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**ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES**

**DETERMINANTS OF LIFE INSURANCE DEMAND
IN ETHIOPIA**

BY ROMAN GEBREYES

JUNE, 2011

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BY ROMAN GEBREYES GEBEREMEDHIN

**A PROJECT PAPER SUBMITTED TO THE SCHOOL OF
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(APPLIED TRADE POLICY)**

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ROMAN GEBREYES

APPROVED BY

SIGNITURE

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ACRONYMS

CSA	Central Statistics Agency
CPI	Consumer Price Index
M2	Broad Money
OECD	Organization for Economic Co-operation and Development
OLS	Ordinary Least Square
UNCTAD	United Nations Conference on Trade and Development

ABSTRACT:

The Ethiopian insurance industry is experiencing encouraging growth since its inception in 1905; however, there is still low level insurance penetration equal to 0.2 % of GDP. The paper tries to explore the determinants of life insurance demand in Ethiopia using a time series data over the period of 1980-2009 within an error correction model. The co-integration test revealed financial development (FD) and inflation are significant variables both in the long run and short run dynamic regression with their positive and negative sign respectively. A change in income has a positively correlated in the short run, while the long run regression shows that current income is inversely related to demand for life insurance. The current price of insurance, a change in real interest rate (RIR) and gross domestic saving per-capita(GDS) have significant but inversely related to demand for life insurance in Ethiopia. The error correction term is significant at 1 percent with a feedback effect of about 63 percent. The explanatory power of the independent variables is also strong at about 98 percent. The Durbin Watson statistics of 1.93 indicates the presence of very little form of auto-correlation.

Declaration

I undersigned, declare that this project work is my original work and has not been presented, in part or whole, in any other university or college. All sources of the material used for this project work have been duly acknowledge

Name Roman Gebreyes Gebremedhin

Signature _____

Advisor Tekie Alemu(Ph.D)

Signature _____

CHAPTER ONE

1. Introduction

Life is full of uncertainties. Unexpected events can lower people's well-being and an important mechanism that protects against risk is purchasing insurance to guarantee the benefit in the event of certain loss. Rosen,(1995).

Life insurance is a contract between a policy owner and the insurer, where the insurer agrees to pay a designated sum of money upon the occurrence of the policy owner's disability due to accident or aging, death or other events, and the policy owner agrees to pay a fixed amount to the insurer at designated interval. While the main objective of insurance companies is to mitigate insurable risks, in tandem they also play an important role in development of the financial sector. They mobilize savings which can be challenged for long term investments which help economic growth and development.

The risk spreading character of insurance has drawn attention to the fact that insurers would like to spread risks in two directions namely, the over- time and between person(s) and organization(s) at the point in time. While most insurance business is concerned with spreading risk across individual entities at the point in time, life insurance is mainly an overtime risk spreading mechanism. (Carter, 1979).

Life insurance products are important vehicle that encourage long-term savings that could be channeled to investment in both private and public sector projects. Because life insurance products offer a means of disciplined contractual saving, they have become

effective as instrument for encouraging substantial amounts of savings, competing with other forms of saving (like bank deposits, securities, and other contractual savings) in the market in many countries around the world. (Beck and Webb 2002).

Financial sector development including the insurance sector in developing countries, especially in Africa is at its infancy. The financial system has not been serving the countries' development needs adequately. The past thirty years these countries have directed considerable efforts to changing the structure of these financial systems and controlling their operations in order to channel savings to investments, as these are crucial components of development programs. (UNCTAD 1984,1988).

Modern insurance activity in Ethiopia started in 1905, where the Bank of Abyssinia was operating as an agent to a foreign insurance company and began underwriting fire and marine insurance policy. In 1923 the first insurance company was established in Addis Ababa by a company called La.Balois. This was followed by other foreign insurance companies that posted their agents in Addis Ababa. During the Italian invasion the activity was undertaken by their companies, and immediately after the end of the invasion insurance companies from Europe continued to run the business.

In 1970, a proclamation was promulgated in order to license and regulate insurance businesses. It empowered the Ministry of Commerce and Industry to regulate the activity. While 15 local insurance companies were licensed pursuant to proclamation two of them discontinued their business and at the eve of the 1974 Ethiopian revolution there were 13 such companies.

One of the first companies that were affected by the revolution was the financial institutions. Consequently, proclamation No.26/197 nationalized the existing 13 insurance companies and a provisional insurance board was formed to supervise the companies. Later on the nationalized companies were merged to form what has come to be known as the Ethiopian Insurance Corporation. (EIC Annual bulletin 4th edition).

Before liberalization the command economy including political instability had been the stumbling block for the growth of the financial sector in Ethiopia, and is still undergoing significant structural changes with the re-introduction of a market economy. The 1990's ushered in economic liberalization that led to the revival of private sector participation in the financial sector. This has led to the formation of a number of private insurance companies. As a result by 2008th there were 12 insurance companies¹ in the country (CSA, 2008/09). Although we observe a strong growth and revival of the private sector since liberalization in the 1990s, the state-owned insurance company, Ethiopian Insurance Corporation (EIC), remains the dominant player in the sector and accounted more than 40 percent of the total capital. Moreover foreign owned financial institutions are not allowed to enter the market.

In Ethiopia, the insurance market is undeveloped, uncompetitive and there exist paucity of information on the kind of life insurance that is currently present. The current practice of bulk of insurance coverage and business in Ethiopia is target the corporate market and focuses mainly on general insurance with a very limited coverage in life insurance.

¹ Ethiopia Insurance Corporation, Nyala Insurance S.C, United Insurance Company (UNIC), Awash Insurance S.C, Nile Insurance S.C, Africa Insurance S.C, NIB Insurance S.C, Lion insurance S.C, Global insurance S.C, National insurance Company(NIC), Ethio life insurance company and Oromia insurance S.C

The total life insurance premium generated in Ethiopia is minimal compared to other African countries; like South Africa, Kenya and Egypt. The percentage contribution of life insurance business to the gross domestic product (GDP) in year 2006/07 (Ending June 2007) is 15.3, 2.5 and 0.6 respectively while Ethiopia is one of the countries which has very low level insurance penetration equating is 0.2 percent (Chamberlin, 2010). However the last ten consecutive year data in yearly statistical bulletin of Central Statistics Authority of Ethiopia shows that there has been a continuous increase in life insurance premium income. This indicates that the Ethiopia insurance industry in general, and its life insurance in specific, both have a bright prospect and a high potential role to play in contributing to the national savings.

Several studies have been undertaken by different scholar in the past. Many studies examining life insurance demand have focused on the Asian market. They tried to develop and test the different socio-economic and institutional factors as possible determinants of life insurance consumption across different countries. However a study in Africa especially in Ethiopia is apparently scarce. Some studies have been conducted concerning general insurance business in Ethiopia. Ayalew (2007) tried to analyze the structure, trends, and performance of life insurance with reference to the Ethiopian Insurance Corporation (EIC), Zeleke, (2007) tried to see the historical development of insurance in Ethiopia and its future challenges. He clearly stated that the total life insurance market contribution of African countries to the globe is very minimal.

The works of these limited researchers share a common issue that indicates the contribution of the insurance in general and life insurance industry in particular is very

low. However, they did not conduct a research that shows the impact of macroeconomic variables on life insurance market in Ethiopia.

Therefore, the interest of this paper is to analyze the determinants of demand for life insurance which can be the reason for consumers little/no response to life insurance and slow market penetration of the business. Accordingly it will help to fill the gap in knowledge and might help as a supporting document for those interested.

CHAPTER TWO

2. Literature Review

This section presents a review of selected theoretical studies which highlights the most relevant findings in the field of life insurance demand. The theoretical frameworks usually are followed by the empirical investigation of the developed models, so it will highlight the models and the empirical findings, on life insurance demand in particular countries and across them where they are present.

Theoretical Studies

The colossal importance of life insurance in managing income risk, facilitating savings, and providing term finance, has promoted researchers try to understand what drives its demand and supply across countries and over time. A number of authors have proposed a variety of different socio-economic and institutional factors as possible determinants of demand for life insurance.

Starting 1960's, many researchers constructed quantitative models to analyze the demand for life insurance and the rate of investment for an individual under uncertainty. Demand for life insurance has usually been explained through the life-cycle models where households or individuals maximize their expected utility of lifetime consumption. According to Outreville (1996), almost all theoretical work on the demand for life insurance products identify Yaari (1965). He was the first researcher who worked out the theoretical background which considered the demand function for life insurance derived from the maximization of utility function of the consumer would depends on wealth,

income stream, a vector of interest rates, a vector of prices (including insurance premium) and the consumers' utility functions for consumption and wealth, which can be affected by the level of the market financial development.

Based on the life cycle model, Yaari (1965) analyzed consumer's future plan problem under uncertain life time, i.e., how long he/she will live, using the framework of expected utility and a continuous time. In Yaari's model the consumer maximizes his expected

lifetime utility: $E(U(T)) = \int_0^T \alpha(t) g[c(t)] dt + \beta(T) \varphi[S(T)]$, where E is the expectation

operator, U is a utility function, T (unknown) is the number of years the consumer expects to live, α is the subjective discount function, g the instantaneous utility of consumption, c , denotes the rate of expenditure on consumption, β is the subjective bequest weighting factor, φ denotes the utility of the bequest, and S denotes consumer's bequest. He showed that it is beneficial for a risk averse consumer with bequest motives to purchase actuarial fair life insurance protection and that it is optimal for the consumer to equate the marginal utility of consumption to the marginal utility of bequest at every moment. That is, $\alpha(t) g'[c^*(t)] + \beta(t) \varphi'[S(t)]$ for all t .

Later Lewis (1989) used life cycle model developed by Yaari (1965) He extends this framework by explicitly incorporating the preferences of the dependents and beneficiaries into the model, because while making a decision about insurance the insured explicitly takes into account the dependent members of the family. So the total amount of life insurance purchased by the insured is derived from the maximization of the consumption

level of beneficiaries, who in turn maximize their utility of the consumption by choosing the optimal level of expenditures on life insurance.

Another study conducted by Economides, (1982) examined demand for life insurance by applying economics of uncertainty based on the theoretical study of R.A. Campbell, derived simple demand-for-insurance equations that relate households' optimal responses to human capital uncertainty for households characterized by risk aversion, the optimal amount of human capital insurance is a decreasing function of the "load factor," λ which is defined as a percentage markup from the actuarially fair² value of insurance. He found that the optimal and the approximate life insurance coverage coincide if the "load charge" is zero, i.e. if the insurance firm charges the actuarially fair premiums. If there is some positive "load charge" for reasonably low probabilities of death, which indicates that Campbell's approximation underestimates the optimal coverage. However, demand for life insurance is affected by a lot of important supply and demand side factors that facilitate the life insurance coverage and expected to affect the cost of life insurance products.

Empirical Studies

A number of different models of life insurance demand have been developed and tested, many of these motivated by the existence of varying consumption patterns between different countries. Beck and Webb (2003) highlight the fact that life insurance demand is predominantly low in developing countries, and even large variation between developed

² The premium or price of insurance that exactly equal to the expected value of payments

economies. This variation of demand across countries, arise a question to the researchers to investigate the causes of the variation in demand for life insurance.

Beck and Webb (2003) conducted a comprehensive research over 68 countries of the world, paying attention to the question what causes the variance in life insurance consumption between different countries. Four different measures of life insurance consumption and incorporate various economic, demographic and institutional factors used in their research. As a result, they find that countries with higher income per capita level, more developed banking sector and lower inflation tend to consume larger amounts of life insurance. In addition, life insurance consumption is observed to be positively influenced by private savings rate and real interest rate. Such demographic factors as education, life expectancy, young dependency ratio does not have any robust influence on the life insurance consumption.

The disposable personal income in the study of Browne & Kim (1993) refers to the national income .It is defined as the GNP minus depreciation (capital consumption) and indirect business tax. According to Browne and Kim (1993), national income is a more accurate measurement of disposable personal income for a country than GDP or GNP, because national income is the income earned by the various production factors. The finding provided evidence of positive relation ship between life insurance demand and income.

Outreville (1996) relates the income variable in his study as the real disposable income per capita GDP is used as the basis for the disposable personal income, and the result showed similar to Browne and Kim (1993) and Li et al. (2007) which exclusively done

on 25 OECD countries. The study made on India by Sue (2008) taking GDP per capita as indicator of income. The result provided contradicting to the expected signs, that income is inversely related to life insurance penetration.

Saving as economic variable taking different indicator considered researchers. As theories suggest on Beck and Webb (2003), an ambiguous relation between life insurance and an economy private saving. Sue (2008) taking per capita GDS as indicator of saving on their study and the result the analysis provide that as saving increase they raise insurance consumption. But insurance are not purely savings and hence, its purchase may smoothen the income or wealth over time. If saving plus life risk insurance products sold, it might bust insurance consumption.

Inflation is empirically tested as a factor to determine the life insurance market. The findings of Browne & Kim (1993) and Outreville (1996) reveal that inflation has a significant negative relationship with life insurance demand. Inflation has a dampening effect on the demand for life insurance. High inflation tends to cause the purchasing of life insurance to be less attractive because of the rising cost of living. Li and Moshirian (2007) on their studies of OECD countries found the same result, anticipated inflation depress the value of financial asset and hence depress the attractiveness of life insurance product. Although macroeconomic conditions in OECD countries largely differ from those in developing countries the same negative result is observed.

In explaining life insurance demand different researchers include different variables in the model, Sen. (2008) is one of the researchers who used detailed quantity of variables. The impact of GDP per capita, GDS (gross domestic savings) per capita, financial depth,

urbanization, dependency ratio, adult literacy, life expectancy at birth, crude death rate, inflation, real interest rate and insurance price on the demand for life insurance. His finding supports the previous studies by conforming significant positive relationship between demand for life insurance and income, financial development, gross domestic savings, and negative to inflation. Real interest rate is the insignificant factor in cross country analysis, while real interest rate appears significant in his time serious analysis for India conducted from year 1965 to 2004.

Truett et al. (1990) discussed the growth pattern of life insurance consumption in Mexico and United States during the period 1964 to 1984. They conceptually assumed that demand depends upon the price of insurance, income level, availability of substitute and other individual and environment specific characteristics. Further, they experimented with demographic variables like age of individual insured(s) and population within the age group 25 to 64 and also considered education level to have some bearing on insurance consumption decision. They concluded the existence of higher income inelasticity of demand for life insurance in Mexico with low income levels. Age, education and income were significant factors affecting demand for life insurance in both countries.

More recently a number of papers were written and different models were developed by Lim and Hamberman, (2004), Ibiwoye et.al(2010),Lenten and Ruli (2006) examined the influence of economic variables on life insurance consumption within single countries.

Lim and Hamberman,(2004) for instance examined life insurance demand in Malaysia from a macroeconomic perspective, in order to study the interaction between

macroeconomic and demographic variables. Ibiwoye, et.al (2010), studied the determinant of life insurance consumption in Nigeria during the period 1970 – 2005 within an error correction framework to capture the long-run relationship and short run dynamics between the life insurance consumption and independent variables under study. The study of Lenten & Ruli (2006) focused on a time series analysis of the life insurance demand in Australia in the period of 1981–2003 using statistical procedure where the unobservable components are extracted, which helps to easily explain the behavior of life insurance demand. The result implies that, life insurance demand was influenced by certain environmental effects most likely related to deregulation and industry reform.

As it is mentioned above basically, there is no one right quantity of determinants to include in the model, because the determinants depend on the particular country's environment and vary due to different socio-economic systems across countries. In general the above theoretical and empirical researches shows that macroeconomic variables like income, rate of interest, accumulated savings in wealth form and a set of demographic or social variables having potential impact on an individuals' decision to choose for or not to demand life insurance.

The variables used to explain determinants of life insurance vary from paper to paper depending on the chosen countries under the study. Even though there is no as such much study specific to low income countries like Ethiopia. This paper will extend the research conducted on the single country cases which are assumed to have similar developing path, in order to mark out the factors, which influence the demand for life insurance in the country.

CHAPTER THREE

3. Research Methodology

Factors affecting consumers' decision to purchase life insurance policies differ across countries due to their social and economic situation. A number of models have been developed to explain life insurance demand Sen. (2010), Beck and Web (2002) explained as, "life insurance penetration" (ratio of insurance premiums volume to GDP), "life insurance density" (insurance premiums per capita in constant dollars) and ratio of "life insurance in force to GDP"

In this paper co-integration and error correction technique is used to capture the long-run relationship and short run dynamics between the dependent and independent variables, while avoiding problems of spurious correlation related with non-stationary time series data.

We specify the model for the determinants of demand for life insurance (LID) in Ethiopia as follows:

$$LID = f(\text{Price}, \text{GDP}, \text{FD}, \text{RIR}, \text{INFL}, \text{GDS}, \text{DPOL})$$

The above model is hereby written as:

$$LID_t = \beta_0 + \beta_1 \ln(\text{GDP})_t + \beta_2 \ln(\text{Price})_t + \beta_3 \text{INF}_t + \beta_4 \text{RER}_t + \beta_5 \ln(\text{GDS})_t + \beta_6 \ln(\text{FD})_t + \beta_7 \text{DPOL}_t + \varepsilon_t \dots \dots \dots (1)$$

It is expected to be; $\beta_1 > 0, \beta_2 < 0, \beta_3 < 0, \beta_4 < 0, \beta_5 > 0, \beta_6 > 0, D_1$

Where,

LID= Life insurance demand in the country

Price = Price of insurance

GDP = Per capita income

RIR =Real interest rate (saving deposit rate less inflation)

INF =Rate of Inflation (CPI)

GDS= Gross Domestic Saving per capita

DPOL =Political instability dummy: 1 if military regime and 0 otherwise, indicates periods of civil rule (stability) and military regime/turbulent years.

The final estimation equation is represented as:

$$\Delta LID_t = \beta_0 + \beta_1 \ln \Delta(GDP)_t + \beta_2 \ln \Delta(\text{Price})_t + \beta_3 \Delta INF_t + \beta_4 \Delta RER_t + \beta_5 \ln \Delta(GDS)_t + \beta_7 \ln \Delta(FD)_t + DPOL_t - ECM_{t-1} + \epsilon_t \dots \dots \dots (2)$$

ECM_{t-1} is the error correction factor whose magnitude defines the feedback effect among the co-integrated variables.

The dependent variable **demand for Life insurance:** - Refers percentage calculated as the ratio of the new sums insured in a year to the total sums insured in force in the preceding year.

Independent variable

Price: - The data for price of life insurance is not available as such. One can make an attempt to extract it from the existing policies or to find a relevant proxy to value price of life insurance. The price of insurance is expected to be negatively related to the demand for life insurance. The price measure used in this study is based on the model used by Browne and Kim (1993) .It is defined as the ratio of the total annual premium in force to the total sums insured in force in a year.

Per capita income: -. The income of a country has been found to be an important factor in explaining demand for life insurance the work of Browne and Kim (1993), Outreville (1996), Beck and Webb (2002),Lim and Haberman (2004) and Sen. (2008) etc. confirmed the significant positive relationship of income and demand for life insurance. Income per capita is used as a proxy for permanent income and it is measured as the GDP at market price divided by the number of population that represents disposable personal income. In line with this, this study will use the ratio of GDP to the population to represent income per capita.

Real interest rate: It is expressed by deposit interest rate minus inflation. Interest rate is expected to have a positive relationship with demand for life insurance. The relationship between demand for life insurance and interest rate has been studied by many researchers and its finding is controversial. Outreville (1996) found that real interest is an insignificant variable. Beck and Webb(2003). Browne and Kim (1993) neglect the influence of this variable on their study of life insurance demand. Theoretical justification deals that high real interest rates may reduce demand for life insurance. Lenten and Rulli,

(2006) states that the rise in interest rate may reduce the purchase of life insurance as higher returns on alternative assets may switch consumers from savings in life insurance to another type of money accumulation.

Inflation (CPI):- The Inflation rate is hypothesized to be negatively related to the demand for life insurance. High inflation tends to cause the purchasing of life insurance to be less attractive because of the rising cost of living. The negative impact of inflation had been studied by a number of researchers (see Outreville (1996), Beck and Webb (2002), Li et al. (2007) etc.)

Gross domestic saving per capita: - domestic saving is one of the economic factors considered as an economic variable. It is obtained by dividing total savings by yearly population. There is an expected positive correlation between increase in savings behavior, financial service industry and demand for life insurance (beck and Webb (2003), Sen (2008)). Taking this forward, the first issue is to find whether or not per capita growth domestic savings and financial depth influences life insurance consumption.

Financial Development FD (M2): - Financial development is hypothesized to be positively related to the demand for life insurance. Two different proxies have been used as a measurement for financial development. The first one is the ratio of quasi-money (M2-M1) to broad money (M2). This is an indicator for the complexity of financial structure. Focusing on developing countries, Outreville (1996) found a positive relationship between life insurance consumption and the complexity of the financial structure. The second one is the broad definition of money (M2). The value of broad definition of money (M2) at the end of year is used to proxy the level of financial depth it

is regarded as an adequate measure for the financial development in developing countries because banking is the predominant sector in the financial market of the countries.

Political instability dummy: - 1 if military regime and 0 otherwise, indicates periods of civil rule (stability) and military regime/turbulent years. Political and legal stability is proved to be important by Ward and Zurbruegg (2002), a recent study conducted by Ibiwoye, A et al. (2010), also included in his model and found it insignificant.

CHAPTER FOUR

4. Data Description

The availability of timely and reliable data determines the quality of any research, so that it is important to give due attention in collecting necessary information from reliable sources.

For the purpose of this paper annual data from the period 1980 to 2009 is collected. The paper employed secondary data from local and other international sources. Data on life insurance premium is collected from annual statistical abstract of Central Statistics Agency of Ethiopia; almost all economic variables are sourced from National Bank of Ethiopia and other international sources like World Development Indicators, World Economic Outlook website, World Bank website and different local organizations mainly insurance companies. As mentioned above it is attempted to find several sources on each number to compare and rely on the better known and more credible ones. The study period is determined by the availability of data for the selected variables.

CHAPTER FIVE

5. Estimation Analysis and Interpretation

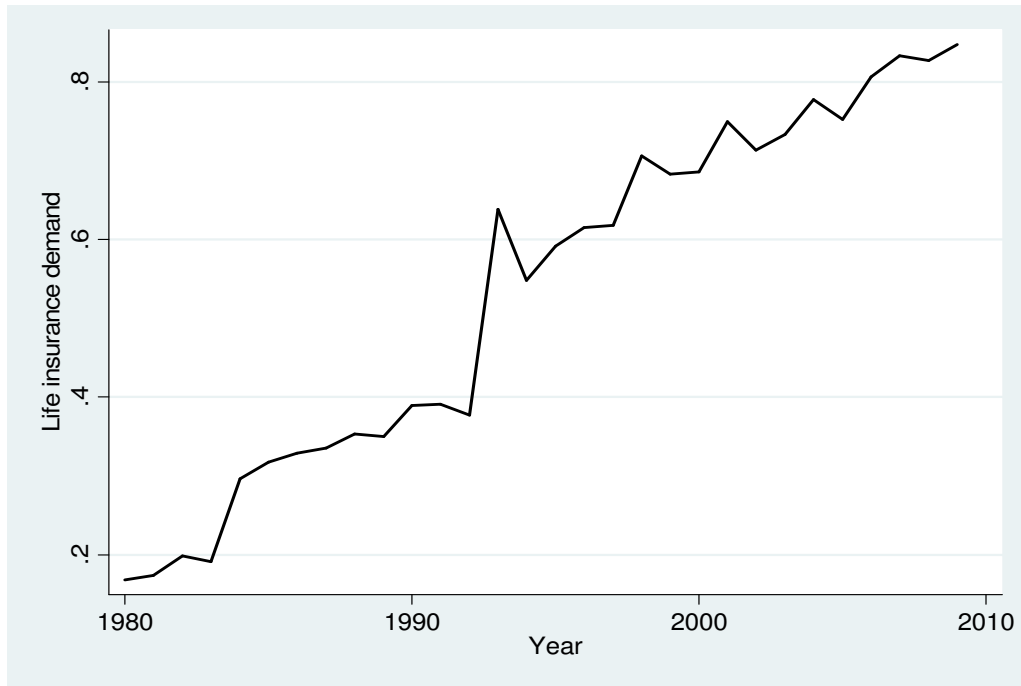
5.1 Transformation of variables

For any time - series analysis the first step is to deal with the available data series, and check for seasonality. The next step is transformation of the variables, if needed depending upon the model / hypothesis to be tested. A transformation will make to a variable at level – value; however, variables of rate value are not transformed because they are already in a preferred form as they are a measure of change. Based on this rationale the variable at the level form, i.e. per-capita Gross Domestic product (GDP) financial development (FD) gross domestic saving per capita (GDS) and price of insurance (Price) were transformed by taking the natural logarithm of their level values and the transformed variables are labeled LNGDS, LNFD, LNGDP and LNPrice, Therefore, their coefficients represent elasticity.

5.2 Time Series Graph

A number of time series graph has been plotted for each of variables in the study. The graphs provide a crude observation of the variables about the likely nature of the time series before a formal test of stationary is pursued. The dependent variable, the demand for life insurance (LID), indicated in graph 1, shows a slow growth pattern during 1980-1990's and tends to be increasing with up and down fluctuation over time during the periods 1990-2009.

Fig.1, Time series graph of Life Insurance Demand



The explanatory variables such as Price in its transformed LN (price) and Gross Domestic savings per capita (GDS) and its transformed LN (GDS) also shows approximately a similar trend with the dependent variable.

Other variables like anticipated rate of inflation (INF), Real interest rate (RIR) tend to exhibit some large variations from time to time with noticeable ups and downs throughout the periods under investigation. Financial development (FD) with its transform (LNFD) shows a tremendous increase through the investigation period and Gross domestic product (GDP) with its transformed (LNGDP) does the same in sensible increasing manner specially starting the year 2000.

5.3 Testing for Heteroscedasticity.

Breusch-Pagan test is used to investigate the presence of heteroscedasticity in the variance of the residuals of the final estimation regression. The chi-square statistic obtained and corresponding p-value at a significant level of 5% are used to test the hypothesis. If the P-value for the χ^2 -statistic exceeds the significance level, leading to possible acceptance of the null hypothesis that the variance of the disturbance term is constant.

5.4 Testing for Multicollinearity

The primary concern is that as the degree of multi-collinearity increases, the regression model estimates of the coefficients become unstable and the standard errors for the coefficients can get wildly inflated. Variance inflation factor has been checked and a variable whose VIF values are less than 10 and tolerance value defined as 1/VIF lower than 0.1 is considered as a linear combination of other independent variable

5.5 Testing Autocorrelation

Testing for autocorrelation, as most regression problems involving time series data exhibit positive autocorrelation, Durbin-Watson test is used to examine.

The hypotheses test is, $H_0: \rho = 0$ $H_1 : \rho > 0$

The test statistic is:-

$$d = \frac{\sum_{i=2}^n (e_i - e_{i-1})^2}{\sum_{i=1}^n e_i^2} \dots \dots \dots (3)$$

If $d < dL$ reject $H_0: \rho = 0$
 If $d > dU$ do not reject $H_0: \rho = 0$
 If $dL < d < dU$ test is inconclusive.

5.6 Unit Root Test

The empirical analysis under co-integration begins with a consideration of the time series characteristics of the data employed. This was achieved by considering the order of integration of each series using Augmented Dickey - Fuller (ADF) class of unit root tests.

Augmented Dickey Fuller (ADF) Test, Based on the model of the form

$$\Delta y_t = \beta + \beta_2 t + \delta y_{t-1} + \sum_{i=1}^m \alpha_i \Delta y_{t-i} + \epsilon_t \dots \dots \dots (4)$$

And the hypothesis test $H_0 = \delta = 0$ vs. $H_0 = \delta < 0$

A standard t-statistics will be calculated for the coefficient of δ from any ordinary least square estimation and the non stationary will be rejected if the critical values are greater than the appropriate t- statistics.

Table 1, shows the unit root test results. The variable, demand for life insurance (LID), per capita income (GDP), financial development(FD), rate of inflation(INF), average price of insurance (Price) and gross domestic saving per-capita (GDS) are I(1) or non-stationary at levels. They are stationary only at their first difference. However, real interest rate (RIR) is I(0); that is; stationary at its levels. The ADF test is performed using 95% critical values. This analysis shows that any dynamic specification of the model in the levels of the series is likely to be inappropriate and has problems of spurious regression. Therefore to avoid this problem, an I(0), real

interest rate (RIR) will not be included in the co-integration analysis, because I (0) is not expected to have a long run relationship with I(1) series.

Table, 1 Augmented Dickey Fuller Unit Root Tests

Variable level	ADF test statistics	Critical values at 5%	Variable first difference	ADF statistics	Critical values at 5%
LID	-0.959	-2.989	Δ LID	-8.870	-2.992
RIR	-2.997	-2.989	Δ RIR	-6.376	-2.992
INF	-2.326	-2.989	Δ INF	-6.108	-2.992
LNPrice	-1.508	-2.989	Δ LN Price	-7.502	-2.989
LNGDP	-2.409	-2.989	Δ LNGDP	-8.295	-2.992
LN GDS	-1.371	-2.989	Δ LN GDS	-6.813	-2.992
LN FD	1.492	-2.989	Δ LNFD	-3.480	-2.992

5.7 Co-integration Test

The idea of co-integration is important to the analysis of long-run relationships between economic time series. The possible presence of co-integration must be taken into account when choosing a technique to test hypotheses concerning the relationship between two variables having unit root (i.e. integrated of at least order one). Even though ordinary least square (OLS) regression on data which had been initially differenced is used as a usual procedure for large samples, co-integration provides more power full tools when data sets are of limited length. For the purpose of testing co-integration, Johansen's co-integration test is used to determine whether the non-stationary variables are co-integrated.

The results of the Johansen co-integration multivariate tests are presented in Table 2. The results show that the series on life insurance demand (LID), rate of inflation, gross domestic savings per capita, financial development, price and gross domestic product are co-integrated both at 1 percent and 5 percent levels. In addition, in testing for co-integration, ADF test is applied to the residuals of the co-integrating regression, rather than the levels of the series. If the residuals from the linear combination of non-stationary series are themselves stationary then we can accept that the, I (1) series are co-integrated. Our co-integration regression residual test suggests the existence of co-integration, since the test statistic (-6.095) is greater than the critical value (-2.989) at 5 percent, which implies that the residuals from the linear combination of non-stationary I (1) series are themselves stationary.

An error correction (ECM) is estimated using the residual from the long-run equation. The ECM is based on stationary data (as all the I(1) regressors are in first difference form) and includes the lagged residuals of the long-run equation, which is also I(0) when the variables have co-integrating relationship.

Table, 2 Johansen Co-integration Test Results

Sample 1981 -2009 Series LID, LNFD, LNPrice, LNGDP LNGDS ,INF Included observation 28					
Hypothesized No. of CE(s)	LL	eigenvalue	Trace statistics	5% critical value	1% critical
None**	62.19	0.95	60.35 *1*5	68.52	76.06
Atmost1	75.79	0.62	33.14	47.27	54.47
Atmost2	85.35	0.49	14.02	29.68	35.65
Atmost3	89.46	0.25	5.79	15.41	20.04
Atmost4	91.42	0.13	1.9	3.76	6.65

Note:*(**) denotes rejection of the hypothesis at 5% (1%) significance level. Max eigenvalue test indicates 1 co integrating equation(s) at both 5% and 1% significance level.

Source: computed.

5.8 Long run Life Insurance Demand Regression

The long-run regression results in Table 3 indicate the price and gross domestic saving have expected sign. However, this association is not statistically significant.

Per-capita income, financial development and rate of inflation appear to be an important variable associated with demand for life insurance.

The long-run positive effect of financial development in life insurance demand (LID) as amplified in the development literature is confirmed by the results of this study. Financial development has a strong positive impact on life insurance demand (LID) during the period under investigation. The finding of this paper regarding income variable is negatively correlated with life insurance which fail to conform the expected positive sign. Rate of inflation was discovered to be negatively correlated and statistically significant in the long-run.

Table, 3 The OLS Estimation for the Long- run Regression of the Demand for Life Insurance

Dependent variable Life insurance demand N=30 (1980-2009)

Variables	Co-efficient	Standard Error	t- values	Prob.
Cons	-3.838857	.3412423	-11.25	0.000
LnPrice	-.0494354	0.38688	-1.28	0.214
lnGDP	-.1172227	.0561107	-2.09	0.047
lnFD	.2310242	.0187439	12.33	0.000
lnGDS	.011149	.0171329	0.65	0.521
INF	-.0019427	.0009137	-2.13	0.044
$R^2 = 0.9754$ $AdjR^2 = 0.9703$ Prob > F statistics = 0.0000 P- value F (statistics) = 190.30 Durbin-Watson d-statistic (6, 30) = 2.3				

Source: Computed

5.9 Short-run Life Insurance Demand Results

Having confirmed that the residuals are stationary, the dynamic version of the long run model was specified with the residuals from the co-integration regression as the error correction term (ECM). The short run error correction regression model was estimated by including one period lagged residual in the differenced variables.

Over-parameterized specification captures the main dynamic processes in the model. It sets the lag length such that the dynamic processes would not be constrained by too short lag length. As is evident in the over-parameterized specification the lag length was set bearing in mind the possible problems of low degrees of freedom if higher order lags are used.

As is traditional, the over-parameterized model was reduced to achieve a parsimonious model, which is both data admissible theory consistent and interpretable. Parsimony maximizes the goodness of fit of the model with a minimum number of explanatory variables. The reduction process is mostly guided by statistical considerations,

A one period optimal lag length was used because of the shortness of the observation period and to have sufficient degrees of freedom. Looking at the result in Table 4, reveals that the signs of the original and its lagged repressors are inconsistent they tend to have a mixture of positive and negative signs.

Table,4. Short run over -parameterized Life Insurance Demand estimation
 Model LID OLS regression Sample 1980-2005

Variables	Co-efficient	Standard Error	T-value	P>t
Constant	-4.026896	.1766418	-22.80	0.000
$\Delta(LID)_{t-1}$	.9980048	.0648653	15.39	0.000
LN(GDP)	-.1373697	.0146613	-4.88	0.000
$\Delta LN(GDP)_{t-1}$	.051421	.0193903	5.86	0.000
LN price	-.0641879	.0178799	-3.59	0.003
$\Delta LN(\text{price})_{t-1}$	.051421	.0146613	3.51	0.003
LN(GDS)	.0071193	.0074359	0.96	0.355
$\Delta LN(GDS)_{t-1}$	-.0148995	.0084628	-1.76	0.100
LN(FD)	.2482403	.0128544	19.31	0.000
$\Delta LN(FD)_{t-1}$	-.2135607	.1119464	-1.91	0.077
RIR	.0016997	.000472	3.60	0.003
ΔRIR_{t-1}	-.000847	.0003098	-2.73	0.016
INF	-.0002868	.0006378	-0.45	0.660
Pos	.0251861	.0134841	1.87	0.083
ECM_{t-1}	1.027031	.1100494	9.33	0.000
R2=	0.9989	F-statistic	885.73	
Adj R2=	0.9977	P-value (F-statistic)	0.0000	
DW	2.07			

Source: computed

This model is subject to parsimonious reduction which is done by dropping the variables whose sign is contradicting the prior (economic) expectations and low t-statistics, (insignificant) with no evidence of residual serial correlation for predicting demand for life insurance. Through the simplification process variables, that have opposite sign from the prior expectation and variables that have got insignificant like RIR_{t-1} $LNFD_{t-1}$, $LNGDS_{t-1}$, $LNGDP_{t-1}$, $LNPRICE$ and POS are removed sequentially from the estimation equation.

The result, in Table 5, of the parsimonious model looks relatively good. One of the findings on the OLS estimation for the final test equation is test of homoskedasticity among the error terms. The null hypothesis for heteroskedasticity test indicates that the

variance of disturbance term is constant. Using the Breush-Pagan heteroskedasticity test, the value of the chi-square statistic obtained is approximately $\chi^2=29$ and its corresponding p-value is 0.4, leading to possible acceptance of the null hypothesis that the variance of the disturbance term is constant. The other one is test of normality, normality of residuals is only required for valid hypothesis testing, that is, the normality assumption assures that the p-values for the t-tests and F-test will be valid indicates that the residuals are normally distributed. We used The Shapiro-Wilk W test for normality. The P value is based on the assumption that the distribution is normal with very large P value of 0.49, indicating that we cannot reject that residual is normally distributed. Durbin-Watson statistic was 1.93 which indicates presence of very little form of auto-correlation.

Almost all coefficients under consideration are significant and good predictor of demand for life insurance. Financial development, per-capita income and a prior one period lag insurance demand has a positive correlation. The performance of life insurance in the immediate previous period has a direct relationship with the demand for life insurance. The coefficient of income is positively related and significant at 10 %. It confirms the theoretical concept that the higher per-capita income leads to higher demand for life insurance and empirical researches conducted by Brown and Kim (1993), Outreville (1996), Beck and Webb (2002), Lim and Haberman (2004) and Sen. (2008) etc. proved that as income increases, life insurance becomes relatively more affordable.

Table, 5. Short run Parsimonious Estimation

Model LID by OLS regression Sample 1980-2009

Variable	Coefficient	Standard. Error	t-value	P>t
Cons.	-4.548169	.1007581	-45.14	0.000
Δ LID _{t-1}	.8658736	.1156542	7.49	0.000
Δ LNGDP	.0501896	.0268105	1.87	0.076
Δ LNGDS	-.0287738	.010725	-2.68	0.014
LNFD	.2439381	.0082741	29.48	0.000
INF	-.0034447	.0005364	-6.42	0.000
LNPrice	-.0752825	.0212981	-3.53	0.002
Δ RIR	-.0011127	.0004903	-2.27	0.034
ECM_1	.6348621	.167269	3.80	0.001
R ² =	0.988	F-statistic =	352.29	
Adj R ² =	0.985	DW=	1.93	
P-value (F-statistic) = 0.0000				
<i>Source:</i> computed				

The strong positive sign of financial development is indicative of the fact that improved financial system seems to be an important predictor of life insurance demand. The coefficient on the inflation rate is significantly negative in the model; this supports the hypothesis that inflation has a dampening effect on the amount of insurance purchased in a country. So increase by 1 implies a 100% increase in CPI, therefore 1% increase in inflation would reduce life insurance penetration by only 0.000034 percentage points.

The gross domestic saving per capita has a significant negative relationship with the demand for life insurance. This finding is contrary to the hypothesized proposition that domestic saving per-capita is positively related to the demand for life insurance. Moreover, it contrast the finding of Sen.(2008) and Beck and Web(2002) that the

personal savings rate significantly and positively influences the demand for life insurance.

It was expected that increase in saving activity will push up per capita insurance expenditure and thereby enhance insurance demand. However, the result indicates that per-capita gross domestic saving is regarded as a competing yield on alternative savings products for comparison against the interest rate being credited to the insurance policy in the accumulation of cash values under the policy.

Price variable has a significant negative relationship with the demand for life insurance. A negative price tends to associate with an increase in the demand for life insurance, i.e. a decline in the price change of 1% on average, leads to about 0.00075 absolute increments in life insurance.

A lagged value of real interest rate appears to be significant under 5% level of significance and shows the reduction in demand for life insurance by 0.001 with the raise in interest rate by 1 percentage point.

The error correction term is significant at 1 percent with a feedback effect of about 63 percent. The explanatory power of the independent variables is very strong at about 98 percent.

CHAPTER 6

6. Conclusion

The major objective of this study is to investigate the determinants of life insurance demand in Ethiopia. The empirical test of this paper finds out the long run and short run relationship among the variables under consideration by applying co-integration and error correction model. Both the long run and short run dynamics regression result confirm that financial development (FD) and inflation are the two important variables that have a positive and negative significant impact on life insurance demand respectively. The short run dynamic regression shows price, real interest rate and gross domestic saving per-capita are negatively correlated and significant predictors of demand for life insurance.

Negative impact of real interest rate on the demand for life insurance in Ethiopia confirms the preferences of population towards alternative financial assets. Higher returns on alternative assets switch consumers from savings in life insurance to another type of money accumulation. This pattern also may indicate the unawareness of potential consumers about the benefits of life insurance.

Therefore, more efforts should be made by insurance companies in persuading and motivate people to improve their low level utilization. Policies should support the efficient development of the entire financial system - as might be reflected in the absence of interest rate ceilings and other distortionary policies – is thought to help life insurers invest more efficiently

The growing pattern of time series data on life insurance demand shows the fact that Ethiopia can be a highly potential region for the growth of insurance markets. And as far as insurance sector development serves as an indicator of overall economic development, the increase of life insurance sector should be viewed as inevitable part of stable economic development. Hopefully, findings highlighted in the study may be useful for life insurance companies in developing their strategic policies on the market.

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