DETERMINANTS OF THE SOLVENCY OF LIFE INSURANCE COMPANIES IN NEPAL

A Dissertation submitted to the Office of the Dean, Faculty of Managemen t in partial fulfillment of requirement for the Master's Degree

By

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CERTIFICATION OF AUTHORSHIP

I hereby corroborate that I have researched and submitted the final draft of dissertation entitled "**DETERMINANTS OF THE SOLVENCY OF LIFE INSURANCE COMPANIES IN NEPAL**". The work of this dissertation has not been submitted previously for the purpose of conferral of any degree nor has it been proposed and presented as part of requirements for any other academic purposes. The assistance and cooperation that I have received during this research work has been acknowledged. In addition, I declared that all information sources and literature used are cited in the reference section of the dissertation.

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March 2024

REPORT OF RESEARCH COMMITTEE

Ms. Reeya Rajak has defended a research proposal entitled "**DETERMINANTS OF THE SOLVENCY OF LIFE INSURANCE COMPANIES IN NEPAL**", successfully. The research committee has registered the dissertation for further progress. It is recommended to carry out the work as per suggestions and guidance of supervisor Dhan Raj Chalise and submit the thesis for evaluation and viva voce examination.

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APPROVAL SHEET

We have examined the dissertation entitled "**DETERMINANTS OF THE SOLVENCY OF LIFE INSURANCE COMPANIES IN NEPAL**" presented by Reeya Rajak Management for the degree of Master of Business Studies (MBS).We hereby certify that the dissertation is acceptable for the award of degree.

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Any remaining errors are mine.

Reeya Rajak

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ABBREVIATIONS

ANOVA	:	Analysis of Variance
CR	:	Claim Ratio
FSZ	:	Firm Size
IFRN	:	Inflation Rate
INV	:	Investment
LEV	:	Leverage
LIC	:	Life Insurance Corporation
LIQ	:	Liquidity
Nepal ALIC	:	Asian Life Insurance Co. Ltd.
NLIC	:	Nepal Life Insurance Co. Ltd
NLICL	:	National Life Insurance Co. Ltd.
PRO	:	Profitability
S.D	:	Standard Deviation
SDC	:	Shanker Dev Campus
SJLIC	:	Surya Joti Life Insurance Company
SOL	:	Solvency
SPSS	:	Statistical Package for the Social Sciences
T.U	:	Tribhuwan University
TD	:	Training and Development

ABSTRACT

The objectives of study are to examine the current status factors determining solvency of life insurance companies in Nepal, to examine the relationship between leverage, investment, liquidity, claim ratio, profitability, inflation, firm's size and solvency of Nepalese life insurance companies and To analyze the impact of leverage, investment, liquidity, claim ratio, profitability, inflation, firm's size to the solvency of Nepalese life insurance companies. The independent variables of research are leverage, investment, liquidity, claim ratio, profitability, inflation and firm's size. The dependent variables of research are solvency ratio. The research conducted using the descriptive and casual comparative research design. The sample of the research five life insurance companies on the basis of the availability of the data for previous ten years. Population are all the insurance companies running in Nepal. The research conducted financial analysis or called descriptive analysis for achievement of the result of objectives one. The objective second and third are find out from the statistical analysis of correlation and regression analysis. The finding of the research are the minimum, maximum, mean and standard deviation of the given table shows the different in the minimum and maximum. The high different in the mean and minimum and maximum. The standard deviation also seem high. On the basis of the given truth the current status of the given each of the variables are fluctuating in nature. The relationship of leverage and firm size is significant to the solvency ratio and investment, liquidity, claim ratio and profitability is not significant relationship to the solvency ratio. The impact of the leverage and claim ratio have significant to the solvency ratio. The impact of investment, liquidity, profitability, firm size and inflation rate have not significant impact to the solvency ratio.

Keywords: Solvency, Investment, Liquidity, Profitability, Firm Size and Inflation, Leverage and Claim Ratio

CHAPTER-I

INTRODUCTION

1.1 Background of the Study

Solvency represents a company's capacity to fulfill its long-term financial commitments, serving as a gauge of its financial well-being and its ability to sustain operations in the foreseeable future. Investors often employ ratios to assess solvency. Recently, there has been an increased emphasis on examining the solvency of insurance firms due to heightened competition within the industry. Company management, along with shareholders, employees, and policyholders, are motivated to ensure the company's continuity, bolster its reputation, and mitigate risks. This focus has prompted regulators to pay closer attention to the financial standing of insurance companies. Consequently, there is a need to explore the factors influencing the solvency of insurance companies in Palestine and to understand the nature and strength of the relationship between these factors and solvency (Affolter at al., 2009).

Solvency portrays the ability of a business (or individual) to pay off its financial obligations. For this reason, the quickest assessment of a company’s solvency is its assets minus liabilities, which equal its shareholders’ equity. There are also solvency ratios, which can spotlight certain areas of solvency for deeper analysis. Many companies have negative shareholders’ equity, which is a sign of insolvency. Negative shareholders’ equity insinuates that a company has no book value, and this could even lead to personal losses for small business owners if not protected by limited liability terms if a company must close. In essence, if a company was required to immediately close down, it would need to liquidate all of its assets and pay off all of its liabilities, leaving only the shareholders’ equity as a remaining value (Caporale et al., 2017).

It is typical for newly established private companies, startups, or recently listed public companies to have negative shareholders' equity on their balance sheets. As a company matures, its solvency position generally strengthens. However, certain occurrences can heighten solvency risks, even for well-established companies. For instance, the impending expiration of a patent can jeopardize solvency by enabling competitors to manufacture the

product, leading to a loss of associated royalty income. Additionally, regulatory changes that directly affect a company's ability to conduct business can pose further risks. Both businesses and individuals may encounter solvency challenges if they face significant legal judgments following lawsuits (Dhaene et al., 2017).

When delving into solvency analysis, it's crucial to consider various measures employed for managing liquidity. While solvency and liquidity are distinct concepts, it's often prudent to evaluate them in tandem, especially during instances of insolvency. A company may be insolvent yet continue to generate consistent cash flow and maintain stable levels of working capital. Given that insurance companies constitute significant components of the economic framework in Palestine, safeguarding the insurance sector is integral to the overall economic stability. Therefore, it becomes imperative to scrutinize the financial standing of these companies and their efficacy in fulfilling their obligations as they mature, a concept referred to as financial solvency (Daykin et al., 1984).

Insurance serves as a safety net for unforeseen circumstances. It involves a contractual arrangement between an insurer and an insured individual, wherein the insurer guarantees compensation for losses resulting from specific causes within a specified period, in exchange for a premium. Life insurance, for instance, offers financial security to a family in the event of the insured individual's untimely death, or provides a lump sum amount upon reaching old age when earning potential diminishes (Cummins, Rubio & Vencappa, 2017). Life insurance offers more than just protection; it also serves as an investment avenue where a portion of the sum assured is payable to the insured upon death or at the end of a specified term. This arrangement hinges on principles of utmost good faith and insurable interest. Insurance, in essence, functions as a mechanism to mitigate financial losses by shifting the risk of loss from one party to another. Governments have also undertaken measures to encourage investment in life insurance products.

The world is inherently fraught with risk, as the future remains uncertain, giving rise to various uncertainties. No occupation or endeavor is immune to risk in human life. Before engaging in any activity, individuals must contend with the possibility of failure or adversity in the future. As rational beings, humans are naturally apprehensive about risk and aspire to secure both their present and future lives. The evolution of human consciousness has

introduced methods and systems to safeguard against future uncertainties, with insurance being one such avenue. Given the ever-changing landscape of uncertainties that each new day brings, it's imperative to be well-prepared to navigate life's challenges. Insurance offers stability and resources to shield individuals from the unpredictable risks encountered in daily life. In the quest for a country's development, the presence of robust financial and capital markets is deemed essential. Both government entities and individual firms play pivotal roles in these markets by investing resources into recognized sectors such as productive industries and finance, with the expectation of reasonable returns (Browne & Hoyt, 1995).

Insurance companies stand as significant players among various financial institutions and intermediaries. The comprehensive and rapid advancement of a nation can only be achieved when competitive insurance services are accessible in every corner of the country. Within the framework of every economy, insurance companies hold a crucial position. They offer assurance to industries, businesses, and capital, facilitating the development of industries, trade, and business by investing the funds collected as premiums (Rauch & Wende, 2015). Insurance companies have the capacity to offer financing for various sectors including industry, government, and individuals. They extend different financial services tailored to their specific investment policies, which are aligned with their corporate objectives and the nature of their insurance business lines.

1.2 Problem Statement

The research aimed to explore the factors influencing the solvency of life insurance companies in Nepal and to elucidate the nature and strength of the relationship between liquidity, investment, leverage, claims, and solvency in this sector. To fulfill these objectives, the study employed descriptive and quantitative analysis methods. By analyzing financial data from five life insurance companies (selected from a total of 14) and utilizing panel data regression with fixed effects for the period spanning from 2012/13 to 2021/22, the research revealed that claims exert a positive impact on financial solvency, while leverage has a negative effect on solvency in the Nepalese insurance industry. However, investment and liquidity were found to have an insignificant effect on financial solvency (Bajracharya & Amin, 2012). Specifically, this study is connected to search answer of the following questions related to the determinants of the solvency of life insurance companies in Nepal:

1. What are the current status of determinants of solvency of life insurance companies in Nepal?
2. How is solvency of Nepalese insurance companies related with investment, leverage, liquidity, claim, profitability, inflation and firm's size related variables?
3. Is overall effect of investment, leverage, liquidity, claim, profitability, inflation and firm's size related variables significant on solvency of life insurance companies in Nepal?

1.3 Objectives of the Study

Each research endeavor comes with its set of goals. While this study encompasses numerous objectives, its primary aim is to identify the factors influencing the solvency of life insurance companies in Nepal. The detailed objectives of this investigation are articulated as follows:

1. To examine the current status factors determining solvency of life insurance companies in Nepal.
2. To examine the relationship between leverage, investment, liquidity, claim ratio, profitability, inflation, firm's size and solvency of Nepalese life insurance companies.
3. To analyze the impact of leverage, investment, liquidity, claim ratio, profitability, inflation, firm's size to the solvency of Nepalese life insurance companies.

1.4 Hypothesis of the Study

When formulating hypotheses, the primary objective is to determine the presence of a significant impact between each independent variable and the dependent variable. Additionally, the goal is to evaluate the combined significance of the independent variables on the dependent variable. The hypotheses are structured as follows:

Financial leverage rise raises insurance businesses' risk exposure (Carson & Hoyt, 1995). To a certain point, growth in leverage is advantageous to the Company, but beyond that point, it increases the likelihood of financial issues (Chen & Wong, 2004). High force makes it difficult for insurance companies to meet capital needs cheaply (Ilyas & Rajasekaran, 2019). (Shiu, 2005) revealed a negative correlation between financial leverage and solvency in the non-life insurance market in South Africa.

H_1: There is significant negative relationhsip of Leverage Ratio on Solvency of Life Insurance Companies in Nepal.

A noteworthy positive correlation between investment and solvency was identified in alignment with the findings of Yakob et al. (2012). Consequently, the rejection of the notion that investment exerts a significant negative impact on solvency in insurance companies listed in PEX was warranted. In light of these results, the researcher recommends that Palestinian insurance companies increase their investments as a strategy to improve their solvency position.

H_2: There is significant positive relationship of Investment on Solvency of Life Insurance Companies in Nepal.

Jawad and Ayyash (2019) found that there is a positive relation between liquidity and solvency, but both of Abdel Jawad, & Ayyash, (2019) and Shiu, (2005), found liquidity had no impact on solvency.

H_3: There is significant negative relationship of Liquidity Ratio on Solvency of Life Insurance Companies in Nepal.

The solvency of insurance companies listed on PEX is notably influenced by claims, demonstrating a significant positive impact. This positive influence can be rationalized through the escalation in the ratio of claims paid to equity. This, in turn, contributes to the augmentation of total liabilities to total assets, thereby enhancing the overall solvency of these insurance companies (Jawad, & Ayyash, 2019).

H_4: There is significant positive relationship of Claim Ratio on Solvency of Life Insurance Companies in Nepal.

Caporale et al. (2017) The investigation reveals a significant impact of profitability on insolvency within insurance companies. Notably, another study corroborates these findings by identifying a negative correlation between profitability and solvency.

H_5: There is significant positive relationship of Profitability Ratio on Solvency of Life Insurance Companies in Nepal. Inflation is a widespread economic occurrence worldwide. A rise in inflation tends to lead to a reduction in the company's revenue. With Tabaru's fund administration, both participant claims and insurance management charges escalate. If the

participant's share, augmented by insurance administration expenses, surpasses the insurance income, or if there is a deficit in Tabarru's underwriting fund, it will affect the company's revenue. This situation results in a decrease in profit-sharing compared to the previous scenario, leading to a decline in participant confidence in the company when income decreases (Zein et al., 2017).

H_6: There is significant negative relationship of Inflation on Solvency of Life Insurance Companies in Nepal.

In this context, the term "firm size" pertains to the dimensions of the insurance company and represents a factor influencing the efficiency of Nepalese insurance companies. A smaller company is more likely to demonstrate increased efficiency in converting input into output (Islam et al., 2013). Big companies typically have superior resources, cheaper transaction costs, and excellent resistance to competition and economic shock. In other words, large firms or firms with substantial assets are typically more efficient (Surifah et al., 2011).

H_7: There is significant positive relationhsip of Firm’s Size on Solvency of Life Insurance Companies in Nepal.

1.5 Rationale of the Study

Insurance services thrive in developing nations like Nepal, boasting a total of 40 insurance companies within its borders. This comprises 20 general insurance companies, 19 life insurance companies, and one engaged in reinsurance. The viability of life insurance companies is evident, as they can easily amass substantial funds, exceeding a billion, without encountering significant challenges. This attractiveness has led foreign life insurance companies to establish branches in Nepal. However, despite the proliferation of insurance companies, their focus primarily on urban areas and major cities results in intense competition for market share, with little emphasis on issuing new policies and exploring potential markets.

These companies seem content with their existing market positions, refraining from venturing into new and promising sectors to invest their funds for greater returns. Consequently, their investment practices are often limited to traditional sectors. This scenario

necessitates a fresh examination of the determinants influencing the solvency of life insurance companies in Nepal.

Such a study is imperative to elucidate the factors influencing the solvency of the Nepalese life insurance industry, emphasizing the need for prudent mobilization of collected funds. Evaluating the current conditions of Nepalese life insurance companies is crucial, shedding light on the utility of life insurance in the local context. The study zeroes in on the life insurance market and solvency in Nepal, aiming to identify weaknesses and propose improvements in fund management, insurance policies, and investment strategies.

Given the evolving landscape of insurance in Nepal, characterized by increased competition due to liberal economic policies, private insurance companies are engaging in aggressive and competitive practices. This competition has prompted a need for efficient management, albeit with the trade-off of reduced premium rates. While the decrease in rates poses the potential challenge of shrinking profit margins, it simultaneously serves as a means to engage and inform the public about the current state of insurance companies in Nepal. This dynamic backdrop underscores the importance of this study, positioned at the core of the life insurance system, as it delves into the factors determining solvency, offers insights into policy weaknesses, and proposes avenues for improvement.

1.6 Limitations of the Study

The objective of this study is to uncover the realities and patterns associated with investment policies in the life insurance sector of Nepal. Consequently, the scope is confined to life insurance companies functioning within the country. Every research endeavor inherently has its constraints, and this study is no exception. These limitations are recognized as the boundaries that define the scope of the research and are acknowledged as the study's limitations. The limitations of the study are:

a. The whole study is deal with 5 life insurance Company’s solvency position and factors determining solvency as there is 14 LIC’s in Nepal.
b. This study is concentrated in determinants of solvency from sample companies and the data will be collected from Insurance Board (Beema Samiti), Nepal stock exchange, respective insurance company and website at www.bsib.org.np, www.nepalstock.com.np, official websites of sample life

insurance companies and other sources. Research based on secondary data is not far from the limitation to inherent character.

c. The study is concern at least ten year's period data from year 2012/13 to year 2021/22 and conclusion drawn confines only to the limit duration.

CHAPTER-II

LITERATURE RERVIEW

The literature review within a research thesis succinctly synthesizes existing scholarship on the topic, highlighting key themes, methodologies, and gaps. It critically evaluates the credibility of sources and identifies areas where the research contributes novel insights. By contextualizing the study within the broader scholarly discourse, the literature review establishes the significance and relevance of the research, guiding the reader towards understanding its objectives and potential contributions.

2.1 Theoretical Review

Insurance essentially involves the redistribution of risk. To illustrate, let's envision a hypothetical insurance company with a hundred clients, each owning a single commercial building valued at Rs.1 million (although in reality, such a company would be unrealistically small). Actuaries, who are skilled applied mathematicians and statisticians, assess the likelihood of each client experiencing a total loss in a given year. In practice, these assessments would cover various levels of loss.

Suppose the actuaries determine that each client has a 1 percent chance of facing a total loss. The insurance company could theoretically take the Rs.3 million premium payments received and simply store them in a safety deposit vault. However, this would be unwise, as there are viable investment opportunities to grow the funds. Investing the premiums serves two beneficial purposes: it enhances the insurance company's profits and allows for a reduction in premium amounts, thereby increasing the attractiveness of its policies to clients.

Insurance companies have the option to invest in the stock market, and indeed, many do. However, relying solely on stock market investments is deemed too risky due to its cyclical nature, fluctuating between high bull market returns and significant bear market losses. To ensure a high degree of certainty that they won't incur unsustainable losses in any given year, insurance companies limit the proportion of their investment portfolios allocated to stocks. In the case of life insurance companies, stock market investments typically constitute around 5 percent of their total holdings, while property and casualty insurance companies usually

allocate approximately 30 percent of their holdings to common stocks. Bonds, on the other hand, are favored for their more predictable future cash flow, despite offering lower average returns compared to the long-term returns of the stock market.

The primary objective of this literature review is to examine existing literature on the investment policies of life insurance companies in Nepal, drawing information from commercial studies, various publications, journals, newspapers, and books. This process, known as a literature review, involves studying diverse materials related to the chosen research topics to gain insights and general knowledge about the subject matter. Numerous experts, authorities, and master's degree students have conducted various researches in the insurance business domain. However, only a limited number of these studies are dedicated to the investment aspect of insurer and insurer business. Despite the abundance of research in the insurance field, there is a noticeable gap in the literature regarding investment policies. Consequently, this study represents a worthwhile and fitting attempt to address this particular aspect.

Solvency indicators for insurers are primarily delineated in relation to capitalization, with the solvency margin serving as a proxy for the insurer's solvency. This margin is calculated by dividing available capital by total assets, as previously mentioned. Consequently, our hypotheses are largely formulated based on capital structure theories. Two principal theories may influence insurers' capital structures. The trade-off theory asserts that maintaining a capital buffer is advantageous as it helps insurers mitigate the costs of financial distress in the face of relevant losses in the portfolio. Simultaneously, the utilization of financial debt offers the primary benefit of tax reduction. Additionally, the interplay between financial debt and technical provisions is a key consideration in the various trade-offs that shape the capital structure of insurance companies (Dhaene et al., 2017). Decreasing financial debt, while keeping other variables constant, has the advantage of expanding the scope of insurance business for an equivalent investment in the securities portfolio. Furthermore, the additional provisions typically qualify for tax deductions (Bradford & Logue, 1999). Jensen and Meckling (1976) introduce ‘agency costs’ as another potential source of costs and benefits to consider when firms are choosing the optimal capital structure.

Insurers face two primary forms of agency costs: conflicts of interest between owners and policyholders, and conflicts between owners and managers. Considering this, the most suitable capital structure for an insurance company may hinge on the prevailing type of conflict. Lower capitalization tends to alleviate the owner–manager conflict, while higher capitalization helps mitigate the owner–policyholder conflict (De Haan & Kakes, 2010). In contrast, the pecking order theory of financing (Myers & Majluf, 1984). The assertion is made that the presence of information asymmetries between managers and investors increases the cost of external financing compared to internal financing. Consequently, companies might prioritize financing through internal funds and debt over issuing new equity. Nevertheless, it is essential to examine specific considerations in the context of insurance companies. Firstly, insurers predominantly invest in financial securities, as they are not obligated to finance significant inventories or accounts receivables. Consequently, it is reasonable to anticipate fewer financial deficits in insurance firms, assuming all other factors remain constant (Dhaene et al., 2017). Second, because insurers are subject to asymmetric information in liabilities (Zhang et al., 2009), given that financial debt is subordinate to policyholder claims, investors may perceive this type of debt as risky. Accordingly, the pecking order theory within insurance companies foresees limited utilization of financial debt, resulting in a heightened reliance on internal funds by these firms.

Every company possesses assets and liabilities, using its assets to meet obligations during crises. When a company's assets equal its liabilities, meeting obligations is straightforward. However, a sudden increase in liabilities can lead to insolvency, a precarious situation. To address this, the concept of solvency margin becomes crucial. This study examines the solvency ratios of five life insurance companies in India over the three-year period from 2009-2010 to 2011-12. The research aims to determine whether the performance of these companies is similar or exhibits significant differences. Additionally, the paper ranks the companies based on their solvency ratios.

Factors influencing insurer capitalization fall into two main groups. The first group comprises determinants unique to each insurance company, including size, profitability, and reinsurance utilization, risk profile of the asset portfolio, underwriting risk, long-tailed business, organizational structure, and specialization. Most of these determinants result from

managerial decisions. The second group of determinants comprises factors relating insurers' capital to the industry structure and to the macroeconomic environment, such as industry concentration, interest rates and economic growth (Yakob, Yusop, Radam & Ismail, 2012)),.

Firm Size

Sharpe and Stadnik (2007) find that financially distressed insurers are typically small in size. Because the average losses for a larger pool of policyholders may be more easily predictable, larger insurance firms may have lower default probabilities with the same amount of capital (De Haan & Kakes, 2010). Additionally, larger insurers may need less capital than smaller firms because they normally benefit from economies of scale and scope and have lower financing costs (Caporale et al., 2017). De Haan and Kakes (2010) and Cheng and Weiss (2013), among others, find that size is negatively and significantly related to insurer capitalization.

Profitability

The empirical literature on insurance firms concludes that higher profitability contributes to higher levels of capitalization and lower probabilities of insolvency (Rauch and Wende, 2015). Shim (2017) according to the findings, in line with the pecking order theory, the level of profitability is a crucial factor influencing an insurer's capacity to augment capital. This suggests that insurers tend to heavily depend on retained earnings, as external financing is deemed expensive due to the presence of asymmetric information. Rauch and Wende (2015) state that an insurer's profitability positively influences the company's equity and solvency because premium and investment income exceeds claims and other expenses. In the same vein, Caporale et al. (2017) report that highly profitable insurers are less likely to become insolvent because they manage expenses effectively and can set competitive premium rates.

Reinsurance

According to the renting capital hypothesis, reinsurance serves as a substitute for equity because the cost of renting capital from reinsurers may be lower than the cost of issuing extra equity (Dhaene et al., 2017). That reinsurance allows insurers to transfer part of its risk to third parties results in more predictable future losses and, consequently, a reduction in its capital reserves (Caporale et al., 2017). Moreover, reinsurance enables primary insurers to have sufficient risk capacity for planning and pricing new business lines (Upreti & Adams,

2015). Nevertheless, although reinsurance is widely used by insurance firms to reduce capital requirements, it exposes them to counterparty risk potentially resulting in insurers with higher probabilities of default. Nevertheless, most of the empirical evidence shows an inverse relationship between the use of reinsurance and the insurer's capitalization (Cheng & Weiss, 2013).

Risk profile of the asset portfolio

Most studies report a positive relationship between the risk of the asset portfolio and capitalization for insurance companies (Bradford & Logue, 1999; Manka & Belgacem, 2016; Rauch & Wende, 2015). Cheng and Weiss (2013) provide several reasons to explain this positive relationship. First, higher capital may help insurers prevent financial distress costs. Second, insurers will raise capital to offset policyholders' awareness of insolvency when increasing risk taking. Third, agency costs also lead to a positive relationship between risk and capital if managers compensate for increases in risk by holding higher capital buffers.

Underwriting risk

Underwriting risk captures, the risk on the insurance portfolio (De Haan & Kakes, 2010), reflecting the amount and types of business that the insurer underwrites each year (Cheng & Weiss, 2013). Hence, while asset risk primarily encompasses the risk related to bond defaults and fluctuations in stock prices (pertaining to the investment portfolio), underwriting risk pertains to the possibility that the payments for losses will exceed the anticipated losses factored into the premiums collected from policyholders. Employing a similar logic as in the asset risk hypothesis, one could anticipate a positive correlation between underwriting risk and insurer capitalization. Empirical literature supports this positive relationship. (Cheng & Weiss, 2013).

Long-tailed business

Insurance lines characterized by a prolonged time gap between policy issuance and claims settlement, commonly referred to as long-tail lines, might adversely impact insurer solvency. This is attributed to the tendency of such lines to generate less underwriting income compared to shorter-tail lines (De Haan & Kakes, 2010). Moreover, engaging in longer-tailed business means that managers have extended control over policyholder funds, increasing the likelihood of mismanagement. This extended control raises the risk of more pronounced

owner–manager conflicts, consequently leading to elevated agency costs. Owners may alleviate this conflict by reducing capital and escalating leverage (Berry, Koissi & Shapiro, 2010).

Organizational form

The ownership structure stands out as a potential factor influencing an insurer's solvency margins. Following the logic of agency costs, it could be anticipated that mutual insurance companies would maintain lower capital levels compared to stock companies, as mutual firms have better control over owner–policyholder conflicts. Nonetheless, mutual insurers might encounter challenges in raising capital, leading the pecking order theory to predict a heightened inclination for them to accumulate capital (De Haan & Kakes, 2010). The empirical literature mostly finds evidence that the existence of a mutual organization contributes to higher capital ratios and, thus, higher actual solvency margins (Cheng & Weiss, 2013; Rauch & Wende, 2015).

Specialization

Investment activities, operations and liabilities' maturities notably differ between life and non-life segments of the insurance industry (Rubio-Misas & Fernandez-Moreno, 2017).

While life insurance companies operate as financial intermediaries, non-life insurers function as entities that assume and manage risks (Chen & Wong, 2004). Non-life insurers are perceived as more risky than life insurance companies, not solely due to the unpredictability of claim payments but also owing to the challenges in foreseeing potential threats (Grundl et al., 2016).

Industry concentration

The majority of literature examining the correlation between concentration and financial stability has concentrated on the banking sector, presenting two opposing hypotheses (Baselga-Pascual et al., 2015). The perspective known as the 'concentration-stability' view posits that an industry characterized by concentration, featuring a few large firms, tends to be more stable. This is attributed to the likelihood that large firms, benefiting from market power, can generate increased profits. These profitable entities possess the capability to bolster their capital, consequently enhancing their solvency. On the contrary, the 'concentration-fragility' view contends that a more concentrated industry is susceptible to

financial fragility. This is because the 'too-big-to-fail' protective mechanism may incentivize managers to undertake excessive risk, thereby adversely affecting the solvency of companies. In the realm of the insurance sector, only a limited number of recent studies have explored this relationship, yielding contradictory results. Although Cummins et al. (2017) report a positive relationship between concentration and soundness in European life insurance firms, Altuntas and Rauch (2017) and Shim (2017) conclude that higher market concentration is associated with lower financial stability in the insurance sector, providing empirical support for the ‘concentration-fragility view’.

Interest rates

The extant literature on the impact of interest rates on insurer solvency is also ambiguous (Cheng & Weiss, 2012; Shim, 2017). The conflicting results in these studies may be attributed to the dual effects of interest rates. Elevated interest rates can boost yields in insurer account portfolios, potentially positively influencing solvency. However, they may concurrently have a detrimental impact on insurer capitalization as a result of the diminishing market value of fixed-income assets (Rubio-Misas & Fernandez-Moreno, 2017).

Economic Growth

Earlier research on banking solvency has illustrated the beneficial impact of economic growth on capital. Banks leverage an expansive macroeconomic setting to amass capital (Schaeck & Cihak, 2012). Furthermore, in economic downturns, defaults on bank loans rise, resulting in increased losses that are subtracted from bank capital. Nonetheless, certain segments of the banking literature assert that specific institutions may exhibit overly lenient behavior during economic upswings. This behavior is attributed to a failure to adequately account for the cyclical nature of economic output, leading to an underestimation of risks. Ayuso et al. (2004) find that capital buffers were countercyclical in Spain during 1986–2000.) While there is limited literature on the impact of economic growth on insurer solvency, it is apparent that overall economic conditions can influence insurer capitalization. Raising capital might be more achievable in a relatively robust economy (Cummins & Sommer, 1996).

Factors Affecting Insurer’s Insolvency/Solvency Margins

BarNiv and McDonald (1992) outlined the factors influencing insurer insolvency, offering

valuable insights into the financial well-being of insurers. However, these factors were not categorized based on the types of insurers. The subsequent section will examine company-specific elements affecting property-liability (general) and life insurers individually, along with market factors that impact both categories of insurers. This distinction is made due to the substantial differences in operations, investment practices, vulnerabilities, and liability durations between life insurers and general insurers. (Brockett et al., 1994) life insurers are said to function as “financial intermediaries” while general insurers as “risk takers”.

Firm - Specific Factors on General Insurer’s Insolvency

Many previous studies focused on general insurers used financial characteristics as insolvency predictors (Ambrose and Seward, 1988; BarNiv & Hershbarger, 1990; Baniv & McDonald, 1992). For evaluating the insolvency risk of general insurers, essential factors encompass firm size, investment outcomes, underwriting performance, liquidity, operating margin, premium expansion, and surplus growth rate.

Firm size

The financial well-being of any entity is impacted by various factors, including its size or overall assets. Smaller insurers are anticipated to be more susceptible to insolvency, as regulatory authorities are less likely to intervene and liquidate larger insurers (BarNiv & Hershbarger, 1990). Indicators employed to gauge the size of a firm encompass total premium, total admitted assets, and capital and surplus.

Investment Performance

The efficiency and efficacy of investment decisions are revealed through investment performance, making it a crucial factor in ensuring the financial stability of an insurer. Kim et al. (1995) and Kramer (1996) find that investment performance is negatively correlated to insolvency rate.

Underwriting Result

An insurer's total operating income comprises two components: investment income and underwriting income. The impact of investment performance has been previously addressed. Regarding underwriting income, its performance is assessed using the combined ratio. Browne and Hoyt (1995) combined ratio is positively correlated to insolvency rate.

Liquidity Ratio

Liquidity pertains to an insurer's ability to meet its liabilities, encompassing operating expenses and disbursements for losses/benefits under insurance policies, as they become due. In the context of insurers, liquidity relies on two primary sources: cash flow, primarily derived from premiums and investment income, and the liquidation of assets (Hampton, 1993).

The issue of liquidity is typically less urgent for insurance companies when compared to banks. This is due to the relatively predictable nature of their liability liquidity, especially for non-life insurers, where liabilities, apart from claims, typically have shorter durations. Nevertheless, regulations often stipulate that the liquidity ratio should be maintained at a level exceeding 100 percent. Hampton, (1993). Furthermore, addressing liquidity challenges may necessitate a restructuring of capital and an infusion of additional capital to enhance the liability profile. Lee and Urrutia (1996) found that the current ratio is a significant indicator of solvency. The stability of the liquidity ratio is a necessary measure of corporate solvency (Dambolena & Khoury, 1980).

Operating Margin

In a straightforward sense, profitability implies that insurers are generating more revenue than they are expending on expenses. Kramer (1996) identified a positive correlation between operating margin and financial stability, indicating that a higher operating margin is associated with a lower likelihood of insolvency.

Premium Growth

Premium growth quantifies the pace of market penetration. Empirical findings indicate that a swift expansion in premium volume is a contributing factor to insurer insolvency. (Kim et al. 1995). Excessive fixation on growth can result in self-destructive consequences, as it may lead to the neglect of other crucial objectives. This tendency is particularly pronounced during economic downturns, as exemplified by events like the Asian Financial Crisis.

Growth Rate of Surplus

Closely tied to the operating margin is the growth of surplus. A profitable insurer is expected to demonstrate a consistent rise in surplus over time. However, such increases should be

moderate, as a sharp upswing may signal heightened operational risk. Operating with growth at an elevated risk level could have adverse effects on the financial well-being of the insurer (Lee & Urratia, 1996).

Firm - Specific Factors on Life Insurer's Insolvency

Unlike general insurer's insolvency, Kim et al. (1995) Discovered that the correlation coefficients of the identified variables in predicting life insurer insolvency are not remarkably high. Despite this, these variables play a crucial role in predicting insurer insolvency and are consequently discussed in detail below.

Firm Size, Investment performance, and operating margin

Consistent with the findings for general insurers, firm size (Kim et al., 1995) and age (Grace, Harrington & Klein, 1998) are negatively correlated with life insurer's rate of insolvency. Ambrose and Carroll (1994) got a better classification when ratio of net investment income to total income was included in their analyses. BarNiv and Hershbarger (1990) found that operating margin is the best single variable associated with life insurer's solvency.

Change in Asset Mix

Assets held by life insurers can be categorized into different classes, including bonds, common and preferred stocks, mortgage loans, and loans. These insurers provide a diverse range of life insurance policies, annuities, and other investment-sensitive contracts, each characterized by distinct risk-return features (Klein, 1995). Consequently, alterations in the composition of assets will undeniably impact the financial stability of the insurer to varying extents. Empirical results have validated a positive correlation between this variable and the likelihood of insolvency among life insurers (Ambrose *Carroll, 1994; BarNiv & Harshbarger, 1990).

Change in Product Mix

The change in product mix is a metric indicating the average alteration in the percentage of total premium derived from each product line throughout the year. BarNiv and Harshbarger (1990) found that change in product mix affects smaller life insurers adversely.

Insurance Leverage

Insurance leverage is characterized by the reserve-to-surplus ratio. The risk profile of an insurer may escalate with an augmentation in either its insurance leverage or financial leverage (Carson & Hoyt, 1995).

Existing literature on capital structure affirms that a firm's value tends to rise up to a certain optimal point with increasing leverage, but beyond this point, further increases in leverage can lead to a decline in value. Therefore, surpassing this optimal level of leverage may entail a heightened risk of insolvency and a diminished overall firm value.

Market/ Economic Factors on General Insurer's Insolvency

A good understanding of economic conditions under which an insurance company operates is valuable for three reasons (Browne & Hoyt, 1995). Initially, the likelihood and potential of insolvencies can be significantly diminished through regulatory influence over market conditions. Secondly, the effectiveness and efficiency of regulatory interventions concerning an insurer's financial distress are contingent upon the existing economic circumstances. Thirdly, the optimal allocation of resources for solvency oversight varies depending on the economic environment in which insurers function. Therefore, more resources are necessary during challenging economic periods, such as the Asian Financial Crisis.

Browne and Hoyt (1995) examined six hypotheses regarding the insolvency of general insurers, encompassing factors such as the number of insurers (reflecting competition), underwriting cycle, combined ratio, the first quarter of the year (associated with the timing of regulatory actions), unanticipated inflation, interest rate level, and interest rate change. The anticipated relationships for these variables were predominantly positive, with the exception of the interest rate level. The study determined that only the first three hypotheses were statistically significant. Some aspects of their findings align with conclusions drawn in previous studies (Munch & Smallwood, 1980; Babbel & Staking, 1991).

Market/ Economic Factors Related to Life Insurer's Insolvency

In a study examining the relationship between insurance market conditions and life insurers' insolvency, Best Company (1992) found that the number of insolvencies is correlated with the accident and health underwriting cycle (lagged by 1-3 years). The rise in the number of insolvencies is associated with upticks in interest rates and a heightened emphasis by life

insurers on investment-related products. Nevertheless, the study did not explore economic factors within a multivariate framework to discern their comparative significance. Browne and Hoyt (1995)

Strived to pinpoint factors external to individual life insurers that elevate their vulnerability to insolvency. This is because conditions external to the firm may amplify the likelihood of financial distress. Their findings reveal a positive correlation between life insurers' insolvencies and increases in long-term interest rates and personal income, while showing a negative correlation with real estate returns. These results reinforce the assertion that economic and market factors play a crucial role in predicting the financial well-being of life insurers.

Failure Prediction Models

Indications of imminent financial distress or failure typically become evident before the actual occurrence. Consequently, with effective methods of predicting failure, creditors, investors, management, and other stakeholders may have the opportunity to take corrective measures before the final occurrence of failure. Jensen & Meckling (2019) noted the need to develop mechanisms that detect the impending failure early enough.

Various business failure prediction models have been developed:

Univariate analysis models

Jensen & Meckling (2019) was the first to use statistical techniques to predict corporate failure. He utilized a univariate discriminant analysis model, examining various financial ratios within a matched sample of failing and non-failing companies to forecast company failure. Beaver employed a dichotomous classification test to identify the most effective ratios in categorizing companies as failing or non-failing, with failure defined as the incapacity to meet any type of financial obligations. His observations indicated a notable difference in the mean ratio between the failed firms and the non-failed firms. Not only was it lower, but it deteriorated markedly as failure approached (Beaver 1966).

Risk Index models

Tamari (1966) noted the weaknesses in Beaver’s (1966) Deviating from a single-variable approach and acknowledging the variability in ratio application, he devised the risk index.

This model employs a straightforward "point system" that incorporates various ratios widely recognized as indicators of financial health. Each firm receives a specific number of points, ranging from 0 to 100, based on its ratio values. A higher total points score signifies a more favorable financial situation. The risk index is designed to consider the varying importance of ratios, assigning higher weights to the most significant ones.

Causes and Effect of Insurers' Failure

Several causes of business failure within the insurance industry have been identified, including rapid growth, instances of fraud and greed, corporate governance issues, and insufficient regulatory oversight. An example is the collapse of Australia's HIH, attributed to factors such as rapid expansion, unsupervised delegation, complex reinsurance practices, under-pricing, reserving problems, false reporting, incompetence, fraud, greed, and self-dealing.

Reports from insurance commissioners, such as those in Kenya, outline causes of business failure in insurance companies, including cash flow constraints, asset and liability mismatches, imprudent segment decisions, excessive operating expenses, and financial mismanagement. Access Insurance Company Limited, declared insolvent in 1993, experienced negative reserves for three consecutive years due to severe cash flow constraints. Kenya National Assurance Limited (KNAC), closed down in 1995, faced deficits in its ordinary and superannuation businesses, with imprudent investment decisions and excessive management expenses cited as contributing factors. Stallion Insurance Company Limited (SIC), closed down in 2000, also faced challenges leading to closure.

The repercussions of insurer failure are severe for both the industry and the insuring public. Surviving insurers are obligated to bear the liabilities of failed insurers, as per the Insurance Act Cap 487. In co-insurance scenarios, the leading insurer assumes the burden of claims. Additionally, failure tarnishes the image of insurers, resulting in a loss of confidence in the industry.

Carson and Hoyt (1995) observed that there exists a distinction in the cost of failure between insurers and non-insurers. In the event of insolvency for a non-insurer, former customers typically face a loss limited to the value of the purchased product or service, and often little more. Conversely, when an insurer fails, some policyholders not only experience the loss of

already-paid premiums but may also incur losses for which they will not be indemnified, representing the very contingencies for which they had sought coverage.

Solvency of Life Insurance Companies in Nepal

A significant characteristic of insurance funds is their long-term nature, with claims from policyholders materializing in a relatively consistent pattern over time. The primary goal in managing the funds of life insurance companies is to ensure the availability of sufficient funds to fulfill various claims. These claims encompass not only death benefits, disability payments, and annuities stipulated in policies but also include requests for cash surrender values from individuals canceling their policies or seeking loans secured by the cash surrender value (Bajracharya & Amin, 2012). This aspect of the insurance business underscores the importance of an investment policy, as the fund of a life insurance company represents a liability for the insurer. Consequently, the insurer bears the responsibility to invest in sectors that are financially lucrative.

Poudel et al. (2019) indicated that a significant portion of investments was concentrated in the categories of 'government securities' and 'bank fixed deposits,' falling under the 'compulsory' classification. Conversely, a smaller proportion of investments was directed towards sectors classified as 'optional.' The historical investment pattern suggests that life insurance companies struggled to diversify their investment portfolios adequately in terms of both choice and proportional distribution among portfolios. The current regulatory measures were perceived as less effective in safeguarding the interests of policyholders. Additionally, the lack of banking facilities in a substantial part of the country contributed to the increasing trend in life insurance companies' investments. The observed correlation between policy surrender and macroeconomic factors highlights the importance of insurer efforts to comprehend and actively manage disintermediation risk through insurance contracts and investment policies.

Yadav and Tiwari (2012) in the research paper titled "A Study on Factors Influencing Customer Investment in Life Insurance Policies" emphasizes the critical role of customers in the success of the life insurance business. It underscores the importance for insurers to ensure the satisfaction and long-term retention of policyholders while also attracting new business through the introduction of innovative and tailored products. The study reveals that various

factors influence customers' decisions to invest in life insurance, with demographic considerations emerging as a major and pivotal determinant in the purchase of life insurance policies.

Athma and kumar (2007) in the research study titled "An Explorative Study of Life Insurance Purchase Decision Making: Influence of Product and Non-Product Factors," a sample size of 200 individuals from both rural and urban markets was investigated. The study examined a range of product and non-product-related factors, analyzing their impact on decision-making when purchasing life insurance. The survey analysis revealed that in the urban market, product-based factors such as risk coverage, tax benefits, and returns held more influence. Conversely, in the rural population, non-product-related factors like the credibility of the agent, company reputation, trust, and customer services played a more significant role.

Theories of Solvency

Consider an insurance company that is publicly listed and engages in underwriting life assurance, general insurance, or a combination of both. The company allocates policyholder premiums and shareholder capital across various investment avenues, including government bonds, corporate bonds, mortgages, loans, equities, and real estate. In the global insurance landscape, the company's actuaries typically evaluate an asset risk capital requirement to comply with regulatory solvency supervision. Furthermore, a significant majority of these insurers define and disclose a clear financial market risk appetite as part of their strategic approach.

The determination of the regulatory solvency capital requirement can be executed through an internal model approved by the regulatory authority or based on a calculation stipulated by the supervisor. In either scenario, the capital assessment often revolves around a probabilistic target level aimed at securing policyholders' commitments. This measure of security can be articulated in various ways, such as Solvency II's reliance on estimating the 99.5th percentile of the 1-year asset portfolio value relative to liabilities. Alternatively, it might involve a longer-term funding projection, like the 95th percentile of the assets needed to meet all liability cash flows as they mature. Regardless of the approach, the solvency capital requirement is designed to be risk-sensitive, implying that a higher tolerance for risk would necessitate a larger capital requirement, assuming all other factors remain constant.

There are two (related) questions that arise in the context of the above high-level description of regulated insurance business:

Why do insurance firms often have a non-zero financial market risk appetite for the assets held to back insurance liabilities?

Conceptually, the purpose of solvency regulation in insurance raises fundamental questions about the definition of the solvency capital requirement (SCR). Despite the apparent clarity stemming from insurers' well-established business models and their historical success in fulfilling policyholder promises while creating shareholder value, the last two decades have witnessed substantial changes in global approaches to solvency capital assessment, leading to diverse perspectives on the "best" methodologies. An exploration of the underlying fundamentals may shed light on this ongoing debate.

Why do insurance firms often exhibit a significant financial market risk appetite for the assets supporting their insurance liabilities? The seemingly straightforward answer lies in the well-rewarded nature of this risk, contributing substantially to insurers' revenues and profits. However, economic logic suggests that, absent complicating factors like taxes, the choice of investment strategy is inconsequential to enhancing shareholder value. Shareholder wealth does not inherently benefit from transitioning from low-risk government bonds to riskier assets like corporate bonds or equities.

If the purpose of insurance firms doesn't revolve around assuming investment risk on behalf of shareholders, what is their fundamental role? Essentially, insurers efficiently facilitate the pooling and diversification of policyholders' risks, a valuable economic activity. While modern insurance firms offer a broader range of financial services beyond risk pooling, this doesn't alter the economic argument against assuming financial market risk with assets supporting insurance liabilities.

Despite this general economic argument, certain complicating factors specific to insurance firms need consideration, including liquidity, regulation, and leverage. For instance, when policyholders purchase insurance policies, they might acquire highly illiquid assets, especially in cases where surrender options are limited. Recognizing that illiquid assets may be valued lower than equivalent liquid ones, insurers might find a rationale for having an appetite for asset illiquidity. This doesn't necessarily equate to a desire for market risk,

although it's acknowledged that obtaining significant illiquidity premia (after costs) might involve exposure to some market risks.

As outlined earlier, insurers typically operate within a regulatory framework that involves a solvency capital requirement sensitive to risk. When insurers increase asset investment risk, regulators mandate shareholders to provide additional capital on the insurance balance sheet. Holding this capital on the insurance balance sheet comes with associated costs for shareholders, such as double taxation, agency costs, and financial distress costs. Therefore, the investment irrelevance proposition is strengthened: shareholders should not only be indifferent to asset risk-taking on the insurance balance sheet but should actually prefer less asset risk-taking to avoid incurring these capital-related costs. This perspective suggests that shareholders and policyholders might both face disadvantages in the scenario of increased investment risk.

Taking investment risk does not immediately align with policyholders' interests. Policyholders entrust their insurance premiums to someone else taking risks without participating in the potential investment gains. However, the downside risk introduces uncertainty about the security of their promised benefits, even with additional capital requirements. Despite these considerations, a significant number of insurers exhibit a substantial appetite for investment risk, prompting the question of why.

Economic theory provides an explanation when acknowledging that the insurance balance sheet is leveraged through borrowing from policyholders. The shareholders' equity claim can be viewed as a call option on the firm's assets, entitling shareholders to the remaining asset value after paying creditors (policyholders). Limited liability ensures that this amount cannot be negative. This perspective, treating equity as a call option, is not a new concept and has roots in Modigliani-Miller theory from the 1950s and the development of option pricing theory in the early 1970s.

Considering policyholders as lenders to the insurance firm is also not a novel idea. Policyholders hold a form of debt in the insurance firm, represented by insurance policies obliging the insurer to make payments under specified events or circumstances. As debtholders, policyholders face the risk that the insurance firm's assets might be insufficient to meet their claims when due, positioning them as short on a put option on the firm's assets.

In this perspective, an elevation in asset risk (volatility) is seen as a wealth transfer from policyholders to shareholders, assuming all other factors remain constant. Such an increase enhances the value of the shareholder's call option on the firm's assets while simultaneously diminishing the value of the insurance policy for policyholders due to the heightened value of the put option they are short.

To address this reduction in the value of insurance policies for policyholders, adjustments can be made in the pricing structure. A decrease in the insurance premium charged to policyholders could ensure that both shareholders and policyholders share in the potential economic rewards associated with the firm's chosen level of investment risk-taking. Consequently, shareholders gain a higher expected but riskier reward, while policyholders still receive an insurance payout fixed concerning investment risk. However, this payout is now larger per unit of premium, albeit with an increased risk of default. If shareholders can escalate risk without decreasing the policyholder premium for a given insurance policy, they have an incentive to pursue higher risk.

This scenario raises questions about how policyholders can ascertain fair compensation for the risks associated with the shareholders' investment risk appetite and whether there is a minimum security level that should be linked to an insurance policy. These questions underline the importance of solvency regulation.

In developed consumer insurance markets, there is an expectation that the financial commitments within an insurance policy should be highly secure. Solvency regulation is designed to ensure a high level of security for the insurer's long-term commitments to policyholders. In the context of the earlier discussion on insurance firms' investment risk appetite, prudential solvency regulation aims to limit the wealth transfer from policyholders to shareholders linked with investment risk-taking. Achieving this involves requiring firms to hold more capital as their investment risk increases. The augmented capital pushes the shareholder option to default further out-of-the-money, consequently diminishing its value. This counteracts the rise in the option value resulting from increased asset volatility.

This model of shareholder incentives, policyholder protection, and regulatory control offers an intriguing perspective on the purpose and impact of prudential solvency regulation. It also suggests a potentially insightful way of quantitatively defining solvency capital requirements.

Actuaries worldwide often assess solvency capital requirements using probabilistic models. In the UK, actuaries have employed probabilistic approaches to evaluate capital requirements related to financial market risk in various insurance business types since the Maturity Guarantees Working Party's 1980 report. The Working Party recommended an approach that evaluates the assets needed today to meet all liability cash flows as they fall due with a specified probability level, commonly referred to as the run-off approach. The Working Party explored various probability levels and suggested using 95%. Solvency II, introduced in European insurance regulation in 2016, also adopts an explicitly probabilistic approach to solvency capital requirements, conceptualized around a market value balance sheet and the 99.5th percentile 1-year deterioration in its net assets (a 1-year Value-at-Risk). Both approaches use a percentile of the tail of a probability distribution as the primary risk statistic. Several technical studies have debated whether a percentile approach is statistically as robust as other tail measures like Conditional Tail Expectations (CTE).

Different probabilistic approaches to defining solvency capital requirements have been developed and implemented. However, it is not clear which one is superior. The argument presented here suggests that all these probabilistic definitions are inherently flawed and ultimately unsatisfactory due to the non-stationary nature and complexity of the social, particularly economic and financial, world. The uncertainties arising from socio-economic phenomena such as interest rates, equity returns, and even changes in longevity trends make reliable forward-looking probability estimations challenging. These phenomena lack the uniformities found in physical phenomena and are influenced by the complex interplay of future human behavior, leading to an epistemic limit on predicting future human behavior.

Our knowledge about future financial and demographic phenomena, such as the 95th percentile of the 2030 FTSE 100 or the 1st percentile of life expectancy for a 70-year-old in 2040, is fundamentally uncertain. Pretending otherwise and assuming these uncertainties don't exist may lead to a systematic understatement of risks. This is evident in the inability of models in use by actuaries and financial risk managers in 2000 to predict the interest rate environment in 2019 or accurately estimate the mortality of a 70-year-old male annuitant in 2020.

In the face of such deep uncertainty, debates over the mathematical and statistical properties of percentiles versus Conditional Tail Expectations (CTEs) for financial market risk measures become inconsequential. Consensus views on market value and run-off solvency approaches will cyclically shift, with each approach being deemed unreliable in turn, only to be replaced by the perception of the other as self-evidently superior.

The theoretical discussion on prudential solvency regulation introduces an alternative approach to defining capital requirements that doesn't rely on probability estimates for projected future asset prices or cash flows. Instead, the solvency capital requirement could be quantitatively determined as the amount of capital needed to limit the value of the shareholder's default put option to a specified maximum level.

For instance, in the case of capital invested in the matching bond, a 10% capital requirement ensures a sufficient total allocation to fully match the liability cash flow, reducing the default option value to zero. If no capital is held beyond the basic reserve, the default option value is the same for both capital investment strategies. However, when some capital is held, more capital is required to achieve a given default option value when invested in equities compared to the matching bond.

It's essential to highlight that we haven't explored situations where the basic reserve falls below the promised liability cash flow discounted at the risk-free rate (without considering the default option). In the current regulatory framework of Solvency II, this reserve scenario might be possible due to features such as the Matching Adjustment, Volatility Adjustment, and the use of yield curve extrapolation parameters for the Euro, which are inconsistent with present market conditions.

The proposed solvency capital measure presents distinctive features compared to the Solvency II Value-at-Risk (VAR) approach and the widely adopted run-off approach in recent actuarial practices. Notably, it provides two advantages over these alternative quantitative definitions for risk-sensitive capital requirements:

This solvency capital definition avoids direct reliance on 'real-world' probabilities, catering to those in social science who question the accurate estimation of such probabilities or find them philosophically challenging.

The capital measure determines the proportion of the risky asset return to be passed on to the policyholder through a fixed reduction in insurance premiums. This approach represents a more economically meaningful quantity than an arbitrary percentile level.

However, this definition isn't a one-size-fits-all solution. Many financial market risks and non-financial risks, such as longevity risk, found on insurance balance sheets lack observable traded option prices. Consequently, the option valuation exercise described would require a valuation method heavily reliant on real-world probability estimates to generate assumed values for option prices. Nevertheless, actuaries routinely incorporate such assumptions in valuing contingent liabilities like with-profit guarantees, presenting no significant new challenges.

Some may take issue with characterizing insurance firms' investment risk-taking as an attempted transfer of wealth from policyholder to shareholder. An argument could be made that both parties benefit – the shareholder shares prospective proceeds with policyholders through an upfront reduction in insurance premiums. The question of whether investment risk-taking is genuinely a win-win ultimately depends, at least in part, on how products with increased default risk are marketed and whether there is consumer demand for more affordable insurance policies.

One could make the case that the investment risk-taking by insurance firms with assets supporting insurance liabilities holds significance for the broader economy. These funds play a crucial role in financing essential infrastructure and similar projects. The argument suggests that if all these assets were exclusively invested in risk-free bonds, it would further drive up the costs of these bonds, potentially reaching unprecedented levels. In response, an opposing viewpoint could argue that if insurance firms aim to engage in risk-taking within the real economy, they should structure insurance products that align with that purpose. This likely involves enabling policyholders to directly and explicitly partake in the investment returns of the assets, as seen in product structures like unit-linked or with-profit styles. Simultaneously, adjusting the investment strategy for 'non-profit' insurance liabilities would free up risk capital, decrease investment management expenses, and alleviate the substantial costs associated with regulatory compliance under principle-based systems such as Solvency II.

One-Period Model of an Insurance Firm

Given that the company acquires its capital and collects premiums at the start of a period but only settles claims at the end, it must make decisions on how to invest its funds during this period. The investment framework follows the capital asset pricing model (CAPM), where investors allocate their portfolios among a risk-free security and various risky securities. However, equilibrium in the securities market, achieved after security prices adjust to balance supply and demand, implies that each investor opts for the same combination of available risky securities. Essentially, in equilibrium, each investor holds a share of the entire market. Thus, distinctions among investors are evident only in how they divide their portfolios between the "risk-free asset" and the "market asset," the latter comprising all risky securities in proportion to their total market value.

In the model, the demand specification relying solely on P and z overlooks the potential for partial claims recoveries. The condition $n < 0$ suggests that not all claims can be fully paid, with the extreme scenario being zero claims recoveries only when total assets are zero at the period's end. Consequently, the theoretically justified assumption of perfect knowledge is that demand depends on the complete distributions of both final assets and claims. However, this specification introduces complexity and significantly stretches the perfect-knowledge assumption.

Acknowledging that policyholders fall between perfect information and total ignorance, a more relevant assumption would be that buyers are partially informed. Yet, analyzing market equilibrium and regulatory effects under this assumption proves challenging. An alternative is to assume that applicants employ reasonably straightforward rules, potentially involving proxies for financial stability. However, introducing this assumption raises a new issue: when dealing with buyers using simple rules or proxies to assess financial condition, firm value cannot be meaningfully analyzed within a one-period model. The foundation of firm value becomes fundamentally different, as the assumption that applicants can monitor all relevant parameters and deduce their implications for claims outcomes is removed, limiting the firm's ability to build intangible capital.

The Case of Unlimited Liability

The competitive premium rate equates to the expected cost per policyholder, discounted at the risk-free rate of return. The ability of the insurance firm to achieve an expected rate of return higher than that from investing a portion of its portfolio in the market portfolio does not impact the competitive premium rate. This is because the enhanced return on the investment portfolio must be distributed to equity owners as compensation for bearing risk. The same rationale also clarifies why the firm's value remains unaffected by the parameter 'a.'

The equation provides valuable insights into the ongoing discussion about whether investment income should be factored into the formula for determining premium rates. During a recent rate-setting hearing, the insurance commissioner argued in favor of including investment income in the rate-making formula. However, the equation demonstrates that even if higher investment returns are realized, they must be shared with equity owners as a reward for assuming risk. Consequently, a premium level established based on the assumption of earning the minimum risk-free rate of return should not be considered an upper limit for ensuring a competitive return on capital.

Solvency Regulation: Repairing a Deficit

If, at the end of the period, total funds surpass total claims, the firm settles all claims, restores capital to its initial level, and initiates the next period. Conversely, if total claims exceed total funds, the firm utilizes all remaining funds to settle claims, resulting in insolvency. These assumptions align with the authority of state insurance commissioners to dissolve any firm falling below the required capital and surplus levels. However, the possibility of owners having the chance to revive the firm by infusing additional capital at the period's end is not considered. The decision to "resurrect" the firm depends on whether it is in the owners' best interests, contingent on the extent of the deficit.

Given limited liability, owners cannot be compelled to rectify a deficit. If they consistently have the option to rectify a deficit, the optimal strategy within this model becomes evident. With demand displaying complete insensitivity to invested capital (K), the firm will invariably choose to set K. In such a scenario, "excess" capital primarily serves the purpose of covering a higher proportion of claims in periods when salvaging the firm is not economically viable.

It's crucial to highlight that owners' indifference to the firm's investment behavior is not rooted in an assumption of investor risk neutrality. Within the Capital Asset Pricing Model (CAPM), the community of investors is assumed to be risk-averse, and this risk aversion can extend to an arbitrarily high degree. The key lies in their portfolio diversification, which renders the firm's investment behavior inconsequential. While these conclusions may seem unrealistic, it's essential to acknowledge the specific aspects modeled to enhance the analysis's realism. Three implicit assumptions in the CAPM underpin these conclusions: the absence of transaction costs in securities trading, universal information sharing among potential investors about returns' distribution for all firms, and the given and unaltered nature of each firm's returns and managerial behavior, unaffected by changes in ownership. Let's label these as the challenges of ownership transfer, information, and agency, respectively.

While ownership transfer costs undeniably impact small investors, it seems improbable that, in a world devoid of information and agency problems, the market value of firms would be highly responsive to such costs. The presence of significant traders and financial intermediaries would likely mitigate this impact for all but the smallest firms. Thus, to enhance the CAPM analysis of market value, particularly concerning closely held firms, we must confront the challenges posed by information and agency problems. The agency problem revolves around the classic challenges related to incentives and control when there is a separation between management and ownership. Although one might assume that managers aim to minimize the risk of insolvency, this depends on their compensation structure and risk aversion.

Concerning information, managers may possess a more nuanced understanding of the interplay between claims costs, securities returns, and the regulatory requirements specific to reserve forms. Consequently, external portfolio management by owners may not be a perfect substitute for internal portfolio management, and the firm's investment behavior may indeed impact market value. If the issues of agency and information were explicitly incorporated into models, the analytical outcomes would likely see some modifications, especially for closely held firms. However, we still regard these results as primary solutions that are fundamentally accurate. Analyzing a firm's optimal decisions within the framework of limited liability poses a fundamental challenge: how to specify demand for the firm's

product, given the potential for insolvency. Since the scenario of perfect knowledge is uninteresting, the challenge becomes defining the response of partially informed buyers. Yet, there is no apparent and compelling method for establishing the relationship between the firm's choices and the assessments made by partially informed prospective policyholders regarding the firm's stability.

However, this inference presupposes that each old firm's market position is lucrative enough to warrant protection through setting. If the profitability of an old firm diminishes to a level where the incentives of limited liability outweigh the value of safeguarding its position, then applicants willing to pay for safety may unwittingly be exploited. What circumstances could lead to the profitability of old firms declining to the extent that it becomes unviable to preserve the intangible capital associated with the perception of the firm being established and reliable? It's crucial to highlight that the threat of excess capacity is essentially non-existent; the amount of specific physical capital in the insurance industry is minimal. Marginal and average costs show little variation, and firms can downsize from an extended "production" level with minimal issues. In fact, the ease with which insurance firms can downsize has contributed to dissatisfaction with the industry's performance in recent years.

Certainly, rate regulation is one potential factor. Forcing rates below the long-run full-cost levels might eradicate the motivation to safeguard market access. Firms have, against their preferences, been compelled to remain in certain insurance markets in certain states. This leverage exists because these are multiline firms, and the insurance line in question represents only a fraction of their business. Moreover, only one or a few states may be exploiting this leverage.

The inevitable outcome appears to be clearly pathological. As firms face insolvency, their liabilities are distributed among existing firms in proportion to market share. There is a possibility that a point might be quickly reached where new entrants prefer to wait until all surviving firms have gone under. Consequently, the presence of a guaranty fund necessitates financial regulation. However, it is important to note that financial regulation only addresses the issue arising when applicants lack the incentive to avoid financially risky firms. According to the model we have examined, firms will still opt to set, the probability of insolvency will remain positive, and the "externalities" problem will persist.

Another contributing factor to insolvencies in the automobile market may be the challenge firm's face in assessing the risks on which their premiums are based. Olson suggests that expenses related to automobile claims extend beyond a single year, as individuals may be able to claim compensation today for injuries from accidents that occurred in past years. Consequently, determining premiums based on past claims distribution may not be straightforward. The problem of establishing economically variable rates is further complicated by state regulatory agencies that restrict proposed rate increases by companies. The difficulty firm's encounter in estimating future losses provides an additional rationale for implementing minimum capital requirements. If firms are unable to deduce the mean and variance of their future claims from past data, their decisions on optimal premiums and policyholders may rely on inaccurate information.

2.2 Empirical Review

Numerous researchers, experts, authorities, and students have undertaken extensive research in the field of insurance. However, only a limited number of studies specifically address the solvency aspect of the insurance business. Despite the abundance of research in the broader insurance domain, there is a noticeable gap in the literature concerning solvency and its determining factors.

Sukmaningrum et al. (2023) investigated the productivity and its determinants in Sharia-compliant life insurance businesses in Indonesia over six years (2014-2019). The study employed a Two-Stage Malmquist Productivity Index, combining the Malmquist Productivity Index (MPI) method in the first stage and panel data regression in the second stage. The results revealed that technological advancements were insignificant, impacting the productivity of Islamic life insurance companies. Solvency, interest rates, inflation, currency rates, and production indices significantly influenced productivity, highlighting the need for businesses to be mindful of these factors.

Alokla et al. (2022) explored solvency determinants in the UK life insurance market, utilizing panel data spanning from 2006 to 2019. The study found positive correlations between solvency and asset-to-bond ratio and equity-to-asset ratio. Conversely, negative correlations were identified with unexpected inflation, market competition, pension reserves to total reserves, company size, and leverage.

Siddik et al. (2022) assessed the financial situation and solvency of insurance companies in Taiwan. The study identified several factors, including capital equity, assets, profitability, liquidity, management, and market sensitivity, positively and significantly impacting the solvency of insurance companies in Taiwan.

Zanotto and Clemente (2022) investigated early indicators of financial distress in life insurance companies and their relevance in assessing insolvency risk. Analyzing 1900 insurance companies from 2004 to 2020, the study, using logistic regression, revealed that capital and surplus had a negative impact on insolvency. Additionally, the study found that concentrating operations in specific geographic areas acted as a competitive advantage, reducing insolvency risk.

Ningsih and Purwohedi (2021) studied the factors influencing the profitability of insurance companies, using data from 2009 to 2012. Leverage, equity capital, and management efficiency index positively impacted profitability, while size, liquidity, and ownership structure negatively correlated with profitability.

Moreno et al. (2020) examined solvency determinants in insurance companies from 2008 to 2015. The study, using a dynamic panel data model, found positive correlations between actual solvency margins and profitability, underwriting risk, and mutual-type organization. Negative correlations were identified with company size, reinsurance use, and life insurance specialization.

Rubio-Misas and Fernández-Moreno (2017) investigated factors affecting the regulatory solvency of insurance companies in Spain. Premium and reinsurance growth negatively impacted regulatory solvency, while investment risk, operational leverage, and company size showed no statistically significant impact.

Caporale et al. (2017) analyzed insolvency risk in insurance companies over 30 years, concluding that macroeconomic factors like interest rates, real exchange rates, and foreign direct investment are crucial in assessing credit risk. Corporate factors, including underwriting, leverage, liquidity, reinsurance, and organizational structure, positively impacted insolvency, while growth and company size did not show statistical significance. Notably, leverage had a consistently negative impact on solvency across studies.

Rauch and Wende (2015) found that operating leverage negatively impacted the regulatory solvencyof insurance companies, while investment risk had a positive effect.

Komen (2012) determined solvency determinants in Kenyan insurance companies from 2001 to 2010. Liquidity and surplus growth positively impacted solvency, while investment and claims ratios negatively affected solvency. Company size did not demonstrate a statistically significant impact.

Yakob et al. (2012) explored solvency factors in Malaysian insurance companies. Leverage, liquidity, total interest paid to fixed capital ratio, and surplus ratio negatively impacted solvency. These results were consistent with the findings of Caporale et al. (2017) and Shiu (2005), highlighting the adverse impact of liquidity and leverage on insurance company solvency.

Table 1

META Table (Summary of Literature Review)

Author (Year)	Title of the Article	Major Objective	Methods Used	Findings
Sukmaningrum et al./ (2023)	Determinants of sharia life insurance productivity in Indonesia	This study examines the productivity and factors influencing the productivity of Sharia-compliant life insurance businesses in Indonesia.	The study employed a Two-Stage Malmquist Productivity Index. In the initial stage, productivity was assessed using the Malmquist Productivity Index (MPI) method, followed by the second	As per the findings of the MPI, Sharia-compliant life insurance businesses in Indonesia have not attained productivity, primarily attributed to the lack of significance in technological advancements. The productivity of these businesses is notably influenced by variables

			stage, which utilized panel data regression to identify the factors influencing productivity.	such as solvency, interest rate, inflation, currency rate, and production index. It is crucial for businesses to be cognizant of these factors that impact their production levels.
Fares et al., (2022)	The Determinants of Solvency for Insurance Companies Listed on the Palestine Exchange	This study aimed to find the factors that influenced solvency of insurance companies which listed in PEX.	Multi-regression model used with descriptive statistics and correlation analysis. use a panel data and test the impact for five independent variables	The study revealed that the impact of profitability and liquidity on solvency is not statistically significant. In contrast, financial leverage, investment, and claims exhibit a significant positive influence on solvency. As a result, it is advisable for Palestinian insurance companies to focus on investing in surplus and liquidity, while adopting a stringent risk acceptance policy.
Alokla et al. /(2022)	Determinants of solvency in life insurance	To examine the factors determining	Inferential statistics, correlation	The research indicated a positive correlation between solvency and

	companies of United Kingdom.	solvency of life insurance companies in UK.	analysis and multiple regression analysis.	the asset-to-bond ratio, as well as a positive relationship with the equity-to-asset ratio. Conversely, solvency showed a negative correlation with unexpected inflation, market competition, pension reserves to total reserves, company size, and leverage.
Siddik et al. (2022)	A case study on the factors determining the solvency position of insurance companies in Taiwan.	To assess the financial situation and monitor the solvency of selected samples in Taiwan	The research analyzed various factors related to solvency, including capital equity, assets, profitability, and liquidity, management, and market sensitivity.	The research identified that all the aforementioned factors exert a positive and statistically significant influence on the solvency of insurance companies in Taiwan. Additionally, it inferred that liquidity has an adverse effect on the solvency of insurance companies.
Zanotto and Clemente, (2022)	Study of the variables of financial distress in life	To study the importance of the variables in assessing	The investigation encompassed a sample of 1900 insurance	The findings revealed that capital and surplus exerted a detrimental influence on the

	insurance companies of European Union.	the risk of insolvency of insurance companies.	companies, spanning from 2004 to 2020, and employed the logistic regression model.	insolvency of insurers. Furthermore, concentrating the operations of an insurance company in specific geographic areas was identified as a negative factor for insolvency, providing a competitive advantage over other companies. Positive impacts on insolvency were observed for liabilities to current assets, leverage, and the ratio of real estate to total assets in life insurance companies within the European Union.
Pavlovic, (2021)	Effect of financial leverage and capital on solvency of life insurance companies in Indonesia.	To analyze the effects of financial leverage and capital management on solvency position of life insurance companies in	A descriptive and correlational research design was employed to elucidate the influence of leverage on solvency. The study utilized correlation and	Capital exerts a favorable influence on the solvency of insurance companies, whereas financial leverage demonstrates an adverse impact on their solvency.

		Indonesia.	multiple regression analyses to explore these relationships.	
Ningsih and Purwohedi, (2021)	Study of relationship between solvency and profitability of insurance companies in Kenya.	To determine the factors affecting the solvency and profitability of insurance companies in Kenya.	Utilizing data spanning from 2009 to 2012 and employing the multiple linear regression method, the study assessed the Revenue to Assets Ratio.	The research identified a positive impact of leverage, equity capital, and management efficiency index on the profitability of insurance companies. Conversely, profitability demonstrated a negative correlation with the size of companies, liquidity, and the ownership structure of insurance companies. However, factors such as the retention ratio, underwriting risk, and the age of the company did not exhibit a significant effect on the profitability of insurance companies.
Olalere et al. (2021)	The moderating	The aim is to explore the	The research utilizes balanced	The empirical findings

role of financial innovation on financial risks, business risk and firm value nexus: Empirical evidence from Nigeria	moderating role on the financial risks, business risk and firm value nexus.	panel data to examine 16 commercial banks in Nigeria during the period from 2009 to 2017, encompassing a total of 144 observations.	indicate a notable positive association between credit risk and firm value, whereas liquidity risk, operational risk, market risk, and solvency risk exhibit a substantial negative impact on firm value. Additionally, business risk demonstrates a significant negative correlation with firm value. The introduction of financial innovation significantly moderates the connections between financial risks, business risk, and the firm value of the banks.

2.3 Research Gap

There is a considerable time gap between this study and the previous research. Unlike earlier studies, this research focuses on five distinct life insurance companies and utilizes data spanning five years. The selection criteria for companies and variables differ, as previous researchers did not concentrate on comparable tools such as solvency, liquidity, investment, leverage, and claim ratio, whereas this study places emphasis on these variables. Previous studies primarily examined premium collection and investment patterns, whereas this study solely focuses on the solvency and its determinants of life insurance companies. While previous researchers exclusively employed financial tools and disregarded statistical tools, this study utilizes both financial and statistical tools. The previous studies relied on a descriptive approach, whereas this study adopts both descriptive and analytical approaches. Additionally, this study relies solely on secondary data, in contrast to previous research that incorporated both primary and secondary data sources.

CHAPTER-III

RESEARCH METHADOLOGY

The research methodology pertains to the specific problem at hand, providing essential insights for management decisions. It focuses on finding solutions for addressing a given problem and implementing those solutions, emphasizing the future and present rather than evaluating past actions. F.N. Kerlinger underscores the significance of research methodology, stating, "Research methodology is a vital and absolutely indispensable part of social scientific and educational research. Without methodology research, modern social scientific and educational research would still be in the dark age." Essentially, research methodology elucidates the techniques, methods, and processes employed in the entire scientific research process. It encompasses the various sequential steps a researcher takes to study a problem with specific objectives in mind. In essence, this chapter outlines the methods and sequential steps used in analyzing the problem at hand.

3.1 Research Design

The research design serves as the blueprint, structure, and strategy of the investigation, devised to obtain answers to specific questions and manage variance. The study's analysis is grounded in a particular research design tailored to the study's objectives. Research design outlines the overarching plan for collecting, analyzing, and evaluating data, acting as an integrated system that directs the researcher in formulating, implementing, and controlling the study. It encompasses a series of stages in conducting the study. The chosen design for this study is causal-comparative, aiming to establish relationships between independent and dependent variables after a particular action or event has occurred. The data utilized for analysis, interpretation, and drawing conclusions were derived from the annual reports of relevant life insurance companies and the financial statements of life insurance companies published by Beema Samiti, spanning from the fiscal year 2012/2013 to 2021/2022.

3.2 Population and Sample

Out of the total 14 life insurance companies operating in the Nepalese insurance market, a subset has been selected through a sampling process. Specifically, five life insurance companies have been chosen as the sample from the entire population. The sample life

insurance companies are National Life Insurance Co. Ltd. (NLICL), Nepal Life Insurance Co. Ltd. (NLIC), Life Insurance Corporation (Nepal) Ltd. (LIC Nepal), Asian Life Insurance Co. Ltd. (ALIC) and Surya Joti Life Insurance Company. This study covers the period of ten years from year 2012/13 to 2021/22.

The selection of sample life insurance companies has been based on a conventional sampling approach, utilizing a combination of non-probability sampling and a judgmental approach. The inclusion of these particular five life insurance companies in the sample is influenced by factors such as recent mergers within the industry and the absence of financial data for the last ten years for some new insurance companies.

3.3 Sources of Data

This research relies on secondary data, which is extracted from the annual reports of the selected life insurance companies. The essential data has been sourced from the financial statements of these companies, as made publicly available. Additional information is derived from various reports, both published and unpublished, journals, theses, and other relevant sources. It's important to emphasize that the study exclusively utilizes secondary data for its analysis, and additional information is gathered from diverse institutions as needed.

3.4 Method of Analysis

In this study, a diverse set of financial and statistical tools have been employed for comprehensive analysis. The examination of the available data follows a specific pattern, with major analyses conducted using financial tools and simple regression analysis. The interrelation between various variables pertinent to the study is elucidated through the application of both financial and statistical tools. Key financial indicators such as debt ratio, leverage ratio, investment ratio, liquidity ratio, claim ratio, profitability ratio, inflation, and firm size have been systematically computed. Simultaneously, statistical tools such as arithmetic mean, regression analysis, standard deviation, coefficient of variation, and coefficient of correlation have been utilized to enhance the analytical depth of this research.

a. Arithmetic Mean

The arithmetic mean of a set of observations is determined by dividing the sum of the observations by the total number of items in the set. This method assumes equal importance

for all items within the dataset. For the purposes of this study, simple arithmetic mean has been employed as deemed necessary for the analysis.

Mean ($\bar{X}$) = $\frac{\sum X}{n}$

Where,

$\sum$X = Sum of all values of the observation

N = Numbers of observation

X = Value of variable

b. Standard Deviation

Standard deviation, typically denoted by the symbol (σ), as proposed by Karl Pearson, serves as a commonly used measure of dispersion. It gauges the extent to which individual observations deviate from the arithmetic mean within a set of values. Also referred to as the root mean square deviation, standard deviation has been utilized in this study to assess the level of fluctuation in the variables under analysis.

Standard deviation (σ) = $\sqrt{\frac{\sum(\mathbf{X}-\bar{\mathbf{X}})^{\mathbf{2}}}{\mathbf{n}}}$

c. Coefficient of Variation

The coefficient of variation, a relative measure of dispersion derived from standard deviation, is denoted as C.V. The coefficient of variation is calculated by multiplying the standard deviation by 100.

C.V. = $\frac{S.D.(\sigma)}{Mean(\bar{X})}$×100

Where, S.D. (σ) = Standard Deviation

$\bar{X}$ = Mean value of variables

d. Correlation Coefficient

The correlation coefficient is a straightforward and reliable measure for assessing the relationship between variables, indicating both the strength and direction of this relationship. In this study, the assumption is that the relationship exists solely between two variables,

without external factors influencing this relationship. Karl Pearson's correlation method, based on covariance, is employed for the analysis, and it is represented by the symbol 'r'.

Correlation Coefficient $(r_{xy}) = \frac{COV.(x,y)}{\sigma_x * \sigma_y}$

Cov. (x,y) = $\frac{\sum(X-\bar{X}).(Y-\bar{Y}}{n}$

The correlation coefficient lies between -1 to +1 and higher degree of correlation coefficient between the variables indicates the greater association and vice versa.

e. Multiple Regression Analysis

Multiple regression is a statistical technique utilized to determine the value of a criterion based on multiple independent or predictor variables. It involves simultaneously considering several factors to understand their collective impact on a specific outcome. However, this method becomes ineffective when dealing with factors characterized by immeasurable or purely random nature.

Model 1 (With Moderating Variable)

Solvency = β_0 + β_1Leverage + β_2Investment + β_3Liquidity + β_4Claims ratio + Profitability ratio + β_6Inflation rate+ β_7 Firm's Size + ε_{it}

The variables represent the following:

Solvency (Debt ratio): The ability of a company to meet its long-term debts and financial obligations.

Leverage: The amount of debt a firm uses to finance assets.

Investment: Investment income defined as the placement of funds in projects to achieve the return of the company.

Liquidity: Liquidity Reflect the Company's ability to meet its obligations when due.

Claim Ratio: The proportion of claims, defined as the proportion of compensation losses that occur to the insured.

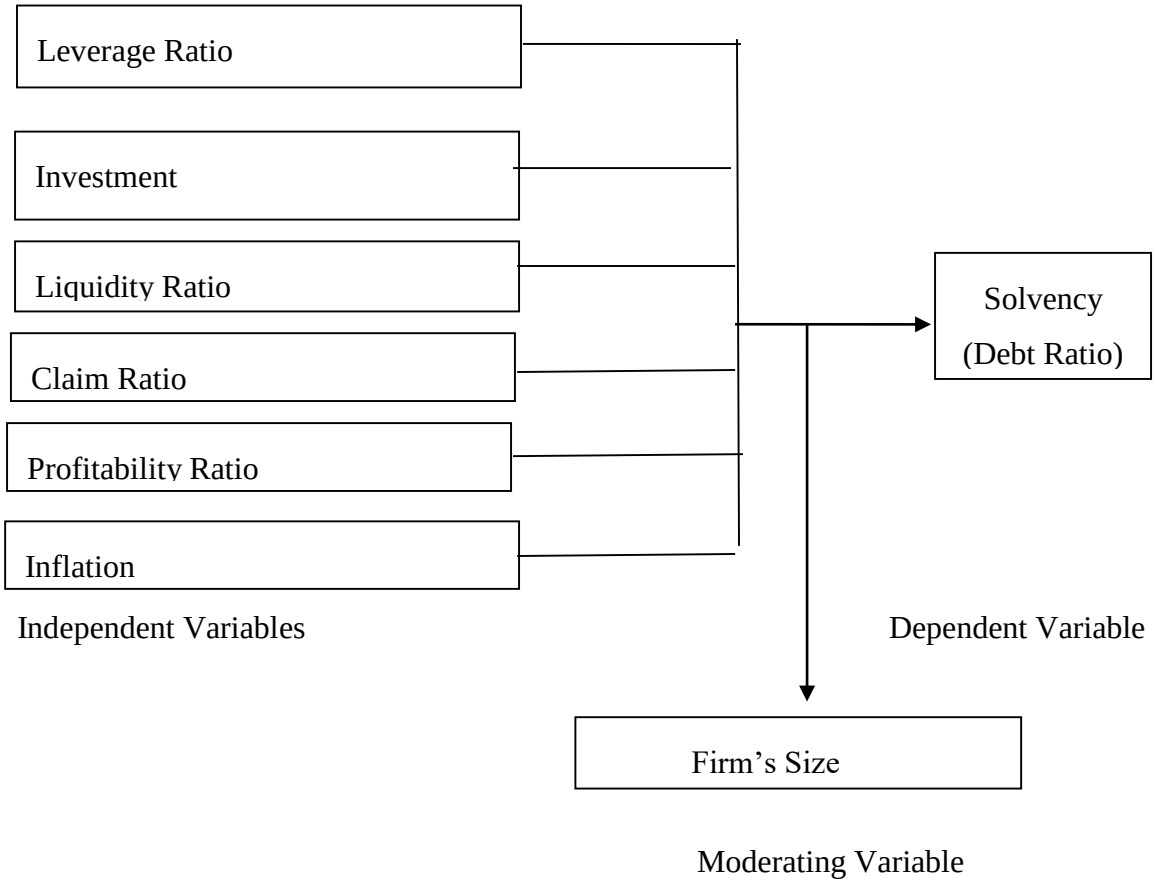
Profitability Ratio (ROE): The ratio of net profit to total equity.

Inflation rate: The rate of inflation in Nepal for recent fiscal years.

Firm's Size is natural logarithm value of total assets.

β_0 is the intercept (constant); β_1, β_2, β_3, β_4, β_5, β_6 and β_7 represent the corresponding slope which addresses the impact coefficients and εit represents the error term.

3.5 Research Framework



(Source: Jawad1 & Issam, 2019, Fares & Naser, 2023 & Sukmaningrum et al., 2023)

Figure 1: Conceptual Framework.

Definition of the Variables

Dependent Variable

The solvency ratio, calculated using total debt to equity, is a critical financial metric used to evaluate a company's ability to meet its long-term financial obligations and assess its overall financial health and stability. This ratio provides insights into the extent to which a company's debt is financed by shareholders' equity.

The formula for calculating the solvency ratio using total debt to equity is:

Solvency Ratio= Total Equity/Total Debt

Total Debt represents all debts and liabilities of the company, including both short-term and long-term obligations such as bank loans, bonds, and leases.

Total Equity refers to the total value of shareholders' equity, encompassing common equity, preferred equity, retained earnings, and additional paid-in capital.

A higher solvency ratio indicates a higher proportion of debt relative to equity, which suggests a higher level of financial leverage. While debt financing can amplify returns, it also increases financial risk, particularly during economic downturns or periods of financial instability. Therefore, a higher solvency ratio may indicate a greater risk of default or financial distress.

Conversely, a lower solvency ratio signifies a lower level of debt relative to equity, implying a more conservative financial structure. Companies with lower solvency ratios generally have greater financial stability and resilience to economic shocks, as they rely less on debt financing and have a larger cushion of equity to cover their obligations.

i. Leverage Ratio

The Total Equity to Total Assets ratio, also known as the leverage ratio, is a financial metric used to assess the extent to which a company's assets are funded by equity compared to debt. It provides insights into the company's financial structure and risk profile.

The formula for calculating the Total Equity to Total Assets ratio is:

Total Equity to Total Assets Ratio = Total Equity/Total Assets

Where:

Total Equity represents the total value of shareholders' equity, including common equity, preferred equity, retained earnings, and additional paid-in capital.

Total Assets refers to the sum of all assets owned by the company, including both tangible assets (such as property, plant, and equipment) and intangible assets (such as patents and goodwill).

A higher Total Equity to Total Assets ratio indicates that a larger proportion of the company's assets are funded by equity capital rather than debt. This suggests a lower degree of financial leverage and may indicate a more conservative financial structure. On the other hand, a lower ratio implies a higher reliance on debt financing, which may increase the company's financial risk and leverage.

ii. Investment

Insurance companies often invest substantial portions of their assets in various financial instruments to generate returns that can help offset claims payouts and operational expenses while also ensuring long-term financial stability and growth. These investments typically include a diverse range of asset classes such as bonds, equities, real estate, and alternative investments like private equity and hedge funds.

One of the primary objectives of insurance company investments is to maintain an appropriate balance between risk and return. To achieve this, insurers typically allocate their investment portfolios across different asset classes based on their risk tolerance, investment objectives, regulatory requirements, and market conditions. For instance, fixed-income securities such as government and corporate bonds are commonly favored by insurance companies for their relatively stable returns and lower risk compared to equities.

Equity investments play a significant role in insurance company portfolios as well, offering the potential for higher returns over the long term, albeit with greater volatility. Real estate investments, including commercial properties and mortgage-backed securities, provide additional diversification and income-generating opportunities.

Moreover, insurance companies may also invest in alternative assets like private equity, infrastructure projects, and hedge funds to further diversify their portfolios and potentially enhance returns. These alternative investments often have unique risk-return profiles and may offer opportunities for higher yields or non-correlated returns compared to traditional asset classes.

Risk management is paramount in insurance company investments, given the importance of maintaining solvency and meeting policyholder obligations. Insurers employ sophisticated risk management strategies and analytics to assess and mitigate various risks, including credit risk, market risk, liquidity risk, and operational risk.

Regulatory authorities closely oversee insurance company investments to ensure compliance with solvency requirements and prudent investment practices. Additionally, rating agencies assess insurers' investment portfolios as part of their overall creditworthiness evaluation

iii. Liquidity Ratio

The liquidity ratio, often represented by the current ratio, is a fundamental financial metric used to assess a company's ability to meet its short-term financial obligations. It provides insight into the company's liquidity position by comparing its current assets to its current liabilities.

The formula for calculating the current ratio is:

Current Ratio = Current Assets / Current Liabilities

Current assets include cash, accounts receivable, inventory, and other assets that are expected to be converted into cash within a year, while current liabilities consist of obligations due within the same period, such as accounts payable, short-term debt, and accrued expenses.

A current ratio greater than 1 indicates that the company has more current assets than current liabilities, suggesting it should be able to cover its short-term obligations comfortably. However, a very high current ratio may indicate inefficiency in asset utilization or an excessive amount of idle resources.

Conversely, a current ratio below 1 suggests that the company may have difficulty meeting its short-term obligations with its current assets alone, which could raise concerns about liquidity and potential financial distress.

While the current ratio is a valuable tool for assessing liquidity, it's essential to consider industry norms and other financial metrics in conjunction with it. For instance, industries with high inventory turnover rates may have lower current ratios compared to those with slower inventory turnover, yet both scenarios could be financially healthy within their respective contexts.

iv. Claim Ratio

The claim ratio is a crucial metric used in the insurance industry to assess the company's profitability and performance in handling claims. It represents the ratio of claims paid out by

an insurance company relative to the premiums collected from policyholders within a specific period, typically a year.

The formula for calculating the claim ratio is:

Claim Ratio = (Total Claims Paid / Total Premiums Earned) x 100%

A lower claim ratio indicates that the insurance company is effectively managing its claims and operating efficiently, as it's paying out fewer claims relative to the premiums collected. Conversely, a higher claim ratio may suggest that the insurer is facing higher claim costs compared to the premiums earned, which could potentially impact its profitability.

Insurance companies closely monitor their claim ratios to ensure they are sustainable and in line with their business objectives. They aim to strike a balance between competitive pricing to attract customers and managing risk effectively to maintain profitability. Additionally, analyzing claim ratios helps insurers identify trends in claims frequency and severity, allowing them to adjust underwriting practices and pricing strategies accordingly.

It's important for insurance companies to keep their claim ratios within acceptable ranges to remain financially stable and competitive in the market. However, it's also essential for policyholders and stakeholders to consider other factors such as customer service, coverage options, and financial strength when evaluating an insurance company's performance and reliability.

v. Profitability Ratio (ROE)

Return on equity (ROE) is a key financial metric used to evaluate the profitability and efficiency of a company. It measures how much profit a company generates with the money shareholders have invested in it. ROE is calculated by dividing net income by shareholders' equity and is usually expressed as a percentage.

ROE = Net Income / Shareholders' Equity

A higher ROE indicates that a company is effectively using shareholder funds to generate profits, while a lower ROE may suggest inefficiency or a lack of profitability.

Investors often use ROE to compare the performance of different companies within the same industry or to track a company's performance over time. However, it's important to consider

other factors such as debt levels, industry trends, and economic conditions when interpreting ROE figures. Additionally, ROE can vary significantly between industries due to differences in capital structure and business models.

vi. Inflation

Inflation is the rate of increase in prices over a given period of time. Inflation is typically a broad measure, such as the overall increase in prices or the increase in the cost of living in a country.

Inflation is a rise in prices, which can be translated as the decline of purchasing power over time. The rate at which purchasing power drops can be reflected in the average price increase of a basket of selected goods and services over some period of time. The rise in prices, which is often expressed as a percentage, means that a unit of currency effectively buys less than it did in prior periods. Inflation can be contrasted with deflation, which occurs when prices decline and purchasing power increases.

Moderating Variable

The moderating variable for this study is the firm's size. It represents the ownership of assets by life insurance companies. High asset ownership enables life insurance companies to offer more financial services at low cost. The ratio is calculated using relation;

Firm's Size = Log (Total Assets)

CHAPTER-IV

RESULTS AND DISCUSSIONS

This section encompasses the examination and presentation of the gathered data. Its objective is to scrutinize the collected data with the aim of achieving the study's goals by converting raw data into comprehensible presentations. Utilizing financial and statistical tools in accordance with the research methodology outlined in the third chapter, the data have been analyzed and interpreted. Various tables have been employed to organize the collected data, transforming them into relevant tables based on their common characteristics. The outcomes of the analysis have been presented in appropriate formats.

4.1 Result

4.1.1 Financial Analysis

Data presentation is a crucial aspect of academic studies, commercial ventures, industrial operations, marketing activities, and professional practices. It involves the use of collected raw data, which needs processing for practical applications. The presentation of data aids in interpreting information and making decisions or addressing research questions. This is achieved through the use of data processing tools and software, starting with the collection of data, followed by various processing methods and sorting. Processed data facilitates extracting meaningful information, as raw data is often non-comprehensive. Pictorial representation of individual variables helps measure the bank's overall contribution in different years. While ratio analysis describes the relationship between two variables, it doesn't provide information about their absolute values. Hence, this chapter examines some essential individual variables in terms of mean and standard deviation.

Data analysis is a comprehensive process involving the inspection, cleansing, transformation, and modeling of data to discover valuable insights, draw conclusions, and support decision-making. It encompasses various techniques, approaches, and methods, contributing to different domains such as business, science, and social sciences. In the contemporary business landscape, data analysis plays a pivotal role in making decisions more scientific and enhancing overall operational efficiency. Data mining, a specific analysis technique, focuses on modeling and knowledge discovery for predictive purposes. Additionally, business

intelligence involves data analysis with a strong emphasis on aggregation, primarily centered around business information. In this study, and following ratio for five life insurance companies in past ten years are analyzed:

4.1.1 Solvency Ratio

A solvency ratio measures how well a company's cash flow can cover its long-term debt. Solvency ratios are a key metric for assessing the financial health of a company and can be used to determine the likelihood that a company will default on its debt. The higher ratio usually indicates efficiency in utilizing its overall resources and vice versa. A solvency ratio is a key metric used to measure an enterprise's ability to meet its long-term debt obligations and is used often by prospective business lenders. A solvency ratio indicates whether a company's cash flow is sufficient to meet its long-term liabilities and thus is a measure of its financial health. An unfavorable ratio can indicate some likelihood that a company will default on its debt obligations.

A higher solvency ratio indicates a higher proportion of debt relative to equity, which suggests a higher level of financial leverage. While debt financing can amplify returns, it also increases financial risk, particularly during economic downturns or periods of financial instability. Therefore, a higher solvency ratio may indicate a greater risk of default or financial distress.

Conversely, a lower solvency ratio signifies a lower level of debt relative to equity, implying a more conservative financial structure. Companies with lower solvency ratios generally have greater financial stability and resilience to economic shocks, as they rely less on debt financing and have a larger cushion of equity to cover their obligations.

Table 2

Solvency Ratio

Years	NLICL	NLIC	LIC Nepal	ALIC	SJLIC
2022	9.21	2.84	17.95	9.37	4.07
2021	8.87	10.8	18.89	9.07	3.42
2020	8.07	9.75	19.22	7.69	2.7
2019	7.05	7.41	16.25	6.78	4.36
2018	8.7	5.43	13.95	9.63	2.75
2017	8.57	5.82	20.41	10.55	2.73
2016	8.72	11.07	16.89	9.01	2.69
2015	7.41	11.18	17.48	6.33	2.02
2014	9.05	10.3	16.41	4.46	9.35
2013	10.5	10.23	18.93	3.63	4
Mean	8.6	8.48	17.6	7.65	3.8
SD	0.96	2.91	1.86	2.3	2.08
CV	11.19	34.39	10.55	30.17	54.83

Source: *Appendix-2*

Table 2 shows the solvency ratio is maximum during the year 2017 with 20.41 percent in recent ten year's period among 5 sample life insurance companies and minimum average solvency ratio is reported for recent year 2015 with 2.02 percent. The standard deviation of NLIC is highest having 2.91 percent and lowest standard deviation is NLICL with 0.96 percent. The least CV of 10.55 percent of LIC Nepal which explain the more consistence of the data presented among the life insurance. The fluctuation is more in the SJLIC because the SJIC of 54.83 %. Overall the solvency ratio is very much fluctuating.

4.1.2 Leverage Ratio

A higher Total Equity to Total Assets ratio indicates that a larger proportion of the company's assets are funded by equity capital rather than debt. This suggests a lower degree of financial leverage and may indicate a more conservative financial structure. On the other hand, a lower ratio implies a higher reliance on debt financing, which may increase the company's financial risk and leverage.

Table 3

Leverage Ratio

Years	NLICL	NLIC	LIC Nepal	ALIC	SJLIC
2022	9.79	26.01	5.28	9.64	19.71
2021	10.13	8.47	5.03	9.93	22.64
2020	11.03	9.3	4.95	11.5	27.05
2019	12.42	11.9	5.8	12.86	18.67
2018	10.31	15.54	6.69	9.41	26.65
2017	10.45	14.66	4.67	8.65	26.79
2016	10.29	8.29	5.59	9.99	27.12
2015	11.89	8.21	5.41	13.63	33.14
2014	9.95	8.85	5.74	18.32	9.66
2013	8.7	8.9	5.02	21.6	20
Mean	10.49	12.01	5.41	12.55	23.14
SD	1.06	5.61	0.57	4.27	6.5
CV	10.12	46.70	10.68	34.04	28.09

Source: *Appendix-2*

Table 3 shows the Leverage Ratio is maximum during the year 2015with 33.14 percent in recent ten year's period among 5 sample life insurance companies and minimum Leverage Ratio is reported for recent year 2017 with 4.67 percent. The standard deviation of SJLIC is highest having 6.5 percent and lowest standard deviation is LIC Nepal with 0.57 percent. The least CV of 10.12 percent of NLICL which explain the more consistence of the data presented among the life insurance. The fluctuation is more in the NLIC because the NLIC of 46.7 %. Overall the Leverage Ratio is very much fluctuating.

4.1.3 Investment

Insurance companies often invest substantial portions of their assets in various financial instruments to generate returns that can help offset claims payouts and operational expenses while also ensuring long-term financial stability and growth. These investments typically include a diverse range of asset classes such as bonds, equities, real estate, and alternative investments like private equity and hedge funds.

One of the primary objectives of insurance company investments is to maintain an appropriate balance between risk and return. To achieve this, insurers typically allocate their investment portfolios across different asset classes based on their risk tolerance, investment objectives, regulatory requirements, and market conditions. For instance, fixed-income

securities such as government and corporate bonds are commonly favored by insurance companies for their relatively stable returns and lower risk compared to equities.

Table 4

Investment

Years	NLICL	NLIC	LIC Nepal	ALIC	SJLIC
2022	51661	143823	76364	31038	14331
2021	45287	119170	66163	27805	9585
2020	34338	94650	54815	19671	8825
2019	28251	71930	45589	16128	8319
2018	22297	58760	42539	12048	4526
2017	18879	47570	33288	8841	3141
2016	16244	33941	25073	7241	2420
2015	13385	24522	20513	4678	1663
2014	10616	18333	15418	3584	1194
2013	8697	13535	12168	2524	865
Mean	24965.5	62623.4	39193	13355.8	5486.9
SD	14716.4	44460.3	21817.4	10091.9	4526.73
CV	58.94	70.99	55.66	75.56	82.5

Source: *Appendix-2*

Table 4 show the investment is maximum during the year 2015 with 143823 million in recent ten year's period among 5 sample life insurance companies and minimum investment is reported for recent year 2013 with 865 million. The standard deviation of NLIC is highest having 44460.3 and lowest standard deviation is SJLIC with 4526.73 percent. The least CV of 55.66 percent of LIC Nepal which explain the more consistence of the data presented among the life insurance. The fluctuation is more in the SJLIC because the SJLIC of 82.5%. Overall the investment is very much fluctuating.

4.1.4 Liquidity Ratio

The liquidity ratio, often represented by the current ratio, is a fundamental financial metric used to assess a company's ability to meet its short-term financial obligations. It provides insight into the company's liquidity position by comparing its current assets to its current liabilities. Current assets include cash, accounts receivable, inventory, and other assets that are expected to be converted into cash within a year, while current liabilities consist of obligations due within the same period, such as accounts payable, short-term debt, and accrued expenses. A current ratio greater than 1 indicates that the company has more current

assets than current liabilities, suggesting it should be able to cover its short-term obligations comfortably. However, a very high current ratio may indicate inefficiency in asset utilization or an excessive amount of idle resources.

Table 5

Liquidity Ratio

Years	NLICL	NLIC	LIC Nepal	ALIC	SJLIC
2022	1.28	7.64	2.72	1.62	3.14
2021	1.19	7.06	3.04	1.4	7.88
2020	1.5	3.64	2.14	3.84	3.35
2019	1.95	4.74	2.64	4.87	2.32
2018	3.59	3.75	3.67	4.23	3
2017	2.76	8.76	3.02	5.63	4.22
2016	1.28	15.65	16.69	4.74	5.23
2015	1.02	12.56	13.87	31.39	4.75
2014	1.25	8.09	12.08	14.56	6.75
2013	1.41	4.87	4.4	15.48	6.89
Mean	1.72	7.67	6.42	8.77	4.75
SD	0.82	3.9	5.51	9.3	1.89
CV	48.04	50.9	85.84	106.19	39.93

Source: *Appendix-2*

Table 5 show the Liquidity Ratio is maximum during the year 2015 with 31.39 times in recent ten year's period among 5 sample life insurance companies and minimum Liquidity Ratio is reported for recent year 2015 with 1.02 times. The standard deviation of ALIC is highest having 9.3 and lowest standard deviation is NLICL with 0.82 percent. The least CV of 39.93 percent of SJLIC which explain the more consistence of the data presented among the life insurance. The fluctuation is more in the ALIC because the ALIC of 106.19 %. Overall the Liquidity Ratio is very much fluctuating.

4.1.5 Claim Ratio

The claim ratio is a crucial metric used in the insurance industry to assess the company's profitability and performance in handling claims. It represents the ratio of claims paid out by an insurance company relative to the premiums collected from policyholders within a specific period, typically a year.

A lower claim ratio indicates that the insurance company is effectively managing its claims and operating efficiently, as it's paying out fewer claims relative to the premiums collected.

Conversely, a higher claim ratio may suggest that the insurer is facing higher claim costs compared to the premiums earned, which could potentially impact its profitability.

The claims ratio is the percentage of claims costs incurred in relation to the premiums earned. There are two main reasons why this business is profitable: the premiums are not cheap, and the claims ratio is low. The claims ratio is equal to the claims rate divided by the risk premium rate. The claims ratio is the percentage of claims costs incurred in relation to the premiums earned.

Table 6

Claim Ratio

Years	NLICL	NLIC	LIC Nepal	ALIC	SJLIC
2022	42.81	40.49	50.28	50.03	24.95
2021	32.88	27.89	43.55	43.55	22.13
2020	32.14	22.33	25.31	25.31	15.53
2019	32.44	35.03	25.36	25.36	11.08
2018	30.41	38.08	22.47	22.47	13.6
2017	32.31	23.92	20.66	20.66	12.03
2016	28.58	13.13	10.2	10.2	5.64
2015	30.72	11.54	10.64	10.64	5.62
2014	32.47	13.12	11.92	11.92	3.15
2013	35.02	17.98	10.38	10.38	1.88
Mean	32.97	24.35	23.07	23.05	11.56
SD	3.85	10.73	14.06	14.01	7.79
CV	11.68	44.06	60.96	60.80	67.38

Source: *Appendix-2*

Table 6 show the claims ratio is maximum during the year 2022 with 42.81 percent in recent ten year's period among 5 sample life insurance companies and minimum claims ratio is reported for recent year 2013 with 1.88 percent. The standard deviation of LIC Nepal is highest having 14.06 and lowest standard deviation is NLICL with 3.85 percent. The least CV of 11.68 percent of NLICL which explain the more consistence of the data presented among the life insurance. The fluctuation is more in the SJLIC because the SJLIC of 67.38 %. Overall the claims ratio is very much fluctuating.

4.1.6 Profitability Ratio (ROE)

Profitability ratios are a class of financial metrics that are used to assess a business's ability to generate earnings relative to its revenue, operating costs, balance sheet assets, or

shareholders' equity over time, using data from a specific point in time. Profitability ratios can be compared with efficiency ratios, which consider how well a company uses its assets internally to generate income (as opposed to after-cost profits). For most profitability ratios, having a higher value relative to a competitor's ratio or relative to the same ratio from a previous period indicates that the company is doing well.

Table 7

Profitability Ratio (ROE)

Years	NLICL	NLIC	LIC Nepal	ALIC	SJLIC
2022	11.65	-0.02	19.24	11.16	8.77
2021	12.13	18.28	16.88	10.04	8.65
2020	15.6	11.68	19.83	9.47	10.66
2019	8.87	14.43	8.58	8.91	15.26
2018	18.08	14.87	44.62	6.5	13.61
2017	18.6	13.5	7.96	10.57	7.63
2016	18.43	30.11	18.76	3.37	20.48
2015	15.71	23.69	20.36	10.37	14.17
2014	28.43	34.61	19.6	16.62	67.15
2013	52.14	58.33	40.86	18.08	48
Mean	19.9	21.94	21.66	10.5	21.4
SD	12.4	16.1	12.02	4.29	19.9
CV	62.59	73.35	55.47	40.87	93.02

Source: *Appendix-2*

Table 7 show the Profitability ratios is maximum during the year 2013 with 58.33 percent in recent ten year's period among 5 sample life insurance companies and minimum Profitability ratios is reported for recent year 2022 with negative 0.02 percent. The standard deviation of SJLIC is highest having 19.9 and lowest standard deviation is ALIC with 4.29 percent. The least CV of 40.87 percent of ALIC which explain the more consistence of the data presented among the life insurance. The fluctuation is more in the SJLIC because the SJLIC of 93.02 %. Overall the Profitability ratios is very much fluctuating.

4.1.8 Firm's Size

Firm's size accounts for the existing economies and diseconomies of scale in the financial market. Larger banks tend to be more active in markets, have a greater product and have better possibilities for risk diversification (Lehar, 2005). Also, larger banks can make efficiency gains as they do not operate in the too competitive market. However, the extent to

which financial, legal and other factors affect the profitability of firm is closely related to its size.

Table 8

Firm's Size

Years	NLICL	NLIC	LIC Nepal	ALIC	SJLIC
2022	4.81	5.29	5	4.57	4.26
2021	4.75	5.1	4.94	4.53	4.16
2020	4.63	5.01	4.87	4.39	4.06
2019	4.54	4.89	4.77	4.3	4
2018	4.44	4.8	4.67	4.17	3.75
2017	4.36	4.71	4.58	4.06	3.6
2016	4.28	4.56	4.49	3.96	3.45
2015	4.15	4.43	4.35	3.72	3.29
2014	4.07	4.3	4.24	3.61	3.15
2013	4	4.17	4.13	3.46	2.7
Mean	4.4	4.72	4.6	4.07	3.64
SD	0.28	0.36	0.29	0.38	0.50
CV	6.38	7.63	6.50	9.46	13.75

Source: *Appendix-2*

Table 8 show the Firm's Size is maximum during the year 2021 with 5.1 in recent ten year's period among 5 sample life insurance companies and minimum Firm's Size is reported for recent year 2013 with 2.7. The standard deviation of SJLIC is highest having 0.5 and lowest standard deviation is NLICL with 0.28 percent. The least CV of 6.38 percent of NLICL which explain the more consistence of the data presented among the life insurance. The fluctuation is more in the SJLIC because the SJLIC of 13.75 %. Overall the Firm's Size is very much fluctuating.

4.2 Descriptive Statistics Analysis

Descriptive statistics involve analyzing both dependent and independent variables through various statistical calculations, including minimum, maximum, mean, and standard deviation. These calculations provide insights into the current status of each variable within the manufacturing companies.

Table 9

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
solvency	50	2.02	20.41	9.23	5.02
leverage	50	4.67	33.14	12.72	7.16
investment	50	865.00	143823.00	29124.92	30508.28
liquidity	50	1.02	31.39	5.87	5.59
Claim Ratio	50	1.88	50.28	23.00	12.44
profitability	50	-.02	67.15	19.10	14.09
firm size	50	2.70	5.29	4.29	.53
Inflation rate	50	3.63	9.04	6.27	2.0
Valid N (listwise)	50				

Source: *Appendix-2*

Table 9 shows the descriptive statistics of the variables. The independent variables of the research are leverage, investment, liquidity, Claim Ratio, profitability, firm size and Inflation rate. The dependent variables of the research is solvency ratio. The total number of observation are 50 from different five insurance companies. The minimum, maximum, mean and standard deviation are shows for understanding the current status of the given variables.

The minimum, maximum, mean and standard deviation of solvency ratio is 2.02, 20.41, 9.23 and 5.02 respectively. The minimum, maximum, mean and standard deviation of leverage ratio is 4.67, 33.14, 12.72 and 7.16 respectively. The minimum, maximum, mean and standard deviation of investment is 865.00, 143823.00, 29124.92 and 30508.28 respectively. The minimum, maximum, mean and standard deviation of liquidity ratio is 1.02, 31.39, 5.87 and 5.59 respectively. The minimum, maximum, mean and standard deviation of Claim Ratio is 1.88, 50.28, 23.00 and 12.44 respectively. The minimum, maximum, mean and standard deviation of profitability is -.02, 67.15, 19.10 and 14.09 respectively. The minimum, maximum, mean and standard deviation of firm size is 2.70, 5.29, 4.29 and 0.53 respectively. The minimum, maximum, mean and standard deviation of Inflation rate is 3.63, 9.04, 6.27 and 2.0 respectively.

The minimum, maximum, mean and standard deviation of the given table shows the different in the minimum and maximum. The high different in the mean and minimum and maximum. The standard deviation also seem high. On the basis of the given truth the current status of the given each of the variables are fluctuating in nature.

4.3 Correlation Analysis

Correlation analysis is the analysis of the finding out the relationship between dependent and independent variables. Here we calculated the correlation with the independent variables of the research are leverage, investment, liquidity, Claim Ratio, profitability, firm size and Inflation rate. The dependent variables of the research is solvency ratio.

Table 10

Correlation Analysis

		SOL	LEV	INV	LIQ	CR	PRO	FSZ	IFRN
SOL	Pearson Correlation	1							
LEV	Pearson Correlation	-.858**	1						
INV	Pearson Correlation	.225	-.208	1					
LIQ	Pearson Correlation	-.016	.027	-.134	1				
CR	Pearson Correlation	.158	-.295*	.556**	-.496**	1			
PRO	Pearson Correlation	.202	-.245	-.241	.026	-.293*	1		
FSZ	Pearson Correlation	.447**	-.496**	.806**	-.233	.707**	-.350*	1	
IFRN	Pearson Correlation	.023	-.016	-.349*	.386**	-.441**	.488**	-.462**	1
	N	50	50	50	50	50	50	50	50

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Source: *Appendix-2*

Table 9 shows the correlation analysis of the variables. The independent variables of the research are leverage, investment, liquidity, Claim Ratio, profitability, firm size and Inflation rate. The dependent variables of the research is solvency ratio. The total number of observation are 50 from different five insurance companies. The table is maintain for the achievement of the objective two related to the relationship between the independent and dependent variables.

The relationship between solvency and leverage ratio is moderately negative at -0.858, indicating a moderate correlation. The correlation is statistically significant, supporting the hypothesis, as the p-value is less than 1%, which is considered significant at the 1% level.

The relationship between solvency and investment is low positive at 0.225, indicating a low correlation. The correlation is statistically not significant, not supporting the hypothesis, as the p-value is more than 5%, which is not significant.

The relationship between solvency and liquidity is low negative at 0.016, indicating a low correlation. The correlation is statistically not significant, not supporting the hypothesis, as the p-value is more than 5%, which is not significant.

The relationship between solvency and Claim Ratio is low positive at 0.158, indicating a low correlation. The correlation is statistically not significant, not supporting the hypothesis, as the p-value is more than 5%, which is not significant.

The relationship between solvency and profitability is low positive at 0.202, indicating a low correlation. The correlation is statistically not significant, not supporting the hypothesis, as the p-value is more than 5%, which is not significant.

The relationship between solvency and firm size is low positive at 0.447, indicating a low correlation. The correlation is statistically significant, supporting the hypothesis, as the p-value is less than 1%, which is called 1% level of significant.

4.4 Regression Analysis

The aim of multiple regression analysis is to predict changes in the dependent variable by considering changes in the independent variables. This analysis serves to assess the effectiveness of multiple regressions as predictors. Furthermore, the multiple determination can be interpreted as the percentage of variability in the dependent variables that can be explained by the regression equation.

Table 11

Model Summary of the Regression

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.878[a]	.770	.732	2.6

a. Predictors: (Constant), Inflation rate, leverage , liquidity , investment , profitability , Claim Ratio, firm size

Source: *Appendix-2*

Table 11 shows the model summary of 50 observations of five life insurance companies in Nepal. where R^2=0.77 means 77% of total variations in solvency ratio is explained by independent variable i.e Inflation rate, leverage , liquidity , investment , profitability , Claim Ratio, firm size but 23% of total variation on employee performance is explained by other factors.

Table 12

ANOVA of the Regression

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	953.627	7	136.232	20.091	.000[b]
	Residual	284.786	42	6.781		
	Total	1238.414	49			

a. Dependent Variable: solvency

b. Predictors: (Constant), Inflation rate, leverage , liquidity , investment , profitability , Claim Ratio, firm size

Source: *Appendix-2*

Table 12 shows the ANOVA of five insurance companies of 50 observations. Here dependent variable solvency ratio called predictor and independent variable Inflation rate, leverage ratio, liquidity ratio, investment, profitability ratio, Claim Ratio and firm size. Here regression is significant because significant value is 0.000 which is less than 5%. Its mean the regression is strong.

Table 13

Coefficient of the Variables

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	15.588	9.235		1.688	.099		
	leverage	-.616	.082	-.879	-7.479	.000	.397	2.520
	investment	1.71	.000	.104	.712	.481	.255	3.924
	liquidity	-.095	.085	-.106	-1.112	.272	.607	1.648
	Claim Ratio	-.114	.049	-.282	-2.346	.024	.378	2.643
	profitability	-.017	.038	-.047	-.446	.658	.491	2.038
	firm size	.937	1.977	.099	.474	.638	.124	8.054
	Inflation rate	.076	.247	.030	.308	.760	.564	1.773

a. Dependent Variable: solvency

Source: *Appendix-2*

Table 13 shows the coefficient of five insurance companies of 50 observations. Here dependent variable solvency ratio called predictor and independent variable Inflation rate, leverage ratio, liquidity ratio, investment, profitability ratio, Claim Ratio and firm size. Here coefficient table shows the individual variable variation to the dependent variable, their accuracy, significant level and variables inflation factors (VIF).

The solvency and leverage related ratio has beta of negative 0.616. It represent that 1% change in leverage negative 0.616% change in solvency. The standard error is 0.082 which is low it mean the calculated result is accurate high. The significant value is 0.000 its mean the hypothesis is true because leverage is significantly impact to the solvency. The variable inflation factor (VIF) is 2.520 it means the independent variable leverage has low inflation to the other independent variable so it's appropriate variable under study because VIF is below 10.

The solvency and investment related ratio has beta of positive 1.71. It represent that 1% change in investment positive 1.71% change in solvency. The standard error is 0.000 which is low it mean the calculated result is accurate high. The significant value is 0.481 its mean

the hypothesis is not true because investment is not significantly impact to the solvency. The variable inflation factor (VIF) is 3.924 it means the independent variable investment has low inflation to the other independent variable so it's appropriate variable under study because VIF is below 10.

The solvency and liquidity related ratio has beta of negative 0.095. It represent that 1% change in liquidity negative 0.095% change in solvency. The standard error is 0.085which is low it mean the calculated result is accurate high. The significant value is 0.272 its mean the hypothesis is not true because liquidity is not significantly impact to the solvency. The variable inflation factor (VIF) is 1.648 it means the independent variable liquidity has low inflation to the other independent variable so it's appropriate variable under study because VIF is below 10.

The solvency and Claim Ratio related ratio has beta of negative 0.114. It represent that 1% change in Claim Ratio negative 0.114% change in solvency. The standard error is 0.049 which is low it mean the calculated result is accurate high. The significant value is 0.024 its mean the hypothesis is true because Claim Ratio is significantly impact to the solvency. The variable inflation factor (VIF) is 2.643 it means the independent variable Claim Ratio has low inflation to the other independent variable so it's appropriate variable under study because VIF is below 10.

The solvency and profitability related ratio has beta of negative 0.017. It represent that 1% change in profitability negative 0.017% change in solvency. The standard error is 0.038 which is low it mean the calculated result is accurate high. The significant value is 0.658 its mean the hypothesis is not true because profitability is not significantly impact to the solvency. The variable inflation factor (VIF) is 2.038 it means the independent variable profitability has low inflation to the other independent variable so it's appropriate variable under study because VIF is below 10.

The solvency and firm size related ratio has beta of positive 0.937. It represent that 1% change in firm size positive 0.937% change in solvency. The standard error is 1.977 which is low it mean the calculated result is accurate high. The significant value is 0.638 its mean the hypothesis is not true because firm size is not significantly impact to the solvency. The variable inflation factor (VIF) is 8.054 it means the independent variable firm size has low

inflation to the other independent variable so it's appropriate variable under study because VIF is below 10.

The solvency and Inflation rate related ratio has beta of positive 0.076. It represent that 1% change in Inflation rate positive 0.076% change in solvency. The standard error is 0.247 which is low it mean the calculated result is accurate high. The significant value is 0.76 its mean the hypothesis is not true because firm size is not significantly impact to the solvency. The variable inflation factor (VIF) is 1.773 it means the independent variable Inflation rate has low inflation to the other independent variable so it's appropriate variable under study because VIF is below 10.

4.2 Discussion

The first objectives of research is to examine the current status factors determining solvency of life insurance companies in Nepal. It is found that the solvency ratio, the Leverage Ratio, the investment, the Liquidity Ratio, the claims ratio, the Profitability and the Firm's Size is very much fluctuating. The result is consistence with the result of Siddik et al., (2022). The minimum, maximum, mean and standard deviation of the given table shows the different in the minimum and maximum. The high different in the mean and minimum and maximum. The standard deviation also seem high. On the basis of the given truth the current status of the given each of the variables are fluctuating in nature. The result is consistence with the result of Sukmaningrum, Hendratmi, Putri and Gusti (2023).

The second objectives of research is to examine the relationship between leverage, investment, liquidity, claim ratio, profitability, inflation, firm's size and solvency of Nepalese life insurance companies. It is found that the relationship between solvency and leverage ratio is moderately negative and statistically significant, supporting the hypothesis. The result is consistence with the result of Siddik et al., (2022).The relationship between solvency and investment is low positive and statistically not significant, not supporting the hypothesis. The result is consistence with the result of Zanotto and Clemente, (2022). The relationship between solvency and liquidity is low negative and statistically not significant, not supporting the hypothesis. The result is consistence with the result of Ningsih and Purwohedi, (2021).The relationship between solvency and Claim Ratio is low positive and

statistically not significant, not supporting the hypothesis. The result is consistence with the result of Moreno et al., (2020).

The relationship between solvency and profitability is low positive and statistically not significant, not supporting the hypothesis. The result is consistence with the result of Rubio-Misas and Fernández-Moreno, (2017). The relationship between solvency and firm size is low and statistically significant, supporting the hypothesis. The result is consistence with the result of Rauch and Wende, (2015).

The third objectives of research is to analyze the impact of leverage, investment, liquidity, claim ratio, profitability, inflation, firm's size to the solvency of Nepalese life insurance companies. It is found that the solvency and leverage related ratio has beta of negative its mean the hypothesis is true because leverage is significantly impact to the solvency. The result is consistence with the result of Rauch and Wende, (2015). The solvency and investment related ratio has beta of positive its mean the hypothesis is not true because investment is not significantly impact to the solvency. The result is consistence with the result of Caporale et al., (2017). The solvency and liquidity related ratio has beta of negative its mean the hypothesis is not true because liquidity is not significantly impact to the solvency. The result is consistence with the result of Moreno et al., (2020). The solvency and Claim Ratio related ratio has beta of negative its mean the hypothesis is true because Claim Ratio is significantly impact to the solvency. The result is consistence with the result of Zanotto and Clemente, (2022). The solvency and profitability related ratio has beta of negative its mean the hypothesis is not true because profitability is not significantly impact to the solvency. The result is consistence with the result of Siddik et al., (2022). The solvency and firm size related ratio has beta of positive its mean the hypothesis is not true because firm size is not significantly impact to the solvency. The result is consistence with the result of Alokla et al., (2022). The solvency and Inflation rate related ratio has beta of positive its mean the hypothesis is not true because firm size is not significantly impact to the solvency. The result is consistence with the result of Sukmaningrum, Hendratmi, Putri and Gusti (2023).

CHAPTER-V

SUMMARY AND CONCLUSION

This chapter is the final chapter of the study which consists of summary, conclusion and implications. As mentioned in the objectives of the study, this chapter summarizes the determinants of the solvency position of Life Insurance Companies of Nepal.

5.1 Summary

Solvency refers to a company's ability to meet its long-term debts and other financial obligations, serving as a crucial measure of its financial health and capability to sustain operations into the foreseeable future. Investors often utilize ratios to assess a company's solvency. The significance of examining the solvency of insurance companies has grown in recent times due to intense competition in the insurance industry. Company management, shareholders, employees, and policyholders are all concerned with ensuring the company's continuity, enhancing its reputation, mitigating risks, and attracting regulatory attention to its financial standing. Insurance, as a risk-mitigating tool, involves an agreement between the insurer and the insured. The insurer guarantees compensation for losses resulting from specific causes during a defined period, in exchange for a consideration known as the premium. Insurance companies play a vital role among financial institutions and intermediaries, contributing to the overall development of a country by providing certainty to industry, trade, and business through the investment of collected funds as premiums. On the basis of given background the study is conducted on “Determinants of the solvency of life insurance companies in Nepal”.

The problem of the study are what are the current status of determinants of solvency of life insurance companies in Nepal? How is solvency of Nepalese insurance companies related with investment, leverage, liquidity, claim, profitability, inflation and firm’s size related variables? Is overall effect of investment, leverage, liquidity, claim, profitability, inflation and firm’s size related variables significant on solvency of life insurance companies in Nepal? to find out the solution of the certain objectives are fixed and they are to examine the current status factors determining solvency of life insurance companies in Nepal, to examine the relationship between leverage, investment, liquidity, claim ratio, profitability, inflation,

firm's size and solvency of Nepalese life insurance companies and To analyze the impact of leverage, investment, liquidity, claim ratio, profitability, inflation, firm's size to the solvency of Nepalese life insurance companies. The independent variables of research are leverage, investment, liquidity, claim ratio, profitability, inflation and firm's size. The dependent variables of research are solvency ratio. The research conducted using the descriptive and casual comparative research design. The sample of the research five life insurance companies on the basis of the availability of the data for previous ten years. Population are all the insurance companies running in Nepal. The research conducted financial analysis or called descriptive analysis for achievement of the result of objectives one. The objective second and third are find out from the statistical analysis of correlation and regression analysis. The finding of the research are the minimum, maximum, mean and standard deviation of the given table shows the different in the minimum and maximum. The high different in the mean and minimum and maximum. The standard deviation also seem high. On the basis of the given truth the current status of the given each of the variables are fluctuating in nature. The relationship of leverage and firm size is significant to the solvency ratio and investment, liquidity, claim ratio and profitability is not significant relationship to the solvency ratio. The impact of the leverage and claim ratio have significant to the solvency ratio. The impact of investment, liquidity, profitability, firm size and inflation rate have not significant impact to the solvency ratio.

5.2 Conclusion

The first objectives of research is to examine the current status factors determining solvency of life insurance companies in Nepal. It is found that the minimum, maximum, mean and standard deviation of the given table shows the different in the minimum and maximum. The high different in the mean and minimum and maximum. The standard deviation also seem high. On the basis of the given truth the current status of the given each of the variables are fluctuating in nature. In conclusion the solvency ratio, the Leverage Ratio, the investment, the Liquidity Ratio, the claims ratio, the Profitability and the Firm's Size is very much fluctuating.

The second objectives of research is to examine the relationship between leverage, investment, liquidity, claim ratio, profitability, inflation, firm's size and solvency of Nepalese

life insurance companies. It is found that the relationship of leverage and firm size is significant to the solvency ratio and investment, liquidity, claim ratio and profitability is not significant relationship to the solvency ratio. In conclusion the the relationship of leverage and firm size is significant to the solvency ratio.

The third objectives of research is to analyze the impact of leverage, investment, liquidity, claim ratio, profitability, inflation, firm's size to the solvency of Nepalese life insurance companies. It is found that the impact of the leverage and claim ratio have significant to the solvency ratio. The impact of investment, liquidity, profitability, firm size and inflation rate have not significant impact to the solvency ratio. In conclusion the impact of the leverage and claim ratio have significant to the solvency ratio.

5.3 Implications

Managerial Implications

Elevated levels of solvency and leverage ratios not only heighten the risk for life insurance companies but also impact the overall liquidity health of the organization. Drawing from the key findings of this study, several implications have been suggested to address solvency issues within the life insurance sector. Beema Samiti is recommended to enhance supervision and inspection activities, ensuring that life insurance companies maintain adequate liquidity to conduct insurance operations without additional risks. Life insurance firms should prioritize maintaining sufficient liquidity to facilitate smooth insurance and investment activities. Providing relevant training on solvency management to managers and staff involved in solvency management is crucial. The insufficient management of liquidity by life insurance companies is a major contributor to the growing liquidity crisis in the Nepalese financial sector, emphasizing the need for comprehensive solvency analysis to maintain a sound liquidity position. Additionally, a larger firm size is deemed essential for efficiently conducting life insurance business, and an appropriately sized firm is seen as indicative of a successful business organization.

Future Scope

This research on the solvency determinants for life insurance companies in Nepal opens up avenues for future exploration. The study, typical of survey research, relies on cross-sectional data and self-reporting. There are notable issues that merit attention in subsequent research

endeavors. The researcher advocates for more extensive studies with larger and more representative samples, crucial for providing a more generalized overview of work activities in the Nepalese context. Future research could encompass a broader array of insurance companies, given that this study is based on only five life insurance companies in Nepal. The coming years are expected to witness heightened global competitiveness in the Nepalese business landscape, with a maturation of the insurance sector in terms of operational years. Exploring solvency in relation to strategic adoption and its consequential impact on the performance of life insurance companies in Nepal would be an intriguing avenue for future investigation. Additionally, future research endeavors might consider incorporating firm size as a determinant variable and analyze its influence on the liquidity performance of the life insurance business. Given its prominence as a determining factor, a thorough examination of the impact of firm size should be conducted in subsequent research studies.

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APPENDICES

Appendix 1: data from Annual Report of the Respective Insurance Companies

National Life Insurance Co. Ltd. (NLICL**)** Rs. In Million

Year	Net profit after tax	Total liabilities	Total assets	Equity	Investment	Current assets	Current liabilities	Net Claim incurred	Net Premium collected
2022	736	58178	64494	6316	51661	3253	2542	6,043	14115
2021	692	50591	56296	5705	45287	3254	2737	4,048	12313
2020	739	38226	42963	4737	34338	2369	1578	2,923	9096
2019	385	30616	34957	4341	28251	2183	1117	2,550	7860
2018	511	24592	27418	2826	22297	4137	1153	1879	6179
2017	441	20313	22684	2371	18879	2953	1068	1559	4825
2016	365	17267	19247	1980	16244	823	644	1029	3600
2015	265	12500	14187	1687	13385	557	547	887	2887
2014	336	10696	11878	1182	10616	637	510	778	2396
2013	450	9061	9924	863	8697	621	441	705	2013

solvency NLICL	leverage	investment	liquidity	Claim Ratio	profitability	firm size	Inflation rate
9.21	9.79	51661	1.28	42.81	11.65	4.81	6.26
8.87	10.13	45287	1.19	32.88	12.13	4.75	4.09
8.07	11.03	34338	1.5	32.14	15.6	4.63	5.05
7.05	12.42	28251	1.95	32.44	8.87	4.54	5.57
8.7	10.31	22297	3.59	30.41	18.08	4.44	4.06
8.57	10.45	18879	2.76	32.31	18.6	4.36	3.63
8.72	10.29	16244	1.28	28.58	18.43	4.28	8.79
7.41	11.89	13385	1.02	30.72	15.71	4.15	7.87
9.05	9.95	10616	1.25	32.47	28.43	4.07	8.36
10.5	8.7	8697	1.41	35.02	52.14	4	9.04

Nepal Life Insurance Co. Ltd. (NLIC) Rs. In Million

Year	Net profit after tax	Total liabilities	Total assets	Equity	Investment	Current assets	Current liabilities	Claim incurred	Premium collected
2022	-11	143844	194413	50569	143823	48412	6334	14167	34988
2021	1966	116195	126950	10755	119170	23544	3335	8910	31949
2020	1108	92515	102000	9485	94650	16575	4549	6093	27282
2019	1336	68561	77819	9258	71930	11564	2441	7993	22819
2018	1453	53107	62880	9773	58760	6218	1658	6239	16386
2017	1005	43308	50750	7442	47570	30153	3442	2884	12055
2016	906	33301	36310	3009	33941	26164	1672	1331	10135
2015	527	24869	27094	2225	24522	18143	1444	920	7973
2014	614	18266	20040	1774	18333	9177	1135	729	5557
2013	774	13576	14903	1327	13535	4851	997	407	2264

Solvency NLIC	leverage	investment	liquidity	Claim Ratio	profitability	firm size	Inflation rate
2.84	26.01	143823	7.64	40.49	-0.02	5.29	6.26
10.8	8.47	119170	7.06	27.89	18.28	5.1	4.09
9.75	9.3	94650	3.64	22.33	11.68	5.01	5.05
7.41	11.9	71930	4.74	35.03	14.43	4.89	5.57
5.43	15.54	58760	3.75	38.08	14.87	4.8	4.06
5.82	14.66	47570	8.76	23.92	13.5	4.71	3.63
11.07	8.29	33941	15.65	13.13	30.11	4.56	8.79
11.18	8.21	24522	12.56	11.54	23.69	4.43	7.87
10.3	8.85	18333	8.09	13.12	34.61	4.3	8.36
10.23	8.9	13535	4.87	17.98	58.33	4.17	9.04

Life Insurance Corporation (Nepal) Ltd. (LIC Nepal) Rs. In Million

Year	Net profit after tax	Total liabilities	Total assets	Equity	Investment	Current assets	Current liabilities	Claim incurred	Premium collected
2022	1010	94212	99461	5249	76364	4523	1660	9123	18145
2021	745	83347	87760	4413	66163	6749	2222	7474	17161
2020	719	69684	73310	3626	54815	4712	2198	3762	14866
2019	296	56020	59468	3448	45589	3886	1472	3399	13404
2018	1406	43941	47092	3151	42539	4319	1177	2338	10407
2017	142	36399	38182	1783	33288	4661	1543	1761	8523
2016	321	28897	30608	1711	25073	20484	1227	710	6958
2015	249	21381	22604	1223	20513	14939	1077	567	5328
2014	194	16249	17239	990	15418	8613	713	490	4110
2013	277	12833	13511	678	12168	4652	1058	327	3150

solvency LIC Nepal	leverage	investment	liquidity	Claim Ratio	profitability	firm size	Inflation rate
17.95	5.28	76364	2.72	50.28	19.24	5	6.26
18.89	5.03	66163	3.04	43.55	16.88	4.94	4.09
19.22	4.95	54815	2.14	25.31	19.83	4.87	5.05
16.25	5.8	45589	2.64	25.36	8.58	4.77	5.57
13.95	6.69	42539	3.67	22.47	44.62	4.67	4.06
20.41	4.67	33288	3.02	20.66	7.96	4.58	3.63
16.89	5.59	25073	16.69	10.2	18.76	4.49	8.79
17.48	5.41	20513	13.87	10.64	20.36	4.35	7.87
16.41	5.74	15418	12.08	11.92	19.6	4.24	8.36
18.93	5.02	12168	4.4	10.38	40.86	4.13	9.04

Asian Life Insurance Co. Ltd. (ALIC) Rs. In Million

Year	Net profit after tax	Total liabilities	Total assets	Equity	Investment	Current assets	Current liabilities	Claim incurred	Premium collected
2022	403	33851	37463	3612	31038	1769	1092	9123	18235
2021	337	30445	33800	3355	27805	2423	1725	7474	17161
2020	269	21860	24701	2841	19671	1887	491	3762	14866
2019	230	17495	20076	2581	16128	1912	393	3399	13404
2018	91	13485	14886	1401	12048	1247	295	2338	10407
2017	104	10386	11370	984	8841	1149	204	1761	8523
2016	31	8288	9208	920	7241	1251	264	710	6958
2015	75	4580	5303	723	4678	4206	134	567	5328
2014	125	3353	4105	752	3584	3029	208	490	4110
2013	113	2269	2894	625	2524	1950	126	327	3150

solvency (ALIC)	leverage	investment	liquidity	claim ratio	profitability	Firm size	Inflation rate
9.37	9.64	31038	1.62	50.03	11.16	4.57	6.26
9.07	9.93	27805	1.4	43.55	10.04	4.53	4.09
7.69	11.5	19671	3.84	25.31	9.47	4.39	5.05
6.78	12.86	16128	4.87	25.36	8.91	4.3	5.57
9.63	9.41	12048	4.23	22.47	6.5	4.17	4.06
10.55	8.65	8841	5.63	20.66	10.57	4.06	3.63
9.01	9.99	7241	4.74	10.2	3.37	3.96	8.79
6.33	13.63	4678	31.39	10.64	10.37	3.72	7.87
4.46	18.32	3584	14.56	11.92	16.62	3.61	8.36
3.63	21.6	2524	15.48	10.38	18.08	3.46	9.04

Surya Jyoti Life Insurance Company Ltd. **(SJLIC)** Rs. In Million

Year	Net profit after tax	Total liabilities	Total assets	Equity	Investment	Current assets	Current liabilities	Claim incurred	Premium collected
2022	314	14595	18177	3582	14331	1372	437	1266	5074
2021	284	11215	14498	3283	9585	3207	407	958	4328
2020	328	8297	11374	3077	8825	1519	454	449	2891
2019	283	8082	9937	1855	8319	764	329	272	2454
2018	205	4144	5650	1506	4526	656	219	227	1669
2017	81	2900	3961	1061	3141	574	136	151	1255
2016	155	2034	2791	757	2420	1904	364	57	1010
2015	91	1295	1937	642	1663	1106	233	35	623
2014	92	1281	1418	137	1194	756	112	12	381
2013	48	400	500	100	865	558	81	4	213

solvency **SJLIC**	leverage	investment	liquidity	Claim Ratio	profitability	firm size	Inflation rate
4.07	19.71	14331	3.14	24.95	8.77	4.26	6.26
3.42	22.64	9585	7.88	22.13	8.65	4.16	4.09
2.7	27.05	8825	3.35	15.53	10.66	4.06	5.05
4.36	18.67	8319	2.32	11.08	15.26	4	5.57
2.75	26.65	4526	3	13.6	13.61	3.75	4.06
2.73	26.79	3141	4.22	12.03	7.63	3.6	3.63
2.69	27.12	2420	5.23	5.64	20.48	3.45	8.79
2.02	33.14	1663	4.75	5.62	14.17	3.29	7.87
9.35	9.66	1194	6.75	3.15	67.15	3.15	8.36
4	20	865	6.89	1.88	48	2.7	9.04

Appendix 2: calculation from SPSS

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
solvency	50	2.02	20.41	9.2394	5.02730
leverage	50	4.67	33.14	12.7248	7.16574
investment	50	865.00	143823.00	29124.9200	30508.28196
liquidity	50	1.02	31.39	5.8709	5.59943
Claim Ratio	50	1.88	50.28	23.0042	12.44428
profitability	50	-.02	67.15	19.1058	14.09283
firm size	50	2.70	5.29	4.2908	.53398
Inflation rate	50	3.63	9.04	6.2720	2.00855
Valid N (listwise)	50				

Correlations

		solvency	leverage	investment	liquidity	Claim Ratio	Profitability	firm size	Inflation rate
solvency	Pearson Correlation	1	-.858**	.225	-.016	.158	.202	.447**	.023
	Sig. (2-tailed)		.000	.116	.911	.272	.159	.001	.874
	N	50	50	50	50	50	50	50	50
leverage	Pearson Correlation	-.858**	1	-.208	.027	-.295*	-.245	-.496**	-.016
	Sig. (2-tailed)	.000		.148	.851	.037	.087	.000	.910
	N	50	50	50	50	50	50	50	50
investment	Pearson Correlation	.225	-.208	1	-.134	.556**	-.241	.806**	-.349*
	Sig. (2-tailed)	.116	.148		.354	.000	.092	.000	.013
	N	50	50	50	50	50	50	50	50
liquidity	Pearson Correlation	-.016	.027	-.134	1	-.496**	.026	-.233	.386**
	Sig. (2-tailed)	.911	.851	.354		.000	.856	.103	.006
	N	50	50	50	50	50	50	50	50
Claim Ratio	Pearson Correlation	.158	-.295*	.556**	-.496**	1	-.293*	.707**	-.441**
	Sig. (2-tailed)	.272	.037	.000	.000		.039	.000	.001
	N	50	50	50	50	50	50	50	50
profitability	Pearson Correlation	.202	-.245	-.241	.026	-.293*	1	-.350*	.488**
	Sig. (2-tailed)	.159	.087	.092	.856	.039		.013	.000
	N	50	50	50	50	50	50	50	50
firm size	Pearson Correlation	.447**	-.496**	.806**	-.233	.707**	-.350*	1	-.462**
	Sig. (2-tailed)	.001	.000	.000	.103	.000	.013		.001
	N	50	50	50	50	50	50	50	50
Inflation rate	Pearson Correlation	.023	-.016	-.349*	.386**	-.441**	.488**	-.462**	1
	Sig. (2-tailed)	.874	.910	.013	.006	.001	.000	.001	
	N	50	50	50	50	50	50	50	50

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.878[a]	.770	.732	2.60396

a. Predictors: (Constant), Inflation rate, leverage , liquidity , investment , profitability , Claim Ratio, firm size

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	953.627	7	136.232	20.091	.000[b]
	Residual	284.786	42	6.781		
	Total	1238.414	49			

a. Dependent Variable: solvency

b. Predictors: (Constant), Inflation rate, leverage , liquidity , investment , profitability , Claim Ratio, firm size

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	15.588	9.235		1.688	.099		
	leverage	-.616	.082	-.879	-7.479	.000	.397	2.520
	investment	1.719E-5	.000	.104	.712	.481	.255	3.924
	liquidity	-.095	.085	-.106	-1.112	.272	.607	1.648
	Claim Ratio	-.114	.049	-.282	-2.346	.024	.378	2.643
	profitability	-.017	.038	-.047	-.446	.658	.491	2.038
	firm size	.937	1.977	.099	.474	.638	.124	8.054
	Inflation rate	.076	.247	.030	.308	.760	.564	1.773

a. Dependent Variable: solvency

Descriptive Statistics[a]

	N	Mean	Std. Deviation
solvency	10	8.6150	.96442
leverage	10	10.4956	1.06272
investment	10	24965.5000	14716.44020
liquidity	10	1.7231	.82778
Claim Ratio	10	32.9787	3.85285
profitability	10	19.9647	12.49705
firm size	10	4.4038	.28129
Inflation rate	10	6.2720	2.09592
Valid N (listwise)	10		

a. Insurance Name = National Life Insurance Co. Ltd. (NLICL)

Descriptive Statistics[a]

	N	Mean	Std. Deviation
solvency	10	8.4833	2.91784
leverage	10	12.0141	5.61085
investment	10	62623.4000	44460.27807
liquidity	10	7.6758	3.90702
Claim Ratio	10	24.3507	10.73109
profitability	10	21.9476	16.09997
firm size	10	4.7264	.36069
Inflation rate	10	6.2720	2.09592
Valid N (listwise)	10		

a. Insurance Name = Nepal Life Insurance Co. Ltd. (NLIC)

Descriptive Statistics[a]

	N	Mean	Std. Deviation
solvency	10	17.6372	1.86135
leverage	10	5.4173	.57874
investment	10	39193.0000	21817.43093
liquidity	10	6.4278	5.51764
Claim Ratio	10	23.0771	14.06924
profitability	10	21.6694	12.02122
firm size	10	4.6042	.29962
Inflation rate	10	6.2720	2.09592
Valid N (listwise)	10		

a. Insurance Name = Life Insurance Corporation (Nepal) Ltd. (LIC Nepal)

Descriptive Statistics[a]

	N	Mean	Std. Deviation
solvency	10	7.6532	2.30970
leverage	10	12.5532	4.27402
investment	10	13355.8000	10091.86218
liquidity	10	8.7758	9.31981
Claim Ratio	10	23.0523	14.01605
profitability	10	10.5092	4.29557
firm size	10	4.0790	.38613
Inflation rate	10	6.2720	2.09592
Valid N (listwise)	10		

a. Insurance Name = Asian Life Insurance Co. Ltd. (ALIC)

Descriptive Statistics[a]

	N	Mean	Std. Deviation
solvency	10	3.8083	2.08835
leverage	10	23.1441	6.50190
investment	10	5486.9000	4526.73347
liquidity	10	4.7520	1.89791
Claim Ratio	10	11.5622	7.79111
profitability	10	21.4382	19.94264
firm size	10	3.6407	.50075
Inflation rate	10	6.2720	2.09592
Valid N (listwise)	10		

a. Insurance Name = Surya Jyoti Life Insurance Company Ltd. (SJLIC)