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The motor insurance industry in South Africa: a survival analysis

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THE MOTOR INSURANCE INDUSTRY IN SOUTH AFRICA:

A SURVIVAL ANALYSIS



By

ABBOT PFUKWA

A research report submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, in partial fulfillment of the requirements for the degree of Master of Management in Finance and Investment

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SUPERVISER: PROF PAUL ALAGIDEDE

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DECLARATION

I, **Abbot Pfukwa** declare that the research work reported in this dissertation is wholly my work, except where otherwise indicated and acknowledged. This dissertation has not either in whole or part, been submitted at any other university or institution for degree purposes.

Abbot Pfukwa

Johannesburg

June 2015

Signed at ……

On the …….. Day of June 2015

DEDICATION

This research report is dedicated to

My wife and business partner, Simphiwe, and our children, Kayla and Caleb, for sharing the same vision with daddy.

My parents and my in-laws, for believing in us

To the Octomate team, you are positioned for purpose

And all my MMFI 2014 classmates, we shared good times

Love you lots

ABSTRACT

An interesting phenomenon experienced in the insurance sector is the concept of underwriting cycles. The underwriting cycle challenge usually affects new registered insurers. When the premiums charged in the market are high, above the average, new players are prompted to enter the market and an underwriting cycle commences. New players in the insurance market may threaten the survival of the established companies. Established companies respond by strategically reducing their premiums below the average prices attracting clients by offering a better premium. This chokes the new insurers to death, and once they are out of business and there is less competition, the established insurers, will gradually increase their premiums to maintain profitability.

What are the chances of survival of any new player in the short term insurance industry? Are there any significant differences in survival chances of motor insurers to non-motor insurers in the short term insurance sector? Are there any trends in the underwriting profits/losses for insurers who experienced death, years prior to death?

Survival analysis methods enable us to answer these questions. We embarked on a survival analysis study, of short term insurance companies in South Africa, over a period of fourteen years. The Kaplan-Meir, test is used extensively in this project.

We find that any new registered player in the motor and non-motor insurance industry has over 75% chance of survival over a period of 10 years. There are no significant differences in the survival functions of a motor and a non-motor insurer. Dormancy and fluctuations in net underwriting profits/losses are cited in the trend analysis of insurance companies that experience death.

ACKNOWLEDGEMENTS

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To Ms Montshiwa Tau, from the Insurance Prudential Department of the Financial Services Board, thank you, for supplying the annual reports used in this study.

To the MMFI academic staff, thank you for imparting great and relevant knowledge into our minds.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION AND BACKGROUND OF THE STUDY

The current state of the motor insurance sector in South Africa

The motor insurance market in South Africa is far from flooding, ironically, the motor insurance sector is highly competitive, PwC (2013:4). The strong competition is aggravated by the relative steadiness of the insurable motor vehicle population, coupled with the advent of the intense South African insurance regulatory framework monitored by the Financial Services Board (FSB). Are there any fundamental differences between the motor and the non-motor insurance sectors?

There is no compulsory motor insurance cover in South Africa, as is in most countries such as the United Kingdom, Canada, Australia, New Zealand, France, Zimbabwe, to mention a few. Instead in South Africa, we have the Road Accident Fund (RAF). The RAF is financed through the fuel levy paid on the pump. The RAF has been recording deficits, in their financial statements for many years and their outstanding claim payouts are rising. (RAF Annual Report 2010-2015)

In a survey conducted by the Automobile Association of South Africa, 65% of vehicles on South African roads have no insurance at all, SAIA Media Release (2013) and Wheel24 (2013). Only 35% of the vehicles on the South African roads are insured. It is axiomatic: the rife competition in the motor insurance sector is concentrated on a lesser part of the insured proportion. Motor insurers are competing on this undersized portion of the market. Germane to the above stated statistics, there has been a steady increase in the number of short term insurers and brokerages registered with the Financial Services Board (FSB) over the past few years, FSB (2013;88). Most short term insurers and many brokerages, write motor insurance business.

The motor insurance sector in South Africa is also a developing sector. New players (banks-insurers, large retail distribution channels and brokerages are joining the traditional short term insurance companies.

Generally growth in the South African short-term insurance industry is under pressure, KPMG (2013:75). This is attributed to economic changes over the past years, strict regulatory requirements by the regulator (FSB) and very demanding customers.

Customers are able to cancel and transfer insurance cover to a competitor at will, with immediate effect. A cancellation may be reported by either the customer or the competing company. Although motor insurers have retention departments, the best way to retain clients is to offer superior service at all times while offering competitive premiums. Therefore, there has been an increased interest in customer relationship management in this sector.

The purpose of our study is to investigate the survival chances of a motor insurer in South Africa compared to a non-motor insurance enterprise. We are looking at analyzing the chances of a registered insurance company surviving in this competitive space. In considering the survival of a motor insurers and non-motor insurers, we will do a trend analysis of the net underwriting profits for the company that experienced death, five years prior to death. This will enable us to see if there are significant trends. This study is of great value because of the unique characteristics of the South African motor and non-motor insurance market from which the study draws evidence. Knowledge of the survival chances of a registered short term insurer is vital if a new player is contemplating of venturing into this industry.

1.2 RESEARCH PROBLEM

Motor insurers and non-motor insurers in South Africa are faced with challenges of survival. An interesting phenomenon experienced in insurance is the concept of underwriting cycles. The underwriting cycle challenge is faced by many new registered insurers. When the premiums charged in the market are higher above the general expectations, this prompts new players to enter the market and an underwriting cycle commences. New players in the insurance market may threaten the survival of the established companies. Established companies respond by strategically reducing their premiums below the average prices attracting clients with a better premium. This chokes the new insurers to death and once they are out of business and there is less competition, the established insurers, will gradually increase their premiums to maintain profitability.

1.3 RESEARCH OBJECTIVES

The objectives of this research are:

- To analyze the survival chances of registered motor and non-motor insurance companies in South Africa as from the 1st of January 1999 to 31st of December 2013.
- To find out if there are any trends in the net underwriting profit/loss of an insurer five years prior to death.

1.4 RESEARCH QUESTIONS

The research questions are as follows

- What are the chances of survival as a motor or a non-motor insurer in South Africa?
- Is there any trend in net underwriting profits/loss of an insurance company five years prior to its death?

1.5 GAPS AND SIGNIFICANCE IN LITERATURE

This paper answers the fundamental question, that every new player in any industry would ask himself before commencing business. What is the chance of survival? The study is focused on motor and the non-motor insurance sectors of South Africa. The study will help enrich the literature of motor and non-motor insurance research in the South African context. The paper will equip potential new players in the motor and non-motor insurance with the relevant survival probabilities, before a start-up. New players need to prepare fully and weigh their survival probabilities and strategize before entering the market.

1.6 OUTLINE OF THE STUDY

Chapter 2 provides literature review on the subject of survival analysis. We look at past studies in survival analysis and issues in the motor insurance sector that impact on the survival of the motor insurer. Chapter 3 presents the research methodology and discusses the research design, survival analysis and the underwriting profit/loss trend analysis. Chapter 4 analyses and presents the results of the study. Chapter 5 discusses the results and draws conclusions as well as making recommendations and suggestions for further study.

1.7 CHAPTER SUMMARY

In this chapter we looked at the background of the study. The objectives and questions of the study were presented. The gap, significance and outline of the study were highlighted. Survival analysis in the motor and non-motor insurance sector is an interesting study which should be given the attention it deserves, considering the limited insured motor population in South Africa.

CHAPTER 2

LITERATURE REVIEW

2.1: INTRODUCTION

Kalbfleisch, J. D. and Prentice, R. L. (1980), defines survival analysis as a branch of statistics that deals with analysis of time duration until one or more events happens. In this particular study the only event we are looking at is the event when an insurer ceases to offer insurance due to any other factor. We are looking at the death of an insurer. Survival analysis is also called reliability theory, duration analysis or event history analysis. Ritter, Ron (2002), described that survival analysis gives us answers to different questions that are applicable to practical research questions that involve time. Elandt-Johnson, R. C. and Johnson, N. L. (1980), defines the survival function, conventionally denoted S (t), as:

$$S(t) = Pr(T>t)$$

T is a random variable denoting the time of death, and 'Pr' stands for probability. That is, the survival function is the probability that the time of death is later than some specified time t.

Usually one assumes S (0) = 1. Survival to a later age is only possible if all younger ages are attained. Given this property, the lifetime distribution function and event density are well-defined.

2.2: DISTRIBUTION FUNCTIONS

Lifetime distribution function and event density function

The lifetime distribution function, conventionally denoted F, is defined as the complement of the survival function,

$$F(t) = Pr(T \leq t) = 1-S(t)$$

If F is differentiable then the derivative, which is the density function of the lifetime distribution, is conventionally denoted *f*,

$$F(t) = F'(t) = \frac{d}{dt} F(t)$$

The function f is sometimes called the event density; it is the rate of death or failure per unit time. The survival function can be expressed in terms of probability distribution and probability density functions.

$$S(t) = Pr(T>t) = \int_t^{\infty} f(u)du = 1 - F(t)$$

Similarly, a survival event density function can be defined as

$$S(t) = S'(t) = \frac{d}{dt} S(t) = \frac{d}{dt} \int_t^{\infty} f(u)du = \frac{d}{dt} [1-F(t)] = -f(t)$$

Hazard Function and Cumulative Hazard Function

The hazard function, conventionally denoted h (t) is defined as the event rate at time t conditional on survival until time t or later (that is, $T \geq t$),

$$h(t) = \frac{f(t)}{S(t)} = -\frac{S'(t)}{S(t)}$$

The hazard function must be non-negative, $h(t) \geq 0$, and its integral over $[0, \infty]$ must be infinite, but is not otherwise constrained; it may be increasing or decreasing, non-monotonic, or discontinuous. The hazard function can alternatively be represented in terms of the Cumulative Hazard Function, conventionally denoted H (t).

$$H(t) = -\log S(t)$$

$$\frac{d}{dt} H(t) = -\frac{S'(t)}{S(t)} = h(t)$$

The name 'cumulative hazard function' is derived from the fact that:

$$H(t) = \int_0^t h(u)\, du$$

This is the 'accumulation' of the hazard over time.

Censoring

Censoring is a form of missing data problem which is common in survival analysis. Ideally, both the birth and death dates of a subject are known, in which case the lifetime is known. If it is known only that the date of death is after some date, this is called **right censoring**. Right censoring will occur for those subjects whose birth date is known but who are still alive when they are lost to follow-up or when the study ends. If a subject's lifetime is known to be less than certain duration, the lifetime is said to be **left-censored**. It may also happen that subjects with a lifetime less than some threshold may not be observed at all: this is called **truncation**. Truncation is different from left censoring, since for a left censored datum, we know the subject exists, but for a truncated datum, we may be completely unaware of the subject.

Modeling and estimating S (t) and H (t)

If we are assuming that every subject follows the same survival function (no covariates or other individual differences), we can easily estimate S(t), Collett, D. (1994). We can use non-parametric estimators like the Kaplan-Meier estimator, Kaplan, E. L. and Meier, P. (1958) and the Nelson-Aalen Estimator, Aalen (1978).We can also estimate the survival distribution by making some parametric assumptions. In this case, we would use the parametric distributions such as the exponential, weibull, gamma and log-normal distribution; Cox, D. R. and Oakes, D. (1984).

2.3 PAST STUDIES IN SURVIVAL ANALYSIS

Lu (2002:16), churn analysis is carried out in a telecommunication company by looking at historical customer data which is used for predictive modeling of customer duration. Lu used SAS, and his study is different from this study as his study looks at the telecommunication industry in Chicago, United States of America. Although the theories of Lu's study and this study have strong similarities, the dynamics of the telecommunications industry in USA are different from those of the motor and non-motor short term insurance industry of South Africa.

Mackay N, Petzer D and Mostert D (2014) studied on the relational benefits and customer satisfaction on South African short-term insurance industry. Their study was based on the short term insurance industry as a whole. Although their study looked at customer satisfaction issues which are related to profitability and survival of an insurer, their study did not analyze survival chances in the short term insurance sector.

Du Plessis, L. & Roberts- Lombard, M. (2013) looked at customer loyalty in the South African life insurance industry. Their research was looking at client relationship management issues with reference to the life insurance sector in South Africa but did not resolve survival issues, in the life insurance sector.

In Van der Poel and Larivère (2004: 22), a survival model is used with time-varying data when predicting churn incidences in the financial service market, with particular reference to the banking industry in the European financial services sector. The dynamics of the banking industry are different from the motor and non-motor insurance sector in South Africa.

Guillen, Nielsen, Scheike and Perez-Marin (2006:11), analyzed customer lifetime duration in the insurance industry and applied an extended Cox model to retention time after an initial, partial cancellation of insurance policies. They found empirical evidence of time-dependent effects of factors explaining duration and suggested methods to identify customers with high risk of cancelling all remaining policies and how the risk varies over time. The study is of great importance to the theoretical base of survival analysis base in the insurance application. However the study looks at life insurance in Barcelona (Europe) which is different from this study which looks at short term insurance principles in motor insurance in South Africa. Our setting is somewhat different, in that we will develop models with respect to motor insurance products - i.e. comprehensive, third party fire and theft and third party only cover.

Of great importance is the study by Oulidi, Marion and Ganachaud (2010), published in the Actuarial Journal. The study looks at the survival analysis methods in insurance applications in the car insurance contracts, with particularly reference to the Cox model and Aalen model which allows covariate effects to vary with time (time defendant covariates). The study was undertaken in France. Although theoretically similar, to this study, the French motor insurance market is more mature and different from the South African motor insurance market. There is compulsory motor insurance statute in France. In South Africa, there is no compulsory motor insurance legislation. Aggrieved parties will have to seek compensation from the RAF in South Africa, if the other party is not insured. Also in France, the concept of 'bonus-malus', meaning 'reward or penalize', is a covariate influencing many motor insurance contracts but is not necessarily a factor in the South African motor insurance market.

2.4 ISSUES IN THE MOTOR INSURANCE SECTOR THAT IMPACT ON THE SURVIVAL OF A MOTOR INSURER IN SOUTH AFRICA

Among the many challenges faced by the motor insurance sector is the challenge of the ever increasing premiums. There has been an increasing trend in motor insurance premiums, Lilley A, (2009, 14-15), restricting low income earners access to motor insurance. Some hard-pressed policyholders opt to cancel cover, to self insure and in most cases not to have insurance at all.

Another problem is the difficulty of consumers not understanding replacement value as applied in the motor insurance sector, Fourie C (2011,11). Although the value of motor vehicles depreciates, this is not the only factor that determines what it would cost to replace the motor vehicle. The price of vehicle repairs and spare parts has become one of the most significant factors in determining premiums, alas, there has been a gradual increase in the prices of spare parts and repairs since most of the genuine parts found in South Africa are imported and/or pricey. This has resulted in frustrated clients. Many customers do not comprehend the dynamics involved in motor insurance transactions, leading to bad reputation for the insurance sector. This has led many policyholders not trusting motor insurers resulting in some individuals opting to have no insurance cover at all.

The insurance industry has become complacent when it comes to managing their image and reputation in the market due to other, top of mind matters, such as the increased regulatory and legislative requirements, climate change, landscape and economic changes, KPMG (2013; 8).

In his statement, Barry Scott, the then Chief Executive Officer of the South African Insurance Association (SAIA) (a body representing about 99% of the short term insurance companies in South Africa), when asked of the greatest challenge facing the short term insurance, responded by stating, "the biggest challenge for the short term insurance generally and the SAIA specifically will be to draft and implement holistic and comprehensive strategy to address motor insurance. Such a strategy will not only have to address the risk, but also the cost of motor insurance claims, to keep motor insurance affordable and sustainable," Scott (2010; 14).

Faurie J, (2014) asserts that the FSB is proposing to offer new insurance licenses for the low income earners market, with less onerous regulatory requirements. This is a lighter form of compliance to the Financial Advisory and Intermediary Services (FAIS) Act and lesser capitalization requirements, as well as simpler wording requirements. This is an obvious indication of the need to deal with the issue of a market that has not been tapped: the low income market. The FSB's challenge will be to convert this brilliant idea on paper, into a reality to enable the insurers to be able to increase their market penetration in the motor insurance pool.

The intellectual test for the motor insurance industry is to come up with new and innovative motor insurance products to address the needs of the low income market. Affordability is of great significance while profitability of the insurer is imperative.

The insurance industry is changing at a rapid pace due to technology and therefore insurers need to be flexible and adapt their business models in order to survive, Faurie J (2014). Companies with the ability to develop technological proficiency will put themselves at a distinct advantage over their competitors, World Insurance Report (2014; 17). Prudent investments in technology will enable cost reductions and profitability for insurers thereby aiding survival chances.

Financial service providers such as banks and insurances companies, worldwide, have accepted that an unrelenting customer contentment agenda in the provision of their service is the most effective method of retaining customers. This helps in reducing the need of huge investments for attracting new clients. Services of high quality result in more repeat sales and market share improvement, Buzzell and Gale, (1987). This will increase the chances of survival of an insurer.

Loyalty in the insurance sector maybe defined as the extent to which the insured wishes to keep their relationship with an insurer, and usually results from how much they believe that the value they receive from this insurer is higher compared to others. Loyalty is behaviorally expressed by retention, Bansal and Taylor (1999) and emotionally by the use of 'word of mouth', Ranaweera and Prabhu (2003), as the insured is able to refer other potential clients to engage the same insurer. The client is willing to inform others on service incidents that have given them satisfaction, Soderlund (1998). If an insurer has loyal clients, the likelihood of survival is increased.

Sometimes it is not easy to change from one insurer to another at will, as with life insurance contracts. In the non-life insurance or short term insurance sector, there are fewer restrictions on the way the insured can cancel and transfer to a competing insurer. The customer has a privilege to transfer to another insurer at will. If an insurer experiences more cancellations and terminations at a rate higher than they are acquiring new business, the survival of that insurer will be under pressure.

Companies in the financial services sector use aggressive marketing strategies to attract new customers and increase market share at the expense of competitors. They also use defensive strategies of maximizing client retention to protect themselves from competition, (Fornell, 1992; Ennew and Binks, 1996; Abdel-Maguid Lotayif, 2004; Roberts, 2005). Research has shown that defensive strategies such as client retention strategies can be more profitable. Increased customer retention can be more rewarding than market share enlargement. Small increases in the customer retention rate can generate considerable improvement in profitability through reduced cost of attracting new customers and increased sales to old customers, (Lenskold, 2003; Lombardi, 2005). Insurers in the USA consider retention as the most important determinant of economic success (Moore and Santomero, 1999). The cost of selling of an insurance policy is not recovered unless the policy is renewed for at least three or four years in the long term insurance sector (Zeithaml et al., 1996).

This calls for an insurer in the long term insurance market to keep the client for at least three years for such a transaction to be considered economically viable. High retention rates are therefore closely related with the economic performance of companies (Diacon and O'Brien, 2002).

In the short term insurance sector, the longer, the customers remain with a company, the less likely they are to submit claims (Peppers and Rogers, 2004). The insurance industry generally considers that understanding customers' behavior after the initial purchase will help insurers to maintain longer customer-insurer relations (Harrison, 2003) and therefore manage their survival in the insurance sector.

In a study related to a banking product Rose (1990) reports that a credit card customer who stays with the same company for ten years is three times more profitable than those who stay for five years. Thus the increased duration of a client retained influences the profitability of an enterprise positively and the survival of the insurance company also.

Overally, very little has been written on survival analysis as applicable to the motor insurance industry in South Africa.

2.5 CHAPTER SUMMARY

We introduced the theory on survival analysis in this chapter. We explored on the survival and hazard function and the modelling of these functions using the Kaplan-Meir method. Past studies on survival analysis have been detailed and we concluded with a discussion on the issues in the motor insurance sector in South Africa, which impact on the survival of a motor insurer.

CHAPTER 3
RESEARCH METHODOLOGY

3.1: INTRODUCTION

This chapter presents the data, its sources and research design to ascertain the survival chances of registered short term motor insurer. A trend analysis of net underwriting profit/loss is performed for companies which experienced death.

The research design discusses the model used to analyse the survival data; the Kaplan-Meier method.

3.2: DATA AND DATA SOURCES

The current study investigates the survival chances of registered motor insurance companies. The data is derived from the annual reports from the registrar of short term insurance from 1999 to 2013. We also use the information from the annual reports from the registrar of the Financial Services Board from 1999 to 2013. The study is based purely on the recording of the years in which an insurer has been operating and when he exits.

There have been a total of about 120 registered insurance companies in the period of study. Companies that reached the end of study, and had not experience death, where censored. Companies were grouped into two treatments: the motor insurers and non-motor insurers. Any insurer who offered motor insurance was recorded as motor insurer and the companies offering any other products that do not include motor insurance are recorded as non-motor insurers. We kept track of any name changes for registered insurance companies. After noting the year of exit of any company, we recorded the net underwriting profits/ loss of the exited insurer five years prior to exit. The annual reports from the registrar of short term insurance, and also the FSB's annual report by the Registrar contains all this information, well documented.

We did not transform the data. After capturing the data, we subjected the data to a test of normality and the data passed the test. Since the model we intended to use was a non-parametric model, we could work with data if it passed the normality test. The motor insurance sample consisted of 92 insurance companies and the non-motor sample consisted of 28 companies. We believe the sample is a good representation of the population, as the study recorded almost every registered short term insurance companies on the period of study.

Other considerations were instances were mergers and transfers of a book from one insurer to another took place. We would record the survival time based on the company that bought the book and kill the one who sold the book. We had to capture the merged insurers as one insurer.

3.3: RESEARCH DESIGN

Registered motor insurers

The annual reports from the short term registrar contain information on the list of all insurance companies registered with the Financial Services Board. The list shows all the insurance companies and the respective policies that the insurance companies are licensed to write such as motor, engineering, guarantee, accident and death, liability, property, transportation and miscellaneous policies. The reports state the number of new registered insurers and the number of total insurers at the end of a particular year, and records the financial results of each specific insurer.

We excluded all the reinsurers in this study, because the 'modus operandi' of reinsurers differs from the subject of this study.

Censored observations

In survival analysis censoring is said to be present when information on time to outcome event is not available for all study participants. A participant is said to be censored when information on time to event is not available due to non-occurrence of outcome event before the trial end or due to loss in follow-up. Censoring occurs where some information is available but the information is not complete. Analyzing a censored variable requires procedures designed to account for the censoring. There are insurance companies, in this particular study that did not experience the death event during the period of study, so the time to event is incomplete for these cases. We just know that the time to event is greater than the length of time that these insurers were studied for, but not how much greater.

Simple approaches may be used to deal with censored data such as setting the censored observations to missing, replacing the unobserved value of the variable by zero, replacing the value by the minimum, maximum, mean value, or a randomly assigned value from the range of possible values. When the censoring is minimal, using the above stated approaches can be reasonable. When censored observation are not minimal, these simple solutions can, however,

cause serious bias in estimates and standard errors. This can create a sample that is not a representative of the population studied.

Unlike ordinary regression models, the non-parametric survival model: Kaplan Meir method, correctly incorporate information from both censored and uncensored observations in estimating important model parameters. The dependent variable in survival analysis is composed of two parts: one is the time to event and the other is the event status, which records if the event of interest occurred or not. One can then estimate two functions that are dependent on time, the survival and hazard functions.

The survival and hazard functions are key concepts in survival analysis for describing the distribution of event times. The survival function gives, for every time, the probability of surviving (or not experiencing the event) up to that time. The hazard function gives the potential that the event will occur, per time unit, given that a participant has survived up to the specified time. Many other quantities of interest (e.g., mean survival) may subsequently be estimated from knowing either the hazard or survival function. Table 1, shows an extract of the survival dataset, detailing the name of the insurer, the time duration to a death event, censoring indicator and the status or treatment of the insurer.

TABLE 1: EXTRACT OF THE SURVIVAL DATASET

Name of Insurers	**Time Duration to Event**	**Censor[1]**	**Status/ Treatment**
Vodacom Insurance Company	3	0	Non-Motor
Westchester Insurance Company Ltd	14	0	Motor
Western National Insurance Company Ltd	6	0	Motor
Workers Life Insurance Ltd	14	0	Non-Motor
Zurich Insurance Company SA Ltd	9	0	Motor

[1] When conducting survival analysis in SPSS using the Kaplan-Meir Methods, censoring is done using two indicators. If the participant experienced the death event during the period of study the indicator used is 1, if the death event was not observed due to censoring, an indicator 0 is used.

Zurich Risk Financing SA Ltd	9	0	Motor
African General Insurance Company Ltd	5	1	Motor
Agri Risiko Spesialiste BPK	3	1	Non-Motor
AIM Insurance Ltd	3	1	Motor
Aviation Insurance Company Ltd	8	1	Non-Motor
Fedsure General Insurance Ltd	3	1	Motor
Fedsure Health General Insurance Ltd	2	1	Non-Motor
Ferrosure SA Insurance Co Ltd	9	1	Motor
Furnguard Insurance Company Ltd	4	1	Non-Motor
Investec Specialised Insurance Ltd	7	1	Motor
National Employers General Insurance Co Ltd	2	1	Motor

The number of registered short term insurers that did not survive a particular year is derived from the total number of companies that experienced a 'runoff' during the year as listed on the annual report and the number of registered motor insurers that had their licenses cancelled in that particular year. A 'runoff' is experienced when an insurance business or investment fund has stopped accepting new risks or has been closed to new business. In the annual reports 'runoffs' and dormant companies are summed up. To separate the companies that experienced a runoff from those that are dormant, we analyzed the following year's reports. The companies that would appear in the subsequent year's report would have been a dormant company in the previous year, but if the company does not appear in the next years report it would have experienced a run-off during the previous year. Companies that had their licenses withdrawn in the period of study had the same status as those which experience death.

The Kaplan-Meir survival model

The Kaplan-Meier method (Kaplan & Meier, 1958), also known as the product limit method is a non-parametric method used to estimate the probability of survival past given time points, meaning that it calculates survival distributions. The method also allows for comparisons of two or more groups that can be compared for equality. In this particular study we used the Kaplan-Meier method to understand the survival distribution based on time until death for registered short term insurance companies. The survival rates for non-motor and motor policyholders are

also compared for equality. The Kaplan-Meir survival function estimates survival rates and hazard rates from data that may be censored.

The survival rate is expressed as the survivor function S (t):

$$S(t) = \frac{\text{number of motor insurers surviving longer than time t}}{\text{total number of motor insurers studied}}$$

Where t is a time period known as the survival time, time to failure or time to event (such as a run off by a motor insurance company).

Estimating the survival function

We used the Kaplan-Meir non-parametric method to estimate and plot the survival distribution or the survival curve. Time is shown on the X-axis and survival probability is shown on the Y-axis. The survival distribution is derived from the statistical package SPSS.

Estimating the hazard function

At the heart of survival analysis in this study is also the hazard curve, which can be defined as the amount of risk of death of a registered motor insurer at any point in time. The hazard function (also known as the failure rate, hazard rate, or force of mortality) h (t) is the ratio of the probability density function P(t) to the survival function S(t), given by:

$$h(t) = \frac{P(t)}{S(t)}$$

3.4: HYPOTHESIS TESTING

It is widely stated in the insurance cycles that writing motor insurance business is riskier than focusing on non-motor insurance business. Are these statements true or they are just myths and misconceptions? We have to subject such statements to test to prove their correctness. We would like to test whether this belief is true/ or not.

The research tests two hypotheses:

Hypothesis 1: Comparing survival functions between two treatments

H_0: The survival of motor insurers is the same as the survival of non-motor insurers.

H_1: The survival of motor insurers is different from non-motor insurers

Hypothesis 2: Test for equality of means

H_0: There are equal chances of survival or of death for a motor insurer. The mean survival for motor insurers is the same as the mean survival rate for non-motor insurers.

H_1: The mean survival rates are different.

Log rank test and Wilcoxon test

The log rank test is used in this study to test the null hypothesis that there are no difference in survival functions of the motor insurer group and the non-motor insurer group. The test compares the entire survival experience between the two groups and can be thought of as a test of whether the survival curves are identical or not. Survival curves are estimated for the motor insurers and the non-motor insurers only group, considered separately. The log rank statistic is approximately distributed as a chi square test statistic. The log rank test is computed using the SPSS statistical package. The generalized Wilcoxon test is also used in this study to compare survival functions between the motor and non-motor groups. This is also a non-parametric test for comparing survival curves and it is an extension of the Wilcoxon rank sum test in the presence of censoring.

3.5: CONFIDENCE INTERVALL OF SURVIVAL MEAN

We tested the equality of means using the confidence intervals method. The confidence level sets the boundaries of a confidence interval; this is conventionally set at 95% to coincide with the 5% convention of statistical significance in hypothesis testing. The confidence interval is the range Q-X to Q+Y where Q is the value that is central to the study question, Q-X is the lower confidence limit and Q+Y is the upper confidence limit. A 95% CI is the interval that we are 95% certain that the true population value may be estimated from a much larger study.

3.6: TREND ANALYSIS OF THE UNDERWRITING PROFITS/LOSS

After looking at the survival data of short term motor insurers, we take particular interest at the companies that failed to survive within the particular period of study (1999-2013). We use the net underwriting profit/loss to check for any trends in underwriting profits/loss five years prior to death. Is lack of profitability a reason for death? The trend analysis may help us make some deductions that may be used in further studies.

3.7: CHAPTER SUMMARY

This chapter looked at how the survival data was derived from the annual report from the registrar. The research design includes the capturing the survival times of the registered motor and non-motor insurers. A thorough elaboration is made on how censored observations are dealt with using the Kaplan-Meir survival model. The use of the SPSS statistical package in estimating survival and hazard function is highlighted. We discussed the hypothetical tests performed in this study such as the comparisons of the motor and non-motor survival function and the test of

equality of means between the two treatments. This chapter concludes with an illustration of how the trend analysis of the net underwriting profits or losses of the insurers which experienced death during the period of study could indicate any special clues for further study.

CHAPTER FOUR

PRESENTATION OF RESULTS

4. 1: INTRODUCTION

This chapter presents the results after survival analysis examination of the insurance industry in South Africa. The survival analysis results for motor insurers are compared to non- motor insurers. This chapter tries to answer the question: what are the survival chances of a registered motor insurer? Are the survival chances for motor insurers significantly different from non-motor insurers? Is there any specific trend to both motor and non-motor insurers before they experience death? The two former questions are addressed by a thorough analysis of survival times of registered short term insures as from the 1 January 2000 to the 31 December 2013, a period spanning 14 years. The latter question is answered through a trend analysis of the underwriting profit/ loss of the motor insurers or non-motor insurers which experienced death. A five year trend analysis prior to death is performed.

4. 2: STATISTICS ON SURVIVAL DATA

From the data, collected from the reports published by the registrar of short term insurance, a total of 120 registered short term insurance companies are analyzed in this study. This is almost the entire population of registered short term insurers within the period of study. The start of date of observation survival is the 1st of January 2000 and the end date, the 31 Dec 2013. The complete dataset of the survival times is shown on Annexure 1.

Of the registered short term insurers, 92 of the companies are involved in motor insurance business and 28 of the companies are involved in strictly non-motor insurance business. Throughout this fourteen year period, 11 of the motor insurers and 6 of the non-motor insurers experienced ‘death’, meaning, they could not continue offering viable motor insurance. They either considered a ‘run-off’ or the license was terminated.81 motor insurers and 22 non-motor insurers survived throughout the period of study hence they have been censored as we do not know when the death event would happen in future. Table 4.1 summarizes these statistics.

TABLE 2: GENERAL STATISTICS				
			Censored Observations	
Type of Insurer	Total Number of Insurers	Number of Insurers Who did not Survive as from 1 Jan 2000 up to the 31 Dec 2013	Number of Insurers who survived during the Period of Study	Percent
Motor	92	11	81	88.0%
Non-Motor Insurer	28	6	22	78.6%
Overall	**120**	**17**	**103**	**85.8%**

Assumptions on survival data when using non-parametric survival models

The following assumptions were applied in order to fit the non-parametric tests.

- Censored insurers have the same prospect of survival as uncensored insurers.
- Survival prospects are the same for early as for late entrants into the study.
- The event studied (death of an insurer) happens at a specified time.

Survival functions for motor insurers and non motor insurers using the Kaplan-Meir non-parametric method.

The Kaplan–Meier method can be used to estimate the survival functions from the observed survival times without the assumption of an underlying probability distribution. In analyzing survival data, two functions that are dependent on time are of particular interest: the survival function and the hazard function. The survival function S (t) is defined as the probability of surviving at least to time t. The hazard function h(t) is the conditional probability of dying at time t having survived to that time. After fitting the survival data to the Kaplan-Meir non parametric model, the survival functions shown in Fig 1 results.

FIGURE 1: SURVIVAL FUNCTION FOR MOTOR AND NON-MOTOR INSURERS

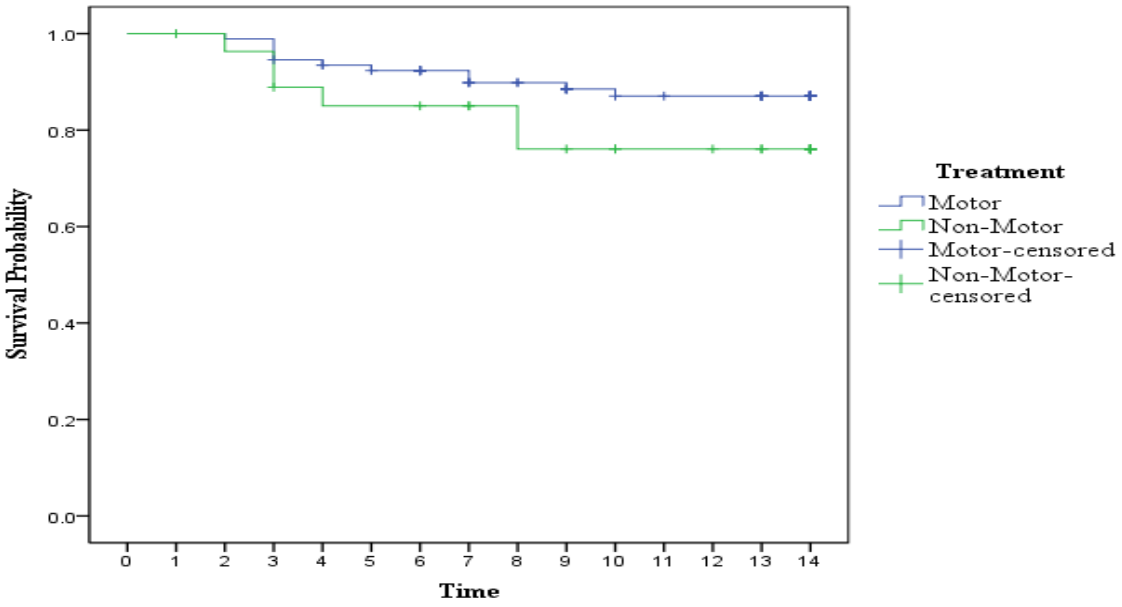


Figure 4.1 shows the survival function for motor and non-motor insurers. It can be stated that the survival function for the motor insurers appear to have a higher survival rate than the survival function of non-motor insurers. Does this imply that the survival function of motor insurers is significantly different from the non-motor survival function? Would we be statistically correct to make that assertion? We will hypothetically test this statement in section 4.3.

The survival function S (t) is defined as the probability of surviving at least to time t. We can illustrate that the probability of surviving at least to time 5 years by a motor insurer or a non motor insurer is 0.946 and 0.868 respectively. Other few examples of the survival chances are shown in Table 4.2. Annexure 2: Shows the complete survival table.

TABLE 3: SUMMARY OF SURVIVAL PROBABILITIES

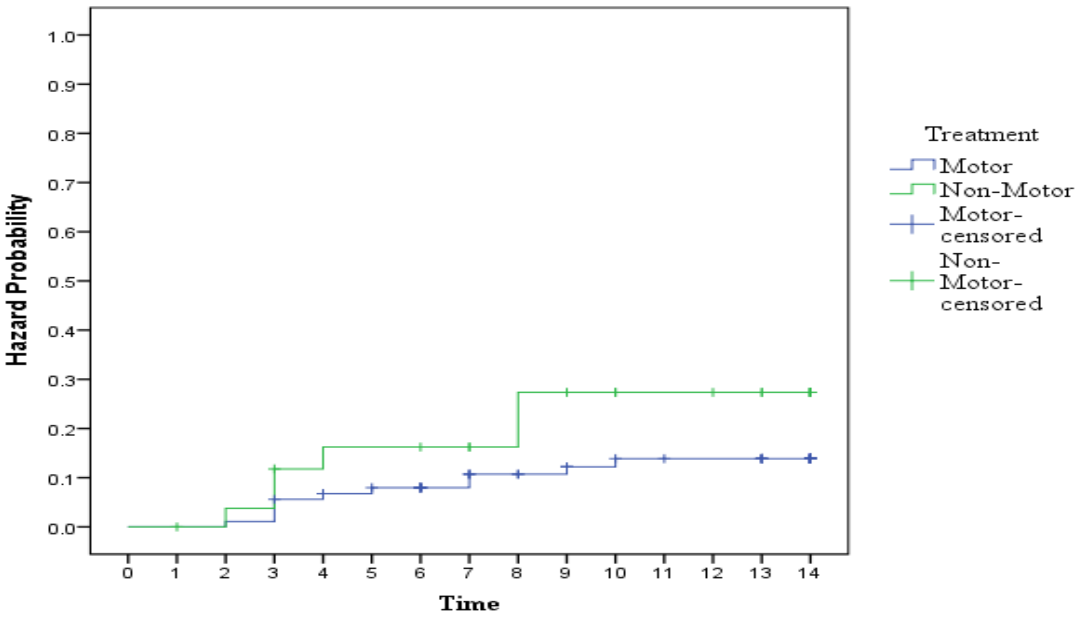
S(t)	**Motor**	**Non- Motor**
S (2)	0.989	0.963
S (5)	0.946	0.868
S(10)	0.871	0.761
S(14)	0.871	0.761

An interesting phenomenon is noted from Table 4.2. Survival chances decrease with time up to 10 years. Any year after 10 years, survival probabilities remain constant. This is an interesting phenomenon, which can be researched further, as to possible reasons why survival chances plateau after 10 years in operation?

Hazard functions for motor and non-motor insurers using the Kaplan-Meir non-parametric method

The hazard function h (t) is the conditional probability of dying at time t having survived to that time. There is a steady increase in the first 8 years for non-motor insurers and the rate plateaus after 8year. The hazard rate for motor insurers follows the same rate but at a lower level than that of non-motor insurers. The motor insurers' hazard rate remains constant after 10 years, another observable fact to be studied further. Fig 4.2 shows the hazard functions for the two treatments.

FIGURE 2: HAZARD FUNCTION FOR MOTOR AND NON MOTOR INSURERS



4.3 HYPOTHESIS TESTING

Are there any differences in the survival functions of the motor and non-motor groups? We compare by performing a hypothesis test:

Null and alternative hypothesis

H_0: The survival function of both the motor insurer is the same as the survival of non-motor insurers.

H_1: The survival function of motor insurers is different from non-motor insurers

The Log rank test tends to focus on what happens later in the time course. The Breslow test to focus on what happens in the earlier parts of the time course and the Tarone-Ware tend to focus on what happens in the middle of the time course. Table 4, shows the overall comparison of the above stated hypothesis.

TABLE 4: TESTING FOR EQUALITY OF SURVIVAL FUNCTIONS OF THE MOTOR AND NON-MOTOR INSURANCE GROUPS

	Chi-Square	df	Sig.
Log Rank (Mantel-Cox)	1.860	1	.173
Breslow (Generalized Wilcoxon)	1.904	1	.168
Tarone-Ware	1.892	1	.169

Testing at 5 % level of significance, we fail to reject the null hypothesis on all the three tests, as the P-Values for the Logrank, Breslow and Tarone-Ware tests are above 0.05. We conclude that the result is statistically non-significant. There is no evidence to suggest that the survival functions for motor and non-motor groups are significantly different.

Testing equality of means from the motor or non-motor group using the confidence intervals

We are interested in finding out if there are significant differences in the mean survival times between the motor and the non motor group. We would use the mean descriptive statistics in this case because the survival data fits a normal distribution.

Null and alternative hypothesis

H_0: The mean survival time for the motor group is the same as the mean survival time of non-motor group.

H_1: The mean survival time for the motor group is the different from the mean survival time of non-motor group.

TABLE 5: MEAN CONFIDENCE INTERVALS FOR THE MOTOR AND NON MOTOR INSURANCE GROUPS

	Mean			
			95% Confidence Interval	
Treatment	Estimate	Std. Error	Lower Bound	Upper Bound
Motor	12.880	.325	12.243	13.518
Non-Motor	11.817	.802	10.246	13.389
Overall	12.643	.312	12.031	13.256

After analyzing the confidence intervals for motor and non-motor insurers we note that there is an overlap on the lower bound of the motor confidence interval as it crosses into the upper bound of the non-motor group. This suggests that there is no evidence of significant differences in the mean survival times of the motor group and that of the non-motor group. Testing using a 95 % confidence interval, we fail to reject the null hypothesis and conclude that the mean survival times for the two groups are the same.

4.4: TREND ANALYSIS OF NET UNDERWRITING PROFIT

It is therefore prudent for us to analyze the trends for all the insurers who experienced deaths and notice if there are any special attributes that can be taken to note. We look at a period of five years prior to the insurer's death and record the net underwriting profit/loss results, five years prior to death. The results indicated in Table 5 and Table 6.

TABLE 6: TREND ANALYSIS OF MOTOR INSURERS WHO EXPERIENCED DEATH

	Company	Underwriting Profit/ Loss Results on Motor Business Five Years Prior to Death of the Insurer in '000s)				
		5 years	4 years	3 Years	2 years	1 year
Motor Insurers	African General Insurance Company Ltd	Dormant	Dormant	Dormant	Dormant	Dormant
	AIM Insurance Ltd	Dormant	Dormant	Dormant	Dormant	Dormant
	Fedsure General Insurance Ltd	-	-	-	40020	15884
	Ferrosure SA Insurance Co Ltd	1276	650	15071	1075	(49)
	Investec Specialized Insurance Ltd	-	0	0	Dormant	Dormant
	National Employers General Insurance Co Ltd	-	-	-	Dormant	Dormant
	Nedcor SA Insurance Co Ltd	1379	0	0	0	Dormant
	Pick n Pay Insurance Company Ltd	533	90	480	156	282
	Protea Insurance Co Ltd	-	-	18137	0	0
	RMB Specialized Lines	-	0	0	(641)	Dormant
	XL Winterthur Insurance Ltd	0	0	0	0	0

TABLE 7: TREND ANALYSIS ON NON-MOTOR INSURERS WHO EXPERIENCED DEATH

	Company	Underwriting Profit/ Loss Results on Non-Motor Insurers For a Period of Five Years Prior to Death of the Insurer in '000s)				
		5 years	4 years	3 Years	2 years	1 year
Non- Motor Insurers	AgriRisikoSpesialiste BPK	0	Dormant	Dormant	Dormant	Dormant
	Aviation Insurance Company Ltd	Dormant	Dormant	Dormant	Dormant	Dormant
	Fedsure Health General Insurance Ltd	-	0	(3467)	5921	840
	Furnguard Insurance Company Ltd	70157	(463)	82	966	(30)
	SANLAM Health Risk Management Ltd	(216 246)	63187	19572	33549	31889
	Southern Insurance Association Ltd	(2070)	(1579)	(20)	(273)	(12)

The main trend distinguished from the insurers both from the motor and non-motor insurance group who experienced death is that the insurers had been dormant in their activity. Dormancy is a rational reason that could lead to death of an insurer. Even when insurers are dormant, they are expenses incurred in maintaining the license. If these costs accumulate, this may lead an insurer considering a 'run-off'. Another probable reason for death of an insurer is the reductions and fluctuations in underwriting profits over time, as in the case Southern Insurance Association Ltd, Furnguard Insurance Company Ltd, Ferrosure, RMB specialized lines. It is quite startling that two insurers of health risks, experienced death, yet reporting favorable underwriting profits five years prior to death. The reason of a run-off may have been ascribed to wanting to switch the health risk to a more favorable license category such as licenses from the registrar of long term insurance or the medical schemes council. A follow up study on the impact of dormancy, underwriting losses and registration regime on the survival of insurers will be relevant and plausible.

4.5 CHAPTER SUMMARY

The chapter looks at the analysis of the recorded survival data. Survival and hazard functions were compiled. We tested hypothesis of equality of function and survival means. A trend analysis of the net underwriting profits concludes the chapter.

CHAPTER FIVE
CONCLUSION AND RECOMMENDATIONS

5.1: INTRODUCTION

The results enable us to make an inference which results in informed decisions.

5.2: DISCUSSION ON THE NEED OF THIS STUDY

What is the importance of this study? After going through the analysis of the survival data, we are able to give an opinion to someone who is considering to start an enterprise in either the non-motor and motor insurance short term insurance industry on his/her survival chances. We warn on the need to check out on dormancy and ensuring they score better underwriting profits whilst in operation.

5.3: RECOMMENDATIONS AND CONCLUSIONS

This work on survival analysis of motor and non-motor insurance companies was an illustration of well-known methods of survival analysis applied to the short term insurance industry in South Africa. Insurance brokerages can use this information when deciding if they want to grow and become registered insurance companies. This study helps in estimate their survival chances in this industry. In choosing which class of insurance to run, it can be affirmed that the registered insurer has the same survival chances in running either a motor insurance or non-motor insurance business. Any new player has a chance above 75% of surviving up to 10 years in either the motor or the non-motor insurance industry. However, it should be emphasized that probabilities and hazard rates are estimated based on historical data and market conditions that are changing at a rapid pace due to technology changes and other factors.

5.4 FURTHER RESEARCH

A number of issues were identified in this research which can be explored for further study. These issues include amongst them

- Comparisons of survival chances of short term insurance brokerages with registered short term insurance companies.
- Research on how dormancy, fluctuating underwriting results and reduction in underwriting profits have on the survival of motor and non- motor insurance business.
- The impact of compulsory motor insurance on survival of registered motor insurers.

- Comparison of the motor insurance industry of South Africa, with other countries that have compulsory motor insurance.

5.5 CHAPTER SUMMARY

This research has fulfilled its purpose of using literature and survival analysis methods to investigate the comparative survival functions for the motor and non-motor insurance companies in South Africa. Dormancy, underwriting losses and highly fluctuating underwriting performance has been noted as factors to guard against during the first ten year period of business.

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ANNEXURE 1: SURVIVAL DATASET

Name of Insurers	Time Duration to Event	Censor	Status
Absa Idirect Ltd	6	0	Motor
Absa Insurance Company Ltd	14	0	Motor
Absa Insurance Risk Management Services Ltd	9	0	Motor
Ace Insurance Ltd	14	0	Motor
AECI Captive Insurance Company Ltd	14	0	Motor
AEGIS Insurance Company Ltd	14	0	Motor
African General Insurance Company Ltd	5	1	Motor
AGRe Insurance Company Ltd	13	0	Motor
Agri Risiko Spesialiste BPK	3	1	Non-Motor
AIM Insurance Ltd	3	1	Motor
Alexander Forbes Insurance Company Ltd	14	0	Motor
Allianz Global Corporate and Specialty	14	0	Motor
Attorneys Insurance Indemnity Fund	14	0	Non-Motor
Aurora Insurance Company Ltd	7	0	Non-Motor
Auto & General Insurance Company Ltd	14	0	Motor
Aviation Insurance Company Ltd	8	1	Non-Motor
Bidvest insurance Ltd	14	0	Motor
British Engine Insurance Company of SA Ltd	1	0	Non-Motor
Budget Insurance	9	0	Motor
Centriq Insurance Company (RF) Ltd	14	0	Motor
CGU Insurance Ltd	14	0	Motor
Chartis South Africa Ltd	14	0	Motor
Clientele General Insurance Ltd	6	0	Motor
Coface S.A Insurance Company Ltd	10	0	Non-Motor
Compass Insurance Company Ltd	14	0	Motor
Constantia Insurance Company Ltd	14	0	Motor

Corporate Guarantee (SA) Ltd	10	0	Motor
Credit Guarantee Insurance Corporation of Africa Ltd	14	0	Non-Motor
Customer Protection Insurance Company Ltd	14	0	Motor
Densecure (Edms) Bpk	14	0	Motor
Dial Direct Insurance Ltd	13	0	Motor
Discovery Insure Ltd	4	0	Motor
Emerald insurance Company Ltd	14	0	Motor
Enpet Africa Insurance Ltd	14	0	Motor
Escap Ltd	14	0	Motor
Etana Insurance Company Ltd	6	0	Motor
Name of Insurers	**Time Duration to Event**	**Censor**	**Status**
Export Credit Insurance Cooporation of SA Ltd	13	0	Non-Motor
Exxaro Insurance Company Ltd	6	0	Motor
Fedsure General Insurance Ltd	3	1	Motor
Fedsure Health General Insurance Ltd	2	1	Non-Motor
Ferrosure SA Insurance Co Ltd	9	1	Motor
First Central Insurance Ltd	14	0	Motor
First for Women Insurance Company Ltd	4	0	Motor
Firstrand insurance Services Company Ltd	8	0	Motor
Furnguard Insurance Company Ltd	4	1	Non-Motor
G4S Insurance Ltd	14	0	Motor
Guardian National Insurance Company Ltd	14	0	Motor
Guardrisk Insurance Company Ltd	14	0	Motor
HDI Gerling Insurance SA Ltd	14	0	Motor
Hollard Insurance Company Ltd	14	0	Motor
Homeloan Guarantee Company	14	0	Non-Motor

IGF	14	0	Non-Motor
Indequity Specialised Insurance Ltd	13	0	Motor
Infiniti Insurance Ltd	7	0	Motor
Intermediaries Guarantee Facility Ltd	14	0	Non-Motor
Investec Specialised Insurance Ltd	7	1	Motor
JDG Micro Micro insurance Ltd	6	0	Non-Motor
Khula Credit Guarantee Limited	14	0	Non-Motor
King Price Company Ltd	3	0	Motor
KingFisher Insurance Company	14	0	Motor
Legal Expenses Insurance Company SA Ltd	10	0	Non-Motor
Lion of Africa Insurance Company Ltd	14	0	Motor
Lloyd's Underwritters	14	0	Motor
Lombard Insurance Company Ltd	14	0	Motor
M&F Risk	14	0	Motor
Miway Insurance Ltd	5	0	Motor
Momentum Alternative Insurance Ltd	12	0	Non-Motor
Momentum STI Company Ltd	8	0	Motor
Momentum Structured insurance Limited	14	0	Motor
Monarch Insurance Company Ltd	14	0	Non-Motor
MUA Insurance Company Ltd	13	0	Motor
Mutual and Federal Insurance Company Ltd	14	0	Motor
Mutual and Federal Risk Financing Ltd	14	0	Motor
National Employers General Insurance Co Ltd	2	1	Motor
Natsure Ltd	14	0	Motor
Name of Insurers	**Time Duration to Event**	**Censor**	**Status**
Nedcor SA Insurance Co Ltd	3	1	Motor
Nedgroup Insurance Company Ltd	14	0	Motor
New National Assurance Company Ltd	14	0	Motor

NMS Insurance Company SA Ltd	6	0	Motor
Nova Risk Partners Ltd	14	0	Motor
Oakhurst Insurance Company Ltd	6	0	Motor
Oakleaf Insurance Company Ltd	14	0	Motor
Old Mutual Health Insurance Ltd	14	0	Non-Motor
Orange Insurance Ltd	7	0	Motor
Outsurance Holdings Ltd	14	0	Motor
Pick n Pay Insurance Company Ltd	7	1	Motor
Pinnafrica Insurance Ltd	14	0	Motor
Protea Insurance Co Ltd	3	1	Motor
Rand Mutual Assurance Company Ltd	14	0	Non-Motor
Regent Insurance Company Ltd	14	0	Motor
Relyant Insurance Company Ltd	14	0	Motor
Renasa Insurance company Ltd	14	0	Motor
Resolution Insurance Company Ltd	9	0	Motor
RMB Specilised Lines	4	1	Motor
RMB Structured insurance Ltd	7	0	Motor
Sabsure Ltd	14	0	Motor
Safire Insurance Company Ltd	13	0	Motor
SAHL Insurance Company Ltd	7	0	Non-Motor
SANLAM Health Risk Management Ltd	3	1	Non-Motor
Santam BPK	14	0	Motor
SARB CIC	13	0	Motor
Sasguard Insurance Company Ltd	14	0	Motor
SASRIA Limited	14	0	Motor
Saxum Insurance Limited	11	0	Motor
Sentrasure Limited	14	0	Motor
Shoprite Insurance Company Limited	13	0	Non-Motor
Southern Insurance Association Ltd	8	1	Non-Motor
Standard Insurance Limited	14	0	Motor

Sunderland Marine Africa Ltd	9	0	Non-Motor
The FEMA Company Proprietary Ltd (RF)	14	0	Non-Motor
The Parktown Insurance Company Ltd	14	0	Motor
Truck& General Insurance Company Ltd	14	0	Motor
Unitrans Insurance Ltd	14	0	Motor
Vodacom Insurance Company	3	0	Non-Motor
Name of Insurers	**Time Duration to Event**	**Censor**	**Status**
Westchester Insurance Company Ltd	14	0	Motor
Western National Insurance Company Ltd	6	0	Motor
Workers Life Insurance Ltd	14	0	Non-Motor
XL Winterthur Insurance Ltd	10	1	Motor
Zurich Insurance Company SA Ltd	9	0	Motor
Zurich Risk Financing SA Ltd	9	0	Motor

ANNEXURE 2: SURVIVAL TABLE

Survival Table							
Treatment		Time	Status	Cumulative Proportion Surviving at the Time		N of Cumulative Events	N of Remaining Cases
				Estimate	Std. Error		
Motor	1	2.000	1	.989	.011	1	91
	2	3.000	1			2	90
	3	3.000	1			3	89
	4	3.000	1			4	88
	5	3.000	1	.946	.024	5	87
	6	3.000	0			5	86
	7	4.000	1	.935	.026	6	85
	8	4.000	0			6	84
	9	4.000	0			6	83

	10	5.000	1	.923	.028	7	82
	11	5.000	0			7	81
	12	6.000	0			7	80
	13	6.000	0			7	79
	14	6.000	0			7	78
	15	6.000	0			7	77
	16	6.000	0			7	76
	17	6.000	0			7	75
	18	6.000	0			7	74
	19	7.000	1			8	73
	20	7.000	1	.898	.032	9	72
	21	7.000	0			9	71
	22	7.000	0			9	70
	23	7.000	0			9	69
	24	8.000	0			9	68
	25	8.000	0			9	67
	26	9.000	1	.885	.034	10	66
	27	9.000	0			10	65
	28	9.000	0			10	64
	29	9.000	0			10	63
	30	9.000	0			10	62
	31	9.000	0			10	61
	32	10.000	1	.871	.037	11	60
	33	10.000	0			11	59
	34	11.000	0			11	58
	35	13.000	0			11	57
	36	13.000	0			11	56
	37	13.000	0			11	55
	38	13.000	0			11	54
	39	13.000	0			11	53

f	40	13.000	0			11	52
	41	14.000	0			11	51
	42	14.000	0			11	50
	43	14.000	0			11	49
	44	14.000	0			11	48
	45	14.000	0			11	47
	46	14.000	0			11	46
	47	14.000	0			11	45
	48	14.000	0			11	44
	49	14.000	0			11	43
	50	14.000	0			11	42
	51	14.000	0			11	41
	52	14.000	0			11	40
	53	14.000	0			11	39
	54	14.000	0			11	38
	55	14.000	0			11	37
	56	14.000	0			11	36
	57	14.000	0			11	35
	58	14.000	0			11	34
	59	14.000	0			11	33
	60	14.000	0			11	32
	61	14.000	0			11	31
	62	14.000	0			11	30
	63	14.000	0			11	29
	64	14.000	0			11	28
	65	14.000	0			11	27
	66	14.000	0			11	26
	67	14.000	0			11	25
	68	14.000	0			11	24
	69	14.000	0			11	23

	70	14.000	0			11	22
	71	14.000	0			11	21
	72	14.000	0			11	20
	73	14.000	0			11	19
	74	14.000	0			11	18
	75	14.000	0			11	17
	76	14.000	0			11	16
	77	14.000	0			11	15
	78	14.000	0			11	14
	79	14.000	0			11	13
	80	14.000	0			11	12
	81	14.000	0			11	11
	82	14.000	0			11	10
	83	14.000	0			11	9
	84	14.000	0			11	8
	85	14.000	0			11	7
	86	14.000	0			11	6
	87	14.000	0			11	5
	88	14.000	0			11	4
	89	14.000	0			11	3
	90	14.000	0			11	2
	91	14.000	0			11	1
	92	14.000	0			11	0
Non-Motor insurers	1	1.000	0			0	27
	2	2.000	1	.963	.036	1	26
	3	3.000	1			2	25
	4	3.000	1	.889	.060	3	24
	5	3.000	0			3	23
	6	4.000	1	.850	.069	4	22

	7	6.000	0			4	21
	8	7.000	0			4	20
	9	7.000	0			4	19
	10	8.000	1			5	18
	11	8.000	1	.761	.086	6	17
	12	9.000	0			6	16
	13	10.000	0			6	15
	14	10.000	0			6	14
	15	12.000	0			6	13
	16	13.000	0			6	12
	17	13.000	0			6	11
	18	14.000	0			6	10
	19	14.000	0			6	9
	20	14.000	0			6	8
	21	14.000	0			6	7
	22	14.000	0			6	6
	23	14.000	0			6	5
	24	14.000	0			6	4
	25	14.000	0			6	3
	26	14.000	0			6	2
	27	14.000	0			6	1
	28	14.000	0			6	0