THE EFFECT OF RISK FACTORS ON PRICING OF GENERAL BUSINESS INSURANCE PRODUCTS BEFORE AND AFTER COVID-19 PANDEMIC: EVIDENCE FROM KENYA

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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 thesis itself.

Signed:  **Date:** 8th June, 2023

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ABSTRACT

Pricing is one of the critical practices of the insurance industry. In Kenya, very little research has investigated effect of risk factors on pricing of general business insurance products which is the gap that this paper aims to bridge. The study's main objective was to determine the effect of risk factors on premium pricing of Kenya's general business insurance products before and after Covid-19 pandemic, particularly with a focus on the motor insurance product line. The study was anchored on the Game theory. The research method used was quantitative, which informed the adoption of a cross-sectional study design and the target population comprised of all the registered general business insurers which were sampled out of a population of 61 insurers in Kenya. A census method was applied to select all the general insurers. This study utilized both secondary and primary data collection techniques. For secondary data, panel data on premium pricing and documented aspects of risk factors was sourced from published annual reports for the period 2018 to 2021 while primary data was obtained through questionnaires filled by risk officers, actuaries and insurance managers in four different departments of the selected insurance firms. The extracted research data was analyzed using Stata 16 and Statistical Package for Social Sciences (SPSS) version 28. Descriptive analysis described the data in terms of charts, frequencies, percentages, mean scores and standard deviations. The research also adopted a multiple linear regression analysis and multiple binary logistic regression to estimate the influence and effect of the independent variables on premium pricing for general business insurance products in Kenya and the results of the study were presented using tables. The study found that insurance sector regulation, prior insurance coverage, underwriting risk and market value had a significant effect on premium price. The study recommends that insurance companies adopt risk-based pricing in their pricing methodologies used for insurance products and that policies are put in place to ensure that the key risk factors identified as having an effect in the pricing of general business products such as motor insurance products are factored in their pricing methodologies. This would in turn assist in the overall enhancement of the profitability of Kenya's sector.

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ABBREVIATIONS AND ACRONYMS

CBK	Central Bank of Kenya
FSD	Financial Sector Deepening
GDP	Gross Domestic Product
GWP	Growth Written Premium
KES	Kenya Shillings
OESAI	Organization of Eastern and Southern Africa Insurers
PCR	Prescribed Capital Ratio
SSA	Sub-Saharan Africa

DEFINITION OF TERMS

Variable	Definition
Insurance premium	Insurance premiums are the fees charged by an insurance company for services expected to be rendered. The insurance premium or gross written premium is the amount of money charged by the insurer or paid by the insured to secure the services of insurance (Insurance Regulatory Authority (IRA), 2020).
Claim History	Claims history is the record of a person's use of insurance. When you experience a loss and make a claim, the details of that claim become part of your claims history. The subject of the claim, what caused the damage, the amount paid by the insurer, and other such details are all included in this history (Stephen & Jonathan, 1995).
Insurance industry Regulations	Insurance regulation refers to the government overseeing the insurance market to ensure fairness and professionalism among those working for the insurance industry, to prevent the market from collapsing, and to democratize insurance. Laws are created for the industry and an agency is put up to make sure these laws are observed (Rob, 2010).
Prior Insurance Coverage	Prior insurance is a type of policy that, when issued, covers acts that occurred before the date the policy was issued. This is mostly applicable to liabilities that took place in the past but are only legally acted upon once the policyholder has already purchased the policy (Liu & Jon, 1998).
Demographic Factors	This is personal characteristics which include age, sex, income level, race, employment, location, homeownership, and level of education (Ning , 2022).

Coverage Amount	Coverage amount is the maximum amount you can claim as compensation in case of a contingency. It is also known as the sum insured or sum assured of the policy (Vernon, 1968).
Market Value	Market value is the price that would have to be paid to purchase an asset in its market (James, 2021).
Period of Cover	A coverage period is the period during which an insured event is protected by an insurance contract. Outside of the coverage period, a loss is not covered by such a contract (Hans , 1997).
Claims (Underwriting risk)	"Insurance underwriting risk" is the risk that an insurance company will suffer losses because the economic situations or the occurring rate of incidents have changed contrary to the forecast made at the time when a premium rate was set (Joyce, 2014).

DEDICATION

This research is dedicated to my beloved parents i.e. my father and my late mother whose prayers have continued to surround me and for their unwavering belief in me which has given me the confidence to chase my dreams.

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CHAPTER ONE: INTRODUCTION

1.1 Background of the study

It is impossible to contemplate social and economic development without insurance. Insurance is one of the largest industries in the world, with a global market value greater than the gross domestic product (GDP) of many countries. According to Jiménez (2022), global insurance premiums represented 7.1% of the world's economic activity in 2021. This percentage is even better understood when translated into absolute figures: premiums rose above USD 6.8 trillion. To put it into perspective, there were only two countries with a higher GDP than this in 2021 that is the U.S. and China which makes the global insurance industry larger than the overall economy of countries such as Japan, Germany, and the UK. The world's top 15 insurance markets include six where insurance penetration in relation to GDP is in double digits, highlighting the importance of the industry to their economies. Hong Kong leads the ranking with a penetration rate of close to 20%; in Taiwan and South Korea, the percentage drops to 14.5% and 10.7%, respectively. The remaining three countries are the United States, Great Britain, and France, as reported in The Spanish Insurance Market in 2021 edited by (MAPFRE Economics, 2021). In 2020, due to the Covid-19 pandemic and containment efforts to reduce its spread, the global economic growth in 2020 slowed to an annualized rate of around -3.2%, with a recovery of 5.9% projected for 2021. Global premium growth slowed to approximately 1.2 percent (compared with more than 4 percent per year between 2010 and 2020). Life insurance premium volumes are estimated to have had a negative growth rate of 4.5% in 2020 due to the rising joblessness, reduced purchasing power and ultra-low interest rates which have reduced the attractiveness of saving-type insurance productswhile Non-life insurance 2020 volume growth was estimated at 1.1% (Association of Kenya Insurance, 2020). The mobility restrictions imposed on populations worldwide to suppress the pandemic resulted in far fewer motor insurance claims than normal. This brought large windfall gains to insurers' profitability in 2020 (Swiss Re Institute, 2021).

In Africa, the insurance industry represents less than one percent of insured catastrophe losses worldwide, although it's home to almost 17 percent of the global population. Africa's insurance industry was valued at about $68 billion in terms of GWP in 2018 and was the eighth largest in the world with 91 percent of premiums concentrated in just ten countries. South Africa,

the largest and most established insurance market, accounted for 70 percent of total premiums. Outside of South Africa, there are six primary insurance regions in Africa that is Francophone Africa, Anglophone West Africa, Southern Africa, North Africa, East Africa and Angola.

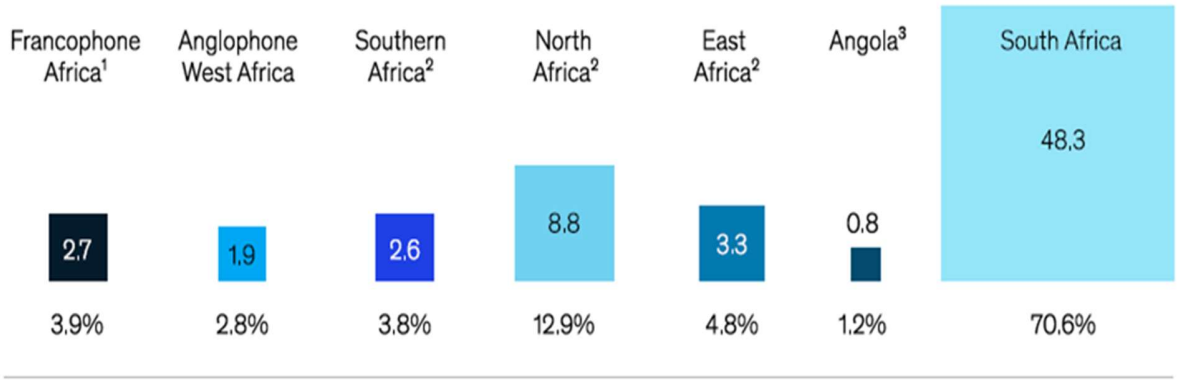

Figure 1.1: Gross written premium (GWP) in Africa in $ billion (2018)

Source: Mckinsey & Co.(2020)

Low insurance uptake in Africa could be attributed to the low-income levels (Rudden, 2022). According to Bagus *et al*., (2020), the insurance market was expected to grow at compound annual growth rates of 7 percent per annum between 2020 and 2025, nearly twice as fast as North America, over three times that of Europe, and better than Asia's 6 percent prior to the impact of COVID-19. However, the pandemic had profoundly affected both lives and livelihoods, and consumers were cutting back on discretionary expenditure including insurance in the face of income and market volatility. Consequently, Africa's GDP shrunk by 2.1% in 2020 from 3.4% in 2019 before rebounding to 4.9% in 2021 (Association of Kenya Insurance, 2020).

Regionally, within the Sub Saharan-Africa, the added pressure from the pandemic adversely affected the industry especially with regards to reduced premium written and investment income which threatened the sustainability of most insurance companies (Beyers, et al. 2020). Therefore, consequently, the insurance industry was negatively impacted in three dimensions i.e., business operations, underwriting and claims and investment income. For example, a survey conducted by FSD Africa, OESAI and Centri, (2020) across Eastern and Southern Africa revealed that 64% of insurance providers reported decrease in premium collection while 41% reported an increase in policy lapses during the period of the pandemic. Policy lapses may continue to occur for as long

as consumer incomes are affected. Consequently, the industry's expense ratio was also adversely impacted. According to Beyers *et al*., (2020), before the advent of the COVID-19 pandemic, many insurance companies were already reporting underwriting losses and expense ratios above the global Benchmark of 40%. It was also found that in 33% of the survey respondents who comprised of insurance sector players in Eastern and Southern Africa had expense ratio above 80% (Beyers, et al., 2020). Insurers are also huge investors and by principle, an insurer collects premiums which are priced based on the risk being underwritten, makes investments and uses the proceeds to make claim pay-outs in the event the risk occurs. However, with most governments having lowered interest rates in 2020 as part of their accommodative monetary policies during the pandemic, this also reduced investment income (Beyers *et al*., 2020). However, despite Africa's GDP shrunk by 2.1% in 2020, East Africa remained resilient and is the only region in Africa to post a positive estimated growth of 0.7% in 2020 which represents major opportunities mainly due to the low insurance penetration, coupled with expected economic growth as well as a rising awareness of the benefits of insurance powered by technological uptake (Association of Kenya Insurance, 2020).

In Kenya, according to the Kenya National Bureau of Statisticsu (KNBS) (2022), the economy recovered from the crippling effects of the COVID-19 pandemic to expand by 7.5 per cent in 2021 compared to a contraction of 0.3 per cent in 2020. The growth was evidenced by 16.2 per cent growth in net premium income to stand at KSh 246,660 million in 2021. Meanwhile, prior to the pandemic, Kenya's insurance industry was already in a vulnerable state as evidenced by the overall declining trajectory of the insurance penetration ratio (measured by premiums paid to GDP) from the period 2010 to 2019. Insurance penetration had declined to 2.30% in 2020 and remained unchanged in 2021 from 2.37% in 2019 as reported by the Central bank of Kenya (CBK) (2020) in its 2020 Financial Stability Report. The (Association of Kenya Insurance, 2020), asserts that Developing new non-traditional insurance products that suit customer demands to help expand market reach especially among low-income earners and those in less accessible areas could lead to higher penetration numbers.

1.1.1 Risk Factors

Risk is a concept that denotes a potential negative impact to an asset or some characteristic of value that may arise from some present process or future event (Bhattacharjee *et al*., 2021). The

insurance industry is faced with many kinds of risks factors which include for example, risks associated with calculating premiums. While regularly analyzing and assessing these insurance-specific risk factors is the task of the insurance supervision, insurers also need to track the business practices by managing key risks (Krenn & Oschischnig, 2003). General business insurance prices tend to fluctuate due to economic and/ or institutional risk factors. Without careful considerations of risk factors in the pricing of insurance products, insurers would inevitably misprice their products and incur losses. For example, Magri *et al*., (2019) in their study to analyse the risk factors in determining motor insurance premium in a small island state of Malta, found that most insurers were still using the traditional rating factors, even though this might not necessarily reflect the risk being insured. Moreover, it was found that although insurers are aware that certain rating factors, such as penalty points and vehicle grouping, can help in improving the risk identification, these are not yet being considered in the current premium calculation. The study reflects the fact that Maltese insurers are falling short in the risk identification process, and consequently may not be factoring in all the risks factors leading to the actual premium composition. On the other hand, Connor and Niko (2022) found that demand for flood insurance is negatively associated with the amount of insurance coverage. This indicates that insurance premium is not driven by insurance coverage as a factor. Tsvetkova *et al*., (2020) also found conflicting results in their study to investigate factors affecting the performance of insurance companies in Russian Federation. The study found that the investigated variables such as size of company, premiums growth rate and claims ratio only comprised 45.1 per cent of the total variability in the performance of insurance companies. 54,9 per cent is influenced by other variables not included in the study. This left a room for further studies of other factors influencing the financial performance of insurance companies. This evidence will be extended to the Kenyan economy using data from the Kenyan insurance industry by investigating the factors affecting premium pricing of general business insurance products.

1.1.2 Premium Pricing

Insurance pricing involves consideration of the frequency and severity of insured risks and the expected average payout resulting from the risks (Association of Kenya Insurers, 2017). The premium price set by an insurance company must obtain profit for the company considering the indemnification of the accidents and at the same time, it must also be at the rate that motivates people to purchase the service (Farhadi, 2009). Insurance premium pricing varies from country to

country with a spectrum of methodologies. On one end of the spectrum, the premium is calculated according to the risk posed by the individual whereby, insurers will consider characteristics called rating factors and assign an appropriate level of risk, the higher the risk and the higher the premium. On the other end, policy holders pay the same premium regardless of their individual circumstances. In both cases, premiums are pooled, and any claims are paid out of the collective pool (Association of British Insurers , 2008). In a study on improving profitability models in insurance industry, Farhadi, (2009) found that while there are various insurance pricing models with various parameters considered for setting the premium rate of a specific type of insurance, these models may not comply with the way that insurance companies set their premium rates, this being as a result of a lack of a feasible model which considers more related parameters to the environment. Similarly, Naseeb *et al*., (2020) carried out an exploratory study on the impact of the COVID-19 pandemic on medical and travel insurance pricing with a specific focus on the Gulf Cooperation Council region. The study found that pricing risk is found to represent an immediate risk that is not easy to manage as historical data is not available. This causes the failure of the present risk models in anticipating the probability and severity of the claims. As a response, insurers rely on scenario analysis and brainstorming to anticipate the costs. As a result, the researchers called for regulators to allow insurers to use risk-based pricing as this would allow them to set premium prices according to assumed risk and to tailor their policies according to different population segments. In essence, the insurer has to device appropriate pricing mechanisms that ensure that profits are maximized. Sisay (2017) on the other hand found that credit risk, liquidity risk, solvency risk, underwriting risk, and technical provisions risk had a negative effect on the performance of insurance companies in Ethiopia. Similarly, Obuba (2016) also found that insurance companies in Kenya were struggling to keep the transaction and administrative cost low which had a major impact on the pricing of products.

1.1.3 General Business Insurance Products- Motor Insurance

General business insurance, also referred to as Non-life insurance relates to the protection of material and financial possessions such as homes and cars and provides cover to the policyholder for a period of one year or less. On the other hand, Life insurance also referred to as long-term insurance, is a long-term contract between a (policy holder) and an insurance company whereby, in the event of death of the insured, life insurance ensures that their loved ones continue to enjoy quality life (Association of Kenya Insurers, 2023). Historically life insurance has been the largest

segment of the global insurance market, accounting for 55 to 60 percent of the market since at least 2006. This changed in 2017 though, with the non-life segment achieving a market share of about 53 percent (Statistica, 2022). Following a slowdown (in the non-life insurance sector) or even a decline (in the life sector) in 2020, the insurance industry experienced a rebound in gross premiums written in 2021. Motor insurance is the largest contributor to nonlife insurance, driven by requirements for a compulsory minimum level of insurance, often third-party liability in countries like Morocco, Kenya, Nigeria, and Egypt (Bagus et al., (2020). In the Kenyan insurance industry, motor insurance and medical insurance classes accounted for 64.8% of the gross premium income under the general insurance business in 2021 (Insurance Reguatory Authority (IRA), 2021).

1.1.4 Risk Factors and Premium Pricing for General Business Insurance Products

The various risk factors in pricing of general business insurance products pose a threat to the overall performance of the insurance industry in Kenya. For example, according to the Insurance Regulatory Authority, (2020), the most frequent fraud cases in 2020 were fraudulent motor insurance claims making up 39 cases and respresenting (30.7%) of the total number of cases. Kaya, (2015) also asserted that the motor insurance appears to be a sector in which competition is intense worldwide and insurance companies find it difficult to gain profit from this portfolio. It is possible to state that this situation arises from the high loss payments and marketing costs in motor insurance and the fact that companies make pricing according to the prices of competitive companies with the concern that they could lose market share. Within this framework, it is expected that there is a reverse relationship between the share of motor insurance in the insurance portfolio of a company and the company's profitability. However, it is possible to make motor insurance profitable and sustainable with the correct pricing of risks and an effective damage and cost management.

1.1.5 Implications of Covid-19 Pandemic on General Business Insurance Products

According to Swiss Re Institute, (2021), the motor insurance sector recorded profitability gains in 2020 owing to reduced claims due to mobility restrictions worldwide in order to suppress the pandemic. These profitability gains also resulted in price softening as insurers sought market share. In 2021, however, motor insurance sector profitability had been squeezed by price competition and rising claims after an extraordinarily positive 2020. According to OECD (2023), the economic recovery in 2021, coupled with the easing of COVID-19 related movement restrictions, led to

larger amounts of claims paid, especially in motor vehicle insurance. Naseeb *et al*., (2020) carried out an exploratory study on the impact of the COVID-19 pandemic on medical and travel insurance pricing and fraud risks with a specific focus on the Gulf Cooperation Council region. The study found that the pandemic provided new income streams as well as presented unexpected claims' risks while the researchers called for regulators to allow insurers to use risk-based pricing strategies as this would allow them to set premium prices according to assumed risk and to tailor their policies according to different population segments. On the other hand, the study by Harris *et al*., (2021) reveals that the pandemic may have increased the value of insurance products and calls on insurers to use premium pricing strategy. China's Wanget *et al*., (2021) make similar observations, noting increased demand for specific health insurance has necessitated new products as well as prices. Indeed, insurers are using creative and innovative ways to attract and retain policy holders (Zimon & Tarighi, 2021). These studies were, however, were carried out in developed countries with larger economies of scale, regulation as well as internal controls. Their investors also have more confidence in the quality of reporting and regulatory control. Prior to the pandemic, the Kenyan insurance sector was already facing problems stemming from low penetration, structural weaknesses, poor governance, fraud, delays in settlement of claims as well as premiums collection. With Garrett and Gangopadhyaya (2020) affirming that uninsurance rates will significantly increase and be spread out unevenly across different countries, it becomes paramount to understand how the different risks factors faced by insurers before and after the pandemic would affect their pricing of insurance products.

1.1.6 Insurance Companies in Kenya

According to Insurance Regulatory Authority (IRA) (2021), in 2020, Kenya was ranked fourth in Africa in terms of gross premium income after South Africa, Morocco and Egypt. The insurance industry in Kenya comprised of a total of 56 insurers as at December 2021 with the total industry's gross premium income distributed between general insurance business (accounting for 55.2%) and long-term Insurance Business (accounting for 44.8%). Whereas General insurance business comprises of motor and medical insurance to a large extent, Long term insurance business primarily comprises of life assurance, annuities, group life, group credit, investments, pensions etc. The general insurance business still dominates the industry accounting for 56.5% of total premium. Motor insurance and medical insurance classes account for 64.8% of the gross premium income under the general insurance business. Six (6) out of fifty-six insurers control a market share

of at least 5% each of the total gross premium income GPI. In 2020, the industry recorded KES 234.78 billion in gross premium (2019: KES 229.50 billion) translating to a nominal growth of 2.3% (-2.9% in real terms). During this period, the industry's net profit decreased significantly by 57.7% from KES 15.12 billion to KES 6.39 billion (Insurance Regulatory Authority (IRA), 2020). In 2021, the insurance sector contributed 12.5% to Kenya's GDP according to the Economic Survey Report by the (Kenya National Bureau of Statistics (KNBS) 2022). However, the effects of the COVID-19 had placed significant pressure on Kenya's insurance industry and insurers that were weak prior to the pandemic are now at a severe risk of failure while attempting to remain compliant with the stricter regulatory requirements being imposed by the regulator. For example, in April 2020, Insurance Regulatory Authority (IRA) issued a directive urging insurers to settle Covid-19 related claims for which most insurance companies had not previously included in their pricing methodologies. Shortly after, on 30 June 2020, the new capital adequacy requirements by IRA requiring companies to meet 200% (previously 100%) of the Prescribed Capital Ratio (PCR) also came into effect. Meanwhile, prior to the pandemic, Kenya's insurance industry was already in a vulnerable state as evidenced by the overall declining trajectory of the insurance penetration ratio (measured by premiums paid to GDP) from the period 2010 to 2019 as reported by the Central bank of Kenya (CBK) (2020) in its 2020 Financial Stability Report.

1.2 Statement of the Problem

In addition to the economic environment in Kenya, as well as people's ability to purchase insurance products, other risk factors come into play which influences the overall performance of the industry particularly with regards to the pricing of insurance products. As consequence of the pandemic, the General business insurance industry in Kenya was negatively impacted with its underwriting results reducing significantly from a loss of KES 1.18 billion in Q4 2020 to a loss of KES 6.34 billion in Q4 2021. Within this sector, the motor insurance product recorded the most frequent fraudulent motor insurance claims making up 39 cases and representing (30.7%) of the total number of cases (IRA, 2020). In Kenya, the profitability of this sector has also been hit by losses amid premium undercutting practices by insurers as competitive strategies. According to a report by Cytonn (2022), the battle for market share has seen some insurers in Kenya resort to underhand methods of gaining competitive advantage, such as premium undercutting which involves secretly offering clients unrealistic low premiums in order to gain competitive advantage and to protect their market share. This is a major driver of underwriting losses suffered by the industry. The regulator retaliated plans to engage a consultant to relook at the industry pricing hence the need for this study. Furthermore, according to an article by the Financial Fortune, (2022), insurance companies in Kenya that made losses in 2021 were looking to revise their premium rates upwards in order to make up for the higher claims incurred. KPMG, (2020) also asserted that insurers in Kenya were reassessing their pricing strategies in light of current market conditions. This process however, need not to be reactive but instead, insurance leaders need to give risk factors strategic importance in their insurance product pricing methodologies in order to accurately price insurance products to enhance overall performance as well as maximize product returns. Farhadi, (2009) also affirmed that while there were various insurance pricing models with various parameters considered for setting the premium rate of a specific type of insurance, these models may not comply with the way that insurance companies set their premium rates.

While Connor and Niko (2022) found conflicting results indicating that demand for flood insurance is negatively associated with the amount of insurance coverage as a risk factor, other prior studies have also left a contextual gap with regards to investigating the effect of risk factors on the pricing of insurance products in Kenya particularly with consideration of exogenous shocks such as the Covid-19 pandemic. Notably, Angima et., (2017) left a contextual gap in their study to establish the intervening effect of underwriting risk (loss ratio) on the relationship between

actuarial risk management practices (ARMP) and performance of property and casualty (P & C) insurance underwriters in East Africa and recommended that further empirical studies be carried out to establish other factors that specifically influence insurance financial performance. Magri, et al., (2019) also found that most insurers were still using the traditional rating factors that did not necessarily reflect the risk being insured. This study also left a methodological and contextual gap in its use primary data only and did not also consider the Covid-19 pandemic as an exogenous shock. In addition, while the most previous studies relating to insurance pricing have adopted data from developed economies, this paper utilizes data from the Kenyan insurance industry to provide new evidence.

1.3 Research Objectives

The general objective of the study was to determine the effect of risk factors on pricing of Kenya's general business insurance products before and after Covid-19 pandemic.

1.3.1 Specific Objections

The specific objectives of this study were:

i. To determine the effect of non-quantitative risk factors on premium pricing of the motor insurance product line in Kenya.
ii. To determine the effect of quantitative risk factors on premium pricing of the motor insurance product line in Kenya.
iii. To determine the effect of non-quantitative and quantitative risk factors on premium pricing of the motor insurance product line in Kenya before and after Covid-19 pandemic.

1.3.2 Research Questions

i. What is the effect of non-quantitative risk factors on premium pricing of the motor insurance product line in Kenya?

ii. What is the effect of quantitative risk factors on premium pricing of the motor insurance product line in Kenya?

iii. What is the effect of non-quantitative and quantitative risk factors on premium pricing of the motor insurance product line in Kenya before and after Covid-19 pandemic?

1.4 Scope of Study

The geographical scope shall be insurance companies in the Kenyan market within Nairobi County. The study adopted both primary and secondary data. Primary data was collected from four different departments or functions of the selected insurance companies, that is, Heads of Risk, Heads of Actuarial services, Heads of Underwriting, Heads of Marketing or their equivalent as the targeted respondents and covered the period from 2018 to 2021. This study's secondary data was drawn from financial reports, published insurance reports by the regulator as well as underwriting and claims reports from 2018 to 2021 of insurance companies in Kenya. The Covid-19 pandemic was included as an exogenous shock. The contextual scope of the study was be limited to an examination of the effect of risk factors on the premium pricing of the general business (motor) insurance products in Kenya before and after Covid-19 pandemic. The study specifically investigated the significance of Claim history, Insurance sector regulations, Demographic factors (Gender), Coverage amount, Market value, Period of cover, Prior insurance coverage and Underwriting risk on premium pricing of the motor insurance product. The time scope of the research was limited to two years prior to the onset of the Covid-19 pandemic and two years after the Covid-19 pandemic thus 2018 to 2021.

1.5 Significance of Study

This study will be significant to industry players who are the insurance companies, policy makers, managers, as well as the insurance regulators as it will offer valuable contributions from both a theoretical and practical perspective. Theoretically, it will contribute to the general understanding of effect of risk factors on Kenya's insurance industry premium pricing particularly for motor insurance before and after Covid-19 pandemic.

1.5.1 To policy Makers

The study will also be useful to policy makers as well as insurance regulators in setting regulation on insurance pricing practices. The findings will be key to the regulatory authorities in providing vital information on how various risks factors are impacted by pandemics. This will help in developing key regulatory benchmarks and providing policy guidance that can be implemented to ensure better performance in insurance industry. In additional, this study will help policy makers in demonstrating how regulatory requirements and policies implemented during the pandemic can affect insurer's operations and in turn make suggestions on necessary improvements based on the findings.

1.5.2 To Management

To the management of insurance companies, the findings of the study will enable insurance companies and their managers to improve their pricing of insurance products by prioritizing the risk factors as well as consider future shocks or eventualities such as outbreak of Covid-19 pandemic. This will result in improved performance of insurance companies and maintenance of a competitive edge. Investment managers will also find this study important as it will explain the value of consideration of risk factors and provide evidence on how different risk factors should impact their premium pricing methods. This will inevitably assist insurers to maximize profits as they will have a better understanding of what influences the premium pricing of their insurance products.

1.5.3 To Academia

Very few studies have been carried out on effects of risk factors on insurance pricing while considering exogenous shocks such as the Covid-19 pandemic. This study will therefore suggest more studies in this line which be significant for future scholars and academicians looking to conduct more research work in the field. This aspect of the Covid-19 pandemic would be a key reference material for future studies. In essence, this study will contribute to a strand of literature where little academic research has been done so far on this topic.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter outlines the overall literature review of the study. The operational definitions of the terms used have been elaborated in detail in this chapter. In the proceeding section 2.2, the theoretical review being used in this study has been carried out. The empirical review of previous studies has also been discussed in section 2.3 to strengthen the research. Finally, section 2.5 looks at the conceptual framework being used in this research.

2.2 Theoretical Review

Several theories exist to explain the relationship between risk and financial performance. This study is anchored on the Risk Return Theory and Financial pricing theory. The risk return theory established a link between risks undertaken by managers of firms and the resultant expected impact of their performance whereas financial pricing theory explains why insurers in competitive market devise ways of collecting more premiums.

2.2.2 Game Theory

The game theory credited to the works of Princeton mathematician John Von Neumann in 1944 and has widely been adopted in academic fields such as mathematics, economics and management (Geckil & Anderson, 2016). The original model of the game theory was based on the premise of pure conflict, popularly known as zero-sum games (Von & Oskar, 2007). In this case, for one participant to win, another must lose an equivalent amount gained and therefore players would find it relevant to cooperate to avoid losses. Recent versions of the game theory focus on games that are neither lose-lose nor simply helpful. In these games the players pick their activities independently, however, their connections to others include components of both rivalry and collaboration (Badr & Francine, 2014).

Based on the foundations of the study that each management decision outcome may be influenced by the reactions of competitors and that the by anticipating where their initial decisions will ultimately lead, the managers can calculate their current best choice. For this reason, the study finds the theory relevant in anchoring strategy formulation where the managers formulate strategies considering the strategies adopted by competitors and their reaction to the firm's strategy. According to Lemaire (1980) a proponent of game theory thought that game theory provided solutions to problems of conflicting interest, and that is why those models of game theory

are certainly not completely useless to a practical paper. Roger (1991) defines game theory as the study of mathematical models of conflict and cooperation between intelligent rational decision-makers. The theory employs mathematical concepts to analyze and assess issues from which a decision may be made based on agreement among two partners with an aim of influencing another person's welfare. In insurance pricing, the double auction model is usually used to set premium rates which operate under the game theory concepts. Relating the game principle, the players are the insurer and the insured. This game operates in two phases. When the price of insurance coverage is fixed, the two parties will negotiate about the premium rates and the risk coverage.

Despite its applicability in providing solutions to problems of conflicting interest, the game theory is not without criticism. The game theory requires that protocols for interaction are precise (whereas in the real world they are often ambiguous). The theory often provides many equilibria and no way to choose among them. In addition, game theory often struggles to factor in human elements such as loyalty, honesty, or empathy. In insurance pricing for example, an equilibrium price may be set based on the long-standing relationship that the insured and insurer have had. Henrich, (2008) also asserts that game theory is based on rationality and in traditional economic models, rationality is the maximization of one's own payoff. Therefore, in every situation, one would always aim to gain as much as possible, regardless of how it affects others. Interestingly, studies have found that the subjects most likely to fully embrace the economic model of a self-serving, payoff-maximizing agent are kindergarten students, but that by the fourth grade, their behavior begins to favor cooperative strategies. In relation to the study, risk factors (non-quantitative and quantitative) explain the premium price rates employed by insurance firms to sell their policies to the insured. Thus, the insured and the insured base their negotiation on the premium rates with each aiming to gain as much as possible before an equilibrium is reached.

2.3 Empirical Review

While there have been limited studies linking risk factors and premium pricing, much research on factors that influence the performance of insurance companies have been conducted, whose results however, show divergent views from one researcher to another. This section presents a review which compares and contracts the findings of previous literature on the study subjects. The section focuses on the particulars of the study, including focus, methods and finding, as well as identify gaps that need be addressed to determine the effects of risk factors on premium pricing of general

business insurance products. The section therefore reviews the risk factors that inform the study's objectives:

2.4 Non-Quantitative Risk factors on Premium Pricing

Insurance firms globally are exposed to significant unexpected risks. Magri *et al.,* (2019) in their study to analyse the risk factors in determining motor insurance premium in a small island state of Malta, found that most insurers were still using the traditional rating factors, even though this might not necessarily reflect the risk being insured. The study which was conducting 20 semi-structured interviews with experts in the field of motor insurance also found that although insurers are aware that certain rating factors, such as penalty points and vehicle grouping, can help in improving the risk identification, these are not yet being considered in the current premium calculation. The study reflects the fact that Maltese insurers are falling short in the risk identification process, and consequently may not be factoring in all the risks factors leading to the actual premium composition. These findings were be extended to the Kenyan economy by investigating the effect of risk factors on general insurance pricing in the current study. On the other hand, Kinaro (2018) in a study to examine the effect of insurance pricing in the insurance sector found that claims settlement, sales promotion, government regulation and level of competition influenced the insurance pricing in Kenyan insurance firms. The study which employed a descriptive research design with 73 respondents being drawn from Jubilee insurance firms and utilized structured research questionnaires in the data collection and analyzed research data using quantitative techniques, indicated that insurance firms should regularly review their pricing models to ensure consistent market trends and minimize unethical practices. This study however, failed to examine the pricing in the context of risk factors. Similarly, Nyaga and Muema, (2017) also provide evidence that penetration pricing had a positive effect on the profitability of insurance companies but did not link risks factors and pricing choices.

2.4.1 Claim History on Premium Pricing

Cheluget and Kitaka (2020) asserted that most of Kenya insurance companies were faced with challenges which affected claims payments and this explained why some insurance companies were placed under statutory management with ‘‘A’’ Assurance Company Limited being a good example. In their study to determine factors affecting insurance claims payments in Kenya using a case of ‘‘A’’ Assurance Company Limited, it was found that type of cover affect insurance claims

to a very great extent. The study which was anchored on expectancy theory and goal setting theory adopted a descriptive research design with a target population of 120 employees at ‘‘A’’ Assurance Company Limited. Stratified proportionate sampling was used to get a suitable representative of the target population. The study concluded that the process of claims management had to strike a balance between customer expectations and maintaining cost efficiency. The study, however, did not establish the influence of claims on pricing of insurance products. Lemma (2019) conducted a study to investigate the factors affecting motor insurance claim processing time in Ethiopia using the case of awash insurance company. The results of the study's regression result found that competency of service providers was to be the most significant factor in affecting motor insurance claims processing time. The study further recommended intensive training for claims staff in relation to customer handling and disclosure of underwriting policy contents to policyholders. The study, however, did not examine how claims influence pricing of insurance products. Mmbelle (2018) also sought to determine factors contributing to motor claims in the Kenyan insurance sector using a case study of Directline Assurance Company Limited. The research used respondents chosen through random sampling from employees of Directline Assurance Company Limited while secondary data sources were drawn from relevant publicly available literature. The results of the study showed that type of cover, the use of the vehicle, insurable interest in the vehicle and underwriting of the vehicle were the main factors that contributed to motor claims. The study further recommended introduction of structured motor claims compensation system as well as establishment of an integrated motor vehicle insurance data system for the insurance sector. This study did not also link claims with pricing of insurance products.

2.4.2 Insurance Sector Regulation on Premium Pricing

It is critical for insurance companies to operate within a regulatory framework due to the complexity of their operations. This requires the government to play a critical role in developing regulations and policies that should be based on the purpose to promote the industry (Damtew & Muraguri, 2021). Wang *et al*., (2020) studied marketization, competition, and insurance pricing on the non-life insurance market in china. A quantitative approach was applied to construct a model based on game theory to reflect the revenue-maximizing behavior and calculate the Nash equilibrium of the game. The study found that more liberalized regulatory regimes led to low prices being set by larger insurance companies who can took advantage of their large market size which

resulted in smaller insurers being pushed out of the market by the pricing enacted by the larger firms.

Barasa (2016) also sought to identify a framework for adoption by the insurance industry for enhancing the insurance penetration rate. This was a cross-sectional research design in which structured questionnaires had been used to collect data. The regression results showed that customer awareness, marketing and distribution channels, pricing and government intervention and regulatory support were key to enhancing the insurance penetration rate in Kenya. The research further concluded it was important for government to be fully involved in drafting laws and policies for the insurance industry which can stimulate the insurance penetration rate in the country. Yet Ng'ang'a (2016) in his to study to review the regulatory framework for micro-insurance of Kenyan insurance companies, indicated that most of the regulations in place had limited the provision of micro-insurance in Kenya. The study applied a mixed research design with content and descriptive analysis being adopted in the research. The study also revealed a need for the development of new policies and adaptation of existing policies suited to the micro-insurance service providers. These studies, however, did not examine how regulation influences pricing of insurance products.

2.4.4 Demographic Factors on Premium Pricing

In the UK insurance markets, gender has been used as a risk rating factor. Oxera (2010) conducted an independent an objective economic study on the use of gender in UK insurance pricing in which they concluded that removal of a demographic factor such as gender would result in a restriction on risk-based pricing which would result in less accurate pricing while increasing the risk of insurance provision. Generally, there has been limited studies linking demographic factors with pricing of general business insurance products with most studies linking demographic factors with life insurance products, hence the need for this study. For example, in a cross-sectional study, Muranda *et al*., (2021) sought to investigate the role of demographic factors on national health insurance uptake among informal sector workers in Vihiga Sub County in Kenya. The study targeted informal sector workers from Vihiga Sub County using cluster sampling and simple random sampling techniques to obtain a representative sample of 384. Data was collected using semi-structured questionnaires and analyzed using descriptive statistics while bivariate and multivariate logistic regression was used to test for associations. The study found that age, gender,

gender of the household head, level of education, employment status and household monthly income had significant influence on uptake of national health insurance. Similarly, Olga (2020) conducted a study to measure the effect of financial anxiety on the insurance behavior of Russian citizens in the context of 2019 Covid-19 pandemic. The correlation, comparative, and regression analyses of the financial anxiety of Russian citizens found that women demonstrated low financial confidence than men to buy insurance products.

Abachi (2018) also studied about factors that influence pricing of life insurance products focusing on a case study of ICEA Lion Life Assurance Company in which the study sought to investigate factors that influence pricing of insurance products in general limiting itself to study insurance risk factors. The study's major findings and conclusions were that demographic factors such as age, gender, occupation and the health status of a client do play a role in insurance pricing. In as much as the study looked at factors influencing pricing of insurance products it did not look at risk factors. Yet Cantiello *et al*., (2015) in their study to investigate the impact of demographic and perceptual variables on a young adult's decision to be covered by private health insurance found that perceived health status, perceived need, perceived value, and gender were not significant predictors of private health insurance coverage. From these studies, it there has been limited studies linking demographic factors with pricing of general business insurance products.

2.5 Quantitative Risk factors on Premium Pricing

In addition to non-quantitative risk factors, insurance pricing is also influenced by quantitative risk factors. Odemba (2013) also studied Factors affecting insurance uptake in Kenya and found that there was a significant association between premium pricing amongst insurance firms and the risk being insured while Hallberg (2017) contends that in undertaking premium pricing a firm should ensure that all business acquisition costs, management expenses, claims experience and expected prices are taken into account to ensure competitiveness. Abachi (2018) also studied about factors that influence pricing of life insurance products and recommended the need for insurance companies to evaluate existing pricing models employed by insurance in order to ensure compliance with both regulation and the business landscape, although these studies did not consider an exogenous shock such as the Covid-19 pandemic.

2.5.1 Coverage Amount on Premium Pricing

Connor and Niko (2022) used a hypothetical choice experiment to estimate the effect of dwelling value and coverage limits on the probability of purchasing flood insurance while holding the probability of flooding and insurance price constant. The results indicated that demand for flood insurance is negatively associated with the amount of insurance coverage. For people assigned higher-valued dwellings, however, the opposite effect is observed. Since more coverage is generally preferred to less, all else being equal, differences in purchase probability dependent on dwelling value indicate an inconsistent approach to home protection. The higher probability of purchasing flood insurance from people in higher-valued dwellings may indicate an investment into the home as a financial asset, a strategy that is not observed to the same extent among people in lower-valued dwellings. This gave an indication that use of variable coverage limits could increase insurance uptake as low coverage insurance may have lower uptake for those in high-valued dwellings. This research shows an inconsistent demand for flood insurance, dependent on dwelling value and independent of income. These findings were extended to the Kenyan economy by investigating the effect of coverage amount as a risk factor on general insurance pricing in the current study.

2.5.2 Market Value on Premium Pricing

Midega *et al*., (2022) conducted a study to determine the effects of bancassurance on the market value of commercial banks listed on Kenya's Nairobi Securities Exchange (NSE). The study found that NSE listed commercial banks have showed a steady growth in market value as depicted by the GWP values and that there exists a positive relationship between bancassurance and market value of NSE listed banks. The listed commercial banks have shown tremendous growth in uptake of bancassurance products like motor vehicle, health, property and life insurance policies. While in another study, Appiah (2019) sought to examine the effects of internal factors, made up of firm specific variables, and the external factors, consisting of industry and macroeconomic variables, on the financial performance of insurance companies in Mauritius. The models were estimated using the sandwich estimator by White (1980) and Eicker (1963) within pooled OLS, fixed and random effects panel estimation techniques. The findings showed that, a unit increase in the combined ratio and leverage of life insurers impact negatively on the return on assets (ROA), while an increase in reinsurance dependence and firm size impact underwriting profit ratio positively. In the non-life sector, the findings show that insurance companies' profitability is positively impacted

by increases in the combined ratio and gross written premium, while market concentration and foreign exchange negatively impacted non-life insurers' profitability. These studies create a conceptual and contextual gap as the current study seeks to establish the effect of market value of a motor vehicle in the pricing of motor insurance.

2.5.3 Period of Cover on Premium Pricing

Ghosh *et al*., (2020) conducted a discrete choice experiment with agricultural households across four states in India to estimate preferences for specific insurance policy attributes such as coverage period, method of loss assessment, timing of indemnity payments and the cost of insurance. The results of the study suggested that farmers do value crop insurance under certain conditions and some are willing to pay a premium for such coverage in excess of the subsidized rates currently offered. On the other hand, farmers were quite sensitive to coverage periods. The study, however, did not examine period of cover in the context of premium pricing.

2.5.4 Prior Insurance Coverage on Premium Pricing

In a cross-sectional study on trends in US health insurance coverage during the COVID-19 pandemic, Bundorf *et al*., (2021) observe a significant decrease in employer-sponsored insurance (ESI) given the insurance packages are tied to employer ship. Affirming increased financial risk of COVID-19–related care, data was sourced from the US Census Bureau's 2020 Household Pulse Survey and analyzed using regression methods. Findings were that there was a significant decline in coverage rates and ESI while for expansion states, the decline in non-coverage was negligible. The research acknowledged the importance of safety-net programs in expanding coverage to people who lost their jobs due to the pandemic but did not ascertain whether there was a change in the price of insurance rates. Stojkoski *et al*., (2021) makes similar observations in research that reported an 8.2 million Euro loss in the North Macedonian insurance sector in an examination into the short-run impact of COVID-19 on insurance industry activity. The study used autoregressive models reporting that while the pandemic reduced insurance activity, there was increased demand for property insurance with motor vehicle insurance demand dropping significantly. However, while the losses recorded were higher than recommended by the Insurance Supervision Agency, shifts in premium offering as well as automatic stabilizers moderated the negative impact of the pandemic. These findings were extended to the Kenyan economy in the current study.

2.5.5 Claims (Underwriting Risk) on Premium Pricing

Underwriting risk is the risk of loss borne by an underwriter which is a risk due to claims. In insurance, underwriting risk may arise from an inaccurate assessment of the risks associated with writing an insurance policy or from uncontrollable factors. As a result, the insurer's costs may significantly exceed earned premiums. Harris (2020) affirmed that life insurance firms are highly reliant on the underwriter's ability to make accurate risk projections and pricing of mortality risk in research into the effect of the COVID-19 pandemic on life insurance offerings. The study used data on term life insurance policies from Compulife and reveals that despite increased uncertainty and mortality risk due to the pandemic, life insurance companies did not increase premiums or decrease policy offerings. However, there was limited evidence that some policies covering older people were removed and there were some differential increases in premiums for individuals considered high risk.

Sisay (2017) conducted an empirical study to examine the effect of financial risk on the performance of insurance companies in Ethiopia and interpreted the result by relating with the regulations. The regression results showed that credit risk, liquidity risk, solvency risk, underwriting risk, and technical provisions risk show a negative and significant effect on the performance of insurance companies in Ethiopia. The research was not conducted locally, creating an empirical gap that this research fills.

2.5.5 Moderating effect between Risk Factors and Premium Pricing (Age and Size)

There have generally been several studies linking firm characteristics such as size and age with performance of insurance companies. Endang (2020) looked at an Analysis of Companies' Characteristics, economic conditions net premiums and their impact on profitability. The research was conducted on the general insurance companies in Indonesia observed between 2013 – 2017 and the results showed company size had significant influence on net premiums. Similarly, Too and Simiyu (2019) reviewed the firm characteristics and financial performance of general insurance firms in Kenya. The study which utilized a descriptive research design and focused on the 47 general insurance firms in Kenya found that firm size has an inverse relationship to financial performance the study revealed a significant effect of age of the firm on the financial performance of the insurance firms.

M'muriungi *et al*., (2019) examined the effect of firm characteristics on stock returns of non-financial listed companies in Kenya. The findings established that firm size did have a positive effect on the interaction between cash flow, leverage, and stock returns. Similarly, Odira (2018) focused on the general insurance industry in Kenya and analyzed the effect of firm-specific characteristics on financial performance. The research employed descriptive research with 32 insurance companies considered in the survey. The findings indicated that firm size had a positive and significant effect on the financial performance of the insurance firms.

In other studies, Badriyah et al., (2015) found that age and size moderately influence firm performance whereas firm resources and ownership structure strongly influence firm performance. Similarly, Abubakar *et al*., (2018) also found that liquidity and Age have significant negative impact on firm performance, but ownership structure and firm resources are significantly related to firm performance. Whereas Masika and Simiyu (2019), on the other hand, their study concluded that firm size and leverage have a more significant effect on firm performance as opposed to age of the firm. These studies however, present a contextual gap having focused on size and age and their effects on firm performance while the current study examined risk factors in insurance firms which influence premium pricing.

2.4 Summary of Literature and Research Gaps

In Kenya, very little research has investigated effect of risk factors on the premium pricing for general business insurance products which is the gap that this paper aims to bridge. Though there have been extensive studies carried out to investigate the effects that insurance pricing has had on the overall performance of the Kenyan insurance sector, these studies have not gone further to investigate the insurance product risk factors and their effect on premium pricing which ultimately affects the industry's performance. The fact that such a study has not been carried out to consider an exogenous shock such as the Covid-19 pandemic which exerted significant pressure on the industry's performance also represents a contextual gap which this study aims to fill. In addition, most previous studies relating to insurance pricing adopted data from developed economies, while this paper utilizes data from the Kenyan insurance industry to provide new evidence. To further highlight this, the summary of research gaps left by existing studies that motivate this study have been presented in the table below 2.1:

Table 2.1: Summary of Literature and Research Gaps

No.	Author	Title	Findings	Gaps to be addressed
1.	Magri et al., (2019)	An Analysis of the Risk Factors Determining Motor Insurance Premium in a Small Island State: The Case of Malta	The study revealed that most insurers are still using the traditional rating factors, even though this might not necessarily reflect the risk being insured. The study reflects the fact that Maltese insurers are falling short in the risk identification process, and consequently may not be factoring in all the risks leading to the actual premium composition.	This study presents a methodological and contextual gap as it only utilized primary data while the current study makes use of both primary and secondary data. The study did not also consider the Covid-19 pandemic as an exogenous shock exerted on the insurance industry and this element is missing in the referenced study.
2.	Kinaro, (2018)	Effect of Insurance Pricing in the Insurance Sector in Kenya: A Case of Jubilee Insurance Company	The findings showed that claims settlement, sales promotion, government regulation and level of competition influenced the insurance pricing in Kenyan insurance firms	The study presents a methodological and contextual gap as the study's results were drawn from a case study of one insurance company by use of 73 respondents from the same firm whereas the current study focuses on the effects of risk factors on general insurance products of all general insurers in Kenya specifically focusing on the motor insurance product. The current study also utilizes both primary and secondary data.
3.	Hallberg, (2017)	The Micro-Foundations of Pricing Strategy in Industrial Markets: A case study in the European packaging industry	The study contends that in undertaking premium pricing a firm should ensure that all business acquisition costs, management expenses, claims experience and expected prices are	The study presents a contextual gap as it did not link a specific insurance product risk factors with insurance pricing which was the gap the current study aimed to fill. This study

			taken into account to ensure competitiveness.	was also conducted in Europe while the current study utilized data from the Kenyan insurance industry.
4.	Nyaga, (2017)	An Analysis of the Effect of Penetration Pricing Strategy on the Profitability of Insurance Firms in Kenya	The study showed evidence that penetration pricing had a positive effect on the profitability of insurance companies.	The study presents a contextual gap as it focused on the effects of penetration pricing strategy of insurance firms on profitability and did not link risks factors with insurance pricing which is the gap the current study aims to fill.
5.	Lemma, (2019)	Factors affecting Motor Insurance Claim processing Time: The Case of Awash Insurance Company S.C.	The results of the study's regression result found that competency of service providers was to be the most significant factor in affecting motor insurance claims processing time.	The study presents a contextual gap as it focused on factors affecting motor insurance claim processing time and did not examine how claims influence the pricing of insurance products which is the gap the current study aims to fill.
6.	Wang et al., 2020)	Marketization, Competition, and Insurance Pricing: The Comprehensive Evidence from China.	The study found that more liberalized regulatory regimes led to low prices being set by larger insurance companies who can took advantage of their large market size which resulted in smaller insurers being pushed out of the market by the pricing enacted by the larger firms.	The study presents a contextual gap as it did not examine how regulation influences pricing of insurance products. The study was also carried out in China while the current study was based in the Kenyan insurance market.
7.	Connor & Niko, (2022)	Experimental Evidence for Coverage Preferences in Flood Insurance.	The study used a hypothetical choice experiment to estimate the effect of dwelling value and coverage	This study presents a contextual gap as it did not link coverage amount with general insurance pricing as the

			limits on the probability of purchasing flood insurance while holding the probability of flooding and insurance price constant. The results indicated that demand for flood insurance in Canada was negatively associated with the amount of insurance coverage.	current study aim to do. The current study was also carried out in Kenya while the referenced study utilized data from Canada.
8.	Midega et al., (2022)	Bancassurance and Market Value of Listed Commercial Banks in Kenya.	The study found that NSE listed commercial banks have showed a steady growth in market value as depicted by the GWP values and that there exists a positive relationship between bancassurance and market value of NSE listed banks.	The study presents a conceptual and contextual gap as it focused on bancassurance and market Value of NSE listed commercial banks while the current study shone the light of general insurance companies and examined market value of a motor vehicle in the context of its premium pricing.
9.	Ghosh et al., (2020)	Demand for Crop Insurance in Developing Countries: New Evidence from India.	The results of the study suggested that farmers do value crop insurance under certain conditions and some are willing to pay a premium for such coverage in excess of the subsidized rates currently offered.	This study creates a contextual gap as it did not examine coverage period in the context of premium pricing while the current study seeks to establish the effect of coverage period in the pricing of motor insurance.
10.	Stojkoski et al. (2021)	The short-run impact of COVID-19 on the activity in the insurance industry in the Republic of North Macedonia.	The study used autoregressive models reporting that while the pandemic reduced insurance activity, there was increased demand for property insurance with motor vehicle	This study creates a conceptual and contextual gap as it focused on the overall impact of Covid-19 on insurance products in the North Macedonian insurance sector while

			insurance demand dropping significantly.	the current study seeks to establish the effect of prior insurance coverage of motor vehicle insurance in the pricing of motor insurance in Kenya.
11.	Sisay (2017)	The Effect of Financial Risk on Performance of Insurance Companies in Ethiopia.	The regression results showed that credit risk, liquidity risk, solvency risk, underwriting risk, and technical provisions risk show a negative and significant effect on the performance of insurance companies in Ethiopia.	The study creates a contextual gap as it focused on the effect of financial risk on performance of insurance companies but did not link specific insurance product risk factors such as underwriting risk with insurance pricing which is the gap the current study aims to fill. This study was also conducted in Ethiopia while the current study utilized data from the Kenyan insurance industry.

2.5 Conceptual Framework

Ravitch and Riggan (2017) devoted an entire book to providing the most comprehensive understanding of the conceptual framework. They define it as an argument about why the topic one wishes to study matters and why the means proposed to study it are appropriate and rigorous. The conceptual framework below identifies the relationship between financial risk factors (independent variables), firm characteristics (intervening) and the premium (dependent variable) of insurance firms in Kenya.

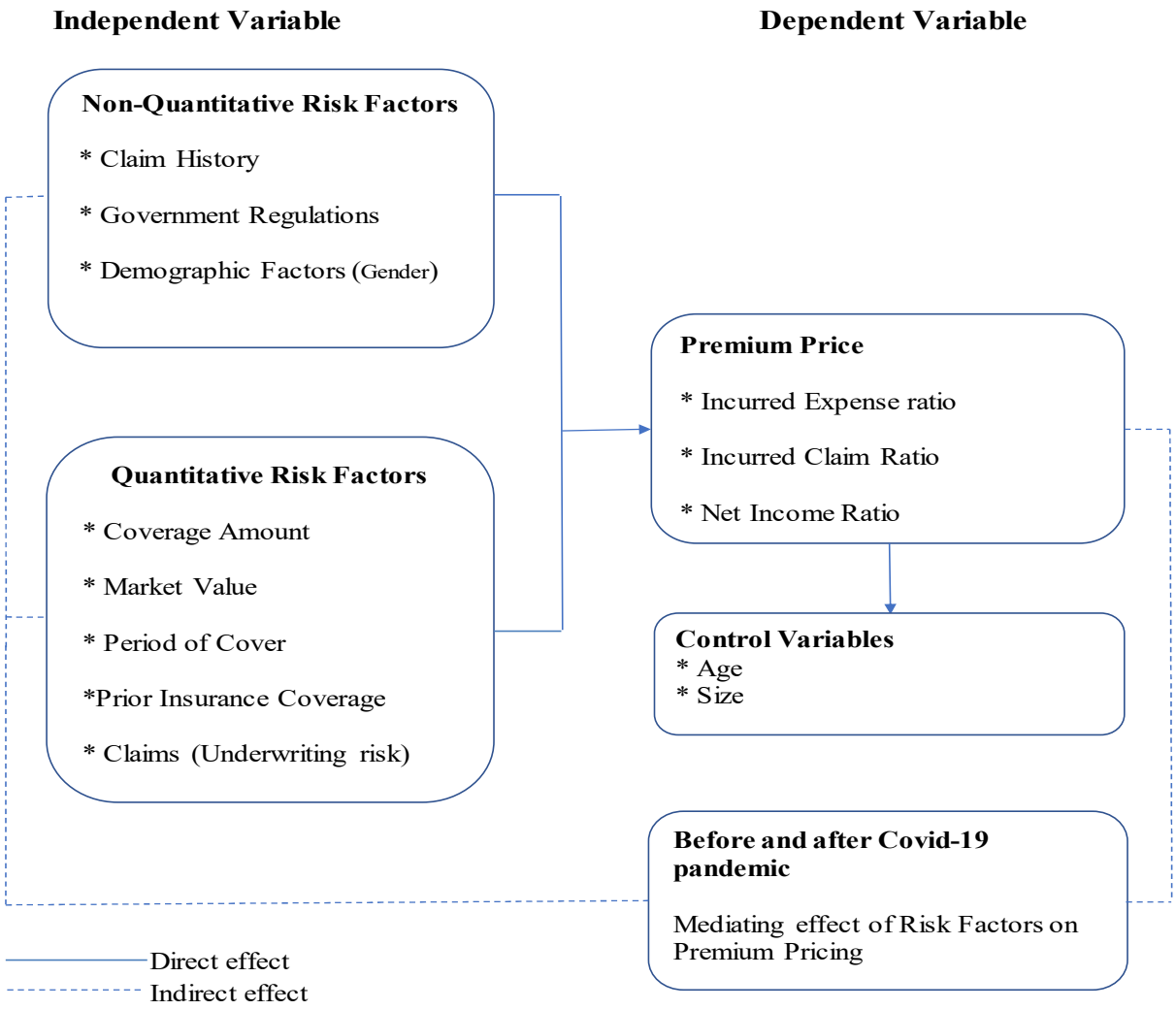

Figure 2.1: Conceptual Framework

2.5.1 Operationalization of Term Definition

Owais (2020) defines operationalization (also called operational definition) as a complete set of instructions for what to observe and how to measure a variable (concept). Operationalization links a conceptual definition to a specific set of measurement techniques or procedures, the construct's operational definition. This study, therefore, uses dependent variable, which measure premium to sum insured and which in this case is premium price. On the other hand, the independent variables are the financial risk factors which are the liquidity risk, solvency risk, operational risk and underwriting risks while the control variables were age of the insurance firm and size of the insurance firm as operationalized below;

Table 2.2: Operationalization of Non-Quantitative Variables

Variable	Type	Indicators	Operationalization	Empirical study
Claims history	Independent	✓ Filing of loss ✓ Registering and documentation of claim ✓ Risk Assessment and adjustment ✓ Communication of risk assessment report	✓ Loss recorded ✓ Claim registration and documentation ✓ Risk report	Rao & Pandey, (2013) Lemma, (2019) Kinaro, (2018)
Insurance Sector Regulation	Independent	✓ Regulation effect ✓ Compliance	✓ Effect of regulations ✓ Compliance with regulations	Laas et al., (2016)
Demographic factors	Independent	Amount to claim	✓ Number of licensed policy holders ✓ Number of policy holders per gender	Gandolfi & Miners, (1996) Truett & Truett, (1990)

Table 2.3: Operationalization of Quantitative Variables

Variable	Type	Indicators	Operationalization	Empirical study
Premium Price	Dependent	✓ Incurred Expense ratio ✓ Incurred Claim Ratio ✓ Net Income Ratio	$\frac{\text{Incurred Expenses}}{\text{Earned Premiums}}$ $\frac{\text{Incurred Claims}}{\text{Earned Premiums}}$ $\frac{\text{Net Income}}{\text{Earned Premiums}}$	Obuba (2016)
Coverage amount	Independent	Amount to pay for a risk	$\frac{\text{Premium}}{\text{Sum Insured}}$	Asseldonk et al., (2015) Srinivasa et al., (2018)
Period of cover	Independent	Policy period	Policy maturity period	Weke & Mureithi, (2006)
Prior Insurance coverage	Independent	Gross written premium growth rate	$\frac{[GWP_{(t)} - GWP_{(t-1)}]}{GWP_{(t-1)}}$	Kaya, (2015)
Claims (underwriting risk)	Independent	Amount to claim	$\frac{\text{Claims Paid}}{\text{Net Premium Earned}}$	David, (2015) Makau & Okeyo, (2021)
Market value	Independent	Amount a property is insured	Market price of covered property	Mbelenga, (2018) Appiah, (2018)
Age of insurance firm	Control	Number of years in operation	Number of years since incorporation	Hunjra et al., (2020) Kafidipe et al., (2021)
Size of an insurance firm	Control	Total assets	Log of total assets.	Hunjra et al., (2020) Kafidipe et al., (2021)

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

The third chapter of the research is instrumental in presenting the methodology applied in solving the study problem. The chapter explicitly presents the philosophy and design that provided a guide for the study. Further, the chapter presents the population, sampling, data collection instruments, procedures, and data analysis approach and finally ethical considerations.

3.2 Research Philosophy

According to Cazeaux (2017) positivism posits that the procedures of social sciences should mirror the natural science ones. Positivist researches aim to elucidate findings that lead to control and predictability. It is a predominant method of understanding the social world, as evident from its usage (Padilla-Díaz, 2015). This research adopted a positivism objectivism philosophy because the concept of positivism objectivist approaches to social science where man acts as information processor and another as responder according to Hughes and Sharrock (1997) described this as positivism and interpretive alternative. This philosophy gives preference to making observations based exclusively on scientific methods i.e. on observation and experimentation that disregard the metaphysical principles. In this study positivist research philosophy was applicable because risk factors and premium could be examined objectively through the use of established theoretical frameworks and structured instruments to assess and analyze them, upon which generalizations were drawn from the findings. In short, this philosophy supported the adoption of quantitative techniques in establishing the relationship between risk factors and the premium pricing of general insurance products before and after Covid-19 in the insurance industry in Kenya.

3.3 Research Design

Kothari (2017) defined research design as setting the conditions for collecting and analyzing data such that it is relevant to the economy. According to Kothari and Garg (2014), social surveys involve overall decisions on collecting and analyzing data. Social survey strategy encompasses the collection of the same information about all the cases in a sample. According to Christensen, Johnson, Turner, and Christensen (2011) survey involves systematic observation or interviewing. The research method used was quantitative, which informs the adoption of a cross-sectional study design. This design was further be appropriate for the study since it allowed for exploratory and

descriptive data. This form of data was crucial in understanding the interaction between risk factors, firm size, age of the firm and premium pricing.

3.4 Population and Sampling

3.4.1 Target Population

Cooper and Schindler (2011) define target population as the total collection of elements which one wishes to generalize the research inference. The research population comprised the registered insurance companies in Kenya. According to the Insurance Regulatory Authority (IRA) (2020), the insurance industry in Kenya comprised of 61 insurers broken down into 33 insurers were conducting general insurance business, 19 conducting long term insurance business, 4 composite companies (conducting both long-term and general insurance business) with the remaining 5 conducting reinsurance. Therefore, the study adopted a census survey of all the 37 registered general insurance companies operating in Kenya. A census approach enables one to collect more accurate and reliable data. According to Mugenda & Mugenda, (2003), the observable characteristics of the target population should be strongly related to the characteristics intended to be generalized by the study. Therefore, the study targeted heads of risk, heads of actuarial services, heads of underwriting, heads of marketing or their equivalent within the firms as the observation unit for the research. The said personnel had been selected for the study as they were assumed to have requisite knowledge on the insurance industry dynamics and the insurance product pricing in Kenya.

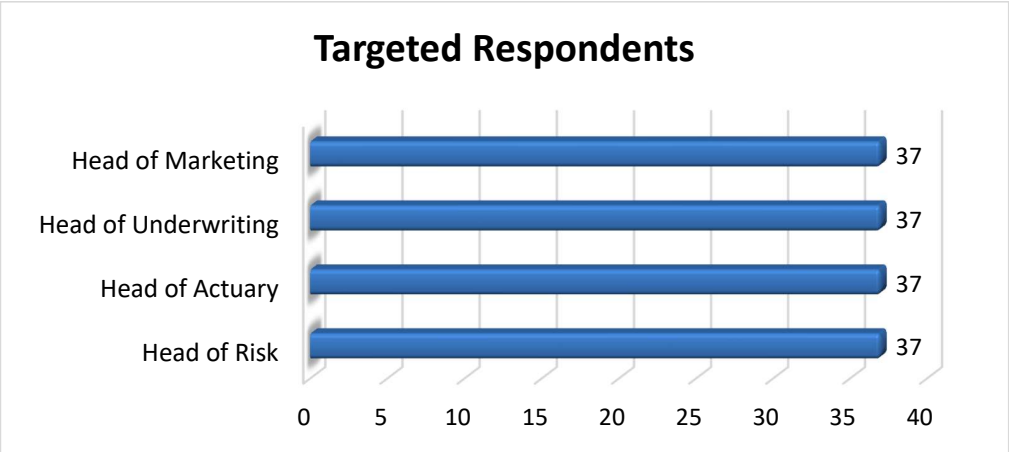

Figure 3.1: Targeted Respondents

The study targeted the 37 general business insurance firms from the total population of 61 insurers while the unit of analysis was the 148 personnel in four departments of the targeted insurance firms.

3.4.2 Sampling Design

Kothari (2009) defined sample as subject of a population that is selected to represent characteristics of population. The preparation of a sampling frame is sometimes a major practical problem. The frame should be updated and be free from errors of omission and duplication of sampling units. Kombo and Tromp (2009) indicated that a sample size of 10% or 20% of the target population selected is adequate to generalize the study findings. According to the Insurance Regulatory Authority (IRA) (2020), the insurance industry in Kenya comprised of a total of 61 insurers but for the purpose of this study, the focus was on General business insurers that cover the motor insurance product bringing the total sample to 37 out of 61. In this context, the research utilized 60% of the insurance industry. The sample frame for this research was the selected general business insurance firms within Nairobi County which had been in operation 2 years prior and 2 years post Covid-19. The sample respondents for this research were 148 staff members drawn from all the registered general business insurance firms. The study adopted a census approach in order to collect more accurate and reliable data according to Mugenda and Mugenda, (2003). Both primary and secondary data was taken into consideration.

3.5 Data Collection Instruments

As indicated by Kothari (2017), information gathering is the method by which data is acquired from the chosen subject of an examination. The study adopted both primary and secondary data. With regards primary data, interviews were conducted using a questionnaire for data collection. The relevant risk managers or equivalent personnel responsible for managing risks in the targeted insurance companies were the targeted respondents. According to Orodho (2008) questionnaire measures likelihood of straight, even and blunt answers. He further outlined that each item on the questionnaire should be developed to address a specific objective, research question or hypothesis of study. Therefore, to determine the effect of risk factors on the premium pricing for Kenya's general business insurance products before and after Covid-19 the pandemic, a questionnaire had been designed with closed-ended questions using scaled questions. The questionnaire had been divided into four parts. While the first part sought to capture the background information, the

proceeding parts were divided into sections which had been designed to achieve research objectives. The questions had been designed to collect non-quantitative and quantitative data and were be administered to responders heading four different departments or functions of the selected insurance companies, that is, Heads of Risk, Heads of Actuarial services, Heads of Underwriting, Heads of Marketing or their equivalent. The questionnaire was used due to the ease in the collection of data from a large population.

This study's secondary data was be drawn from financial reports of 2018 to 2021 of insurance companies in Kenya. Data was collected from the financial statements of the insurance companies, the published annual financial reports prepared by actuaries for submission to the regulator as well as the underwriting and claims reports of the insurance companies. This was the best source of collecting the data since the information is for publication purposes and submission to the regulatory entities thus making it a legal requirement. This increased data validity and reliability. For the dependent variable, data on the premium price was proxied by incurred expense ratio, incurred claim ratio and net income ratio, while period of cover, coverage amount proxied by sum assured to sum insured, claims proxied by underwriting risk and market value were collected to calculate the ratios used in the independent variables.

3.7 Data Analysis and Presentation

Data analysis involves examining what had been collected during experiments or surveys then making inferences and conclusions (Creswell, 2014). The extracted research data was edited and corrected for any errors before coding and analyzing using quantitative techniques using Stata 16 and SPSS 28.0.1. The study made use of descriptive analysis, correlation, binary logistic regression for primary data and panel regression for secondary data. The study applied descriptive analysis to tabulate the research responses using frequencies, means, percentage and standard deviation in analyzing the observations from the selected insurance firms. Data from interviews was subjected to descriptive statistics for the demographic data. The study also utilized inferential analysis to determine the interaction between the independent variables. Pearson correlation analysis was carried out to establish whether there is a relationship linking the independent and dependent variables. Further, the research adopted a linear regression analysis to estimate the influence of the independent variables on premium pricing for general business insurance products in Kenya. The results of the study were presented using charts and tables.

To measure the effect of risk factors on premium pricing for non- life insurance products before and after Covid-19 pandemic, the study considered the product value as the proxy for the premium price. This methodology entailed analysis of the incurred expense ratio (ratio of the incurred expenses to earned premiums), incurred claim ratio (ratio of the incurred claims to earned premiums) and the net income ratio (ratio of the net income to earned premiums). All these ratios formed part of the dependent variable (Y).

Therefore, the regression models below clearly indicate how the X variables influence the outcome of Y and the correlation between the X variables in the study.

Secondary data model (before and after covid-19)

Quantitative Risk Factors:

$$PP_{it} = \alpha + \beta_1 PR_{it} + \beta_2 C_{it} + \beta_3 MV_{it} + \beta_4 CA_{it} + \beta_5 PIC_{it} + \varepsilon \text{ ……..……..……Equation 3.1}$$

Where;

PP is the pricing measured by the Premium Price

PR being period of cover

C is the claims

CA is coverage amount

MV is market value

PIC is prior insurance coverage

β_1- β_4 are coefficients of the independent variables

ε is the error term

t is the time period 2018 – 2021

Control effect

The study further assessed whether the variables firm size and age of the firm as intervening variables influenced the premium pricing of the insurance firms. These were variables that were not of interest in the study but influence the outcomes (Bhandari, 2021).

$$PP_{it} = \alpha + \beta_1 PR_{it} + \beta_2 C_{it} + \beta_3 MV_{it} + \beta_4 CA_{it} + \beta_5 PIC_{it} + \beta_6 FS_{it} + \beta_7 AF_{it} + \varepsilon \text{ ……. Equation 3.2}$$

Where;

FS is firm size

AF is age of the firm

β_6- β_7 are coefficients of the control variables

Primary data model (before and after covid-19)

For primary data the study adopted binary logistic regression to investigate effect of risk factors on premium price before and after covid-19. The following binary logistic regression model was adopted for primary data in the study.

Primary Data Model for Non-Quantitative Risk Factors:

$$\mathbf{PP}=\frac{\mathbf{1}}{\mathbf{1}+e^{-(\alpha+\ \beta 1\mathbf{CH}+\ \beta 2\mathbf{ISR}\ +\ \beta 3\mathbf{DF}\ +\ \varepsilon)}}\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\mathbf{Equation\ 3.3}$$

Control effect

$$\mathbf{PP}=\frac{\mathbf{1}}{\mathbf{1}+e^{-(\alpha+\ \beta 1\mathbf{CH}+\ \beta 2\mathbf{ISR}\ +\ \beta 3\mathbf{DF}\ +\beta 4\mathbf{AF}+\beta 5\mathbf{FS}+\ \varepsilon)}}\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\mathbf{Equation\ 3.4}$$

Where;

e is the exponential in regression formula

PP is the pricing measured by the Premium Price

CH being Claims History

ISR is Insurance Sector Regulations

DF is demographic factor (Gender)

β_1- β_3 are coefficients of the independent variables

ε is the error term

Control effect

AF is age of the firm

SF is firm size

B_4- β_5 is coefficients of the control variables

Primary Data Model for Quantitative Risk Factors:

$$PP=\frac{1}{1+e^{-(\alpha+\beta 1PR+\beta 2C+\beta 3MV+\beta 4CA+\beta 5PIC+\varepsilon)}} \text{.....Equation 3.5}$$

Where;

e is the exponential in regression formula

PP is the pricing measured by the Premium Price

PR being period of cover

C is the claims

CA is coverage amount

MV is market value

PIC is prior insurance coverage

β_1- β_5 are coefficients of the independent variables

β_6- β_7 are coefficients of the control variables

ε is the error term

Control effect

$$PP=\frac{1}{1+e^{-(\alpha+\beta 1PR+\beta 2C+\beta 3MV+\beta 4CA+\beta 5PIC+\beta 6AF+\beta 7FS+\varepsilon)}} \text{.....Equation 3.6}$$

Where;

AF is age of the firm

SF is firm size

β_6- β_7 are coefficients of the control variables

3.7.2 Diagnostic Tests

3.7.2.1 Reliability Tests

Reliability of the instrument was done using Cronbach's Alpha to measure internal consistency to determine if certain items were within the scale measure and same contrast. It establishes if the measure yields the same results on other occasions, similar observations are reached by other observers and transparency in the raw data. Reliability was used to check the internal consistency of the data measuring instrument. Cronbach's coefficient alpha determines the internal consistency or the average correlation of items within the test. It was used after collection of data to test the results. Alpha values range from zero - no internal consistency to one - complete internal consistency. The higher the coefficient, the more reliable the measurements scale. Kilin (2003) established that Alpha value threshold is at 0.6. Nunnally (1978) proposed that if values were too low, either few items were used or the items had little in common and suggested that a value of 0.70 and above was sufficient. However, Sekaran (2003) argued that an alpha coefficient of between 0.50 and 0.80 is adequate to accept presence of internal consistency. For the purposes of this study, the alpha coefficient for the sample was put at 0.70.

3.7.2.1 Validity Tests

Validity is the degree to which an instrument measures what it is supposed to measure or the degree to which results obtained from the analysis of the data give a representation of the phenomena under study (Mugenda and Mugenda, 2003; Kothari, 2004). To test for validity, correlation was used determine if the instrument was valid by examining if all variables were significant at total level.

3.7.2.1 Autocorrelation Tests

The research further applied autocorrelation tests to ensure there were no serial correlation in the adopted regression model. The study applied the Durbin Watson test to checks for serial correlation (Anderson, Sweeney, & Williams, 2012). Durbin Watson test takes values of between 0 to 4. A value of 2 shows that errors are not correlated. However, values from 1.50 to 2.50 are considered acceptable.

3.7.2.2 Collinearity Tests

Midi, Sarkar and Rana (2010) state that when the degree of association of independent variables is high, it means multicollinearity may exist among the independent. According to Midi et.al.,

multicollinearity exists when VIF is greater than 10 and tolerance is less than 0.1. This criterion was adopted in the current research in testing for collinearity problems between the independent variables of the research.

3.7.2.3 Heteroscedasticity Tests

Heteroscedasticity refers to "differing variance. Pernecky (2016), asserts that the existence of heteroscedasticity can be a concern in the application of regression analysis as it can invalidate statistical test that assume the modelling error are uncorrelated and normally distributed. In order to check for heteroscedasticity, the study used Breusch Pagan method to assess for the presence for heteroscedasticity problems in the regression model.

3.7.2.4 Normality Tests

Normality tests enable the researcher to determine the modelling pattern of a normal distribution and to calculate the probability of a random variable governing the data set to be normally distributed (Ghauri, Grønhaug, & Strange, 2020). In order to make inferences, from an analysis, assumption of normally distributed dependent variable is important. The research utilized the Kolmogorov-Smirnov test tests in the normality tests. Further, the normal distribution plot was also extracted to confirm the normality results.

3.7.2.5 Stationarity Tests

The nature of the time series data prompted the stationarity test. Unit root tests was carried out on all the study variables. The Hadri LM test was employed to test the time-series properties of the data series. The ADF tested the null hypothesis of non-stationarity against the alternative hypothesis of stationarity.

3.8 Ethical Considerations

Honesty in documentation and equal treatment of all participating firms was adhered to and maintained within the course of the study. Further, relevant research approval from the ethical review committee was sought before conducting the research. The researcher also ensured the confidentiality of information collected is maintained and the research data is utilized for the stated academic purposes. The study also obtained a research license from the National Commission for Science Technology and Innovation.

CHAPTER FOUR: RESEARCH FINDINGS

4.1 Introduction

This fourth chapter presents information to determine the effect of risk factors on premium pricing of Kenya's general business insurance products before and after Covid-19 pandemic. The primary data collected from the insurance companies for the purpose of the study, was analyzed using descriptive and inferential statistics while secondary data being panel data was analyzed using linear regression techniques. The research period for this study was from 2018 to 2021. This chapter mainly focuses on the results of data analysis, results and discussion of findings. Data analysis results was presented using tables.

The primary data results will be analyzed first, followed by the secondary data analysis. For the purpose of interpreting the findings, diagnostic tests, descriptive analysis, inferential analysis and regression analysis were carried out.

4.2 Primary Data Analysis

This section reviews the analysis and findings of the primary data. A structured questionnaire was used in the data collection process which targeted heads of risk, heads of actuarial services, heads of underwriting, heads of marketing or their equivalent within the firms as the observation unit for the research. The findings from analysis of primary data below outline responses obtained in the data collection, social demographics of respondents, study findings in line with research objectives and the relationship between variables.

4.2.1 Diagnostic Tests

4.2.1.1 Validity and Reliability

According to Patton, (2002), validity and reliability are two factors which any researcher should be concerned about while designing a study, analyzing results and judging the quality of the study.

4.2.1.1.1 Test of Validity

In carrying out the test for validity, two factors were examined at total to test if they were significantly correlated. The results of the test shown in *Table 4.1* indicate that the two factors were both significantly correlated with the total $p<0.001$.

Table 4.1: Test for Validity

		Size of the firm	Age of the firm	total
Size of the firm	Pearson Correlation	1	.504**	.822**
Age of the firm	Pearson Correlation	.504**	1	.886**
total	Pearson Correlation	.822**	.886**	1

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

Source: Survey Data (2023)

4.2.1.1.2 Test of Reliability

In this study, a total of 2 items were examined which yielded a Cronbach Alpha value of 0.662 which was considered sufficient for internal consistency as shown in *Table 4.2* below. According to Hulin, Netemeyer, & Cudeck, (2001), a generally accepted rule is that Alpha (α) of 0.6-0.7 indicates an acceptable level of reliability.

Table 4.2: Cronbach's alpha test

Cronbach's Alpha (α)	No of Items
0.662	2

Source: Survey Data (2023)

4.2.1.2 Test of Normality (Kolmogorov-Smirnov test)

The study conducted a diagnostic test for the variables to determine the normality of the data before conducting inferential statistical analysis. The diagnostic test for normality was based on the hypothesis below:

H_0: Distribution is normal.

H_1: Distribution is not normal.

Table 4.3: One-Sample Kolmogorov-Smirnov Normal Test Summary

Most Extreme Differences	Absolute	0.506
	Positive	0.329
	Negative	-0.506
Test Statistic		0.506
Asymptotic Sig.(2-sided test)		.000[a***]
a. Lilliefors Corrected		

N=96

Source: Survey Data (2023)

Note (***Premium Price had a p-value of 0.000<0.05 which represents 99% level of confidence)

Source: Survey (2023)

Figure 4.1 shows the results of the Kolmogorov-Smirnov test indicated that data samples showed a non-normal distribution. This was in line with the population distribution characteristics of premium pricing. Hence qualifying use of parametric and non-parametric statistical tests. Based on this, the null hypothesis is rejected as the distribution is found to be not normal.

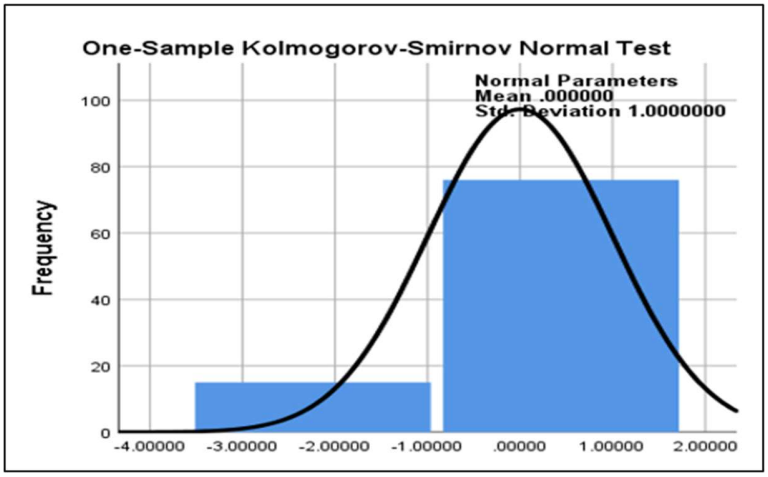

Figure 4.1: Normality of primary data

Source: Survey Data (2023)

4.2.1.1 Test for Multicollinearity

The test of multicollinearity is carried out by examining the tolerance level of each independent variable. Tolerance is defined as the amount of variability of one independent variable that cannot explained by the other independent variables and is denoted as 1-R^2. Tolerance values less than 1

indicate collinearity while VIF values between 1 and 10 indicate multicollinearity (Belsley, Kuh, & Welsch, 2004). *Tables 4.4* and *4.5* below show that the tolerance values are all less than 1 and VIF values are all greater than 1 and less than which can be concluded as having no multicollinearity between the independent variables that would affect the outcome of the regression analysis.

Table 4.4: Collinearity Statistics for non-Quantitative Risk Factors

Non-Quantitative Risk Factors	Tolerance	VIF
Claims History	0.976	1.025
Insurance Sector Regulation	0.974	1.027
Gender	0.989	1.011

Source: Survey Data (2023)

Table 4.5: Collinearity Statistics for Quantitative Risk Factors

	Before Covid-19		After Covid-19	
Quantitative Risk Factors	**Tolerance**	**VIF**	**Tolerance**	**VIF**
Coverage Amounts of Motor Vehicles	0.693	1.442	0.512	1.953
Market Values of Motor Vehicles	0.667	1.499	0.563	1.775
Period of Cover	0.905	1.105	0.980	1.020
Prior Year Insurance Coverage	0.477	2.098	0.349	2.864
Underwriting Risk	0.471	2.121	0.381	2.622

Source: Survey Data (2023)

4.2.2 Response Rate

These findings from *Figure 4.1* below show that the research was able to achieve a response rate of 65% which was equivalent to 96 respondents in absolute terms while 35% or 52 out of a total population of 148 did not respond. This was an indication of a good response rate as asserted by Kombo and Tromp (2009) that a sample size of 10% or 20% of the target population selected is adequate to generalize the study findings. Hence the findings of this research are representative of the entire population that was targeted for the study.

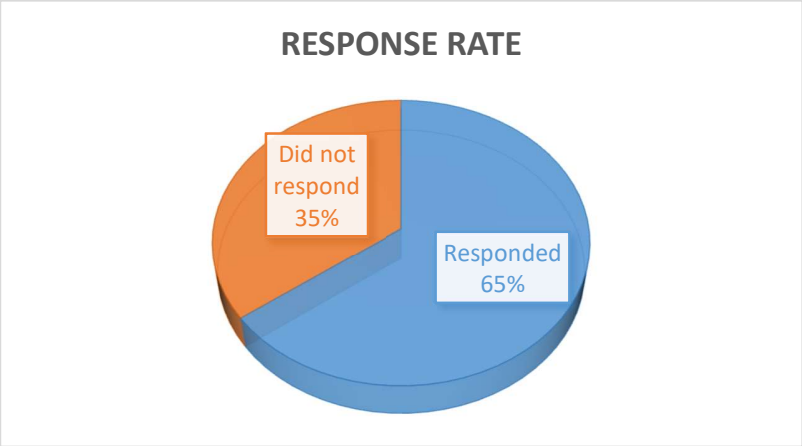

Figure 4.2: Response Rate
Source: Survey Data (2023)

4.2.3 Gender of Respondents

From the study finding, it was found that the majority of the respondents were male accounting for 56% or 54 while the female gender accounted for 44% of 42 in number out of a total of 96 respondents as illustrated in *Figure 4.2* below. Though the male gender dominated the population of the respondents, the gender disparity was not so wide which is an indication that Kenyan insurance firms aim to achieve a gender balance within the industry which may be assumed to be male dominated.

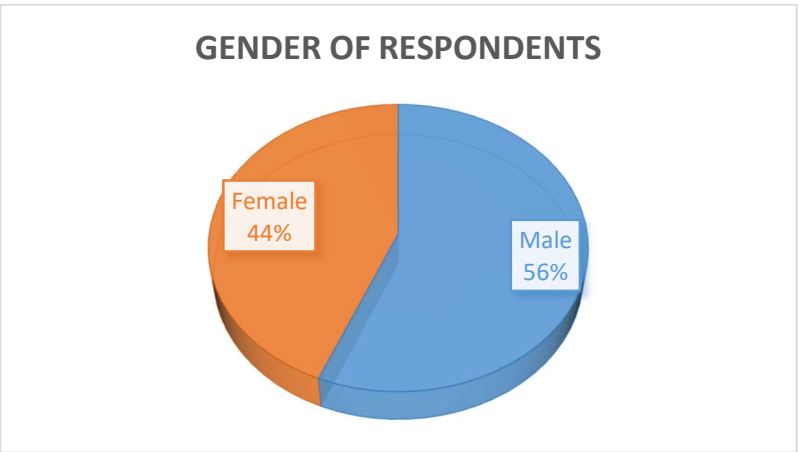

Figure 4.3: Response Rate
Source: Survey Data (2023)

4.2.4 Experience of Respondents

From the study finding presented in *Figure 4.3*, it was found that the majority of the respondents had experience of more than 5 years in the role at the organization and accounted for 45% or 43 respondents. 11% (n=11) accounted were found to have worked in the organization for less than 1 year while 18% (n=17) were found to have worked at the organization between 1 to 2 years and 20% (n=19) accounted for those that had worked between 3 to 5 years while 6% (n=6) did not disclose. However, from observation that the majority of the respondents had worked in the targeted insurance companies for more than 5 years gave an indication that the insurance industry was able to retain its personnel.

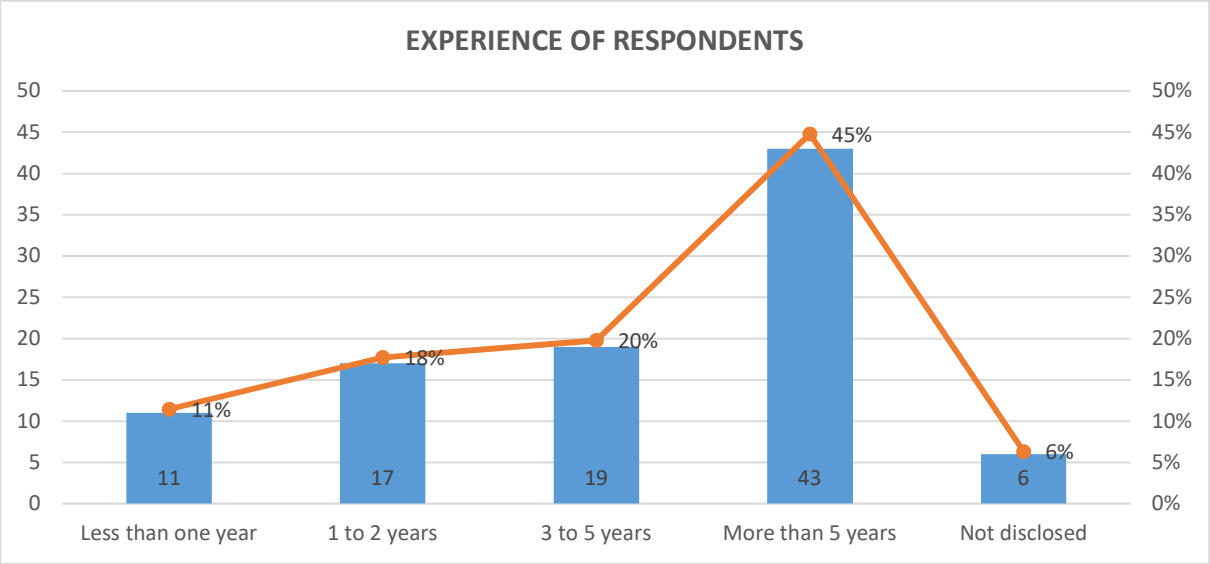

Figure 4.4: Experience of Respondents
Source: Survey Data (2023)

4.3 Descriptive Statistics

This is a summary of the risk factor variables and premium price using data obtained from the survey administered through a questionnaire. The descriptive statistics were used in profiling the data of claim history, insurance sector regulations, gender, underwriting risk, coverage amounts, market value, period of cover and prior period coverage which were used as the independent variables against premium price which is the dependent variable. The tables below give the mean and standard deviation of the variables above.

4.3.1 Effect of Non-Quantitative Risk Factors on Premium Pricing

The first objective was to establish the effect of non-quantitative risk factors on pricing of general business- motor insurance products before and after Covid-19 pandemic. *Table 4.6* below shows the descriptive statistics of the non-quantitative risk factors which included Claim history, Insurance sector regulation and demographic factors. The descriptive findings showed that the three variables ranked relatively the same with insurance sector regulation having the highest standard deviation of 0.401 as shown in *Table 4.6*. This finding suggests that the general business insurance do not use non-quantitative risk factors of claim history, insurance sector regulation and gender in their pricing methodologies of the motor insurance product.

Table 4.6: Non-quantitative risk factors on premium pricing

Non-Quantitative Risk Factors	N	Mean	Std. Deviation
Claim History	96	1.91	0.293
Insurance Sector Regulations	96	1.80	0.401
Gender	96	1.97	0.179

Source: Survey Data (2023)

4.3.2 Effect of Quantitative Risk Factors on Premium Pricing

The second objective was to establish the effect of non-quantitative risk factors on pricing of general business- motor insurance products before and after Covid-19 pandemic. The quantitative risk factors included underwriting risk, coverage amounts, market value, period of cover and prior period coverage.

The descriptive findings showed that the quantitative risk variables ranked relatively the same with the exception of period of cover having the highest standard deviation of 1.229 as shown in *Table 4.7*. This finding suggests that the general business insurance do not use quantitative risk factors of underwriting risk, coverage amounts, market value, period of cover and prior insurance amount in their pricing methodologies of the motor insurance product.

Table 4.7: Quantitative risk factors on premium pricing

Quantitative Risk Factors	N	Before Covid-19		After Covid-19	
		Mean	Std. Deviation	Mean	Std. Deviation
Underwriting risk	96	2.01	0.676	1.60	0.830
Coverage amounts	96	1.79	0.792	1.47	0.772
Market value	96	2.10	0.680	1.45	0.742
Period of cover	96	2.73	1.344	2.89	1.229
Prior coverage	96	1.94	0.697	1.67	0.856

Source: Survey Data (2023)

4.3.3 Effects of firm characteristics (Age and Size) on effect of Risk Factors on Premium Pricing

The third objective was to establish the extent to which age and size affect the relationship between risk factors and premium pricing of the general business insurance products in Kenya before and after Covid-19 pandemic.

The descriptive findings before Covid-19 showed that size of the firm had a standard deviation of 0.996 while age had a standard deviation of 1.213 while after Covid-19, the findings showed that size of the firm had a standard deviation of 1.013 while age had a standard deviation of 1.184 as shown in *Table 4.8*. These finding suggests that the pricing methodologies of the motor insurance products are not affected by age and size.

Table 4.8: Effects of size and age on effect of risk factors on premium pricing

Firm characteristics	N	Before Covid-19		After Covid-19	
		Mean	Std. Deviation	Mean	Std. Deviation
Size of the firm	96	3.66	0.996	3.76	1.013
Age of the firm	96	3.26	1.213	3.41	1.184

Source: Survey Data (2023)

4.4 Inferential statistics

The association between independent and dependent variable was assessed by use of the inferential statistics.

4.4.1 Chi Square

The Chi-square test of independence (also known as the Pearson Chi-square test, or simply the Chi-square) is one of the most useful statistics for testing hypotheses when the variables are nominal. It measures the relationship between two categorical variables (McHugh, 2013).

Table 4.9 below shows the result of the Chi Square test of independence. The result indicates that the non-quantitative risk factors- insurance sector regulation ($\chi^2 = 6.229$, $p < 0.05$) and gender ($\chi^2 = 5.675$, $p < 0.05$) were significantly related to premium pricing.

Table 4.9: **Non-quantitative risk factors and premium pricing**

Attribute	Response	Premium price				Statistics
		Yes		No		
		n	%	n	%	
Claim History	Yes	2	13.3%	7	9.2%	χ^2= 0.239, p = 0.625
	No	13	86.7%	69	90.8%	
Insurance Sector Regulations	Yes	6	40.0%	10	13.2%	χ^2= 6.229, p = 0.013
	No	9	60.0%	66	86.8%	
Gender	Yes	2	13.3%	1	1.3%	χ^2= 5.675, p = 0.017
	No	13	86.7%	75	98.7%	
	NA	0	0.0%	0	0.0%	

Source: Survey Data (2023)

Table 4.10 below shows the result of the Chi Square test of independence indicating that the quantitative risk factors- period of cover ($\chi^2 = 10.702$, $p < 0.05$) and Prior insurance coverage ($\chi^2 = 13.684$, $p < 0.05$) were significantly related to premium pricing before Covid-19 pandemic.

Table 4.10: Quantitative risk factors and premium pricing before Covid-19

Attribute	Response	Premium price				Statistics
		Yes		No		
		n	%	n	%	
Underwriting risk before Covid-19	Grew	6	40.0%	15	19.7%	X= 2.95129, p = 0.229
	Same	7	46.7%	45	59.2%	
	Declined	2	13.3%	16	21.1%	
Coverage amounts	Grew	7	53.8%	32	42.7%	X= 0.871, p = 0.647
	Same	3	23.1%	27	36.0%	
	Declined	3	23.1%	16	21.3%	
Market value	Grew	2	15.4%	15	20.0%	X= 0.249, p = 0.883
	Same	7	53.8%	41	54.7%	
	Declined	4	30.8%	19	25.3%	
Period of cover	1 year policies	6	40.0%	21	28.4%	X= 10.702, p = 0.030**
	6 months- 1 year policies	0	0.0%	7	9.5%	
	Less than 3-6 months policies	0	0.0%	16	21.6%	
	No change in policy periods	7	46.7%	29	39.2%	
	Not observed	2	13.3%	1	1.4%	
Prior insurance coverage	Grew	10	66.7%	16	21.1%	X= 13.684, p = 0.001***
	Same	5	33.3%	44	57.9%	
	Declined	0	0.0%	16	21.1%	
Size of the firm	Strongly disagree	0	0.0%	2	2.6%	X= 0.807, p = 0.937
	Disagree	3	21.4%	13	17.1%	
	Neutral	1	7.1%	3	3.9%	
	Agree	8	57.1%	47	61.8%	
	Strongly agree	2	14.3%	11	14.5%	
Age of the firm	Strongly disagree	0	0.0%	4	5.3%	X= 5.759, p = 0.218
	Disagree	6	40.0%	26	34.2%	
	Neutral	2	13.3%	7	9.2%	
	Agree	2	13.3%	28	36.8%	
	Strongly agree	5	33.3%	11	14.5%	

Note: **, *** indicates significance at the 95%, and 99% level, respectively

Source: Survey Data (2023)

Table 4.11 below shows the result of the Chi Square test of independence indicating that the quantitative risk factors- period of cover ($\chi^2 = 10.961$, $p < 0.05$) and Prior insurance coverage ($\chi^2 = 21.048$, $p < 0.05$) were significantly related to premium pricing before Covid-19 pandemic.

Table 4.11: Quantitative risk factors and premium pricing after Covid-19

Attribute	Response	Premium price				Statistics
		Yes		No		
		n	%	n	%	
Underwriting risk after Covid-19	Grew	6	40.0%	49	64.5%	X= 3.190, p = 0.203
	Same	4	26.7%	11	14.5%	
	Declined	5	33.3%	16	21.1%	
Coverage amounts	Grew	8	53.3%	54	72.0%	X= 2.032, p = 0.362
	Same	3	20.0%	9	12.0%	
	Declined	4	26.7%	12	16.0%	
Market value	Grew	12	80.0%	51	68.0%	X= 3.442, p = 0.328
	Same	0	0.0%	13	17.3%	
	Declined	3	20.0%	11	13.3%	
Period of cover	1 year policies	0	0.0%	18	24.3%	X= 10.961, p = 0.027**
	6 months- 1 year policies	2	13.3%	8	10.8%	
	Less than 3-6 months policies	6	40.0%	16	21.6%	
	No change in policy periods	5	33.3%	31	41.9%	
	Not observed	2	13.3%	1	1.4%	
Prior coverage	Grew	2	13.3%	49	64.5%	X= 21.048, p = 0.000***
	Same	2	13.3%	14	18.4%	
	Declined	11	73.3%	13	17.1%	
Size of the firm	Strongly disagree	0	0.0%	2	2.6%	X= 3.190, p = 0.807
	Disagree	3	21.4%	13	17.1%	
	Neutral	1	7.1%	3	3.9%	
	Agree	8	57.1%	47	61.8%	
	Strongly agree	2	14.3%	11	14.5%	
Age of the firm	Strongly disagree	0	0.0%	4	5.3%	X= 5.759, p = 0.218
	Disagree	6	40.0%	26	34.2%	
	Neutral	2	13.3%	7	9.2%	
	Agree	2	13.3%	28	36.8%	
	Strongly agree	5	33.3%	11	14.5%	

Note: **, *** indicates significance at the 95%, and 99% level, respectively

Source: Survey Data (2023)

4.4.2 Linear Regression

4.4.2 Regression Analysis for Non-Quantitative Risk Factors without control variables

Table 4.12 below shows the regression results for the effect of non-quantitative risk factors on premium pricing. Non-Quantitative risk factors in the results significantly drove premium pricing ($F = 4.052$, $p < 0.01$). The variation in premium price can be accounted for by 12.3%. The specific risk factors that significantly drove premium pricing were insurance sector regulations $p < 0.05$ and gender $p < 0.05$.

Table 4.12: Regression analysis for non-quantitative risk factors without control variables

Attribute	Regression Results
Constant	5.244**
	(2.277)
Claim History	0.032
	(0.099)
Insurance Sector Regulations	0.250**
	(0.106)
Gender	25.345**
	(10.964)
F (Model)	4.052***
R squared	0.123
No. Observations	96

Note: Standard errors are reported in parentheses. **, *** indicates significance at the 95%, and 99% level, respectively

Source: Survey Data (2023)

4.4.2 Regression Analysis for Non-Quantitative Risk Factors with control variables

Table 4.13 below shows that with control variables, the premium pricing wasn't driven by the non-quantitative risk factors together with control variables $p > 0.05$ and variation of premium price was accounted for by 8.3% a drop from 12.3% and indication control factors have a negative effect on non-quantitative risk factors.

Table 4.13: Regression analysis for non-quantitative risk factors with control variables

Attributes	Regression Results
Constant	3.972
	(2.810)
Claim History	0.039
	(0.101)
Insurance Sector Regulations	0.234**
	(0.112)
Gender	19.174
	(13.574)
Age	-0.092
	0.120
Size	0.089
	(0.120)
F (Model)	1.515
R squared	0.083
No. Observations	96

Note: Standard errors are reported in parentheses. ** indicates significance at the 95%, level.
Source: Survey Data (2023)

4.4.3 Regression Analysis for Quantitative Risk Factors before and after Covid-19 without Control variables

Table 4.14 below shows results for the effect of risk factors on premium pricing before and after Covid-19 without control variables. Before Covid-19, risk factors in the results significantly drove premium pricing ($F = 4.303$, $p < 0.01$). The variation in premium price can be accounted for by 21%. The specific risk factor which significantly drove premium pricing before Covid-19 was prior period coverage $p < 0.01$. After Covid-19, risk factors significantly drove premium pricing ($F = 7.985$, $p < 0.01$). The variation in premium price was accounted for by 32.5% an increase of 11.5%. The specific risk factors which significantly drove premium price after Covid-19 were prior period coverage $p < 0.01$ and underwriting risk $p < 0.05$.

Table 4.14: Regression analysis for quantitative risk factors before and after Covid-19 without control variables

Construct	Before Covid-19	After Covid-19
Constant	0.068***	0.005
	(0.095)	(0.091)
Coverage amounts	-0.055	0.163
	(0.106)	(0.125)
Market value	-0.076	0.037
	(0.118)	(0.119)
Period of cover	-0.097	-0.123
	(0.101)	(0.093)
Prior Period Cover	0.566***	-0.793***
	(0.143)	(0.154)
Underwriting risk	-0.0131	0.319**
	(0.143)	(0.147)
F (Model)	4.303***	7.985***
R squared	0.210	0.325
No. Observations	96	96

Note: Standard errors are reported in parentheses. *, **, *** indicates significance at the 90%, 95%, and 99% level, respectively.
Source: Survey Data (2023)

4.4.4 Regression Analysis for Quantitative Risk Factors before and after Covid-19 with control variables

Table 4.15 below shows results for the effect of risk factors on premium price before and after Covid-19 with control variables. Before the Covid-19 pandemic, risk factors in the results significantly drove premium pricing ($F = 3.344$, $p < 0.01$). The variation in premium price can be accounted for by 23.1%. Risk factors that significantly drove premium pricing before Covid-19 was prior coverage $p < 0.01$. After the Covid-19 pandemic, risk factors insignificantly drove premium pricing ($F = 4.774$, $p < 0.01$). The variation in premium price was accounted for by 29.5% a slight increase of 6.1%. Risk factor that significantly drove premium pricing after Covid-19 was prior period coverage $p < 0.01$.

Table 4.15: Regression analysis for quantitative risk factors before and after Covid-19 with control variables

Construct	Before Covid-19	After Covid-19
Constant	0.097***	0.009
	(0.093)	(0.092)
Coverage amounts	-0.064	0.136
	(0.114)	(0.132)
Market value	-0.091	0.054
	(0.118)	(0.122)
Period of cover	-0.083	-0.112
	(0.100)	(0.101)
Prior period cover	0.547***	-0.733***
	(0.151)	0.171
Underwriting risk	-0.0112	0.258
	(0.149)	(0.161)
Age	-0.019	-0.088
	(0.116)	(0.111)
Size	-0.067	0.063
	(0.111)	0.116
F (Model)	3.344***	4.774***
R squared	0.231	0.295
No. Observations	96	96

Note: Standard errors are reported in parentheses. *** indicates significance at the 99% level.
Source: Survey Data (2023)

4.4.2 Binary Logistic Regression

4.4.2 Influence of Non-Quantitative Risk Factors on Premium Pricing

Table 4.16 shows the non-quantitative risk factor which influenced premium pricing as being insurance sector regulations $p \leq 0.05$ odds ratio 4.197 and gender $p \leq 0.1$ odds ratio 11.52.

Table 4.16: Influence of non-quantitative risk factors on premium pricing without control factors

					95% CI.for EXP(B)	
Attribute	B	S.E.	Sig.	Exp(B)	Lower	Upper
Claim History	0.287	0.914	0.754	1.332	0.222	7.986
Insurance Sector Regulations	1.434	0.656	0.029**	4.197	1.160	15.187
Gender	2.444	1.318	0.064*	11.520	0.869	152.643
Constant	-6.188	3.352	0.065	0.002		

Note: *, ** indicates significance at the 90%, and 95% level, respectively

Source: Survey Data (2023)

Table 4.17 shows that with control factors age and size of the firm, the factor that influenced premium price was insurance sector regulation $p \leq 0.05$ odds ratio 3.952.

Table 4.17: Influence of non-quantitative risk factors on premium pricing with control factors

					95% C.I.for EXP(B)	
Attribute	B	S.E.	Sig.	Exp(B)	Lower	Upper
Claim History	0.295	0.938	0.753	1.344	0.214	8.455
Insurance Sector Regulations	1.374	0.701	0.050**	3.952	1.001	15.603
Gender	1.935	1.483	0.192	6.926	0.378	126.794
Size	0.254	0.356	0.476	1.289	0.642	2.588
Age	-0.211	0.290	0.466	0.810	0.459	1.429
Constant	-5.318	3.901	0.173	0.005		

Note: ** indicates significance at the 95% level

Source: Survey Data (2023)

Table 4.18 shows the quantitative risk factor which influenced premium price before Covid-19 without control factors was prior coverage $p \leq 0.01$ odds ratio 16.379.

Table 4.18: Influence effects of quantitative risk factors on premium pricing before Covid-19 without control factors

					95% C.I. for EXP(B)	
Attribute	B	S.E.	Sig.	Exp(B)	Lower	Upper
Coverage amounts	-0.295	0.479	0.539	0.745	0.291	1.905
Market value	-0.292	0.624	0.640	0.747	0.220	2.540
Period of cover	-0.246	0.268	0.360	0.782	0.462	1.323
Prior Period Cover	2.796	0.839	0.001***	16.379	3.165	84.757
Underwriting risk	-0.326	0.705	0.644	0.722	0.181	2.877
Constant	-0.319	1.549	0.837	0.727		

Note: *** indicates significance at the 99% level

Source: Survey Data (2023)

Table 4.19 shows, with control factors age and size of the firm, the risk factor which influenced premium price was prior coverage $p \leq 0.01$ odds ratio 20.318.

Table 4.19: Influence effects of quantitative risk factors on premium pricing before Covid-19 with control factors

					95% C.I.for EXP(B)	
Attribute	B	S.E.	Sig.	Exp(B)	Lower	Upper
Coverage amounts	-0.131	0.522	0.801	0.877	0.315	2.439
Market value	-0.312	0.667	0.640	0.732	0.198	2.705
Period of cover	-0.204	0.283	0.471	0.816	0.469	1.420
Prior period cover	3.012	0.960	0.002***	20.318	3.093	133.470
Underwriting risk	-0.098	0.771	0.899	0.907	0.200	4.113
Size	-0.343	0.500	0.492	0.709	0.266	1.890
Age	-0.143	0.380	0.706	0.867	0.412	1.824
Constant	0.609	2.354	0.796	1.839		

Note: *** indicates significance at the 99% level
Source: Survey Data (2023)

Table 4.20 shows, the quantitative risk factor which influenced premium pricing after Covid-19 was prior coverage $p \leq 0.01$ odds ratio 0.077.

Table 4.20: Influence effects of quantitative risk factors on premium pricing after Covid-19 without control factors

					95% C.I.for EXP(B)	
Attribute	B	S.E.	Sig.	Exp(B)	Lower	Upper
Coverage amounts	0.473	0.681	0.487	1.605	0.423	6.094
Market value	0.194	0.615	0.753	1.214	0.364	4.052
Period of cover	-0.619	0.439	0.158	0.538	0.228	1.272
Prior period cover	-2.564	0.720	0.000***	0.077	0.019	0.316
Underwriting risk	0.839	0.567	0.139	2.315	0.762	7.034
Constant	6.349	2.107	0.003	571.852		

Note: *** indicates significance at the 99% level
Source: Survey Data (2023)

Table 4.21 shows, with control variables, the quantitative risk factor which influenced premium pricing after Covid-19 with control variables was prior coverage $p \leq 0.01$ odds ratio 0.090.

Table 4.21: Influence effects of risk factors on premium pricing after Covid-19 with control factors

							95% C.I.for EXP(B)	
	B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Coverage amounts	0.388	0.715	0.294	1	0.588	1.473	0.363	5.981
Market value	0.291	0.631	0.213	1	0.645	1.337	0.388	4.605
Period of cover	-0.608	0.490	1.540	1	0.215	0.544	0.208	1.422
Prior period cover	-2.405	0.756	10.107	1	0.001***	0.090	0.021	0.398
Underwriting risk	0.638	0.613	1.086	1	0.297	1.893	0.570	6.289
Size	0.265	0.497	0.283	1	0.594	1.303	0.492	3.454
Age	-0.331	0.430	0.591	1	0.442	0.719	0.309	1.668
Constant	6.486	2.940	4.866	1	0.027	655.828		

Note: *** indicates significance at the 99% level
Source: Survey Data (2023)

4.5 Secondary Data Analysis

This study's secondary data was drawn from financial reports, published insurance reports by the regulator as well as underwriting and claims reports from 2018 to 2021 of insurance companies in Kenya. The study finding below obtained using secondary data, outline results of the descriptive statistics and regression analysis in line with research objectives and the relationship between variables.

4.5.1 Diagnostic Tests

4.5.1.1 Test of Normality

The study conducted a diagnostic test for the variables to determine the normality of the data before conducting inferential statistical analysis. The diagnostic test for normality was based on the hypothesis below:

H_0: Distribution is normal.

H_1: Distribution is not normal.

From the results, the null hypothesis is retained as the distribution is found to be normal. Hence both parametric and non-parametric tests were applied.

Table 4.22: Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.[a,b]	Decision
1	The distribution of Premium price is normal with mean .647 and standard deviation .229822.	One-Sample Kolmogorov-Smirnov Test	.200[c]	Retain the null hypothesis.

a. The significance level is .050.

b. Lilliefors Corrected. Asymptotic significance is displayed.

c. This is a lower bound of the true significance.

Table 4.23: One-Sample Kolmogorov-Smirnov Normal Test

Total N			148
Most Differences	Extreme	Absolute	.057
		Positive	.036
		Negative	-.057
\Test Statistic			.057
Asymptotic Sig.(2-sided test)[a]			.200[b]

a. Lilliefors Corrected

b. This is a lower bound of the true significance.

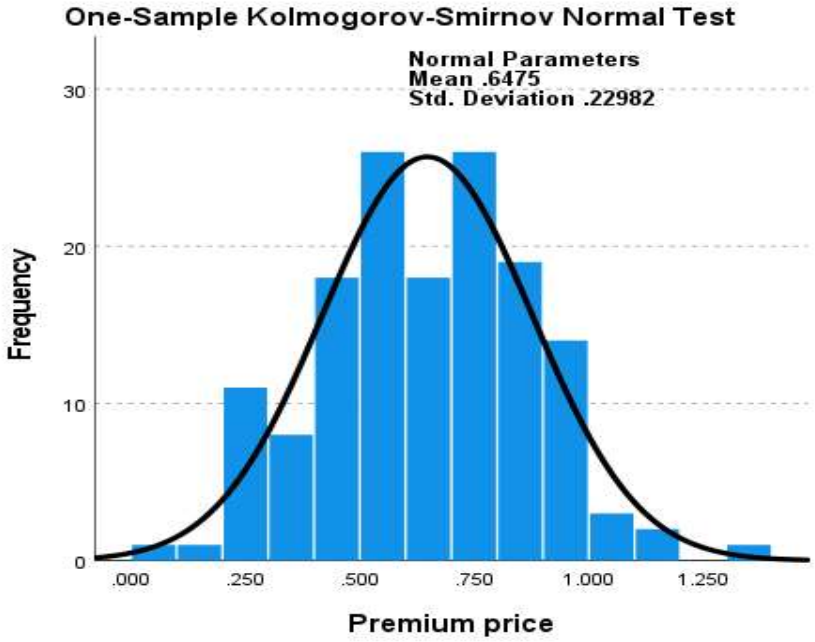

Figure 4.5: Normality of secondary data
Source: Financial Data (2023)

4.5.1.2 Test of Autocorrelation- Durbin-Watson Test

The study carried out the Durbin-Watson (D-W) test to check for test for autocorrelation. The study tested for positive autocorrelation. The Durbin Watson statistic will always assume a value between 0 and 4. *Table 4.22* below shows that the results of the test posted a Durbin-Watson statistic value of DW = 2 which indicated that there was no autocorrelation.

Table 4.24: Durbin-Watson Test

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.447	0.200	0.166	0.209874	2

Source: Financial Data (2023)

4.5.1.3 Test of Heteroscedasticity

When the variance of the errors varies across the observations, heteroscedasticity is said to have occurred. This study used Breusch-Pagan to test for Heteroscedasticity. The findings obtained are presented by *Table 4.23*. Under the Breusch-Pagan, the hypotheses are as follows:

H_0: The variance of the errors does not depend on the values of the independent variables.

H_1: The variance of the errors does depend on the values of the independent variables.

Table 4.25: Breusch-Pagan Test for Heteroskedasticity

Chi-Square	df	Sig.
2.106	1	0.147

Source: Financial Data (2023)

The study observed a chi square of 2.106 and p-value of 0.147>0.05 which implied that at 95% confidence, the null hypothesis of homoscedasticity could not be rejected. Hence, heteroscedasticity was not a problem.

4.5.1.4 Test of Stationarity

Hadri, (2000) tested for stationarity in heterogeneous panel data. This Lagrange Multiplier (LM) test has a stationarity null and a standard normal distribution under the null. The series may be stationary around a unit-specific deterministic trend or a deterministic level that is specific to the unit (a fixed effect). It is possible to assume that the error process is either homoscedastic across the panel or heteroscedastic across the units. The leftover put together test is based with respect to

the squared halfway aggregate course of residuals from a disparaging (detrending) model of level (pattern) stationarity.

Table 4.26: Hadri LM test for Premium Price

Ho: All panels are stationary		Number of panels	37
Ha: Some panels contain unit roots		Number of periods	4
Time trend:	Not included	Asymptotics: T, N	-> Infinity
Heteroskedasticity:	Not robust		sequentially
LR variance:	(not used)		

	Statistic	p-value
z	-1.6559	0.9511

The study observed a p-value of 0.9511 which implied that the null hypothesis stationarity could not be rejected.

Source: Financial Data (2023)

4.6 Linear Regression Results

Panel data was used in this study, to explore the relationship between risk factors and premium pricing.

4.6.1 Relationship between Quantitative Risk Factors on Premium Pricing without control variables

Table 4.25 below shows results for the effect of risk factors on premium pricing before and after Covid-19 without control variables. Before Covid-19, risk factors in the results insignificantly drove premium pricing ($F = 1.3$, $p > 0.05$). The variation in premium price could be accounted for by 8.7%. The specific risk factors that significantly drove premium pricing before Covid-19 were coverage amounts $p < 0.10$, market value $p < 0.05$ and underwriting risk $p < 0.10$. After Covid-19, risk factors significantly drove premium pricing ($F = 5.740$, $p < 0.01$). The variation in premium price was accounted for by 29.7% an increase of 21%. The specific risk factors which significantly drove premium price after Covid-19 were market value $p < 0.05$ and underwriting risk $p < 0.05$.

Table 4.27: Regression analysis for quantitative risk factors without control variables

Attribute	Before Covid-19	After Covid-19
Constant	0.457***	0.551***
	(0.149)	(0.084)
Coverage amounts	-2.580E-08*	-5.508E-09
	(0.000)	(0.000)
Market value	1.364E-07**	-1.660E-07**
	(0.000)	(0.000)
Period of cover	-0.004	-0.112
	(0.007)	(0.101)
Prior period cover	0.005	0.001
	(0.013)	(0.007)
Underwriting risk	-0.412*	0.157**
	(0.227)	(0.067)
F (Model)	1.3	5.740***
R squared	0.087	0.297
No. Observations	96	96

Note: Standard errors are reported in parentheses. *, **, *** indicates significance at the 90%, 95%, and 99% level, respectively.

Source: Financial Data (2023)

4.6.2 Relationship between Quantitative Risk Factors on Premium Pricing with control variables

Table 4.26 below shows results for the effect of risk factors on premium pricing before and after Covid-19 without control variables. Before Covid-19, risk factors in the results insignificantly drove premium pricing ($F = 1.041$, $p > 0.05$). The variation in premium price could be accounted for by 9.9%. The specific risk factors that significantly drove premium pricing before Covid-19 were coverage amounts $p < 0.10$, market value $p < 0.05$ and underwriting risk $p < 0.10$. After Covid-19, risk factors significantly drove premium pricing ($F = 4.452$, $p < 0.01$). The variation in premium price was accounted for by 32.1% an increase of 22.2%. The specific risk factors which significantly drove premium price after Covid-19 were market value $p < 0.05$ and underwriting risk $p < 0.05$.

Table 4.28: Regression analysis for quantitative risk factors with control variables

Attribute	Before Covid-19	After Covid-19
Constant	0.425***	0.524***
	(0.154)	(0.089)
Coverage amounts	-3.687E-08*	-2.537E-09
	(0.000)	(0.000)
Market value	1.417E-07**	-1.612E-07**
	(0.000)	(0.000)
Period of cover	-0.002	0.000
	(0.008)	(0.007)
Prior period cover	0.004	-0.050
	(0.013)	(0.033)
Underwriting risk	0.447*	0.160**
	(0.233)	(0.067)
Age	0.001	0.001
	(0.001)	(0.001)
Size	7.982E-09	-4.606E-09
	(0.000)	(0.000)
F (Model)	1.041	4.452***
R squared	0.099	0.321
No. Observations	96	96

Note: Standard errors are reported in parentheses. *, **, *** indicates significance at the 90%, 95%, and 99% level, respectively.

Source: Financial Data (2023)

4.6.2 Triangulation of Primary and Secondary Data Results

Based on the findings in *Tables 4.27 and 4.28*, it was evident that there existed inconsistency with regards to primary data results and secondary data results in both periods before and after Covid-19 pandemic. Underwriting risk however, showed a significant influence on premium price in the period after Covid-19 pandemic when regressed without the control variables of age and size. In other instances where the primary and secondary data variables were consistent, there was insignificant influence between the independent and dependent variables.

Table 4.29: Significance of Effect of Risk Factors on Premium Pricing without control variables

Effect of Risk Factors on Premium Pricing	**Primary Data Results (Survey data)**		**Secondary Data Results (Financial Data)**		**Level of consistency between Primary and Secondary Data results**	
	Before Covid-19	**After Covid-19**	**Before Covid-19**	**After Covid-19**	**Before Covid-19**	**After Covid-19**
Coverage amounts	Insignificant	Insignificant	Significant	Insignificant	Inconsistent	Consistent
Market value	Insignificant	Insignificant	Significant	Significant	Inconsistent	Inconsistent
Period of cover	Insignificant	Insignificant	Insignificant	Insignificant	Consistent	Consistent
Prior period cover	Significant	Significant	Insignificant	Insignificant	Inconsistent	Inconsistent
Underwriting risk	Insignificant	Significant	Significant	Significant	Inconsistent	Consistent

Table 4.30: Significance of Effect of Risk Factors on Premium Pricing with control variables

Effect of Risk Factors on Premium Pricing	**Primary Data Results (Survey data)**		**Secondary Data Results (Financial Data)**		**Level of consistency between Primary and Secondary Data results**	
	Before Covid-19	**After Covid-19**	**Before Covid-19**	**After Covid-19**	**Before Covid-19**	**After Covid-19**
Coverage amounts	Insignificant	Insignificant	Significant	Insignificant	Inconsistent	Consistent
Market value	Insignificant	Insignificant	Significant	Significant	Inconsistent	Inconsistent
Period of cover	Insignificant	Insignificant	Insignificant	Insignificant	Consistent	Consistent
Prior period cover	Significant	Significant	Insignificant	Insignificant	Inconsistent	Inconsistent
Underwriting risk	Insignificant	Insignificant	Significant	Significant	Inconsistent	Inconsistent
Age	Insignificant	Insignificant	Insignificant	Insignificant	Consistent	Consistent
Size	Insignificant	Insignificant	Insignificant	Insignificant	Consistent	Consistent

4.7 Regression summary

4.7.1 Regression summary for Secondary Data

Before Covid-19, when regressed with control variables, risk factors in the results insignificantly drove premium pricing. In the period after Covid-19 pandemic and without taking into account the control variables, the findings show that market values and underwriting risk had a statistically significant effect on premium price. Therefore, the findings gave rise to the interpretation that a unit increase in market values result in a -1.660E-07 decrease in premium price. A unit increase in underwriting risk results in a 0.157 increase in premium price. The proposed regression model:

$PP_{it} = \alpha + \beta_1 PR_{it} + \beta_2 C_{it} + \beta_3 MV_{it} + \beta_4 CA_{it} + \beta_5 PIC_{it} + \varepsilon$

Therefore becomes;

Premium Pricing = 0.551 - 1.660E-07MV + 0.157C + 0.084

Similarly, Before Covid-19, when regressed with control variables, risk factors in the results insignificantly drove premium pricing. In the period after Covid-19 pandemic and after taking into account the control variables, the findings show that only market values and underwriting risk had a statistically significant effect on premium price. Therefore, the findings gave rise to the interpretation that a unit increase in market values results in a decrease of -1.612E-07 in premium price while a unit increase in underwriting risk results to a 0.160 increase in premium price. The proposed regression model:

$PP_{it} = \alpha + \beta_1 PR_{it} + \beta_2 C_{it} + \beta_3 MV_{it} + \beta_4 CA_{it} + \beta_5 PIC_{it} + \beta_6 FS_{it} + \beta_8 AF_{it} + \varepsilon$

Therefore becomes;

Premium Pricing = 0.524 - 1.612E-07MV + 0.160C + 0.089

4.7.2 Regression summary for Primary Data (Non-Quantitative Risk Factors)

Without taking into account the control variables, the findings show that insurance sector regulation had a statistically significant effect on premium price. Therefore, the findings gave rise to the interpretation that a unit increase in insurance sector regulation results in an increase of 1.434 in premium price. After taking into account the control variables, the findings show that insurance sector regulation was the only variable that had a statistically significant effect on

premium price. Therefore, the findings gave rise to the interpretation that a unit increase in insurance sector regulation results in an increase of 1.374 in premium price.

The proposed regression model:

$$PP = \frac{1}{1+e^{-(\alpha + \beta 1CH + \beta 2ISR + \beta 3DF + \varepsilon)}}$$

And

$$PP = \frac{1}{1+e^{-(\alpha + \beta 1CH + \beta 2ISR + \beta 3DF + \beta 4AF + \beta 5FS + \varepsilon)}}$$

Therefore becomes;

Without Control Variables	**With Control Variables**
$PP = \frac{\mathbf{1}}{\mathbf{1+e^{-(6.188 + 1.434ISR + 3.352)}}}$	$PP = \frac{\mathbf{1}}{\mathbf{1+e^{-(-5.318 + 1.374ISR + 3.901)}}}$

4.7.3 Regression summary for Primary Data (Quantitative Risk Factors)

In the period before Covid-19 pandemic and without taking into account the control variables, the findings show that prior insurance coverage had a statistically significant effect on premium price. Therefore, the findings gave rise to the interpretation that a unit increase in prior insurance coverage results in an increase of 2.796 in premium price. After taking into account the control variables, the findings show that prior insurance coverage had a statistically significant effect on premium price and gave rise to the interpretation that a unit increase in prior insurance coverage results in an increase of 3.012 in premium price.

In the period after Covid-19 pandemic and without taking into account the control variables, prior insurance coverage remained consistent as the only variable with a statistically significant effect on premium price. Therefore, the findings gave rise to the interpretation that a unit increase in prior insurance coverage results in an increase of 2.564 in premium price. After taking into account the control variables, the findings show that prior insurance coverage had a statistically significant effect on premium price and gave rise to the interpretation that a unit increase in prior insurance coverage results in an increase of 2.405 in premium price.

The proposed regression model:

$$PP=\frac{1}{1+e^{-(\alpha+\beta 1PR\quad \beta 2\quad +\beta 3MV+\beta 4CA+\beta 5PIC+\varepsilon)}}$$

And

$$PP=\frac{1}{1+e^{-(\alpha+\beta 1PR+\beta 2\quad +\beta 3MV+\beta 4CA+\beta 5PIC+\beta 6AF+\beta 7FS+\varepsilon)}}$$

Therefore becomes:

Quantitative Risk Factors	**Without Control Variables**	**With Control Variables**
(Before Covid-19)	$PP=\frac{1}{1+e^{-(-0.319+2.796PIC+1.549)}}$	$PP=\frac{1}{1+e^{-(0.609+3.012PIC+2.354)}}$
(After Covid-19)	$PP=\frac{1}{1+e^{-(6.319-2.564PIC+2.107)}}$	$PP=\frac{1}{1+e^{-(6.486-2.405PIC+2.940)}}$

4.8 Chapter summary

The study's findings and results were presented in this chapter in the form of tables, charts, and the researcher's own interpretation. The diagnostic tests were introduced first followed by descriptive statistics, inferential statistics and multiple regression analysis between the variables.

CHAPTER FIVE: SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This fifth chapter presents the summary of findings, interpretations, conclusions, limitations as well as recommendations of the study. This was in order to determine the effect of risk factors on premium pricing of Kenya's general business insurance products before and after Covid-19 pandemic in the period from 2018 to 2021.

5.2 Discussion of Findings

The study was carried out using panel regression on thirty-seven observations and the findings of the study were discussed below. A structured questionnaire was used in the data collection process which targeted a total of 148 risk personnel within the targeted general business insurance firms as the units of observation for the research whose results were analyzed using inferential statistics. The discussion involves a presentation of the study findings which are contrasted and compared to previous study findings.

5.2.1 Effect of Non-Quantitative Risk Factors on Premium Pricing before and after Covid-19 Pandemic

This study sought to investigate the effects of non-quantitative risk factors on premium pricing of the general business insurance- motor insurance product line in Kenya before and after Covid-19 pandemic. The results of the study from the regression analysis showed that premium price was significantly explained by insurance sector regulation in both periods before Covid-19 and after Covid-19 pandemic. This implies that insurance sector regulation is a key non-qualitative risk factor in the pricing of motor vehicle insurance products.

These findings also agree with Barasa (2016) who sought to identify a framework for adoption by the insurance industry for enhancing the insurance penetration rate. The regression results showed that government intervention and regulatory support were key to enhancing the insurance penetration rate in Kenya. The results however, contract with Ng'ang'a (2016) who found that that most of the regulations in place had limited the provision of micro-insurance in Kenya.

5.2.2 Effect of Quantitative Risk Factors on Premium Pricing before and after Covid-19 Pandemic

This study sought to investigate the effects of quantitative risk factors on premium pricing of the general business insurance- motor insurance product line in Kenya before and after Covid-19 pandemic. Before the Covid-19 pandemic, the results of the study from the regression analysis showed that only prior insurance coverage significantly drove premium pricing. However, after the Covid-19 pandemic, the results of the study showed that prior insurance coverage, market value and underwriting risk significantly drove premium pricing. Hence premium price is significantly explained by the quantitative risk factors- prior insurance coverage, underwriting risk and market value.

These findings were also consistent with Sisay (2017) whose regression results showed that credit risk, liquidity risk, solvency risk, underwriting risk, and technical provisions risk had significant effect on the performance of insurance companies in Ethiopia.

5.2.3 Moderating effect between Risk Factors and Premium Pricing (Age and Size)

The study also aimed to establish the effect of age and size on effect of Risk Factors on Premium Pricing. From results the regression analysis showed that the p values of age and size were insignificant in the period before and after Covid-19 pandemic. According to most of the respondents, the age and size of an insurance company did not have a bearing on the pricing of general business insurance products.

These findings however contradict with Odira (2018) who focused on the general insurance industry in Kenya and analyzed the effect of firm-specific characteristics on financial performance. The findings indicated that firm size had a positive and significant effect on the financial performance of the insurance firms. In other studies, Badriyah et al., (2015) found that age and size moderately influence firm performance. Whereas Masika and Simiyu (2019), on the other hand, their study concluded that firm size and leverage have a more significant effect on firm performance as opposed to age of the firm.

5.3 Conclusions

The outbreak of the Covid-19 pandemic exerted negative effects on the performance of industries worldwide, having been the exogenous shock of 2020 that depressed the global economy in an

instant. The insurance industry, being the industry that aims to absorb shocks and provide risk mitigation solutions was faced with significant pressure from the advent of the pandemic. The ramifications for insurers were huge, from an upstream in Covid-related claims to an array of new reporting requirements and standards. However, the crisis also provided an opportunity for the industry to effectively evolve its risk mitigation as well as performance strategies in order to build resistance against shocks such as the Covid-19 pandemic. Therefore, because the sector's general performance is mainly driven by premiums collections, this study was of paramount importance in ensuring that insurance leaders gave risk factors strategic importance in their product pricing methodologies in order to enhance overall performance as well as maximize product returns.

In this context, the findings revealed that premium price was significantly affected by insurance sector regulation, prior insurance coverage, market value and underwriting risk in the premium pricing of general business motor insurance products in Kenya. Most insurance personnel however, did not believe that insurance sector regulation, market value and underwriting risk had a significant relationship with premium pricing. Insurance companies also oddly enough, do not seem to be compensated for the risks and costs of providing motor vehicle insurance as most of the risk factors were found to have had an insignificant relationship with premium pricing. The reason may be that the general business insurance industry generally misprices the premium for motor insurance products by using traditional risk rating factors as concluded by Magri *et al.,* (2019) in their study to analyse the risk factors in determining motor insurance premium in a small island state of Malta. The study found that most insurers were still using the traditional rating factors, even though these did not necessarily reflect the risks being insured.

5.4 Recommendations

There is need for insurance companies to adopt risk-based pricing in their pricing methodologies used for insurance products. Policies also need to be put in place to ensure that the key risk factors identified as influencing the pricing of general business products such as motor insurance products are factored in pricing methodologies. This would in turn assist in the overall enhancement of the profitability of Kenya's insurance sector.

5.4.1 Recommendations for practice

The findings of this study can be used by academics and insurance industry experts for other research projects in Kenya and abroad, including industry-based studies with the goal of defining

other factors that affect premium pricing and creating recommendations and policies for the insurance industry. Based on the results of this study, insurance top managers and experts may establish and modify strategic plans and tactics of their insurance firms.

5.4.2 Managerial Recommendations

The study recommends that managers of Insurance companies should also have in place well documented pricing policies and enforced by the risk and compliance departments. This would also assist in reducing the practice of arbitrary price revision strategies or downsizing of insurance products by insurance companies in order to enhance performance.

5.4.3 Policy Recommendations

While developing insurance sector regulation, the Insurance Regulatory Authority can also issue guidelines on product pricing methodologies to be adhered to by insurers. This would assist the regulator in deterring insurers from using pricing undercutting measures or arbitrary price revisions in order to maintain or enhance their competitiveness.

5.5 Limitations of the Study

The study provided a comprehensive foundation into the risk factors affecting the pricing of motor insurance products, nonetheless, it was not without limitations. Firstly, the study's limitation is that it did not look at how risk factors affected the pricing of other insurance products before and after Covid-19 pandemic. This is because the scope of the study was limited to the general business insurance sector with a focus on the motor insurance product which was deemed to have been the most affected with regards to its performance during the Covid-19 pandemic. Furthermore, the investigation could only be carried out until 2021 as the effects of the Covid-19 were not as severe and began to dissipate after 2021.

5.6 Suggestions for further Research

This topic provides opportunities for further research to enhance pricing methodologies of insurance companies in order to enhance the industry's overall performance. In this context, a researcher may find an opportunity to compare the pricing methodologies of the different insurance products within the different sectors, that is, general business or life insurance. This would help in providing more insights as to the performance characteristics of the different insurance products due to their pricing methodologies. The multi linear regression model may also be used to measure

price performance of the different insurance products while adopting the use of adjusted R^2. The research further leaves more room for investigation into other factors that affect premium pricing.

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APPENDICES

Appendix I: Data Extraction Form

Variable	Indicators	2018	2019	2020	2021
Premium Price	$\frac{\text{Incurred Expenses}}{\text{Earned Premiums}}$ $\frac{\text{Incurred Claims}}{\text{Earned Premiums}}$ $\frac{\text{Net Income}}{\text{Earned Premiums}}$				
Coverage amount	$\frac{\text{Premium}}{\text{Sum Insured}}$				
Period of cover	Policy maturity period				
Prior Insurance coverage	$\frac{[GWP_{(t)} - GWP_{(t-1)}]}{GWP_{(t-1)}}$				
Claims (underwriting risk)	$\frac{\text{Claims Paid}}{\text{Net Premium Earned}}$				
Market value	Market price of covered property				
Age of insurance firm	Number of years since incorporation				
Size of an insurance firm	Log of total assets.				
Premium Price	$\frac{\text{Incurred Expenses}}{\text{Earned Premiums}}$ $\frac{\text{Incurred Claims}}{\text{Earned Premiums}}$ $\frac{\text{Net Income}}{\text{Earned Premiums}}$				
Coverage amount	$\frac{\text{Premium}}{\text{Sum Insured}}$				

Appendix II: Structured Questionnaire Template

This interview template is intended to provide information for the study on the views of insurance risk managers regarding risk before and after Covid-19 for insurance companies in Kenya. Please note that the information provided will be used for academic purpose only and will be treated with utmost confidentiality.

For the purpose of this survey, before Covid-19 is defined as two years prior to onset of Covid-19 (2018- 2019) and after Covid-19 are defined as two years after Covid-19 (2020- 2021).

Kindly answer the following questions by ticking (x) in the appropriate box or by giving the necessary details in the spaces provided.

PART 1: GENERAL DATA

1. Gender
   a) Male [ ]
   b) Female [ ]

2. Number of years of experience in the role at the company
   c) Less than one year [ ]
   d) 1 to 2 year [ ]
   e) 3 to 5 years [ ]
   f) More than 5 years [ ]

3. Department

4. What is your job title?

PART II: NON-QUANTITATIVE RISK FACTORS

This section contains questions and statements that establish the effect of non-quantitative risk factors on pricing of general business- motor insurance products before and after Covid-19 pandemic

NO.	STATEMENT	Yes	No
A	**Claim History**		
1.	Did you report more motor insurance claims during covid-19 as compared to before covid-19?		
2.	Please provide a reason for your answer in 1?		

B	**Insurance Sector Regulation**		
3.	Did your motor vehicle insurance pricing methodologies change as a result of regulatory policies during the pandemic?		
4.	If Yes to question 3, what additional factors did you consider in your pricing methodologies of motor insurance products during the pandemic?		
	1. 2.		
C	**Demographic Factors (Gender)**		
5.	Do you use gender as a risk rating factor when pricing risks of motor insurance products?		
6.	In your opinion, do the costs of providing motor insurance cover differ between men and women?		
7.	If Yes to question 6, what are the reasons of the difference insurance costs between genders?		
	1. 2.		
8.	Do you consider any other demographic risk rating factor in motor insurance pricing decisions?		
9.	If Yes to question 8, which other demographic risk rating factor do you consider in motor insurance pricing decisions?		
	1. 2.		
10.	In your opinion, do the risks attached to the motor insurance product differ based on gender disparities?		
11.	If Yes to question 10, which gender carries a higher risk why?		
	1. 2.		
12.	In your opinion, do you think there should be a difference in the pricing methodologies of motor insurance products based on gender?		
13.	If Yes to question 12, please provide a reason.		

PART III: QUANTITATIVE RISK FACTORS

This section contains questions and statements that establish the effect of quantitative risk factors on pricing of general business motor insurance products before and after Covid-19 pandemic

14. What changes did you see in **coverage amounts** of motor vehicles before and after Covid-19 pandemic?

Risk Factor	**Before covid-19**	**After covid-19**
Coverage amount	Grew [ ] Same [ ] Declined [ ]	Grew [ ] Same [ ] Declined [ ]

15. What changes did you see in **market values** of motor vehicles before and after Covid-19 pandemic?

Risk Factor	**Before covid-19**	**After covid-19**
Market value	Grew [ ] Same [ ] Declined [ ]	Grew [ ] Same [ ] Declined [ ]

16. What were the differences (if any) observed in the **period for motor** vehicle insurance policies before and after Covid-19 pandemic?

Risk Factor	**Before covid-19**	**After covid-19**
Period of cover	1 year policies [ ] 6 months- 1 year policies [ ] Less than 3-6 months policies [ ] No change in policy periods [ ] Not observed [ ]	1 year policies [ ] 6 months- 1 year policies [ ] Less than 3-6 months policies [ ] No change in policy periods [ ] Not observed [ ]

17. In your opinion and based on your answer to question 16, what were the reasons for these differences (if any) observed in the **period for motor** vehicle insurance policies before and after Covid-19 pandemic?
    i) ……..
    ii) ……..
    iii) ……..

18. What were changes in the levels of **prior year insurance coverage** of motor vehicles before and after Covid-19 pandemic?

Risk Factor	**Before covid-19**	**After covid-19**
Prior Motor insurance coverage	Grew [ ] Same [ ] Declined [ ]	Grew [ ] Same [ ] Declined [ ]

19. What was the change on the levels of incurred **claims** of motor vehicle insurance before and after Covid-19 pandemic?

Risk Factor	**Before covid-19**	**After covid-19**
Motor vehicle insurance claims	Grew [ ] Same [ ] Declined [ ]	Grew [ ] Same [ ] Declined [ ]

PART III: CONTROL EFFECT

This section contains questions and statements that examine the extent to which firm characteristics affect the relationship between risk factors and premium pricing of the general business insurance products in Kenya before and after Covid-19 pandemic

20. On a scale of 1 to 5 where 1 is strongly disagree and 5 is strongly agree how do you rate the following statements during covid-19? (tick appropriately)

A) Size

Statement	1	2	3	4	5
i). The size of an insurance company has a strong bearing on the pricing of general business insurance products ***(<2% of general business insurance market share***)	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
ii). Our insurance company is considered to be a small insurance firm	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
iii). Our insurance company is considered to be a medium sized insurance firm ***(>2% of general business insurance market share***)	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
iv). Our insurance company is considered to be a large insurance firm ***(>5% of general business insurance market share***)	Strongly disagree	Disagree	Neutral	Agree	Strongly agree

B) Age

Statement	1	2	3	4	5
i). The age of an insurance company has a strong bearing on the pricing of general business insurance products	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
ii). Our insurance company has been in existence for **0-5 years**	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
iii). Our insurance company has been in existence for **5-10 years**	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
iv). Our insurance company has been in existence for **10-20 years**	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
v). Our insurance company has been in existence for **20-30 years**	Strongly disagree	Disagree	Neutral	Agree	Strongly agree

THANK YOU

Appendix III: Work Plan

ACTIVITIES	March 2023	April-May 2023	May 2023	May 2023	June 2023	June 2023
Formulation of the research problem						
Proposal writing						
Defence of Proposal						
Data collection						
Data analysis						
Project report writing and review						

Appendix IV: Research Budget

NO	ITEMS	COST (KSHS)
1	Stationery	6,000.00
2	Transport	10,000.00
3	Typing & Printing	3,500.00
4	Photocopying & Binding	3,000.00
5	Data Collection	15,000.00
7	Miscellaneous	2,400.00
8	Publication Fees	15,000.00
9	Online Journal Access Fees	20,000.00
	TOTAL	**76,900.00**

Appendix V: Regression Results for Primary Data

Non-Quantitative risk factors without control factors

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.350	0.123	0.092	0.95271889

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11.032	3	3.677	4.052	.010[b]
	Residual	78.968	87	0.908		
	Total	90.000	90			

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.244	2.277		2.303	0.024
	Claim history	0.032	0.099	0.033	0.322	0.748
	Insurance Sector Regulation	0.250	0.106	0.239	2.352	0.021
	Gender	25.345	10.964	0.233	2.312	0.023

Non-Quantitative risk factors without control factors

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.288[a]	0.083	0.028	0.96305460

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.026	5	1.405	1.515	.194[b]
	Residual	77.908	84	0.927		
	Total	84.933	89			

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.972	2.810		1.414	0.161
	Claim history	0.039	0.101	0.041	0.386	0.700
	Insurance Sector Regulation	0.234	0.112	0.224	2.089	0.040
	Gender	19.174	13.574	0.149	1.413	0.161
	Size	0.089	0.120	0.092	0.742	0.460
	Age	-0.092	0.120	-0.096	-0.769	0.444

Quantitative risk factors before Covid-19 without control factors

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.458[a]	0.210	0.161	0.88029457

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	16.671	5	3.334	4.303	.002[b]
	Residual	62.768	81	0.775		
	Total	79.439	86			

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.068	0.095		0.714	0.477
	Coverage Amounts	-0.080	0.116	-0.082	-0.690	0.492
	Market Values	-0.076	0.118	-0.078	-0.643	0.522
	Period of Cover	-0.097	0.101	-0.100	-0.961	0.339
	Prior period Coverage	0.566	0.143	0.568	3.970	0.000
	Underwriting Risk	-0.131	0.143	-0.132	-0.921	0.360

Quantitative risk factors before Covid-19 with control factors

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.480[a]	0.231	0.162	0.85529617

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	17.122	7	2.446	3.344	.004[b]
	Residual	57.059	78	0.732		
	Total	74.181	85			

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.097	0.093		1.043	0.300
	Coverage Amounts	-0.064	0.114	-0.067	-0.559	0.578
	Market Values	-0.091	0.118	-0.097	-0.770	0.444
	Period of Cover	-0.083	0.100	-0.088	-0.834	0.407
	Prior period Coverage	0.547	0.151	0.568	3.631	0.001
	Underwriting Risk	-0.112	0.149	-0.117	-0.757	0.452
	Size	-0.067	0.111	-0.071	-0.604	0.548
	Age	-0.019	0.116	-0.020	-0.160	0.873

Quantitative risk factors after Covid-19 with control factors

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.570[a]	0.325	0.284	0.85376834

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	29.100	5	5.820	7.985	.000[b]
	Residual	60.500	83	0.729		
	Total	89.601	88			

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.005	0.091		0.054	0.957
	Coverage Amounts	0.163	0.125	0.164	1.304	0.196
	Market Values	0.037	0.119	0.037	0.309	0.758
	Period of Cover	-0.132	0.093	-0.129	-1.415	0.161
	Prior period Coverage	-0.793	0.154	-0.788	-5.163	0.000
	Underwriting Risk	0.319	0.147	0.317	2.168	0.033

Quantitative risk factors after Covid-19 with control factors

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.543[a]	0.295	0.233	0.86353990

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	24.922	7	3.560	4.774	.000[b]
	Residual	59.656	80	0.746		
	Total	84.578	87			

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.009	0.092		0.100	0.921
	Coverage Amounts	0.136	0.132	0.141	1.033	0.305
	Market Values	0.054	0.122	0.056	0.442	0.660
	Period of Cover	-0.112	0.101	-0.113	-1.114	0.269
	Prior period Coverage	-0.733	0.171	-0.740	-4.281	0.000
	Underwriting Risk	0.258	0.161	0.263	1.603	0.113
	Size	0.063	0.116	0.065	0.548	0.585
	Age	-0.088	0.111	-0.091	-0.795	0.429

Appendix VI: Regression Results for Secondary Data

Quantitative risk factors before Covid-19

Model Summary[a]				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.315[b]	0.099	0.004	0.194432

ANOVA[a,b]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	0.276	7	0.039	1.041	.411[c]
	Residual	2.495	66	0.038		
	Total	2.771	73			

Coefficients[a,b]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.425	0.154		2.765	0.007
	Underwritting risk	0.447	0.233	0.277	1.921	0.059
	prior coverage	0.004	0.013	0.042	0.326	0.745
	Market value	1.417E-07	0.000	0.335	2.047	0.045
	Coverage amount	-3.687E-08	0.000	-0.542	-1.867	0.066
	period of cover	0.002	0.008	0.040	0.298	0.767
	Age of the firm	0.001	0.001	0.095	0.782	0.437
	size of the firm	7.982E-09	0.000	0.147	0.663	0.510

Quantitative risk factors after Covid-19

Model Summary[a]				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.566[b]	0.321	0.249	0.211301

ANOVA[a,b]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.391	7	0.199	4.452	.000[c]
	Residual	2.947	66	0.045		
	Total	4.338	73			

Coefficients[a,b]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.524	0.089		5.876	0.000
	Underwritting risk	0.160	0.067	0.283	2.396	0.019
	prior coverage	0.050	0.033	0.163	1.528	0.131
	Market value	-1.612E-07	0.000	-0.282	-2.347	0.022
	Coverage amount	-2.537E-09	0.000	-0.033	-0.221	0.826
	period of cover	0.000	0.007	-0.005	-0.051	0.960
	Age of the firm	0.001	0.001	0.148	1.439	0.155
	size of the firm	-4.606E-09	0.000	-0.074	-0.514	0.609