THE EFFECT OF ASSET- LIABILITY MANAGEMENT ON THE PROFITABILITY OF LONG-TERM INSURANCE BUSINESSES IN KENYA.

MUSINGILWA SERGE
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MASTER OF COMMERCE

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DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the dissertation itself.

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28th March 2025

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ABSTRACT

Asset-Liability Management (ALM) is critical for the financial sustainability of long-term insurance companies, where the balance between profitability and fulfilling policyholder obligations must be meticulously managed. Despite the significance of the insurance sector to Kenya's economy, contributing approximately 2% to the GDP, the relationship between ALM and the profitability remains insufficiently studied compared to the banking sector. This study aims to fill this gap by investigating the impact of ALM on the profitability of 25 long-term insurance companies in Kenya over the period from 2013 to 2022. The research adopts a positivist approach, leveraging secondary panel data and employing a Three-Stage Least Squares (3SLS) regression model, complemented by Random Effects (RE) and Fixed Effects (FE) models for robustness checks. The findings of the study indicate that effective asset management, characterized by the efficient utilization of resources, significantly enhances profitability. This suggests that insurers who adeptly manage their assets can achieve superior financial outcomes. Furthermore, larger firms with greater market share are better positioned to capitalize on asset management efficiencies, due to economies of scale and more diversified investment portfolios, which enhance their profitability. Conversely, the study found that maintaining excessively high levels of solvency—while crucial for risk management—can negatively impact profitability. This implies that an overly conservative approach to solvency, which prioritizes high capital buffers, may inadvertently constrain profitability. Interestingly, the analysis showed that claims management did not have a significant direct impact on profitability, indicating that the mere handling of claims does not necessarily drive financial success. Additionally, the study identified that macroeconomic factors, specifically inflation and interest rates, also play a significant role in influencing profitability. Higher inflation rates were found to potentially boost nominal returns on investments, while higher interest rates contributed to increased returns on fixed-income investments. These factors can partially offset the negative effects of high solvency levels, highlighting the complex interplay between external economic conditions and internal financial management strategies. Given these findings, the study recommends that insurers focus on optimizing asset management strategies, such as diversifying investment portfolios and adopting innovative asset management technologies, to improve profitability. Additionally, larger firms should leverage their size to further enhance financial outcomes through better risk management practices. Regulators should consider setting optimal solvency benchmarks that balance the need for financial stability with the goal of maintaining healthy profitability, avoiding excessively stringent solvency requirements. Since claims management alone was not a significant determinant of profitability, insurers are encouraged to integrate comprehensive risk assessment frameworks to identify and address other factors that may influence profitability. Finally, the study suggests that insurers should monitor and respond to macroeconomic conditions, such as inflation and interest rates, to better align their investment strategies with prevailing economic trends.

Keywords: Asset-Liability Management, Asset Turnover Ratio, Loss Ratio, Solvency Ratio

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LIST OF ABBREVIATIONS

ALM	Asset-Liability Management
ASM	Available Solvency Margin
GDP	Gross Domestic Product
IRA	Insurance Regulatory Authority
LogTA	Natural Logarithm of Total Assets
MCR	Minimum Capital Required
MFIs	Microfinance Institutions
ROE	Return on Equity
RSM	Required Solvency Margin

DEFINITION OF TERMS

Asset-Liability Management (ALM)	The strategic management of the balance sheet for risk optimization of liabilities and assets, considering all market risks (Rosen & Zenios, 2006).
Asset Turnover Ratio (ATR)	The ratio of total revenue (including premiums collected, investment income, and other revenue related to insurance operations) to total assets, used as a measure of asset management (Batool & Sahi, 2020).
Insurance Regulatory Authority (IRA)	The regulatory body overseeing the insurance industry in Kenya (Insurance Regulatory Authority, 2022).
Logarithm of Total Assets (LogTA)	The natural logarithm of total assets, used as a control variable to account for variations in technology, investment opportunities, and economies of scale among insurance companies (Abebe, 2022).
Long-Term Insurance Businesses	Refers to insurance companies or firms that specialize in providing insurance products and services with long-term commitments, such as life assurance, annuities, pensions, permanent health insurance, and investment-linked insurance (Insurance Act, CAP 487 of the Kenyan Laws).
Loss Ratio	The loss ratio is a metric in insurance that shows the relationship between what an insurer pays out in claims (including adjustment expenses) and the premiums they earn. It is

	calculated by dividing the sum of paid claims and adjustment expenses by the total earned premiums (Malik, 2011).
Minimum Capital Required (MCR)	The minimum amount of capital that insurance companies are required to maintain to meet regulatory standards (Kamau, 2020).
Return on Equity (ROE)	Return on equity (ROE) measures the shareholders' return on their invested equity. This is an index of profitability measured by translating the net profits with overall equity. A high ROE demonstrates an effective usage of the bank's equities and higher management efficiency (Nicodem, 2020).

CHAPTER ONE : INTRODUCTION

1.1. Background to the study

1.1.1. Insurance Sector in Kenya

The insurance sector employs a sizable number of people in both developed and developing markets. In addition to directly employing people, insurers also significantly contribute to the indirect employment of many professionals, including agents, brokers, financial intermediaries, and other service providers in industries including IT, transportation, auditing, and consulting (Liedtke, 2007). Aside from the employment and compensation for financial losses that insurance provides, it is a crucial element in the capitalization mechanism of a modern, market-driven economy. It creates large capital assets. In Kenya, the value of investments on the balance sheet of insurance companies stands at over KES. 800 billion (Insurance Regulatory Authority, 2023). Due to the nature of the contracts and the often very lengthy time horizons involved, the money invested by insurance companies typically stays in the financial market of the economy for a long time. Rather than rushing around in search of fast gains, this investment made by insurance companies is focused on the medium to long term. Thus, it has a unique function supporting the expansion of an economy.

In Kenya, the insurance industry made revenues of KES 312 billion as of 2022, which represented approximately 2% of the country's GDP, which stood at KES 13 trillion (Association of Kenya Insurers, 2022). The industry had seen an annual growth rate of 13.5%, which is significantly higher than the average historical GDP growth rate of 1.21% from 2005 to 2022 in the country. Between 2018 and 2022, shareholders' capital, life funds, and reserves experienced a compounded annual growth rate (CAGR) of 1.88%. This translates to a 9.59% increase in 2022, bringing the total from KES 119 billion to KES 131 billion. Notably, total assets and liabilities also saw significant growth over this five-year period, increasing by 7.7% and 8.9%, respectively.

The significance of the insurance sector to an economy cannot be fully gauged solely by its scale, workforce, assets, or GDP contribution. It serves a deeper purpose in a modern society, acting as a crucial prerequisite for numerous activities that would otherwise not occur without insurance (Liedtke, 2007). While insurers play a role in enhancing financial stability through their ability to redistribute risks in the economy and their typically long-term investment strategies, they also possess the capability to disrupt the financial system. Specifically, challenges faced by insurers have the potential to impact not just the individuals and businesses

that have purchased insurance, but also financial markets through the insurers' investment actions, as well as banks and other financial institutions through both direct and indirect connections (European Central Bank, 2009). Therefore, the stability of investments made by insurance companies—and their alignment with their liabilities—has a profound impact on both the sector's performance and its ability to weather financial shocks and by doing so, maintaining economic stability.

1.1.1.1. The long-term insurance industry

The Insurance Act, CAP 487 of the Kenyan Laws, defines long-term insurance business as one including insurance business of all or any of the following classes: life assurance, annuities, pensions (personal pension or deposit administration), group life, group credit; permanent health, investment (unit link and linked investments or non-linked investments); and includes, in relation to any insurer, business carried on by the insurer as incidental to any such class of insurance business.

As of 2022, the sub-sector had a total gross written premium amount of KES. 141.32 billion which represents 45.27% of the total industry value (Association of Kenya Insurers, 2023). The sector had shown a 5-year growth rate of 11.28% from 2018 to 2022.

Reports (Actuarial Services E.A Limited, 2021) show that as of 2020, The Kenyan long-term insurance sector exhibited moderate financial performance, with profitability averaging 2.0% over a five-year period. However, profitability fluctuates, with a significant rise (to 5.2%) in 2019 tied to a 67.5% increase in investment income. This highlights the importance of investment performance, which constitutes the bulk of the assets for these companies, for the sector's overall success. These fluctuations underscore the critical influence of investment performance on overall profitability. As long-term insurers manage substantial assets to meet liabilities spanning decades, any misalignment between these assets and liabilities can jeopardize profitability, solvency, and market confidence. This highlights the need for robust asset-liability management (ALM) practices to stabilize performance and ensure financial health.

1.1.1.2. Risk-based supervision.

In Sub-Saharan Africa's insurance regulation landscape, Kenya stands out for its adoption of risk-based supervision (RBS) over the prevailing compliance-based approach in the region. Unlike most countries in the area, only South Africa mirrors Kenya's adoption of RBS, while

others like Uganda are in the process of transitioning. RBS differs from traditional compliance-based models by focusing on assessing risks inherent in insurance operations rather than just adherence to set rules.

RBS mandates supervisors to scrutinize insurers' risk identification and management, evaluating the likelihood and impact of significant risks and the efficacy of mitigation measures. Compliance-based supervision, on the other hand, ensures adherence to rules without emphasizing risk management strategies (Njeru, 2018).

RBS is dynamic and forward-looking, enabling proactive identification of emerging risks and resource allocation accordingly. It emphasizes consistency, transparency, and proportionality in decision-making, promoting collaboration between supervisors and financial institutions for deeper risk understanding and sound risk management (The Toronto Center, 2018).

In Kenya, the Insurance Regulatory Authority (IRA) operates under RBS, with discretionary power to mandate insurers to increase paid-up capital based on risk factors. This approach highlights Kenya's adaptive and proactive supervision, aimed at safeguarding financial stability amidst evolving market dynamics and risk landscapes. However, effective risk management within this framework depends on the implementation of sound ALM practices.

1.1.2. Asset-Liability Management

The management of assets and liabilities is defined as the strategic management of the balance sheet for risk optimization of liabilities and assets banks taking into account all market risks (Rosen & Zenios, 2006). The management of assets and liability's objective is similar to the management of risk, it aims to help banks and insurance companies to achieve a balance between risks and profitability, this is realized using good planning of liquidity both short-term and long-term, through the process of internally transferred funds, the planning and allocation of capital, profitability measurement and risk management trading (Trenca & Cociuba, 2014).

The ALM department, whether in an insurance company or in a bank, is therefore responsible for producing studies providing recommendations on marketing strategy and asset allocation (Corlosquet-Habart, Gehin, Janssen, & Manca, 2015).

In the world, prior to the 1970s, interest rates in developed countries varied little, and thus losses caused by asset and liability mismatches were low. Interest rate volatility began in the 1970s and persisted through the early 1980s. The effects of this volatility on financial

institutions were dangerous. The market for USD deposits migrated overseas as a result of US regulation which had set a ceiling on the interest rates that banks could pay depositors. Most businesses employed accrual accounting, so it took some time for the risk to be identified. Over the following five or ten years, businesses gradually accumulated financial losses (Corlosquet-Habart et al., 2015). Learning lessons from this, managers of financial firms focused on developing a sounder ALM.

They looked for methods of managing balance sheets to keep a mix of loans and deposits consistent with the bank's long-term growth and risk management objectives. They began creating novel financial approaches as a result, including gap analysis, duration analysis, and scenario analysis.

In the United States, alone among major types of institutions, insurance companies have maintained this focus because it is required by the regulations under which they operate (Ryan, 2013). The IAIS Standard No. 13 (2006) which is the basis for insurance company regulation in the United States, defines asset/liability management (ALM) as the practice of managing a business so that decisions and actions taken with respect to assets and liabilities are coordinated[1].

Financial institutions nowadays are increasingly embracing market-value accounting for some business lines, especially investment banks that engage in trading activities on a daily basis. Market risk management techniques, such as Value-at-Risk, are better suitable for trading books than ALM techniques. ALM is used in financial institutions to manage assets and liabilities that need to be accounted for on an accrual basis. This covers virtually all conventional insurance activities as well as banks' lending and deposit-taking.

Evidence from studies done on ALM in Africa, though greatly concentrated on deposit-taking institutions such as commercial banks, demonstrates the importance of the practice in African financial institutions. Abebe (2022) in his study on microfinance institutions (MFIs) in sub-Saharan Africa argues that due to high inflation rates in many countries, exposure to foreign exchange risk due to large foreign borrowing to supplement the low access to local funds and the push by donors for MFIs to curtail their dependence on subsidies has pushed these institutions to adopt ALM practices to ensure they are self-sustainably profitable. Odhiambo

[1] IAIS: International Association of Insurance Supervisors.

(2006) concluded that most commercial banks in Kenya still employ maturity matching as an asset/liability exposure management.

One common element noticed in all the literature on ALM is that poorly executed ALM can lead to mismatches that erode profitability, increase solvency risks, and destabilize the market. Despite its potential, the application of ALM in Kenya's insurance sector remains under-researched, particularly concerning its role in addressing profitability and solvency challenges. The fluctuating profitability of Kenya's long-term insurance sector underscores the critical role of ALM in ensuring stable investment performance and aligning assets with long-term liabilities. Given the sector's economic significance, fluctuating profitability, and the underexplored role of ALM, this study aims to provide critical insights into how ALM can enhance the profitability of Kenya's long-term insurance sector.

1.2. Problem statement

In the world of long-term insurance, striking a balance between financial performance and honoring commitments to policyholders is paramount. Asset-Liability Management (ALM) serves as a cornerstone for achieving this delicate equilibrium. It is a framework that orchestrates investments (asset management) to generate sustainable growth while ensuring the resources are available to meet future obligations to policyholders (liability management) (Gerstner et al., 2008). Effective ALM is demonstrably crucial for the long-term success of insurance firms (Uyemura & van Deventer, 1992).

Existing research highlights the importance of ALM in optimizing profitability across financial institutions, yet notable gaps remain in its application to Kenya's long-term insurance sector. Most studies, such as those by Tee (2017), Belete (2013), and Rekha (2018), focus on banking institutions, emphasizing how asset quality, liability management, and solvency influence profitability. While these findings provide valuable insights into ALM's impact, the banking sector's characteristics—shorter liability durations and different regulatory environments—make direct comparisons to insurance companies inadequate. Further, the limited studies on ALM in insurance, such as Olowokudejo and Ukpong (2021), are geographically concentrated outside Kenya, where regulatory frameworks differ significantly. Kenya's adoption of risk-based supervision (RBS) and unique practices such as the Gross Premium Valuation (GPV) method set its insurance sector apart (Shah, 2016). These distinctive features necessitate a tailored exploration of ALM to determine its role in ensuring solvency, enhancing profitability,

and maintaining long-term financial stability for Kenyan insurers. Additionally, previous studies have revealed debates around the drivers of profitability within ALM. For instance, some research, such as by Owusu and Alhassan (2020), highlights liabilities as detrimental to profitability, while others, like Makau and Memba (2014), suggest positive contributions from managed liabilities. Similarly, the interplay between solvency and performance remains contested, with findings ranging from positive associations (Nicodem, 2020) to trade-offs between profitability and liquidity (Mucheru et al., 2017). However, such debates remain underexplored in Kenya's insurance context, where longer-term liabilities and asset structures present unique challenges.

These gaps underscore the need for focused research on how ALM specifically influence the profitability of long-term insurance companies in Kenya. By addressing this underexplored area, the study aims to contribute to academic discourse and provide actionable insights for insurers and regulators to enhance sectoral stability and growth.

Despite the evident growth of Kenya's long-term insurance sector, its financial stability remains precarious. Profitability swings unpredictably, often hinging on volatile investment income rather than sustainable underwriting performance. For instance, in 2019, profitability surged to 5.2%, primarily driven by a 67.5% spike in investment income—yet this gain was short-lived, highlighting insurers' heavy dependence on external market conditions rather than operational efficiency. Solvency pressures persist, as seen in cases where some insurers have struggled to meet policyholder obligations, prompting regulatory interventions. The collapse of Resolution Insurance in 2022, that of Invesco Assurance in 2023, and repeated liquidity concerns among insurers underscore the sector's vulnerability. These challenges suggest that weaknesses in Asset-Liability Management (ALM) may be amplifying financial instability rather than mitigating it. Poor ALM practices can lead to asset mismatches, liquidity shortfalls, and an overreliance on unpredictable investment gains—jeopardizing insurers' ability to honor long-term commitments. This underscores a critical gap in understanding how ALM practices—or their inadequacies—shape asset productivity, underwriting efficiency, and solvency, ultimately determining insurers' profitability and long-term viability.

This research aimed to bridge this gap in knowledge by examining the effect of ALM on the profitability of long-term insurance businesses in Kenya. By focusing solely on this specific context and industry, the study sought to contribute valuable insights to the body of knowledge

and inform strategies for Kenyan long-term insurance companies to achieve sustainable financial success. This study explored a novel approach to assess how ALM affects long-term insurance companies' profitability. It went beyond simply looking at total assets and total liabilities but used three key ratios: asset turnover (efficiency in using assets to generate revenue), loss ratio (effectiveness in managing claims payouts), and solvency ratio (ability to meet future obligations). By analyzing these metrics together, this research hoped to provide a more comprehensive understanding of ALM's impact compared to past studies in the insurance sector.

Given the gaps poised in empirical studies, this study posed the research question: “What is the effect of ALM on the profitability of these long-term insurance businesses in Kenya?.”

1.3. Research Objectives

The general research objective was to investigate the implications of asset-liability management and its effect on the profitability, measured by profitability, of long-term insurance businesses in Kenya.

1.3.1. Specific Research Objectives

1. To assess the effect of asset management on the profitability of long-term insurance businesses in Kenya.
2. To find out the influence of liability management on the profitability of long-term insurance businesses in Kenya.
3. To determine the effect of solvency management on the profitability of long-term insurance businesses in Kenya.

1.4. Research Questions

The research sought to answer the following questions:

1. Does a noteworthy correlation exist between asset management and the profitability of long-term insurance businesses in Kenya?
2. Is there a substantial association between liability management and the profitability of long-term insurance businesses in Kenya?
3. Does a significant relationship exist between solvency management and the profitability of long-term insurance businesses in Kenya?

1.5. Scope of the study

According to the long-term industry trend report prepared by Actuarial Services E.A. Ltd., there was 25 companies offering underwriting long-term insurance contracts in Kenya as of 31 December 2022. This was the target population for this research. To meet the objectives of this study, secondary panel data was used for a 10-year period from 2013 to 2022 for the 25 companies.

1.6. Significance of the study

1.6.1. Insurers

ALM plays a major role in long-term insurance due to the nature of its business. Long-term insurance companies hold liabilities (benefits) for very long periods of time, demanding, therefore, that they maintain an asset portfolio that will ensure they are able to meet each of these obligations when they fall due while remaining profitable in order to provide a reasonable return to its shareholders within their acceptable levels of risk. This study sought to inform insurers on what ALM strategies are, especially on the efficiency of assets, claims experience and solvency monitoring.

This research, inspired and guided by previous similar ones in the banking sector, aimed to add an empirical lens to the widely agreed-on view in the literature that ALM plays a key role in the sustainable running of insurance companies, by giving a view from the vibrant insurance market of Kenya which is the 4th largest in Africa and 1st in the East-African sub-region.

1.6.2. Regulators

One of the main roles of regulators is to ensure insurers will meet their obligation; this paper sought to provide a basis for policy formulation on the balance sheet items of insurers.

This study intended to be highly beneficial to regulators by offering insights for informed policy decisions, improved risk management, more effective market supervision, and enhanced consumer protection. It aimed to provide a tool for regulators to tailor regulations to the local market, identify specific risk factors, establish ALM benchmarks, and proactively address financial health concerns, ultimately promoting stability, consumer confidence, and trust in the regulatory framework within the Kenyan insurance sector.

1.6.3. Researchers and Academicians

This research aimed to contribute to the academic knowledge base by filling a contextual gap, as most existing studies in this area have been conducted in different countries with distinct regulatory environments. Consequently, this study sought to provide specific insights into the Kenyan insurance industry, enhancing our understanding of how ALM influences profitability within this unique context.

Moreover, the findings from this research were to serve as a valuable reference point for researchers seeking to explore the intersection of financial management and profitability in the insurance sector. By focusing exclusively on long-term insurance businesses in Kenya and utilizing profitability as the primary dependent variable, this study intended to offer a reference point for future academic investigations. Thus doing, this research, ultimately, not only sought to advance academic knowledge but also showed the potential to inform and shape industry practices, benefiting both scholars and practitioners alike.

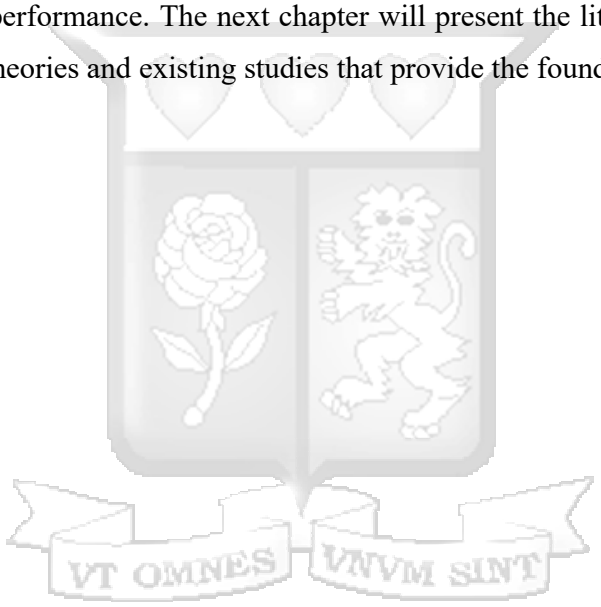
1.7. Dissemination Plan to key Stakeholders

A key component of the project is ensuring the knowledge gained from the research reaches those who can benefit from it most. To ensure its practical application, we have crafted a targeted dissemination plan to empower key stakeholders. Insurers will receive a clear and concise summary, highlighting research takeaways that translate directly into optimal asset allocation strategies for boosting their bottom lines within the Kenyan market. We will deliver this via e-mail to all long-term insurance companies.

A concise policy brief, outlining the research's implications for the Kenyan insurance sector's regulatory framework, will be prepared specifically for the regulators. This brief will be presented in a clear and easy-to-understand manner, ensuring policymakers can readily grasp the research's significance. The researcher will take an active role in ensuring the policy brief reaches the appropriate decision-makers within the Insurance Regulatory Authority (IRA).

Finally, to contribute to the broader knowledge base and foster collaboration within the academic community, the research findings will be submitted for publication in a peer-reviewed journal relevant to financial management or insurance. By implementing this multi-faceted dissemination plan, the research project aims to ensure its findings reach a wide range of stakeholders and contribute meaningfully to the Kenyan insurance sector.

This chapter provided a comprehensive background on the Kenyan insurance sector, emphasizing its economic significance, growth trends, and regulatory framework. It highlighted the crucial role of long-term insurance in financial stability, given its substantial asset base and long investment horizons. The study focuses on Asset-Liability Management (ALM) as a key determinant of profitability and solvency, recognizing its importance in mitigating risks and ensuring long-term sustainability. Despite the sector's growth, fluctuating profitability and regulatory interventions signal weaknesses in ALM practices. The chapter identified gaps in existing research, particularly the lack of focused studies on ALM's impact on long-term insurance profitability in Kenya. To address this, the study investigates the relationship between asset management, liability management, and solvency management in shaping financial performance. The next chapter will present the literature review, exploring the underpinning theories and existing studies that provide the foundation for this study.



CHAPTER TWO : LITERATURE REVIEW

2.1. Introduction

This chapter reviews the theoretical and empirical literature on ALM, especially as it relates to the profitability of financial institutions and specifically insurance companies. The initial section provides an overview of broad theories in this domain. The second part delves into previous studies that informed and acted as foundation of the present research. Finally, in this chapter, the research argues its pertinence by exploring the gaps left by the precursor literature and presents its variables of interest to answer the research questions.

2.2. Theoretical Reviews

The following theories served as the theoretical foundation for this study: The modern portfolio theory, the risk theory, and the immunization theory. These theories provided support for the concepts of asset allocation, risk, and solvency that this research sought to explore.

2.2.1. Modern Portfolio Theory

Harry Markowitz, an American economist, is credited with developing the Modern Portfolio Theory (MPT) in the year 1952. His theories revolve around the significance of portfolios, risk, diversification, and the links between various types of assets. It is a mathematical model that may be used to construct a portfolio of assets in such a way that it maximizes the expected return while maintaining a predetermined degree of risk. It is a formalization and extension of the concept of diversity in investing, which is the notion that the ownership of various types of financial assets is less hazardous than the ownership of only one type. The most important lesson from it is that the risk and return of an asset should not be evaluated on its own, but rather in relation to how it affects the entire risk and return of a portfolio. The variation in asset prices is used as a proxy for risk in this method.

Markowitz (1952) laid the groundwork for the theory when he published his paper on portfolio selection. The theory is an amalgamation of postulations, and its basis was laid in 1952. The idea operates under the presumption that the investor who makes the investment is logical and will take precautions to prevent any unnecessary risks. This suggests that any decision maker that acts in a reasonable manner will have the goal of maximizing their utility, and they will evaluate their investments based on the return vis-à-vis the risk that is associated with it.

According to Elton, Gruber, Brown, and Goetzmann's (2014) interpretation of this theory, the market portfolio is the one that provides the best level of return for each individual unit of

market risk in a market that is price efficient. This indicates that the market portfolio will be able to take advantage of the effectiveness of the market. According to Elton et al. (2014), a portfolio is a collection of several types of financial assets. This suggests that the decision to invest in a particular set of investments is based on a comparison of the returns on those investments. The decision of how much of each component of the portfolio, and consequently how much capital, to invest in each of these rests inside this decision.

The long-term insurance companies can use risk-return trade-off to decide on the investment portfolio. This is because of a risk-return trade-off, invested money can render higher profits only if the investor is willing to accept a higher possibility of losses. Long-term insurance companies make use of the theory in determining ow much money (capital) will be invested in various investment projects to guarantee maximum returns to the shareholders while at the same time ensuring enough cashflow to meet claims arising from unforeseen calamities. Thus, in long term insurance companies, modern portfolio theory is useful in management of the assets which are used in generating revenues to cover claims, finance operations and guarantee a return to shareholders. This theory will be used to guide the first objective, to assess the relationship between assets management and the profitability of long-term insurance businesses in Kenya.

Though the MPT is a key theory in finance, it has a number of lacunas that opens it to critiquing. Critics cast doubt on the viability of Modern Portfolio Theory (MPT) as an investment strategy, citing disparities between its financial market model and the real world. Challenges to MPT's basic assumptions have emerged, particularly from fields like behavioral economics. The translation of MPT's theoretical foundation into a practical portfolio construction algorithm has faced technical hurdles, primarily due to the instability of the original optimization problem with available data (Iyiola, Munirat & Nwufo, 2012).

A study by Beyhaghi and Hawley (2012) critically examined the Modern Portfolio Theory (MPT) in the context of financial crises and proposed regulatory reforms. Their analysis underscores the limitations of MPT, citing its theoretical assumptions as unrealistic and its inability to adequately capture the complexities inherent in the real-world financial landscape and human behavior. The discussion contends that, despite adherence to MPT and prevailing risk management practices, a considerable level of risk remains unaddressed. The study advocates for a more comprehensive evaluation by managers, stakeholders, and regulators,

emphasizing the necessity to recognize the limitations of MPT in effectively managing risks in the financial system.

2.2.2. Risk Theory

The development of risk theory has long been intertwined with the foundations of actuarial science. In his seminal work "Mathematical Methods in Risk Theory," Hans Buhlmann (1970) elucidates the intrinsic link between actuarial theory and the mathematical underpinnings of risk.

In Buhlmann's exploration of risk theory, a significant portion of his work is dedicated to the calculation of risk premiums, a crucial aspect of actuarial practice. Buhlmann meticulously discusses four alternative principles for determining risk premiums, each offering distinct perspectives on the assessment of risk. These principles include the expected claims loaded proportionately, expected claims loaded by a constant times the standard deviation of claims, expected claims loaded by a constant times the variance of claims, expected claims plus a loading designed to equalize the insurer's expected utility upon entering the insurance contract with its current utility (Bohman, 1976).

Central to Buhlmann's examination is the recognition that the determination of risk premiums is fraught with uncertainty. The dynamic nature of risk conditions often precludes the collection of sufficient data for precise risk premium estimation. Consequently, statistical methodologies primarily aid in estimating collective premiums, which are the expected premiums taken with respect to the structure distribution over the set of risk premiums (Hickman, 1970, p. 214).

Buhlmann introduces the concept of credibility premiums, particularly employing the variance loading principle. He demonstrates that as the number of experience periods increases, credibility premiums tend to converge to the risk premiums, providing a means to approximate the true risk premiums over time. However, the practical challenge lies in estimating successive credibility premiums, a task that Buhlmann tackles through innovative techniques.

Utilizing the concept of least squares approximation, Buhlmann devises a linearized approximate credibility premium that leverages claims statistics from the collective. This approach, although ingenious, underscores the ongoing struggle to accurately estimate risk premiums amidst evolving risk landscape.

On Key criticism of Bulhman's theory is the omission of investment income from the calculation of insurance premiums. Kahane (1979) argues that this approach is incomplete because it ignores the fact that insurance companies can invest the money they collect in premiums and earn a return. He proposes a new formula that includes a negative loading for investment income. This means that the premium is reduced to reflect the amount of money the insurance company expects to earn by investing the premium. The formula also includes a loading for risk. This loading is based on the "beta" of the insurance activity, which is a measure of how risky it is compared to the overall market. He argues that this is a more objective way to measure risk than the traditional methods, which are based on the variability of past claims.

This theory directly informed the second objective as it explores risk premiums and ratemaking and their direct implications on insurance companies' loss ratios, a crucial measure of liability management and risk exposure. First, for ratemaking, the determination of premiums, influenced by factors such as risk loading and expected investment income, directly impacts the ability of premium income to cover expected losses. Adjustments in premiums based on risk assessments can consequently affect the loss ratio, which represents the relationship between premiums collected and claims incurred. Moreover, the concept of risk loading plays a pivotal role in this scenario. The objective determination of risk loadings, often based on market assessments, can lead to more accurate pricing of premiums. This precision in pricing helps align premiums more closely with the actual risk exposure, potentially resulting in more favorable loss ratios for insurance companies.

2.2.3. Redington's Theory of Immunization

Frank Redington produced the theory of immunization in 1952. In a critique of "The Principle of Life-Office Valuations," Redington coined the term "immunization" for an investment strategy that shields existing business from interest rate fluctuations. His approach focused on aligning the maturities of assets and liabilities. If market rates dropped, the reduced income from reinvested funds would be offset by the increased value of longer-term assets held until maturity. Conversely, rising rates would lead to higher returns on reinvested funds but be countered by a decrease in the portfolio's value. Essentially, balancing maturities neutralizes the impact of interest rate changes on the company's equity value by creating offsetting effects on the balance sheet, as noted by Fong and Vasicek (1984).

Bodie, Treussard and Willen (2007) say that immunization is the process of setting up a position so that its worth is not affected by small changes in a certain parameter. This usually

helps strategic managers reach their profit goals. Most of the time, the term is used to describe a debt and a portfolio that backs it up so that the net or surplus market value of the position does not change much when interest rates go up or down. This term could easily be used for any business whose profits or values have been protected from changes in the price of an input or product.

Because assets and payments have different lengths of time, many insurance companies are open to interest rate risk. Interest rate risk management that aims to close the duration gap could protect their holdings from interest rate changes (Liu, 2021). So, Redington's Theory of Immunization has been used in the financial management of insurance companies. These companies can "immunize" their portfolios by making the length of their assets and liabilities the same, which is called "duration matching." When the interest rate changes, the prices of assets and liabilities change by (roughly) the same amount.

Immunization is a strategy employed by insurance companies to capitalize on favorable market rates within a specific period. This approach seeks to match the maturities of their assets with their liabilities, particularly future pension payouts. By doing so, the impact of fluctuating interest rates on the company's capital needs is minimized, as highlighted by Christensen, Fabozzi, and LoFaso (1997). This strategy also plays a crucial role in constructing immunized portfolios that support guaranteed investment contracts offered to major investors. Therefore, understanding the influence of liability management, which encompasses immunization strategies, forms the basis of Objective Three, which aims to explore its impact on the profitability of long-term insurance businesses in Kenya.

Shiu (1990) noted that Redington's immunization model lacks differentiation between short-term and long-term interest rates, assuming uniformly flat yield curves and consequently leading to potential arbitrage opportunities. His analysis also reveals that, in the context of the single premium immediate annuity business, employing a duration-matching strategy may result in guaranteed losses for the company in the face of every parallel shift in the yield curve.

One other potential critique of Redington's Theory of Immunization is its reliance on the assumption that assets and liabilities can be perfectly matched in terms of time duration. In reality, achieving a precise match can be challenging due to the varying nature of financial instruments and obligations. The theory's effectiveness may be compromised if the practical implementation of "duration matching" is not accurate.

Moreover, the theory operates under the assumption that changes in interest rates affect both the reinvested cash flows and the value of the portfolio assets in a symmetrical manner. However, the real-world impact of interest rate changes may not always exhibit such perfect symmetry, potentially undermining the theory's predictive power. The critique lies in the potential challenges of achieving and maintaining a perfect duration match, as well as the assumption that the effects of interest rate changes will be symmetrical.

Despite these considerations, Redington's Theory of Immunization has been widely used in the financial management of insurance companies. It plays a crucial role in guiding decisions related to liabilities management, influencing the amount of capital needed, and supporting the development of immunized portfolios for backing guaranteed investment contracts. The theory's application is integral to understanding the influence of solvency on the profitability of long-term insurance businesses as helps insurance companies manage interest rate risk by aligning asset and liability maturities. This minimizes the impact of interest rate fluctuations on equity value, thus supporting solvency. By matching durations, companies reduce vulnerability to interest rate changes, ensuring stability in financial positions. Immunization involves setting up asset portfolios in such a way that changes in interest rates affect both assets and liabilities proportionately, reducing the risk of asset-liability mismatch. This duration matching helps stabilize the company's equity value, which is crucial for maintaining solvency.

2.3. Empirical Literature Review

An empirical review delves into existing research studies, focusing on aspects relevant to the specific investigation at hand (Kombo & Tromp, 2013). The existing research explored are classified here as it relates to asset management, liability management and solvency management and their individual effect on profitability in keeping with the objectives of the study.

2.3.1. Asset Management and Profitability

Asset management plays a crucial role in determining the profitability of financial institutions, including long-term insurance businesses. The ability of insurers to effectively utilize their assets directly impacts their ability to generate revenue, optimize risk exposure, and ultimately improve their financial performance. Studies have consistently demonstrated a positive relationship between asset management and profitability, though the specific mechanisms through which asset management influences profitability vary across institutions and markets.

Eyup et al. (2017) and Olowokudejo and Ukpong (2021) observed positive associations between specific assets and profitability, suggesting better asset quality improves financial health. However, the specific assets driving profitability differ. Eyup et al. (2017) focused on reducing non-performing loans (NPLs), while Olowokudejo and Ukpong (2021) found specific asset categories in life insurance companies mattered more.

Eyup et al. (2017) and Olowokudejo and Ukpong (2021) found that better asset quality enhances financial health. However, while Eyup et al. (2017) focused on non-performing loans (NPLs) in banks, Olowokudejo and Ukpong (2021) highlighted that specific asset categories in life insurance companies were more critical in driving profitability. Similarly, Shrestha (2016) and Belete (2013) observed a positive impact of asset levels on profitability in the commercial banking sector of Nepal and Ethiopia, respectively. These findings contrast with those of Tee (2017), who found a positive association only with total assets in Ghanaian banks, suggesting that the impact of asset management may depend on institutional and regulatory factors.

In the Kenyan insurance sector, the concentration of assets in government securities aligns with Modern Portfolio Theory principles, as it minimizes risk while ensuring stable returns. A distinctive characteristic of asset allocation in this market is the heavy investment in government securities, which account for 74% of the industry's total assets (IRA, 2023). However, Resource-Based Theory (RBT) also provides an alternative perspective: firms with superior resource allocation capabilities—including prudent asset management—gain a competitive edge, translating into better financial performance (Alarussi, 2021).

2.3.2. Liability Management and Profitability

Liability management is an equally crucial component of Asset-Liability Management (ALM), particularly for long-term insurers whose primary liabilities include policyholder obligations and claims. In Kenya's insurance sector, long-term insurers carry substantial policyholder obligations, which represent nearly 90% of their total assets. Ensuring that these liabilities are well-managed is critical for maintaining financial stability.

Existing literature highlights the impact of liability structures on profitability, though findings vary. Studies by Tee (2017), Owusu and Alhassan (2020), and Belete (2013) show that total liabilities generally have a negative impact on profitability in banks, reinforcing the importance of strategic liability management. These findings align with the Trade-Off Theory (Kraus &

Litzenberger, 1973), which suggests that while debt financing (or liabilities) can provide financial leverage, excessive liabilities may lead to higher financial distress costs, ultimately reducing profitability. The negative correlation between liabilities and profitability observed in these studies is consistent with this theory, as institutions with excessive liabilities may face higher interest expenses, risk exposure, and potential default risks, which reduce their overall profitability.

However, Owusu and Alhassan (2020) noted an interesting exception: Ghanaian banks with both high returns on assets and high costs of liabilities exhibited greater profitability. This suggests that firms adept at utilizing their liabilities efficiently can turn them into a source of competitive advantage, particularly when liabilities are used for productive investments that yield higher returns than their associated costs. This scenario is supported by Pecking Order Theory (Myers & Majluf, 1984), which postulates that the cost implication of the financing will determine the preference ranking in its choosing by firms, but also, if firms use liabilities to finance high-yield investments, they can enhance profitability despite higher liability costs.

Makau and Memba (2014) explored a case study of Diamond Trust Bank (Kenya), highlighting the positive impact of both higher customer deposits and increased loans on profitability. This reinforces the importance of managing both sides of the balance sheet for optimal performance. When liabilities (such as deposits or insurance reserves) are managed effectively, they serve as a cheap source of funding, reducing the cost of capital while enabling institutions to generate higher revenue through lending (in banks) or investments (in insurance firms).

Other studies, such as Mukasinayobye and Mulyungi (2018) and Onaolapo and Adegoke (2020), reveal complex relationships between ALM and profitability in different banking systems, demonstrating that liability management strategies must be tailored to the specific financial structures of each institution. This aligns with the Contingency Theory (Lawrence & Lorsch, 1967), which suggests that no single liability management strategy fits all institutions, and that the effectiveness of liabilities in contributing to profitability depends on factors such as market conditions, interest rate environments, and regulatory frameworks.

2.3.3. Solvency and Profitability

Solvency is a cornerstone of financial stability in the insurance industry, as it determines an insurer's ability to meet long-term obligations. In Kenya, solvency is governed by risk-based capital regulations under the amended Insurance Act (2019/2022). Insurers must maintain a

100% Capital Adequacy Ratio (CAR), with a minimum capital requirement of KES 600 million for general insurers and KES 400 million for life insurers. Despite the industry's total assets exceeding KES 1 trillion, compliance with solvency benchmarks remains a challenge—by 2023, 23 insurers had failed to meet the minimum capital requirements, collectively facing a shortfall of KES 32.2 billion (IRA, 2023). This underscores the difficulty of balancing solvency mandates with the need for profitability.

Several studies have examined the interplay between solvency and profitability. Mamati et al. (2017) and Nicodem (2020) found positive associations between solvency-related metrics—such as capital adequacy, asset quality, and liquidity management—and profitability in financial institutions. Their findings emphasize the role of regulatory compliance in mitigating risk and ensuring financial stability. This aligns with the Buffer Capital Theory (Berger et al., 1995), which argues that financial institutions maintain capital buffers above regulatory minimums to protect themselves against unexpected losses. From this perspective, firms with strong solvency positions are better equipped to absorb financial shocks, thereby enhancing investor and customer confidence, which in turn contributes to higher profitability. This is particularly relevant in regulated industries like insurance, where maintaining a strong solvency margin reassures policyholders and reduces the likelihood of regulatory interventions.

However, conflicting findings emerge from Thuku (2015) and Mucheru et al. (2017), who observed that maintaining higher liquidity and solvency could lead to lower returns. This suggests a potential trade-off between financial stability and profitability, as firms that prioritize solvency may forgo higher-yield investment opportunities. This observation can be explained using the Risk-Return Trade-Off Theory (Markowitz, 1952), which posits that firms must balance their risk exposure and potential returns. Highly solvent firms often invest conservatively, holding large portions of their assets in low-risk, liquid instruments (such as government bonds) to meet regulatory solvency requirements. While this ensures financial stability, it limits the firm's ability to allocate funds to higher-return investments, ultimately dampening profitability.

An optimal solvency position allows insurers to withstand financial shocks while maintaining competitive returns. Striking this balance requires efficient ALM strategies, where capital is allocated prudently across various investment vehicles without excessively limiting revenue-generating opportunities.

2.4. Summary of Research Findings and Research Gaps

From the review done above, it was noted that prior research explored ALM's impact on profitability, but often in contexts not directly applicable to Kenyan long-term insurance. These studies focus on commercial banks (e.g., Eyup et al., 2017) or lack a Kenyan perspective (e.g., Olowokudejo and Ukpong, 2021) with its unique risk-based regulation framework. Additionally, some studies investigate different aspects of financial health (e.g., Mutumira, 2019; Mamati et al., 2017) instead of profitability.

This study investigated the impact of Asset-Liability Management (ALM) on the profitability of long-term insurance companies. We used a novel approach that utilizes three key ratios to capture different aspects of ALM's influence: asset turnover ratio, loss ratio, and solvency ratio.

The asset turnover ratio serves as a measure of asset management efficiency. It reflects how effectively the company utilizes its assets to generate revenue. Resource-based theory proposes that firms that have assets will use these strategic resources to enhance their return and increase firm capabilities (Alarussi, 2021). The asset turnover ratio is a critical indicator of financial productivity in insurance companies. In the insurance sector, assets typically include investment portfolios, policyholder funds, and receivables. A higher ratio signals that the company is maximizing returns on these assets, particularly by effectively managing the "float"—premium income not yet paid out in claims. This enhances profitability and supports sustainable growth by ensuring that assets are actively contributing to both underwriting and investment income. These are reasons why Batool and Sahi (2019) identified this as a determinant of insurance profitability, finding a positive and significant relationship between the two.

In the context of ALM, a well-designed strategy should optimize asset allocation to maximize their yield and cash generation in anticipation of payouts and profitability requirements, resulting in a higher asset turnover ratio. While traditionally viewed as a measure of operational efficiency, the asset turnover ratio has unique applicability in the insurance context. For insurers, assets predominantly include investment portfolios that generate returns supporting underwriting activities. By incorporating this metric, this study reflects the efficiency of these investments in generating revenue and maximizing the "float." While it may not directly measure the allocation between short-term and long-term investments (a key ALM focus), it remains a critical indicator of resource productivity. The argument that ALM

strategies inherently aim to optimize asset productivity supports the inclusion of this ratio as a relevant metric.

The loss ratio, on the other hand, gauges the effectiveness of liability management. It represents the portion of premium income paid out in claims. The ratio indicates how much policyholders receive in return for each monetary unit of the premium paid (Opoku et. al, 2024). An insurer's ability to settle claims demonstrates its commitment to indemnify policyholders, a key indicator of sound liability management (Mehari & Aemiro, 2013), a high loss ratio signals potentially costly liabilities, reflecting challenges in underwriting or claims management.. Mwangi and Iraya (2014) used this measure to gauge the performance of general insurance businesses in Kenya stating that Losses incurred (or total claims expense) to premiums earned denotes the underwriting results or, essentially, the quality of business underwritten i.e. the quality of the insurer's liabilities; and found that loss ratio had a negative relationship with profitability as measured by return on assets (ROA).

A sound ALM framework should consider risk profiles and their effect on the quality of the liabilities when setting premiums, potentially leading to a lower or more stable loss ratio. Unlike fixed liabilities in banking, insurance liabilities fluctuate due to cancellations, surrenders, or unexpected claims. Effective ALM must account for these dynamics, and the loss ratio provides an aggregated metric for evaluating how well these risks are managed. Liability management in insurance is inherently tied to underwriting quality and claims management, both of which are encapsulated by the loss ratio. The study leverages this metric not only as an indicator of risk but also as a reflection of how premiums and claims are balanced—a central concern of ALM in mitigating solvency risks.

Finally, the solvency ratio provides a comprehensive picture of ALM's effectiveness by encompassing both asset management and liability management. It measures the company's ability to meet future obligations by maintaining a surplus of assets over liabilities. It directly reflects the success of ALM in balancing asset productivity and liability management to ensure financial stability. Solvency is a primary concern for regulators, claims paying ability is vital for policyholders, and return on investment is critical for investors (Brockett, et al., 2004). By focusing on the solvency ratio, this study addresses how ALM strategies ensure regulatory compliance while preserving profitability. Carson and Hoyt (2000) emphasize that the solvency of insurance companies, a key indicator of financial vulnerability, is influenced by factors such

asset composition and leverage. Similarly, Chen and Wong (2004) emphasize that firm size (in terms of its assets) and investment performance (yield on the assets) play crucial roles in determining a company's solvency which in turn has positive impact on profitability. A strong and comprehensive ALM strategy should ensure a sufficient capital buffer with the right mix of assets and liabilities which is reflected in a healthy solvency ratio. Integrating this variable within ALM emphasizes the interplay between financial health and strategic balance sheet management.

A robust ALM strategy in insurance should ensure asset productivity (asset turnover), manageable liabilities (loss ratio), and long-term financial health (solvency ratio). By examining these three ratios concurrently, we hoped to gain a holistic understanding of how ALM influences a long-term insurance company's profitability. The study recognizes that ALM in insurance is distinct from banking. Instead of addressing liquidity mismatches, it focuses on optimizing investments and liabilities to meet future obligations and enhance profitability. While prior studies may explore similar variables in isolation, the integration of these dimensions under an ALM framework for long-term insurers represents a valuable addition to the field. Furthermore, the selected variables (especially the loss ratio and solvency ratio) are uniquely suited to the insurance sector, making this study particularly focused and relevant.

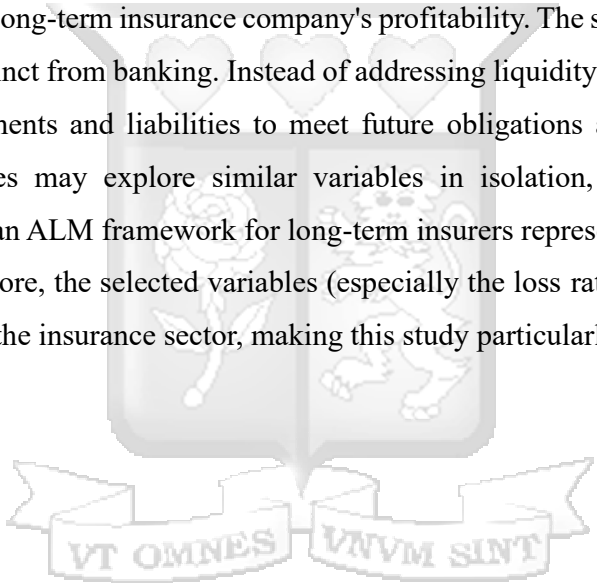


Table 2-1. Summary of Research Gap

Author	**Key Findings**	**Research Gaps**
Eyup et al. (2017)	- Strong negative association between non-performing loans and profitability of banks in Türkiye.	Contextual Gap: Studied commercial banks in Türkiye, regulations differ from Kenya's long-term insurance sector and the operations and working capital requirements for commercial banks do not reflect those of long-term insurance companies.
Tee (2017)	- Positive association between total assets and profitability, negative association	Contextual Gap: Studied commercial banks in Ghana, regulations might differ

	between total liabilities and profitability (esp. savings and deposits) for Ghanaian banks.	from Kenya's long-term insurance sector.
Olowokudejo and Ukpong (2021)	- Statistically significant association between specific assets and profitability, specific liabilities, and profitability in Nigerian life insurance companies.	Contextual: the regulations in Nigeria are different from Kenya's Risk-based regulations which limits replicability.
Mutumira (2019)	- Positive return on assets (ROA) for participating Kenyan insurance companies, positive correlation between cash flow and asset quality.	Empirical Gap: Direction of the relationship between ALM and profitability not specified.
Shrestha (2016)	- All asset categories positively influenced profitability; all liabilities had a negative impact on profitability in Nepalese commercial banks. - Negative effect of macroeconomic factors (GDP, inflation) on bank profitability.	Contextual Gap: Studied commercial banks in Nepal, regulations differ from Kenya's long-term insurance sector and the operations and working capital requirements for commercial banks do not reflect those of long-term insurance companies.
Owusu and Alhassan (2020)	- Link between profitability and ALM structure in Ghanaian banks. Banks with higher ROA and higher cost of liabilities exhibited higher profitability.	Potential Contextual Gap: Studied commercial banks in Ghana, might not directly translate to long-term insurance.
Makau and Memba (2014)	- Positive influence of both higher customer deposits and increased loans on a bank's net interest income (NII) in a Kenyan case study (Diamond Trust Bank).	Contextual Gap: Case study of a single bank, might not be generalizable.
Belete (2013)	- Positive association between assets (loans and advances) and profitability, negative association between all liabilities (esp. savings and deposits) and profitability in Ethiopian commercial banks.	Contextual Gap: Studied commercial banks in Ethiopia, protectionist regulations in Ethiopia significantly differ from Kenya's long-term insurance sector.
Mukasinayobye and Mulyungi (2018)	- Positive and statistically significant influence of effective ALM on the financial performance of Rwandan commercial banks.	Contextual Gap: Studied commercial banks in Rwanda, regulations differ from Kenya's long-term insurance sector and the operations and working capital

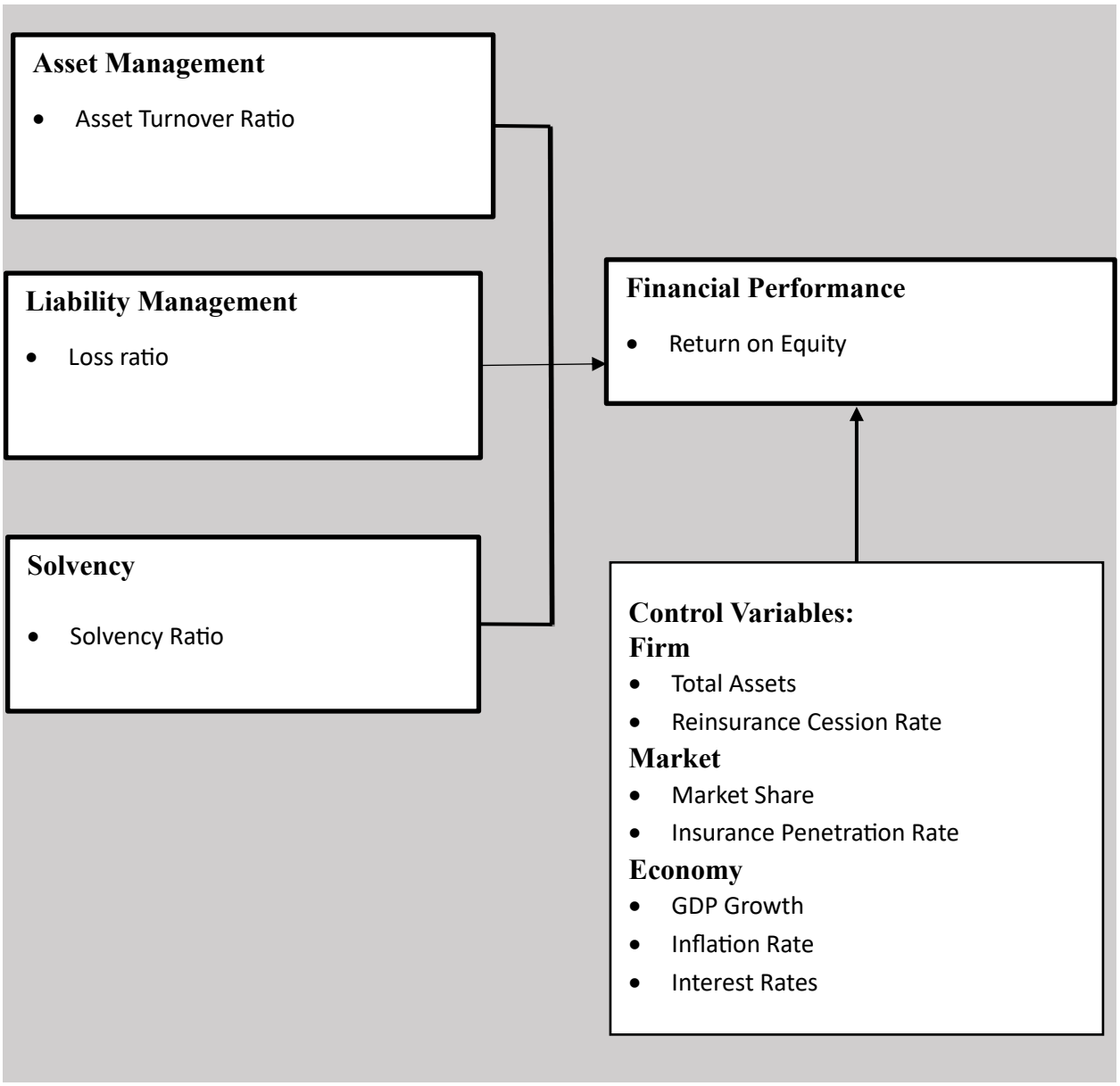
		requirements for commercial banks do not reflect those of long-term insurance companies.
Abebe (2022)	- Asset-liability mix of MFIs (Microfinance Institutions) can have both positive and negative effects on returns (e.g., net loan portfolio, size, deposits).	Contextual Gap: Studied Microfinance Institutions in sub-Saharan Africa, the operations and business model of MFIs differ from those of long-term insurance businesses, limiting therefore replicability.
Onaolapo and Adegoke (2020)	- Complex and nuanced relationship between ALM and profitability in Nigerian deposit money banks. - Loan quality (non-performing loans) is a crucial factor. - Bank size can have both positive and negative effects.	Contextual Gap: Studied deposit taking institutions in Nigeria, regulations differ from Kenya's long-term insurance sector and the operations and working capital requirements for commercial banks do not reflect those of long-term insurance companies.
Mamati et al. (2017)	- Significant associations between liquidity risk, liquidity stress testing, loan-to-deposit ratio, return on assets, and return on equity in Kenyan microfinance banks.	Conceptual Gap: Used liquidity risk as dependent variable, proposed research uses profitability.
Nicodem (2020)	- Positive associations between capital adequacy, asset quality, liquidity management, and profitability of commercial banks in Tanzania.	Contextual Gap: Studied commercial banks in Tanzania, the operations and working capital requirements for commercial banks do not reflect those of long-term insurance companies.
Thuku (2015)	- Challenges in maintaining optimal asset and liability levels for Kenyan microfinance banks, leading to difficulties meeting financial commitments. - Negative impact of asset and liability management on profitability, with operating efficiency emerging as a significant factor.	Empirical Gap: Needs further investigation of specific ALM components and profitability in long-term insurance.
Rekha (2018)	- Strong positive association between secured advances ratio and profitability of Indian commercial banks.	Contextual Gap: Studied commercial banks in India where regulations differ from Kenya's long-term insurance

Source: Researcher (2024)

2.5. Conceptual Framework

According to Cooper and Schindler (2014), a conceptual framework is "a collection of overarching concepts and guiding principles drawn from relevant fields of study that will be utilized to organize a subsequent presentation." This collection will be used to arrange the presentation that will follow. According to Kothari (2012), it comprises of the dependent variable that the researcher is attempting to explain as well as the independent variable that is believed to be the source of the changes in the dependent variable. This study's conceptual framework reveals the connection between asset liability management and the profitability of insurance businesses in Kenya. These are examined in this research.

Figure 2-1. Conceptual Framework



Source: Researcher (2024)

2.7. Operationalization of Variables

Table 2-2. Operationalization of Variables

Concept	Variable	Indicator	Measurement	Supporting Literature
Long-Term Insurance Company Asset Liability Management	Asset Management	Asset Turnover Ratio	This is the ratio of the total revenue (i.e., all premiums collected, investment income, and other sources of revenue related to insurance operations) to the total assets.	Batool and Sahi (2019).
	Liability Management	Loss Ratio	Loss ratio is the ratio of claim payouts to the total premiums collected during the year. It is a measure of the quality of liability as a high payout ratio indicates costly liabilities (policies).	Mwangi and Iraya (2014), Mehari and Aemiro (2013), Malik (2011), Lamm-Tennant et. Al (1992).
	Solvency	Solvency Ratio	The solvency ratio quantifies its capacity to fulfill future policyholder obligations. The solvency ratio is the ratio of Available Solvency margin (ASM) to Required Solvency margin (RSM). The ASM is the difference of the admitted assets (Total Assets except intangible assets and Prepayments) and total liabilities while the RSM is the higher of 5% of total liabilities and KES 400 million (Oraro and co, 2018).	Ray (2023), Morara and Sibindi (2023), Norton Rose Fulbright (2023).
Long Term Insurance Company Profitability	Profitability	Return on Equity	(Net Operating Income – Income Taxes)/Total Equity, this ratio shows how successful the company is at generating value for shareholders.	Nicodem (2020), Morara and Sibindi (2021).
Firm Level Control	Firm Size	Natural Logarithm of Total Assets	This calculates the size of the business in terms of the value of the assets under its control.	Abebe, 2022), Kipra (2016), Dhiab (2021), Berhe and Kaur (2017).
	Risk Management Strategy	Reinsurance cession rate	This is calculated by dividing the outward reinsurance premium paid by the total gross premium. It measures the proportion of risk that insurance companies, after collecting premiums	Kramaric, Miletic, and Pavic (2017), Camino-Mogro and Bermúdez-Barrezueta (2019)

			from policyholders, transfer to reinsurers.	
Sector Level Controls	Market Depth	Insurance Penetration rate	This is calculated by dividing the total insurance premiums by the Gross Domestic Product (GDP) and is typically expressed as a percentage. It, therefore, measures the relative importance of the insurance sector in the economy.	Akotey, Sackey, Amoah, and Frimpong Manso (2013), Sharma, Jadi, and Ward (2018)
	Market Competitiveness	Market Share	This is calculated as the percent of a specific company's gross premium to the total gross premium in the sub-sector. It is, therefore, a measure of the relative competitiveness in the sub-sector.	Kramaric, Miletic, and Pavic (2017), Alhassan, Addison, and Asamoah (2015)
Macroeconomic Controls	Economic Activity	GDP Growth	This is calculated by comparing the GDP for one year to the previous one. It is a measure of the expansion or contraction of economic activities that in turn affect insurance operations.	Alhassan, Addison, and Asamoah (2015), Olowokudejo and Ukpong (2021)
	Purchasing Power	Inflation Rate	The annual inflation rate is calculated by comparing the Consumer Price Index (CPI) or another price index from one year to the next. This rate indicates the percentage change in the price level of goods and services over a year, reflecting the erosion of purchasing power and which can increase claim costs and premiums, impacting profitability in the insurance business.	Belete (2013), Olowokudejo and Ukpong (2021)
	Cost of Borrowing	Interest Rates	This is the real interest rate which is the lending interest rate adjusted for inflation. Real interest rates are crucial for an insurance company as they impact investment returns and the valuation of liabilities.	Yang (2007)

Source: Researcher (2024)

CHAPTER THREE : RESEARCH METHODOLOGY

3.1. Introduction

This chapter presents the methodological plan that was employed to guide the research. It provides details on the research philosophy, design, its population, and the decision taken with regards to sampling. Additionally, it outlines the data collection instruments, procedures, instrument quality, and data analysis approaches that were utilized.

3.2. Research Philosophy

A research philosophy defines the underlying assumptions regarding how knowledge is developed and interpreted. In business and financial research, several philosophical paradigms provide distinct perspectives on knowledge construction.

Interpretivism emphasizes subjective meanings and qualitative inquiry, arguing that knowledge is socially constructed (Creswell & Creswell, 2018). It is useful for exploring human behaviors and decision-making, but its reliance on interviews and case studies makes it unsuitable for purely quantitative financial research (Bryman & Bell, 2015). Critical realism, as proposed by Bhaskar (1978), acknowledges an objective reality influenced by underlying structures (Fletcher, 2017). While valuable for studying macroeconomic trends and systemic financial risks, it often necessitates mixed-method approaches, which are not required in this study. Pragmatism, which prioritizes practical problem-solving, combines qualitative and quantitative methods to address complex research questions (Morgan, 2007). However, as this study relies solely on quantitative data from financial reports, pragmatism is not the best fit.

Positivism asserts that knowledge comes from observable, measurable phenomena, emphasizing empirical evidence and statistical analysis (Collins, 2010). It follows a deductive approach, allowing for objective, replicable, and generalizable research (Saunders, Lewis, & Thornhill, 2019). Given that this study analyzes financial performance indicators such as ROE, solvency ratios, and asset turnover ratios, positivism is the most appropriate choice. Unlike interpretivism, which focuses on subjective perspectives, or critical realism, which seeks deeper causal mechanisms, positivism allows for systematic, unbiased financial analysis. Its dominance in empirical financial research (Crowther & Lancaster, 2008; Shrestha, 2016) further supports its relevance here, ensuring a rigorous, data-driven examination of asset-liability management and profitability in the Kenyan long-term insurance sector.

3.3. Research Design

The study utilized an ex post facto research design because it focused on research conducted after events have occurred, relying on pre-existing data. In ex post facto design, the researcher identifies events that have already occurred or conditions that are already present and then collects data to investigate a possible relationship between these factors and subsequent characteristics or behaviors (Rahman, 2013). This design is perfectly suited to investigate the historical impact of Asset-Liability Management (ALM) on the profitability of long-term insurance businesses in Kenya. This design excels at analyzing past events, aligning perfectly with our assessment of how past ALM has influenced the financial health of insurance companies. Furthermore, the study relies on pre-existing data from annual reports, a hallmark of ex-post facto research.

The study employs a quantitative approach, utilizing panel data collected over a 10-year period (2013–2022) from 25 insurance companies engaged in long-term insurance operations in Kenya. This timeframe provides 250 data points for each variable, ensuring robust statistical analysis. The selection of a 10-year period is consistent with similar studies in the insurance industry, allowing for the observation of long-term trends and the impact of economic cycles on financial performance (Shrestha, 2016; Belete, 2013). The cutoff at 2022 corresponds to the latest available reports from the Insurance Regulatory Authority (IRA) and the Association of Kenya Insurers (AKI) at the time of the study, ensuring the most current data is analyzed.

3.4. Population and sampling

The study encompassed all the licensed insurance companies operating in Kenya's long-term insurance sector, totaling 25 companies as at the date of the most recent reports at the time of the study i.e., those dated 31 December 2022 (see report and list of companies on the IRA link here). These 25 companies represent the entire population under investigation. However, due to inconsistencies in financial reporting, only 23 companies with relatively complete data were included in the final analysis.

Data pertaining to asset liability management variables and the profitability of long-term insurance businesses were easily accessible in the IRA and AKI annual reports for most companies. These reports also helped retrieve data for the sector-level variables of interest i.e., insurance penetration rate and market share. For macroeconomic variables, we relied on data

provided by the World Bank on its online repository which is readily available on the World Bank's website.

3.5. Data Collection Methods

The study used secondary data collected from the insurance companies' financial statements as reported in IRA and AKI's annual reports in the study period. The data collection method employed involved a comprehensive document review of these reports. Document review is a systematic research method used to analyze and interpret existing written materials relevant to the research question or topic. Document analysis is a systematic procedure for reviewing or evaluating documents - both printed and electronic (computer-based and Internet-transmitted) material (Bowen, 2009). In the context of this research, document review focused specifically on these annual reports especially the sections on the financial statements of long-term insurance businesses and specifically the balance sheets and income statements to calculate the ratios needed for to answer the research questions.

Macroeconomic variables were sourced from the World Bank's World Development Indicators database. The World Bank is widely recognized for its comprehensive and standardized macroeconomic datasets, making it a reliable source for this study (World Bank, 2024). This approach aligns with established practices in economic research, ensuring data consistency and comparability across countries.

By leveraging the document review method, this research aimed to derive meaningful insights into the impact of ALM on the profitability of long-term insurance companies in the Kenyan market.

3.6. Data analysis

3.6.1. Data analysis

According to Saunders and Thornhill (2009) data analysis refers to the systematic application of statistical tools to process data into meaningful information. The gathered research data was analyzed using the statistical software Stata 18.0. The descriptive statistics were first calculated to gauge the magnitude of each variable. Correlation analysis was conducted to determine the direction of the effect of variables among themselves and already note noteworthy relations among variables. Regression analysis was used to estimate the overall strength of the relationship between Asset Liability Management (ALM) and profitability as controlled by firm, sector, and macroeconomic factors. The Three-stage least-square (3-SLS) regression

method was used for this purpose and was complemented by the random effects (RE) regression method for robustness check. Additionally, tests for collinearity, normality, and heteroscedasticity were conducted to ensure that the data meets the fundamental requirements for regression analysis.

3.6.2. Model Specification

In the estimation of the model specified below, the 3-SLS regression method was used. This method is preferred due to its ability to efficiently handle systems of interrelated equations and its superior performance in accounting for any cross-equation correlations in the residuals. This is particularly relevant given the potential interactions among the variables. To inspect the 3-SLS regression for robustness, we considered a second regression method that fits the panel data used in the study. Both fixed effects (FE) and random effects (RE) techniques were considered. The selection between the FE model and RE model was determined through the Hausman specification test, and as done by Owusu and Alhassan (2020).

Long-term insurance businesses' profitability was measured in this study by the return on equity (ROE). The variability in ROE will be expressed in terms of variation in ALM specifics using the following model:

$$\mathbf{ROE_{lt} = \alpha_1 + \alpha_2 ATR_{lt} + \alpha_3 Loss\_Ratio_{lt} + \alpha_4 Solv\_Ratio_{lt} + e_{lt}} \quad \mathbf{(1)}$$

Where:

ROE_{lt} : is the return on equity of business l at time t. The return on equity will be calculated as follows: ROE(%) = (Net operating income − income taxes)/ Total Equity value.
ATR: is the asset turnover measured by dividing the total revenue (i.e. all premiums collected, investment income, and other sources of revenue related to insurance operations) with the total assets. Here, it is expressed as a percentage.
Loss_Ratio: is the Loss Ratio measured by dividing the sum of paid claims and adjustment expenses by the total earned premiums. Here, it is expressed as a percentage.
Solv_Ratio: is the solvency ratio is measured as a ratio of Available Solvency Margin (ASM) divided by Required Solvency Margin (RSM). Here, it is expressed as a percentage.
α_1: is the return on equity that is explained by other variables not under consideration in this study.

α_2: is the coefficient of the explanatory variable ATR denoting the change in the ROE caused by a unit change in the ATR.

α_3: is the coefficient of the explanatory variable Loss_Ratio denoting the change in the ROE caused by a unit change in the Loss_Ratio.

α_4: is the coefficient of the explanatory variable Solv_Ratio denoting the change in the ROE caused by a unit change in the Solv_Ratio.

e_{lt} is the stochastics error term accounting for stochastic differences among the firms.

To ensure robust analysis of the relationship between these ALM variables and the ROE, the ALM variables were controlled for firm-level, sector-level and macroeconomic level variables. Regarding the firm-level variables, the first control variable this research employed is the business' size (expressed as the natural logarithm of total assets) as the control variable. This choice is made to account for variations in technology, investment opportunities, and economies of scale among Insurance companies (Abebe, 2022). The second variable used was the reinsurance cession rate, expressed as a percentage, to measure the risk management strategy of these businesses as indicated by the part of their premium ceded to reinsurers for extra cover.

As for the sector-level variables, the study employed the insurance penetration rate, expressed as a percentage, as a measure of market depth and the individual businesses' market share, expressed as a percentage, as a measure of market competitiveness. And for macroeconomic variables, the GDP growth rate, the inflation rate, and the interest rate, measured by the real interest rate were used.

The modify model is therefore:

$$\mathbf{ROE_{lt} = \alpha_1 + \alpha_2 ATR_{lt} + \alpha_3 Loss\_Ratio_{lt} + \alpha_4 Solvency\_Ratio_{lt} + \alpha_5 LogTA_{lt} + \alpha_6 GDP\_Growth_{lt} + \alpha_7 Int\_rates_{lt} + \alpha_8 Infl\_Rate_{lt} + \alpha_9 Ins\_pen\_Rate_{lt} + \alpha_{10} Reins\_prem_{lt} + \alpha_{11} Mkt\_share + e_{lt}} \quad \mathbf{(2)}$$

Where:

LogTA: The natural logarithm of total assets.

GDP_Growth: The GDP growth in Kenya.

Int_rates: The real interest rate in Kenya.

Infl_Rate: The inflation rate in Kenya.

Ins_pen_Rate: The insurance penetration rate in Kenya.

Reins_prem: The reinsurance cession rate for individual long-term businesses.

Mkt_share: The market share of individual long-term businesses.

$\alpha_{5:}$ is the coefficient of the natural logarithm of the total asset (LogTA).

α_{6}: is the coefficient of the control variable GDP_Growth denoting the change in the ROE caused by one percentage point change in the GDP growth.

α_{7}: is the coefficient of the control variable Interest_rates denoting the change in the ROE caused by one percentage point change in the interest rates.

α_{8}: is the coefficient of the control variable Infl_rate denoting the change in the ROE caused by one percentage point change in the inflation rate.

α_{9}: is the coefficient of the control variable Ins_pen_Rate denoting the change in the ROE caused by a percentage point change in the insurance penetration rate.

α_{10}: is the coefficient of the control variable Reins_prem denoting the change in the ROE caused by a percentage point change in the reinsurance cession rate.

α_{11}: is the coefficient of the control variable Mkt_share denoting the change in the ROE caused by a percentage point change in the market share.

The rest, same as in (1) above.

3.7. Research Quality – validity, reliability, and objectivity of the research

Ensuring the validity, reliability, and objectivity of the research entails rigorous detection and mitigation of statistical phenomena like heteroscedasticity, multicollinearity, autocorrelation, and endogeneity within the dataset. For heteroscedasticity, the Breusch-Pagan and White test was conducted, while the variance inflation factor (VIF) and tolerance were used to detect multicollinearity. For autocorrelation, the Wooldridge test was conducted and the Hausman test was conducted for endogeneity. By implementing these tests and procedures, the research endeavored to uphold the highest standards of validity, reliability, and objectivity. This systematic approach ensures that the findings are robust and credible, thereby enhancing the overall quality of the research.

Data was entirely collected from the annual reports on the insurance industry that are published by the IRA and the AKI and so are considered of acceptable reliability. The research instrument's validity was strengthened through continuous feedback from the supervisor. This feedback guided necessary revisions and modifications, ensuring the instrument accurately measured what it was intended to. The researcher had no connection to companies under investigation at the time of the research, which would have affected the objectivity of the research results.

3.8. Ethical Considerations

The researcher obtained the necessary ethical approval from Strathmore's Ethical Review Board as a prerequisite for conducting the research, a copy of the approval can be seen in Appendix 2. The researcher also obtained a research permit from the National Commission for Science, Technology, and Innovation (NACOSTI) and a copy of the approval can be seen in Appendix 3.

CHAPTER FOUR : PRESENTATION OF RESEARCH FINDINGS

4.1. Introduction

This chapter presents the results and findings concerning Asset-Liability Management (ALM) and its impact on profitability within the Kenyan long-term insurance industry. The section begins with descriptive statistics to illustrate the current state of the industry, including metrics of profitability, efficiency, and risk management. Subsequently, the analysis examines how key variables derived from the descriptive statistics influence Return on Equity (ROE), highlighting the potential effects of ALM on profitability.

4.2. Descriptive Statistics

The study examines 25 long-term insurance companies operating in Kenya as of 31 December 2022. Due to inconsistencies in financial reporting before 2013, the analysis was limited to a 10-year period (2013–2022), yielding a total of 250 observations per variable. Furthermore, only 23 of the 25 targeted companies maintained relatively consistent reporting throughout the study period and were therefore included in the final analysis as shown in Appendix 1. Given these adjustments and instances of imbalanced data, a minimum of 179 observations per variable were obtained, representing 71.6% of the expected data points, as detailed in Table 4-1.

Table 4-1 Descriptive Statistics

Variable	Obs	Mean	Std. dev.	Min	Max
ROE	185	5.030	13.450	-19.459	32.171
ATR	185	39.854	22.032	4.023	139.456
Loss_Ratio	183	62.510	31.252	3.498	194.209
Solv_Ratio	184	145.170	104.690	5.490	485.823
LogTA	185	15.738	1.625	12.544	18.713
GDP_Growth	185	4.489	1.827	-0.300	7.600
Int_rates	185	7.565	1.391	5.700	10.100
Infl_Rate	185	6.304	1.016	4.690	8.006
Ins_pen_Rate	185	2.576	0.343	2.180	3.400
Reins_prem	179	13.764	14.669	0.328	80.759
Mkt_share	185	5.111	5.848	0.030	24.582

Source: Researcher (2024)

4.2.1. The Return on Equity and the Asset Turnover Ratio

The average Return on Equity (ROE) of 5.03% suggests a moderate level of profitability within the Kenyan long-term insurance sector over the ten-year period examined. The standard deviation of 13.45% highlights significant variability in performance across different companies. This disparity can be attributed to factors such as the diversity of product offerings (some companies offer a full range of long-term products while others specialize in a subset as is the case with Jubilee or ICEA Lion for example offering the full range from life to investments to Cannon offering only group life), variations in risk management strategies, and differential investment returns. Firms exhibiting higher ROE are more proficient in generating income from premiums and investments.

The mean Asset Turnover Ratio (ATR) of 39.85% indicates an average efficiency level in utilizing assets to generate revenue, with the industry producing approximately 40 cents of revenue for each shilling invested in assets. The standard deviation of 22% underscores that some companies are markedly more efficient than others at converting assets into revenue streams, including premiums and investment income. We have companies such as Pioneer Assurance consistently generating upwards of Kes 1.2 of revenue for each shilling of asset while Monarch struggles to make it to 20 cents to the shilling. This efficiency is influenced by factors such as investment strategies, product design, and operational costs. Companies with higher ATR are more effective in leveraging their assets to generate revenue.

4.2.2. Loss Ratio and Solvency

The average Loss Ratio of 62.6% indicates that, on average, Kenyan long-term insurance companies pay out 62.6 cents in claims for every Ksh. 1 collected in premiums. The high standard deviation of 31.60% suggests significant variation in claim experiences across companies, which can be attributed to differences in risk selection processes, product underwriting practices, and reinsurance arrangements. Companies with lower Loss Ratios are typically more effective at managing risk. Kenya Orient has, for example, has shown great practice by keeping its loss ratio at approximately 19% over the research period.

The mean Solvency Ratio of 146% implies that, on average, Kenyan long-term insurance companies possess sufficient capital to meet their financial obligations. The substantial

standard deviation of 104.55% indicates variability in risk tolerance and capital adequacy among firms. Factors influencing this variation include risk appetite, and growth strategies. Firms with higher Solvency Ratios are better equipped to withstand potential financial shocks. Companies such as ICEA Lion and CIC Life Assurance show very robust capital adequacy with ratios of over 300%, while companies like Kenya Alliance show weak adequacy with ratios often below 10%.

4.2.3. Company Size and the Economy

The average Log of Total Assets (LogTA) of 15.738 corresponds to an estimated average total asset value of Ksh 6.7 billion per company. The standard deviation of 1.625 reflects the diverse range of company sizes within the sample, indicating the presence of large (such as ICEA Lion with an average of Ksh. 73 billion in assets, medium (such as GA Life Assurance with Ksh. 6.2 billion), and smaller players (such as Monarch with just Ksh. 656 million) in the Kenyan long-term insurance industry.

The average annual GDP growth rate of 4.49% with a standard deviation of 1.83%, reflects a steady economic expansion over the period. This growth supports the insurance sector by potentially increasing disposable incomes and the demand for insurance products. However, fluctuations in economic growth can influence consumer behavior and investment returns, affecting the overall performance of insurance companies.

Additionally, the mean borrowing rate in Kenya was approximately 7.57%, with a standard deviation of 1.39%. This suggests that the cost of borrowing varied slightly over the period but remained moderate, potentially affecting investment decisions and profitability within the insurance sector. The average inflation rate was around 6.26%, with a standard deviation of 1.00%. High inflation can erode the value of investment returns and affect the purchasing power of policyholders, thereby influencing premium income and claims.

The average insurance penetration rate was 2.58%, with a standard deviation of 0.36%. This indicates a relatively low but slowly growing level of insurance uptake among the Kenyan population, which can affect the overall market size and growth potential for long-term insurance companies. On average, 13.76% of gross premiums were ceded to reinsurers, with a standard deviation of 14.76%. This highlights the reliance on reinsurance to manage risk and

maintain solvency. The average market share of individual companies was 5.11%, with significant variation (standard deviation of 5.61%). This suggests a competitive market with a few dominant players and many smaller firms.

4.3. Diagnostic Statistics

4.3.1. Heteroscedasticity

The Breusch-Pagan test was conducted to examine heteroscedasticity, which pertains to the unequal variance of the error terms in the regression model. As illustrated in Table 4-2 below, the test results (p-value = 0.9219) do not reject the null hypothesis of homoscedasticity. This suggests that the error terms likely exhibit constant variance across the observations. In other words, the variance of the unexplained errors in the model appears to be consistent, which is a desired assumption for the validity of our analysis.

Table 4-2 Breusch-Pagan//Cook-Weisberg

Test Statistic	Chi-Sq (1)	p-value
Breusch-Pagan/Cook-Weisberg	0.01	0.9219

Source: Researcher (2024)

4.3.2. Multicollinearity

Multicollinearity among the independent variables was assessed using the variance inflation factor (VIF) and tolerance. A VIF exceeding 5 is considered indicative of a potential multicollinearity issue. The analysis reveals that most variables exhibit weak correlations with each other. For instance, the VIF values for Loss Ratio (1.35) and Asset Turnover (1.25) are well below the threshold, and their corresponding tolerance values (0.74 and 0.80, respectively) further substantiate this weak correlation. Similarly, GDP Growth shows no signs of concerning multicollinearity, with a VIF of 1.08 and a tolerance of 0.93.

However, some variables present a cause for potential concern. The natural logarithm of total assets (LogTA) has a VIF of 4.69 and a tolerance of 0.21, suggesting a moderate correlation with other independent variables. This indicates that there might be a significant inflation of the variance of the estimated coefficient for LogTA, potentially affecting the precision of its

estimate in the regression model. Market Share also exhibits a moderate correlation, with a VIF of 3.59 and a tolerance of 0.28. However, since these values do not exceed the threshold of 5, this was considered unproblematic.

Table 4-3 Variance inflation factor

Variable	VIF	1/VIF
LogTA	4.69	0.213013
Mkt_share	3.59	0.278234
Int_rates	2.7	0.369951
Ins_pen_Rate	2.13	0.47018
Infl_Rate	1.92	0.520487
Solv_Ratio	1.62	0.616435
Reins_prem	1.46	0.682653
Loss_Ratio	1.35	0.741544
ATR	1.25	0.801547
GDP_Growth	1.08	0.927943
Mean VIF	**2.18**	

Source: Researcher (2024)

4.3.3. Autocorrelation

The Wooldridge test was conducted to examine the presence of first-order autocorrelation, which refers to the correlation between error terms in consecutive time periods. As indicated in Table 4-4, the test results (p-value = 0.4218) do not reject the null hypothesis of no autocorrelation. This suggests that the error terms are likely uncorrelated across time periods. In other words, the errors in the model do not appear to be influenced by the errors in previous periods, which is a desired assumption for the validity of our analysis.

Table 4-4 Wooldridge test for autocorrelation in panel data

Test Statistic	F (1,20)	P>F
Wooldridge test	0.673	0.4218

Source: Researcher (2024)

4.3.4. Endogeneity

The Hausman test was conducted to assess the consistency of the random effects model, which is equivalent to testing for the presence of endogeneity as argued by Woodridge (2010). The test compares the estimates of the random effects model (which assumes no endogeneity) with those of the fixed effects model (which accounts for potential endogeneity). As displayed in Table 4-5, the test results (p-value = 0.4060) do not reject the null hypothesis of model consistency. This suggests that the random effects model is appropriate for the data and that endogeneity is not a concern. In other words, the model's estimates are consistent, a desired assumption for reliable analysis.

Table 4-5 Hausman Test

Statistic	Value
Chi-square (df=10)	10.40
p-value	0.4060

Source: Researcher 2024

4.4. Correlation Analysis

The correlation matrix (shown in Table 4-6 below) revealed several statistically significant relationships that offer valuable insights into the long-term insurance sector's dynamics. A significant positive correlation was observed between the logarithm of total assets (LogTA) and return on equity (ROE), with a coefficient of 0.253 at the 1% significance level. This suggests that larger firms, as indicated by their asset size, tend to exhibit higher profitability, potentially due to economies of scale or better resource utilization. Furthermore, the relationship between LogTA and the loss ratio, with a correlation of 0.165 at the 5% significance level, indicates that larger firms may also experience higher loss ratios. This could imply that these firms engage in riskier underwriting practices or face different risk profiles. Moreover, the negative correlation between LogTA and reinsurance cession rates (-0.464, $p < 0.01$) indicates that larger firms spend less on reinsurance, due to their ability to retain more risk internally or negotiate better terms.

The solvency ratio, a critical measure of financial stability, showed a strong positive correlation with LogTA (0.570, $p < 0.01$), suggesting that larger firms have better solvency positions. This is due to their greater capacity to absorb losses and manage risks. Additionally, a weak positive correlation was found between the asset turnover ratio (ATR) and ROE (0.142, $p < 0.1$), indicating that firms more efficiently utilizing their assets tend to achieve higher returns on equity. We also observed a significant positive relationship between market share and LogTA (0.805, $p < 0.01$), underscoring that larger firms dominate the market. This dominance is reflected in their higher ROE, as market share and ROE were positively correlated (0.276, $p < 0.05$). A strong positive correlation between market share and the solvency ratio (0.541, $p < 0.01$) suggests that firms with greater market share also tend to have better financial stability, due to their more significant resources and risk management capabilities.

Macroeconomic variables also played a significant role. A strong positive correlation between interest rates and the insurance penetration rate (0.539, $p < 0.01$) was identified, suggesting that higher interest rates might enhance the attractiveness of insurance products or reflect a more robust economic environment that boosts demand for insurance. On the other hand, a negative correlation was found between LogTA and the insurance penetration rate (-0.197, $p < 0.05$), indicating that as firms grow larger, they may not necessarily contribute to increasing the overall penetration of insurance in the market.

Table 4-6 Pairwise Correlation

	ROE	ATR	Loss_Ratio	Solv_Ratio	LogTA	GDP_Growth	Int_rates	Infl_Rate	Ins_pen_Rate	Reins_prem	M a
ROE	1.000										
ATR	0.142*	1.000									
Loss_Ratio	-0.105	0.287***	1.000								
Solv_Ratio	0.110	0.011	0.126*	1.000							
LogTA	0.253**	-0.258***	0.165**	0.570***	1.000						
GDP_Growth	0.023	0.025	-0.076	0.011	0.007	1.000					
Int_rates	0.113	-0.029	-0.063	0.002	-0.102	0.125*	1.000				

Infl_Rate	0.109	0.050	-0.016	0.031	-0.003	0.058	-0.534***	1.000		
Ins_pen_Rate	0.194**	0.053	-0.132*	0.037	-0.197***	0.018	-0.539***	0.059	1.000	
Reins_prem	-0.084	0.155**	0.169**	-0.198***	-0.464***	-0.048	-0.034	0.017	-0.019	1.000
Mkt_share	0.276**	-0.108	-0.018	0.541***	0.805***	-0.007	0.021	-0.017	0.036	-0.410***

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Source: Researcher (2024)

These findings highlight the intricate relationships between firm size, market positioning, and financial stability within the Kenyan long-term insurance sector. Larger firms appear to benefit from economies of scale, resulting in better profitability and stability. However, they also face challenges, such as potentially higher loss ratios. The impact of macroeconomic factors, particularly interest rates, further underscores the complex interplay between external economic conditions and the insurance market.

4.5. Effects of Asset Liability Management on Profitability

To assess the explanatory power of the model and identify statistically significant relationships with ROE, we employed three stage least square (3-SLS) regression technique. This method is preferred due to its ability to efficiently handle systems of interrelated equations and its superior performance in accounting for any cross-equation correlations in the residuals. This is particularly relevant given the potential interactions among the dependent variable, ROE, and the independent variables i.e., ATR, Loss Ratio, and Solvency Ratio. The 3SLS approach leverages the benefits of Seemingly Unrelated Regression (SUR) to provide more efficient parameter estimates by considering the potential correlations between the error terms across different equations (Zellner & Theil, 1962; Greene, 2012).

Table 7 below suggests that the model explains 22.62% of the variation in ROE and the extremely low p-value (0.0000) associated with the chi-square statistic strongly suggests that the overall model is statistically significant, meaning that the independent and control variables collectively have a significant impact on ROE.

Table 4-7. 3 SLS Model Fit

Equation	Obs	Params	RMSE	R-squared	chi2	P>chi2
ROE	**176**	**10**	**11.947**	**0.2262**	**51.45**	**0.0000**

Source: Researcher 2024

To ensure the robustness of the findings, the Random Effects (RE) method, after comparison with the Fixed Effects (FE) method, was employed as supplementary analysis. While the RE model captures unobserved heterogeneity assuming that individual effects are uncorrelated with the regressors, the FE model controls for time-invariant characteristics by differencing out individual-specific effects, thus mitigating bias from omitted variables (Hausman, 1978). Utilizing RE or FE models for robustness testing ensures that the results are not driven by the specific econometric approach, thereby reinforcing the reliability of the conclusions drawn from the primary 3SLS estimation (Baltagi, 2005).

4.5.1. Effects of Asset Management on Profitability

The analysis highlights a significant relationship between asset management, measured by the Asset Turnover Ratio (ATR) and the profitability, measured by the Return on Equity (ROE), for long-term insurance businesses in Kenya, answering, thereby, positively the first research question. Specifically, the coefficient for ATR is 0.1503 with a standard error of 0.0459, and it is statistically significant at the 1% level (p-value = 0.001). This positive coefficient indicates that an increase in the Asset Turnover Ratio is associated with an increase in the Return on Equity, holding other factors constant; more specifically, for each extra percentage increase in ATR, the ROE increases by 0.15%. This result implies that more effective utilization of assets is beneficial for the profitability of long-term insurance businesses in Kenya.

Moreover, this relationship between ATR and ROE is strengthened when controlled for company size (LogTA) and consequently for market share (given the strong positive correlation between the two) suggesting that larger firms and those with higher market share benefit more from effective asset management. LogTA itself has a positive and significant relationship with ROE (4.131, $p<0.01$). The positive impact of ATR on ROE might be enhanced for larger firms due to economies of scale, better risk management practices, and more diversified investment portfolios. Larger firms are better at leveraging their assets to generate higher returns, thus strengthening the positive relationship between ATR and ROE.

4.5.2. Effects of Liability Management on Profitability

To assess the effect of liability management on profitability of these long-term insurance businesses and answer the second research question, the analysis examined the relationship between the Loss Ratio and Return on Equity (ROE). The coefficient for Loss Ratio is -0.0379, with a standard error of 0.0342, and a p-value of 0.267. This negative coefficient suggests that an increase in the Loss Ratio is associated with a decrease in ROE, although the relationship is not statistically significant at conventional levels. The negative coefficient implies that, on average, an increase in the Loss Ratio tends to reduce the ROE. This relationship is theoretically sound because higher claim payouts reduce the net income, thereby lowering the equity returns. However, the p-value of 0.267 indicates that this relationship is not statistically significant, meaning that there is insufficient evidence to confidently assert that the Loss Ratio impacts ROE in this context suggesting, therefore, that other factors may be at play, potentially overshadowing the direct impact of the Loss Ratio on ROE; it could also indicate that the variability in ROE is better explained by other variables in the model, such as Asset Turnover Ratio or Solvency Ratio.

4.5.3. Effects of Solvency Management on Profitability

The analysis investigates the relationship between the Solvency Ratio and Return on Equity (ROE) for long-term insurance businesses in Kenya to answer the third and last research question. The coefficient for Solvency Ratio is -0.0233, with a standard error of 0.0110, and a p-value of 0.035. This negative coefficient suggests that an increase in the Solvency Ratio is associated with a decrease in ROE, and this relationship is statistically significant at the 5% level. More specifically, a 1 percentage point increase in solvency ratio is associated with a 0.02 percentage points decrease in profitability. This means that while maintaining higher solvency is crucial for risk management and regulatory compliance, it may come at the cost of lower returns on equity. This could be because maintaining a higher solvency margin often involves holding more capital in lower-yielding, safer investments, which may reduce the overall return on equity. Essentially, while higher solvency enhances financial stability and reduces risk, it can also constrain the company's ability to generate higher returns on its equity.

Moreover, the strength of the relationship between Solvency Ratio and ROE is further emphasized by the simultaneous inclusion of inflation rate and government borrowing rates

(interest rates) as control variables, both of which have significant relationships with ROE. The coefficient for inflation rate is 2.543, with a standard error of 1.236, and a p-value of 0.040 indicating that higher inflation rates can lead to increased nominal returns on investments, potentially boosting ROE. The coefficient for interest rates is 1.813, with a standard error of 1.068, and a p-value of 0.088 indicating that higher interest rates can lead to higher returns on fixed-income investments held by insurance companies, contributing to increased ROE.

The inclusion of inflation rate and interest rates as control variables strengthens the relationship between Solvency Ratio and ROE because these macroeconomic factors directly impact the returns on investments and the cost of capital for insurance companies. When inflation and interest rates are accounted for, the model better isolates the effect of the Solvency Ratio on ROE by controlling for external economic conditions that influence profitability. Higher inflation and interest rates can enhance returns on investments, potentially offsetting the conservative investment strategies required to maintain high solvency margins. Therefore, the negative impact of the Solvency Ratio on ROE becomes more apparent and significant when these factors are included, highlighting the trade-off between maintaining financial stability and achieving higher equity returns.

Table 4-8 Three-stage least-squares regression

ROE	Coefficient	Robust std. err.	z	P>z	[95% conf.	interval]
ATR	0.150	0.046	3.28	0.001	0.060	0.240
Loss_Ratio	-0.038	0.034	-1.11	0.267	-0.105	0.029
Solv_Ratio	-0.023	0.011	-2.11	0.035	-0.045	-0.002
LogTA	4.131	1.231	3.36	0.001	1.719	6.543
GDP_Growth	-0.169	0.501	-0.34	0.736	-1.152	0.813
Int_rates	1.814	1.069	1.7	0.090	-0.281	3.909
Infl_Rate	2.543	1.237	2.06	0.040	0.119	4.967
Ins_pen_Rate	6.650	3.799	1.75	0.080	-0.797	14.096
Reins_prem	0.093	0.074	1.25	0.211	-0.053	0.238
Mkt_share	0.082	0.292	0.28	0.780	-0.491	0.654
_cons	-108.006	23.254	-4.64	0.000	-153.583	-62.429

Source: Researcher 2024

Based on above results, regression equation was fitted as follows:

ROE = -180.006 + 0.150ATR - 0.034Loss_Ratio - 0.023Solv_Ratio + 4.131LogTA – 0.169GDP_Growth + 1.814Int_rates + 2.543Infl_Rate + 6.65Ins_pen_Rate + 0.093Reins_prem - 0.082Mkt_share + ε

4.6. Robustness Analysis

For robustness analysis, we employed an alternative regression method to ascertain consistency of the coefficients obtained through the 3 SLS method. Given the panel nature of the data, it was concluded that either a fixed effect or random effect model would be appropriate. We used, therefore, the Hausman test results, which are used to compare fixed effects and random effects models in panel data analysis. The results are in Table 4-6 above. Given the p-value of 0.406, which is greater than the typical significance level of 0.05, we failed to reject the null hypothesis of the test. This meant that there was not enough evidence to suggest that the fixed effects model was more appropriate than the random effects model. Therefore, we preferred the random effects model for this robustness analysis.

Table 4-9. Random Effect Model Fit

Statistic	RE Method
Number of obs	176
Number of groups	22
R-squared: Within	0.1273
R-squared: Between	0.5620
R-squared: Overall	0.2243
Wald Chi-Square / Chi2	38.76
Prob > Chi-Square	0.0000

Source: Researcher 2024

Table 4-10. Random-effects GLS regression

ROE	Coefficient	Std. err.	z	P>z	[95% conf. interval]	
ATR	0.151	0.055	2.75	0.006	0.043	0.258
Loss_Ratio	-0.035	0.037	-0.95	0.342	-0.107	0.037
Solv_Ratio	-0.021	0.013	-1.66	0.096	-0.046	0.004
LogTA	4.493	1.563	2.87	0.004	1.429	7.557

GDP_Growth	-0.179	0.494	-0.36	0.716	-1.147	0.788
Int_rates	1.960	1.054	1.86	0.063	-0.105	4.026
Infl_Rate	2.600	1.222	2.13	0.033	0.204	4.995
Ins_pen_Rate	6.687	3.924	1.7	0.088	-1.003	14.378
Reins_prem	0.116	0.086	1.35	0.177	-0.052	0.284
Mkt_share	-0.046	0.379	-0.12	0.903	-0.789	0.697
_cons	-115.117	28.389	-4.05	0.000	-170.758	-59.476

Source: Researcher 2024

The 3SLS regression, which accounts for potential simultaneous equations and the interdependencies among the independent variables, revealed several significant relationships. Notably, the coefficients for ATR (0.150, $p < 0.01$), Solvency Ratio (-0.023, $p < 0.05$), LogTA (4.131, $p < 0.01$), Inflation Rate (2.543, $p < 0.05$), and Insurance Penetration Rate (6.650, $p < 0.10$) were significant, suggesting their influential roles in determining ROE. The model achieved an R-squared of 0.2262, indicating that approximately 22.62% of the variation in ROE could be explained by the model.

In contrast, the Random Effects model as shown in table 4-10 above, while controlling for unobserved heterogeneity across firms, yielded a slightly different set of significant coefficients. The RE results showed significant relationships for ATR (0.151, $p < 0.01$), LogTA (4.493, $p < 0.01$), Inflation Rate (2.600, $p < 0.05$), and Insurance Penetration Rate (6.687, $p < 0.10$). The Solvency Ratio was marginally significant at a 10% level ($p = 0.096$). The overall R-squared, as revealed in table 4-9 above, was 0.2243, with a notable between R-squared of 0.5620, indicating substantial variability explained by differences between firms.

The comparison between the 3SLS and RE models shows a general consistency in the significance and direction of key coefficients, reinforcing the robustness of the results. The 3SLS approach, however, provides a more nuanced understanding by accounting for the potential endogeneity and simultaneity among the variables, which could be overlooked by the RE model. The RE model's consistency in significant coefficients further supports the robustness of the 3SLS findings, suggesting that the identified relationships are not artifacts of the estimation method but reflect underlying economic realities in the sector.

Therefore, while the 3SLS method was chosen for its ability to handle complex interdependencies and provide consistent estimates in a system of equations framework, the

RE model serves as a robustness check, affirming the validity of the main results. This complementary use of methodologies enhances confidence in the study's conclusions about the relationships between ALM and profitability in the Kenyan long-term insurance market.

4.7. Conclusion

The analysis indicated that among the Asset-Liability Management (ALM) variables, both the Asset Turnover Ratio (ATR) and Solvency Ratio had statistically significant relationships with Return on Equity (ROE). Specifically, ATR showed a positive relationship with ROE, with a coefficient of 0.150, suggesting that firms that more efficiently utilize their assets tend to achieve higher profitability. In contrast, the Solvency Ratio exhibited a negative relationship with ROE, with a coefficient of -0.023, indicating that higher solvency levels are associated with lower profitability, potentially due to the cost of maintaining capital adequacy.

The inclusion of control variables such as firm size (LogTA), macroeconomic factors (Inflation Rate), and market dynamics (Insurance Penetration Rate) significantly improved the model's explanatory power. Larger firms, as measured by total assets (LogTA), tend to exhibit higher ROE. The analysis showed that a thousand shillings increase in total assets was associated with a 4.13% increase in ROE. This finding suggests that larger firms benefit from economies of scale, greater investment opportunities, and operational efficiencies. Macroeconomic conditions, particularly the Inflation Rate, also had a significant impact on ROE. A 1 percentage point increase in the inflation rate was associated with a 2.54 percentage point increase in ROE. This positive relationship could be attributed to higher investment returns and the ability of insurers to adjust premiums in response to inflationary pressures. Moreover, the Insurance Penetration Rate was found to be positively correlated with ROE, with a coefficient of 6.65. This indicates that a one percentage point increase in the penetration rate could lead to a 6.65 percentage point increase in profitability, reflecting the benefits of a broader market base and enhanced risk diversification.

These findings underscore the importance of both internal financial strategies and external macroeconomic factors in shaping the profitability of firms in the Kenyan long-term insurance sector. The results suggest that a multifaceted approach, including efficient asset utilization, maintaining optimal solvency levels, and leveraging market opportunities, is crucial for enhancing profitability.

CHAPTER FIVE : DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1. Introduction

This chapter synthesizes the findings, conclusions, and recommendations derived from the investigation into asset-liability management (ALM) within the Kenyan long-term insurance industry. It also outlines potential avenues for future research to deepen our understanding in this domain.

5.2. Summary of the Findings

The analysis of the data reveals a Kenyan long-term insurance sector marked by moderate profitability, efficiency variability, and diverse company sizes within a moderately growing economy. Observed performance disparities stem from differences in product mix, risk management, and investment strategies. Asset management plays a pivotal role in profitability, as evidenced by the strong positive correlation between Asset Turnover Ratio (ATR) and ROE, suggesting that companies efficiently utilizing their assets achieve superior financial outcomes. Larger firms, benefiting from economies of scale and diversified portfolios, demonstrate enhanced ATR effects on profitability. In contrast, liability management, measured by the Loss Ratio, shows no statistically significant relationship with profitability, reflecting the complexities of claims management and underwriting practices. Solvency management reveals a delicate balance, with higher solvency ratios ensuring regulatory compliance but negatively impacting ROE due to the opportunity cost of holding excess capital.

Economic conditions, such as inflation and interest rates, significantly influence profitability by shaping investment returns and capital costs. High inflation, while potentially boosting nominal asset values and premiums, also requires careful hedging to mitigate its erosion of real returns. Similarly, the moderate borrowing rates observed play a role in shaping investment strategies and operational decisions. With an average insurance penetration rate of 2.58%, the sector exhibits untapped growth potential, necessitating strategic initiatives to increase accessibility and awareness. Furthermore, the competitive landscape, characterized by an average market share of 5.11% per company, underscores the importance of innovation and differentiation. These dynamics call for

adaptive strategies that align risk management with operational efficiency while leveraging external macroeconomic factors to optimize both stability and profitability.
This intricate interplay underscores the pivotal significance of effective risk management, strategic investment, and operational efficiency in enhancing both profitability and stability within the Kenyan long-term insurance sector.

5.3. Discussion of the Findings

The analysis unveils a nuanced landscape characterized by moderate profitability and efficiency, notable variability in risk management and solvency practices, and a diverse array of company sizes within an economy exhibiting moderate growth.

The study reveals that the Kenyan long-term insurance industry maintains moderate profitability, with an average Return on Equity (ROE) of 5.03%. The substantial standard deviation highlights significant variability in performance across companies. This variability suggests that factors such as product mix, risk management, and investment returns play crucial roles in determining profitability. Companies with higher ROE are more proficient in generating income from premiums and investments, indicating superior management practices and strategic decision-making. This finding aligns with previous studies on commercial banks in various countries, which suggest that profitability can vary significantly based on the specific financial institution and its strategic approaches (Shrestha, 2016; Belete, 2013). Similarly, the mean Asset Turnover Ratio (ATR) indicates that, on average, the industry generates 40 cents of revenue for every shilling invested in assets. However, the significant standard deviation reveals considerable disparities in efficiency among companies. This efficiency is influenced by investment strategies, product design, and operational costs. Companies demonstrating higher ATR are more adept at converting their assets into revenue streams, reflecting effective asset management and operational efficiency.

In examining liability management and solvency within the context of Asset-Liability Management (ALM), the study finds that Kenyan long-term insurance companies typically pay out 62.5 cents in claims for every Ksh 1 collected in premiums. The high standard deviation suggests significant variation in claim experiences across companies. These differences are influenced by variations in risk selection, underwriting practices, and reinsurance strategies. Companies with lower loss ratios exhibit a stronger ability to manage risk, through more

stringent underwriting standards reducing risky policies. Additionally, the average solvency ratio indicates that these companies have sufficient capital to meet their financial obligations, with solvency margins being, on average, 1.45 more than the required levels.. However, the substantial standard deviation here too points to wide variations in risk tolerance and capital adequacy across companies. Some firms maintain robust solvency ratios, reflecting conservative capital management and a strong buffer against potential losses, while others exhibit weaker solvency positions, potentially exposing them to higher financial risk. These findings resonate with studies on commercial banks by Tee (2017) and Owusu and Alhassan (2020), which emphasize the critical role of effective liability management in ensuring profitability and stability. Studies on microfinance institutions (Abebe, 2022) similarly highlight the importance of tailored risk management strategies based on the specific financial structure of the institution.

Considering company size and economic growth, the average logarithm of total assets (LogTA) corresponds to an estimated average total asset value of Ksh 6.7 billion per company. The standard deviation reflects the diverse range of company sizes, indicating the presence of large, medium, and smaller players in the Kenyan long-term insurance industry. This diversity underscores the varying capacities and strategies employed by companies of varied sizes to navigate the market dynamics. The annual GDP growth rate during the ten-year period provides a supportive backdrop for the industry's performance within the broader economic environment. Economic growth enhances disposable incomes, thereby increasing the demand for insurance products. However, economic fluctuations can significantly impact consumer behavior and investment returns, necessitating agile management practices to adapt to changing economic conditions.

Additionally, the mean borrowing rate in Kenya suggests that while the cost of borrowing varied slightly, it remained moderate, eventually affecting investment decisions and profitability within the insurance sector. The high inflation can erode the value of investment returns and affect the purchasing power of policyholders, thereby influencing premium income and claims. Companies need to adopt strategies that hedge against inflation to protect their financial stability. The average insurance penetration rate indicates a relatively low but slowly growing level of insurance uptake among the Kenyan population. This low penetration rate highlights the untapped potential within the market and underscores the need for initiatives to

increase insurance awareness and accessibility. The reinsurance cession rate highlights a reliance on reinsurance to manage risk and maintain solvency. Reinsurance plays a critical role in spreading risk and ensuring that companies can withstand significant claims events. The low average market share of individual companies suggests a competitive market with a few dominant players and many smaller firms. This competitive landscape necessitates continuous innovation and strategic differentiation to capture and retain market share.

To delve deeper into the relationship between ALM and a company's ROE within the Kenyan long-term insurance industry, we employed a 3SLS model. This analysis assesses how key variables from the descriptive statistics influence ROE.

5.3.1. Asset Management and Profitability

The analysis explores the association between efficient asset utilization, measured by Asset Turnover Ratio (ATR), and profitability, indicated by Return on Equity (ROE). The regression results show a significant positive effect of asset management on profitability. This strong positive relationship between ATR and ROE suggests that companies that efficiently manage their assets are more profitable.

In the context of the insurance industry, which often invests in long-term, less liquid assets, optimizing asset turnover is crucial for improving profitability. Insurers who can effectively convert their assets into revenue tend to achieve higher profitability. This finding is consistent with the study by Eyup et al. (2017), who observed that better asset quality significantly improves financial health. Similarly, Olowokudejo and Ukpong (2021) highlighted that specific asset categories in life insurance companies positively impact profitability, emphasizing the importance of targeted asset management strategies. Moreover, studies by Shrestha (2016) and Belete (2013) in commercial banks in Nepal and Ethiopia, respectively, found a positive impact of all asset categories on profitability, further supporting the notion that effective asset management is crucial for financial success. Although these studies focused on commercial banks, the principles of efficient asset utilization are equally applicable to the insurance industry.

Furthermore, the relationship between ATR and ROE becomes stronger and more pronounced when the model controls for company size and market share. Larger companies, indicated by

higher LogTA, might have more resources and better capabilities to manage their assets efficiently. The positive impact of ATR on ROE might be enhanced for larger firms due to economies of scale, better risk management practices, and more diversified investment portfolios. Larger firms are better at leveraging their assets to generate higher returns, thus strengthening the positive relationship between ATR and ROE.

This finding is consistent with Modern Portfolio Theory (MPT), which suggests that optimal asset allocation enhances returns while balancing risk. MPT advocates diversification to maximize returns for a given level of risk, which aligns with how Kenyan long-term insurers invest predominantly in government securities (approximately 74% of industry assets as of 2023). This conservative investment strategy ensures financial stability while generating steady returns. However, MPT also implies that diversification across asset classes (including equities and alternative investments) could further enhance profitability. The fact that some insurers outperform others in ATR suggests that firms that optimize asset allocation beyond government bonds may achieve superior returns, partially validating MPT in this context. In the context of insurance companies, MPT underscores the need to allocate resources strategically, balancing investments to ensure both profitability and liquidity for meeting claims.

All this allows us to assert that there is a significant relationship between asset management and the profitability of long-term insurance businesses.

5.3.2. Liability Management and Profitability

The study examines the impact of liability management through claims experience, measured by the Loss Ratio (LR), on profitability. Typically, a lower loss ratio, indicating fewer premiums paid out in claims, is expected to lead to higher profitability. However, the regression analysis yielded a non-significant negative effect of liability management on profitability. This result suggests that the data might not fully capture the extent of claim severity and frequency. Moreover, the complexity of claims management, including factors like risk selection and underwriting practices, might obscure the direct relationship between LR and ROE. While Malik (2011) found a negative relationship between loss ratio and the profitability of insurers in Pakistan, our study indicates that other underlying factors might influence this relationship in the Kenyan context. This does not allow us to conclusively determine there is a significant

relationship between liability management as defined in this study and profitability of long-term insurance businesses in Kenya.

The findings on liability management align with Risk Theory, which emphasizes the calculation of risk premiums to manage insurance liabilities effectively. Buhlmann's theory highlights the role of risk loading and credibility premiums in adjusting premiums based on expected claims and market risks. In the context of liability management, the loss ratio reflects the relationship between premiums collected and claims paid, which is central to determining profitability. Although no significant relationship was found in this study, Risk Theory suggests that better risk assessment and premium adjustments could influence the loss ratio and profitability in the long-term insurance sector.

5.3.3. Solvency Management and Profitability

The relationship between solvency management, measured by the Solvency Ratio (SR), and ROE was also investigated. Regulatory capital requirements often compel insurance companies to hold capital reserves that might exceed immediate needs, creating a complex relationship between solvency and profitability. The regression analysis shows a negative and statistically significant coefficient for SR; meaning, therefore, that while maintaining higher solvency is crucial for risk management and regulatory compliance, it may come at the cost of lower returns on equity. This is likely because a higher Solvency Ratio implies that a significant portion of the company's assets is allocated to secure regulatory capital requirements, which could otherwise be utilized for more profitable investments or operations. This negative relationship is consistent with studies by Mamati et al. (2017) and Nicodem (2020), who noted that while high capital reserves ensure solvency, they can potentially dampen short-term profitability due to the opportunity cost of holding excess capital. The findings suggest that companies must carefully balance solvency requirements with profitability goals to maintain financial health.

The inclusion of inflation rate and interest rates as control variables strengthens the relationship between Solvency Ratio and ROE because these macroeconomic factors directly impact the returns on investments and the cost of capital for insurance companies. Higher inflation and interest rates can enhance returns on investments, potentially offsetting the conservative investment strategies required to maintain high solvency margins. Therefore, the negative

impact of the Solvency Ratio on ROE becomes more apparent and significant when these factors are included, highlighting the trade-off between maintaining financial stability and achieving higher equity returns. This result aligns with findings from Olowokudejo et al. (2011), who noted that inflation can positively impact profitability by driving up nominal asset values and premium income. Inflation can also lead to higher nominal returns on investments, thereby boosting profitability. However, it is crucial for companies to manage inflation risks effectively to sustain profitability in the long run.

Furthermore, the inclusion of interest rates as a control variable strengthens the significance of the negative relationship between SR and ROE. Redington's Theory of Immunization emphasizes the importance of managing interest rate risk by aligning the durations of assets and liabilities. According to this theory, fluctuations in interest rates can significantly affect an insurance company's solvency, making it crucial to match asset and liability durations. This approach helps stabilize solvency, ensuring that interest rate changes do not disproportionately impact a company's financial health.

All this allows us to assert that there is a significant relationship between solvency management and the profitability of long-term insurance businesses in Kenya.

5.4. Recommendations

The Kenyan long-term insurance industry shows potential for growth and improved performance. To enhance profitability and stability, companies should consider a series of strategic recommendations based on the presented findings.

The study indicates that larger companies benefit from economies of scale, as evidenced by the positive relationship between company size and ROE and are also better at generating revenues from their assets. To capitalize on this, smaller companies should consider mergers or strategic alliances to pool resources and expertise. This can help achieve operational efficiencies and reduce costs, particularly in areas such as investment management, technology infrastructure, and compliance functions. Additionally, optimizing the Asset Turnover Ratio (ATR) through better asset management can enhance revenue generation. Companies should invest in advanced asset management systems and training to improve their ability to convert assets into

revenue streams. This approach is critical in an industry characterized by significant disparities in efficiency, as highlighted by the variation in ATR among companies.

The negative relationship between Solvency Ratio and ROE suggests that while maintaining high solvency is essential for stability, it may limit profitability. Companies should aim to find an optimal balance where solvency requirements are met without excessively tying up capital in low-yield investments. This can be achieved through strategic capital allocation and seeking higher yielding, yet stable investment opportunities. To help in this, regulators, through the IRA, should ensure that solvency requirements are stringent enough to protect policyholders but not so excessively that they hinder the profitability and growth of insurance companies. Regular reviews and adjustments of solvency frameworks, based on market conditions and industry feedback, can help achieve this balance. Continuing the implementation of a risk-based supervision approach can help in identifying and mitigating potential risks in insurance companies' operations. This will involve tailoring regulatory scrutiny based on the risk profile and systemic importance of individual firms, rather than a one-size-fits-all approach.

Considering the significant impact of inflation and interest rates on ROE, companies should actively monitor macroeconomic trends and adjust their investment strategies accordingly. For instance, during periods of rising interest rates, increasing allocations to fixed-income securities could enhance returns.

By implementing these recommendations, the Kenyan long-term insurance industry can enhance its profitability and stability, positioning itself for sustainable growth in a dynamic economic environment.

5.5. Limitation of the study

Despite the enhanced model fit achieved by incorporating various control variables, this study has several limitations that warrant discussion. Firstly, the model may not have captured all pertinent factors influencing Return on Equity (ROE). Although the inclusion of control variables such as firm size, inflation rate, and market size improved the model's explanatory power, there may still be critical, unaccounted factors. Macroeconomic variables like exchange rates, political stability, and global economic trends, which were not included in this study, might also significantly affect the profitability of long-term insurance companies in Kenya.

Secondly, the marginal significance of some coefficients suggests that the relationships between specific independent and control variables and ROE are not entirely robust. This indicates a need for further refinement of the model, using larger datasets or more sophisticated analytical techniques. Such measures could provide clearer insights and enhance the reliability of the findings.

Another limitation lies in the potential interaction effects between control variables, which were not fully explored in this study. Understanding how factors like asset allocation strategies interact with variables such as market share or risk profiles could provide deeper insights into the profitability dynamics of insurance companies.

Lastly, the study did not account for unobserved factors that might influence ROE, such as managerial expertise, organizational culture, technological adoption, or customer satisfaction. These variables are challenging to quantify but are crucial for a comprehensive understanding of company performance. Employing advanced statistical techniques in future research could help mitigate this limitation by accounting for these unobserved factors.

In conclusion, while this study provides valuable insights into the factors influencing ROE in the Kenyan long-term insurance industry, it highlights the need for further research to address these limitations. Future studies should aim to incorporate a wider range of variables and employ more sophisticated methodologies to develop a more comprehensive understanding of profitability determinants in this sector.

5.6. Suggestion for Further Research

Building on the limitations identified in this study, several avenues for future research are suggested to deepen the understanding of factors influencing Return on Equity (ROE) in the Kenyan long-term insurance industry.

Firstly, future studies could explore the interaction effects between different control variables and their combined impact on ROE. Analyzing how asset allocation strategies affect companies with varying market shares or risk profiles could uncover nuanced insights into the dynamics of profitability. Understanding these interaction effects would provide a more comprehensive picture of how different factors collectively shape profitability.

Secondly, investigating the influence of company-specific strategies on ROE is recommended. Future research could focus on how different business models, product offerings, and operational strategies impact profitability across firms of various sizes and market positions. This approach would help identify best practices and strategic differentiators that contribute to superior financial outcomes.

Additionally, future studies should consider incorporating unobserved factors that might influence ROE but were not captured in this study. Employing advanced statistical techniques, such as fixed-effects models or instrumental variable approaches, could account for variables like managerial expertise, organizational culture, technological adoption, or customer satisfaction. These factors are crucial for a holistic understanding of company performance but are often challenging to quantify.

Furthermore, expanding the range of macroeconomic variables included in the analysis would provide a more detailed understanding of external influences on ROE. Factors such as exchange rates, political stability, and global economic trends could significantly impact the profitability of insurance companies and should be considered in future models.

Finally, longitudinal studies tracking changes over time could offer valuable insights into the evolving dynamics of the industry. By examining how relationships between variables and ROE develop over multiple periods, researchers can better understand the long-term effects of strategic decisions and external factors on profitability.

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APPENDICES

Appendix 1. Sample Data Collection Sheet for a single year.

Company	Year	ATR	Loss Ratio	Solvency Ratio	LogTA	ROE	GDP Growth	Interest rates	Inflation Rate	Insurance Penetration Rate	Percent Reinsurance premium	Market Share	ROA
ABSA LIFE ASSURANCE	2022								7.66%	2.29%		4.04%	
APA LIFE ASSURANCE COMPANY	2022	0.499707	0.397147	1.497268	16.24178	-8.08%	4.80%	6.00%	7.66%	2.29%	15.81%	3.42%	-0.57%
BRITAM LIFE ASSURANCE	2022	0.306925	0.725881	1.786369	18.59391	15.77%	4.80%	6.00%	7.66%	2.29%	2.49%	20.14%	1.31%
CANNON LIFE ASSURANCE (K) LIMITED	2022	0.239374	1.399738	0.365474	14.45577	-9.62%	4.80%	6.00%	7.66%	2.29%	52.93%	0.30%	-1.46%
CAPEX LIFE ASSURANCE COMPANY	2022	0.705584	0.445167	0.362024	14.21178	12.19%	4.80%	6.00%	7.66%	2.29%	18.24%	0.73%	3.52%
CIC LIFE ASSURANCE COMPANY	2022	0.465131	0.536009	2.228258	16.86095	4.87%	4.80%	6.00%	7.66%	2.29%	18.75%	6.24%	0.50%
CORPORATE INSURANCE COMPANY	2022	0.158157	1.665577	0.0549	13.63785	91.91%	4.80%	6.00%	7.66%	2.29%	0.00%	0.09%	3.11%
EQUITY LIFE ASSURANCE	2022	1.151863	0.034979	1.669282	15.26417	32.17%	4.80%	6.00%	7.66%	2.29%	35.02%	3.10%	6.66%
GA LIFE ASSURANCE COMPANY	2022	0.356557	0.244172	0.602716	17.1894	15.47%	4.80%	6.00%	7.66%	2.29%	0.87%	5.31%	0.45%
GEMINIA LIFE INSURANCE COMPANY	2022	0.59151	0.876956	1.425836	14.8523	-4.39%	4.80%	6.00%	7.66%	2.29%	51.54%	0.80%	-1.13%
ICEA LION LIFE ASSURANCE	2022	0.228166	0.599602	2.892692	18.71254	5.51%	4.80%	6.00%	7.66%	2.29%	0.00%	14.69%	0.70%
JUBILEE INSURANCE COMPANY	2022	0.24364	0.700118	1.880596	18.55191	9.05%	4.80%	6.00%	7.66%	2.29%	0.00%	12.70%	0.78%
KENINDIA ASSURANCE COMPANY	2022	0.241012	0.613067	0.920773	18.02076	9.12%	4.80%	6.00%	7.66%	2.29%	0.36%	6.22%	0.53%
KENYA ORIENT LIFE ASSURANCE	2022	0.417788	0.35577	1.39829	15.13333	2.52%	4.80%	6.00%	7.66%	2.29%	9.53%	0.89%	0.48%
KUSCCO MUTUAL ASSURANCE LIMITED	2022								7.66%	2.29%		1.08%	
LIBERTY LIFE ASSURANCE COMPANY	2022	0.233708	0.944705	1.727387	17.05058	-2.09%	4.80%	6.00%	7.66%	2.29%	5.85%	3.52%	-0.23%
MADISON INSURANCE COMPANY	2022	0.262674	0.917678	-1.46121	16.63594	46.57%	4.80%	6.00%	7.66%	2.29%	5.37%	2.44%	-2.76%
OLD MUTUAL ASSURANCE	2022	0.238118	1.104057	4.584986	17.20249	4.23%	4.80%	6.00%	7.66%	2.29%	21.11%	3.69%	0.79%
PIONEER ASSURANCE COMPANY	2022	0.574789	0.780735	1.594594	15.75501	2.08%	4.80%	6.00%	7.66%	2.29%	20.82%	2.64%	0.25%
PRUDENTIAL LIFE ASSURANCE	2022	0.756842	0.353353	1.614964	14.89865	-22.10%	4.80%	6.00%	7.66%	2.29%	11.89%	1.44%	-6.24%
SANLAM LIFE ASSURANCE	2022	0.32084	0.698779	2.087021	17.25004	10.46%	4.80%	6.00%	7.66%	2.29%	10.61%	5.54%	1.03%
THE KENYAN ALLIANCE INSURANCE	2022	0.355727	0.778643	0.616332	15.43133	41.07%	4.80%	6.00%	7.66%	2.29%	6.99%	0.90%	2.62%
THE MONARCH INSURANCE	2022	0.151627	0.399681	0.163176	13.64367	12.72%	4.80%	6.00%	7.66%	2.29%	36.95%	0.08%	1.46%

Appendix 2. Strathmore University Ethical Board Approval

Strathmore UNIVERSITY

14th May 2024

Mr Musingilwa Serge,
serge.musingilwa@strathmore.edu

Dear Mr Musingilwa,

RE: The Effect of Asset Liability Management Practices on the Financial Performance of Kenyan Long-Term Insurance Businesses

This is to inform you that SU-ISERC has reviewed and **approved** your above **SU-masters** research proposal. Your application reference number is **SU-ISERC2207/24.** The approval period is from **14th May 2024 to 13th May 2025.**
This approval is subject to compliance with the following requirements:

i. Only approved documents including (informed consents, study instruments, MTA) will be used.
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by SU-ISERC.
iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to SU-ISERC within 72 hours of notification.
iv. Any changes anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to SU-ISERC within 72 hours.
v. Clearance for the export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to the expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days of completion of the study to SU-ISERC.

Before commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology, and Innovation (NACOSTI) https://research-portal.nacosti.go.ke/ and obtain other clearances needed.

Yours sincerely,

Mr Ambrose Rachier,
Chairperson; SU-ISERC

Ole Sangale Rd, Madaraka Estate. PO Box 59857-00200, Nairobi, Kenya. Tel +254 (0)703 034000
Email admissions@strathmore.edu www.strathmore.edu

Appendix 3. NACOSTI Ethical Approval

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **352475**

Date of Issue: **23/April/2024**

RESEARCH LICENSE

This is to Certify that Mr.. Serge Musingilwa of Strathmore University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Nairobi on the topic: THE EFFECTS OF ASSET-LIABILITY MANAGEMENT PRACTICES ON THE FINANCIAL PERFORMANCE OF LONG-TERM INSURANCE BUSINESSES IN KENYA. for the period ending : 23/April/2025.

License No: **NACOSTI/P/24/34906**

352475

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