

# Evaluation of the hypothesis of habit formation in purchasing life insurance policies in Iran

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## Abstract

Throughout its lifetime, neoclassical economics has always faced a steady stream of criticisms and suggestions regarding alternative methods and methodical approaches. The insurance industry consists of a large number of investors with different sentiments. These investors can be faced with emotions such as fear or excitement. In the capital market, these same feelings of investors can become problematic. As many people gain in the stock market and their capital increases, many people may also suffer losses. This research is of an applied type and the data of the statistical sample of the research, which includes the information of customers buying products in the insurance industry during the years 2013-2014, will be analyzed. First, the research variables were calculated using Excel software, and then the data was analyzed in a panel format using Eviews software. In the following, the research hypotheses will be analyzed. Finally, with statistical analysis, it can be stated that the hypothesis of habit formation in buying life insurance by using multivariate and autoregressive conditional heterogeneity variance approach has a significant effect.

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## 1 Introduction

Improving economic growth in all countries is achieved through the creation and improvement of economic infrastructure and business environment, which is an important part of this process, determining appropriate economic goals and choosing smart strategies and turning them into operational plans. Another factor that is very important in achieving the set goals is the development and facilitation of the business environment, the creation, maintenance and improvement of which plays an important role in achieving the set economic goals. The relationship between the development of the business environment and the financial sector of any economy, which includes sectors such as banks, insurance companies, and the capital market, cannot be denied. These sectors, which constitute the financial sector and especially the financing system, either through direct methods such as providing financial resources and credit for production sectors and industries, or through indirect methods such as their facilitating role in the way Starting a new business and also facilitating the process of carrying out economic activities will help to improve the business environment and thus increase the economic growth and development of each country. As one of the most important sectors providing long-term financial resources, the insurance industry can also play a significant role in

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the development of the business environment of any country due to its risk distribution role. Based on this, two roles can be considered for the insurance industry in the development of the business environment. One role of this industry is to provide financial resources and help companies and industries access long-term financial resources; The role of this industry in the financing system through life insurance and savings, which increases the supply of funds and consequently reduces financing costs. Another role is role that this industry can play in facilitating the process of providing credit and financial resources in other financial sectors and distributing the risk of economic activities through insurance fields such as credit insurance, stock insurance and insurance have a deposit Every business is exposed to risks that may impose heavy costs on it. The insurance industry can contribute to the sustainability of business through risk coverage [18].

The insurance industry consists of a large number of investors with different sentiments. These investors can be faced with emotions such as fear or excitement. In the capital market, these same feelings of investors can become problematic. As many people gain in the stock market and their capital increases, many people may also suffer losses. Most of the time, losses to investors are caused by making emotional decisions. For this reason, the psychology of the capital market and understanding the behaviour of investors in the past are considered to be one of the main factors contributing to success in the capital market. Humans usually tend to imitate others and act like them. Successful capital market investors usually use these collective behaviours for their investments. Market psychology is one of the new tools used in financial markets; which can be used to have a new and different perspective on the events surrounding the market. Everything that happens in the capital market or other parallel markets is understood in market psychology. In this way, the investor interprets new events by examining past events and finding similar behaviours. These events generally cause collective behaviour to form in the market. These collective behaviours are interpreted only by market psychology [21].

The principle of rational behaviour forms the basis of the theory of consumer behaviour. According to this principle, it is expected that, based on the available information and limited income, the consumer can rank the goods in terms of priority in such a way that his utility is maximized. In a two-commodity space  $X$  and  $Y$  with market prices  $P_x$  and  $P_y$  and income  $M$ , the consumer consumes an amount of this commodity that maximizes his preference function. If Preference function (objective function)

$$U = F(X, Y) \quad (1.1)$$

Consumer budget limit (adverb)

$$M = XP_x + YP_y \quad (1.2)$$

The demand function at time  $t$  is equal to

$$X_t = F(M_t, P_{xt}, P_{yt}) \quad (1.3)$$

Relationship number (1.3) is actually a static relationship, with the change of independent variables, the demand is instantly affected. While in practice this may not be the case and with the change of each of the independent variables, it will take some time for the consumer to respond to these changes. This issue can be investigated under the title "demand in dynamic mode". One of these reasons may be "habit". In other words, there is a "psychological reserve" 14 in the demand function that leads to a break in the impact of independent variables on demand. Algebraically, this theory is as follows:

$$S(t) = \int_{-\infty}^{t_1} X(t)\delta_e(t_1 - T)dt \quad (1.4)$$

so that:  $\delta$  is the discount rate,  $S(t)$  is the psychological reserve at time  $t$  and  $X(t)$  is the demand at time  $t$

And on the other hand we have:

$$S^0(t) = X(t) - \delta S(t) \quad (1.5)$$

$S^0(t)$  represents the derivative of mental reserve with respect to time. Therefore, relation (1.6) indicates that the changes of  $S(t)$  in two times will include the difference in the amount of purchased goods or services  $X(t)$  and the depreciation of mental reserve. If the demand function is a linear function with respect to income  $Y(t)$ , commodity price  $P(t)$  and psychological reserve, we will have:

$$X(t) = \epsilon + \beta S(t) + \alpha Y(t) + \delta P(t) \quad (1.6)$$

Therefore, in dynamic mode, demand is not only affected by economic factors such as income and current price, but psychological variables also affect it. This new variable expresses the stability (interest) and habit of the consumer

towards changing conditions. In other words, the consumer does not immediately adjust his demand after a change in price or income, because in the process of habit formation, the change in habit immediately causes a lack of utility. Therefore, it is necessary to spend some time in order to obtain information in order to make a decision to maximize the utility.

As stated, in the beginning, classical (conventional) economics had psychological foundations, which can be clearly seen in the studies of Smith, Marshall, Ricardo, Bentham and many founders of classical economics, but with the passage of time and developments such as behaviorism caused these foundations (psychological foundations) to fade to the point that even some classical economists made a serious reaction and even opposition to these foundations. But with the pioneering studies of George Katona and Herbert Simon and then the studies of Kahneman and Tversky, along with the developments in the science of psychology (the emergence of the cognitive movement in the 1960s), a link between psychology and economics was once again created.

Throughout its lifetime, neoclassical economics has always faced a steady stream of criticisms and suggestions regarding alternative methods and methodical approaches. One of these approaches is behavioural economics. Proponents of this economy claim that by using psychological and social foundations, the realism of economic analysis has increased and the special features of this science (theoretical insight, prediction of phenomena and appropriate policies) have been improved. These economists state that although classical economics was initially interested in the foundations of psychology, this interest has since declined and even led to conflict with these principles at times. But behavioural economists, using the pioneering studies of Katona and Herbert Simon, and then the studies of Kahneman and Tursky, etc., have once again been able to establish a link between these two categories. The connection that each of these thinkers has advanced in a very limited area and in order to establish a close and systematic communication and actually achieve a dominant "paradigm" has a long way to go.

Most of the studies that have been conducted on the purchase of life insurance have been limited to the estimation of the demand function of life insurance and through that, the effect of variables such as income, inflation, literacy level, dependents, etc. on the demand for life insurance as a dependent variable of the model has been limited. The study of psychological issues along with economic variables in the purchase of life insurance has been investigated according to macroeconomic theories (as an example of Dusenberry's theory), if consumption, which accounts for an important part of the gross national product, is influenced by relative income. Therefore, the discussion of an eye and an eye is raised and the influence of psychology in economics. Therefore, the question that is raised is whether the buyers of life insurance are subjected to the discussion of eye and eye and risk aversion factors or are affected by past consumption and habit. In particular, the hypothesis of the habits and attitudes of buyers about buying life insurance is the subject that is investigated in this study.

## 2 Literature and research background

In today's diverse world, each of us is a consumer of various goods and services and we lead our lives based on the consumption of these goods and services. The expansion of trade and production has made it possible for every person to consume dozens of types of goods and services. People with different tastes, needs, experiences and desires, each of them, according to their financial limitations, are able to buy the goods or services they like. Buying insurance as a necessary service in life is a behaviour that many consumers in today's society do. Consumer behaviour includes various psychological and social processes that exist before and after purchasing and consumption activities. Several factors affect consumer behaviour (both in the buying process and consumption). Today's customers are no longer just looking to buy their product or service, but they are looking for attractive and memorable moments that will give them a pure feeling. The concept of customer experience was first introduced in 1982. According to the proposed theory, it is not possible to look at the consumer only as a logical entity, and the consumer's behaviour has emotions, feelings and a subconscious mind in addition to rational aspects. In 1998, Pine and Gilmore [20] used the term experience economy for the first time. They divided the development of the economy into 4 general parts. They believed that the world has entered the experience economy after passing through the agricultural economy, industrial economy and service economy. We can consider customer experience as the overall result of customer perception and feeling from direct or indirect exposure to products, services, systems, employees, other customers and the organization's brand. Companies in the 21st century are focusing on the experience-based economy instead of the service-based economy. Currently, customer experience is a key indicator to support the organization's performance. Customer experience is becoming a battlefield for organizations after products and services, and customer satisfaction is seriously based on positive and negative experiences. These experiences play a vital role in decision-making in the customer's purchase process. In the digital era, the value proposition for customer demands must be different from the traditional era. The value proposition must lead to the creation of an attractive experience through versatile channels. Insurers should

adopt an analytical approach to handle the claims of the insured, which should be done automatically.

Due to its limitations, the human mind usually cannot see the whole reality, for this reason, it suffers errors in understanding the reality, which we call "cognitive errors". We suffer from cognitive errors because our minds can only see a part of reality and not the whole of reality. As mentioned, some of the factors affecting consumer behaviour are psychological and individual factors, which consist of various factors such as motivation, perception, learning, personality, perceptions, etc. Among these factors, perception has a significant role and influence on consumer behaviour. Perception is a process during which a person creates a meaningful image of the world through selection, organization and interpretation of information.

## 2.1 Effective factors in consumer behavior

Consumers are very different from each other in terms of age, income, level of education, taste and other factors. Consumer behavior is influenced by individual characteristics in his decision making process. Individual characteristics consist of four main cultural, social, personal and psychological factors. In the following, each of these factors is briefly explained.

- A) **Cultural factors;** Cultural factors have the most and deepest effects on consumer behavior.
- B) **Social factors;** Consumer behavior is also influenced by social factors. These social factors consist of small groups, family members, and the social position and role of the consumer. Companies should carefully consider these factors when drafting their marketing policies, because these factors strongly affect consumer reactions.
- C) **Personal factors;** buyer's decisions are also influenced by his personal characteristics. These features include age and stage of life, occupation, economic status, lifestyle and personality and personal image.
- D) **Psychological factors;** Buying is influenced by four major psychological factors, including motivation, understanding, learning, and beliefs.

- Perception

Most of what we know about the world around us is transmitted to us through our senses, and these sensory processes are physiological in nature and are actually made up of our nervous system. Perception is a process by which people give meaning to their sense perceptions. Perception affects feelings by recalling and using past experiences, and people give meaning and meaning to their sense perceptions. Perception plays a major role in the stage of the purchase decision process where options are identified. Perception is the process of receiving, organizing and transforming meanings into information by the five senses, and this is how we interpret or give meaning to the world around us.

- Learning

We acquire many attitudes, values, tastes, behaviour, preferences, etc. through learning. Culture and social class, family, friends, school, etc. provide us with learning experiences that greatly affect our lifestyle and consumer goods. Learning refers to relatively permanent changes in behaviour that result from experience. Sometimes, these experiences do not directly affect the learner. People can learn without trying, for example, consumers can remember the names of many brands, even the products they don't use.

- Motivation

Every person has several needs at any time, when a need becomes so intense that it creates tension, motivation occurs. A motivating factor is a need that exerts enough pressure to determine a person's path to self-satisfaction.

- Beliefs and ideas

People acquire their beliefs and opinions through action and learning. These beliefs and opinions, in turn, affect their buying behavior. A belief is a descriptive opinion that a person has about something. Marketers are interested in people's beliefs about specific goods and services and how these beliefs are formed. These beliefs are placed like a halo around the product and the mental image of the brand, and people also act based on their beliefs. If some of these beliefs prevent the purchase due to incorrectness, the marketer must adjust and correct it by resorting to special programs.

People have beliefs about religion, politics, clothing, music, food, and almost everything else. An opinion represents a person's relatively stable evaluations, feelings, and inclinations toward a product or a way of thinking. These are the beliefs that make people like or hate something and make them go towards something or avoid it. The mentioned items influence the person's attitude, and the habit is the resistance to changing the attitude.

These cases are part of the psychological factors that have an impact on consumer behaviour especially on life insurance buyers, in addition to that, from the point of view of economic issues, the coefficient of the eye and eye effect in consumption among Iranian households shows that this coefficient is between 55% It is up to 68%. This coefficient is indicative of the high degree of eye effect and eye effect in consumption among Iranian households and the influence of psychological factors in Iranian households and shows the high importance of relative consumption. In addition, the coefficient of risk aversion in Iranian households is significant, and much other evidence indicates attention to psychological issues related to the behaviour of consumers or buyers of life insurance policies. In fact, in this study, we examine one of these factors, "habit formation" as a psychological factor along with other economic factors.

## 2.2 life insurance

Life insurance is one of the most important fields of personal insurance. From a legal point of view, life insurance is a contract whereby the insurer, in exchange for receiving the insurance premium, undertakes to pay a certain amount in the event of the insured's death or survival. capital or pension) to the policyholder or a third party designated on his behalf. Technically, life insurance is a type of insurance operation whose obligations are subject to the length of a person's life.

### 2.2.1 Types of life insurance

Life insurance is divided into four groups:

#### 1. Life insurances in case of insured life

- (a) Capital insurance under the condition of life or return of insurance premium or without return of insurance premium (with single insurance premium or installment insurance premium): it is an insurance contract by which the insurer undertakes to pay a fixed capital in return for receiving the insurance premium. pay at the expiration of the insurance period and on the condition that the insured is still alive on that date. In case of death of the insured before the expiration of the said period, the insurer has no obligation (another type of this insurance with the condition of returning the insurance premium in case of death of the insured during the period It is a contract whose rate is more expensive than the usual rate).
- (b) Lifetime immediate annuity insurance and temporary temporary annuity insurance: according to the contract, the insurer undertakes to pay a certain amount at the end of every year or every six months or every three months from the date of insurance commencement (conclusion of the insurance contract) in case of life insurance The insurance premium of this type of insurance is received in a single lump sum. If the pension payment period is limited, it is called temporary pension insurance, and if it is for the whole life, it is called lifetime pension insurance.
- (c) Retirement pension insurance: the date of pension payment may be several years after the conclusion of the contract. In this case, it is called delayed pension insurance (or pension insurance).

If the insurance premium of this type of insurance is not paid in one lump sum, it can be paid in installments (monthly, quarterly, six-monthly and yearly) during the delay period. In fact, all kinds of pension insurances are a form of this type of insurance. The payment of pension may be conditional on the survival of one or more people. In the latter case, the pension is paid until the last person is alive, or the amount paid by the insurer decreases with the death of each person. In two-person pension insurance, the pension payment continues until the death of the other person (if each one dies earlier, the pension is paid to the other).

#### 2. Life insurance in case of death of the insured

- (a) Term life insurance or term simple death risk insurance: it is an insurance contract whereby the insurer undertakes to pay the capital specified in the policy only in If the insured dies before the expiry of the specified period, he will pay the user. If the insured is alive at the end of the mentioned period, the insurer has no obligation. There is another type of this insurance with the condition of returning the insurance premium if the insured is alive at the expiration of the contract, whose rate is more expensive than the normal rate. In this insurance, if the insured does not die during the contract period, the premiums received from the policyholder will be returned to him without interest.

#### 3. Mixed life insurances

- (a) Mixed savings insurance for one person and two people: In this insurance, the insurance capital can be paid in case of death of the insured during the insurance period and also in case of his/her survival at the expiration of the insurance period.
- (b) Fixed term insurance with capital payment at the expiration of the term: the insurance capital is paid to the user at the expiration of the term specified in the insurance policy, whether the insured who is also the policyholder is alive or not. If the policyholder dies before the expiration of the insurance period, the payment of the insurance premium is stopped (the insurer does not claim the insurance premium).

#### 4. Children's capital insurance

Like term insurance, it is fixed and the capital is paid at the expiration of the term, provided that one of the beneficiaries mentioned below is alive:

- (a) The child specified in the contract.
- (b) Brothers and sisters of this child who are alive or will be born during the contract period.

If the above persons and the insured (premium payer), who is usually the father, die before the expiration of the insurance period, the paid insurance premiums will be returned without interest. However, if only the insured is alive, he can request a change. Enter the user.

## 2.3 Research background

### 2.3.1 Domestic background

Pezhouyan and Pour Partovi [19] estimated the pattern of life insurance demand using the statistical data of 2014-2015 and the amount of demand for 2013 has been estimated. In this research, the effect of income, expected inflation, burden and level of education on the demand for different types of life insurance in Iran has been studied. Received insurance premiums as a demand for life insurance as a dependent variable and other variables as a dependent variable in the relevant model using the ordinary least squares (OLS) method. The obtained results show that income and education have a positive effect and inflation, on the contrary, has a negative effect on the demand for life insurance.

In 2006, using the statistical data of the time series of national, monetary and financial accounts of the Macroeconomic Office of the Program and Budget Organization and the statistical calendar, the variables of income, the probability of the death of the head of the household, the burden of dependents, inflation and education as independent variables of the model and It has used the insurance premium received per capita of life insurance as the dependent variable of the model. The result of this model shows. The percentage elasticity of demand for life insurance with literacy is greater than unity. Assuming that educated people are risk-averse, the justification of the coefficient is more than an elasticity of education. In this research, the effect of dependent variables and the probability of death of the head of the household is rejected at the level of 5%. In other words, removing these two variables did not have much effect on other variables. However, the effect of the expected inflation variable is significant and has a negative coefficient.

In [17], Mehrara and Rajabian presented an article entitled "Demand for life insurance in Iran and oil exporting countries". In this article, the demand for life insurance is estimated using Iranian time series data during the period of 1383-1345, based on the ARDL approach, as well as panel data for middle-income oil exporting countries for the period of 1998-2002, and the results are compared. The results show that the main factors determining the demand for life insurance in Iran include: income, level of education, and dependents. The income elasticity of life insurance demand shows that life insurance is a luxury commodity in oil-rich countries with middle income, but in Iran, this commodity is a necessary commodity. Therefore, the increase in income plays a more fundamental role in the expansion and evolution of life insurance in oil-rich countries compared to Iran. In addition, technical and institutional capacities, especially in the supply of riyals, are more important in the development of life insurance in oil-rich countries than in Iran. Demand factors.

Abbasi and Derakhshideh, in [1], investigated factors such as per capita income, savings rate, and literacy rate on the demand for life insurance in Iran. According to the results obtained in their article, income and savings rates have a positive and significant relationship with the demand for life insurance, but the inflation rate has a negative and significant relationship. The literacy rate did not have a significant relationship with the demand for life insurance.

### 2.3.2 Foreign background

One of the theoretical academic research on the risk-averse economic human behaviour that aims at risk management is the famous article by Yaari [23]. In his study, Yaari points out that the demand for life insurance should be examined from the perspective of consumer resource allocation in the framework of the life cycle model. This research

was the beginning of much other research. In [15], Hammond et al. in the article entitled "Determining the cost of family insurance premiums, an experimental study", experimentally showed that there is a positive relationship between the burden of dependency and the demand for life insurance.

Hakansson [14], in the article entitled "Optimal investment and consumption strategies under risk, an uncertain lifetime, and insurance", Fischer [12], in 1973, in the article entitled "A life cycle model of life insurance purchases", Fortune [13], in 1973, in An article entitled: "A theory of optimal life insurance: Development and test", and Campbell [7] in an article entitled "The demand for life insurance: An application of the economics of uncertainty". A positive and significant relationship between national production and life insurance demand has been achieved.

Cummins in [8], in an article entitled "An econometric model of the life insurance sector of the US economy", has investigated the effects of macroeconomic variables on the American life insurance industry and has achieved a positive and significant relationship between life insurance and gross national product. In 1981, in an article titled "Inflation, indexation, and life insurance sales in Brazil", Babbel [2] found a significant and negative relationship between life insurance and expected inflation.

Beenstock et al., in [3], in an article titled "The determination of life premiums: An international cross-section analysis 1970–1981", studied the relationship between liability insurance and income for 50 developing and developed countries. According to the results of that model, the positive relationship between income insurance and life insurance premiums was confirmed.

In 1993, Browne and Kim [6], in the article titled "An international analysis of life insurance demand", the factors influencing the demand for life insurance include: income, dependent burden, expected inflation and education level for 45 developing countries and investigated the developed and the results of that article showed a positive and significant relationship between the demand for life insurance with income and burden and a negative relationship with expected inflation. Lim and Haberman in [16] investigated the impact of macroeconomic variables on the demand for life insurance in Malaysia and confirmed the positive relationship between income and negative inflation on life insurance.

Dynan in [9], in her article entitled "Habit formation in consumer preferences: Evidence from panel data" examines the existence of habit formation in the family. The results confirm the hypothesis of habit formation in household consumption. In other words, the demand depends on the demand or consumption of the previous years in addition to the current variables. Therefore, consumption or demand is dependent on the variable of permanent income so that the current income and the consumer resist the shocks created so that the current consumption is less subject to changes.

Tan et al. in [22] have an article titled "Optimal dynamic reinsurance policies under a generalized Denneberg's absolute deviation principle". In this article, the impact of habit formation on the demand for possible life demands has been investigated in the life cycle model. As in the article, the consumer divides his resources between saving and consumption and investing in buying life insurance. With the difference that this article specifies how consumption habits can change the motivation related to inheritance and in this regard, how the demand for products such as insurance is formed in conditions of uncertainty and risk aversion. According to this model, on the one hand, the head of the family behaves in order to maintain his consumption level in accordance with the consumption of previous years, and this issue may have a decreasing effect on savings, on the other hand, due to risk management in conditions of uncertainty, it is necessary for the heirs. Save enough to avoid any problems in the future. Therefore, these cases have been examined together with the discussion of habit formation and its effects on consumption and savings in the life cycle model and purchase of life insurance in order to foresee the future of the head of the household.

### 3 Research method

This research is of an applied type and the data of the statistical sample of the research, which includes the information of customers buying products in the insurance industry during the years 1391-1400, will be analyzed. First, the research variables were calculated using Excel software, and then the data was analyzed in a panel format using Eviews software. In the following, the research hypotheses will be analyzed.

## 4 Research findings

### 4.1 Descriptive statistics

In this section, the descriptive analysis of the research data is discussed and descriptive statistics for the research variables are presented. Descriptive statistics includes a set of methods used to collect, summarize, classify and describe numerical facts.

Descriptive statistics indicators presented in this table are mean, median, maximum, minimum, standard deviation and Jarek-Ber test. The most important central index is the average, which represents the balance point and the center of gravity of the distribution, and is a good index to show the centrality of the data. Standard deviation is one of the most important dispersion parameters and a measure of the dispersion of observations from the average. One of the most important uses of the descriptive statistics table is judging the normality or abnormality of the data. Jarek's test is a general test for this review. According to the table below, some research variables are normal and others are abnormal.

Table 1: Descriptive statistics of research variables

Log of mental reserve (habit)	Log of Price	Log of income	demand	Variable name
10.302	11.27	18.204	11201.50	Average
10.371	11.28	18.354	11748.00	Middle
10.642	13.12	20.049	15408.00	Maximum
9.502	8.545	15.804	4926.00	Minimum
0.220	1.196	1.0808	2112.32	standard deviation
0.000	0.0506	0.038	0.000	Jarek Bra test
120	120	120	120	Number of observations

## 4.2 Unit root test

One of the important things that must be checked before estimating the model is checking the stationary variables. This case exists in most time series and is investigated to prevent false regression. If the time series variables are unknown, the model will result in a false regression. Therefore, it is necessary to determine the significance or non-significance of the variables before estimating the model. In this research, the Augmented Dickey-Fuller (ADF) and Phillips Perron (PP) tests were used for the investigation. These two tests were conducted for the level and difference of the data, and the results presented in the table below indicate the significance of the research variables, and the non-significant variables were made significant through a differential method. As a result, the model is safe from false regression.

Table 2: Mean test of variables

Variable	level	Data difference	level	Data difference
demand	0.0000		0.0000	
Log of income	0.0000		0.0000	
Log of Price	0.9727	0.0000	0.9742	0.0000
Log of mental reserve (habit)	0.0000		0.0000	

## 4.3 Variance heterogeneity test

It is clear that one of the most important assumptions of the linear regression model is that the disturbance components that appear in the regression function have the same variance. In this research, the LR test was used to investigate this issue. The results of this test in the table below show the existence of variance heterogeneity in the data of all research hypotheses.

Table 3: Heterogeneity of variance test

Test	LR test		Result
	t statistic	probability	
Research hypothesis	-24224.01	0.359	There is heterogeneity

## 4.4 Autocorrelation test

In a classical linear regression model, it is assumed that the covariance between disturbance components is equal to zero. In other words, there is no correlation between the disturbance components. Violation of this assumption creates a problem called autocorrelation. In this research, Voldrich's test was used to check this assumption, the zero assumption of which is based on the absence of autocorrelation. The results of this test in the table below indicate the lack of autocorrelation of the data.



Table 4: Autocorrelation

Test	Wooldridge test		Result
	t statistic	probability	
Research hypothesis	0.238	0.6001	There is no autocorrelation

#### 4.5 Port Manto test to check the correlation of disorder components of the model

The following table shows the results of the Port Manto test to check the correlation of the disorder components of the model. Based on the results in this table, the hypothesis of zero correlation between the disorder components of the model is rejected.

Table 5: Port Manto's test to check the correlation of disorder components of the model

Prob	Kaido statistics	Degrees of freedom	Lag
< 0.0001	48.94	4	2
< 0.0001	63.90	8	3
< 0.0001	81.51	12	4
< 0.0001	86.51	16	5
< 0.0001	95.99	20	6
< 0.0001	102.46	24	7
< 0.0001	108.96	28	8
< 0.0001	113.13	32	9
< 0.0001	117.04	36	10
< 0.0001	118.69	40	11

#### 4.6 LM test

In this research, modified GARCH model and EViews software have been used. The results of the estimation of exchange rate fluctuations are presented in the table below.

Table 6: Autocorrelation test

Test	LM test		Result
	t statistic	probability	
Research hypothesis	2.976	0.0094	GARCH method is suitable

According to the LM Test, if the hypothesis of non-existence of ARCH is rejected, the model is estimated as ARCH, and if the hypothesis of non-existence is accepted, the model is estimated as ARIMA. According to the results of this test, the probability of which is 0.0094, the null hypothesis is rejected and it means that the exchange rate changes have ARCH effects. As a result, this time series has been estimated in ARCH format and the modified GARCH method has been used to estimate the model. According to what is presented in the above table, it is concluded that GARCH is significant.

In this research, the autoregressive conditional variance heteroskedasticity model (GARCH) was used to calculate the hypotheses during the period from 2013 to 2014. This model is usually used for financial time series that show volatility categories based on time (periods with volatility are accompanied by periods without volatility). One of the reasons for using ARCH models is the presence of small and large prediction errors in economic clusters (such as exchange rates, etc.). The advantage of ARCH models is that they can explain the trend of conditional variance according to the past information of the variable itself and its variance. In time series studies, researchers have seen extreme fluctuations of the series in some periods and faced the decline of these fluctuations in other periods. Mak's studies in 1979 have shown the usefulness of the ARCH model for examining such time series. Further, in the real world, empirical applications first encountered the fact that the estimation of the  $ARCH(\infty)$  model was practically impossible until Bollerslev proposed the GARCH model in [4] to solve this problem.

#### 4.7 The final test of research hypothesis

Univariate GARCH linear combination models, as their name suggests, are linear combinations of several univariate models, each of which is not necessarily a standard GARCH model. However, the univariate GARCH nonlinear combination models allow the researcher to separately specify each of the conditional variances on the one hand and specify the conditional correlation matrix on the other hand. Calculating these models using existing software is

not possible and requires special programming. But among the above models, vector GARCH models, BEKK and F-GARCH factor models are more widely used in financial time series modelling [5], which will be introduced in the general structure of the BEKK model.

Suppose vector  $r_t$  is the yield vector of N financial assets in the period t and  $I_{t-1}$  is the collection of information collected until time t-1. Therefore, it can be written:

$$r_t = \mu_t(I_{t-1}) + \varepsilon_t \quad (4.1)$$

where the following vector is the expected return of the period t according to the past information set, which can be a VAR model in the following relationship:

$$\mu_t = A_0 + \sum_{i=1}^p A_i r_{t-i}. \quad (4.2)$$

The following vector represents the residuals in the period T, which can be defined as follows:

$$\varepsilon_t = H_t^{\frac{1}{2}}(I_{t-1})z_t. \quad (4.3)$$

Considering that in a VEC model it is difficult to guarantee the positive definiteness of  $H_t$  without applying strong restrictions, Engle and Kroner [11] proposed the BEKK model. A BEKK(1,1,K) model is defined as the above relationship:

$$H_t = C^{*'}C^* + \sum_{k=1}^K A_k^{*'}\varepsilon'_{t-1}\varepsilon_{t-1}A_k^* + \sum_{k=1}^K G_k^{*'}H_{t-1}G_k^*. \quad (4.4)$$

In a simpler form, a BEKK(1,1) model is defined as follows:

$$H_t = C^{*'}C^* + A_k^{*'}\varepsilon'_{t-1}\varepsilon_{t-1}A^* + G^{*'}H_{t-1}G^*. \quad (4.5)$$

According to the explanations provided, the complete and opened form of the 3rd order model is presented as a relation:

$$\begin{bmatrix} r_{1,t} \\ r_{2,t} \\ r_{3,t} \end{bmatrix} = \begin{bmatrix} \phi_{0,1} \\ \phi_{0,2} \\ \phi_{0,3} \end{bmatrix} + \begin{bmatrix} \phi_{1,1,1} & \phi_{1,1,2} & \phi_{1,1,3} \\ \phi_{1,2,1} & \phi_{1,2,2} & \phi_{1,2,3} \\ \phi_{1,3,1} & \phi_{1,3,2} & \phi_{1,3,3} \end{bmatrix} \begin{bmatrix} r_{1,t-1} \\ r_{2,t-1} \\ r_{3,t-1} \end{bmatrix} + \begin{bmatrix} \phi_{2,1,1} & \phi_{2,1,2} & \phi_{2,1,3} \\ \phi_{2,2,1} & \phi_{2,2,2} & \phi_{2,2,3} \\ \phi_{2,3,1} & \phi_{2,3,2} & \phi_{2,3,3} \end{bmatrix} \begin{bmatrix} r_{1,t-2} \\ r_{2,t-2} \\ r_{3,t-2} \end{bmatrix} + \dots + \begin{bmatrix} \varepsilon_{1,t} \\ \varepsilon_{2,t} \\ \varepsilon_{3,t} \end{bmatrix} \quad (4.6)$$

$$\begin{bmatrix} \varepsilon_{1,t} \\ \varepsilon_{2,t} \\ \varepsilon_{3,t} \end{bmatrix} = \begin{bmatrix} h_{11,t} & h_{12,t} & h_{13,t} \\ h_{21,t} & h_{22,t} & h_{23,t} \\ h_{31,t} & h_{32,t} & h_{33,t} \end{bmatrix}^{\frac{1}{2}} \begin{bmatrix} z_{1,t} \\ z_{2,t} \\ z_{3,t} \end{bmatrix} \quad (4.7)$$

Also, the conditional variance-covariance matrix of the model according to a BEKK(1,1) model is defined as follows:

$$\begin{aligned} \begin{bmatrix} h_{11,t} & h_{12,t} & h_{13,t} \\ h_{21,t} & h_{22,t} & h_{23,t} \\ h_{31,t} & h_{32,t} & h_{33,t} \end{bmatrix} &= \begin{bmatrix} c_{11} & c_{12} & c_{13} \\ 0 & c_{22} & c_{23} \\ 0 & 0 & c_{33} \end{bmatrix}^T \begin{bmatrix} c_{11} & c_{12} & c_{13} \\ 0 & c_{22} & c_{23} \\ 0 & 0 & c_{33} \end{bmatrix} + \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}^T \begin{bmatrix} \varepsilon_{1,t-1} \\ \varepsilon_{2,t-1} \\ \varepsilon_{3,t-1} \end{bmatrix} \begin{bmatrix} \varepsilon_{1,t-1} \\ \varepsilon_{2,t-1} \\ \varepsilon_{3,t-1} \end{bmatrix}^T \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix} \\ &+ \begin{bmatrix} g_{11} & g_{12} & g_{13} \\ g_{21} & g_{22} & g_{23} \\ g_{31} & g_{32} & g_{33} \end{bmatrix}^T \begin{bmatrix} h_{11,t-1} & h_{12,t-1} & h_{13,t-1} \\ h_{21,t-1} & h_{22,t-1} & h_{23,t-1} \\ h_{31,t-1} & h_{32,t-1} & h_{33,t-1} \end{bmatrix} \begin{bmatrix} g_{11} & g_{12} & g_{13} \\ g_{21} & g_{22} & g_{23} \\ g_{31} & g_{32} & g_{33} \end{bmatrix} \end{aligned} \quad (4.8)$$

where C matrix is constant values, A is ARCH coefficients matrix and G is GARCH coefficients matrix. If we order the elements of the return vector ( $r_t$ ) by size, that means the time series  $r_{1,t}$ ,  $r_{2,t}$ , and  $r_{3,t}$  represent the time series of stock index returns, respectively. If it is assumed that the lead-lag feature, which was stated in the previous chapter, exists as a basic theory of research in the spread of returns, the conditional average part of the model will be lower triangular and the other parts will not change. Therefore, assuming the establishment of the lead-lag effect, the conditional average part of the model will be as follows:

$$\begin{bmatrix} r_{1,t} \\ r_{2,t} \\ r_{3,t} \end{bmatrix} = \begin{bmatrix} \phi_{0,1} \\ \phi_{0,2} \\ \phi_{0,3} \end{bmatrix} + \begin{bmatrix} \phi_{1,1,1} & 0 & 0 \\ \phi_{1,2,1} & \phi_{1,2,2} & 0 \\ \phi_{1,3,1} & \phi_{1,3,2} & \phi_{1,3,3} \end{bmatrix} \begin{bmatrix} r_{1,t-1} \\ r_{2,t-1} \\ r_{3,t-1} \end{bmatrix} + \begin{bmatrix} \phi_{2,1,1} & 0 & 0 \\ \phi_{2,2,1} & \phi_{2,2,2} & 0 \\ \phi_{2,3,1} & \phi_{2,3,2} & \phi_{2,3,3} \end{bmatrix} \begin{bmatrix} r_{1,t-2} \\ r_{2,t-2} \\ r_{3,t-2} \end{bmatrix} + \dots + \begin{bmatrix} \varepsilon_{1,t} \\ \varepsilon_{2,t} \\ \varepsilon_{3,t} \end{bmatrix} \quad (4.9)$$

The explanation of the elements of this model is the same as the previous model.

It should be noted that BEKK models are a special form of VEC models, but the parameters of BEKK model, unlike VEC model, do not directly show the effect of interruptions on  $H_t$  elements. Despite the application of various restrictions on BEKK models, usually too many parameters are still a basic problem. Therefore, these models are not used in cases with dimensions of more than 3 or 4 variables (series).

In [10], Engle presented a new method to determine the parameters of  $H_t$ . His main idea was that simultaneous changes in stock returns are caused by a limited number of common variables, which are called factors. The factor model (FA) can be expressed as a special form of the BEKK model.

In order to overcome some of the consequences of the ARCH model, the generalized ARCH model with GARCH was proposed by Bollerslev [4].

The definition of GARCH (p,q) process is as follows:

$$\delta_t^2 = \omega + \sum_{i=1}^q \alpha_i \varepsilon_t^2 + \sum_{j=1}^p \beta_j \delta_{t-j}^2 \quad (4.10)$$

$$E(\varepsilon_t / \varepsilon_{t-1}) = 0 \quad (4.11)$$

which the latter relationship is the infinite ARCH pattern equation. Therefore, it can be concluded that the GARCH model is better compared to the ARCH model.

#### 4.8 Research hypothesis

In this research, the following model is used to estimate the final model using the GARCH method:

$$X(t) = \epsilon + \beta S(t) + \alpha Y(t) + \delta P(t)$$

The hypothesis of habit formation in buying life insurance is confirmed in a meaningful way.

Table 7: Research hypothesis test

Variable	Coefficients	Z-statistic	Statistical probability
mental reserve logarithm (habit)	9503.53	66.12	0.000
logarithm of income	126.60	8.24	0.000
Price logarithm	-71.65	-12.78	0.000
Fixed variable	-85210.44	-52.94	0.000
GARCH	-72.11	-6.24	0.005
The coefficient of determination			0.674
Adjusted coefficient of determination			0.668
Durbin-Watson Test			1.903

The results related to the probability of z-statistics show that the models are generally significant for the Garch state and according to their Durbin-Watson statistic of 1.903, there is no autocorrelation problem. In addition, the results related to the coefficient of determination show that during the research period for this hypothesis, 0.67 of the dependent variable changes were influenced by the independent variable of this test. According to the results of the above table, it can be stated that the hypothesis of habit formation in buying life insurance by using multivariate and autoregressive conditional heterogeneity variance approach has a significant effect.

## 5 Conclusion

Today, insurance is considered as one of the manifestations of progress and it has an impact on people's lives in many countries of the world. People benefit from life insurance as a tool for investment, overcoming problems caused by the death of the head of the family, old age and old age, so they allocate a significant share of their income to it. The vast amount of capital of insurance companies, especially life insurance companies in the world, has forced these companies, which are part of the global financial system, to carry out commercial and economic activities. These companies give a part of the profit to the insurers and they work extensively to increase demand and market and supply better products. Among the methods that intelligent people have provided to face risks and provide for their economic, social and psychological conditions is the phenomenon of "insurance"; Because insurance is a tool that, in

addition to compensating for economic losses caused by accidents, provides for the future, improving people's living standards and creating a safe platform for economic growth and development, it gives peace of mind to the members of the society, which in turn, causes dynamics. Social life, the growth and flourishing of talents and the increase of efficiency and productivity in society becomes the family, when the main source of its income is lost due to risks such as premature death, disability, unemployment, or the arrival of old age and retirement. If he does not have other resources to replace him, he will be in a very bad situation. In such a situation, such adverse consequences can be dealt with by the mechanism of life insurance.

There are many structural problems that exist in third-world countries such as Iran, which ultimately create barriers and factors of reluctance to buy life insurance policies, one of which is the huge class difference in these deciles of society. A large part of society is at such a low level economically and socially that they cannot afford to buy an insurance policy, and a part that usually includes a small percentage of society is at such a high level that there is no need to buy this insurance policy. They don't have any and they get huge profits by making short-term investments, so they won't have the desire to buy an insurance policy. In the third part of society, proper advertisements have not been made to attract their attention.

The complete government structure of insurance providing pension services, such as social security and national services, has also had a very negative effect on the life insurance and investment industry. In addition, the structure of Iran's insurance industry is completely designed and controlled by the government. The insurance tariffs are not free and competitive and are presented by the Supreme Insurance Council affiliated to the Central Insurance and other insurance companies, even private companies, are forced to implement them, which has caused the lack of penetration of life and investment insurance in the Iranian society. Therefore, in order to better examine the obstacles and factors of not buying an investment life insurance policy, we will discuss the following points.

Another factor that is related to the previous one is the low level of income. There is a direct relationship between income level and demand for life insurance. A decrease in purchasing power and limited income prevent buying insurance. People provide their essential needs in the first place and allocate additional funds to other expenses and savings. Research shows that the per capita income elasticity of life insurance is 1.57 compared to the per capita income. Therefore, according to the elasticity of per capita income, life insurance is a luxury product from an economic point of view, and with the increase in income, the share of life insurance premiums increases sharply, which leads to the following result: life insurance is dependent on per capita income and seeks to increase. The income of life insurance will also increase.

There is a direct relationship between the burden of takaful and the amount of demand for life insurance under normal conditions, while this relationship is the opposite in the case of Iran. In developed countries, with the increase in the number of dependents, the head of the family feels a greater need to buy insurance to protect the future of the family members from the risk of becoming homeless and other consequences. But in Iran, due to the lack of knowledge about life insurance and the fact that as a result of the increase in the number of dependents, it has become more difficult to meet the needs of all family members, so there is no need to buy life insurance. With the increase in the number of children, the head of the family is thinking more about providing their everyday necessities and life insurance is considered a luxury item for them.

The most important recommendation for the development of life insurance is to move towards a competitive environment and carry out activities by the private sector. Being a state-owned life insurance industry is not suitable for its development and expansion, because life insurance requires motivation and patience more than other insurances, and the insurer must seek to attract individual customers, each of whom does not pay a large premium on their own. In addition, activating the departments related to research and research on various issues of life insurance, such as a more accurate assessment of risks, determining tariffs and insurance premium rates, and choosing the right place to invest technical and mathematical reserves in solving sales problems. Life insurance will be effective. Using different educational and propaganda methods such as radio programs, religious and social lectures, making television series and movies, and even getting help from the clergy of mosques to change people's attitude towards belief in fate and destiny. God's destiny without effort and practical action regarding the future, correcting the culture of negligence and indifference towards the future of oneself and children and not planning for it, avoiding luxury and consumerism, all of which are reprehensible and objectionable from the point of view of Islam. Also, encouraging people to spend properly and save is one of the things that removes obstacles to buying life insurance.

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