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Determinants of Sharia Life Insurance Density in Indonesia

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Abstract--- *Insurance density is defined as the ratio between total insurance premium and population of a country. Therefore, insurance density is one of indicators that can be used as a proxy for measuring insurance demand. This research was conducted to examine what factors determines the density of sharia life insurance in Indonesia and how the prediction of these variables for the next 10 years. The independent variables utilized in this study are life expectancy, dependency ratio, income per capita, savings, education, urban population, interest rates, unemployment and inflation. The analytical method applied in this study is to select the best model using best subset regression. The benefit of best subset regression is to determine which independent variables would be included in the regression model so as to explain the behavior of sharia life insurance density appropriately. The findings show that the best model is a model that contains 4 independent variables and the influence of them, namely income per capita, age dependency ratio, and education is significantly positive towards the density of sharia life insurance at the alpha level of 5% while unemployment also has a significant and negative impact on insurance density at the alpha level of 5%.*

Keywords--- *Insurance Density, Indonesia, Sharia Insurance.*

I. INTRODUCTION

Sharia insurance products are insurance products that have followed Islamic norms ranging from contracts, concepts, basic principles, legal basis that follow the Qur'anic rules to its supervisory board. The first sharia insurance company in the world was founded in 1979 in Sudan called Islamic Insurance of Sudan, which was then followed by the Saudi Arabian country which the company name is The Islamic-Arab Insurance Co. Other Middle Eastern countries also helped to establish Islamic insurance. As for the Southeast Asian region, sharia insurance was first implemented by Malaysia.

Sharia insurance is a form of business that has to protect and help among a number of people from certain risks through investments in the form of assets (*tabarru'*) that provide return through contracts (agreements) that are following sharia concept. Sula (2004)states that takaful or sharia insurance is regulated based on 3 main principles namely all participants are responsible for paying a sum of money as contributions, cooperating with each other and helping one another, and protecting each other. In sharia concept, the role of the insurance company is limited to only manage the operational management and investment from the amount of funds.

Fund management carried out in sharia insurance is transparent and is used maximally to bring benefits to the insurance policy holders themselves. In sharia insurance, a grant agreement (*tabarru*) is only used that is based on the sharia system and is certainly halal. Referring to the sharia contract used, the collection of funds in the sharia insurance fund is a shared property (all insurance participants), where the insurance company only acts as the fund

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manager only. In Islamic insurance, all profits obtained by companies related to insurance funds, will be distributed to all insurance participants.Sharia insurance investment activities may not be carried out through business activities that are contrary to Islamic principles and contain illegal elements in its activities such as gambling and games classified as gambling.

Sharia insurance was first established in Indonesia in 1994, which was pioneered by PT United Takaful Indonesia. Quite still young and new, the development of the sharia industry can be quite good. In sharia insurance, supervision is carried out strictly by the National Sharia Council formed directly by the Indonesian Ulama Council and assigned to oversee all forms of implementation of sharia economic principles in Indonesia. The development of sharia insurance in Indonesia has increased every year as seen from the increasing number of sharia insurance companies, increased assets, investments and gross contributions. The increase in the growth of the insurance industry using sharia principles is shown in the number of life insurance companies, non-life insurance and reinsurance with sharia principles and insurance companies that have sharia units in 2017 as many as 63 or an increase of 8.6% compared to 2016 with 58 companies. While in terms of assets, the sharia insurance industry in 2017 had assets that increased by 22.4% compared to 2016, from IDR 33.12 trillion to IDR 40.53 trillion. The gross contribution of the sharia insurance industry in 2017 reached IDR13.74 trillion, an increase of 11.7% from the gross contribution in 2016, which was IDR12.31 trillion. Although the growth of Islamic insurance in Indonesia is relatively slow, it is quite convincing that this industry is able to contribute to economic growth. Safitri (2019)revealed that Islamic insurance provides a significant positive contribution to economic growth in Indonesia, while economic growth does not affect the amount of demand for Islamic insurance.

Insurance density is one of indicators used to measure the growth of the insurance industry by dividing premiums or insurance contributions to the total population. In terms of sharia life insurance, if the gross contribution amount of IDR 11.09 trillion compared to the total population of Indonesia in 2017, which is 261.9 million people, an insurance density of IDR 42,344 will be obtained. This has the understanding that on average every Indonesian citizen spends IDR 42,344 to pay sharia life insurance premiums. The number of sharia life insurance participants in 2017 was 7.4 million participants. If the figure is categorized as the total population of Indonesia, it is only 2.86% and 2.04% for 2016. This percentage is very small compared to the fact that Indonesia is the country with the majority Muslim population in the world.

There have been many studies that discuss the determinants of sharia or takaful insurance demand, for example research conducted by Gustina & Abdullah (2012), Redzuan(2014), Arifin, Yazid, & Hussin, (2014) and Akhter & Khan (2017). Akhter & Khan (2017) conducted a study of takaful insurance demand by using a takaful insurance density proxy. Research that discusses the determinants of sharia or takaful insurance penetration from a manager's perspective is fromMohamed & Alhabshi (2015).

This study examines the determinants of sharia life insurance density in Indonesia by dividing it into 2 main categories namely economic factors and demographic factors because it refers to most of the previous studies namely Gustina & Abdullah (2012); Beck & Webb(2003); Browne & Kim, (1993); Dragos(2014); Redzuan(2014); Arifin, Yazid, & Hussin, (2014).

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Economic factors that are considered in determining the density of sharia insurance are per capita income, interest rates, and inflation. Browne & Kim, (1993) state that income becomes the most important oneamong macroeconomic factors that leads people to be able to afford and buy which causes demand for insurance products increases. Beck & Webb(2003)examined the determinants of life insurance demand in 68 countries and found that an increase in income led to an increase in human capital which in turn increased demand for life insurance products.Safitri, (2019)also found a statistically significant positive effect on per capita income on overall sharia insurance premiums. Ćurak & Kljaković-Gašpić(2011)found income through GDP per capita was significantly positive and related to the demand for life insurance products. Rahman & Yusof(2015) statedone of macroeconomic variables,GDP was significant on the demand of takaful families. Redzuan, Rahman, & Aidid(2009) found that increasing in income levels can also increase the affordability for takaful families products to protect their dependents from their risk of death. Gustina & Abdullah (2012)conducted a comparative study for takafullife and family insurance in Malaysia, found income as the main determinant of demand for Takaf life and family insurance. Sherif & Shaairi(2013)investigated the impact of macroeconomic and socio-demographic factors on the Takāful family and found that income had a positive and significant impact. Redzuan(2014) also found that there ispositively long and short term relationship between per capita income andtakaful life and family insurance. Empirical results found by Podoabă (2015)show that there is a positive relationship between GDP per capita and the density of accident and health insurance.

Some studies examining the relationship between inflation and insurance demand, for example Gustina & Abdullah (2012)found negative inflation for takaful family demand, while positive for insurance demandeventhough the two results are insignificant in their comparative study for life insurance and takaful families. On the other hand, Redzuan(2014)stated a significant negative relationship between inflation and insurance demand but for takaful family results it looked ambiguous because it only has a long-term positive relationship. According to Babbel(1981) inflation (expected and / or realized) has a negative relationship with net per capita real life insurance in force in Brazil.

Education is one proxy that can determine the awareness of risks that may be faced by someone in the future. Sherif & Shaairi(2013) found there is a positive relationship between education and the demand for takaful life insurance. Redzuan(2014)analyzed life insurance and takaful families from the 1970-2008 period in Malaysia and found a significant positive and long-term effect of education levels on life insurance and takaful family demandusing the ARDL approach,. There are research that statededucation or school on the grounds was found to have an insignificant relationship with life insurance and that insurance education is basically not provided in schools (Beck & Webb(2003; Li, Moshirian, Nguyen, & Wee, 2007; Treerattanapun, 2011). Meanwhile, a study conducted (Anderson & Nevin, 1975) found a negative relationship between life insurance and education level which showed that the involvement of more people in obtaining tertiary education reduced the workforce that affected the country's GDP. Higher education is considered to have a positive effect on life insurance on the grounds that educated people have more knowledge about insurance and a higher awareness of insurance so that financial risk is better maintained if the head of the family dies at some point.

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Urban population is one of some another demographic factors that impacts on the demand of takaful's insurance due to the industrialization and the city expansion. This provides an opportunity for the insurance sector to grow, especially in developing countries. Hwang & Gao(2003)found urbanization affects positivelyon the tendency to save urban communities in their study. They also stated that insurance can play an important role in providing financial protection and security for small families. Sen (2008) also stated thatlife insurance and urbanization products are found to be positively related in Asian countries. However, several research have found insignificant effects of urbanization on life insurance in Central and Eastern European countries which conducted by Beck & Webb(2003),Nesterova(2008), and Yazid & Arifin (2012), they developed a conceptual framework for the takaful demand of families and propose a positive relationship between takaful demand and urbanization.

The dependency ratio is also considered an important factor that influences takaful's insurance and demand. Lenten & Rulli(2006) defined the dependency ratio as the average young or old family member depends on support for the main breadwinner. The study from Chui & Kwok(2008)They stated that the increasing in number of dependents indicates that people think they need to buy more life insurance. In the case of takaful requests, Sherif & Shaairi(2013) found a positive impact on the dependency ratio and takaful family requests revealed that an increase in demand would trigger takaful family requests. While Yazid & Arifin, (2012) expected a positive effect from the dependency ratio for the takaful family demandin their conceptual framework. A study conducted by Redzuan(2014) found a positive long-term and short-term impact of the number of dependents on takaful life and family insurance in Malaysia.

Life expectancy is defined as the average number of years a person lives after the person reaches his xth birthday. Life expectancy was found positively relatedto life insurance demand that contradicted their expectations (Li et al., 2007). Life expectancy was found to have positive impact on life insurance demand, but it was statistically insignificant and was removed from estimates model of their study (Lim & Haberman, 2003). The relationship between demand of life insurance and life expectancy at birth is found to be positive because populations with longer life spans tend to buy life insurance policies because they expect to enjoy lower insurance costs, greater incentives for the accumulation of human capital because costs are spread in a longer period and the cash value is accumulated for a longer period (Lim & Haberman, 2003). It also implies that the longer the duration of life reduces the price for life insurance and provides stimulus to buy more to accumulate more capital through savings, therefore, the demand for life insurance products will increase (Sen, 2008).

Unemployment is defined as a condition where a person is at an labor force age seeks for a job but is not able to get it. The unemployment rate is one of some indicatorsthat signifies the income uncertainty and becomes as an uncertainty variable. Several studies have been conducted to explain the relationship between life insurance demand and the unemployment rate (Lenten & Rulli, 2006). There is not much research that addresses the relationship between insurance and unemployment so we try to analyze it in Indonesia.

Some researchers have found whether interest rate plays a role in affecting life insurance demand or not. Interest rates have shown different results where several research identified that interest rate is found to have significant positive relationship with insurance demand (Beck & Webb, 2003; Lim & Haberman, 2003; Haiss & Sümegi, 2008;

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Sen, 2008; Redzuan, Rahman, & Aidid, 2009). However, Li, Moshirian, Nguyen, & Wee(2007),Nesterova (2008), andSen(2008) found that the interest rate was aninsignificant variable in determining takaful life / family insurance demand and was negatively correlated with the interest rate.

Savings instruments are alternatives that represent competitive life insurance products.The impact of savings on life insurance demand has been studied in the past (Beck & Webb, 2003; Sen, 2008; Redzuan, Rahman, & Aidid, 2009). Sen(2008) stated the demand for life or family insurance might increase if savings plus life insurance products are sold. Sen, (2008) also suggested that increasing saving activity will increase demand for life insurance by increasing per capita insurance expenditure.Evidence from the another findings shows that savings have a negative impact on Takaful life / family insurance demand (Beck & Webb, 2003; Redzuan, Rahman, & Aidid, 2009). Redzuan, Rahman, & Aidid(2009) stated that consumers prefer to consider other alternatives to savings if the effective return on the insurance policy is not higher than that offered by other savings instruments.

Based on the background described above, this study was conducted to find out what factors contributed significantly to the density of sharia insurance in Indonesia. There are 2 general factors which are divided into several independent variables, namely economic factors and demographic factors. Economic factors include interest rates, inflation, per capita opinions and savings instruments. While socio-economic factors consist of age dependency ratios, life expectancy, unemployment rates, education, and urban populations.

II. EXPERIMENTAL, MATERIALS AND METHODS

2.1 Data and Hypotheses

The country which is the focus of this research as observation data is Indonesia. The data used are secondary data which is an aggregate time series for the period 2002-2017. Data related to sharia insurance was collected from the publication of the Indonesian Financial Services Authority. While data related to economic and demographic factors were obtained from the World Bank. The following Table 1 shows the variables and operational definitions.

Table 1: Data and Variables

No	Variable	Operational Definition	Unit
1	Life Sharia Insurance Density	The ratio of sharia life insurance premiums to the total population of Indonesia	Rupiah
2	Inflation rate	Inflation is defined as a price increase in general and continuously within a certain period.	Percentage
3	Real interest rate	Difference between nominal interest rate and inflation	Percentage
4	Income per capita	Results of the division of national income of a country with the population of that country	Rupiah
5	Savings	Deposits from money that is not spent and can be done by individuals.	Percentage
6	Unemployment rate	Comparison of unemployment with workforce	Percentage
7	Education	Measured by the percentage of the population applying to high school	Percentage
8	Life expectancy	The average number of years a population of a group or country can survive	Years
9	Dependency ratio	a comparison between the number of productive age population and non-productive age population	Percentage
10	Urban population	Number of residents living in urban areas	Percentage

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Based on the discussion in the literature review section and references from several previous studies, the authors compiled hypotheses to show how the relationship between 9 independent variables and the density of sharia life insurance as dependent variable are as follows.

H_1: Income per capita siginificantly and positivelyaffects the density of sharia life insurance

H_2: Dependency ratio capita siginificantly and positivelyaffects density of sharia life insurance

H_3: Life expectancy capita siginificantly and positivelyaffects the density of sharia life insurance

H_4: Unemployment capita siginificantly and negativelyaffects the density of sharia life insurance

H_5: Savings siginificantly and negativelyaffects the density of sharia life insurance

H_6: Education siginificantly and negativelyaffects the density of sharia life insurance

H_7: Urban population siginificantly and negativelyaffects the density of sharia life insurance

H_8: Interest siginificantly and negativelyaffects on the density of sharia life insurance

H_9: Inflation siginificantly and negativelyaffects on the density of sharia life insurance

2.2 Time Series Regression

1) We apply the best model selection method with the selection of independent variables entered into the model must be in accordance with the criteria called the best subset regression method. The best subset regression starts with selecting the best model starting from the simplest one with a variable. Furthermore, the other variables are infiltrated one by one so that the model is obtained based on the number of independent variables. Criteria are based on increasing the coefficient of determination, subtracting S2, or the proximity of the Mallow C-p value to the number of variables in the model. The coefficient of determination is a measure of the diversity of dependent variables that can be explained together by the independent variables in the model. The estimated value obtained from the regression equation based on partial independent variables is generally biased. To assess the goodness of the model used means square error (MSE) with its variants and biases.

2) To do the analysis with the best regression subset, the writer uses minitab software. After selecting the best independent variable, the authors then performed regression modeling with the least squares estimator. After that, classic regression assumptions also need to be met, namely checking the assumptions of normality, heteroscedasticity, autocorrelation and multicollinearity.

2.3 Research flow chart

The following stages of research are illustrated through the figure 1 below.

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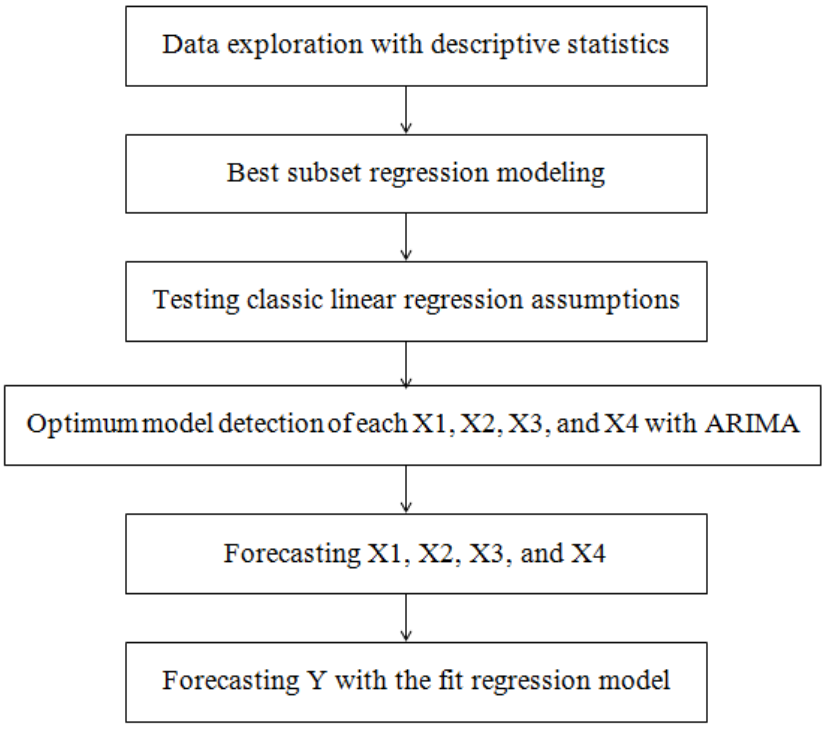

Figure 1: Flow of Research Stages

III. Results And Discussion

The following table 2 below shows the descriptive statistics of all variables. Refer to the literature review section that researchers cited research results with variables tied to many insurance demand. The amount of insurance demand can be measured using many variables such as premium volume, many policies from the insured, or insurance density. The variable density of sharia life insurance is measured by the total amount of sharia life insurance premium divided by the total population of the Indonesian population. The income per capita variable is measured using the ratio between gross domestic product and the total population of Indonesia. Dependency ratio is measured using a ratio between the population aged 0-14 years, plus a population of 65 years and over (both referred to as non-workforce) compared with the number of residents aged 15-64 years (labor force). Urban population refers to the percentage of the population living in urban areas (the number of urban residents divided by the total population). Unemployment refers to the portion of the labor force that does not work but is available for and looking for work and is measured through the division between the labor force that does not work divided by the total workforce. The level of education is measured using a pure enrollment rate which has the definition of the ratio of children enrolled in secondary school to the appropriate official school age population. The savings variable is measured using gross national saving minus the value of consumption of fixed capital divided by gross national income. Interest rates are measured using loan interest rates adjusted for inflation. Inflation variable is measured by the consumer price index. Finally, life expectancy variables are measured by the average age of Indonesia's population.

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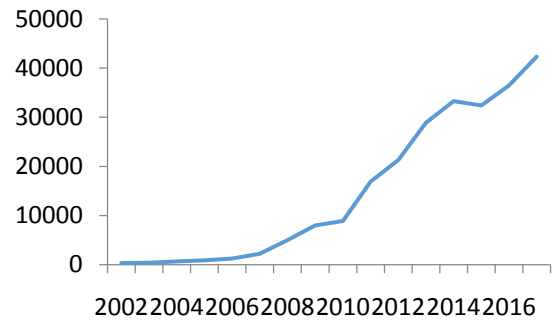
Table 2: Descriptive Statistics of all Variables

Variable	Mean	Std. Deviation	Median
Sharia Life Insurance Density	14972	15168	8461
Income per capita	27,26	14,59	25,31
Age dependency	51,36	1,88	51,26
Unemployment rate	5,88	1,47	5,86
Life expectancy	68,92	1,62	69,03
Savings	9,97	4,36	11,48
Education	66,16	9,64	65,75
Urban population	49,32	3,53	49,52
Interest rate	5,11	4,49	6,06
Inflation rate	6,91	2,93	6,38

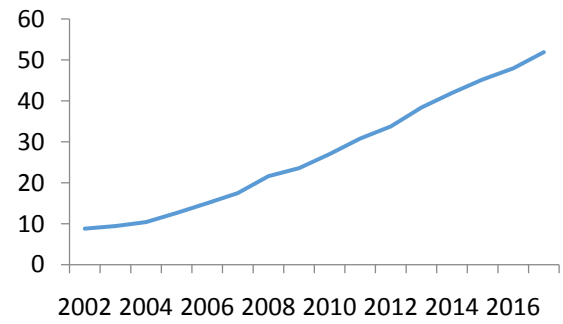
Source: Author's result of analysis using Microsoft Excel software

To see the pattern of data or trends every year from each variable presented in Figure 2. Density of sharia life insurance has an upward trend despite a slow increase, seen from 2002-2005 there appears to be no significant increase in density and seems to decrease in 2015. Revenue per Indonesia's population per capita has experienced a consistent increase, so has life expectancy and the urban population has not decreased at all. The age dependency ratio of Indonesia's population experiences a declining trend. This variable is one of the important demographic indicators. The lower dependency ratio shows the lower burden borne by the productive population to finance populations that are not yet productive and no longer productive. The unemployment ratio in general has decreased although from 2002-2007 the unemployment ratio has increased. For savings instruments in general have increased despite a decline in the period 2010-2015. While the movement of inflation and interest rates every year is very volatile, sometimes experiencing a sharp increase and a sharp decline as well.

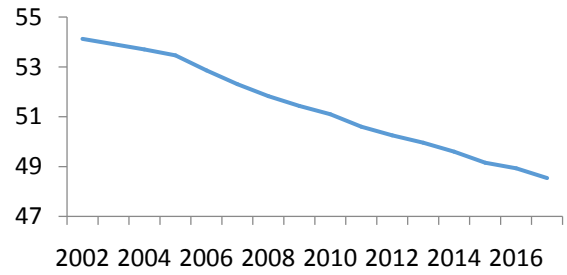
Sharia Life Insurance Density



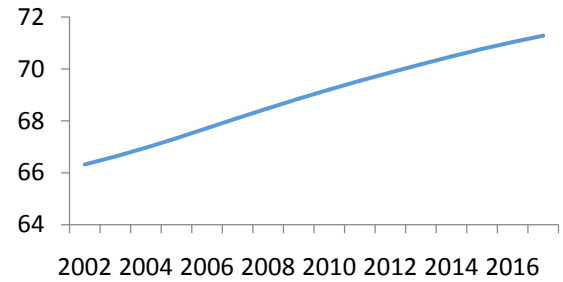
Income percapita



Age Dependency



Life Expectancy



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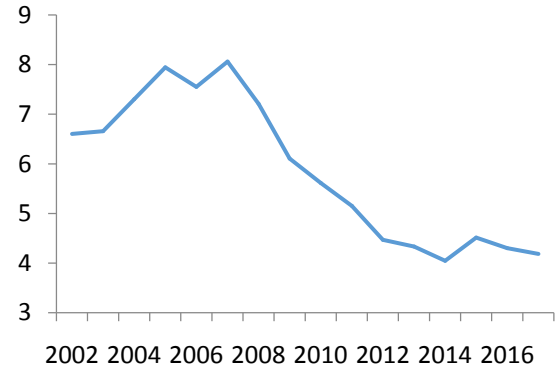
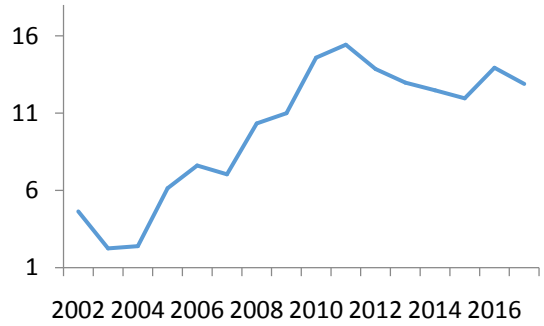
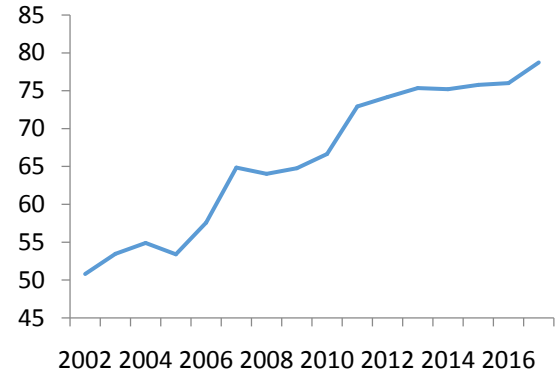
Unemployment rate



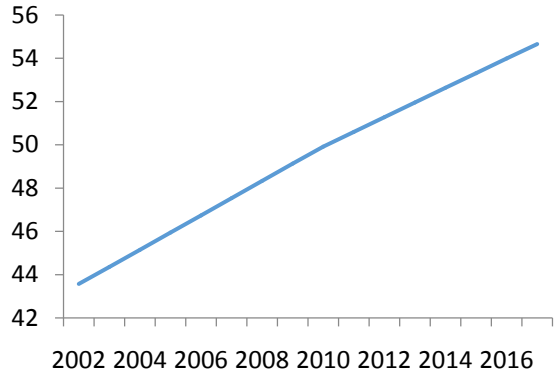
Savings



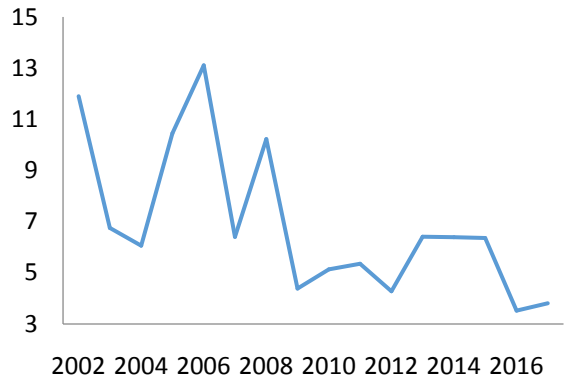
Education



Urban Population



Inflation rate



Real interest rate

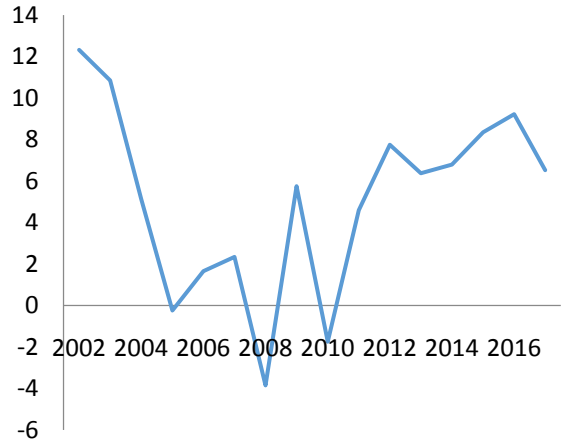


Figure 2: Trend of Independent and Dependent Variable 2002-2017

Source: Author'sResult of Analysis

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This study focuses on checking relationships and looking at the effects of 9 independent variables (income per capita, real interest rates, inflation, unemployment rate, education, urban population, savings, life expectancy, and age dependency ratio) on the density of sharia life insurance as dependent variables. We applied the best model selection with the best subset regression. Based on the C-p value there are two models that can be taken as the best model. Both models are models with 5 independent variables and with 4 independent variables. But if it is viewed from the addition of R^2adj values, it is more likely to choose a model with a total of 4 independent variables with the following equation.

$$Y_t = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + \beta_4 X_{4t} + \varepsilon$$

Where Y_t is the density of sharia life insurance for the period 2002-2017; β_0 is the intercept of the regression model; β_1, β_2, β_3, β_4 are the slope of the regression model; X_{1t} is the variable income per capita; $X_{2t}$is the age dependency ratio; X_{3t} is the unemployment rate variable; X_{4t} is an educational variable; ε is an error or residual.

After performing regression modeling, the results are shown in Table 3 below.

Table 3: Results of Regression Analysis

Variabel	**Sharia Life Insurance Density**	
	Coefficient	**P-Value**
Per capita Income*	2400,3	0,000
Dependency Ratio*	14851	0,000
Unemployment rate**	-1001,6	0,045
Education*	672,8	0,004

Source: Results of author's analysis

* significant at 1% level

** significant at the 5% level

Table 3 represents the coefficient or slope and p-value of each independent variable selected based on the best subset regression. Per capita income influences significantly and has a positive effect on the density of sharia life insurance. This proves that the higher the income per capita the higher the Indonesian people's desire to buy sharia life insurance products. These findings are in line with previous studies conducted by Sherif & Shaairi(2013), Safitri, (2019),Redzuan, Rahman, & Aidid(2009) that per capita income has a statistically positive effect on insurance demand, in research, the proxy used is the density of sharia life insurance. The age dependency ratio also has a statistically positive impact on the density of sharia life insurance. This means that the Indonesian people are aware that they must protect their dependents from financial difficulties if one day the family head who makes a living dies. These findings are also in line with research findings from Chui & Kwok(2008), Sherif & Shaairi, (2013), Yazid & Arifin, (2012), Redzuan, (2014). The unemployment rate has a negative but not statistically significant impact. The education variable also has a significant positive impact on the density of life insurance. This indicates that the increasing number of educated people, the purchase of sharia life insurance products will also increase because they tend to realize that they have to protect their assets through life insurance. Sherif & Shaairi (2013)danRedzuan(2014) also stated in their research that education influences insurance demand in Malaysia. Figure 3 below shows the plot relating to the residuals of the best subset regression modeling as testing the regression assumptions.

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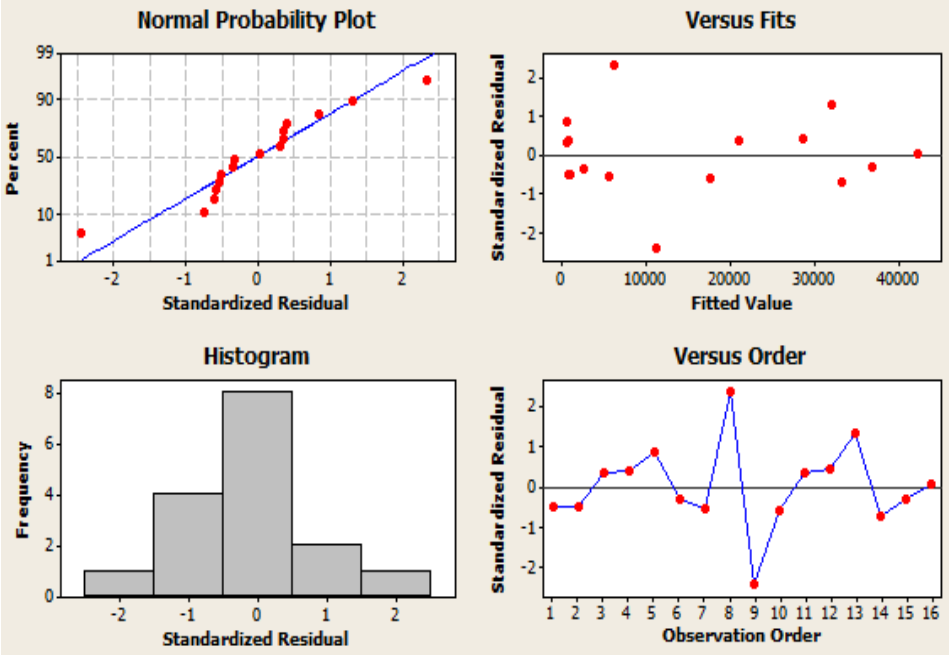

Figure 3: Residual plot

Source: Author's result of analysis using Minitab 16 software

Based on Figure 3, residual spreads are seen normal so that normality assumptions are met. In addition we also conducted the Kolmogorov Smirnov test of residuals and in the end we came to the conclusion that the assumption of normality was fulfilled. For the assumption of autocorrelation the authors conducted the Runs test. Testing this autocorrelation-free assumption must be done if the data used is time series data with linear regression modeling. So we get the Asymp Sig. (2-tailed) of 0.796. An indication of the existence of autocorrelation can be seen if the value is smaller than 0.05, but the value is actually greater than 0.05 so the conclusion is that there is no autocorrelation. For the assumption of heteroscedasticity, based on the scatterplot between the residuals and the alleged y (density of sharia life insurance) or fitted values in Figure 3. it is known that the points do not accumulate only above 0 or below 0 only and the spread of the data points does not form a pattern. Thus we can conclude that there is no heteroscedasticity problem. If multicollinearity occurs, then the regression coefficient will be unstable and easy to change. If there is multicollinearity, the change in the number of variables will drastically affect the magnitude of the regression coefficient, it can even change the sign from positive to negative and vice versa. Therefore, based on the results of the best subset regression model modeling that can be used for prediction is the following equation.

$$y_t = -851811 + 2400x_{1t} + 14851x_{2t} - 1001{,}6x_{3t} + 672{,}8x_{4t}$$

Forecasting for the next 5 years

The author compiles several tentative forecasting models depending on the ACF and PACF values so that the most optimum ARIMA model (1,1,0) is chosen for the variable income per capita. For the dependency ratio variable, the model with the smallest and significant MS P value is obtained, namely ARIMA (2,1,1). The most

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optimum model for unemployment ratio is ARIMA (2,1,2). Finally, the model for education level variables is ARIMA (1,1,1). The following table below forecast results for variables y, x1, x2, x3, and x4 for the next 10 years.

Table 4: Forecasting Results for the next 10 years

Tahun	Y	X1	X2	X3	X4
2018	44970,60	55,26	48,04	4,04	81,45
2019	46609,07	58,34	47,54	3,91	83,75
2020	48773,86	61,29	47,10	3,75	85,84
2021	51792,97	64,16	46,73	3,56	87,85
2022	55152,1	67,00	46,40	3,34	89,81
2023	58189,92	69,82	46,04	3,11	91,76
2024	60620,08	72,63	45,65	2,88	93,69
2025	62607,25	75,44	45,23	2,67	95,62
2026	64535,01	78,24	44,81	2,49	97,55
2027	66691,23	81,04	44,40	2,32	99,48

Based on the analysis that has been done, it can be concluded that the significant determinants of the density of sharia insurance in Indonesia are income per capita, education, and dependency ratios that have a positive impact, while unemployment is an independent variable that gives a statistically negative effect. Therefore, policy makers must pay attention to the free variable of education. Educated people will find it easier to become aware of insurance, so sharia life insurance needs to do more socialization for educated people. In addition, the average educated person has enough income to meet insurance needs for the protection of financial problems. On the other hand, policy makers in Islamic insurance need to work with the government to reduce unemployment so that it will have an impact on rising demand for Islamic insurance if people are not unemployed.

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