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Abstract
The main aim of this study was to estimate the demand function for life insurance in Iran and to analyze the
demand behavior towards life insurance from 1991 until 2013. In this regard, the research model was estimated to
be the OLS method. The research results indicated that the most important determining factors in the demand for
life insurance in Iran were income, literacy rate, life expectancy, and financial development. Moreover, the
income elasticity of demand for life insurance was greater than one. The results of this study are useful for
insurance companies to become acquainted with the behavior towards purchasing insurance in the country.
Furthermore, the government can identify the factors influencing the demand for insurance at the macro level and
make plans accordingly.

JEL Classification: G22, C32
Keywords: Life Insurance, Demand for Insurance, Iran, OLS Method

1 Introduction
Having multiple uses, life insurance is one of the important economic tools in the current world. The most
important role played by life insurance is in determining and guaranteeing the future of families, which is its most
tangible aspect. In the shelter of life insurance, nowadays people living in developed countries have reached a
favorable position in terms of the death risks threatening the head of household and economic difficulties caused
by them along with the problems resulting from the old age. The insurance industry is one of the most important
components of economy with respect to charging premiums, increasing its share in Gross Domestic Product
(GDP) and the current volume of investment in it. Therefore, it will not be surprising that increasing the demand
for insurance helps financial development, which results in economic growth, to a great extent.
Given the relationship between financial development and economic growth, the majority of studies were
conducted to understand the factors leading to improvements in services and financial services. Therefore, if the
variables promoting the demands made by insurance institutes (as an instance of financial services) are specified,
it will be possible to determine the factors which really result in financial development and economic growth at
last. Investigating these variables can provide insurance companies, seeking business development, with the
knowledge to select the markets they should enter. Thus, the factors influencing the development of life insurance
industry in Iran should be investigated and determined. This study was intended to identify the factors and
variables influencing the demand for life insurance in the country. It was also supposed to determine the
importance and impact of each of these variables on the demand for life insurance (Put other way, it was meant to
specify the economic factors and variables influencing the demand for life insurance, specify the coefficients of
these variables, and calculate the income elasticity). In this regard, the most important aims of this study were to
investigate the factors influencing the demand for life insurance in Iran and also to estimate it from 1991 until
2013. The rest of paper was organized as follows:

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The research literature is reviewed in the second part. The third part deals with the research methodology. The empirical results of estimating the model are presented in the fourth part. Finally, the conclusion is discussed.

2- A Review of Literature
The majority of newly-conducted, theoretical studies on the demand for life insurance (Lewis, 1989; Stanley Fischer, 1972; Pissarides, 1980; Edi Karni & Itzhak Zilcha, 1985 and 1986) considered the study named Insurance Uncertainty, Life Insurance and Consumer Theory (Yarri, M, 1965, 138) to be the starting point for their works. Yarri pointed out that the demand for life insurances should be investigated from the perspective of consumer’s resources allocation within the framework of the lifecycle model. In the concept of lifecycle model with an uncertain lifetime, Yarri indicated that an individual would increase his or her expected utility by purchasing a life insurance and receiving an annuity. In Yarri’s model structure, a consumer purchases a life insurance in order to increase the expected utility of lifetime.

\[ E[U(T)] = \int_{0}^{T} \alpha(t) g[C(t)]dt + \beta(T)\Psi[S(T)] \]  

(1)

In this equation, \( T \) refers to consumer’s lifetime which is a random variable. \( g[C(t)] \) is the future utility of consumption while \( \alpha(\cdot) \) and \( \beta(\cdot) \) are the factors of discount (mediation), and \( \Psi[S(T)] \) represents the future utility of inheritance.

When the consumers get married or have children, \( \beta(\cdot) \) increases considerably. Therefore, such events explain the change in the ownership (purchase) of life insurance more. According to Equation (1), the change in the ownership of life insurance depends more on the exogenous shift in consumer’s utility function. Expanding Yarri’s model, Lewis concluded that the shift in consumer’s utility function was endogenous with regard to children and wives’ preferences at least partially. Lewis also assumed that the utility function of each family member was separable. This assumption allows us to consider the discussion from the perspective of children and wives, who are the heirs, instead of the viewpoint of the consumer, meaning the person who is insured.

The children purchase life insurance on account of the fact that they have uncertain incomes due to the uncertainty of their father’s lifetime. They stay with the family by the age of \( a \). Until then, they receive certain transfer funds annually; however, if the father passes away, they do not receive any more transfer funds except a certain share of the inheritance. The children who are younger than the age of \( a \) are not allowed to borrow money in return for the potential income they may have in the future, although they are allowed to save money. The pattern of transfer funds from the father is considered in a way that the children do not really have any savings while they stay with the family. At the age of \( i \), each child maximizes the expected utility with respect to the expenditures in relation to life insurances premium \( d_i \) (Frank D. Lewis, 1989).

If the father lives, the children consume as much as \( t_i - d_i \), in which \( t_i \) is the income resulting from the transfer funds. If the father passes away, the children receive an amount equal to \( f_i + b_i - d_i \), in which \( f_i \) is the price of life insurance, and \( b_i \) is the share received from the inheritance.

The problem can be written as follows:

\[ \text{Max } EU_i = (1 - p_i) \times [U_i(t_i - d_i) + EU_i + 1] + P_i [u_i(f_i + b_i - d_i)] \]  

(2)

In which \( EU_k \) is the expected utility from age \( k \) to age \( a \), and \( P_i \) refers to the probability of father’s death when the child is \( k \) year(s) old while \( U_i(0) \) represents the future utility at the age of \( k \) \( [U''_i(0) < 0 \text{ and } U''_i > 0] \). In this equation, \( U_i(0) \) refers to the utility from the age \( k \) to the age \( a \) with the assumption of an optimal consumption pattern.
The relationship between the insurance price and premium is as follows (premium is a percentage of the insurance price):

\[ f_i = \frac{d_i}{Lp_i} \]  \hspace{1cm} (3)

In which \( L \) is the labor factor (labor expenditure).

Equation (3) and \( U''(0) < 0 \) create the following optimal conditions:

\[ U'_i (t_i - d_i^*) = \frac{1 - Lp_i}{L(1 - p_i)}U'(f_i^* + b_i - d_i^*) \]  \hspace{1cm} (4)

In the above equation, the factors marked by asterisks indicate the optimal value. The following equation is used to simplify the analysis. If the death rate of fathers is low in families, this equation is almost true.\(^3\)

\[ U'_i (t_i - d_i^*) = U'_i (T_i - D_i^*) \]  \hspace{1cm} (5)

In which, \( T_i \) and \( D_i \) indicate the current values of transfer funds and life insurance premium from the age of \( k \) until \( a \) in case the father lives. Putting Equation (4-2) in Equation (5-2) and assuming a utility function with constant elasticity, the following equation is obtained:

\[ f_i^* + b_i - d_i^* = \left[ \frac{1 - Lp_i}{L(1 - p_i)} \right]^{\frac{1}{\gamma}} [T_i - D_i^*] \]  \hspace{1cm} (6)

In which \( \gamma \) (negative) is the final utility elasticity in proportion to consumption or the Arrow-Pratt measure of relative risk-aversion.

Putting Equation (3) in Equation (6) and limiting the children to non-negative life insurance assets, the following equation is obtained:

\[ [1 - Lp_i]f_i^* = \max \left[ \left( \frac{1 - Lp_i}{L(1 - p_i)} \right)^{\frac{1}{\gamma}} C_i^* - b_i \right] \]  \hspace{1cm} (7)

In which \( C_K = (T_i - D_i^*) \) refers to the current (present) value of the consumption stream from the age of \( k \) until \( a \) in case the father lives. Equation (7) is simply interpreted. Assume that the child does not inherit (meaning \( b_i=0 \)); therefore, if the probability of father’s death (\( p_i \)) is low, Equation (7) is changed as follows:

\[ f_i^* = \left[ \frac{1}{\gamma} \right]^{\frac{1}{\gamma}} C_i^* \]  \hspace{1cm} (8)

In this case, assuming that the father lives until the age of \( a \), the value of life insurance is simply a fraction of the current value of child’s consumption. This ratio is directly related to the labor factor \( (L) \) and inversely related to child’s risk-aversion degree \( (\gamma) \).

The problem of wife is like that of the children. It is assumed that the wife certainly lives until the age of \( T \) at which she is bound to leave inheritance share \( B \). The first-order condition at the age of \( i \) is like Equation (4) to maximize the expected utility.

\(^3\) Lewis F.D, Dependents and the Demand for Life Insurance, American Review, 1989, No, 79: 452-467
In which $y_K$ represents the widow’s future utility at the age of $K$ while $V_K$ refers to the utility from the age $K$ to $T$ assuming an optimal consumption plan, and $y$ represents wife’s income. Moreover, $r$ indicates the discount rate, and $K_w$ refers to the current value of wife’s capital in case the husband passes away at the age of $K$.

Following the same procedure applied to the demand for life insurance for children, wife’s demand is calculated as follows:

$$[1 - \ell p_i] = \max \left[ \frac{1 - \ell p_i}{L(1 - p_i)} \right]^{\frac{1}{\beta}} C_w^* - K_i + \frac{\beta}{(1 + r)^{\alpha + \gamma}}$$

In which $C_w^*$ represents the wife’s consumption stream value between the ages $K$ and $T$ in case the husband lives until the age $T$. Total insurances issued according to the age of the husband are (simply) equal to the sum of purchases made by the wife and each of the children, assuming that all the family members have the same relative risk-aversion. Considering the fact that the non-negative limiting factor in life insurance assets is either related to all family members or not related to any of them, Equations (7) and (10) can be combined with each other in order to obtain the sum of life insurance assets in the family.

$$[1 - \ell p]F = Max \left[ \frac{1 - \ell p}{\ell(1 - p)} \right]^{\frac{1}{\beta}} TC - W$$

In Equation (11), $F$ represents the nominal value of all insurances issued in relation with the father’s lifetime in the family, and $TC$ refers to the current value of each child’s consumption during the current period until the age of $a$ and that of the wife, assumed to be alive, until the age of $K$ while $W$ represents the wealth of family without considering wife’s inheritance.

Equation (11) is an abstract demand explains the explicit calculations made by many families at the time of purchasing life insurances. Therefore, the discussion is concluded by Equations (2-11) in this way that the demand for life insurances has a positive relationship with the probability of breadwinner’s death in the family, the current value of family consumption and also the risk-aversion, whereas it has a negative relationship with the labor expenditure (Lewis, 1989, p. 544).

Employing the ARDL method and using the data from time series pertaining to the period between 1966 and 2003 in a study, Rajabian (2005) estimated the demand function for life insurance in Iran. The results indicated that the most important factors determining the demand for life insurance were income and education level in Iran. According to the results, the income elasticity pertaining to the demand for life insurance in Iran was 0.31 in the short term, whereas it was 0.44 in the long term. However, the income elasticity pertaining to the demand in petroleum-exporting countries was considerably higher than Iran.

Jafari Samimi and Kardgar (2007) investigated the causal relationship between the development of insurance and economic growth in Iran during the period from 1959 by the end of 2003. The results indicated a causal relationship between the development of life insurance and economic growth.

Using the ARDL method, Mehrara and Rajabian (2008), estimated the demand function for life insurance in Iran from 1966 by the end of 2003 and in petroleum-exporting countries from 1988 and 2002. The results indicated that income was one of the most important factors determining the demand for life insurance in Iran. According to the results, the income elasticity pertaining to the demand for life insurance in Iran was 0.31 in the short term while it was 0.44 in the long term. However, the income elasticity pertaining to the demand in petroleum-exporting countries was considerably higher than Iran.
In another study, Tofigi (2009) investigated the factors influencing the demand for life insurance from 1981 until 2006 and stated that inflation and real interest rate had a negative impact on the demand for life insurance, whereas literacy rate, GDP, and national income per capita had a positive and significant impact on it.

Using the input-output method, Jahangard (2011) investigated the causal relationship between economic growth and the development of life insurance in Iran from 1967 until 2007. The results indicated that there was a significant relationship between economic growth and the development of life insurance in Iran.

In their study in 2000, Rubayah and Zaidi investigated the relationship between macroeconomic variables and the demand for life insurances. They indicated that inflation had a negative impact on the demand, whereas income had a positive impact on it.

Ward and Zurbruegg investigated the relationships and mutual impact between the real premium of life insurances and real GDP for OECD countries between 1961 and 1999. Regarding Canada and Japan, the researchers found out that the insurance market contributed to a large part of GDP. They indicated that the consumption of life insurance products in OECD countries were three times less sensitive to the changes in income rather than the consumption in Asian countries. It was then concluded that the Asians spent more money on life insurance.

In their study, Beck and Webb investigated the relationship between the consumption of life insurance and some economic, demographic and institutional variables for 68 countries from 1961 until 2001. A strong relationship was found between GDP and life expectancy, inflation and banking sector development.

Among the explanatory variables, the expected inflation, real interest rate and savings rate were assessed as important. It was stated that although the savings rate had a positive coefficient, this problem could make families seek to purchase life insurances less and spend their incomes on different investment paths more.

To Hawng and Gao (2003), the majority of studies conducted on the demand for life insurance were cross-country investigations. In the literature of such studies, a kind of complexity and difference is observed between the factors influencing the demand for life insurance from one country to another. Therefore, the conducted a case studies on the factors influencing the demand for life insurance in China. Using the analysis of time series data, the empirical investigations indicated that the factors influencing the demand were directly related to successful economic reforms increasing the knowledge level among people and changing the social structure in China. The interesting results of this study included the lack of a negative relationship between inflation and the demand for life insurance, although China experienced a high inflation in the mid-90s.

Conducting a study named Investigation of the Factors Influencing the Demand for Life Insurance in Malaysia in 2004, Lim and Haberman investigated the relationship and impact of macroeconomic variables on the demand for life insurance in Malaysia from 1968 until 2001. They studied the relationship between macroeconomic variables such as financial development, income, inflation, interest rate, and price and statistical variables such as the net birth rate, net death rate and life expectancy and the demand for life insurance (in three ways including the amount of premium, the number of insurance holders, and the number of insurances). They indicated that the net birth rate and changes in total birth rate were two important statistical variables having great impacts on the demand for life insurance. Moreover, the inflation of negative coefficient was very important. However, their results regarding the interest rate and insurance price were contradictory in three demand models.

Conducting a study named Investigation of the Factors Influencing the Demand for Life Insurance in Central China, Hong Kong and Taiwan in 2005, Hwang and Greenford identified the features of insurance markets in each country. The important results of their study included the very strong relationship between income and the demand for life insurance, a fact which was clearly observed in previous studies. The variable of education level had a significant impact on the demand for life insurance. It was also indicated that the variables of insurance rate and social security level did not have a significant impact on the demand for life insurance. The level of economic development of countries would influence the consumption of insurance products. Generally, the more economically developed the countries are, the more demands will be made for life insurance.
In a study named *Investigating the Time Series of the Demand for Life Insurance Companies in Australia: Unobserved Components Approach* in 2006, Lenten and Rulli used a univariate time series model and investigated its behavior through analyzing its components. Using cyclical, procedural and seasonal unobserved components in the time series of the demand for life insurance, they indicated the impact of a set of economic variables. The investigations indicated that the level of prices, income, unemployment, and demographic variables all had procedural and cyclical structures, a fact which determined the convergent relationship between variables. The results showed that all variables had a long-term relationship with demand, except for the interest rate (which had a short-term relationship with the demand).

Conducting a study named *Are the Factors Influencing the Demand for Life Insurance Valid in India and Some of the Asian Countries or Not?* In 2007, Madheswaran and Subir Sen indicated the impact of some economic and demographic variables on the demand for life insurance in two independent investigations. Using the panel data method in the first investigation, they studied the factors influencing the demand for life insurance among 12 Asian countries including four SAARC\(^4\) countries (India, Bangladesh, Pakistan, and Sri Lanka), two countries in the Great China (China and Hong Kong) and six members of ASEAN\(^5\) (Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam) during 11 years (1994-2004). In the second investigation pertaining to 40 years (1965-2004), the effective factors resulting from the first investigation were reexamined for India. The results of both studies indicated that increase in savings and income increased the purchase of life insurances. The real interest rate did not indicate a significant impact in the first investigation; however, this variable had a negative and significant impact on the demand for life insurance in the second investigation.

The demographic variables such as life expectancy, dependency among young people and the elderly, literacy rate, and urbanization rate were identified as the variables influencing the demand for life insurance. However, urbanization rate was the only demographic variable having a significant impact on the demand for life insurance. Lee (2008) investigated the factors influencing the demand made for life insurance by low-level households during 2004, stating that such demands were risk-averting, and such families were unwilling to do so.

In their study, Choi and Coke (2009) investigated the impact of institutional and social factors on the development of life insurance in 38 countries with low, medium and high income level from 1966 and 2004. The results indicated that the institutional index, investor-supporting index, real income per capita, and banking development had positive and significant impacts on the development of life insurance, whereas inflation has a negative and significant impact on it.

Biuvy *et al.* (2010) investigated the factors influencing the development of life insurance in Nigeria from 1970 until 2005. Their results stated that gross domestic product had a positive and significant impact on the demand, whereas inflation and the institutional variable of political stability had a negative and insignificant impact on it.

In their study, Finn *et al.* (2011) investigated the factors influencing the development of life insurance in 90 developed countries from 2000 until 2008. Their results indicated that the institutional variable of strong legal framework and the economic variable of income had a positive and significant impact on the development of life insurance, whereas inflation had a negative and significant impact on it.

Kissen Ba Vaer (2012) studied the main factors determining life insurance in 133 German life insurance companies from 1997 until 2009. The results indicated that GDP and unemployment rate had a positive and significant impact on the development of life insurance.

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\(^4\) South Asia Association for Regional Cooperation

\(^5\) The Association of Southeast Asian Nations
Chiang et al. (2012) studied the causal relationship between the development of life insurance per capita and economic growth in 41 countries with respect to three income levels from 1979 until 2007. They concluded that there was a significant positive bilateral relationship between economic growth and the development of life insurance.

Laura and Mihay (2013) investigated the impact of institutional and economic factors on the development of life insurance in 31 European countries from 2006 until 2010. Their results indicated that the inflation had a negative and significant impact on the development of life insurance. The institutional index of corruption control had a positive and insignificant impact on its development, whereas the institutional index of government efficiency and the general index of institutional factors had positive and significant impacts on it.

3- Research Methodology

3.1- Research Model

In the recent years, the single-country studies which were conducted on the factors influencing the demand for life insurance were as follows: the study by Hwang and Gao (2003) on China’s economy, the investigation by Lim and Haberman (2004) on Malaysia, the study by Hwang and Greenford (2005) on the main regions in China, Hong Kong and Taiwan, the investigation by Lenten and Rulli (2006) on Australia, and the study by Subir Sen and Madheswaran (2007) on India.

In the majority of investigations, the econometric method OLS (Ordinary Least Squares) were used to estimate the coefficients. Such studies include the ones carried out by Hwang and Gao (2003), Lim and Haberman (2004), and Subir Sen and Madheswaran (2007) on India. The econometric pattern employed in the current study is also the OLS method using Eviews 5.

The main idea of the model used in this study was taken from the model employed by Subir Sen and Madheswaran (2007) in India.

The Demand for Life Insurance = f (Income, Inflation, Life Expectancy, Literacy rate, Population growth Rate, Financial Development)

\[
\log \text{(per)} = a_0 + a_1 \log(\text{GDP}) + a_2 \log(\text{Exi}) + a_3 \log(\text{Lie}) + a_4 \log(\text{Lit}) + a_5 \log(\text{Fd}) + \text{DUM}
\]

\( a_0 \): y-intercept
\( \text{NI} \): national income per capita at the constant price in 2011
\( \text{Exi} \): expected inflation
\( \text{Lie} \): life expectancy
\( \text{Lit} \): literacy rate
\( \text{Fd} \): financial development
\( \text{DUM} \): dummy variable representing the impact of war on the demand for life insurance

Log: logarithm on the basis of Napier’s constant

3-2- The Operational Definition of Variables

1- Demand for Insurance: The amounts of life insurance premiums during the research years were used to obtain the data pertaining to the demand for life insurance. The Consumer Price Index (CPI) based on the base prices in urban areas in 1997 was used to exclude the impact of inflation from the insurance premiums pertaining to target years.

The real life insurance premiums (sales) were used as an index for the demand made by individuals; however, the number of insurance holders and insurances could also be used as an appropriate pattern to
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represent the demand. Due to the lack of statistical sources regarding these two cases, the premiums were just used unfortunately. This variable is a dependent one in our model.

The explanatory variables are introduced as follows:

2- **Income**: In the majority of studies, GDP was used as an index of income. In this investigation, GDP indicates people’s income with respect to the constant prices in 1997.

3- **Inflation Rate**: Most of researchers found that the expected inflation had an effective and negative relationship with the demand for life insurances. Basically, increase in inflation reduces the value of life insurance and turns it into an unimportant service. When the contract is signed, the insurance holder pays the exact amount of money which was mentioned, a fact which reduces the real value of insurance if the inflation increases. However, some other researchers concluded that the relationship between the demand for life insurance and inflation was ineffective but positive.

In this study, the growth rate of CPI based on the base prices in 1997 was used as an index of inflation.

4- **Life Expectancy**: This variable is associated with the risk of mortality. When this risk soars, the demand for life insurance is increased. On the contrary, improvement in life conditions and increase in lifetime would reduce the demand for life insurances. The data of this variable were collected from the data pertaining to life expectancy which is annually published by State Health Center.

5- **Literacy Rate**: Investigations indicated that the large number of educated individuals in a society would result in the better understanding of risk and tendency towards insurance. Additionally, educations cause the risk-aversion degree of individuals to increase. The numbers pertaining to literacy rate were used as the variable of literacy rate in this study. The data pertaining to this variable were collected from the website of Central Bank of the Islamic Republic of Iran.

6- **Financial Development**: The growth and development of financial systems can have a positive impact on the insurance industry. Breaking down the traditional boundaries among financial institutions would cause more struggle in financial sectors regarding different businesses. This would result in the better supply of insurance products and the improvement in the demand for insurance industry consequently.

In the majority of studies and by the definition of this variable, it is considered total liquidity \((M_1+M_2)\) in macroeconomics. \(M_1\) represents the money while \(M_2\) refers to unobserved deposits (quasi money). The real volume of liquidity, meaning the total liquidity divided by CPI \(((M_1+M_2)/P)\), was used as an index for financial development. Lim and Haberman (2004) pointed out that \((M_1+M_2)\) was an appropriate index of financial development in the developing countries, whereas \(M_2/(M_1+M_2)\) was good for the developed countries.

7- **DUM**: The dummy variable represents a 10% increase in the interest rate of life insurances in 2011 (the number 1 for 2011, the number zero for other years).

The time series data pertaining to the period from 1991 until 2013 were used to estimate the econometric relationships in this study.

The data pertaining to GDP, inflation rate, literacy rate, and the growth rate of active population were extracted from the Time Series Database (TSD) provided by Central Bank of the Islamic Republic of Iran with respect to the prices in 2011. The statistics regarding the variable of life expectancy were extracted from the relevant numbers published by the Ministry of Health. The data pertaining to life insurance premiums were collected from calendars published by Central Insurance of Iran.

4- **Estimation Results**

In this part, the results of estimating the model in OLS method are presented as follows:

\[
\log(\text{per}) = -45.60 + 2.03 \log(\text{GDP}) - 0.02 \log(\text{INF}) - 11.19 \log(\text{Lie}) + 4.43 \log(\text{Lit})
\]
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\[ t\text{-test} \quad (-3.55) \quad (4.34) \quad (-0.23) \quad (-3.54) \quad (3.37) \]

\[ +1.18 \log(\text{POP}) + 1.12 \log(\text{FD}) + 0.04 \text{DUM} \]
\[ (5.17) \quad (3.57) \quad (0.22) \]

\[ R^2 = 0.957 \quad , \quad DW = 1.89 \quad , \quad F = 87 \]

Considering the estimation results, all variables had a significant impact on the demand for life insurance, except the dummy variable and inflation rate. The results were reassessed after crossing out these two variables.

\[ \log(\text{per}) = -47.22 + 2.08 \log(\text{GDP}) -10.77 \log(\text{Lie}) + 4.23 \log(\text{Lit}) +1.18 \log(\text{POP}) \]
\[ t\text{-test} \quad (-4.91) \quad (5.00) \quad (-3.94) \quad (4.66) \quad (6.06) \]

\[ + 1.11 \log(\text{FD}) \]
\[ (3.85) \]

\[ R^2 = 0.961 \quad , \quad Dw = 1.92 \quad , \quad F = 134 \]

The above-mentioned results indicated that the income elasticity pertaining to the demand for life insurance was 2.08. It means that if the national income (based on the constant price in 2011) changes by 1%, the demand for life insurances changes by 2.08% on average in the same direction. This result has a considerable meaning and indicates that Iranians think of life insurances as a service or luxury considered by a particular group of society. It was observed that the variable of life expectancy had a negative and significant relationship with the dependent variable. It means that the demand for life insurances decreases if the life expectancy soars. Moreover, the demand for life insurances increases by 4.33% on average if the literacy rate increases by 1% in the country. Given the theoretical foundations and empirical studies conducted on the demand for life insurance, both of the variables of growth rate of active population and financial development had positive and significant impacts on the demand for life insurances. The dummy variable (known as the 10% increase in interest rate of life insurances and savings in 2011) and the inflation rate did not have a significant impact on the demand for life insurance.

Investigating the Stability of Results

CUSUM and CUSUMQ Tests
CUSUM and CUSUMQ tests were used to investigate the stability of results. CUSUM test is based on the cumulative sum of residuals while CUSUMQ test is based on the cumulative sum of square recursive residuals. The diagrams pertaining to these tests were drawn over time.
The research dependent variable was the paid life insurance premiums while the explanatory variables of the research included the index of financial development, life expectancy and inflation rate in the first case. Before estimating the model using Johansen-Juselius’s cointegration method, it is necessary that the optimal lag be determined in the VAR pattern. Given the fact that the study period is limited, the number of lags were considered to be 2. According to the Schwarz-Bayesian information criterion, the lag is specified optimally and appropriately. The results of determining the optimal lag in the VAR model are presented in the following table:

Table (1): The Results of Determining the Optimal Lag in the VAR Model

<table>
<thead>
<tr>
<th>Lag</th>
<th>LogL</th>
<th>LR</th>
<th>FPE</th>
<th>AIC</th>
<th>SC</th>
<th>HQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-1348.849</td>
<td>NA</td>
<td>1.06e+51</td>
<td>128.8428</td>
<td>129.0417</td>
<td>128.8859</td>
</tr>
<tr>
<td>1</td>
<td>-1257.169</td>
<td>130.7166*</td>
<td>8.15e+47*</td>
<td>121.5343*</td>
<td>122.6291*</td>
<td>121.8502*</td>
</tr>
<tr>
<td>2</td>
<td>-1241.255</td>
<td>18.17008</td>
<td>1.00e+48</td>
<td>121.0434</td>
<td>123.4340</td>
<td>122.0320</td>
</tr>
</tbody>
</table>

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

This table indicated that the lowest value was equal to 122.62 with respect to the Schwarz-Bayesian information criterion. Therefore, the optimal lag was 1 for the VAR model. After that, the normality tests were used for residuals, and the results are as follows:

Table (2): The Normality Results of Residuals Distribution

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According to this table, it is observed that the null hypothesis indicating the normality of residuals was not rejected at the significance level of 5%; therefore, the estimated residuals had a normal distribution. In the next part, the statistics of LM test was used to make sure that there was no autocorrelations among the error residuals. The results are presented in the following table:

Table (3): The Results of Autocorrelation Test among Residuals
Table (3) indicates that the value of LM test statistics was equal to 17.06, an amount which is smaller than the critical value of table at the significance level of 5%; therefore, the null hypothesis indicating that there was no autocorrelations among residuals were not rejected. Using the LM statistics in the next step, the presence or absence of variance heterogeneity was tested among the error residuals. The results are as follows:

Table (4): The Results of Variance Heterogeneity Test among Residuals

<table>
<thead>
<tr>
<th>Lags</th>
<th>LM-Stat</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>17.06322</td>
<td>0.3815</td>
</tr>
</tbody>
</table>

This table shows that the null hypothesis indicating that there was no variance heterogeneity at the significance level of 5% was not rejected; therefore, the VAR model residuals did not have variance heterogeneity. After investigating the detection tests regarding residuals, the long-term balanced relationship is estimated. For this matter, the maximum eigenvalues and the effect matrix of presence or absence indicating the long-term balanced relationship among model variables were tested using the statistics. The results are as follows:

Table (5): The Results of Test Checking the Presence or Absence of the Long-Term Relationship among Model Variables

<table>
<thead>
<tr>
<th>Chi-sq</th>
<th>df</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>80.12618</td>
<td>80</td>
<td>0.4750</td>
</tr>
</tbody>
</table>
This table indicates that both statistics of effect and maximum eigenvalues confirmed the presence of a long-term balanced relationship among the variables of model. Since the residuals of the VAR model have a normal distribution, the results of maximum eigenvalues test can be cited. The results of estimating a long-term balanced relationship were presented in the following table:

Table (6): The Results of Estimating the Long-Term Balanced Relationship

These results indicated that the explanatory variables of financial development and literacy level of adults had a positive impact on the paid life insurance premiums, whereas the inflation rate had a negative and significant impact on them. Put other way, if the index of financial development and life expectancy increase, the life insurance premiums increase. Moreover, if the inflation rate and uncertainty of macroeconomic environment increase, the life insurance premiums decrease. In the next part, the error correction model was employed to adjust the short-term error towards the balanced long-term value. The results are as follows:
The results of error correction model indicated that the adjustment coefficient was equal to -0.36, and almost 36% of the short-term adjusted error were corrected in each period. The adjustment was done towards the long-term balance value in a relatively longer period. In the next part, the variable of literacy rate of adults was added as the explanatory variables, instead of life expectancy, to the model, and the long-term adjusted relationship was estimated. The results can be seen in the following table:

**Table (8): The Results of Estimating the Long-Term Adjusted Relationship after Adding the Variable of Literacy Rate of Adults**

<table>
<thead>
<tr>
<th>1 Cointegrating Equation(s):</th>
<th>Log likelihood</th>
<th>-1278.820</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Normalized cointegrating coefficients (standard error in parentheses)</th>
<th>REV90</th>
<th>FD</th>
<th>LITE</th>
<th>INF</th>
</tr>
</thead>
<tbody>
<tr>
<td>REV90</td>
<td>1.00</td>
<td>-4.74E-05</td>
<td>-2.43E+09</td>
<td>4.81E+08</td>
</tr>
<tr>
<td>FD</td>
<td>7.30</td>
<td>1.8E+03</td>
<td>6.9E+08</td>
<td>4.8E+08</td>
</tr>
</tbody>
</table>

These results indicated that the variables of index of financial development and literacy rate of adults had a positive impact on paid life insurance premiums, whereas the variable of inflation rate had a negative and significant impact on them. In the final part, the error correction model was used to explain the short-term error adjustment towards the long-term balanced value. The results were reported in the following table:

**Table (9): The Results of Estimating the Error Correction Model to Determine the Short-Term Adjusted Error towards the Long-Term Balanced Value**
According to this table, the adjustment coefficient was equal to -0.23 which was smaller than the first case. In other words, it took a longer time to adjust the error in short term and approach to the balanced value in long term. In the final part, the variable of financial development was crossed out of the model, and the variable of national income was added to it. In this case, the results of determining optimal lag in the VAR model are as follows:

**Table (10): The Results of Determining Optimal Lag in the VAR Model**

<table>
<thead>
<tr>
<th>Error Correction:</th>
<th>D(REV90)</th>
<th>D(FD)</th>
<th>D(LITE)</th>
<th>D(INF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoinEq1</td>
<td>-0.231225</td>
<td>-1239.622</td>
<td>4.22E-12</td>
<td>3.06E-11</td>
</tr>
<tr>
<td></td>
<td>(0.06108)</td>
<td>(936.993)</td>
<td>(1.5E-11)</td>
<td>(1.1E-10)</td>
</tr>
<tr>
<td></td>
<td>[-3.76589]</td>
<td>[-1.32208]</td>
<td>[0.28678]</td>
<td>[0.27739]</td>
</tr>
<tr>
<td>D(REV90(-1))</td>
<td>-0.337619</td>
<td>-2993.693</td>
<td>-5.5E-11</td>
<td>4.13E-10</td>
</tr>
<tr>
<td></td>
<td>(0.21351)</td>
<td>(3275.49)</td>
<td>(5.2E-11)</td>
<td>(3.8E-10)</td>
</tr>
<tr>
<td></td>
<td>[-1.57921]</td>
<td>[-0.91397]</td>
<td>[-1.06879]</td>
<td>[1.07945]</td>
</tr>
<tr>
<td>D(FD(-1))</td>
<td>-5.72E-05</td>
<td>0.354337</td>
<td>-5.53E-15</td>
<td>1.71E-15</td>
</tr>
<tr>
<td></td>
<td>(2.0E-05)</td>
<td>(0.31334)</td>
<td>(4.9E-15)</td>
<td>(3.7E-15)</td>
</tr>
<tr>
<td></td>
<td>[-2.80166]</td>
<td>[1.13083]</td>
<td>[-1.12322]</td>
<td>[0.04533]</td>
</tr>
<tr>
<td>D(LITE(-1))</td>
<td>63888521</td>
<td>-1.69E+13</td>
<td>0.068785</td>
<td>-2.063737</td>
</tr>
<tr>
<td></td>
<td>(1.0E+09)</td>
<td>(1.5E+13)</td>
<td>(0.24014)</td>
<td>(1.80106)</td>
</tr>
<tr>
<td></td>
<td>[0.08424]</td>
<td>[-1.10931]</td>
<td>[0.28643]</td>
<td>[-1.14858]</td>
</tr>
<tr>
<td>D(INF(-1))</td>
<td>-2.02E+08</td>
<td>-3.13E+11</td>
<td>-0.005721</td>
<td>0.011634</td>
</tr>
<tr>
<td></td>
<td>(1.3E+08)</td>
<td>(2.1E+12)</td>
<td>(0.03230)</td>
<td>(0.24271)</td>
</tr>
<tr>
<td></td>
<td>[-1.50327]</td>
<td>[-0.15212]</td>
<td>[-0.17677]</td>
<td>[0.04794]</td>
</tr>
<tr>
<td>C</td>
<td>1.24E+10</td>
<td>1.25E+14</td>
<td>1.840895</td>
<td>1.035957</td>
</tr>
<tr>
<td></td>
<td>(3.8E+09)</td>
<td>(5.5E+13)</td>
<td>(6.8254)</td>
<td>(6.48901)</td>
</tr>
<tr>
<td></td>
<td>[3.45720]</td>
<td>[2.27506]</td>
<td>[2.13426]</td>
<td>[0.16014]</td>
</tr>
</tbody>
</table>

Other statistics:

- R-squared: 0.556783
- Adj. R-squared: 0.409017
- Sum sq. resid: 2.86E+20
- S.E. equation: 4.44E-09
- F-statistic: 3.768386
- Log likelihood: -492.7599
- Akaike AIC: 47.50094
- Schwarz SC: 47.79937
- Mean dependent: 3.74E+09
- S.D. dependent: 5.70E+09

Determinant resid covariance (dof adj): 3.53E-48
Determinant resid covariance: 9.20E-47
Log likelihood: -1278.820
Akaike information criterion: 124.4591

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This table indicates that the optimal lag was equal to 1 in the VAR model. In the next part, the results pertaining to the effect matrix test and maximum eigenvalues were indicated in the following table:

**Table (11): The Results of Test Indicating the Presence or Absence of Long-Term Balanced Relationship**

According to these results, both statistics of the effect matrix test and maximum eigenvalue confirmed the presence of a long-term balanced relationship among the variables of model. Therefore, the null hypothesis
indicating the absence of a long-term relationship among variables of model was rejected at the significance level of 5%. Given the presence of a long-term balanced relationship, it was estimated as follows:

Table (12): The Results of Estimating the Long-Term Relationship

<table>
<thead>
<tr>
<th>Cointegrating Equation(s):</th>
<th>Log likelihood</th>
<th>Normalized cointegrating coefficients (standard error in parentheses)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-931.3495</td>
<td>REV: 0.90, LITE: 5.05E+08, NI: -399.5589, INF: 7.59E+08</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3.9E+08) (153.810) (3.0E+08)</td>
</tr>
</tbody>
</table>

These results indicated that the variables of literacy rate of adults and national income had a positive and significant impact on the life insurance premiums, whereas the inflation rate had a negative and significant impact.

5- Summary and Conclusion

Given the study conducted by Noferesti indicating that the income elasticity pertaining to the demand functions for different services such as life insurances in developing countries and considering the fact that it was calculated 2.08 for Iran in the current study, it can be concluded that our country has achieved a growing economy in terms of life insurances. Considering the fact that cultural and social factors are important as well as the economic conditions (income) which influence the demand for life insurance, the research results indicated that social variables were more important than economic ones. Among the social factors, illiteracy can be pointed out. Reducing illiteracy, people’s awareness would increase, and they achieve a higher level of risk-aversion; therefore, the culture of insurance becomes comprehensive. Since the education and development of human resources is one of the principles of achieving economic development, the efforts made by the government to resolve illiteracy and develop education throughout the country will definitely have a positive impact on the demand for insurance and increase in the purchase of life insurance.

Four factors of population, natural resources, capital and technology have a major role in economic growth. Among them, capital or financial resources and having a strong financial market for the life insurance would play a very important role in economic growth. Supplying capital requires investment which is made with savings. In this regard, life insurance institutions are very important in processing the savings and forming the capital. Using the technological reserves formed by insurance premiums, life insurance institutions can make investments in public or private sectors. This will increase the production. On the other hand, with the increase in productive activities due to the development of life insurance, employment will increase (Nourizadeh, 1999). For this matter, it was attempted to specify the factors influencing the economic growth to some extent by investigating the factors affecting the development of life insurance from the perspective of internal and external investigations. First, some of the common theories regarding the demand for life insurance and the factors influencing them were presented. Then the institutions were introduced, and the impact of governance and macroeconomic conditions were investigated from the perspective of economists. According to the studies conducted by researchers such as Laura and Mihay (2013), Finn et al. (2011), Choi and Coke (2009), Beck and Webb (2002), and Ward and Zurbruegg (2002), the index of good governance had a positive and significant impact on the development of life insurance. Moreover, the improvement in macroeconomic conditions such as increasing GDP per capita, developing financial sector, and decreasing inflation rate had an undeniable role in the development of life insurance. Therefore, the results of theoretical and empirical studies confirmed the fact that the improvement in macroeconomic conditions were considered to be among the important factors of developing life insurance.
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