

HOUSEHOLD DEBT IN MALAYSIA: AN ANALYSIS ON MACROECONOMIC VARIABLES

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Final Year Project Paper submitted in fulfillment of the requirements for the degree of **Bachelor of Business Administration** (Finance)

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AUTHOR'S DECLARATION

I declare that the work in this final year project paper was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Undergraduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

In Malaysia there are two concerns related to debt have often been discussed. One of the debts are household debt, mainly for housing and purchase of a personal car, which contribute about 80 per cent of the gross domestic product (GDP). The expansion of loans has led to the rise of household debt and it has been an increasing trend since the early 2000s. The increase in Malaysia's household debt has risen to 84% of total GDP in 2017. However, in the third quarter of 2018 Malaysia's household debt has fall to 83.2% (Bank Negara Malaysia, 2018). The purpose of this study is to examine the impact of household debt in Malaysia using time series data. This study employs the ordinary least square (OLS) method and the macroeconomic variables used consist of gross domestic product, consumer price index, interest rate, housing price index and unemployment as independent variables taken in the period from 2003 to 2018 annually. The finding shows that GDP, house price index, interest rate and unemployment rate have negative significant with household debt.

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LIST OF SYMBOLS

Symbols

Y	Dependent variable
a	constant
β	Coefficient to be estimated
e	Error term

LIST OF ABBREVIATIONS

HHD	Household Debt
GDP	Gross Domestic Product
СРІ	Consumer Price Index
HPI	House Price Index
INT	Interest Rate
UNE	Unemployment Rate

CHAPTER ONE

INTRODUCTION

1.1 Introduction

Recently, household debt is rising extremely in both developed and developing countries, which raised fears of the financial analyst on the hazard of financial instability (World Bank, 2014). Rising demand for credits along with the target of financial intermediaries in creating a massive return by lending out excessively has contributed to significant debt growth. Even household debt can increase the country financial development through its influence on aggregate demand but extreme debt level may inevitably bring an undesirable result on the economic performance of a country (Cecchetti, Mohanty & Zampolli, 2011).

In Malaysian context, the explanation of household debt refers to the quantity of credits for properties, advances for individual utilize, advances for securities, automobile credits, credit cards among others (Bank Negara Malaysia, 2013). It can be separated into secured and unsecured debt. Secured debts such as mortgage debt is protected by the financial institution because if there is default payment, the mortgage can be a collateral. Mortgage debt has lower risk compared to consumer debt but the rate of default instalments is higher. Whereas, unsecured debts refer to consumer debts that consist of credit cards, personal loans, and auto loans. Consumer debts normally are used to finance the consumption of goods and services.

1.2 Background of study

Recent information has shown that there is a surge in household debt among the developing countries, which is at standard with the developed country especially in Malaysia (International Monetary Fund, 2014). The study of household debt in the country is imperative to dodge the hazard of a credit bubble, which has been experienced in the United States during the global financial crisis. Although the study of household debt has been conducted from different viewpoints the issue remained critical and needs to be inspected on a country-level due to the numerous points of view such as financial, social and environmental background across countries.

According to OECD Data, household debt well-defined as all liabilities that require instalment or payments of interest or principal by household to the lender at a date or future date. Therefore, all debt instruments are liabilities, however some liabilities like shares, equity and financial derivatives are not considered as debt. Debt is therefore obtained because the total of the consequent liability classes, whenever available or applicable within the financial record of the households and non-profit institutions serving households sector, such as: currency and deposits; securities aside from shares, except financial derivatives; loans; protections specialized saves; and diverse accounts payable. For households, liabilities mainly contain credits, specifically contract credits for the buy of homes.

1.3 Problem Statement

In Malaysia there are two concerns related to debt have frequently been examined. One of the debts is household debt, primarily for housing and purchase of a personal car, which contribute around 80 per cent of the gross domestic product (GDP). It is quite high although the percentages in Singapore and South Korea are higher (S.M, 2016). Since the past decade, Malaysian economy has been expanding in household debt. The growth of loans has driven to the rise of household debt and it has been an expanding trend since the early 2000s. The increment in Malaysia's household debt has risen to 84% of add up GDP in 2017. However, in the third quarter of 2018 Malaysia's household debt has fall to 83.2% (Bank Negara Malaysia, 2018). Even though there is declining of household debt, it is still in worrying stage and puts bank at risk in the event of financial emergency. The above issue triggers our interest to do further study on the relationship between macroeconomic variables and the household debt in Malaysia.

1.4 Research questions

There are few research questions can be discussed. From the problem statement and objectives of the study, the researchers came out with three questions to be examined. The questions are:

i) What is the impact of macroeconomic variables to the household debt in Malaysia?

ii) Which macroeconomic variables give more impact to the household debt in Malaysia?

iii) How significant the relationship between the macroeconomic variables and the household debt in Malaysia?

1.5 Research objectives

The research study should have objectives because it is vital in guiding the researchers to achieve the purpose of doing the research. The objectives should be specific, measurable and realistic. The goal of this study is to investigate what factors can take as important factor affecting of household debt in Malaysia. There are few goals that have been pointed in recognizing the factor influencing household debt in Malaysia. Those objectives are:

- To examine the impact of macroeconomic variables to the household debt in Malaysia.
- ii) To investigate which macroeconomic variables that mostly impact the household debt in Malaysia.
- iii) To investigate the relationship between the macroeconomic variables and the household debt in Malaysia.

1.6 Significance of the study

1.6.1 Individual

This study will indirectly become a guide or references for numerous individuals as to identify the factors that influences the determination of household debt in Malaysia. Besides that, it will give information to them regarding on ways how to determine or recognized the factor affecting household debt in Malaysia. Thus, the individual will get information on the factors that influence a household debt.

1.6.2 Researcher

This research will help researcher to get a detail on what factor that related with household debt in Malaysia and it also very valuable information for individual to know. Besides that, it gives researchers information regarding on how to identify the factor that effects household debt in Malaysia. Thus, researcher can know the factor that affect household debt in Malaysia.

1.6.3 Academic

For the academic purpose, it is a requirement for the final year student from faculty to complete the project papers. Besides that, it will give guidelines towards the students in conducting study on their own by referring from other previous research. From that, student is able to learn on how to write a good project paper.

1.7 Scope of the study

The research paper is to study the relationship between household debt and macroeconomic variables in Malaysia by utilizing the data from 2003 until 2018. This study aims to examine whether dependent variable of household debt in Malaysia has a relationship with the independent variables which are gross domestic product (GDP), consumer price index (CPI), interest rate, house price index and unemployment rate.

This study is conducted in Malaysia based on a secondary data from a several journals collected by the researchers. The sample on data were taken from the website of Bank Negara Malaysia, Department of Statistic Malaysia, National Property Information Centre (NAPIC) and Thomson Reuters Data stream. These sample are chosen to analyse the relationship between the dependent variables and independent variables of the study may there will be a positive or negative relationship. The nature of study is based on the journal from the other previous research that have been conducted a same topic of the study on going. The data collected will be examined in an econometric tool such as regress the data in the Eviews (Econometrics Views) to know which independent variable that has been give an influence on the dependent variable.

1.8 Limitations of the study

In order to complete this research, there are some problems and limitation faced by the researchers which are:

1.8.1 Limited Resources

The researchers need to identify and collect information from other resources for literature review since the information provided is limited. The researchers need to gather information from various website and journal about the household debt in Malaysia.

1.9 Definition of key terms

1.9.1 Household debt

The sum of loans for properties, loans for personal use, loans for securities, motor vehicle loans, credit cards among others (Bank Negara Malaysia, 2013)

1.9.2 Gross Domestic Product (GDP)

According to The World Bank, annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2010 U.S. dollars. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.

1.9.3 Consumer Price Index (CPI)

The Consumer Price Index (CPI) is a measure that examines the weighted average of prices of a basket of consumer goods and services, such as transportation, food and medical care. It is calculated by taking price changes for each item in the predetermined basket of goods and averaging them. Changes in the CPI are used to assess price changes associated with the cost of living; the CPI is one of the most frequently used statistics for identifying periods of inflation or deflation.(Chen, 2019)

1.9.4 Interest rate

Interest rate is the amount a lender charges for the use of assets expressed as a percentage of the principal. The interest rate is typically noted on an annual basis known as the annual percentage rate (APR). The assets borrowed could include cash, consumer goods, or large assets such as a vehicle or building. (Bank Rate,2019)

1.9.5 House Price Index

The House Price Index is based on transactions involving conventional and conforming mortgages on single-family properties. (Chen, 2019)

1.10 Summary

This chapter discuss on research objectives and questions, significant of study, scope of study, limitation of study and definition on dependent and independent variables.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The empirical study regarding household debt is limited and this might be due to an insufficient amount of available data. Macroeconomic data such as gross domestic product (GDP), consumer price index (CPI), interest rate, house price index and unemployment rate are fundamental to detect any vulnerability caused by fast growth of household debt. The central point of this study is to examine the determinants of household debt. Therefore, the discussion of the related literatures will focus on the main factors that influence household debt in Malaysia.

2.2 Relationship between gross domestic product with household debt.

Meniago, Petersen, Petersen and Mongale (2013) discovered that there is a significant and positive relationship between household debt to gross domestic product. When GDP increases, this will encourage households to borrow more and in response, caused the household debt to increase. The result supports the theory that higher GDP implies higher economic growth, followed by higher income, which means that households and creditors will feel confident in taking and issuing more debt.

Meniago, Petersen, Petersen and Mah (2013), on the other hand, found that GDP has contributed significantly to changes in household debt levels in South Africa. This finding explains the theory that higher GDP indicates strong economic growth and higher income.

Furthermore, Rahman & Masih (2014) found that any changes in GDP may not influence household debts. Although the result found that GDP is endogenic, the authors

believe that GDP as a proxy of income may play a crucial role in the growth of household debt in Malaysia.

Nizar (2015) revealed that GDP is related with household debt, either in the short run or long run relationship. The researcher found that positive economic growth is reflected by higher GDP, thus households gain higher income which encourages banks to issue more debt.

A studied conducted by Yahaya (2019) found that household debt and gross domestic product is closely related either in short term or in long term.

2.3 Relationship between consumer price index with household debt

Meniago et al. (2013) used the VECM model to estimate the projecting factors that lead to the growth of household debt by using quarterly data from 1985:1 to 2012:1. They found that significant growth of household debt could be described by inflation (CPI).

Mokhtar & Ismail (2013) explored the trend of Malaysia Indebtedness from Q1:1997 until Q4:2011 using the Vector error correction Model (VECM). This study focuses on an Islamic finance viewpoint and they found that inflation is the leading variables.

Meniago, et. al. (2013) further study the cause of household debt to rise in South Africa and their results confirmed the presence of a long run cointegrating relationship between household debt and other macroeconomic factors. Increasing household debt was found to be significantly affected by positive changes in CPI.

2.4 Relationship between interest rate with household debt

Meng, Hoang & Siriwardana (2013) found that there is a negative relationship between household debt and interest rates. Household debt may slow down with growths in interest rate. However, when household debt reaches a higher level, an increase in the interest rate may increase households' repayment burden.

According to Crawford and Faruqui (2011), they found that low interest rates have contributed to the development of household debt. Low interest rates have also contributed towards the increase in home ownership rates and mortgage debt.

Other research by Turk (2015) stated that declining interest rates also explain the rise of household debt in Sweden. This result is supported by Mutezo (2015) who revealed the presence of a long run relationship between household debt and interest rates. The researcher stated that low interest rates have supported household consumption expenditure that causing high household indebtedness.

Besides that, Debelle (2014) stated that lower interest rates have led to significant increases in household debt. A decline in nominal interest rates will allow an increase in the maximum amount a financial institution will offer to households. The researcher also found that financial deregulation decreases credit rationing and lowers interest rates.

However, Hoang & Meng (2015) exposed different results with the previous research, as they stated that interest rate is the main factor that influences household debt. Hoang & Meng (2015) found that an increase in interest rate will only reduce a small amount of household debt.

2.5 Relationship between house price index with household debt

The discoveries of Meniago, Petersen, Petersen and Mongale (2013) found that house prices have completely contributed to a development in household debt. However, the relationship is insignificant between the variables.

Hoang & Meng's (2015) found that there is a negative relationship between

household debt and house prices. As mortgage debt is a major debt in household, people will delay their choice to purchase private houses as house prices have increased. They will delay their purchasing until prices are stable.

Another study done by Turk (2015) found that growth in housing prices will direct to be broadly in line with household debt growth. This result is supported by Jacobsen & Naug (2004) who found that household debt may increase in further since higher house prices may result in higher final wealth and better borrowing conditions. Thus, households will have greater incentive to raise mortgage debt to finance consumption and investment.

According to research done by Rahman & Masih (2014), they found that house prices is the leading factor that rises household debt in the long-run. Bank of Canada (2016) also revealed that there is a positive relationship between household debt and house prices.

2.6 Relationship between unemployment rate with household debt

Hoang & Meng (2015) found that the rise of Australian household debt in the last two decades is primarily because of decreasing in unemployment rate. The result is supported by Debelle (2014) who revealed that the major and most significant negative relationship to household income is unemployment. Defaults on payment will happen as borrowers will find it hard to maintain their mortgage payments through periods of unemployment.

Nieto (2007) revealed that unemployment has a negatively significant relationship with household debt in the short term. Households tend to increase borrowing when confronted with increases in spending or situations of low unemployment. Jauch & Watzka (2013) found that almost one third of the aggregate rise in unemployment in Spain can be traced back to high household debt levels.

Other research conducted by Hamid, Sarmidi and Nor (2015) found that unemployment will make vulnerability in workforce market and anticipate households from borrowing. Financial institutions will also avoid issuing debt. A high unemployment rate means there is less salary for all households and thus a greater desire for loans to finance consumption. Thus, it leads to a rise in household debt (Hoang, Meng & Siriwardana, 2011).

2.7 Theoretical/ Research Framework

This study used the theoretical framework to study the relationship between household debt, gross domestic product, consumer price index, interest rate, house price index and unemployment rate of Malaysia. There is only one theoretical framework that has been established to study the relationship between both dependent and independent variables. The variables have been developed in the theoretical framework in order to study if there are any correlation exist.

Prior to that, the independent variables used are gross domestic product (GDP), consumer price index (CPI), interest rate, house price index, and unemployment rate. Meanwhile, the dependent variables to look into this study is household debt. Below shows the network for this study:

(Independent variable)



Figure 2.8 The Theoretical Framework between gross domestic product, consumer price index, interest rate, house price index and unemployment rate with household debt in Malaysia.

The figure shows the correlation between household debt and gross domestic product (GDP), consumer price index (CPI), interest rate, house price index and unemployment rate. Based on the network above, it indicates that there is a correlation between the independent variables; gross domestic product (GDP), consumer price index (CPI), interest rate, house price index and unemployment rate with household debt in Malaysia.

2.8 Summary

This chapter discuss on literature review on independent variable and theoretical framework for the research.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses the research design, sampling and data collection method techniques for analysing the data measurement.

The technique has been used to regress the data possessed is the Ordinary Least Square (OLS) method whereby the data collected then has regressed by using the EViews (Econometric Views). In this study, EViews is used to run the estimated multiple regressions model analysis to investigate the relationship between macroeconomic variables and household debt in Malaysia. We will apply other test in order to fulfil the BLUE (Best Linear Unbiased Estimators).

3.2 Sampling

This sample of study will focus in Malaysia only. There are 15 annual observation of gross domestic product, consumer price index, interest rate, house price index and unemployment rate are taken for this study.

3.3 Data collection

We will use secondary data. This study requires performing an analysis on time series data from the year 2003-2018 which is 15 years in yearly basis. The sample were taken from Bank Negara Malaysia report, Department of Statistic Malaysia, National Property Information Centre (NAPIC) and Thomson Reuters Data Stream.

3.4 Variables

The purpose of the study is to investigate the impact of macroeconomics variables on household debt in Malaysia. The dependent variable for this study is

household debt. The independent variables are Gross Domestic Product (GDP), Consumer Price Index (CPI), interest rate, house price index and unemployment rate in Malaysia. Below are the proxy unit for the variables:

Variables	Proxy unit
Gross Domestic Product	measured in percentage units
Consumer price index	2005=100 (x)
Interest Rates	base lending rate charged by commercial banks and Islamic
	banks.
House Price Index	Annual percentage change based on house type.
Unemployment Rate	percentage of labor force.

Table 3.4Variables and proxy unit

3.5 Research Design

The discussion will focus on the estimation model used for the chosen macroeconomic variables and household debt. The dependent variable is represented by household debt in Malaysia. The independent variables consist of gross domestic product (GDP), consumer price index (CPI), interest rate, house price index, and unemployment rate. A multiple regression analysis is used to estimate the ordinary least square (OLS) analysis in the period from year 2003 to 2018. This study using 15 observations which covers for fifteen years from the year 2003 to 2018 on yearly basis data. The OLS method is a procedure to determine the best fit line to data.

3.6 Hypothesis Statement

3.6.1 Hypothesis 1

H0: There is no significant relationship between gross domestic product and

household debt.

 $H\alpha$: There is significant relationship between gross domestic product and household debt.

3.6.2 Hypothesis 2

*H***0** : There is no significant relationship between consumer price index and household debt.

 $H\alpha$: There is significant relationship between consumer price index and household debt.

3.6.3 Hypothesis 3

*H***0** : There is no significant relationship between interest rate and household debt.

 $H\alpha$: There is significant relationship between interest rate and household debt.

3.6.4 Hypothesis 4

*H***0** : There is no significant relationship between house price index and household debt.

 $H\alpha$: There is significant relationship between house price index and household debt.

3.6.5 Hypothesis 5

*H***0** : There is no significant relationship between unemployment rate and household debt.

 $H\alpha$: There is significant relationship between unemployment rate and household debt

3.7 Data Analysis Method

In order to define the statistical relationship among the variables and testing, we are going to produce the result using E-views software. This study will apply ordinary least square (OLS) method which is multiple regression analysis to investigate the relationship between macroeconomic variables and household debt in Malaysia. We also will apply other test in order to fulfil the BLUE (Best Linear Unbiased Estimators).

3.7.1 Descriptive Analysis

3.7.1.1 Test of Normalities

a) Kurtosis

Kurtosis describes the trends in charts, If the result is less than 3, thus it indicates Platykurtic. While if the result is more than 3, it indicates Leptokurtic and lastly if the result is around 3, it indicates Mesokurtic.

b) Skewness

It is used by the researchers to measure the asymmetry of the probability distribution of a real-valued random variable that come in the form of "negative skewness" or "positive skewness", depending on whether data points are skew to the left which is negative skew or the right which is positive skew of the data average.

3.7.2 Test of Significance (Hypothesis Test)

3.7.2.1 Coefficient of Determination (**R**²)

 R^2 is the ratio that explained the sum of squares to the total sum of square. The higher R^2 is the closer the estimated regression equation fit the sample data. A value of R^2 close to one (1) show an excellent overall fit, whereas a value near zero (0) shows a failure of estimated regression equation.

 \mathbf{R}^2 was used to measure the variation of dependent variable that is explained by

the regression line and the independent variables. It tests the goodness of fit and R^2 value range from 1 to 0.

3.7.2.2 T-statistic

It is used by most econometricians to test hypotheses about individual regression slope coefficients. Test of more than one coefficient at a time are typically done with the F-test.

The t-test is easy to use because it accounts for differences in the unit of measurement of the variables and in the standard deviations of the estimated coefficients. T-statistic is more appropriate way to use when the error term is normally distributed and when the variance of that distribution must be estimated.

In this test, it has few approaches that can be chosen to test the hypothesis by using compare t-statistic with the critical value, p-value and confidence interval depend on the hypothesis that need to be tested. It can be tested by comparing the t-statistic with its critical value. If the result of the t-test is higher than the critical value, the null hypothesis is rejected. Usually in this test, it uses 10% level of significance. This is where researchers are able to determine whether the variable can influence another variable or not and to be able to see whether it has a positive or negative relationship.

*H***0**: β **1** = **0**

 $H\alpha$: $\beta 1 \neq 0$

3.7.2.3 F-Statistic

F-test is any statistical test in which the statistic has an F-distribution under the null hypothesis. It is most often used in comparing statistical models that have been fitted to a data set, in order to identify the model that best fits the population from which the data were sampled. Exact F-test mainly arise when the models have been fitted to

the data using least square. The underlying hypothesis for F-test is defined as follows:

Null hypothesis

 $H0:\beta 1 = \beta 2 = \beta 3 = \cdots = \beta i = 0$

Alternative hypothesis

 $H\alpha$:H0 is not true

Similarly, p-value approach could be used in determining in the collective significance of variables. Say the given probability generated by EViews software is p and the chosen level of significance is α . Consider that (p< α) thus null hypothesis is rejected; hence at least one of the independent variables is significant of the chosen variables.

3.7.3 Test of correlation

3.7.3.1 Test of Multicollinearity

Multicollinearity means a perfect or exact linear relationship among some or all variables. Multicollinearity violates classical assumption which specifies that no variables are a perfect linear function of any other variables.

To detect multicollinearity, there are two ways that researchers can use which is Pearson correlation and Variance Inflation Factors (VIFs). In this study, researcher use Variance Inflation Factors (VIFs) to detect multicollinearity.

a) Variance Inflation Factors (VIFs)

VIFs used by the researchers to give an indication of the severity of multicollinearity in a sample is controversial. The VIFs is a method of detecting the severity of multicollinearity by looking at the extent to which a given explanatory variable can be explained by all other explanatory variables in the equation. A common rule of thumb is that if VIF (β i) >10, the multicollinearity is severe.

3.8 Summary

This research using E-views software to analyse the result and also apply ordinary least square (OLS) method to determine the relationship between macroeconomic variables and household debt in Malaysia. Macroeconomic variables used are gross domestic product (GDP), consumer price index (CPI), interest rate, house price index and unemployment rate.

CHAPTER FOUR

RESEARCH FINDINGS

4.0 Introduction

This chapter explained about the empirical result of this research study. The results were calculated and obtained from software programme known Econometric Views (Eviews). The importance of this chapter is to answer the entire hypotheses in this study also wants to find out the relation between dependent and independent variables by using Multiple Linear Regression. This equation is used to calculated the result and to find out the result on this study. The result will be explained or interpreted according to the result from Eviews also will be interpreted or explained based on the descriptive statistic and analysis table that will be discussed in this chapter.

4.1 Descriptive Analysis

Campio: 2000 20	10					
	LHHD	LGDP	LCPI	LHPI	LINT	LUNE
Mean	13.35371	1.710281	4.620001	4.767754	1.661908	1.184016
Median	13.45052	1.699910	4.636669	4.708629	1.595066	1.193922
Maximum	13.98719	2.004832	4.793308	5.258646	1.871162	1.280934
Minimum	12.52517	1.440643	4.432007	4.353499	1.510956	1.064711
Std. Dev.	0.503751	0.145024	0.120559	0.331879	0.143330	0.062192
Skewness	-0.241173	0.225681	-0.144780	0.213056	0.355066	-0.312092
Kurtosis	1.590137	2.781696	1.763798	1.487156	1.354680	2.145512
Jarque-Bera	1.387732	0.157115	1.007524	1.543918	2.007104	0.699847
Probability	0.499641	0.924449	0.604253	0.462107	0.366575	0.704742
Sum	200.3057	25.65421	69.30001	71.51631	24.92861	17.76023
Sum Sq. Dev.	3.552710	0.294447	0.203483	1.542014	0.287610	0.054150
Observations	15	15	15	15	15	15

Date: 06/13/19 Time: 08:29 Sample: 2003 2018

Table 4.1 Descriptive analysis

Table above shows the descriptive analysis for the variables used in the study. Based on the result that has been calculated, the mean for household debt, gross domestic product (GDP), consumer price index (CPI), house price index (HPI), interest rate and unemployment is 13.357371,1.710281,4.620001,4.767754,1.661908 and 1.184016 respectively.

The median for household debt, gross domestic product, consumer price index, house price index, interest rate and unemployment rate are 13.45052,1.699910,4.620001,4.767754,1.661908 and 1.184016 respectively.

4.2 Correlation Test: covariance analysis

Covariance Analysis: Ordinary Date: 06/13/19 Time: 08:32 Sample: 2003 2018 Included observations: 15 Balanced sample (listwise missing value deletion)

Correlation t-Statistic Probability	ТННО					
	1 00000		LOIT	<u>_</u>		LOINE
LUUD	1.000000					
LGDP	-0.412352	1.000000				
	-1.631960					
	0.1267					
	0.000269	0 41 4702	1 00000			
LOFT	0.990200	1 642640	1.000000			
	25.05504	-1.043019				
	0.0000	0.1242				
LHPI	0.975251	-0.430031	0.975342	1.000000		
	15.90359	-1.717405	15.93413			
	0.0000	0.1096	0.0000			
	-0.017301	0 305104	-0.872100	-0 876567	1 000000	
	9 205052	1 155522	6 429746	6 566901	1.000000	
	-0.303952	0.0607	-0.420740	-0.500691		
	0.0000	0.2087	0.0000	0.0000		
LUNE	-0.482682	0.075395	-0.415977	-0.339308	0.504832	1.000000
	-1.987147	0.272618	-1.649293	-1.300545	2.108618	
	0.0684	0.7894	0.1230	0.2160	0.0549	

Table 4.2 Covariance Result

Covariance analysis is done to check whether there is any linear relationship between dependent variable and independent variables.

As shown in the table above, the result of covariance analysis for LCPI, LHPI

and INT has the probability of 0.0000 and UNE has the probability 0.0684 which is the value is below the 10% of significant level. It shows that null hypothesis is rejected and conclude that these variables have positive correlation with household debt. Meanwhile, the result for other variables which is GDP represent by 0.1267. It shows that the value is above 10% significant level and failed to reject null hypothesis. Thus, it can be concluded that there is no correlation between GDP.

4.3 Multiple Linear Regression Model

The multiple linear regression model for this study is:

$Y = \alpha + \beta_1 GDP + \beta_2 CPI + \beta_3 HPI + \beta_4 INT + \beta_5 UNE + \epsilon$

Dependent Variable: D(LHHD) Method: Least Squares Date: 06/13/19 Time: 08:04 Sample (adjusted): 2004 2018 Included observations: 14 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C LGDP D(LCPI) LHPI D(LINT) D(LUNE)	0.602877 -0.145050 -0.775185 -0.051633 -0.493301 -0.551922	0.194797 0.077053 0.612659 0.024292 0.179209 0.205924	3.094903 -1.882477 -1.265279 -2.125528 -2.752657 -2.680223	0.0148 0.0965 0.2414 0.0663 0.0250 0.0279
R-squared Adjusted R-squared S.E. of regression Sum squared resid Log likelihood F-statistic Prob(F-statistic)	0.765903 0.619593 0.022815 0.004164 36.97681 5.234788 0.019871	Mean depende S.D. depende Akaike info cr Schwarz crite Hannan-Quir Durbin-Watso	dent var ent var iterion rion on criter. on stat	0.097014 0.036991 -4.425259 -4.151377 -4.450612 2.038048

Table 4.3 multiple regression model result

The coefficient of GDP is -0.145050. This means that 1% increase of gross domestic product will decrease 14.5% of household debt. This show that gross domestic has significantly related with household debt.

The coefficient of CPI is -0.775185. This means 1% increase of consumer price index; household debt will decrease 77.51%. It shows that consumer price index has 23

insignificant relationship with household debt.

The coefficient of HPI is -0.051633. This means 1% increase of house price index will decrease household debt with 5.16%. This shows that house price index significantly related with household debt.

The coefficient of INT is -0.493301. This means if interest rate increase by 1%; household debt will decrease 49.3%. This shows that interest rate has a negative significant with household debt.

The coefficient of UNE is -0.551922. This means 1% increase of unemployment rate will decrease household debt by 55.2%. This shows that unemployment rate has a negative significant with household debt.

The results of R^2 is 0.765903 which means that only 77% of the household debt is explained the correlation of independent that has been used. The rest of 23% is determine by the other factor.

The result of adjusted R^2 is 0.619593 which is 62% of household debt is defined by the independent variables in the study.

The result of F-test is 5.234788. The p-value of F-statistic is 0.019871 which is below than 10% of significant level. The finding is failed to reject null hypothesis.

4.4 Test of assumption

4.4.1 Normality test



Figure 4.1 Normality test

Normality test is a test to determine whether error term is normally distributed.

H₀ : Error term is normally distributed

H₁: Error term is not normally distributed

Based on the normality test result, it shows that Jarque-Bera is 3.621088 and the p-value is 0.163565. The p-value is more than 10% of significant level. Since the p-value is more than 10% of significant level, this study failed to reject the null hypothesis. It can be concluded that the error term is normally distributed.

4.4.2 Autocorrelation

Breusch-Godfrey Serial Correlation LM Test: Null hypothesis: No serial correlation at up to 2 lags

F-statistic	0.003773	Prob. F(2,6)	0.9962
Obs*R-squared	0.017587	Prob. Chi-Square(2)	0.9912

Table 4.5 Autocorrelation

H₀ : error term is serially independent

H₁ : error term is not serially independent

Autocorrelation is the measurement and observation of the data collected in this study to know the relationship between independent variables while dependent variables are not included. The probability value used is Obs*R-squared p-value which is 0.9912. The result shows that this test fail to reject the null hypothesis at 10% significant level. It can conclude that error term is serially independent.

4.4.3 Heteroskedasticity

Heteroskedasticity Test: Breusch-Pagan-Godfrey Null hypothesis: Homoskedasticity

F-statistic	0.344135	Prob. F(5,8)	0.8724
Obs*R-squared	2.478166	Prob. Chi-Square(5)	0.7798
Scaled explained SS	1.203886	Prob. Chi-Square(5)	0.9445

Table 4.6 Heteroskedasticity

H₀ : error term is homoscedasticity

H₁ : error term is heteroskedasticity

The heteroskedasticity is referring to the situation which variance of the error term in regression in not consistent. The probability to be used is Obs *R-squared which is 0.7798. Based on the result, this study failed to reject the null hypothesis at 10% significant level. This finding indicates that error term is homoscedasticity which is error term have constant variance.

4.4.4 Ramsey Reset Test

Ramsey RESET Test Equation: UNTITLED Omitted Variables: Squares of fitted values Specification: D(LHHD) C LGDP D(LCPI) LHPI D(LINT) D(LUNE)

	Value	df	Probability
t-statistic	1.715470	7	0.1300
F-statistic	2.942837	(1, 7)	0.1300
Likelihood ratio	4.913192	1	0.0267

Table 4.7 Ramsey Reset Test

H₀: the error term is not misspecification

H₁ : the error term is in specification

The p-value for T-statistic and F-statistic is above 10% of significant level. Therefore, this study failed to reject the null hypothesis at 10% significant level and it indicates that there is no misspecification.

4.9 Multicollinearity Test

Variance Inflation Factors Date: 06/13/19 Time: 08:29 Sample: 2003 2018 Included observations: 14						
Variable	Coefficient	Uncentered	Centered			
	Variance	VIF	VIF			
C	0.037946	1020.577	NA			
LGDP	0.005937	468.6358	3.333024			
D(LCPI)	0.375351	7.709590	1.211673			
LHPI	0.000590	366.7973	1.539633			
D(LINT)	0.032116	1.240548	1.221071			
D(LUNE)	0.042405	3.480715	3.309431			

Table 4.8 Multicollinearity Test

This test is conducted to detect the multicollinearity problem. Centred VIF value is used to detect if there is serious multicollinearity problem. Based on the result, the value of centred VIF for all variables is between 1 to 10. This indicate that all variables do not have serious multicollinearity problem.

4.5 summary

Based on the result of the test conducted, it can be seen that by using Multiple Linear Regression model, there is four variables is significant with household debt which is gross domestic product, house price index, interest rate and unemployment. Only consumer price index is not giving the effect to household debt.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.0 Conclusion

In this final chapter, it will present the discussion of finding that has been test in chapter 4 and recommendation for future research.

5.1 Discussion of finding

The objective of this study is to investigate the relationship between macroeconomics variables and household debt in Malaysia. The macroeconomics variables used in this study are gross domestic product, consumer price index, house price index, interest rate and unemployment. Multiple Linear Regression with time series data has been used for this study.

Based on the result, gross domestic product has negatively significant with household debt. It supported by Kim (2016) on their research that stated there is a negative significant relationship between household debt and gross domestic product. However, it contrasts with study discovered by Rahman & Masih (2014) found that any changes in GDP may not affect household debts It shows that this study consistent with the previous study.

The result for house price index shows negative significant relationship with household debt. The result is below than 10% of significant level. This result supported by Hoang & Meng's (2015) that found there is a negative relationship between household debt and house prices. However, Bank of Canada (2016) revealed that there is a positive relationship between household debt and house prices index.

The result for interest rate is negative significant with household debt. The result supported by Meng, Hoang & Siriwardana (2011) found that there is a negative

relationship between household debt and interest. This result contradicts with the research found by Hoang & Meng (2015) that stated interest rate is the main reason that influences household debt.

The result for unemployment rate is negative significant. The result is below than 10% of significant level. This result supported by Nieto (2007) revealed that unemployment has a negatively significant relationship with household debt. However, the result is contrast with the research found by Donaldson, J. R., Piacentino, & Thakor (2019) stated that unemployment rate has positive significant relationship with household debt.

The result for consumer price index has insignificant relationship with household debt. It supported by Nazreen (2010) that found consumer price index has insignificant relationship with household debt.

In conclusion, the result of this study has given the lesson and awareness to the accountable parties about factors that give impact to household debt.

5.2 Recommendation

The study has used selected macroeconomics variables which is gross domestic product, consumer price index, house price index, interest rate and unemployment. There are few issues for this study to achieve significant results. Thus, there are several recommendations that can be improve for further research in future and policy maker.

There are many other macroeconomics variables that can be considered such as consumer expenditure and population. Those variables would give the researcher reliable and inclusive result.

Future researchers are advised to utilize longer time period which is the number of observations. The time outline may influence the result of the study since the longer the period taken to carry out a study, the more precise the outcome.

Policymakers need to pay attention on bank lending rate for household. Rise in house price will burden the household. The increase in housing prices is not in line with the increase in average household income.

5.3 Summary

In conclusion, this study has answered all research question. There are many factors that can be used in determining the household debt and there also different relationship exists between dependent and independent variables.

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Raw data

Year	household	gdp	срі	hpi	interest rate	Unemployment
	debt					rate
2003	275176	5.788499284	84.1	77.75	6.299171	3.6
2004	316158	6.783437734	85.3	80.8	6.047504	3.5
2005	361029	5.332139149	87.8	82.9	5.950005	3.5
2006	395466	5.584847072	91	85.1	6.495838	3.3
2007	422900	6.29878593	92.8	88.825	6.405837	3.2
2008	465200	4.831769887	97.8	92.35	6.080004	3.3
2009	516100	-1.513528719	98.4	94.75	5.084169	3.7
2010	594200	7.424847386	100	100.975	5.000002	3.3
2011	694200	5.29391284	103.2	110.9	4.915002	3.1
2012	782300	5.473454192	104.9	125.8	4.785836	3
2013	877400	4.69372252	107.1	139.95	4.612753	3.1
2014	952700	6.00672195	110.5	153.15	4.587027	2.9
2015	1023200	5.091515721	112.8	164.475	4.565377	3.1
2016	1080500	4.223410194	115.2	176.05	4.531061	3.4
2017	1133800	5.897009293	119.5	187.55	4.608078	3.4
2018	1187300	5.060205	120.7	192.221	4.928652	3.4

Descriptive Analysis

Date: 06/13/19	Time: 08:29
Sample: 2003 2	2018

	LHHD	LGDP	LCPI	LHPI	LINT	LUNE
Mean	13.35371	1.710281	4.620001	4.767754	1.661908	1.184016
Median	13.45052	1.699910	4.636669	4.708629	1.595066	1.193922
Maximum	13.98719	2.004832	4.793308	5.258646	1.871162	1.280934
Minimum	12.52517	1.440643	4.432007	4.353499	1.510956	1.064711
Std. Dev.	0.503751	0.145024	0.120559	0.331879	0.143330	0.062192
Skewness	-0.241173	0.225681	-0.144780	0.213056	0.355066	-0.312092
Kurtosis	1.590137	2.781696	1.763798	1.487156	1.354680	2.145512
Jarque-Bera	1.387732	0.157115	1.007524	1.543918	2.007104	0.699847
Probability	0.499641	0.924449	0.604253	0.462107	0.366575	0.704742
Sum	200.3057	25.65421	69.30001	71.51631	24.92861	17.76023
Sum Sq. Dev.	3.552710	0.294447	0.203483	1.542014	0.287610	0.054150
Observations	15	15	15	15	15	15

Covariance Analysis

Covariance Analysis: Ordinary Date: 06/13/19 Time: 08:32 Sample: 2003 2018 Included observations: 15 Balanced sample (listwise missing value deletion)

Correlation t-Statistic Probability	LHHD	LGDP	LCPI	LHPI	LINT	LUNE
LHHD	1.000000					
	· ·					
LGDP	-0.412352	1.000000				
	-1.631960					
	0.1267					
	0.000000	0 44 4700	4 000000			
LCPI	0.990268	-0.414792	1.000000			
	25.65504	-1.643619				
	0.0000	0.1242				
	0.075251	-0.430031	0 075342	1 00000		
L	15 00350	-1 717405	15 03/13	1.000000		
	0.000	0 1006	0.0000			
	0.0000	0.1090	0.0000			
LINT	-0.917301	0.305194	-0.872190	-0.876567	1.000000	
	-8.305952	1.155523	-6.428746	-6.566891		
	0.0000	0.2687	0.0000	0.0000		
LUNE	-0.482682	0.075395	-0.415977	-0.339308	0.504832	1.000000
	-1.987147	0.272618	-1.649293	-1.300545	2.108618	
	0.0684	0.7894	0.1230	0.2160	0.0549	

Multiple Regression Model Analysis

Dependent Variable: D(LHHD) Method: Least Squares Date: 06/13/19 Time: 08:04 Sample (adjusted): 2004 2018 Included observations: 14 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C LGDP D(LCPI) LHPI D(LINT) D(LUNE)	0.602877 -0.145050 -0.775185 -0.051633 -0.493301 -0.551922	0.194797 0.077053 0.612659 0.024292 0.179209 0.205924	3.094903 -1.882477 -1.265279 -2.125528 -2.752657 -2.680223	0.0148 0.0965 0.2414 0.0663 0.0250 0.0279
R-squared Adjusted R-squared S.E. of regression Sum squared resid Log likelihood F-statistic Prob(F-statistic)	0.765903 0.619593 0.022815 0.004164 36.97681 5.234788 0.019871	Mean depende S.D. depende Akaike info cr Schwarz crite Hannan-Quir Durbin-Watso	dent var ent var iterion rion un criter. on stat	0.097014 0.036991 -4.425259 -4.151377 -4.450612 2.038048

Normality Test



Autocorrelation Test

Breusch-Godfrey Serial Correlation LM Test: Null hypothesis: No serial correlation at up to 2 lags

F-statistic	0.003773	Prob. F(2,6)	0.9962
Obs*R-squared	0.017587	Prob. Chi-Square(2)	0.9912

Test Equation: Dependent Variable: RESID Method: Least Squares Date: 06/13/19 Time: 08:23 Sample: 2004 2018 Included observations: 14 Presample and interior missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
С	0.007701	0.255490	0.030141	0.9769
LGDP	-0.001975	0.100858	-0.019587	0.9850
D(LCPI)	-0.026342	0.970925	-0.027131	0.9792
LHPI	-0.000714	0.028967	-0.024651	0.9811
D(LINT)	0.008373	0.226251	0.037005	0.9717
D(LUNE)	-0.004260	0.271869	-0.015670	0.9880
RESID(-1)	-0.045291	0.652941	-0.069364	0.9470
RESID(-2)	-0.053601	0.693807	-0.077257	0.9409
R-squared	0.001256	Mean depend	lent var	1.70E-17
Adjusted R-squared	-1.163945	S.D. depende	ent var	0.017898
S.E. of regression	0.026328	Akaike info cr	iterion	-4.140802
Sum squared resid	0.004159	Schwarz crite	rion	-3.775626
Log likelihood	36.98561	Hannan-Quin	n criter.	-4.174605
F-statistic	0.001078	Durbin-Watso	on stat	2.024204
Prob(F-statistic)	1.000000			

Heteroskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey Null hypothesis: Homoskedasticity

F-statistic	0.344135	Prob. F(5,8)	0.8724
Obs*R-squared	2.478166	Prob. Chi-Square(5)	0.7798
Scaled explained SS	1.203886	Prob. Chi-Square(5)	0.9445

Test Equation: Dependent Variable: RESID^2 Method: Least Squares Date: 06/13/19 Time: 08:25 Sample: 2004 2018 Included observations: 14

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C LGDP D(LCPI) LHPI D(LINT) D(LUNE)	0.000413 0.001466 -0.004838 -0.000511 5.52E-05 0.003652	0.005257 0.002080 0.016535 0.000656 0.004837 0.005558	0.078557 0.704790 -0.292586 -0.778879 0.011423 0.657139	0.9393 0.5009 0.7773 0.4585 0.9912 0.5295
R-squared Adjusted R-squared S.E. of regression Sum squared resid Log likelihood F-statistic Prob(F-statistic)	0.177012 -0.337356 0.000616 3.03E-06 87.54956 0.344135 0.872407	Mean depende S.D. depende Akaike info cr Schwarz crite Hannan-Quin Durbin-Watsc	lent var ent var iterion rion n criter. on stat	0.000297 0.000532 -11.64994 -11.37606 -11.67529 2.318717

Ramsey RESET Test

Ramsey RESET Test Equation: UNTITLED Omitted Variables: Squares of fitted values Specification: D(LHHD) GDP D(LCPI) LHPI D(INT) D(UNE) C

4 - 4- 4 - 4 -	Value	df	Probability	
t-statistic	0.168043	8	0.8707	
F-statistic	0.028238	(1,8)	0.8707	
Likelihood ratio	0.052854	1	0.8182	
F-test summary:				
	Sum of Sq.	df	<u>Mean Square</u> s	
Test SSR	2.45E-05	1	2.45E-05	
Restricted SSR	0.006963	9	0.000774	
Unrestricted SSR	0.006938	8	0.000867	
LR test summary:				
	Value			
Restricted LogL	36.28031			
Unrestricted LogL	36.30673			

Unrestricted Test Equation: Dependent Variable: D(LHHD) Method: Least Squares Date: 06/12/19 Time: 11:31 Sample: 2004 2018 Included observations: 15

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP	0.001353	0.008897	0.152076	0.8829
D(LCPI)	-0.289182	1.113908	-0.259611	0.8017
LHPI	-0.058722	0.109928	-0.534184	0.6077
D(INT)	-0.076954	0.149329	-0.515330	0.6203
D(UNE)	-0.129663	0.238134	-0.544495	0.6009
С	0.393901	0.647088	0.608728	0.5596
FITTED ²	-2.384359	14.18899	-0.168043	0.8707
R-squared	0.610917	Mean depen	dent var	0.097468
Adjusted R-squared	0.319104	S.D. dependent var		0.035689
S.E. of regression	0.029449	Akaike info criterion		-3.907564
Sum squared resid	0.006938	Schwarz criterion		-3.577141
Log likelihood	36.30673	Hannan-Quinn criter.		-3.911084
F-statistic	2.093525	Durbin-Watson stat		1.672356
Prob(F-statistic)	0.164454			

Multicollinearity Test

Variance Inflation Factors Date: 06/12/19 Time: 11:33 Sample: 2003 2018 Included observations: 15

Variable	Coefficient	Uncentered	Centered
	Variance	VIF	VIF
GDP	4.87E-05	28.08431	3.545520
D(LCPI)	0.447697	6.208839	1.172641
LHPI	0.000844	375.4845	1.542922
D(INT)	0.001172	2.497063	2.307406
D(UNE)	0.003963	3.176419	3.162757
C	0.020823	403.7429	NA