and 25, and there were 101 undergraduate volunteers from the International Institute of Information Technology, Hyderabad. Participants did not have a salary and were financially dependent on their parents.

2.2.2 Hypothesis

At lower levels of wealth, individuals prioritize basic needs (food, shelter, clothing) over insurance. Thus, insurance consumption is minimal. As wealth begins to increase, there's a rising need to protect assets and investments. People at intermediate wealth levels might also perceive risks more acutely since they have more to lose than those with lesser wealth. This could lead to an increase in insurance consumption. However, at extremely high wealth levels, individuals might have enough financial buffer to self-insure and might perceive less marginal benefit from additional insurance.

Wealthier individuals may diversify their investments and holdings, which could lead them to acquire various insurance products to safeguard against various types of risks. This could suggest a peak in insurance consumption at upper-middle levels of wealth.

Insurance products in the market may cater more to the middle class or upper-middle class due to their sheer numbers and purchasing power (Memon & Qureshi, 2021). Those with minimal wealth might not find products tailored for them. The extremely wealthy might have access to alternative risk management solutions beyond traditional insurance, like hedging through financial instruments or establishing trusts.

As wealth increases, insurance consumption might initially rise, then plateau, and potentially decrease at the very high end. This results in a nonlinear relationship between the two variables. Hence, we suggest the following hypothesis.

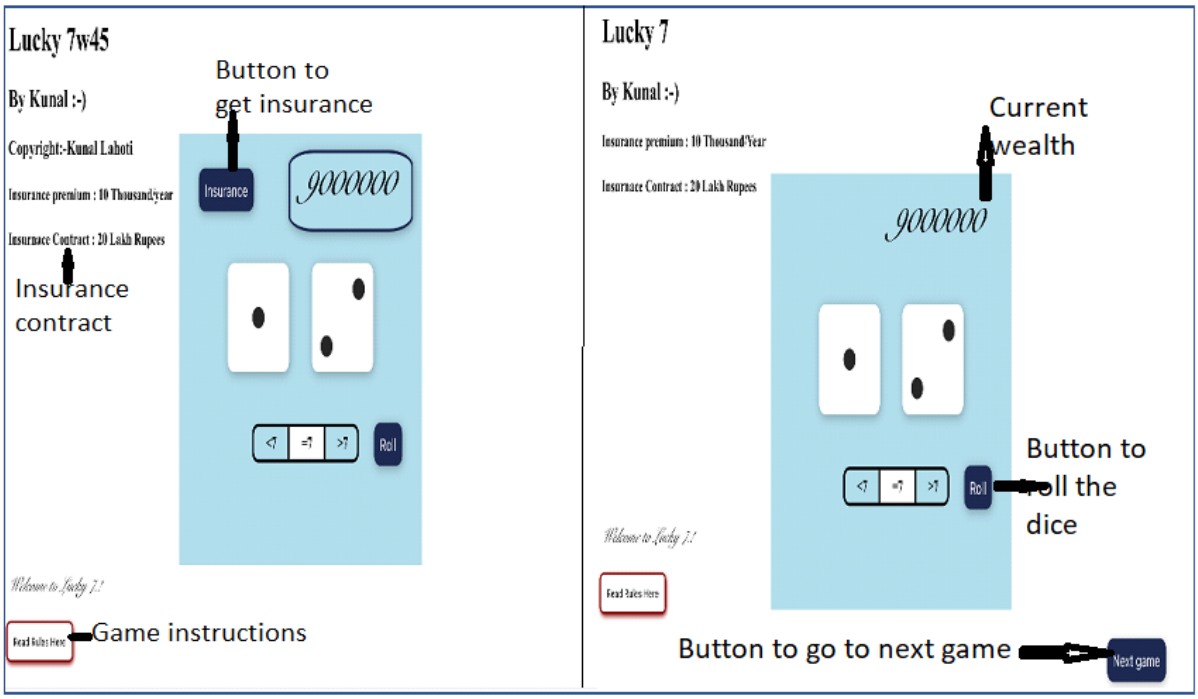

Figure 2.1 Screenshots of the application's components(explain the application's various features). The image on the left depicts a scenario where an insurance button is offered, and clicking the button accesses the insurance option.The instruction button, located on the bottom left-hand side of the screen, gives instructions as well as a demonstration of the game. The current wealth is shown at the top left of the blue box; when the wealth reaches zero, players can go to the next game by tapping the next game button at the bottom left of the screen.

H1: - The relationship between wealth and insurance consumption is nonlinear.

2.2.3 Experimental Design

- A web-based game-like application is created using HTML, ccs, and JavaScript.
- The application begins with an initial payment of 90 lakhs to the players, after which participants are asked to bet 15 lakhs of their initial wealth on the outcome of the die roll by selecting one of three outcomes, namely the sum of the die roll is $= 7$, < 7, > 7.
- The outcome of correct and incorrect predictions
  - Winning twice the amount: - a) If participants choose '$<$7' and the total number of dice is less than 7, or b) If you choose $>$7 and the total number of dice is greater than 7.
  - Winning the amount thrice: - If you choose '$=$7', the dice total is 7.

  - Reduction is net worth equal to bid value: - a) If participants choose '<7' and the total number of dice is greater than 7, or b) if you choose '>7' and the total number of dice is less than 7.

- Participants are offered an insurance option to reduce the loss in case of a wrong prediction. The insurance policy is Rs 20 lakhs, and the premium is 10k annually. Both are displayed in the upper left corner of the application.

- The game consists of 2 rounds

  - In the first round, the insurance option appears for a portion of the net worth unknown to the participants. The insurance options appear at 45 lakhs Rs, 75 lakhs Rs and 60 lakhs Rs.
  - In the second round, there is an insurance button that, when pressed, invokes the insurance option, and the operation is the same as before.

- The effect of the insurance option

  - When the insurance is purchased: -
    * If the insurance is purchased when called in round 1 or the insurance button is pressed in round 2, the loss due to incorrect prediction will be refunded. However, participants must pay a premium in each round, whether they win or lose.
    * Thus, if a participant wins, the winnings minus the premium are added to one's assets. If the participant loses, only the premium is deducted from his net worth.
  - If no insurance is taken out: -
    * If the insurance option is not chosen, the game's rules remain unchanged; the game continues as before the insurance option was chosen.

- The application starts with a wealth of 90 lakhs and continues until the participant's current wealth reaches zero; at this point, they are prompted to hit a button that takes them to the next game.

2.3 Results

- Based on figures 2.2 and 2.3, we can observe that the number of participants purchasing insurance is highest at the insurance point of 60 lakhs in both scenarios when the insurance option is imposed and when the participants are given a choice to purchase insurance at any wealth level.

- The insurance consumption behaviour follows a bell curve, with an increase in the number of participants purchasing insurance at each wealth level up to 60, followed by a decline in the number of participants at each wealth level beyond that.

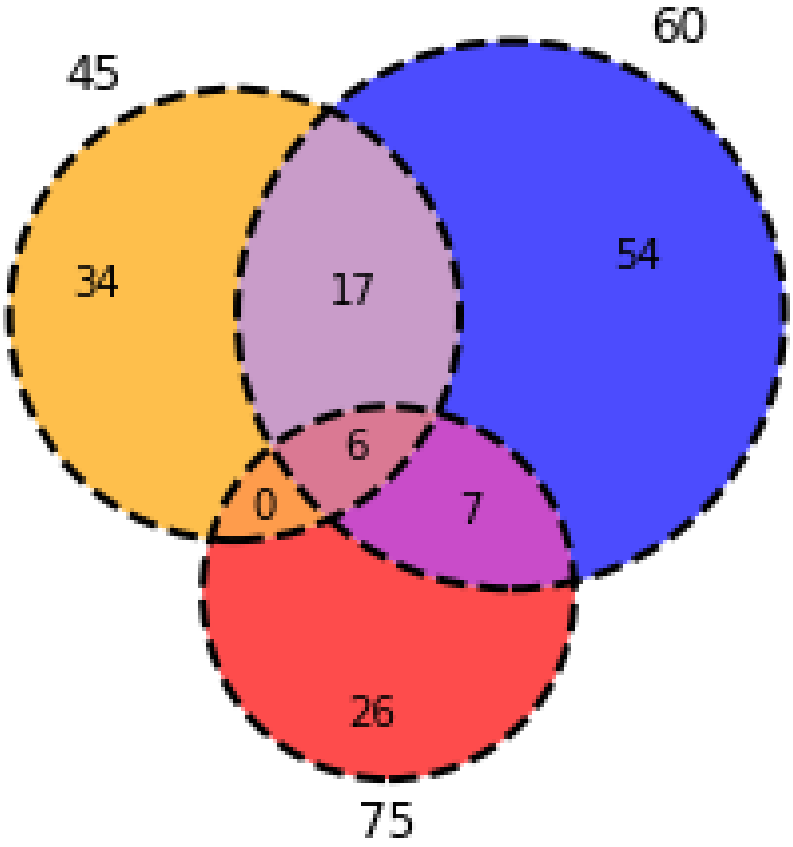

Figure 2.2 Shows the number of participants who bought insurance at various wealth levels, i.e., 45, 60, and 75, in three separate games. In each game, the participant must choose between taking insurance or not at one of three points. The overlapping areas of the two sets show the number of participants who have taken insurance at both insurance points (for example, 17 people have taken insurance at wealth levels of 45 and 60), while the overlapping of three sets reflects the total number of participants who have taken insurance at all insurance points.

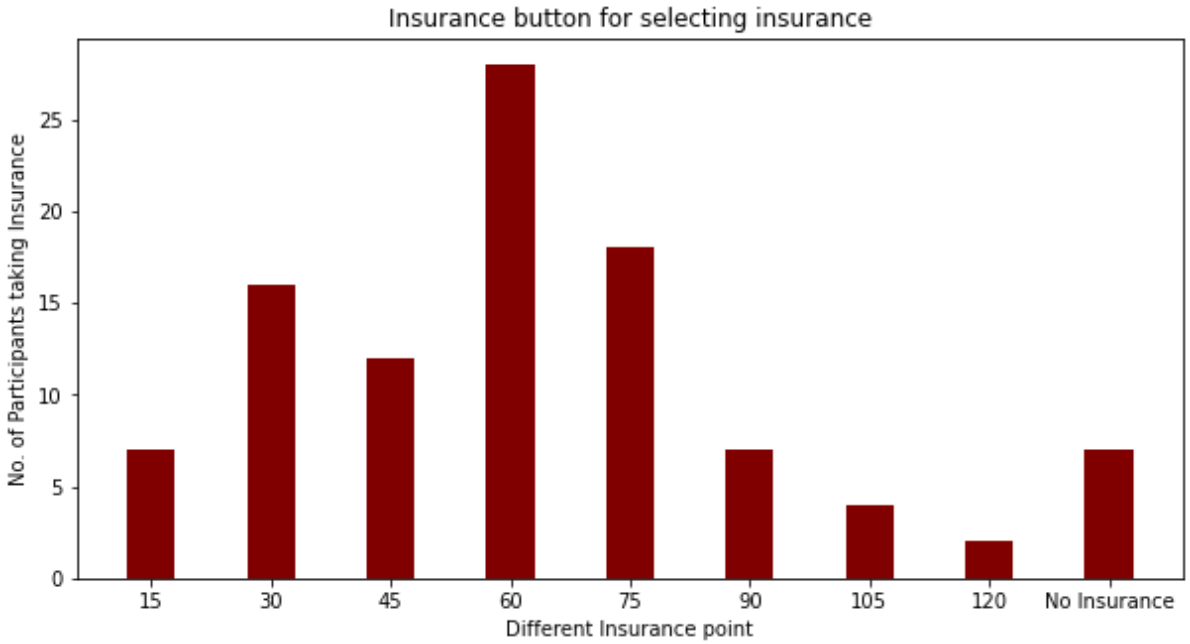

Figure 2.3 The figure depicts the number of players taking insurance at various wealth levels in a single game, i.e., 15, 30, 45, 60, 75, 90, and 120. Unlike in Round 1, where the choice to purchase insurance is forced, the participant is given an insurance button and can purchase insurance at any time.

- The value of 60 serves as a threshold below which there is a positive correlation between wealth level and the number of participants purchasing insurance, but above which insurance does not provide adequate protection against loss, and the influence of insurance declines as wealth level grows.

2.4 Discussion

Using a game-like application, we examined the correlation between insurance purchases and wealth level. In a context that mimics real life, where people face uncertainty without warning, we examined the effects of uncertainty on insurance purchases. The participants in the study were university students aged 18-25. College students are often at a point when they are more prone to taking risks, such as indulging in extreme sports, driving recklessly, or experimenting with drugs and alcohol. (Christine Kearney, 2012; Sharland,2005). Understanding underwriting behaviour can help insurers build policies addressing these risks while offering enough protection. People between 18 and 25 may lack financial experience and be unaware of the hazards they face. By examining their spending patterns, insurers can educate consumers about financial dangers and how insurance might protect them. The main finding was that there is a nonlinear relationship between insurance consumption and wealth level, i.e., more participants buy insurance at an intermediate wealth level than when offered at a lower or higher wealth level (Kangoh Lee,2010; Tolbert et al., 2022), confirming our hypothesis h1.

2.4.1 Wealth Level and its Influence on insurance purchase

People with less wealth may only afford a limited quantity of insurance; benefits are limited, and investing all of one's money in better insurance may not leave enough income for everyday or emergency needs. Insurance expenses can consume a significant portion of a person's or family's budget, and individuals with less money may be unable to afford the same coverage as those with higher salaries. Furthermore, less wealthy people may have more pressing financial challenges, such as paying for food, shelter, and healthcare. This may make prioritising insurance difficult, especially if they feel it is unneeded. People with lower incomes may have less access to insurance information and services and need more awareness about the many types of insurance available to them. This can make it difficult for individuals to make informed insurance decisions, leading to their avoiding coverage altogether (Khullar & Chokshi, 2018).

We utilise the Rampini and Viswanathan (2019) model to assess the growth in insurance consumption between lower and intermediate wealth levels, which claims that insurance may be viewed as "state-contingent savings" because insurance payments must be made in advance. In their concept, households maximise current consumption while saving for the future by accumulating assets that pay off at different income levels. Persons with less money emphasize present spending more than persons with more wealth, so they buy less insurance.

Furthermore, because people with intermediate wealth do not have as many resources as well-off people, purchasing insurance and paying monthly premiums is the most logical course of action. A person with intermediate wealth frequently gets a paycheck mostly spent on daily necessities, with the remaining cash insufficient to provide security in the event of an unexpected loss. The most important thing they can do is obtain insurance, which is more important than having a little money for the near term. A person with an intermediate wealth may live a stress-free life without worrying about potential problems. Furthermore, intermediate wealth is often characterized by reasonably consistent earnings and assets accumulated through hard work. As a result, individuals may stand to lose more monetarily in the case of an unforeseen incident or loss, such as a severe sickness, a serious vehicle accident, or a fire or theft that damages their house and property. Intermediate-income people may have more assets to safeguard than lower-income people, such as a home or a car. Because of their socioeconomic status, people with moderate income may sense a more significant need for insurance. They may believe they have more to lose if something goes wrong and are more inclined to get insurance to limit that risk. In the event of damage or loss, insurance can safeguard these assets. Individuals with intermediate wealth may be more concerned with social mobility and risk aversion than wealthy individuals. As a result, they may be more likely to get insurance to protect themselves from future financial setbacks that might jeopardise their capacity to attain their objectives.

Wealthier individuals will purchase less insurance because insurance products come with an unnecessary burden, such as monitoring and other fixed costs, that make them more expensive than self-insurance through savings (Gropper & Kuhnen,2021). As wealth increases, so does the ability of individuals to bear risks themselves (Borch et al., 2014). According to Fischer (1973), family wealth

appears to act as a form of self-insurance, reducing the demand for insurance over time. There is a level of wealth beyond which insurance provides adequate security, and the effect of insurance becomes insufficient and decreases (Lee et al., 2013). They have more financial resources to cover potential losses or emergencies. However, it is essential to note that this does not mean that wealthy individuals should not consider insurance as a means of protecting their assets and income.

2.4.2 Tax advantages

Purchasing insurance, which is tax-advantaged under the Income Tax Act, is a better option for those with intermediate wealth than those with lesser or greater wealth for the following reasons.

1. People with intermediate wealth have more discretionary income than those with lower incomes, allowing them to spend more money on insurance premiums. This enables persons with a moderate degree of wealth to lower their tax burden by taking advantage of insurance premium exemptions.

2. People with higher wealth may already have a significant amount of income subject to tax, making tax exemptions on insurance premiums less impactful. Additionally, they may have access to other tax-advantaged savings and investment vehicles that provide more significant tax benefits.

3. People with lower wealth may need more income to fully take advantage of tax exemptions on insurance premiums.

4. Intermediate-wealth individuals are also more likely to have assets and financial commitments (such as a mortgage, children's education, or retirement planning) that they would wish to safeguard with insurance, making tax exemptions on insurance premiums more attractive.

The study sheds light on the elements that impact insurance use. According to the findings, demographic variables, economic factors, social factors, and psychological issues are all significant predictors of insurance usage. These issues should be considered by policymakers and insurance firms when devising measures to enhance insurance coverage. Policymakers, for example, may develop policies aimed at specific demographic groups or to improve financial literacy. Insurance companies may prioritize gaining client trust and improving service quality. By considering these issues, policymakers and insurance companies can devise more successful methods to increase insurance consumption and reduce financial risk for people and society.

Chapter 3

Understanding the effect of loss-framing in insurance purchase decisions – using a game-like interface

3.1 Introduction

This study aims to learn how risk-taking behaviour and the incentive supplied by loss framing lead to a shift in insurance consumption in a gaming application that simulates a real-world situation and serves as a platform for testing theories of desire to purchase insurance. The majority of insurance buying research is based on questionnaires. There are various disadvantages to gathering survey data, including the inability to ask direct questions that result in socially acceptable replies, comprehensibility, the lack of a uniform format, and, most crucially, the fact that many people find a survey onerous. We chose a game-like application based on the findings of Cai and Song (2017), who investigated whether insurance games may enhance weather insurance use, and Patt et al. (2009), who similarly employed field games. Insurance consumption studies in Western nations (Millo & Carmeci, 2015; Kjosevski, 2012) may require more generalizability to other countries. As a result, it is critical to assess placed situations while considering inequalities in socioeconomic conditions. Loss framing is important when considering inequality in socioeconomic conditions because it highlights the disparities and disadvantages faced by individuals with lower socioeconomic status (Dietze & Craig, 2020). Loss framing focuses on what individuals stand to lose rather than what they might gain((Bosone & Martinez, 2017).Loss framing is also crucial in insurance consumption because it involves how information is presented to potential customers regarding the outcomes of a decision. Loss framing emphasizes potential losses or negative consequences of not purchasing insurance coverage, which can evoke a stronger emotional response and encourage individuals to take action (Gerend & Sias, 2009). People tend to be more risk-averse when faced with potential losses (Efendić et al., 2021), so highlighting the consequences of not having insurance can increase the perceived importance of obtaining coverage. This framing can make insurance options more appealing and prompt individuals to make informed risk management decisions.

By presenting information on the current financial situation (income, expenses, savings) and a clear insurance contract, we aim to reduce cognitive load in decision-making and other confounding factors while attempting to address discussions of bounded rationality. In addition, the method is intended to raise awareness of and influence the acceptance of new financial products that require the presentation

of uncertainty and an understanding of the benefit-loss relationship. The option to purchase insurance is repeated to test impact: before and after a hospital visit or accident. Our game-like application combines event embedding and consequence feedback for each financial decision, making it an effective tool. Most importantly, the application supports the presentation of information in Indian languages in both text and audio formats and can reach populations with difficulty reading and understanding the extensive text in English.

The application was distributed to three age and financially diverse groups:

- A student cohort with no immediate financial obligations
- An older age group with financially dependent family members
- Young professionals in well-paying jobs and with good prospects

Participant groups were selected based on age, socioeconomic prospects, and family responsibilities. The analysis will help to understand the factors that influence risk perception and the role of financial stability - current or future.

3.2 Methodology

3.2.1 Participants

Data was collected from three sets of participants:

- Group A: 97 undergraduate students (age: 18 and 25; mean = 20.7 ± 1.6). The participants were financially dependent on their parents.
- Group B: - 42 older adults (age: 35 and 55, mean=41.3 ± 4.3) employed as security guards and administrative staff at the institute with a salary range of INR 20,000 – 30,000 monthly.
- Group C: - 65 participants similar in the age range to group B (mean: 38.4 ± 2.9), but for the education levels (IT professionals mainly) and a salary of INR 50,000 to 70,000 per month.

3.2.2 Experimental Design

A web-based game-like application is designed and developed using Vue (an open-source front-end application to build interfaces using JavaScript). The interface presents an individual's typical life stages (flow chart in Figure 3.1) condensed into 12 months, starting with a job as a young adult, getting married, having children, old age and retirement. Events requiring payment to a family member (Figure 3.5 (a)), self-expenses (Figure 3.5 (c)), and insurance options(Figure 3.4) were presented regularly. The information is presented in text or audio format in Hindi, English, and Telugu to reduce confounds due to language comprehension(Figure 3.3). The navigation is by a right scroll design for the progression of events. The options are forced-choice binary (yes/no) decisions or amounts to pay or receive. To

emulate real-life conditions, an amount as salary is credited into the player's account at each turn (a turn represents one month). Depending on the frequency and type of event, the balance (in savings, deposits, etc.) is updated and presented for quick reference (Figure 3.2 (e),3.6). The monthly savings is displayed after an automatic deduction of premium amounts (for any insurance purchased) and a fixed monthly living expense. The accident and health insurance options are presented twice, pre-post and mishap(Figure 3.1), and subsequent hospital expenses are deducted. The instances in which people incur a monetary loss without insurance coverage act as negative feedback.

3.2.3 Experiment paradigm

The participants signed a consent form, and an honorarium of INR 50 was paid. The experiment was conducted in-lab and online (groups C & A), with identical procedures and content. The application was shown on a desktop screen for the in-lab experiment while online participants logged into the application. Post the gameplay; all participants completed a survey with risk-trait questions (Weber et al.,2002) followed by personal details of age, any present significant health condition (yes/no choice only), and financial commitments – like loans and dependents.

3.2.4 Hypotheses

In India, insurance penetration of products such as accident and health insurance remains low (Rana & Abhishek, 2020; Rajalakshmi & Indira, 2014). The primary reason for poor penetration is an under-estimation of events with a low probability of occurring (Kunreuther et al., 2001). Several behavioural economic theories and empirical studies have been proposed to explain why people misjudge these risks and fail to plan for them (Friedl et al.,2014). The absence of loss experience has also been linked to low insurance demand, which may be influenced by low-risk estimates (Robinson & Botzen, 2019). This research uses loss framing to understand how loss awareness influences insurance purchases. In this study, the participants are offered the option of purchasing insurance after suffering a loss. Does the product still affect insurance uptake now that users know the potential loss? We propose the following hypothesis to find out.

H1: Loss-framing increases insurance purchases.

Theoretical studies have shown that the demand for insurance increases with risk aversion (Mossin,1992; Eisenhauer,2004), and risk-taking behaviour is an essential factor in insurance decision-making (Sitkin & Weingart,1995). Our premise is that individual trait of risk aversion(from DOSPERT scores) increases insurance demand as they are more likely to seek protection against perceived loss.

H2: Insurance purchase negatively correlates with a risk-taking attitude and insurance purchase.

Figure 3.1 The flow chart displays all the events in the game. In the application, there are three basic types of events: - A. Events that cause a drop in net worth or as losses (events are highlighted in green). B. Events that result in a rise in net worth (orangish-brown). C. Insurance-related events (blue). D. The change from the status quo (highlighted in yellow).

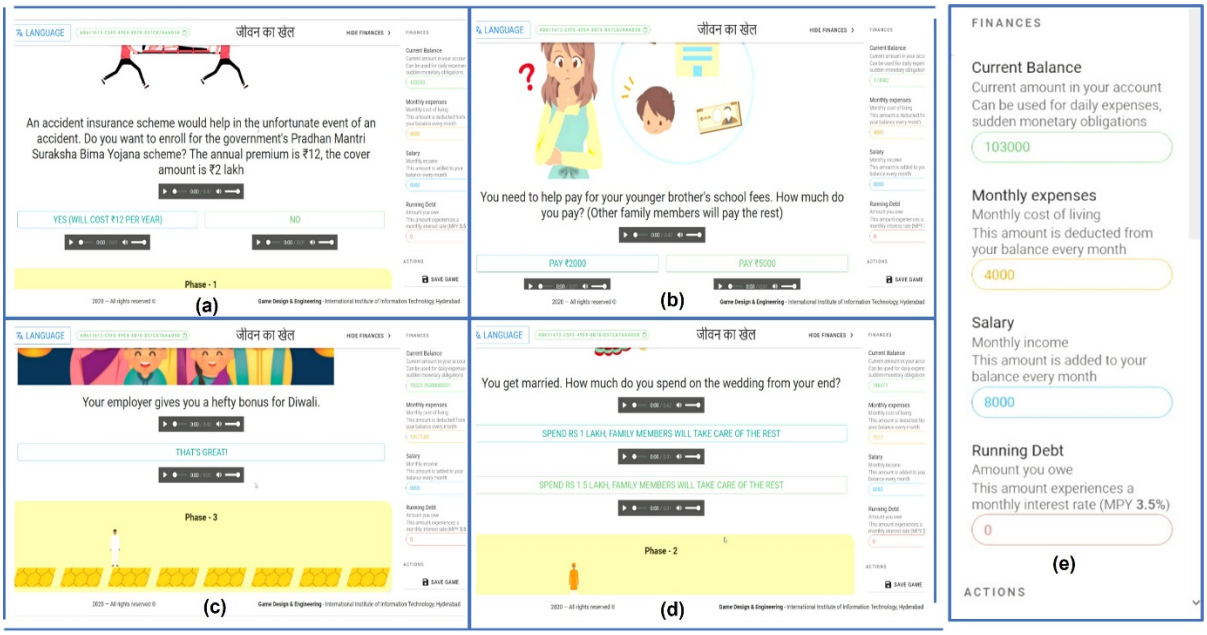

Figure 3.2 Screenshots of the application depicting a sample set of events in the game:- (a) The insurance purchase choice with complete information. The premium and the payment in the event of an accident are indicated. (b) An event that requires the player to spend money on tuition fee payments for a younger sibling. (c) A cash-inflow event – a festival bonus. Other cash-in-flow included capital gains from selling land. (d) This is another example of a significant expenditure – marriage expenses. (e) sample screenshot of the budget panel shown on the screen's right panel.

Figure 3.3 The application began with a dialogue box in which participants had to pick their gender and provide a code (optional) if they wanted to restart from the previously saved state; if no code was entered, the game began from the beginning. The current game's code is displayed in the upper right corner of the screen, and the option to save the game is displayed in the lower left area of the screen. Each event and option has an audio recording, which may be accessed by hitting the play button. Participants can choose from three audio options: English, Hindi, and Telugu, by selecting the language button on the top right-hand side of the screen; this button is accessible throughout the game.

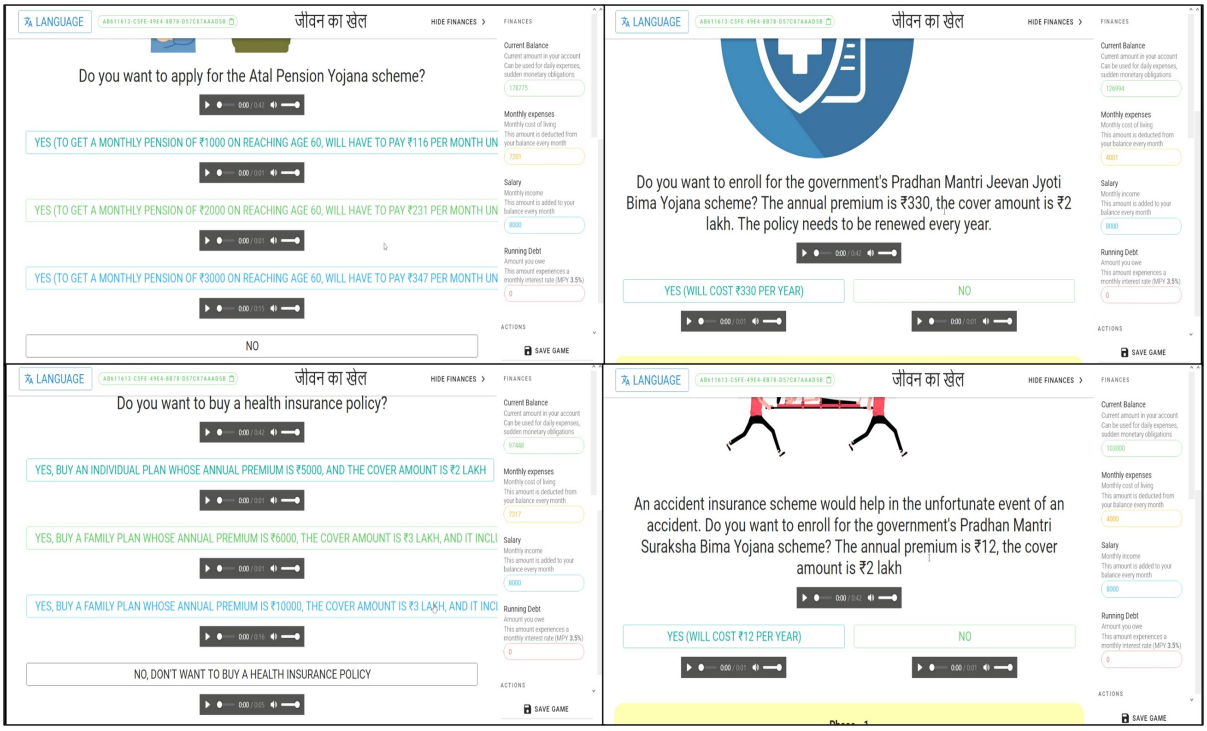

Figure 3.4 Figure displays the various insurance coverage available to participants in the game. The illustrations illustrate a pension plan (top left), a life insurance policy(top right), a health insurance policy (bottom left), and an accident insurance policy (bottom right). The Atal Pension Yojana is a government-backed pension system in India that aims to policyholders with a sustainable income during their retirement years. The Pradhan Mantri Jeevan Jyoti Bima Yojana (PMJJBY) is an Indian government-sponsored life insurance plan. The Pradhan Mantri Suraksha Bima Yojana (PMSBY) is India's government-sponsored accident insurance plan.

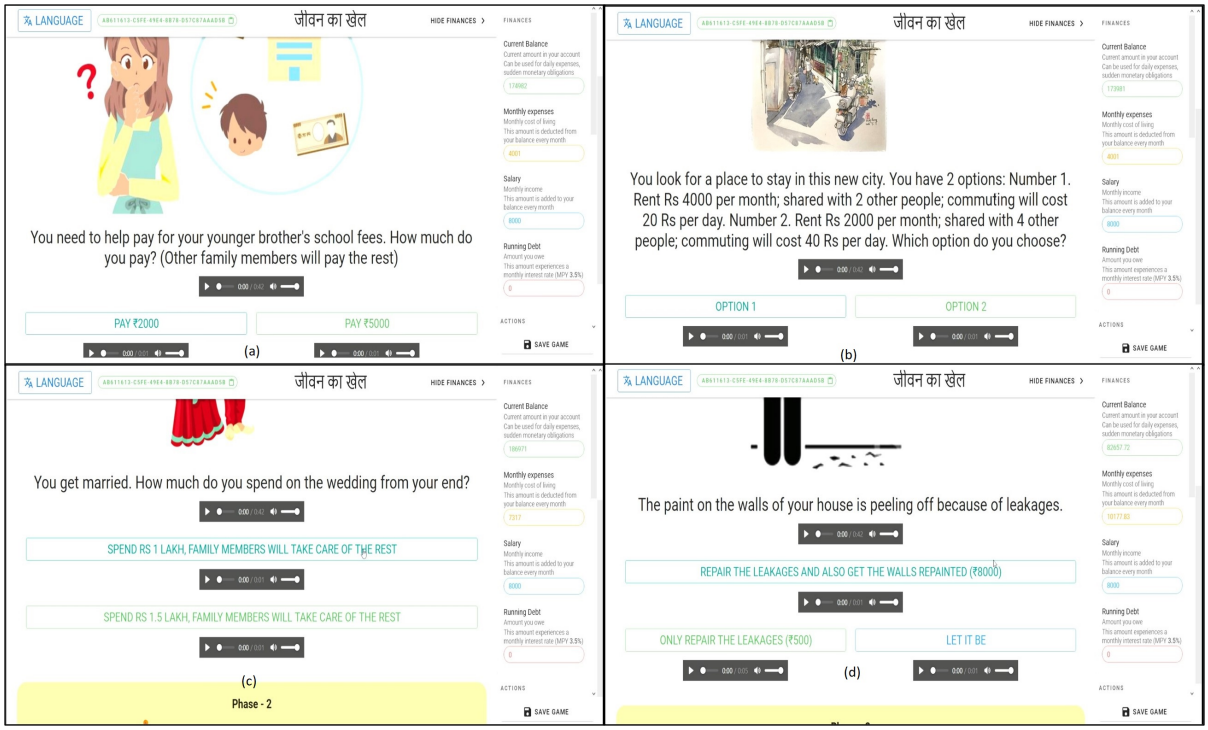

Figure 3.5 The figure shows different events leading to expenses. An instance when the player has to decide on the amount to spend on brother's education fees (top left), making a choice between two house rental options (top right), budgeting for self-wedding (bottom left), and cost for house maintenance (bottom right).

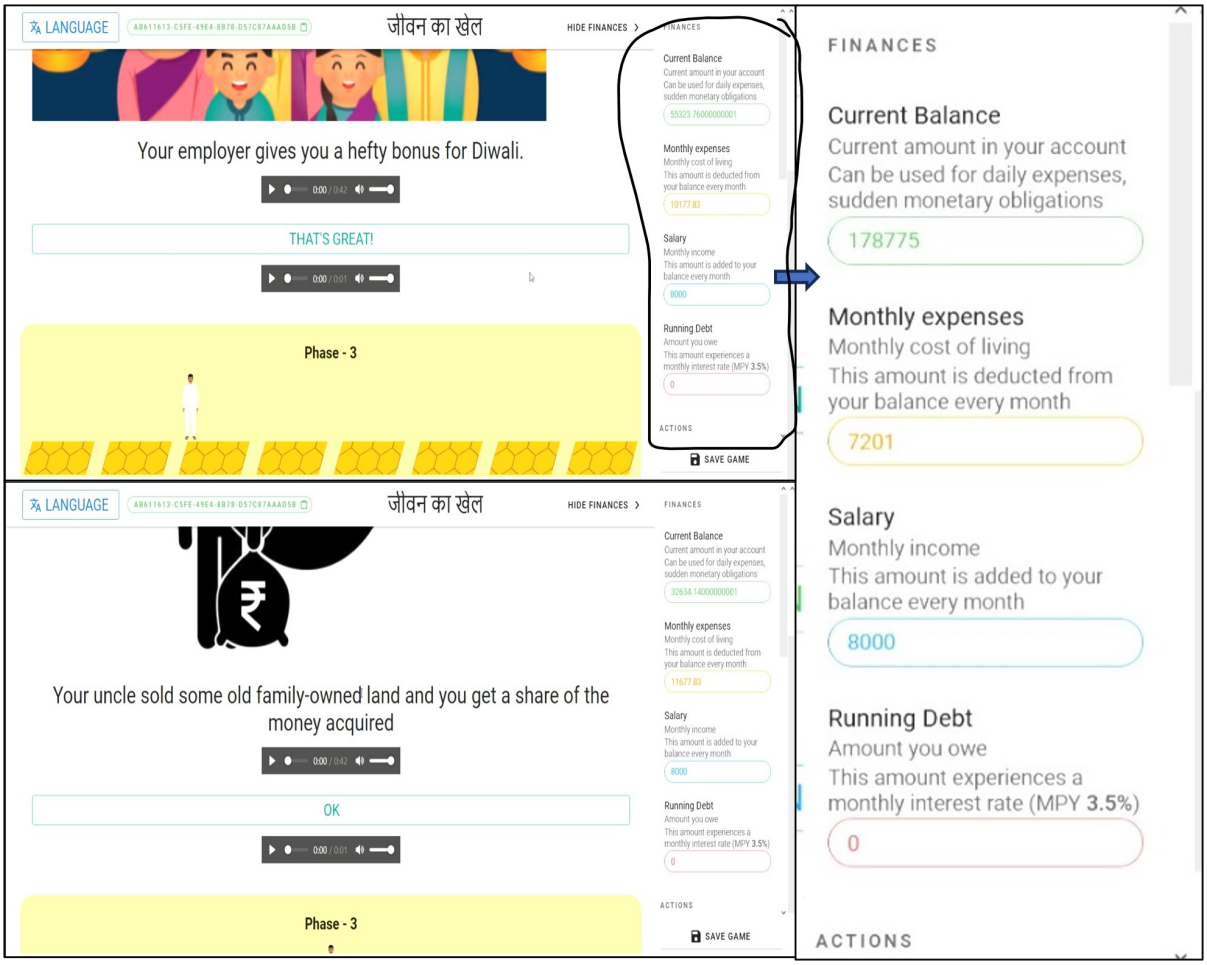

Figure 3.6 The figure depicts several cash inflow events in the game. The image on the top left shows the Diwali bonus, and the image on the bottom left shows the capital gain from the sale of family land. The graphic on the right depicts the financial information made available to participants through the game. Finance information includes current balance, monthly balance, salary, and running debt.

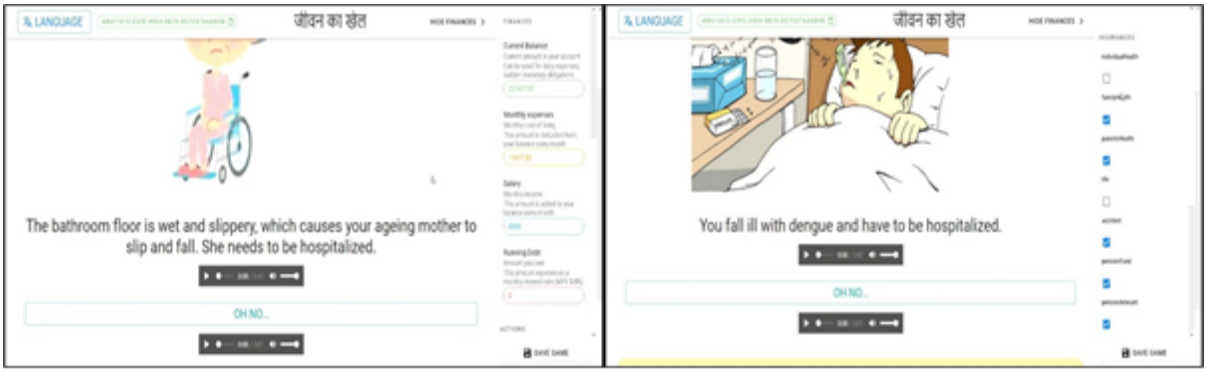

Figure 3.7 The screenshot on the left presents an unfortunate accident to a family member requiring hospitalization and the one on the right is sickness effecting self. These are presented as 'loss-framing' conditions in the game for family health and individual health insurance products.

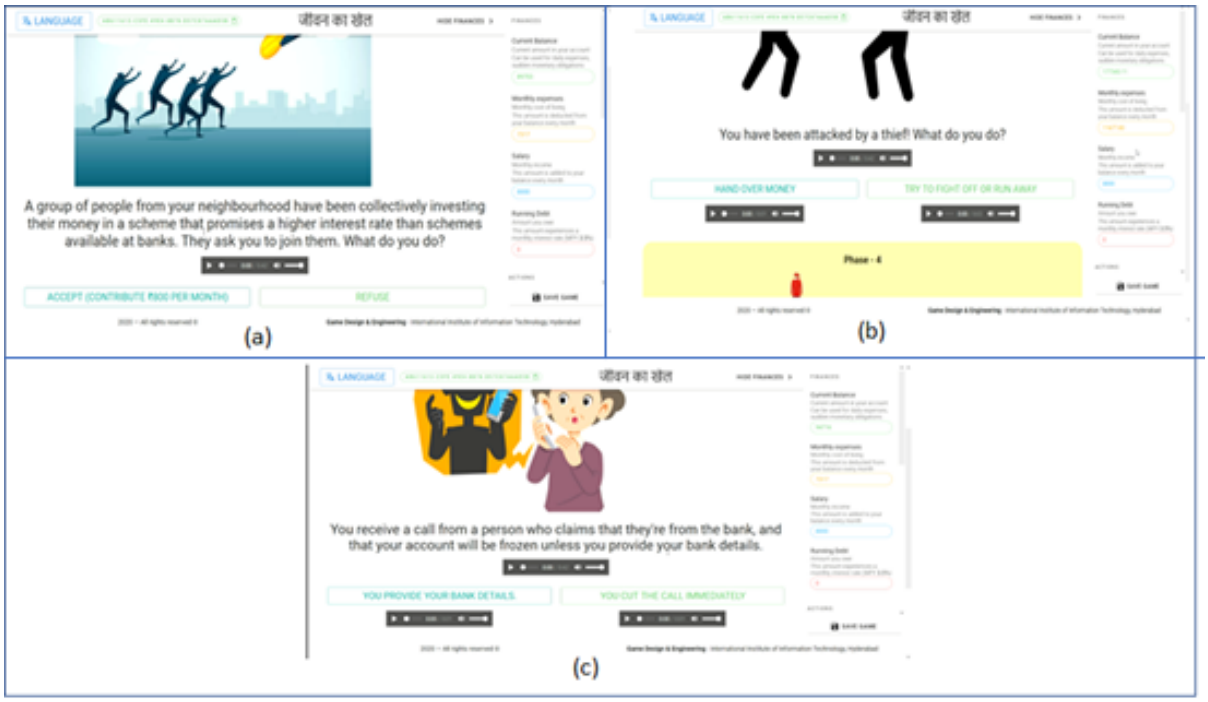

Figure 3.8 The image shows potential money-losing events.
(a) Displays an event where participants are urged to invest in a possibly lucrative scheme.
(b) Displays an event in which participants are robbed.
(c) Displays a call requesting bank information.

3.2.5 Statistical Methods applied

3.2.5.1 Panel data analysis

Panel data analysis is a research strategy that entails analysing data gathered across different time periods and from multiple individuals, entities, or units. This method yields insights that integrate parts of time series and cross-sectional data, allowing researchers to account for individual variations, identify causal linkages, and investigate dynamic processes. Panel data analysis improves statistical efficiency and enables for more accurate estimate of variable correlations by utilising information from repeated observations on the same units.

This study used panel data analysis to examine the correlation between risk-taking scores and willingness to buy insurance, loans (groups B and C), and wealth level for time series data such as health insurance, accident insurance, and family health insurance, which are provided to participants twice before and after a loss.

3.2.5.2 Logistic regression

Logistic regression is a statistical technique used for binary classification tasks, where the goal is to predict one of two possible outcomes based on input variables. Logistic regression was used to evaluate the associations between risk-taking ratings and the willingness to obtain insurance for life insurance and pension plans. Because the choice to purchase life insurance and a pension plan was only made available once and the decision was binary, logistic regression was used for these alternatives.

3.3 Results

3.3.1 Age and insurance purchases

The participants are divided into two age groups (Group A: 18-25 years & Group B & C: 35-55 years). Though group C and group B are in the same age range, a separate label was considered as education and salary levels differed. As observed in (Figure 3.9), the younger age group is comparatively more inclined to purchase nearly all insurance products and the pension plan. Insurance and pension plans are more acceptable in group B. It is interesting to note the difference between groups B & C, where the effect due to salary level, education and job prospects is evident across the insurance types and in pension plans. The lower percentage of insurance purchases in older adults discounts the tax deductions at source one can avail for insurance premium payments as per taxation rules. A probable explanation could be that the tax benefit gap is filled by other factors like home loan EMIs, tax brackets, or investments in the stock market that provide better returns.

The loss framing effect is evident in all demographics, except for a reversal trend in the younger population for individual health insurance. For family health insurance, the difference between before and after loss framing is a 19% rise for younger participants and a 4% increase for older participants; for accident insurance, the loss framing impact is 6% for younger and 22% for older individuals. The

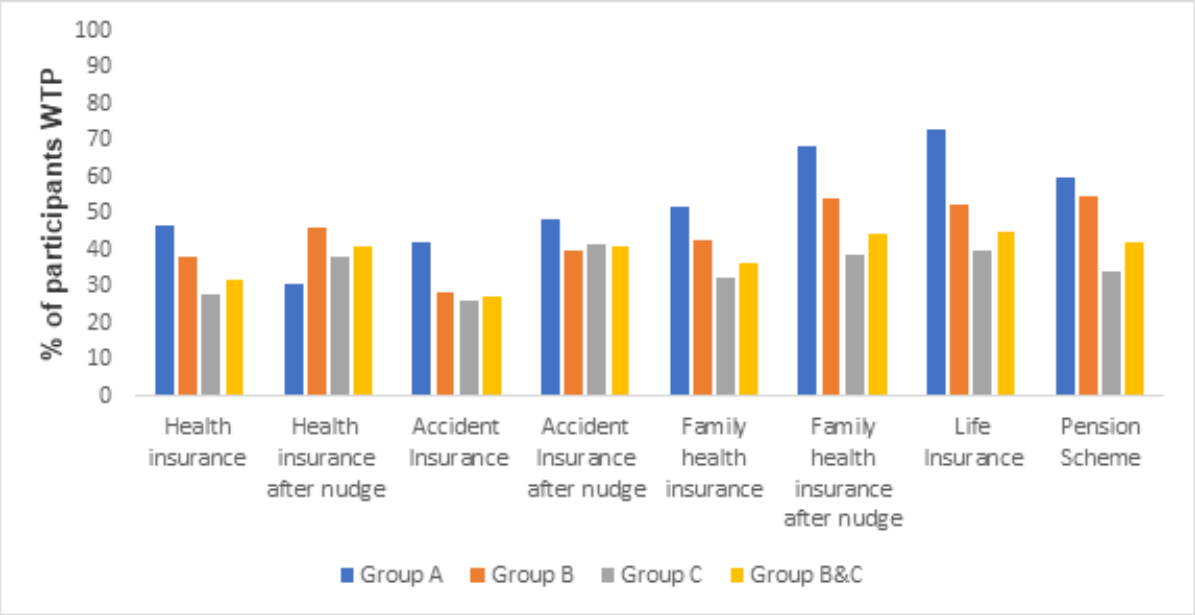

Figure 3.9 Shows the willingness-to-purchase percentage of the participants (y-axis) across the participant groups as a function of the various insurance options.

data support our hypothesis (H1), but they also demonstrate that the influence of loss framing depends on the insurance product. A 2-proportion test (Table 3.1) was used to assess the influence of loss framing on each insurance product and between the two age groups. For this analysis, the number of participants who had insurance before the mishap was subtracted from the total number of participants for the estimate.

The post-mishap effect was similar for the accident and individual health insurance options in both age groups. All other insurance options show a significant difference (at $a = 0.05$) as a function of age.

3.3.2 Risk Attitudes and insurance purchases

The responses to the DOSPERT questions (Financial – 6 questions and health – 3 questions) were analysed for risk attitude metrics. Each question was rated on a one-to-seven Likert scale, with seven being 'extremely likely. The Cronbach alpha to test for internal consistency across all questions was 0.75 (acceptable) for Group A, 0.86 for Group B (good) and 0.85 for Group C. From the between-group difference analysis (average score plot – Figure 4 left), statistical significance was only present for the risk scores for the financial scale between group A & B (Mann Whitney U test: z-score is 2.14207, p-value $= 0.03236$ at $p < 0.05$). But the distribution in the scores across participants was significant (Figure 4 right Box-Whisker plot). While Group C has near equal distribution to the median value, group A & B finance scales show a skew to the bottom quartile. Overall, the younger age group (A) show higher-risk attitudes, with middle-aged and lower income levels (group B) being the most risk-

Insurance	Correlation coefficients group A (P-value)	Correlation coefficients group B and C (P-value)	Correlation Coefficients Group B and C(P-value) with Loan
Individual Health Insurance	0.357(0.095)	0.281(0.364)	0.297(0.652)
Family Health insurance	-0.467(0.032)	-0.206(0.492)	0.335(0.601)
Accident Insurance	0.275(0.198)	0.911(0.023)	0.412(0.592)
Life insurance	0.326(0.161)	0.215(0.473)	0.517(0.416)
Pension Scheme	0.048(0.819)	0.224(0.472)	1.109(0.090)
Individual Health insurance after a mishap	0.164(0.563)	-0.137(0.676)	-0.376(0.587)
Family Health insurance after a mishap	0.265(0.240)	-0.197(0.544)	-0.608(0.371)
Accident insurance after a mishap	-0.618(0.010)	-0.270(0.415)	0.628(0.386)

Table 3.1 The P-value score of the Two-Proportion test for the two age groups and the insurance options.

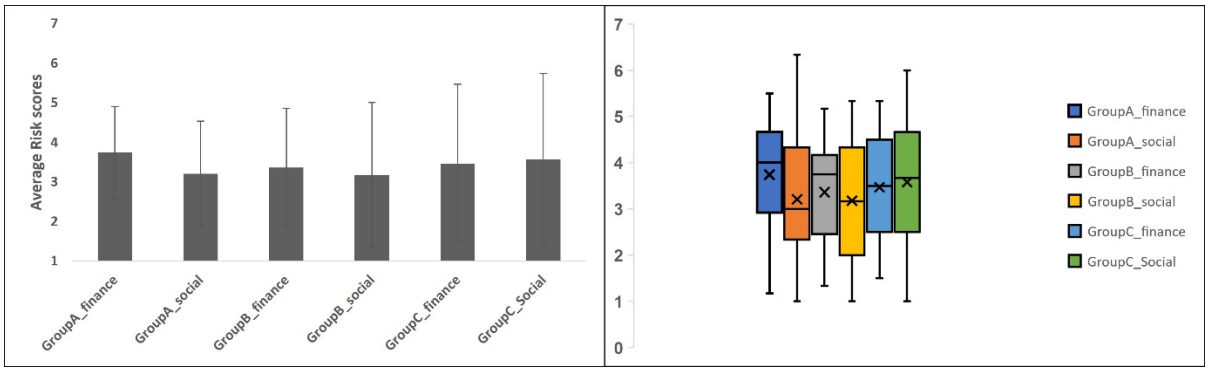

Figure 3.10 The average scores across all questions and participants (left) and the distribution (right plot) for the financial and social risk scale of the DOSPERT survey

averse. Though the social risk scale questions administered were only 3, it is interesting to observe the lower-risk scores in the younger group.

Logistic regression was applied to examine associations between risk-taking scores and willingness to purchase insurance for life insurance and pension plan. The average value of the risk survey response of each participant was taken as the variable. The participants in Group B/C self-disclosed loan responsibility in real life, which was considered in the analysis. The student-age population does not have loans in their names (parents or guardians usually pay the EMI); this data was not collected from Group A.

Panel data analysis was applied to investigate the correlation between taking risk-taking scores and willingness to purchase insurance, loans (groups B and C), and wealth level for time series data such as health insurance, accident insurance, and family health insurance, which are provided to participants twice before and after a loss.

Insurance option	Correlation coefficients group A (P-value)	Correlation coefficients group B and C (P-value)	Correlation Coefficients Group B and C(P-value) with Loan
Life insurance	0.326(0.161)	0.215(0.473)	0.517(0.416)
Pension Scheme	0.048(0.819)	0.224(0.472)	1.109(0.090)

Table 3.2 Shows the findings of a logistic regression used to determine a correlation between insurance options and risk traits for groups A & Group B/C (second and third column) and with loans for groups B and C combined (last column).

Insurance	Correlation coefficients group A (P-value) with wealth	Correlation coefficients group A (P-value) with risk score
Health insurance	0.3469(0.00)	0.0606 (0.716)
Family Health insurance	0.1234(0.030)	- 0.2827 (0.061)
Accident insurance	0.1206(0.041)	0.1763 (0.260)

Table 3.3 Shows the finding of panel data analysis to determine a correlation between insurance option, DOSPERT risk scores, and wealth level for group A for insurance option, which were asked multiple times to the participants.

Table 3.3 shows that health insurance, accident insurance, and family health insurance positively correlate with Group A's desire to buy insurance and wealth level. For all insurance alternatives, there is no statistically significant correlation between risk scores and willingness to acquire insurance for group A members.

According to Table 3.4, only accident insurance has a statistically significant ($p < 0.05$) positive correlation with risk scores for Group B and C (older participants), whereas health insurance has a statistically significant negative correlation with risk scores. The positive correlation shows that as risk-taking grows, so does insurance consumption, whereas the negative correlation shows that as risk-taking increases, insurance consumption decreases. This renders hypothesis H2 for accident insurance invalid while validating hypothesis H2 for health insurance. For all insurance alternatives for groups B and C, there is no statistically significant correlation between having a financial responsibility in the form of a loan and desire to purchase insurance, as well as wealth level and willingness to purchase insurance.

3.4 Discussion

We studied participants' willingness to purchase insurance using a novel paradigm. Setting the context mimicking real-life events with complete information, allowed us to examine the decision-making process for each choice. An immersive or engaging simulator with feedback is an advantage over survey-based responses. For ecological validity, the selected events and information (framing) presented were

Insurance	Correlation Coefficients Group B and C(P-value) with wealth	Correlation coefficients group B and C (P-value) with Risk score	Correlation Coefficients Group B and C(P-value) with Loan
Health insurance	- 0.0781(0.273)	- 0.3305 (0.022)	0.0185 (0.952)
Family Health insurance	0.0742(0.187)	- 0.0644 (0.642)	0.2872 (0.332)
Accident insurance	- 0.0234(0.694)	0.2915 (0.046)	0.3850(0.212)

Table 3.4 : Shows the finding of panel data analysis to determine a correlation between insurance option, DOSPERT risk scores, loan and wealth level for groups B and C for insurance options which were asked multiple times to the participants.

familiar to the participants. Second, data from a more comprehensive age range, especially the 30 – 50 year age group, is novel as most studies focus on 60+ age groups (Chulis et al.,1993; Hadley et al., 2006; Dor et al., 2006) or university students (Price et al., 2010; Adegboyega et al.,2020; Gupta, 2021). The 30-50 year cohort is critical to the insurance industry as it comprises participants in the workforce with varied education levels, salaries, family responsibilities, loans, and financial prospects. A comparative analysis of age, financial prospects, and behavioral aspects like individual risk attitude in insurance (Corcos et al., 2020) have not been extensively studied; hence the findings from our study are a significant contribution. The main observation was the differential responses as a function of the insurance product; savings products like life (endowment or whole life policy) and pension fared better as they are perceived as investment choices than health and accident insurance products.

3.4.1 Age, personal risk attitudes and Willingness to Purchase

It is interesting to observe that WTP is a function of the type of insurance and the subjective perception of risk or threat weighted by age and financial status in real-life. The younger population (group A) without immediate family responsibilities are inclined to purchase insurance products. We can attribute the group's potential financial prospects and hence prospective affordability or acceptance of all insurance products due to minimal real-life experiences to realise the implications of the choices. The differences between age-matched groups B & C are of interest, where financial prospects, income and education dominate decision-making. The lower uptake in the two groups can also be attributed to misperceptions, optimism about the future, and financial stability overconfidence (Bonsang & Costa-Font, 2020)

The mean values of the risk scores from the self-report DOSPERT Survey were slightly higher for the younger group. Group A (university student cohort), with lower risk-aversion, show a higher WTP for all insurance categories supporting the findings (Hanna & Lindamood,2004). This contrasts with the hypothesis that younger age groups have a sense of longevity and hence do not consider accidents or health insurance (Stroud et al.,2015). The result cannot be explained by classical expected utility

theory, but as Eling et al. (2021) suggested, it could be due to not fully understanding the risk transfer mechanism. Group B, with higher risk aversion scores than the age-matched cohort (group C), shows higher WTP, implying that lower salary, education levels, and financial prospects lead to savings (whole life and pension) and health/accident insurance investment. The finding contrasts studies (Mitchell & Curto,2010; Delafrooz & Paim,2011; Kakar & Shukla,2010; Giesbert et al., 2011), which proposed that WTP is directly proportional to education, financial literacy, income or risk-aversion (Hwang,2015). Group B also show an inclination for pension plans which can be attributed to financial protection by incremental investment to cover their post-retirement and ensure family protection. Group C, with better economic and education (compared to Group B), show the least WTP for all insurance products and pension plan. Furthermore, for groups B and C members who are tax-paying citizens, life insurance is frequently viewed as a risk-free form of tax-deferred investing (Hecht & Hanewald,2010).

The influence of loss aversion on insurance demand might also interact with narrow framing and subjective probability (Guttman et al., 2021; Gottlieb & Mitchell, 2020) for group B. People with narrow frames are those whose preferences consider both consumption smoothing and gain-loss utility from prospect theory (Gottlieb & Mitchell,2020). While consumption smoothing increases insurance demand for risk-averse individuals, a concavity of gain-loss utility function leads to a negative correlation between risk aversion and insurance consumption, which could explain why risk aversion is negatively correlated to family health insurance. The non-student participant set also mentioned having personal loans in real life, though, as per our analysis, it does not seem to affect insurance choices significantly. While loans and the EMI one pays in real life determine purchasing insurance plans, the participants may have considered only the information provided in the application.

Analysing each insurance product, we notice that in the older population group (B&C), a positive and significant correlation value with risk attitude is observed for accident insurance and a negative significant correlation for health insurance. The findings support studies (Charness & Jackson, 2009) that reported that increased responsibility leads to increased risk aversion.), a positive and significant correlation value with risk attitude is observed for accident insurance and a negative significant correlation for health insurance. (Barseghyan et al.,2018; Collier & Ragin, 2019) – wherein the older population underestimate health and over-estimate accidents.

Overall correlation with risk attitudes shows no significant associations with insurance purchase, as Liebenberg et al. 2012 (life insurance) reported. Support can also be found in the work of (Giri et al., 2021; Dickinson Gerry, 2000; Landmann et al., 2012), who claim that savings may be a more critical defining factor in insurance consumption than risk attitudes, and the return on life insurance is equally appealing to people with a varying willingness to take the risk. The study by Charness et al.,2020 also found that risk attitudes tested in the lab are not related to risk-taking in the field, calling into question the application of the same to understand decision-making under risk and uncertainty. It is also possible that the domain-specific risk-taking scale poses hypothetical questions rarely encountered by the participants recruited for this study, hence a cultural factor weighing in.

The differential behaviour observed in our study in contrast to previously reported works can also be due to the modality used for presenting the choice architecture, including all insurance products presented with a context similar to real-life events.

3.4.2 Framing effect

Overall the loss framing effect is evident for the three insurance products. In the younger, the loss framing is ineffective only for individual health insurance (figure 3.9). The finding validates our hypothesis (H1) and is supported by theories on loss framing (Mcevoy,2016; Levin et al.,1998). In the case of health insurance, young participants are generally healthy and rarely experience health scares (Murphy, T.,2016), so the effect of loss framing is limited. On the other hand, older participants have health problems and encountered loss, so the effect of loss framing is more significant. In the case of accident insurance, both age groups show an increase in insurance consumption, with the older participants showing a more significant rise because the overall cost due to accidents includes loss of pay in older participants and more likely to be severely injured (Kahane, C. J., 2013). In family health insurance, the 2-proportion test reveals that the loss framing effect was comparable across age categories, owing to the similar impact of loss across all groups.

In summary, according to expected utility theory (Bernoulli, 1954; Von Neumann & Morganstern, 1947), individuals purchase insurance products when they know they would suffer a loss because they are risk averse to changes in their financial situation. Some studies show that risk increases insurance consumption (Eling et al., 2021; Luciano et al.,2016), while others show the opposite when uncertainty is a factor (Lambregts et al.,2021). However, as can be inferred from the results of our study, choices are not unconditional, with product offerings playing an important role. When the information/situation is presented as inevitable loss, participants are risk averse, an essential component of prospect theory (Kahneman & Tversky,1979; Slovic et al., 1977).

Chapter 4

Conclusion

In this thesis, we have examined various aspects of insurance demand. We were primarily interested in understanding consumer behaviour related to insurance purchase decisions. In the first study, we investigated the influence of wealth level on insurance consumption behaviour. Studying the correlation between wealth and insurance in behavioural economics can provide insights into the factors influencing individuals' decision-making and help insurers develop more effective products and communication strategies to promote risk management and financial stability. Several studies have been conducted to determine the relationship, but they are theoretical, and there is little empirical evidence. This study uses a game application to generate uncertainty similar to real life using a dice-rolling experiment. The dice value was random, and players were asked to predict the value; if they guessed correctly, they were rewarded; if they guessed incorrectly, an amount was subtracted from the initial sum. This corresponds to real-life situations where unforeseen wins and losses are expected. To cover the unwanted loss, an insurance option was offered.

The participants of the experiments are students of IIIT Hyderabad aged between 18 and 25 years. Studying the insurance consumption of university students can provide insights into the needs of a specific demographic and help insurers tailor their products to meet those needs better, promote financial literacy, and advance research in the field. We found a nonlinear correlation between wealth and insurance consumption, which increases with increasing wealth and reaches a threshold after which a negative correlation is observed.

Rather than concentrating on absolute wealth, future research should investigate repeating the technique utilised in this study, which used a change in net worth to predict insurance usage.

In the second study, we used a game-like application to determine how various behavioural characteristics, such as risk tolerance and the incentive to purchase insurance in the form of loss framing, affect the decision to purchase insurance. The focus was on two groups of participants: first, university students aged 18 to 25 with no income, and second, working-class people aged 35 to 55. In the experiment, actual events are used to create uncertainty. Participants are presented with unexpected losses, such as medical bills, hospital expenses, and home repairs, and unexpected gains, such as the sale of a property by relatives and a Diwali bonus. The main finding of the experiment was that the effect of loss framing on insurance consumption depends on the particular insurance policy, even if participants

are aware of the loss. Another important finding is that general insurance policies significantly correlate with risk-taking, while investment insurance policies such as life insurance and annuities show an insignificant relationship with insurance consumption. The three participant groups studied were college students and older participants with family responsibilities, broken down by annual income and education. The results show that insurance options influence the effect of loss framing on insurance purchases. The correlation with risk attitude was insignificant for investment products such as life insurance. Health and accident insurance showed a negative correlation with risk attitude for younger participants, while a positive correlation with accident insurance was observed for older participants. The results highlight the role of age, income, and risk attitude on the function of insurance products. Importantly, they show a correlation between age and the goals of the effect heuristic of framing. The age-wise differential choices on insurance types constitute a significant contribution. Laboratory experiments on insurance purchases have been on university students, and non-academic analysis is focused on ages 50 and above. The working adult age with responsibilities is an important segment to understand as potential customers.

The main goal of these two studies is to examine how data can be collected using two different methods, one using a survey and the other using a game-like application. We found that collecting data from survey results can lead to dishonest responses, misunderstandings, and errors in interpretation, among other things. Specific questions are difficult to analyse; respondents may have hidden motivations; there is a lack of customisation; accessibility difficulties; for specific individuals, the survey may be perceived as too long and contain irrelevant questions, leading to data noise.

Gaming applications can provide a more authentic and ecologically valid context for studying insurance consumption behaviour. Traditional surveys often rely on self-reported data, which may be subject to biases, such as social desirability bias or recall bias. In contrast, data collected from gaming applications can capture actual behaviours and decision-making in real-time as participants engage with insurance-related scenarios within the game. This can provide more accurate and reliable insights into their insurance consumption behaviour without relying solely on self-reporting. Moreover, Gaming applications can provide rich behavioural data that can capture various aspects of insurance consumption behaviour, such as decision-making processes, choices, and engagement patterns.

In summary, the two experiments were designed to understand factors such as wealth level, risk perception, and loss framing on insurance. We look at different age groups, economic statuses, and education levels. Though the findings are from controlled lab experiments, the results can be directly extrapolated or modeled to predict human behaviour in real-life situations.

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