

**UNIVERSITY OF GHANA
COLLEGE OF HUMANITIES**

**DETERMINANTS OF COMPREHENSIVE MOTOR INSURANCE
DEMAND: EVIDENCE FROM THE RECENT PREMIUM TARIFF
INCREASE IN GHANA**

SYLVIA BUERKI KUMAGA

DEPARTMENT OF FINANCE

JULY, 2016



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**BY
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**THIS THESIS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON
IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE
AWARD OF MPhil RISK MANAGEMENT & INSURANCE DEGREE**

DEPARTMENT OF FINANCE

JULY, 2016

DECLARATION

I do hereby declare that this thesis is the result of my own research and has not been presented by anyone for any academic award in this or any other University. All references used in this work have been accordingly acknowledged.

I bear sole responsibility for any shortcomings.

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.....
DATE

.....
DR. SAINT KUTTU
(SUPERVISOR)

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DATE

.....
DR. PATRICK O. ASUMING
(SUPERVISOR)

.....
DATE

DEDICATION

To

My husband, Mr. Delali Yao Kumaga,

To

My Mum, Mrs Elizabeth Naa Densua Tetteh

To

My three adorable children

Delassi, Michelle and Jeanelle

I love you all



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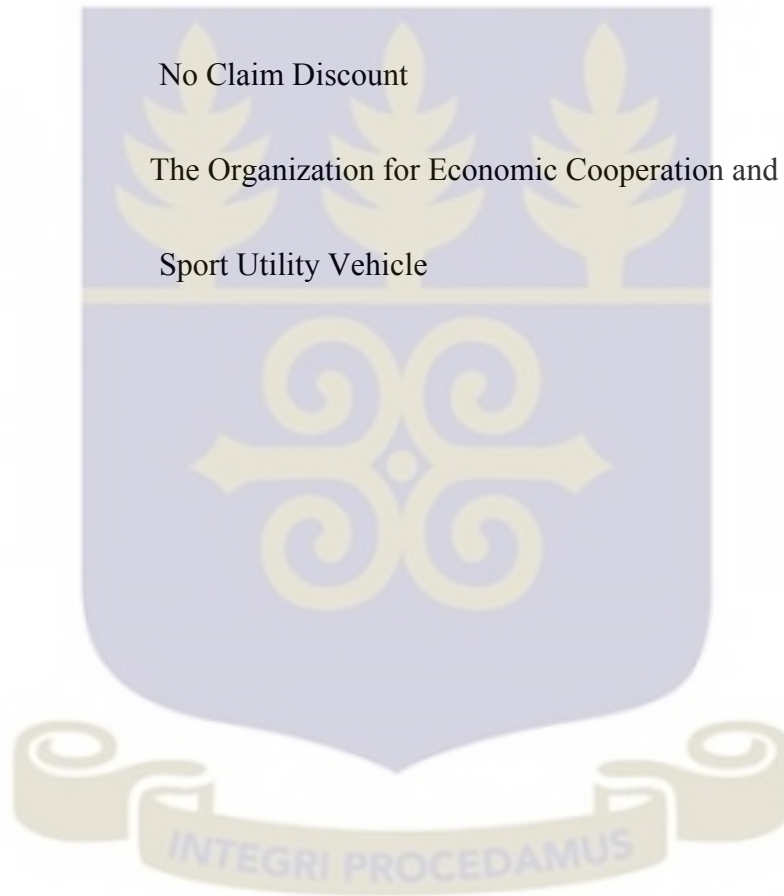
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LIST OF ABBREVIATIONS/ACRONYMS

DVLA	Driver and Vehicle Licensing Authority
GDP	Gross Domestic Product
LPM	Linear Probability Model
NCD	No Claim Discount
OECD	The Organization for Economic Cooperation and Development
SUV	Sport Utility Vehicle



ABSTRACT

The purpose of this paper is in two-folds: i) to identify the factors which influence the purchasing decision of Comprehensive motor insurance policy holders in Ghana and ii) to estimate the effects of a recent upward review of third party motor insurance premiums on the demand for Comprehensive motor insurance. Although motor insurance in Ghana is characterized by high frequency and severity of claims, research on it has received relatively less attention. The study uses individual-level administrative data on annual insurance purchase and renewal from Enterprise Insurance Company, the second largest insurance company in Ghana. A probit regression model was used to identify the probability of a motor owner purchasing a Comprehensive motor policy. The regression results show that the demand for Comprehensive motor insurance is significantly influenced by the premium levels, the vehicle's year of manufacture, the vehicle's make and type of ownership of the vehicle, the policy status (new or existing business) and the geographical location where the vehicle is used. Generally the new policy regime has had a significant effect on the demand for Comprehensive motor insurance. Probit results on policies issued six months before and after the new tariff implementation show that vehicles insured are 9.4 percentage points less likely to be Comprehensive after the policy implementation. The results show that after the new tariff implementation, the Comprehensive-Third-party mix of motor policy accounts has changed in favour of third party policies, thus most vehicles are being insured on third party basis although the percentage increase in Third-Party policies premium far outweighs the percentage increase in Comprehensive premiums. Policy makers did not expect a fall in Comprehensive insurance demand. These findings are contrary to the expectations of the industry players (firms and regulator) that the changes will make

Comprehensive Policies more attractive. Hence, policy-makers in the industry must should consider the potential unexpected consequences of future policy changes.

Key words: Insurance Demand, Motor Insurance, Comprehensive, Third Party, Premium Tariff, Enterprise Insurance, Ghana.



CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

In Ghana several insurance products are issued by insurance companies but only two policy types are mandatory. The Motor Vehicles (Third Party Insurance) Act, 1958 makes it an offence to use a motor vehicle on a public road without an insurance to cover its third party liabilities.

There are three motor insurance policies issued in Ghana. Namely third party, third party fire and theft, and Comprehensive motor insurance policies but the two main motor insurance policies largely purchased on the Ghanaian insurance market are the third party and Comprehensive motor policies.

The third party motor insurance policy covers the insured's liability arising from accidents whilst using the insured vehicle. Compensation for third party injury or death is unlimited, however, liability for third party property damage is limited to the amount stated on the policy schedule. Passengers' liability in the vehicle due to their negligence is mostly covered. In the event of the death of a third party, the legal personal representatives of the deceased are indemnified. Finally, the policy covers legal fees incurred by the insured with the insurer's consent for representation at a coroner's enquiry, fatal accident enquiry, the defense of proceedings in a law court and charges to defend proceedings for manslaughter, reckless or dangerous driving.

The Comprehensive motor insurance policy provides the benefits granted under the third party insurance cover and also protects the insured's own vehicle against the risk of fire (explosion and

lightning), flood, earthquake, malicious damage, theft or attempted theft and damage to the insured's vehicle in use by collision and overturning. Insurance companies focus more on selling Comprehensive motor insurance than third party policies because it generates a higher revenue.

The main difference in coverage is that under the Comprehensive motor insurance, the insured's vehicle is protected based on an insured value beyond which the insurance company is not liable.

Therefore a commensurate premium is charged for each vehicle's sum insured communicated.

The risk lies with compensation for injury claims and death of third parties which is unlimited and there is an equal third party liability exposure to every vehicle being it comprehensively insured or insured on a third party basis. Third party liability claims end up in the law courts with third parties awarded huge unanticipated damages for using a vehicle negligently and causing harm to a third party and this liability is completely borne by the insurance company. Meanwhile premiums paid under third party policies are low. The third party cover is therefore the minimum motor insurance cover every motorist must have on his or her vehicle and the Comprehensive cover which is optional provides a wider scope of cover. The third party insurance policy being the minimum cover has a lower premium compared to the Comprehensive insurance mainly due to the variations in benefit.

In computing a Comprehensive motor insurance premium, a third party premium component is charged. Thus the Comprehensive policy provides the third party benefits in addition to many other benefits granted to the insured's own vehicle. Therefore any increase or reduction in the third party motor tariff has impact on Comprehensive premiums as well.

1.2 Statement of the Problem

On the 1st of August, 2015, there was an over 300% increment in third party premiums in Ghana which resulted in a near 100% increase in Comprehensive insurance premiums. Some heads of insurance companies, explained to the Business and Financial Times in report of 8th June, 2015 (www.bftonline.com) that claim obligations of insurance companies had gone up and it was largely due to the poor performance of the macro economy as well as increases in fuel and utility tariffs. In 2010, when motor insurance premiums were last adjusted, the exchange rate was GHC1.47 to US\$1.00. However, as at 1st August 2015, the cedi was trading at GHC4.00 to US\$1.00. It was further explained that inflation in 2010 was 8.5% and had also increased to 16.8% while fuel prices also increased from GHC1.75 in 2010 to GHC3.30 in 2015.

The high rate of inflation resulted in an increase in the cost of spare parts, leading to a high total repair cost of vehicles, medical expenses as well as compensation for injuries. This implementation of the new policy led to a lot of stakeholder agitation especially from commercial vehicle owners and drivers. There were organized strike action and upheavals all over the country.

From Figures 1.1 and 1.2 below, it can be clearly observed that the premium increase had a significant effect on third party premiums relative to Comprehensive motor premiums. The average third party premium increased from GHC77.20 before the new tariff implementation to GHC278.70 after the implementation, thus a 261.01% increment on the average. Comprehensive motor premiums increased from GHC1, 336.60 to GHC2, 297.30, a 71.88% increase. Therefore the relative cost of third party motor policies increased.

It is further observed that the relative premiums of commercially used vehicles increased far more than the premiums for privately used vehicles. Private third party policy premiums on the

average increased from GHC69.30 prior to the new tariff implementation to GHC240.20 after the implementation, an increase of 246.61%. Meanwhile, premium for commercial third party policies increased from GHC92.50 to GHC371.80 after the implementation, an increase of 301.95% on the average. Furthermore, private Comprehensive premiums on the average increased from GHC1, 271.30 prior to the implementation to GHC1, 936.30 after it, hence an increase of 52.31%. Meanwhile, commercial Comprehensive policy premiums increased from GHC1, 741.80 to GHC5, 090.80 after the new tariff implementation, showing an increase of 192.27%.

Therefore for each insurance cover type, vehicles used for commercial reasons relatively experienced a higher increase in premium than privately used vehicles. Therefore in this study, we will focus on the effect of the various determinants of Comprehensive motor insurance on privately and commercially used vehicles.

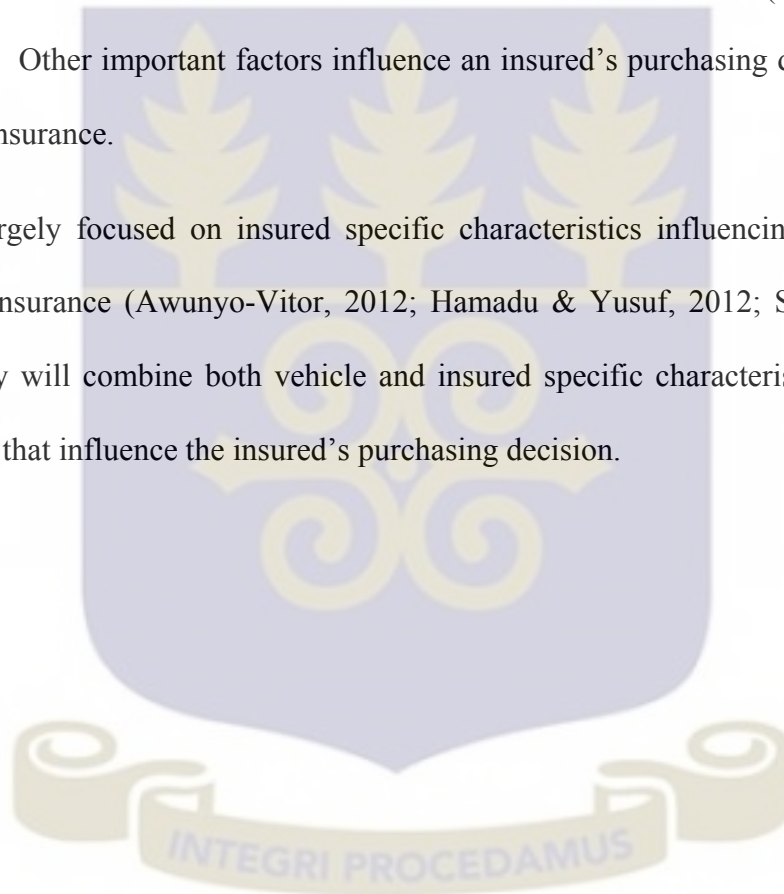
However, Ozioko (2007) posits that a market where pricing is tariff-driven without sufficient proof or statistics to back up the adequacy of premium is likely to suffer the fate of motor insurance pricing. According to Trieschmann, Hoyt, and Sommer (2005), insurance premium is described as the total cost of insurance, derived by multiplying the rate by the number of units covered. However, prior to an insurance company pricing its services, it must consider selecting the objective of pricing, determine the service's level of demand, estimate the cost, analyze its competitor's cost price and finally select a pricing method (Michael & Roberts, 1992).

Insurance pricing is based on adequacy, reasonableness, equity, technical profitability and loss prevention (Asokere & Nwankwo, 2010). A study by Ligon and Thistle (2007) further suggested that an increased volatility of insurance premium due to 'insurers' overconfidence may be a

contributing factor in insurance cycles and that changes in prices in reaction to information may be asymmetric.

There has been no study to identify the effect of the third party tariff increase on the demand of Comprehensive motor insurance. From economic theory, demand and prices are inversely related. Thus the higher the price, the lower the demand. Hence the premium of an insurance commodity is an essential determinant in the level of insurance demand (Swiss Reinsurance Company, 1993). Other important factors influence an insured's purchasing decision to take up Comprehensive insurance.

Literature has largely focused on insured specific characteristics influencing the demand for Comprehensive insurance (Awunyo-Vitor, 2012; Hamadu & Yusuf, 2012; Stith Jr. and Hoyt, 2012). This study will combine both vehicle and insured specific characteristics in examining important factors that influence the insured's purchasing decision.



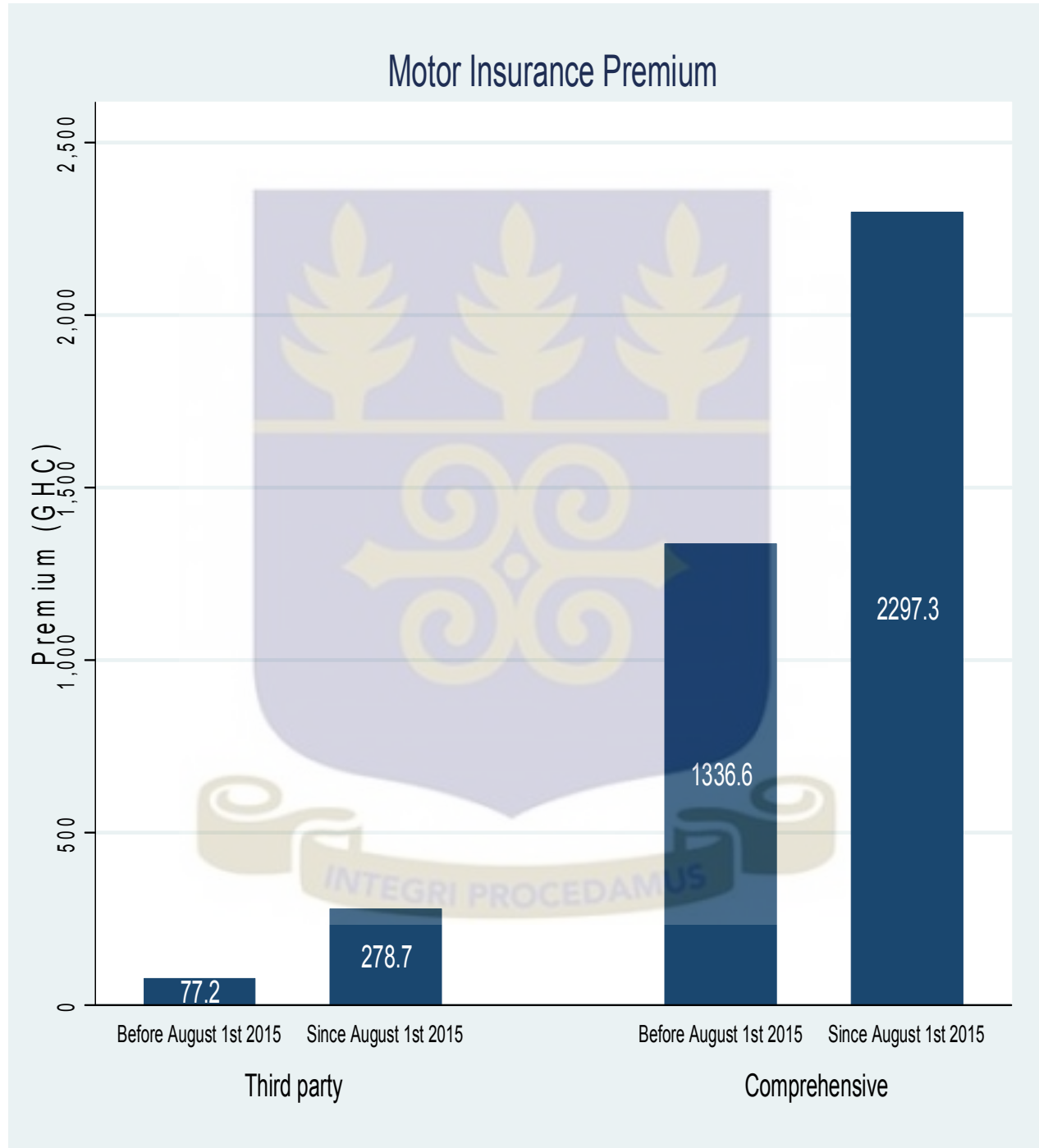


Figure 1.1: Average Premium by Policy Type, before and after 1st August, 2015

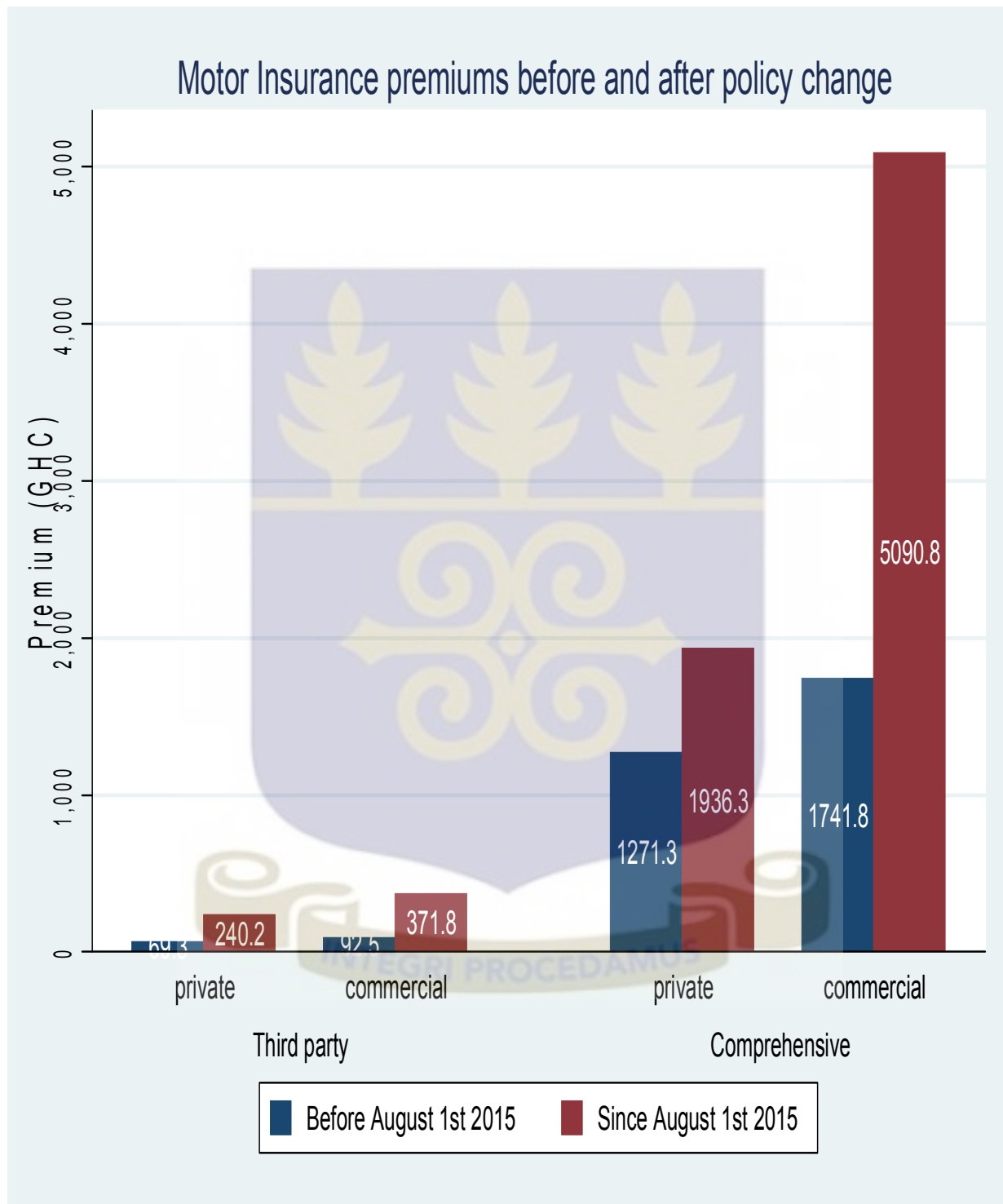


Figure 1.2: Average Premium by Vehicle Use and Policy Type before and after 1st August, 2015

1.3 Research Questions

The study addresses two key research questions on the determinants of Comprehensive insurance demand and the effects of third party tariff increment on the demand for Comprehensive motor insurance in Ghana. These are:

- i. What factors influence the demand for Comprehensive motor insurance in Ghana?
- ii. What are the effects of the third party premium increase on the demand for Comprehensive motor insurance?

1.4 Objectives of the Study

The main objective of this study is to use motor policy insurance data to determine the effects of an increase in motor third party insurance premium on the demand for Comprehensive motor insurance. Particularly, the study seeks to:

- i. To identify the determinants of demand for Comprehensive motor insurance and estimate the demand equation.
- ii. To identify the short-term effects of the tariff increment on demand for Comprehensive motor insurance.

1.5 Significance of the Study

The findings of this study provides an implication for policy on the demand for Comprehensive motor insurance in Ghana. Firstly, insurance companies and the regulator are the utmost beneficiaries for this study because it indicates how an increase in third party policy premiums

play a vital role in the demand for Comprehensive motor insurance and further serves as a guide for future policymaking in respect to motor insurance pricing in Ghana. Furthermore, the findings will help insurance companies understand the influence of various relevant Variables on the demand for Comprehensive motor insurance in Ghana. They will be able to initiate and implement useful policies and strategies that are geared towards the demand for Comprehensive motor insurance. Finally, the study contributes to the extremely limited literature on the demand for Comprehensive motor insurance in Ghana.

1.6 Scope of Study

The study exclusively concentrates on the determinants of Comprehensive motor insurance and the effect of an increase in the premium of third party motor insurance premium on the demand for Comprehensive motor insurance in Ghana. It uses data from Enterprise Insurance Company Limited, the second largest non-life insurance company in terms of its market share within the Ghanaian insurance industry.

1.7 Limitations of the Study

The study is limited to one insurance company in Ghana. It uses a five-year data, covering all new policies and annual renewals from 1st January 2011 to 31st January 2016 to determine the purchasing pattern of policyholders over a period of time and the effect of an increase in third party insurance premium on the demand for Comprehensive motor insurance. Further, the study does not employ all variables acknowledged by literature to determine Comprehensive insurance demand because not all the variables were available. These problems do not mean that the results

from the research would be of less importance for policy making and implementation. A longer period of data after the policy implementation will be ideal, the results should therefore be interpreted in view of the time frame used.

1.8 Organization of the Study

Subsequent parts of this study are organized as follows: Chapter two, considers the literature review mainly on the overview of the demand for insurance in developed countries, developing countries and in Ghana. Chapter three, discusses into detail the required methodology, comprising the source of data, the dependent and independent Variables and the Probit regression model. Chapter four, presents the results and discussions in line with the stated objectives. It further discusses its findings in relation to existing literature that conforms to or otherwise to theory and empirical evidence. Chapter five, summarizes the key findings of the study, makes policy recommendations, conclusions and highlight the gaps for future research.



CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The basic objective of this chapter is to present the theory and empirical literature on the determinants of insurance in developed and developing countries as well as the determinants of Comprehensive motor insurance in Ghana.

2.2 Risk Perception

Insurance purchase behavior at any point in time is a measure of what society views as risky at that particular point in time (Korstanje & George, 2015). In a study by Atkins and Bates (2008), the writers conclude that risk is a combination of the probability of a loss occurring and its outcome. Risk perception has a great influence on the demand for motor insurance and the demand for motor insurance depends largely on certain hazards which determines the valuation of motor risk. These perceptions can be financial, psychological, performance or time (Onafalujo, Abass, & Dansu, 2011). According to Brun (1992), risk perception is the process by which a person chooses, organizes and integrates stimuli into a meaningful coherent picture of the world.

2.3 State – Dependent Utility Theory

This theory suggests that the utility levels and tastes of consumers are influenced by their state such as their socio - economic state. Perceptions might have varying degrees of risk aversion which could have an impact on their insurance purchase decision and the extent of their expected insurance pay-off. Most people insure at the no loss state, at this state, an individual might expect to remain in this loss free - state in the near future which will impact on the choice of insurance policy to purchase. The decision the insured makes concerning the insurance coverage may be lower than the full loss coverage if the insurance pay – off anticipated is below the real loss in case of a loss event occurring. Therefore, given an individual’s current state and the magnitude of insurance pay-off in the event of a loss occurring will influence his demand for insurance (Phelps, 1973).

2.4 Prospect Utility Theory

This theory states that a consumer chooses based on his prospects of gains and losses and not based on the level of uncertainty as concluded by the expected utility theory. For every anticipated gain or loss, an individual assumes an optimal level of risk which may influence his choices. Applied to the insurance context, the theory suggests that people insure from a gain perspective and not because insurance reduces uncertainty. Thus an individual will first assess his risk level and a deviation from it before making an informed purchase decision. The prospect theory concludes that with respect to losses, individuals are risk preferring and customers will only insure if the losses will certainly occur and not because they are risk averse (Kahnemann & Tversky, 1979).

2.5 Determinants of Insurance in Developed Countries

The determinants of various types of insurances have been established in developed countries. Some of the main determinants of insurance in these countries include premium, income, ex post disaster relief by public and private organizations, population, inflation, education, number of dependents and race.

In their work to test whether different determinants factor into the purchase decision of flood insurance, Browne and Hoyt (2000) posit that flood insurance purchases are positively related to income and negatively related to price. Nyce (2007), found several factors that affect the demand for insurance, namely, insurance regulation, risk tolerance, financial status, real services rendered and tax incentives. According to Friedl, Lima de Miranda and Schmidt (2014), even when insurance premiums are subsidized, individual risks tend to be highly correlated. Many peers are therefore affected by a similar disaster. Therefore social comparison is an important factor influencing people's willingness to purchase insurance. However, Raschky and Weck-Hannermann (2007) further posits that one other rational reason for the low demand might be that people anticipate ex post disaster relief by public or private organizations.

In a study by Li, Moshirian, Nguyen, and Wee (2007) on the demand for life insurance in OECD countries, the study concludes that income and population positively related with life insurance consumption while income had a positive relationship with it. Dornbusch and Fischer (1978) also establish that income is a function of consumption and investment. An individual's consumption and human capital increase along with income, thus creating a higher demand for life insurance to safeguard the income potential of the customer and the expected consumption of his or her dependents. The study further confirms that demand for life insurance reduces during inflationary periods. According to Celik and Kayali (2009) on the determinants of the demand

for life insurance in thirty-one (31) European countries, income positively influence the consumption of life insurance. While most literature find a positive relationship between education and the demand for life insurance, Celik and Kayali (2009) further established a negative relationship and explain that as highly educated individuals critically analyze their consumption between 2000 and 2006, they decide not to consume life insurance. They also find that during periods of high inflation, there is a negative demand for life insurance as earlier established by (Li, Moshirian, Nguyen, & Wee, 2007). Finally, Celik and Kayali (2009) found population to be positively related with the demand for life insurance as earlier established by (Mantis & Farmer, 1968).

In a research work to analyze the determinants of life insurance demand in 68 economies, Beck and Webb (2003) find that countries with higher levels of economic and financial development, a more educated population, lower inflation and a short life expectancy have a higher demand for life insurance. On the study of health insurance, Monheit & Schur (1988) found that individuals who were younger, nonwhite, unemployed and had lower levels of education and income were highly likely to be uninsured than others. According to Swartz and McBride (1993), unemployment, limited education and income, increase the likelihood of remaining uninsured for longer periods. They further explain that being married and employed in the manufacturing sector reduced the likelihood of remaining uninsured for lengthy periods. A study on the profile of the uninsured in America, found affordability and employment related factors to be main reasons why individuals remain uninsured (Rowland, Lyons, Salganicoff, & Long, 1994).

A study by Garcia (2012) on the determinants of the property liability insurance market, found the level of GDP to be the only factor explaining the level of property liability insurance demand in Portugal.

According to Pynn and Living (1999), residents who had insured against flood explain that the snowfall, potential damage to the home, affordability of premiums, preserving home equity and the limited federal and state assistance. Uninsured residents on the contrary relied on the national weather service's conservative crest predictions, believe that dikes and flood control devices would provide them with adequate protection and also believe that their homes will not be damaged by floods. The study also found long term residents to be generally less likely to have flood insurance than those who had lived in the same residence for a shorter period, which could be explained by the fact that newer residents were more likely to have mortgages, with requirements from financiers to take up flood insurance policies. Households with children living within were found to slightly more likely to have insurance than those without children. Pynn and Living (1999) further found highly valued homes to be more likely to be insured than moderately or less values homes and also homes that have previous disaster experience are less likely to be insured.

According to Angel, Fraiss, and Hill (2005) serious gaps in the health care safety net affect poor Americans differently based on their state of residence, race ethnicity and household structure. The odds of being insured increases with the educational level of the caregiver. This finding is similar to a study by Carrasquillo, Carrasquillo, & Shea (2000) that investigates into the health insurance coverage among immigrants living in the United States.

2.6 Determinants of Motor Insurance in Developed Countries

Relatively few studies have focused on motor insurance in developed countries. Previous studies found income, location and education to be main determinants of motor insurance demand.

Stith Jr. and Hoyt (2012), analyzed the demand for auto insurance in areas that are underserved in California. The results of their study indicated that high poverty and areas predominately urban have lower demand for motor insurance. Thus, persons who reside in poor urban areas are less likely to demand for auto insurance.

Urbanization impacts negatively on the demand for automobile insurance because more people per capita live in these areas so accidents are more likely. According to Cummins and Tennyson (1996) automobile behavior is different in large metropolitan areas than in rural areas. A research work by Hoyt, Mustard, and Powell (2006), further found that the proportion of bodily injury claim frequency to property damage claim frequency was often much higher in urban areas, therefore higher premiums are charged in urban areas due to high claim costs. The higher premiums however results in a lower demand for insurance (Harrington & Niehaus, 1998).

According to Stith Jr. and Hoyt (2012) the value of their vehicles might not be worth enough to insure or people in these vicinities (undeserved areas in California) have easy access to public transportation and may not need automobile insurance because their vehicles are not driven much. These findings are consistent with findings from a research in Chicago by Harrington and Niehaus (1998).

In California as a whole, results indicated that the higher the income level, the lesser insurance is purchased in a particular area (Stith Jr. & Hoyt, 2012). This result confirms a few literature that argued that insurance is an inferior good. It is consistent with Browne and Hoyt (2000) on flood insurance demand in the United States of America.

On the contrary, consumers with higher incomes are more likely to have a better understanding of the relevance of purchasing insurance and how the insurance purchase can protect them and

their property. Furthermore, higher income consumers are more likely to have more wealth and also at a higher risk of lawsuit and will therefore perceive the value of having liability insurance (Harrington & Niehaus, 1998).

The high school variable was in positive correlation with insurance demand (Stith Jr. & Hoyt, 2012). This implies that the higher the level of education attained, the higher one's demand for insurance. This findings is consistent with a study on homeowners' policy conducted in Texas (Klein & Grace, 2001).

2.7 Determinants of Insurance in Developing Countries

There have been a couple of studies on the determinants of insurance in general in developing countries. These studies posit that peer influence, income, education, income and premium as major determinants of insurance demand.

A study that provides a preliminary empirical evidence in the property insuring behavior of Chinese companies by Zou (2003) found that the level of property insurance spending in Chinese companies has a negative relationship with the company's size and leverage. However, creditors have incentives to demand collateral assets to be insured to reduce lending risk (Smith & Stulz, 1985). Therefore the purchase of property insurance provides an important signal about the quality of the firm's future financial condition and assists to mitigate creditors concern about bankruptcy following a sudden loss (Grace & Rebello, 1993).

Secondly, the purchase of property insurance vary in relation to the geographical location and industry sectors Zou (2003). An environmental disaster, example earthquake in an economically developed coastal area of China, for instance, in Shanghai could have a devastating impact on

share prices of companies located there as well as insurance premiums. Sun, Hone, and Doucouliagos (1999) reported that the coastal areas of China have been more successful in attracting foreign capital than internal regions. The ownership of companies does not have important influences on the managerial property insurance decisions in the Chinese corporate sector (Zou, 2003).

A study on the perceptions of micro insurance in Southern Ghana by Giesbert and Steiner (2012) found that an individual's decision to purchase micro insurance was dependent on his or her peers' previous experience with insurance because about a fifth of households who bought the micro insurance under study reportedly did so on the advice of others. Similarly, a study by Xavier, Townsend and Vickery (2008) on patterns of rainfall insurance participation in rural India found that peers strongly influence each other in their insurance purchase decision.

A study on the determinants of the demand for life insurance in China by Gao (2003) found income to be statistically significant and positively correlated with life insurance consumption and did not find a statistically significant adverse relationship between inflation and life insurance consumption. Thus, Gao (2003) found no evidence that the life insurance industry suffered an adverse effect over the periods of high inflation in the country. Possibly due to the economic growth experienced by the China during the period of high inflation resulting in clients being less sensitive to the negative effect of inflation as it did not have any detrimental effect on people's standard of living. According to Gao (2003) the education and urbanization variable were both found to be statistically significant and positively related to life insurance consumption.

In Malaysia, Abu Bakar, Regupath, Alijunid, and Omar (2012) investigated into the factors affecting demand for individual health insurance and found that for a salaried worker, income

level, age, gender, race-religion, level of education, job sector and the individual's risk attitude all affected the decision to purchase insurance. However for a non-salaried worker, race-religion, level of education, marital status and out of pocket expenditures were major concerns in deciding to purchase insurance. The influence of price on the likelihood of insurance purchase was found to be significant for the salaried worker but not for the non-salaried worker.

2.8 Determinants of Motor Insurance in Developing Countries

In developing countries, a smaller number of studies have focused on motor insurance. A study by Hamadu and Yusuf (2012) sought to find the determinants for corporate and private buyers' decision in Nigeria. Gender, profession, ownership status of the insurance policy, reason for procurement of insurance contract and expectation of insurance service delivery were found to be statistically significant and key in determining predictors for commercial Comprehensive cover (corporate buyer). The automobiles were largely owned by males but the results found women to be significantly in favor of Comprehensive motor insurance.

An earlier study found that customers became disengaged from insurance purchase as a result of lack of trust which is largely due to the confusion around the role of insurers' representatives, as clients are mostly not sure of whether they are getting impartial or professional advice (Cummins & Doherty, 2006). Trust, commitment and customer satisfaction positively influence relationship outcomes but not in the same measures and have varying impacts at different stages (Beloucif, Donaldson, & Kazanci, 2004).

According to Hamadu and Yusuf (2012), most customers are swayed by the legal requirement of insurance products as between compulsory and non-compulsory which explains why most

insured are contented with satisfying the minimum policy coverage. The study also found that existing clients were more likely to purchase Comprehensive insurance, if they became satisfied with their existing relationship with the insurer.

Clients who found settling auto insurance premiums to be financially burdensome may as well have a negative perception of insurance institution and are likely to agree that exaggerating claims are acceptable (Tennyson, 1997). Hamadu and Yusuf (2012) also found marital status, having more than one policy and mode of access to the insurer were found to be statistically significant in private buyers purchasing decisions.

According to Farris, Bendle, Pfeifer, & Reibstein (2010), marketing concern is not just with any clients or all clients but those preselected by management as a market segment which the company will concentrate on. Therefore a specific client with a particular need becomes the focal point of an organization's marketing activity.

In Ghana, highly limited studies has been conducted on motor insurance. Awunyo-Vitor (2012) examined the various determinants of Comprehensive motor insurance Ghana, by collecting data from private vehicle owners, registering their vehicles at the Driver and Vehicle Licensing Authority (DVLA) regional office in Kumasi in the Ashanti region. His study showed that the purchasing decision to insure comprehensively is significantly and positively influenced by income of the insured, sum insured of the vehicle, year of manufacture of the vehicle, the perception of the insured about the premium payable and the claim procedure. The study however found the premium of Comprehensive motor insurance to negatively influence its demand. It further found that males are more likely to take up Comprehensive motor insurance and females.

This study will add onto the limited studies on motor insurance done in the developing economies. It will further contribute to literature by combining vehicle specific and insured specific characteristics in determining the demand for Comprehensive motor insurance.



CHAPTER THREE

METHODOLOGY OF THE STUDY

3.1 Introduction

This chapter discusses the data source, model and the econometric techniques employed to analyze the data for the study. It further discusses the dependent and independent Variables in details.

3.2 Data

The dataset employed in this study is the universe of all motor insurance policies issued by the second largest insurance company in Ghana in respect of its market share in the insurance industry, Enterprise Insurance Company Limited. The data covers all new policies and annual renewals from 1st January 2011 to 31st January 2016 from all branches of the company across the country. The data provides annual information on the motor insurance cover type, use of the vehicle, premium paid, each vehicle's year of manufacture, make and type, policy status, ownership as well as the geographical location where each vehicle is used.

From the data sourced from Enterprise Insurance, only 2% of the motor policies insured within the entire five year period are third party fire and theft policies. Hence, in the analysis, any policy cover higher than the third party cover, is assumed to be a Comprehensive policy. Third party fire and theft and Comprehensive motor insurance policies have therefore been lumped together.

Three different samples were created from this data. The first sample covers the entire population over the entire five year period (Sample 1). Sample 1 includes policy holders who have left the insurance company even before the policy changes took place. A subsample (Sample 2) is created that includes only policyholders who held policies with the company before the change that continued until after the policy change. The sample allows the study to analyze the changes in Comprehensive-Third Party mix among clients who have always been with the Company.

In 2014, the national insurance commission, introduced a new policy known as “no premium, no cover”. Analysis using Samples 1 and 2 could be reflect the joint effect of the two policy changes without the possibility of disentangling the effects. A third sample (Sample 3) is therefore created and restricted to only policies taken six months before and six months after the policy changes. The six months restriction is because the post policy data available is for only six months.

3.3 Econometric Model Specification

To address the two objectives set out at the beginning of the study, a Probit specified model is employed to find out the determinants of Comprehensive motor insurance demand and to examine the effect of an increase in third party premium on the demand for Comprehensive motor insurance. Both the logit and probit regression models were employed to run the data to find out the model that produces the best results. The results were similar for both models. Hence the study reported the probit model. The results of the Logit model are located in the appendix.

$$y_i = \begin{cases} 1 & \text{if } y_i^* \text{ is Comprehensive} \\ 0 & \text{if } y_i^* \text{ is Third party} \end{cases}$$

A model used for estimating when the outcome variable is dichotomous was suggested by Maddala (2005) and Asante Sefa & Sarpong (2011). The structure for such an analysis originates from the threshold theory of choice which occurs when an individual's strength of stimulus rises further than his response threshold (Hill & Kau, 1981). Hence an individual is faced with a decision to make his/her response verge influenced by several factors (Asante, Sefa, & Sarpong, 2011). The result is a dichotomous outcome variable, y_i which takes one for (Comprehensive insurance demand) and zero for (third party insurance demand).

Where, y_i^* is the threshold value for y_i and is assumed to be normally distributed. Common models for estimating such parameters include Linear Probability Model (LPM), probit (standard normal), and logit (logistic) (Maddala, 2005; Asante et al, 2011). LPM is deficient because the probability does not always lie between zero and one (Gujarati, 1995). The choice is between logit and probit. According to the report by Johnston & DiNardo (1997), the difference between logit and probit is rarely large to discriminate between them because both seem to produce similar result. In the case of this study both probit and logit was used but the results from logit was reported in the appendix.

The probit model adopted for the study is specified

$$P(y=1 | X = x_1, \dots, x_k) = \Phi(\beta_0 + \beta_1 \text{Own} + \beta_2 \text{Prem} + \beta_3 \text{Loc} + \beta_4 \text{VU} + \beta_5 \text{VM} + \beta_6 \text{YOM} + \beta_7 \text{VT} + \beta_8 \text{PS} + \beta_9 \text{NR})$$

Where Φ is the cumulative distribution function of the standard normal distribution and β_i 's, $i = 0, \dots, k$ are the parameters to be estimated.

Own refers to the ownership of the vehicle, *Prem* represents the premium paid, *Loc.* is for the geographical location where the vehicle is used, *VU* refers to the use of the vehicle *VM* is for the make of the vehicle, *YOM* represents the vehicle's year of manufacture, *VT* signifies the vehicle type, *PS* refers to the policy status, *NR* represents the new regime (New Regime =1; Old Regime = 0).

Below are detailed explanation of the various independent Variables specified in the baseline equation. The Variables include vehicle ownership, premium paid, location, vehicle usage, type and its year of manufacture, policy status and new regime. The Variables are discussed below.

3.3.1 Independent Variables: (how they were measured and the expected sign)

Vehicle Ownership

Vehicle ownership indicates whether the vehicle is owned by a company, jointly owned by a financier and an individual or a financier and a company, owned by a female or owned by a male. Most companies have high incentives to comprehensively insure their assets. By purchasing Comprehensive insurance, companies benefit from taxation. They also minimize the possibility of financial distress which intend improves companies access in the credit market and many other advantages. Companies are therefore likely to insure their vehicles comprehensively.

A bank or a financial institution grants a loan to purchase a vehicle and automatically becomes a joint owner with the loan beneficiary to its financier's interest. Until the loan is completely paid off with the necessary interest, the financier usually demands that the vehicle is comprehensively insured so that in the event of any unforeseen occurrence resulting in a partial or total damage of

the vehicle, the joint owners are compensated by the insurance company based on each other's financial interest. All other things being equal, vehicles jointly owned are likely to be comprehensively insured. Females are naturally less likely to take on more risk than males, therefore it is expected that women will seek to fully protect their assets to avoid future eventualities but in many African societies, males are deemed more financially endowed than females. Therefore more male car owners are more likely to purchase Comprehensive motor insurance than their female counterparts.

Premium Paid

Ceteris paribus, the higher the price of a policy, the lower its demand. It is therefore anticipated that premiums paid will have a negative relationship with the demand for Comprehensive motor insurance. Premium paid has been categorized into premiums below GHC201, premiums between GHC201 and GHC500, premiums between GHC501 and GHC1, 000, premiums between GHC1, 001 and GHC5, 000 and premiums greater than GHC5, 001. A further description of the categories are provided on Table 4.1.

Geographical Location

The geographical location where a vehicle is used could have a negative influence on the rate at which the vehicle wears down. Enterprise Insurance operates in five regions in Ghana. Namely Accra (Greater Accra Region), Takoradi (Western Region), Kumasi (Ashanti Region), Koforidua (Eastern Region) and Tamale (Northern Region). If the vehicle is driven in areas where the roads are not well maintained, vehicles could easily get damaged through accidents. On the contrary if

the vehicle is used in the urban centers where public transport is available and reliable, most persons will not drive their vehicles often and will not find the need to comprehensively insure them.

In urban centers where population is high there is bound to be heavy vehicular traffic and more road accidents occurring. Finally, if an insured resides in an area with high rates of crime occurring for instance vehicle theft, armed robbery, malicious damage etc., the insured will want to purchase insurance to Comprehensively cover all vehicles he uses in that vicinity. Therefore depending on the location, there demand for Comprehensive motor insurance could vary.

Vehicle Usage

A vehicle could be used for private purposes (domestic and social purposes) or commercial purposes (used for hire or reward purposes). The risk exposure for the two categories of use are completely different. A vehicle used privately is largely used for the insured's own benefit and not for the consumption of the general public. Therefore the rate at which it is driven around is minimal, the load it carries is usually light compared to a commercial vehicle and the number of drivers made to drive it are more limited.

The insurance companies are aware of the nature of the risk carried by the two categories of use and therefore rate them separately. Insurance for commercial vehicles are more expensive than privately used vehicles either comprehensively or third party insured. It is therefore expected that the demand for Comprehensive insurance will be high for privately used vehicles and low for commercially used vehicles.

Most executive members and directors of companies in Ghana drive or are driven in vehicles with a particular make. Prestige is accorded people who use vehicles with a particular type, especially sport utility vehicles (suv). We have categorized the type of vehicles into saloon, suv, pickup, van/bus, truck and others. It is expected that the demand for Comprehensive will be high among insured that use suv as compared to any other category.

Vehicle's Year of Manufacture

A vehicle's year of manufacture is expected to impact positively on the demand for Comprehensive motor insurance. As a vehicle grows older it becomes a disincentive for an insured to purchase Comprehensive insurance for it because its economic value as well as its performance is reduced.

Vehicle's Make

The make of a vehicle which is the identity or brand of the vehicle is influential on an insured's decision to purchase Comprehensive policy to cover it or otherwise. The make or brand of vehicle has a direct relationship with the value of the vehicle all other factors being held constant. The higher the value of a vehicle, the higher an insured's tendency to protect that vehicle and therefore his investment. It is further expected that to afford a high brand vehicle an individual's income should be high enough to purchase it due to its high value, therefore spending on Comprehensive insurance to protect the vehicle is expected. Therefore we expect that a vehicle's make will have a positive relationship with an insured's' decision to purchase Comprehensive insurance.

Policy Status

A motor insurance policy premium reduces with time if an insured drives the vehicle over a period without making a claim on his policy. No claim discount (NCD) or bonus is awarded the insured and the benefit is reflected in the premium paid the following year for driving the vehicle carefully.

For a privately used vehicle, there is a 0% NCD awarded an insured that signs onto either a Comprehensive or motor insurance policy for the first time with an insurer. If the insured makes no claim within the first year, the premium paid in the second year is reduced by 25%, without a claim in the second year, he is entitled to a 30% NCD in the third year. If the insured further makes no claim in the third year, his policy attracts a 35% NCD in the fourth year. Further still without a claim made in the fourth year, the insured merits a 45% NCD in the fifth year. If the insured makes no claim, in the fifth year and beyond, his policy maintains an NCD of 50%.

The experience for commercially insured vehicles are different in terms of the percentage discounts awarded after each policy year of driving the insured vehicle without making a claim. If an insured drives a vehicle for a year without making a claim, his policy attracts a no claim discount of 15% in the second year. Without a claim in the second year the NCD is increased to 20% in the third year. If the insured further makes no claim in the third year and beyond, his NCD on the policy remains 25%. As the name infers, it is a no claim discount.

Therefore if the insured is involved in an accident at any point in time or year and makes a claim on his policy, he either loses his accumulated NCD entirely or the NCD is reduced in the

following year. All things being equal, new policies are less likely to be insured comprehensively than renewal policies because of the reduction in renewal premiums due to the effect of the no claim discount.

New Regime

The new regime represents all transactions issued after the 1st August 2015 when the new third party premium tariff was implemented. The relative average premium of third party premiums increased by over 300% whilst the average premium for Comprehensive policies increased by almost 100%. We therefore anticipate that during the new regime, the demand for Comprehensive motor policies will increase relative to third party policies, all things being equal.

From Figure 1.1 and 2, third party premium relatively increased higher than Comprehensive motor policies. Average third party premium for all vehicles increased from GHC77.20 before the new tariff implementation to GHC278.70 after the implementation while it increased from GHC1,336.60 to GHC2,297.30 for Comprehensive policies.

Commercial motor premiums also increased far more than the premiums payable for private vehicles. Private third party policy premiums on the average increased from GHC69.30 prior to the new tariff implementation to GHC240.20 after the implementation while premium for commercial third party policies increased from GHC92.50 to GHC371.80 after the implementation. Private Comprehensive policies averagely increased from GHC1,271.30 prior to the implementation to GHC1,936.30 after it, while commercial Comprehensive policies increased from GHC1,741.80 to GHC5,090.80 after the new tariff implementation.

Therefore our regression analysis will focus on the effect of the various determinants of Comprehensive motor insurance on privately and commercially used vehicles.

We expect the new regime variable to have a negative relationship with the demand for Comprehensive motor insurance due to the fact that within the new regime, third party premiums increased by a higher percentage relative to Comprehensive insurance premiums.

3.4 Marginal effect of the Probit Model

To explain the estimated coefficients easily, the marginal effect was used. In the probit model, the marginal effects measures the discrete change in the probability of the dependent variable recording a success (Comprehensive insurance) as a result of a change in the binary independent variable changing from 0 to 1 (Williams, 2016). In order to get the marginal effect of a cumulative distribution (continuous distribution), the derivative is found. Which measures the change in the dependent variable when there is a very small (instantaneous) change in the explanatory variable. Given that the explanatory variable is a continuous variable (X_j) then the partial effect of the variable on the dependent variable is $\frac{\partial P(Y=1|X)}{\partial X_j} = \frac{\partial P(X)}{\partial X_j}$, when multiplied by ΔX_j , gives the approximate change in $P(Y = 1|X)$ when X_j increases by ΔX_j holding all the other Variables constant or fixed.

Provided that the independent variable is categorical, we measure the marginal effect with reference to the base or reference group. Example, if there are three levels to a categorical data, then it would mean two of such levels will enter into the equation with one being the reference group. Explanation is provided for the other levels in the equation on the reference group. Hence

the marginal effect will be a probability change in the dependent variable more (less) than the reference group provided the sign of the coefficient is positive (negative).



CHAPTER FOUR

ANALYSIS AND DISCUSSION OF RESULTS

4.1 Introduction

This chapter presents the results of the study and discusses its findings in line with the objectives outlined in chapter one. It starts with the descriptive statistics of the study. It further presents the findings of the study from the probit regression results presented on the tables 4.1, 4.2 and 4.3. The results of the logit model are located in the appendix.

4.2 Descriptive Statistics

The summary statistics of the Variables are presented in Table 4.1. It shows that majority (60%) of vehicles insured by the company are insured on third party basis. However, after the policy implementation in August 2015, there has been a slight reduction in the demand for third party policies. The table further shows that after the policy implementation, third party premiums has gone up by 261.01% whilst Comprehensive premiums has increased by 71.88% on the average. Among the variety of vehicles insured with the company, Toyota vehicles had a larger share (23%) in respect of vehicle make.

The descriptive statistics further show that 73.09% of motor policies insured by the company are insured in Accra, 16.92% in Kumasi, 1.68% in Koforidua, 6.94% in Takoradi and 1.36% on the average are insured with the Tamale branch. Over 50% of vehicles insured with Enterprise Insurance are saloon vehicles. On the average, 70% of all motor policies issued by Enterprise Insurance are renewal businesses. The summary of the descriptive statistics also show that

majority (50%) of the vehicles insured with the company are owned by males, 29% of the vehicles are owned by companies and on an average, 16.43% of all vehicles insured with the company are owned by females and 0.5% insured vehicles in terms of ownership are vehicles jointly owned by an individual and a financier or a company and a financier. Finally, over 75% of the vehicles insured with the company are used for private purposes



Table 4.1: Descriptive Statistics

Characteristics	Full sample	Before August 1 2015	After August 1 2015
Insurance Policy Type			
Third party	60.78%	60.90%	60.22%
Comprehensive	39.22%	39.10%	39.69%
Average premium (GHC)	566.02	480.10	943.98
Third party premium (GHC)	102.79	77.20	278.70
Comprehensive premium (GHC)	1,283.86	1,336.60	2,297.30
Vehicle Make			
Others	33.51%	33.54%	33.42%
Toyota	23.97%	23.86%	24.44%
Nissan	12.70%	12.74%	12.50%
Kia	10.15%	10.36%	9.22%
Hyundai	9.42%	9.18%	10.45%
Mercedes	5.56%	5.46%	5.97%
Opel	4.70%	4.86%	3.99%
Location			
Accra	73.09%	72.73%	74.66%
Kumasi	16.92%	17.08%	16.26%
Koforidua	1.68%	1.55%	2.26%
Takoradi	6.94%	7.29%	5.41%
Tamale	1.36%	1.35%	1.42%
Vehicle Type			
Saloon	56.67%	57.12%	55.51%
suv	20.48%	19.43%	23.25%
Pickup	11.08%	11.74%	9.36%
Bus/Van	10.47%	10.55%	10.25%
Others	1.29%	1.16%	1.64%
Type of business			
Renewal	70.19%	67.98%	79.92%
New Business	29.81%	32.02%	20.08%
Ownership Type			
Company	29.46%	29.28%	29.94%
Female	16.43%	18.16%	11.90%
Male	53.60%	52.04%	57.69%
Joint	0.51%	0.53%	0.47%
Vehicle use			
Private	78.34%	78.23%	78.83%
Commercial	21.66%	21.77%	21.17%
Year of Manufacture			
1909 - 1999	27.53%	29.20%	20.20%
2000 - 2003	22.56%	22.93%	20.95%
2004 - 2007	21.10%	20.81%	22.40%
2008 - 2011	19.28%	19.00%	20.51%
2012 - 2016	9.52%	8.06%	15.95%
Premium Paid (GHC)			
Less than 201	55.05%	62.97%	20.65%
201 and 500	15.47%	9.18%	42.83%
501 and 1,000	12.90%	12.99%	12.50%
1,001 and 5,000	15.30%	13.95%	21.14%
More than 5,000	1.28%	0.92%	2.84%

4.3 Regression Results

The regression results are presented on Tables 4.2, 4.3 and 4.4 below. All 3 tables report the marginal effects of the Probit regression estimating the determinants of motor insurance demand. Three different regressions have been ran to establish the purchasing pattern over varying periods and observe the variations that may occur due to the policy implementation. Table 4.2, reports on results for sample 1, transaction period of 5 years. Table 4.3, reports on results for sample 2, transaction period of 2 years and finally Table 4, reports on results for sample 3, transaction period of 1 year. The results are presented in three columns. For each table, column 1 reports results for the entire sample of policies issued to private and commercial vehicle users, column 2 reports results for policies issued to policyholders whose vehicles are used for only private purposes while column 3 shows results for motor policies issued to clients whose vehicles are solely used for commercial purposes for the various periods of transaction.

4.3.1. Effect of Tariff Revision on Demand for Comprehensive Insurance: Full Sample

Table 4.2 reports results for policies issued four and half years before the tariff revision and six months after the tariff revision. The coefficient on the new regime variable is negative and highly statistically significant. The estimated marginal effect is -0.138, which means that vehicles insured since the introduction of the new tariffs are 13.8 percentage points less likely to have Comprehensive insurance policy compared to the period before the policy change. However, private vehicles are 13.40 percentage points less likely to be insured on Comprehensive basis whilst commercial vehicles are 10.60 percentage points less likely to be insured as Comprehensive. Which implies private vehicles are far less likely to be insured as Comprehensive than commercial vehicles.

Table 4.2: Determinants of Comprehensive Motor Insurance (5 year period of transaction)

Variables	(1) All Marginal Effects	(2) Private Marginal Effects	(3) Commercial Marginal Effects
Before August 1 st 2015 (reference group)			
Since August 1st 2015	-0.138*** (0.001)	-0.134*** (0.001)	-0.106*** (0.003)
Premium Paid (GHC)			
Below 201 (reference group)			
201 and 500	0.623*** (0.004)	0.673*** (0.004)	0.391*** (0.013)
501 and 1000	0.900*** (0.002)	0.928*** (0.002)	0.749*** (0.010)
1001 and 5000	0.936*** (0.001)	0.934*** (0.002)	0.949*** (0.004)
More than 5000	0.938*** (0.002)	0.932*** (0.002)	0.961*** (0.004)
Year of Manufacture			
Before 2000 (reference group)			
2000-2003	0.002 (0.002)	-0.002 (0.002)	0.016*** (0.003)
2004-2007	0.019*** (0.002)	0.010*** (0.002)	0.024*** (0.004)
2008-2011	0.038*** (0.003)	0.024*** (0.003)	0.081*** (0.010)
2012-2016	0.072*** (0.005)	0.054*** (0.005)	0.117*** (0.013)
Ownership			
Company(reference group)			
Female	-0.059*** (0.003)	-0.060*** (0.003)	-0.049*** (0.004)
Male	-0.073*** (0.003)	-0.073*** (0.003)	-0.054*** (0.004)
Joint	-0.018 (0.013)	-0.003 (0.015)	-0.064*** (0.011)
Policy Status			
Renewal business (reference group)			
New business	-0.014*** (0.001)	-0.019*** (0.001)	0.013*** (0.002)
Vehicle Make			
Others (reference group)			
Toyota	0.003* (0.002)	0.004** (0.002)	0.008** (0.004)
Nissan	-0.004* (0.002)	0.000 (0.003)	0.006** (0.003)
Kia	-0.017*** (0.002)	-0.006** (0.003)	-0.005* (0.003)
Hyundai	0.011***	0.014***	0.012***

Table 4.2 continued			
	(1)	(2)	(3)
Variables	All	Private	Commercial
	Marginal Effects	Marginal Effects	Marginal Effects
	(0.003)	(0.003)	(0.003)
Mercedes Benz	-0.008*	-0.004	0.002
	(0.004)	(0.004)	(0.006)
Opel	-0.017***	-0.004	-0.007
	(0.004)	(0.005)	(0.005)
Vehicle Type			
Saloon (reference group)			
Suv	-0.012***	-0.018***	0.014
	(0.002)	(0.002)	(0.009)
Pickup	-0.034***	-0.041***	0.021***
	(0.002)	(0.002)	(0.006)
Bus/van	-0.071***	-0.053***	-0.026***
	(0.003)	(0.004)	(0.003)
Others	-0.076***	-0.051***	-0.029***
	(0.006)	(0.011)	(0.004)
Location			
Accra (reference group)			
Kumasi	-0.033***	-0.030***	-0.016***
	(0.002)	(0.002)	(0.002)
Koforidua	-0.043***	-0.032***	-0.017***
	(0.005)	(0.007)	(0.005)
Takoradi	-0.007**	-0.007**	-0.004
	(0.003)	(0.003)	(0.004)
Tamale	0.023***	0.019**	0.021**
	(0.007)	(0.007)	(0.011)
Observations	181,474	142,164	39,310
Joint Significance	20660.00	16014.48	2838.26
Log Likelihood	-25524.751	-21160.414	-3041.96
Pseudo R2	0.7900	0.7835	0.8435

Notes: The table reports marginal effects from a probit regression model. Each column presents results from a different regression. Column 1 reports results for the entire sample of policies issued to private and commercial vehicle users, column 2 reports results for policies issued to policyholders whose vehicles are used for only private purposes while column 3 shows results for motor policies issued to policyholders whose vehicles are solely used for commercial purposes. ***, ** and * denote statistical significance at 1%, 5% and 10% levels respectively.

4.3.2. Effect of Other Determinants on Demand for Comprehensive Insurance: Full Sample

The coefficient of the premium paid variable is positive and highly statistically significant in Table 4.2. The type of policy an insured selects impacts on the premium paid. For a particular vehicle, the insured pays a higher premium if it is comprehensively insured than when it is insured on third party basis.

Compared to premiums paid below GHC200, clients with premiums between GHC201 and GHC500 are 67.3 percentage points more likely to insure Comprehensive for their private vehicles and 39.1 percentage points more likely to insure their commercial vehicles Comprehensive. For premiums between GHC501 and GHC1000, private car owners are 92.8 percentage points more likely to take up Comprehensive insurance and 74.9 percentage points more likely to take up Comprehensive insurance for their commercial vehicles. Clients with premiums GHC1001 and GHC5000 are 93.4 percentage points more likely to insure Comprehensive for their private cars and 94.9 percentage points more likely to insure commercial vehicles Comprehensive. For vehicles with premiums beyond GHC5000, clients are 93.2 percentage points more likely to insure private vehicles Comprehensive and 96.1 percentage points more likely to insure commercial vehicles Comprehensive. With Comprehensive insurance, premiums are set based on the value of the vehicle. Vehicles with high premiums are usually high valued vehicles which insured's are fully interested in protecting from all forms of damages. It is therefore rational that these vehicles will generate high Comprehensive premiums which the owners are ready to accept.

Table 4.2 further shows that the vehicle's year of manufacture is a significant determinant of Comprehensive motor insurance and it is positively related to the demand for Comprehensive motor insurance, per this study. Vehicles used for commercial purposes have more statistic and

economic significance effect than privately used vehicles. The coefficients of the commercially used vehicles are higher than that of the privately used vehicles. This implies that it is more likely that newer commercial vehicles will be insured Comprehensive than newer private vehicles.

Compared to vehicles manufactured prior to the year 2000, vehicles manufactured between 2004 and 2007 are 1 percentage point more likely to be insured as Comprehensive if they are used as private and 2.4 percentage points more likely to be insured on Comprehensive basis if they are used as commercial vehicles. Private vehicles manufactured between 2008 and 2011 are 2.4 percentage points more likely to be insured as Comprehensive whilst commercial vehicles manufactured within the same period are 8.1 percentage points more likely to be insured as Comprehensive.

Finally private vehicles manufactured within the period 2012 and 2016 are 5.4 percentage points more likely to be insured on Comprehensive basis whilst commercial vehicles manufactured within the same period are 11.7 percentage points more likely to be insured on Comprehensive basis. This report confirms our prediction that the year of manufacture of a vehicle will relate positively with the demand for Comprehensive motor insurance. This is in line with the findings of (Awunyo-Vitor, 2012) who found that the age of a vehicle significantly influenced the demand for Comprehensive motor insurance by private car owners in Ghana.

Table 4.2. further shows that the coefficient of the ownership variable is negative and highly statistically significant relative to vehicles owned by males and females. Compared to vehicles owned by companies, the study shows a negative effect for vehicles owned by females, males and jointly owned by an individual and a financier or a company and a financier. It is also worth

noting that males and females are less likely to insure private vehicles on Comprehensive basis than commercial vehicles. Compared to vehicles owned by companies, females are 6 percentage points less likely to take up Comprehensive insurance for private vehicles and 4.9 percentage points less likely to insure commercial vehicles Comprehensive. Males are 7.3 percentage points less likely to insure their private vehicles Comprehensive and 5.4 percentage points less likely to insure commercial vehicles Comprehensive.

This result confirms the assertion that companies largely insure their vehicles Comprehensive and also the fact that females take less risk than males and therefore will usually protect their assets entirely than their male counterparts. Our findings on ownership of the vehicle agrees with the study by Hamadu and Yusuf (2012) in Nigeria, which found that females are significantly in favour of Comprehensive motor insurance than males. This study however contradicts the study by Awunyo-Vitor (2012) in Ghana, which found that more male car owners purchase Comprehensive motor insurance than females although the result was not statistically significant.

The coefficient of the policy status variable is negative and highly statistically significant. The estimated marginal effect is -0.014, which means that new vehicles insured with the company are 1.4 percentage points less likely to have Comprehensive insurance policy compared to existing policies. However new private vehicles are less likely to be insured on Comprehensive basis (1.9 percentage points) whilst new commercial vehicles are more likely to be insured as Comprehensive (1.3 percentage points).

Comparing the six most highly used vehicles insured with the company in terms of frequency, the coefficient of vehicles with Opel and Kia make is negative and highly significant whilst the coefficient of Hyundai is positive and highly statistically significant. The estimated marginal

effect is -0.017 for Opel and Kia make vehicles, which implies that Opel and Kia vehicles are 1.7 percentage points less likely to have Comprehensive insurance policy. The estimated marginal effect is 0.011 for vehicles with Hyundai make, which also implies that Hyundai vehicles are 1.1 percentage points more likely to be insured Comprehensive.

The coefficient of the vehicle type variable is negative and highly statistically significant. Compared to saloon type vehicles, it is worth noting that all other vehicle types are far less likely to be insured on Comprehensive basis. Relative to saloon type of vehicles, buses and vans are 5.3 percentage points less likely to be insured as Comprehensive when used as private and 2.6 percentage points less likely to be insured on Comprehensive basis when used as commercial and is highly significant at 1% level. Pickups are 4.1 percentage points less likely to be insured as Comprehensive when used as private but 2.1 percentage points more likely to be comprehensively insured when used as commercial and is also highly significant at 1% level.

Table 4.2 finally, shows that location has an impact on the policy being comprehensively insured or not. The coefficient on the location variable is both positive and negative as well as highly statistically significant. The negative impact is more pronounced on private vehicles than on commercial vehicles. Compared to policies insured in Accra, vehicles insured in Kumasi are 3 percentage points less likely to be insured on Comprehensive basis if the vehicle is used as private and 1.6 percentage points less likely to be insured Comprehensive if it is used on commercial basis.

Policies insured in Koforidua, are 3.2 percentage points less likely to be insured as Comprehensive when used as private and 1.7 percentage points less likely to be insured as Comprehensive when used commercial. Both are highly significant at a level of 1% in Table 4.2.

On the contrary, compared to policies issued in Accra, policies issued in Tamale are 1.9 percentage points more likely to be insured comprehensively if they are private vehicles and 2.1 percentage points more likely to be insured comprehensively in respect to commercial vehicles. Tamale is an area with a high record of conflicts, hence records a high rate of malicious damage and a lot of untoward acts leading to the damage of individual property, injury and death. It is therefore rational that persons living in such an area will want a full or Comprehensive cover for their properties.

4.3.3. Effect of Tariff Revision on Demand for Comprehensive Insurance: 2 years transaction period

Table 4.3 reports results for policies issued one and half years before the tariff revision and six months after the revision. The coefficient of the new regime variable is negative and highly statistically significant. The estimated marginal effect is -0.168, which means that vehicles insured since the introduction of the new tariff are 16.8 percentage points less likely to have Comprehensive insurance policy compared to the period before the policy change. Private vehicles are far less likely to be insured on Comprehensive basis (15.70 percentage points) than commercial vehicles (14.70 percentage points).

Although the new regime variable is still highly statistically significant, the negative impact of the tariff revision became more significant when the 2 year data sample was used than the full sample was employed.

Table 4.3: Determinants of Comprehensive Motor Insurance (2 years period of transaction)

Variables	(1) All Marginal Effects	(2) Private Marginal Effects	(3) Commercial Marginal Effects
Before August 1 st 2015 (reference group)			
Since August 1 st 2015	-0.168*** (0.003)	-0.157*** (0.003)	-0.147*** (0.014)
Premium Paid (GHC)			
Below 201 (reference group)			
201 and 500	0.486*** (0.007)	0.531*** (0.007)	0.275*** (0.019)
501 and 1000	0.861*** (0.004)	0.910*** (0.003)	0.577*** (0.020)
1001 and 5000	0.922*** (0.003)	0.920*** (0.003)	0.929*** (0.012)
more than 5000	0.925*** (0.003)		0.956*** (0.015)
Year of Manufacture			
Before 2000 (reference group)			
2000-2003	0.006 (0.004)	0.002 (0.005)	0.020*** (0.006)
2004-2007	0.032*** (0.005)	0.020*** (0.005)	0.035*** (0.010)
2008-2011	0.061*** (0.006)	0.043*** (0.006)	0.114*** (0.023)
2012-2016	0.090*** (0.009)	0.066*** (0.009)	0.170*** (0.028)
Ownership			
Company(reference group)			
Female	-0.065*** (0.005)	-0.064*** (0.006)	-0.061*** (0.010)
Male	-0.084*** (0.005)	-0.079*** (0.005)	-0.072*** (0.009)
Joint	-0.013 (0.025)	0.035 (0.030)	-0.113*** (0.011)
Policy Status			
Renewal business (reference group)			
New business	-0.005 (0.003)	-0.007** (0.003)	0.027*** (0.007)
Vehicle Make			

Others (reference group)			
Toyota	0.014***	0.016***	0.009
	(0.004)	(0.004)	(0.010)
Nissan	-0.003	0.004	0.003
	(0.005)	(0.005)	(0.008)
Kia	-0.013***	0.001	-0.013**
	(0.005)	(0.006)	(0.006)
Hyundai	0.015***	0.018***	0.009
Table 4.3 continued			
	(1)	(2)	(3)
Variables	All	Private	Commercial
	Marginal	Marginal	Marginal
	Effects	Effects	Effects
	(0.005)	(0.006)	(0.008)
Mercedes Benz	-0.005	0.011	-0.009
	(0.009)	(0.010)	(0.009)
Opel	-0.024***	-0.011	-0.019*
	(0.008)	(0.010)	(0.010)
Vehicle Type			
Saloon (reference group)			
Suv	-0.018***	-0.025***	-0.017
	(0.004)	(0.004)	(0.013)
Pickup	-0.052***	-0.061***	0.042***
	(0.004)	(0.004)	(0.014)
Bus/van	-0.105***	-0.071***	-0.035***
	(0.005)	(0.008)	(0.007)
Others	-0.114***	-0.113***	-0.043***
	(0.012)	(0.015)	(0.009)
Location			
Accra (reference group)			
Kumasi	-0.056***	-0.055***	-0.015***
	(0.004)	(0.004)	(0.005)
Koforidua	-0.049***	-0.037***	-0.008
	(0.008)	(0.012)	(0.011)
Takoradi	-0.007	-0.009	0.002
	(0.006)	(0.006)	(0.011)
Tamale	0.032**	0.031**	0.025
	(0.013)	(0.015)	(0.025)
Observations	66,356	54,429	11,426
Joint Significance	6874.81	4783.36	789.24
Log Likelihood	-11191.492	-9454.8262	-1057.03
Pseudo R2	0.7542	0.7492	0.8222

Notes: The table reports marginal effects from a probit regression model. Each column presents results from a different regression. Column 1 reports results for the entire sample of policies issued to private and commercial vehicle users, column 2 reports results for policies issued to policyholders whose vehicles are used for only private purposes while column 3 shows results for motor policies issued to policy holders whose vehicles are solely used for commercial purposes. ***, ** and * denote statistical significance at 1%, 5% and 10% levels respectively.

4.3.4. Effect of Other Determinants on Demand for Comprehensive Insurance: 2 years transaction period

The coefficient of the premium paid variable is positive and highly statistically significant in Table 4.3. This means that the higher the premium paid, the higher the likelihood that the insured signed on to a Comprehensive insurance policy.

Compared to Table 4.2 when the full sample was used, although the coefficients were positive and significant in the 2 year sample analysis, they have reduced in value. What it means is that within the same premium category, it is more likely for policy holders to insure their vehicles Comprehensive when the full sample is used than when the 2 year sample was employed.

Compared to premiums paid below GHC200, clients with premiums between GHC201 and GHC500 are 53.1 percentage points more likely to insure Comprehensive for their private vehicles and 27.5 percentage points more likely to insure their commercial vehicles Comprehensive. For premiums between GHC501 and GHC1000, private car owners are 91 percentage points more likely to take up Comprehensive insurance and 57.7 percentage points more likely to take up Comprehensive insurance for their commercial vehicles. Clients with premiums GHC1001 and GHC5000 are 92 percentage points more likely to insure Comprehensive for their private cars and 92.9 percentage points more likely to insure commercial vehicles Comprehensive.

Table 4.3 further shows that the vehicle's year of manufacture is a significant determinant of Comprehensive motor insurance and it is positively related to the demand for Comprehensive

motor insurance, when the 2 year sample was employed. The main difference in the two results is with the coefficients.

The coefficients are higher for the 2 year study period than the full sample analysis, indicating that newer vehicles are more likely to be insured Comprehensive.

The coefficients of the commercially used vehicles are higher than that of the privately used vehicles. Showing clearly that new commercial vehicles are more likely to be Comprehensive insured than new private vehicles. Compared to vehicles manufactured prior to the year 2000, vehicles manufactured between 2004 and 2007 are 2 percentage point more likely to be insured as Comprehensive if they are used as private and 3.5 percentage points more likely to be insured on Comprehensive basis if they are used as commercial vehicles.

Private vehicles manufactured between 2008 and 2011 are 4.3 percentage points more likely to be insured as Comprehensive whilst commercial vehicles manufactured within the same period are 11.4 percentage points more likely to be insured as Comprehensive. Finally, private vehicles manufactured within the period 2012 and 2016 are 6.6 percentage points more likely to be insured on Comprehensive basis whilst commercial vehicles manufactured within the same period are 17 percentage points more likely to be insured on Comprehensive basis.

Table 4.3 further shows that the coefficient on the ownership variable is negative statistically significant. Table 4.3 continue to show that males and females are less likely to insure private vehicles on Comprehensive basis than commercial vehicles.

However compared to Table 4.2, the negative impact on the demand for Comprehensive motor insurance has gone up in Table 4.3. Compared to vehicles owned by companies, females are 6.4

percentage points less likely to take up Comprehensive insurance for private vehicles and 6.1 percentage points less likely to insure commercial vehicles Comprehensive. Males are 7.9 percentage points less likely to insure their private vehicles Comprehensive and 7.2 percentage points less likely to insure commercial vehicles Comprehensive. It is further worth noting that females and males are still less likely to insure their vehicles used for private purpose comprehensively than their commercially used vehicles in Table 4.3

The coefficient on the policy status variable is still negative but statistically significant. Compared to the results when the full sample was employed, there is a reduction in the negative impact of demand for Comprehensive policies by new private vehicles and it is more likely that new commercial vehicles will be insured Comprehensive.

The estimated marginal effect is -0.005, which means that new vehicles insured with the company are 0.5 percentage points less likely to have Comprehensive insurance policy compared to existing policies. However, new private vehicles are less likely to be insured on Comprehensive basis (0.7 percentage points) whilst new commercial vehicles are more likely to be insured as Comprehensive (2.7 percentage points).

Comparing the six most highly used vehicles insured with the company in terms of frequency, the coefficients of vehicles with Opel and Kia make are negative and highly significant whilst the coefficients for Toyota and Hyundai are positive and highly statistically significant. The estimated marginal effects are -0.024 and -0.013 for Opel and Kia make vehicles respectively, which implies that Opel make vehicles are 2.4 percentage points less likely to have Comprehensive insurance policy and Kia make vehicles are 1.3 percentage points less likely to be insured as Comprehensive. The estimated marginal effects are 0.014 and 0.015 for vehicles with Toyota and Hyundai make. This implies that Toyota vehicles are 1.4 percentage points

more likely to be insured Comprehensive and Hyundai vehicles are 1.5 percentage points more likely to be insured on Comprehensive basis.

Which implies that when the full sample was used and when the 2 year sample was also used. The results show that clients with Toyota and Hyundai make vehicles are more likely to have Comprehensive insurance whilst on the contrary, clients with Kia and Opel vehicles are less likely to insure Comprehensive. New opel branded vehicles are no longer being imported into the country as much as other brands of vehicles. Hence, those currently in the country are old and therefore are more likely to be insured as third party.

The coefficient on the vehicle type variable is negative and highly statistically significant.

Compared to saloon type vehicles, it is once again worth noting that all other vehicle types are far less likely to be insured Comprehensive when used as private than as commercial. Relative to the results on the full data analysis, the negative impact of Comprehensive insurance demand for private vehicles is stronger for the 2 year data analysis. Meaning that considering vehicle types, private vehicles are far less likely to be insured as Comprehensive during the 2 year period than the entire 5 year period.

Compared to saloon type of vehicles, buses and vans are 7.1 percentage points less likely to be insured as Comprehensive when used as private and 3.5 percentage points less likely to be insured on Comprehensive basis when used as commercial and is highly significant at 1% level. Pickups are 6.1 percentage points less likely to be insured as Comprehensive when used as private but 4.2 percentage points more likely to be comprehensively insured when used as commercial and also highly significant at 1% level in Table 4.3

Table 4.3 finally shows that location has an impact on the policy being comprehensively insured or not. Compared to policies insured in Accra, vehicles insured in Kumasi are 5.5 percentage points less likely to be insured on Comprehensive basis if the vehicle is used as private and 1.5 percentage points less likely to be insured comprehensively if it is used on commercial basis at a highly significant level of 1%. Policies issued in Koforidua are 3.7 percentage points less likely to be insured under Comprehensive if it is a private vehicle and 0.8 percentage points less likely to be insured under Comprehensive insurance if it is a commercial vehicle. Compared to policies issued in Accra, policies issued in Tamale are 3.1 percentage points more likely to be insured comprehensively if they are private vehicles and 2.5 percentage points more likely to be insured comprehensively in respect to commercial vehicles.

The results for the location variable is less statistically significant but the results has higher coefficients when the 2 year sample data was employed than when the full sample was employed. This implies that the negative impact of the location on the demand for Comprehensive insurance is higher and the positive impact has also deepened when the 2 year sample was used than when the full sample was used.

4.3.5. Effect of Tariff Revision on Demand for Comprehensive Insurance: 1 year transaction period

Table 4.4 report results for policies issued six months before and six months after the tariff revision. The coefficient on the new regime variable remains negative and highly statistically significant. The estimated marginal effect is -0.094, which means that vehicles insured since the introduction of the new tariffs are 9.4 percentage points less likely to have Comprehensive insurance policy compared to the period before the policy change.

Compared to results for the full sample and 2 years period of transaction, commercial vehicles are 10.1 percentage points less likely to be insured on Comprehensive basis and private vehicles are 8.7 percentage points less likely to be insured as Comprehensive. This implies that compared with the full sample and the 2 year sample, commercial vehicles are far less likely to be insured as Comprehensive than private vehicles with the 1 year sample.



Table 4.4: Determinants of Comprehensive Motor Insurance (1 year period of transaction)

Variables	(1) All Marginal Effects	(2) Private Marginal Effects	(3) Commercial Marginal Effects
Before August 1 st 2015 (reference group)			
Since August 1 st 2015	-0.094*** (0.003)	-0.087*** (0.004)	-0.101*** (0.008)
Premium Paid (GHC)			
Below 201 (reference group)			
201 and 500	0.205*** (0.005)	0.232*** (0.006)	0.109*** (0.008)
501 and 1000	0.840*** (0.004)	0.939*** (0.003)	0.427*** (0.016)
1001 and 5000	0.954*** (0.002)	0.957*** (0.002)	0.929*** (0.012)
More than 5000	0.960*** (0.003)	0.954*** (0.005)	0.975*** (0.010)
Year of Manufacture			
Before 2000 (reference group)			
2000-2003	0.017*** (0.004)	0.008** (0.004)	0.034*** (0.005)
2004-2007	0.044*** (0.004)	0.026*** (0.004)	0.047*** (0.008)
2008-2011	0.064*** (0.005)	0.041*** (0.005)	0.079*** (0.014)
2012-2016	0.089*** (0.007)	0.065*** (0.007)	0.114*** (0.016)
Ownership			
Company(reference group)			
Female	-0.057*** (0.005)	-0.047*** (0.005)	-0.079*** (0.009)
Male	-0.084*** (0.004)	-0.070*** (0.005)	-0.090*** (0.008)
Joint	-0.038* (0.020)	0.005 (0.025)	-0.114*** (0.014)
Vehicle Make			
Others (reference group)			
Toyota	0.010*** (0.003)	0.011*** (0.003)	0.009 (0.007)
Nissan	-0.002 (0.004)	0.003 (0.005)	0.019*** (0.006)
Kia	-0.018*** (0.004)	-0.005 (0.005)	-0.013** (0.006)

Hyundai	0.008*	0.013**	0.009
	(0.005)	(0.005)	(0.007)
Mercedes Benz	-0.006	0.009	0.005
	(0.007)	(0.009)	(0.008)
Opel	-0.030***	-0.016**	-0.006
	(0.006)	(0.007)	(0.009)
Table 4.4 continued			
	(1)	(2)	(3)
Variables	All	Private	Commercial
	Marginal	Marginal	Marginal
	Effects	Effects	Effects
Policy Status			
Renewal business (reference group)			
New business	-0.016***	-0.022***	0.017***
	(0.003)	(0.003)	(0.005)
Vehicle Type			
Saloon (reference group)			
Suv	-0.020***	-0.030***	-0.001
	(0.003)	(0.003)	(0.015)
Pickup	-0.038***	-0.045***	0.044***
	(0.004)	(0.004)	(0.014)
Bus/van	-0.107***	-0.068***	-0.036***
	(0.004)	(0.006)	(0.005)
Others	-0.098***	-0.053***	-0.039***
	(0.008)	(0.015)	(0.008)
Location			
Accra (reference group)			
Kumasi	-0.040***	-0.031***	-0.026***
	(0.003)	(0.003)	(0.004)
Koforidua	-0.041***	-0.027***	-0.016*
	(0.006)	(0.009)	(0.009)
Takoradi	0.006	0.005	-0.000
	(0.006)	(0.006)	(0.011)
Tamale	0.047***	0.046***	0.003
	(0.012)	(0.013)	(0.021)
Observation	53,810	41,971	11,839
Joint Significance	10594.11	5969.11	1343.24
Log Likelihood	-10152.09	-8065.0688	-1404.6487
Pseudo R2	0.7137	0.7177	0.7556

Notes: The table reports marginal effects from a Probit regression model. Each column presents results from a different regression. Column 1 reports results for the entire sample of policies issued to private and commercial vehicle users, column 2 reports results for policies issued to policyholders whose vehicles are used for only private purposes while column 3 shows results for motor policies issued to policy holders whose vehicles are solely used for commercial purposes. ***, ** and * denote statistical significance at 1%, 5% and 10% levels respectively.

4.3.6. Effect of Other Determinants on Demand for Comprehensive Insurance: 1 year transaction period

The coefficient of the premium paid variable is positive and highly statistically significant in Table 4.4. This means that the higher the premium paid, the higher the likelihood that the insured signed on to a Comprehensive insurance policy.

Comparing Table 4.4 to results from Tables 4.2 and 4.3, the value of the coefficients have reduced significantly for premium bands 201 and 500 as well as 501 and 1000 for commercially used vehicles. This is due to the increment in the third party premium as a result of which the premium payable for third party policies have shifted from below GHC200 to below GHC500.

Compared to premiums paid below GHC200, clients with premiums between GHC201 and GHC500 are 23.2 percentage points more likely to insure Comprehensive for their private vehicles and 10.9 percentage points more likely to insure their commercial vehicles Comprehensive. For premium band between GHC501 and GHC1000, private car owners are 93.9 percentage points more likely to take up Comprehensive insurance and 42.7 percentage points more likely to take up Comprehensive insurance for their private and commercial vehicles respectively. Clients with premium bands GHC1001 and GHC5000 are 95.7 percentage points more likely to insure Comprehensive for their private cars and 92.9 percentage points more likely to insure commercial vehicles Comprehensive.

Table 4.4 further shows that the vehicle's year of manufacture is a highly significant determinant of Comprehensive motor insurance and it is positively related to the demand for Comprehensive motor insurance, when the full sample was employed.

Across all the three results reported in Tables 4.2, 4.3 and 4.4 the coefficients of the commercially used vehicles are higher than that of the privately used vehicles. This implies that it is more likely that newer commercial vehicles will be insured Comprehensive than newer private vehicles.

Compared to vehicles manufactured prior to the year 2000, vehicles manufactured between 2004 and 2007 are 2.6 percentage point more likely to be insured as Comprehensive if they are used as private and 4.7 percentage points more likely to be insured on Comprehensive basis if they are used as commercial vehicles. Private vehicles manufactured between 2008 and 2011 are 4.1 percentage points more likely to be insured as Comprehensive whilst commercial vehicles manufactured within the same period are 7.9 percentage points more likely to be insured as Comprehensive. Finally private vehicles manufactured within the period 2012 and 2016 are 6.5 percentage points more likely to be insured on Comprehensive basis whilst commercial vehicles manufactured within the same period are 11.4 percentage points more likely to be insured on Comprehensive basis.

Table 4.4 further shows that the coefficient on the ownership variable is negative and highly statistically significant relative to vehicles owned by males and females. Compared to vehicles owned by companies, the study shows a negative effect for vehicles owned by females, males and jointly owned by an individual and a financier or a company and a financier.

It is interesting to note that when the full sample and the 2 year sample were used, the results show that compared to company vehicles, males and females are far less likely to insure private vehicles Comprehensive. However with the 1 year sample, males and females are far less likely

to insure commercial vehicles Comprehensive than private vehicles. Tables 4.2, 4.3 and 4.4 all show that males are far less likely to insure their vehicles Comprehensive than females.

Compared to vehicles owned by companies, females are 4.7 percentage points less likely to take up Comprehensive insurance for private vehicles and 7.9 percentage points less likely to insure commercial vehicles Comprehensive. Males are 7.0 percentage points less likely to insure their private vehicles Comprehensive and 9.0 percentage points less likely to insure commercial vehicles Comprehensive.

The coefficient on the policy status variable is still negative and statistically significant. Compared to results from Tables 4.2, Table 4.3, the negative impact of the policy status variable is stronger in Table 4.4. It is worth noting that across results from all 3 regressions, the results show that it is less likely new private vehicles will be comprehensively insured but more likely that new commercial vehicles will be insured Comprehensive.

The estimated marginal effect is -0.016, which means that new vehicles are 1.6 percentage points less likely to have Comprehensive insurance policy compared to existing policies. However, new private vehicles are less likely to be insured on Comprehensive basis (2.2 percentage points) whilst new commercial vehicles are more likely to be insured as Comprehensive (1.7 percentage points).

Comparing the six most highly used vehicles insured with the company in terms of frequency to other vehicles insured with the company, the coefficients of Opel and Kia vehicles are negative and highly significant whilst the coefficient for Toyota and Hyundai vehicles remain positive and significant in all the 3 tables reporting the various results on the various samples.

The coefficient for Hyundai remain positive and statistically significant. The estimated marginal effects are -0.030 and -0.018 for Opel and Kia make vehicles respectively, which implies that Opel make vehicles are 3 percentage points less likely to have Comprehensive insurance policy and Kia make vehicles are 1.8 percentage points less likely to be insured as Comprehensive. The estimated marginal effects are 0.010 and 0.008 for vehicles with Toyota and Hyundai make. This implies that Toyota vehicles are 1 percentage point more likely to be insured Comprehensive and Hyundai vehicles are 0.8 percentage points more likely to be insured on Comprehensive basis.

The coefficient on the vehicle type variable is negative and highly statistically significant. Compared to saloon type vehicles, all other vehicle types are far less likely to be insured Comprehensive when used as private than as commercial in the results reported in Tables 4.2, 4.3 and 4.4.

Compared to saloon type of vehicles, buses and vans are 6.8 percentage points less likely to be insured as Comprehensive when used as private and 3.6 percentage points less likely to be insured on Comprehensive basis when used as commercial and is highly significant at 1% level. Pickups are 4.5 percentage points less likely to be insured as Comprehensive when used as private but 4.4 percentage points more likely to be comprehensively insured when used as commercial and also highly significant at 1% level in Table 4.4. It is worth noting that considering all vehicle types, it is only commercially used pickups that are more likely to be insured on Comprehensive basis compared to saloon type of vehicles.

Table 4.4 finally, shows that location has an impact on the policy being comprehensively insured or not. It can be observed considering all 3 tables reporting the various results that the demand

for Comprehensive motor insurance progressively increased for privately used vehicles in Tamale.

Compared to policies insured in Accra, vehicles insured in Kumasi are 3.1 percentage points less likely to be insured on Comprehensive basis if the vehicle is used as private and 2.6 percentage points less likely to be insured Comprehensive if it is used on commercial basis at a highly significant level of 1%. Policies issued in Koforidua are 2.7 percentage points less likely to be insured under Comprehensive if it is a private vehicle and 1.6 percentage points less likely to be insured under Comprehensive insurance if it is a commercial vehicle. Compared to policies issued in Accra, policies issued in Tamale are 4.6 percentage points more likely to be insured comprehensively if they are private vehicles and 0.3 percentage points more likely to be insured comprehensively in respect to commercial vehicles.

4.4 Discussion of Results

The study shows that the recent third party premium increase has negatively influenced the demand for Comprehensive insurance.

New businesses generally responded negatively to the demand for Comprehensive motor insurance but there is a greater likelihood that if the vehicle is used on commercial basis it will be insured Comprehensive than if it was for private use.

The year of manufacture of a vehicle had a positive and consistent relationship with the demand for Comprehensive insurance. This is due to the economic value and performance of newer vehicles. Awunyo-Vitor (2012) also posits that the demand for Comprehensive insurance is significantly and positively influenced by the vehicle's year of manufacture.

Depending on the type of insurance policy purchased, a commensurate premium is advised. Comprehensive insurance premiums are higher than third party premiums, due to the variation in benefits. Premiums paid related positively to the demand for Comprehensive policies because third party premiums are fixed for all types of motor vehicles. The main variation is with respect to the use of the vehicle, either commercial or private. There are however little add on depending on the number of the persons the vehicle carries. With Comprehensive policies however, the higher the value of the vehicle, the higher the premium. In effect the huge premiums are related to vehicles with high sums insured which indicate they are comprehensively insured.

Vehicles owned by females and males responded negative to the demand for Comprehensive insurance relative to company owned vehicles. However males are less likely to take up Comprehensive insurance for their vehicles than females. This must be due to the fact that females by nature take less risk and will therefore have their assets completely protected. Our findings on ownership of the vehicle agrees with the study by Hamadu and Yusuf (2012) in Nigeria, which found that females are significantly in favour of Comprehensive motor insurance than males. This study however contradicts the study by Awunyo-Vitor (2012) in Ghana.

The location of the insured either had a negative or positive influence on the insured's demand for Comprehensive motor insurance. The result was consistent across all 3 tables with the outcome that Tamale which experience a lot of conflict compared to the other locations and therefore characterized by negative activities such as malicious damage had a positive relation to the demand for Comprehensive insurance relative to motor policies issued in Accra. The type of vehicle generally responded negatively to the demand for Comprehensive motor insurance relative to saloon vehicles. However pickups used as commercial vehicles responded positive to Comprehensive demand.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter begins with the summary of key findings of the study based on the objectives of this study. The chapter further outlines the conclusions and recommendations of the study. The final part of this chapter suggests possible areas for future research.

5.2 Summary

In Ghana, the rate of motor accidents and the magnitude of claims paid are of a worry to the insurance industry, more especially due to the poor performance of the macro economy. The remedy was to increase third party motor insurance premiums which automatically led to an increase of premiums for Comprehensive motor insurance premiums as well. Premiums for commercial vehicles increased by over almost 400% for third party and over 250% for Comprehensive policies whilst premiums for private vehicles increased by a little over 300% for third party and less than 100% for Comprehensive. The public negatively accepted the news on the revision and therefore there were agitations and strike actions especially by commercial vehicle drivers.

The study reviewed relevant studies related to this study. The data for this study was sourced from Enterprise Insurance Company limited. It consists of daily motor transactions issued within the company for a five year period over all its branches in Ghana. The study employs the Probit

regression model to identify the determinants of Comprehensive motor insurance demand and to examine the effect of an increase in third party premium on the demand for Comprehensive motor insurance. We estimated a Probit model specified in chapter three, on the determinants of Comprehensive motor insurance demand which include vehicle ownership, premium paid, location, vehicle usage, type and its year of manufacture, policy status and new regime. Table 4.2, reports the results for the full sample (5 years transaction period). Table 4.3 reports on results for a two year sample (2 years transaction period). Table 4.4 reports on results for policies issued six months before and after the tariff revision. (1 year transaction period).

Based on the descriptive statistics, we find that less than 40% of the vehicles insured with the company are insured on Comprehensive basis. However, the third party-Comprehensive policy mix slightly changed in favour of Comprehensive policies after the new policy implementation. Over 70% of vehicles insured with the company are insured in Accra. This shows that the concentration of vehicles in the country are not evenly distributed. On the average, 70% of motor policies insured were new businesses and over a 50% of all motor vehicles insured were owned by males. Toyota is the most highly insured vehicle in the company, in terms of frequency (23.97%). Over 50% of all the vehicles insured with the company are of a saloon type.

From the regression results under the various periods of transaction, the most striking revelation is that the impact of the new policy implementation had a stronger negative impact on most of the Variables. We further find that the introduction of the new tariff reduced the demand for Comprehensive motor insurance. We also find that the policy has a stronger negative effect on privately used vehicles than commercially used vehicles.

The possible explanation is to the fact that although the relative increase in premium for third party policies outweighed Comprehensive policy premiums, the real premium for a

Comprehensive policy is still far more than a third party premium. Therefore the issue of affordability becomes a great hindrance to the increase in the demand for Comprehensive motor insurance as concluded in a study by (Rowland, Lyons, Salganicoff, & Long, 1994; Pynn & Living, 1999). This might also be due to the distinctive nature of an insurance service, the insured or insuring public being unaware of substitutes, the service being used in conjunction with assets previously purchased or the expenditure being a smaller part of the insured's total income as posited by (Nagle & Holden, 2002)

We also find the vehicle's year of manufacture, premium paid, location, vehicle make, vehicle ownership and policy status (new or existing business) to be important determinants of Comprehensive motor insurance demand in Ghana.

Our results further indicate that premium paid, year of manufacture is positively related to the demand for Comprehensive insurance. The new regime, ownership, policy status and vehicle type Variables negatively related to the demand for Comprehensive insurance.

5.3 Conclusion

The analysis suggests the increase in third party premium affected the demand for Comprehensive motor insurance. Although the relative premium for third party policies increased much more than Comprehensive policies, the latter remained more expensive and was further increased due to the third party component in the Comprehensive premium calculation.

After the policy implementation, fewer clients demanded Comprehensive insurance because although the relative increase in premium for third party policies outweighed Comprehensive

policy premiums, the real premium for a Comprehensive policy is still far more than a third party premium.

The vehicle's year of manufacture, premium paid, location, vehicle make, vehicle ownership and policy status (new or existing business) to be important determinants of Comprehensive motor insurance demand in Ghana.

Premium paid, year of manufacture is positively related to the demand for Comprehensive insurance. The new regime, ownership, policy status and vehicle type Variables negatively related to the demand for Comprehensive insurance.

5.4 Recommendations

In terms of policy making, insurance companies in Ghana might adopt the findings of this study and positively influence the demand for Comprehensive motor insurance policies.

Since it has been the interest and major concern of agents, brokers and insurance companies to perform well in terms of generating higher revenue, critical thinking and assessment must be done before important policies are implemented because per the findings of the study, the revision in third party premiums has negatively affected the demand for Comprehensive motor insurance which is a more desirable motor policy to the insurance industry.

Steps must be taken to close the third party Comprehensive premium gap to make the policy more attractive to potential and existing policy holders. Although the relative premium for third party increased much more than Comprehensive premium, considering the cedi amount due for Comprehensive went up by a wide margin. There must be sensitization and education on the

benefits of Comprehensive motor insurance throughout the country to serve as a reminder to those already aware of it as well as a lesson to the ignorant populace.

5.5 Future Research

Firstly, more analysis is needed on other factors that influence the demand for Comprehensive motor insurance. Therefore future researchers can try to combine survey data with an administrative data sourced from insurance companies to determine how all the determinants put together influence the demand for Comprehensive motor insurance. Secondly, it would be worthwhile to extend the current analysis of dealing with the second largest insurance company to conduct a similar analysis on three or more other insurance companies to add more impetus to the findings and to ascertain any changes that may occur due to the size of a company. Finally a longer period data after the tariff implementation will be ideal to add more impetus to the findings and to further observe any changes that may occur overtime.



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APPENDIX – TABLES (LOGIT)**Table 4.5: Determinants of Comprehensive Motor Insurance (5 year period of transaction)**

VARIABLES	(1) All Marginal Effects	(2) Private Marginal Effects	(3) Commercial Marginal Effects
Before August 1 st 2015 (reference group)			
Since August 1st 2015	-0.138*** (0.001)	-0.134*** (0.001)	-0.106*** (0.003)
Premium Paid (GHC)			
Below 201 (reference group)			
201 and 500	0.623*** (0.004)	0.673*** (0.004)	0.391*** (0.013)
501 and 1000	0.900*** (0.002)	0.928*** (0.002)	0.749*** (0.010)
1001 and 5000	0.936*** (0.001)	0.934*** (0.002)	0.949*** (0.004)
More than 5000	0.938*** (0.002)	0.932*** (0.002)	0.961*** (0.004)
Year of Manufacture			
Before 2000 (reference group)			
2000-2003	0.002 (0.002)	-0.002 (0.002)	0.016*** (0.003)
2004-2007	0.019*** (0.002)	0.010*** (0.002)	0.024*** (0.004)
2008-2011	0.038*** (0.003)	0.024*** (0.003)	0.081*** (0.010)
2012-2016	0.072*** (0.005)	0.054*** (0.005)	0.117*** (0.013)
Ownership			
Company(reference group)			
Female	-0.059*** (0.003)	-0.060*** (0.003)	-0.049*** (0.004)
Male	-0.073*** (0.003)	-0.073*** (0.003)	-0.054*** (0.004)
Joint	-0.018 (0.013)	-0.003 (0.015)	-0.064*** (0.011)
Policy Status			
Renewal business (reference group)			
New business	-0.014*** (0.001)	-0.019*** (0.001)	0.013*** (0.002)
Vehicle Make			
Others (reference group)			
Toyota	0.003* (0.002)	0.004** (0.002)	0.008** (0.004)

Table 4.5 continued			
	(1)	(2)	(3)
Variables	All	Private	Commercial
	Marginal Effects	Marginal Effects	Marginal Effects
Nissan	-0.004*	0.000	0.006**
	(0.002)	(0.003)	(0.003)
Kia	-0.017***	-0.006**	-0.005*
	(0.002)	(0.003)	(0.003)
Hyundai	0.011***	0.014***	0.012***
	(0.003)	(0.003)	(0.003)
Mercedes Benz	-0.008*	-0.004	0.002
	(0.004)	(0.004)	(0.006)
Opel	-0.017***	-0.004	-0.007
	(0.004)	(0.005)	(0.005)
Vehicle Type			
Saloon (reference group)			
Suv	-0.012***	-0.018***	0.014
	(0.002)	(0.002)	(0.009)
Pickup	-0.034***	-0.041***	0.021***
	(0.002)	(0.002)	(0.006)
Bus/van	-0.071***	-0.053***	-0.026***
	(0.003)	(0.004)	(0.003)
Others	-0.076***	-0.051***	-0.029***
	(0.006)	(0.011)	(0.004)
Location			
Accra (reference group)			
Kumasi	-0.033***	-0.030***	-0.016***
	(0.002)	(0.002)	(0.002)
Koforidua	-0.043***	-0.032***	-0.017***
	(0.005)	(0.007)	(0.005)
Takoradi	-0.007**	-0.007**	-0.004
	(0.003)	(0.003)	(0.004)
Tamale	0.023***	0.019**	0.021**
	(0.007)	(0.007)	(0.011)
Observations	181,474	142,164	39,310
Joint Significance	20660.00	16014.48	2838.26
Log Likelihood	-25524.751	-21160.414	-3041.96
Pseudo R2	0.7900	0.7835	0.8435

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

Table 4.6: Determinants of Comprehensive Motor Insurance (2 years period of transaction)

VARIABLES	(1) All Marginal Effects	(2) Private Marginal Effects	(3) Commercial Marginal Effects
Before August 1 st 2015 (reference group)			
Since August 1st 2015	-0.185*** (0.002)	-0.173*** (0.002)	-0.152*** (0.014)
Premium Paid (GHC)			
Below 201 (reference group)			
201 and 500	0.524*** (0.006)	0.568*** (0.006)	0.287*** (0.018)
501 and 1000	0.871*** (0.004)	0.919*** (0.003)	0.604*** (0.020)
1001 and 5000	0.931*** (0.003)	0.928*** (0.003)	0.942*** (0.010)
More than 5000	0.934*** (0.003)		0.964*** (0.013)
Year of Manufacture			
Before 2000 (reference group)			
2000-2003	0.004 (0.004)	0.000 (0.004)	0.019*** (0.006)
2004-2007	0.026*** (0.004)	0.015*** (0.004)	0.031*** (0.009)
2008-2011	0.052*** (0.005)	0.036*** (0.005)	0.108*** (0.021)
2012-2016	0.074*** (0.008)	0.053*** (0.008)	0.149*** (0.026)
Ownership			
Company(reference group)			
Female	-0.058*** (0.005)	-0.058*** (0.005)	-0.054*** (0.009)
Male	-0.075*** (0.004)	-0.072*** (0.005)	-0.064*** (0.008)
Joint	-0.015 (0.025)	0.034 (0.029)	-0.104*** (0.009)
Policy Status			
Renewal business (reference group)			
New business	-0.002 (0.003)	-0.004 (0.003)	0.025*** (0.007)
Vehicle Make			
Others (reference group)			
Toyota	0.012*** (0.003)	0.014*** (0.004)	0.010 (0.008)
Nissan	-0.002 (0.004)	0.003 (0.005)	0.007 (0.008)
Kia	-0.011***	0.001	-0.011*

Table 4.6 continued			
	(1)	(2)	(3)
Variables	All	Private	Commercial
	Marginal Effects	Marginal Effects	Marginal Effects
	(0.004)	(0.005)	(0.006)
Hyundai	0.014***	0.017***	0.009
	(0.005)	(0.005)	(0.007)
Mercedes Benz	-0.008	0.007	-0.007
	(0.007)	(0.008)	(0.009)
Opel	-0.022***	-0.009	-0.022**
	(0.008)	(0.009)	(0.009)
Vehicle Type			
Saloon (reference group)			
Suv	-0.016***	-0.021***	-0.020
	(0.003)	(0.003)	(0.013)
Pickup	-0.044***	-0.052***	0.039***
	(0.004)	(0.004)	(0.014)
Bus/van	-0.102***	-0.062***	-0.037***
	(0.005)	(0.007)	(0.007)
Others	-0.111***	-0.110***	-0.044***
	(0.014)	(0.022)	(0.009)
Location			
Accra (reference group)			
Kumasi	-0.049***	-0.049***	-0.013***
	(0.003)	(0.004)	(0.005)
Koforidua	-0.042***	-0.033***	-0.008
	(0.007)	(0.010)	(0.010)
Takoradi	-0.008*	-0.010*	-0.001
	(0.005)	(0.005)	(0.010)
Tamale	0.030**	0.028**	0.028
	(0.013)	(0.014)	(0.023)
Observations	66,356	54,429	11,426
Joint Significance	5904.86	4143.07	703.89
Log Likelihood	-10693.296	-9065.7369	-1019.4337
Pseudo R2	0.7651	0.7595	0.8286

Standard errors in parentheses

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

Table 4.7: Determinants of Comprehensive Motor Insurance (1 year period of transaction)

VARIABLES	(1) All Marginal Effects	(2) Private Marginal Effects	(3) Commercial Marginal Effects
Before August 1 st 2015 (reference group)			
Since August 1st 2015	-0.106*** (0.004)	-0.102*** (0.004)	-0.102*** (0.007)
Premium Paid (GHC)			
Below 201 (reference group)			
201 and 500	0.219*** (0.005)	0.250*** (0.006)	0.111*** (0.007)
501 and 1000	0.847*** (0.004)	0.945*** (0.003)	0.442*** (0.017)
1001 and 5000	0.962*** (0.002)	0.962*** (0.002)	0.942*** (0.011)
More than 5000	0.966*** (0.002)	0.961*** (0.003)	0.982*** (0.008)
Year of Manufacture			
Before 2000 (reference group)			
2000-2003	0.017*** (0.003)	0.008** (0.004)	0.033*** (0.005)
2004-2007	0.042*** (0.004)	0.024*** (0.004)	0.042*** (0.007)
2008-2011	0.061*** (0.004)	0.037*** (0.005)	0.078*** (0.013)
2012-2016	0.082*** (0.006)	0.058*** (0.007)	0.106*** (0.015)
Ownership			
Company(reference group)			
Female	-0.052*** (0.004)	-0.045*** (0.005)	-0.070*** (0.009)
Male	-0.078*** (0.004)	-0.068*** (0.004)	-0.082*** (0.007)
Joint	-0.033 (0.021)	0.010 (0.024)	-0.106*** (0.013)
Vehicle Make			
Others (reference group)			
Toyota	0.009*** (0.003)	0.010*** (0.003)	0.010 (0.007)
Nissan	-0.003 (0.004)	0.002 (0.004)	0.021*** (0.007)
Kia	-0.018*** (0.004)	-0.003 (0.005)	-0.013** (0.006)
Hyundai	0.007* (0.004)	0.014*** (0.005)	0.009 (0.006)
Mercedes Benz	-0.009 (0.007)	0.006 (0.008)	0.004 (0.008)
Opel	-0.031***	-0.016**	-0.008

Table 4.7 continued			
	(1)	(2)	(3)
Variables	All	Private	Commercial
	Marginal Effects	Marginal Effects	Marginal Effects
	(0.006)	(0.007)	(0.009)
Policy Status			
Renewal business (reference group)			
New business	-0.016*** (0.003)	-0.021*** (0.003)	0.016*** (0.005)
Vehicle Type			
Saloon (reference group)			
Suv	-0.021*** (0.003)	-0.030*** (0.003)	-0.001 (0.014)
Pickup	-0.036*** (0.003)	-0.044*** (0.004)	0.039*** (0.013)
bus/van	-0.112*** (0.004)	-0.066*** (0.005)	-0.039*** (0.006)
others	-0.098*** (0.010)	-0.047*** (0.012)	-0.041*** (0.008)
Location			
Accra (reference group)			
Kumasi	-0.036*** (0.003)	-0.029*** (0.003)	-0.025*** (0.004)
Koforidua	-0.039*** (0.006)	-0.029*** (0.008)	-0.015** (0.008)
Takoradi	0.004 (0.005)	0.003 (0.006)	-0.004 (0.011)
Tamale	0.047*** (0.012)	0.046*** (0.013)	0.003 (0.020)
Observations	53,810	41,971	11,839
Joint Significance	8625.49	4508.33	1332.32
Log Likelihood	-9988.64	-7985.0024	-1379.3334
Pseudo R2	0.7183	0.7205	0.7600

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1