THE EFFECT OF MACROECONOMICS AND SOCIAL ELEMENT TOWARD PERSONAL BANKRUPTCY IN MALAYSIA

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DEDICATION

This paper is dedicated to Universiti Tunku Abdul Rahman for providing us an opportunity and platform to enhance and apply the knowledge we had learned throughout the finance course in the past few years.

In addition, we would like to dedicate this paper to Ms. Liew Feng Mei, who is our research project supervisor. She always showed tolerance and support us when we are completing this research project. Other than that, Ms. Liew are sharing the knowledge when she guiding us doing the research. It is hard to imagine that how we complete the research project without the guidance from out respected supervisor.

Next, we would like to dedicate the examiner, Ms. Nik Nuraisyah Binti Nik Azmi. She has expressed her precious recommendation and suggestion regarding the research project in order to have a better improvement on this research project.

Last but not least, this paper is also dedicated to our families, friends and course mates as an appreciation for their helping hand. In the term of physical and mental support towards our research project. We would like to dedicate this research project to the future researcher in assisting them to carry out their researches in the future.

DECLARATION

We hereby declare that:

(1) This undergraduate FYP is the end result of our own work and that due acknowledgement has been given in the references to ALL sources of information be they printed, electronic, or personal.

(2) No portion of this FYP has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.

(3) Equal contribution has been made by each group member in completing the FYP.

(4) The word count of this research report is 12,583 .

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LIST OF ABBREVIATIONS

ADF	Augmented Dickey-Fuller
AKPK	Credit Counselling and Debt Management Agency
ARCH	Autoregressive Conditional Heteroskedasticity
ARDL	Autoregressive Distributed Lag
BNM	Bank Negara Malaysia
CUSUM	Cumulative Sum
DF	Dickey-Fuller
DOSM	Department of Statistics Malaysia
ECM	Error Correction Model
ECT	Error Correction Term
HOC	Home Ownership Campaign
JB	Jarque Bera
MDI	Malaysia Department of Insolvency
PP	Phillips-Perron
PR1MA	Malaysia People's Housing Programme
RESET	Ramsey Regression Equation Specification Error Test

LIST OF APPENDICES

PREFACE

This research is submitted in as a fulfilment of the requirement for the degree of Bachelor of Finance (HONS). This research is focusing on the effect of macroeconomics factors and social element toward personal bankruptcy case in Malaysia by using the independent variables that consist divorce case, unemployment rate and lending rate. The increasing trend of personal bankruptcy in Malaysia is an alarming trend for Malaysia because it may bring negative effect towards Malaysia's economy and society. There are few past researchers identified the factors driven by the high personal bankruptcy case in Malaysia for example, credit card debt, GDP per capital and bad debt. Based on all these identified factors, the policy maker has designed some policy in curbing this problem. However, the personal bankruptcy case in Malaysia is still increasing based on data collected from Department of Statistic Malaysia (DOSM). Thus, this has raised an interest to study that what is the major factors that affect personal bankruptcy which were being ignored by past researchers and policy maker. The detail of the research findings, policy implication, limitation of this research and also the recommendation for future researcher will be discussed in this research.

ABSTRACT

Personal bankruptcy is one of the major issues that happened in Malaysia recently but the determinants of personal bankruptcy cases are still have the room for exploration. This research shows an empirical study of the macroeconomic factors and social elements leading to personal bankruptcy cases in Malaysia based on the available data from 1984 to 2017. The determinants in this research include lending rate, unemployment rate, and divorce cases. Autoregressive-Distributed Lag (ARDL) model was employed to study the relationship of lending rate, unemployment rate, and divorce cases toward personal bankruptcy cases. The results suggested that there is insignificant relationship between divorce cases and personal bankruptcy cases while lending rate and unemployment rate has significant relationship between personal bankruptcy cases. The results show that the rising of lending rate, unemployment rate and divorce cases will lead to the decrease of personal bankruptcy in Malaysia. Based on this study, future researchers are recommended to collect primary data to improve the accuracy of the results. Besides that, future researchers are also recommended to collect data not only based on the macroeconomic disaggregate level but also based on the disaggregate level of individual family. Lastly, it is advisable to lengthen the study period of research so that future researchers could be more focused in studying more relevant topics.

CHAPTER 1: RESEARCH OVERVIEW

1.0 Introduction

Bankruptcy is a crucial problem as it is threatening the nation's future (The Star Online, 2015). Bankruptcy would affect individual on their employability, maintain their desired lifestyle and obtain or secure loan (Free Malaysia Today, 2019). Furthermore, bankruptcy also ruin families by losing trust from spouse and losing respect from children (Free Malaysia Today, 2019). Due to previous statements, governments of countries around the world put effort and work hard to reduce household debt ratio and number of bankruptcy in the country.

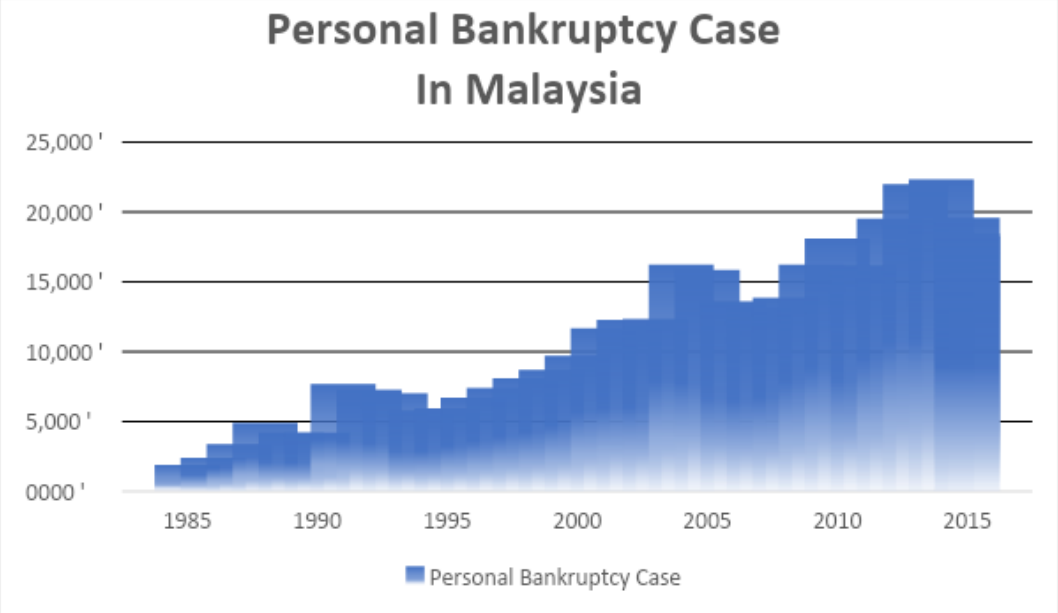
For example, one of the reasons Americans file for bankruptcy is due to the high costs of medical issues and bills, thus the government promote a program called "Medicare for All" to widen the insurance coverage for Americans to deal with the mentioned issue (CNBC, 2019). Other than that, Singapore implemented new rules to reduce bankruptcy threshold from S$10,000 to S$15,000, i.e. an individual need to file for bankruptcy if he owns a non-performing debt amounted more than or equal to S$ 15,000 (The Business Times, 2016).

Similarly, Malaysian government also conducted awareness program and setting up debt management, called Credit Counselling and Debt Management (AKPK) to reduce personal bankruptcy in Malaysia (The Star Online, 2018). However, the personal bankruptcy case in Malaysia is still increasing since 1984s until today (Free Malaysia Today, 2018). Thus, this research intends to investigate the effect of macroeconomics and social elements toward personal bankruptcy in Malaysia.

1.1 Research Background

First of all, bankruptcy is a legal status which is bound to borrowers, no matter an individual, a company or a country, who are seeking relief from unmanageable financial obligation (Lewis, 2018). Meanwhile, personal bankruptcy refers to an individual who is unable to repay his loans and liabilities amounted to certain level as determined by the authority. In Malaysia, a bankrupt person is an individual who has been officially declared that he is unable to pay his debts of at least RM 50,000 (Malaysia Department of Insolvency, 2019)

Figure 1.1: Trend of Personal Bankruptcy in Malaysia



Source: Department of Statistics Malaysia (2019)

Figure 1.1 shows there is an upward trend for personal bankruptcy case in Malaysia from 1985 to 2017. According to Sharifah, Shafinar and Bee (2018), there are around 22,581 number of Malaysian filed for personal bankruptcy between 2012 and September 2016 as recorded by Malaysia Department of Insolvency (MDI).

There are two main elements that relates to personal bankruptcy, which are personal income and ability to repay loans. Personal income is an individual's total earnings, i.e. the summation of his salary, commission, interest from investments, dividends,

rental income etc. meanwhile the ability to repay loan refers to the capability of an individual to repay their loans.

The unemployment rate is one of the most concerned factors when it comes to personal bankruptcy because employment is the primary source of personal income that would influence on consumer spending and overall economic growth. When an individual is unemployed, he or she is losing the resources of income and unable to repay the loan in hand, in this situation, in order to reduce financial stress, it would force them to file for bankruptcy (Hussain, 2002).

Free Malaysia Today (2017) reported that Malaysians have various kinds of loans such as hire purchase loan, credit card loan, personal loan, housing loan and medical expenses. Among all these loans, car loan, personal loan and housing loan are top three loans borrowed by Malaysian (Malaysia Department of Insolvency, 2015). However, housing loan borrowers would have the highest financial burden as compared to car loan and personal loan borrowers because the total amount of interest payment for housing loan is highest (Srfincorp, 2018). Due to the longer repayment period that a housing loan has, the total amount of interest payment is higher as compared to the car loan and personal loan.

Furthermore, social elements are other factors that could affect personal bankruptcy in different countries. Those social elements include gambling, marriage and divorce, health insurance coverage and more (Edmiston, 2006). Social elements such as medical expenses is one of the biggest drivers of personal bankruptcy in the United States (New Strait Time, 2018). However, in Malaysia, both medical expenses and divorce also affect personal bankruptcy.

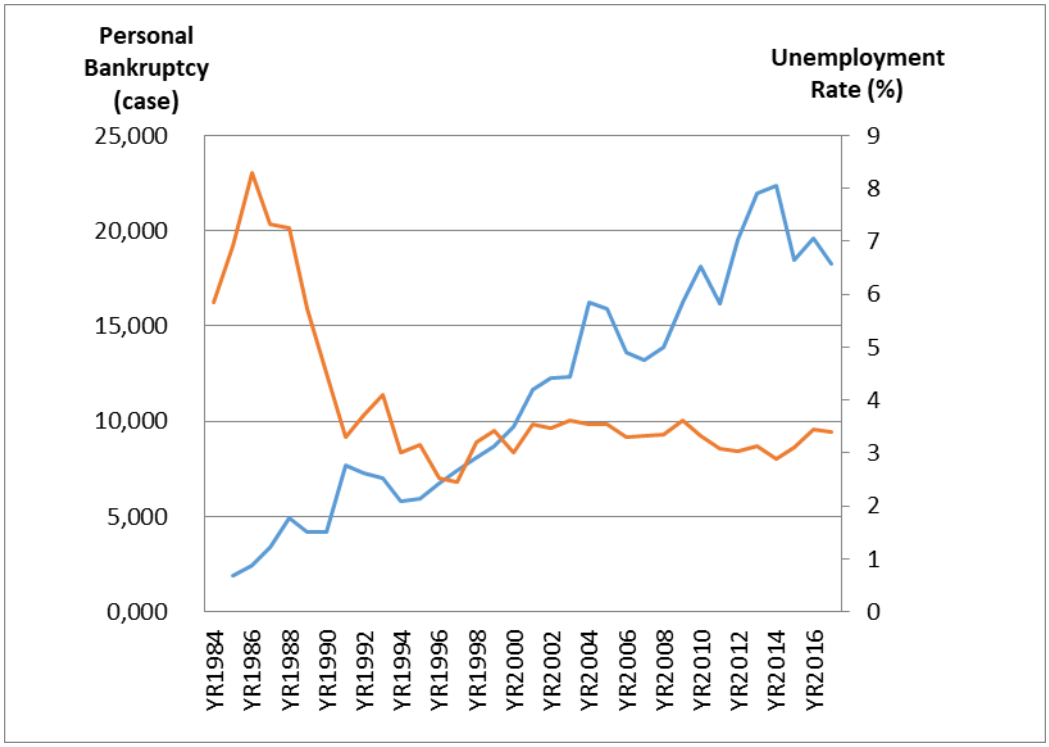
1.2 Problem Statement

Even though Bank Negara Malaysia has set up AKPK in 2006 and government changed the bankruptcy threshold from RM30,000 to RM50,000 in 2016 to reduce the personal bankruptcy case in Malaysia, the trend of personal bankruptcy is still

increasing from 2007 to 2017 (New Straits Time, 2018). Thus, it has come to a question that what are the factors that affect personal bankruptcy in Malaysia.

Normally, when unemployment rate increases, the personal bankruptcy is expected to increase as well. In past history, the most obvious example of the above trend happened during financial crisis, for instance, the 1997 Asian Financial Crisis (Hilwa, Shaliza & Norasyikin, 2013; Hakon & Hatlestad, 2015). However, this trend is not reflected in Malaysia.

Figure 1.2: Trend of Unemployment Rate and Personal Bankruptcy in Malaysia



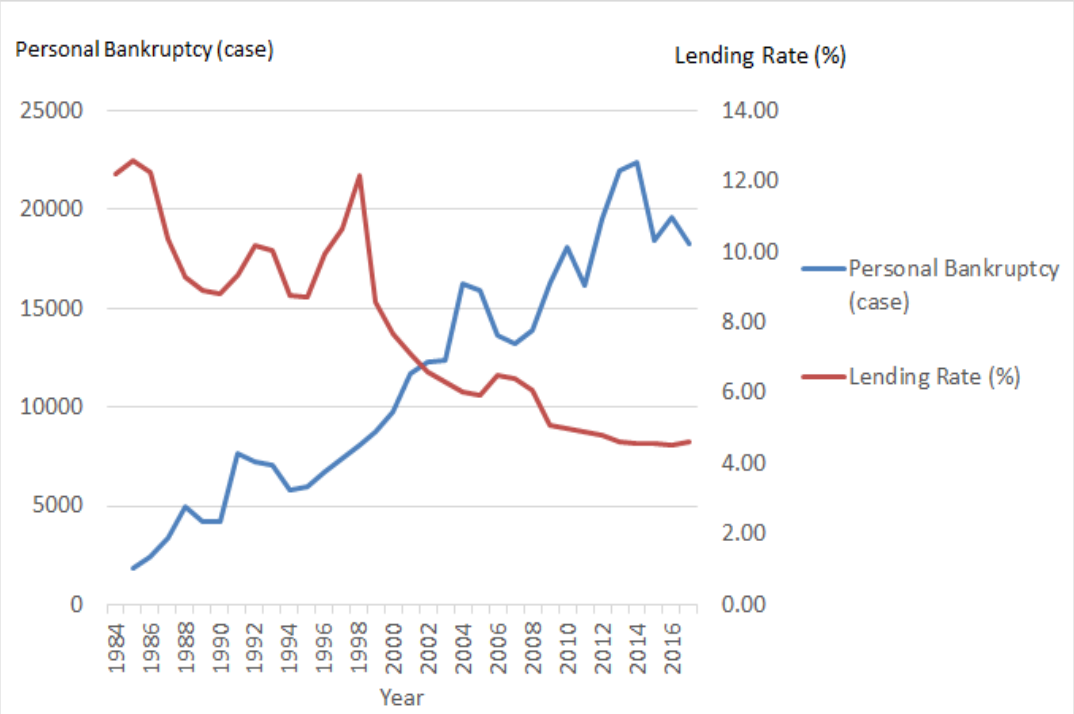
Source: Department of Statistics Malaysia (2018) & Bank Negara Malaysia (2018)

Figure 1.2 shows the trend of unemployment rate and personal bankruptcy case in Malaysia from 1984 to 2017. The trend of unemployment rate shows a decreasing trend while personal bankruptcy shows an upward trend. This has raised the interest of author in exploring possible research gap in the literature of personal bankruptcy.

From the perspective of loan repayment ability, lending rate is one of the factors that should be focused the most because it will affect the interest payment across all

types of loans, especially housing loan because the interest payment accounted for big portion in total repayment (CNBC, 2019). This can be proof by a survey done by a platform which help people to resolve debt called "Freedom Debt Relief", they found 50% or above of people found difficulties to pay off housing loan because the monthly mortgage payment is too high (CNBC, 2019).

Figure 1.3: Trend of Lending Rate and Personal Bankruptcy in Malaysia



Source: Department of Statistics Malaysia (2018)

Figure 1.3 shows the trend of lending rate and personal bankruptcy case from 1984 to 2017 in Malaysia. From the illustration above, lending rate shows an overall downward trend while personal bankruptcy has an increasing trend throughout the years.

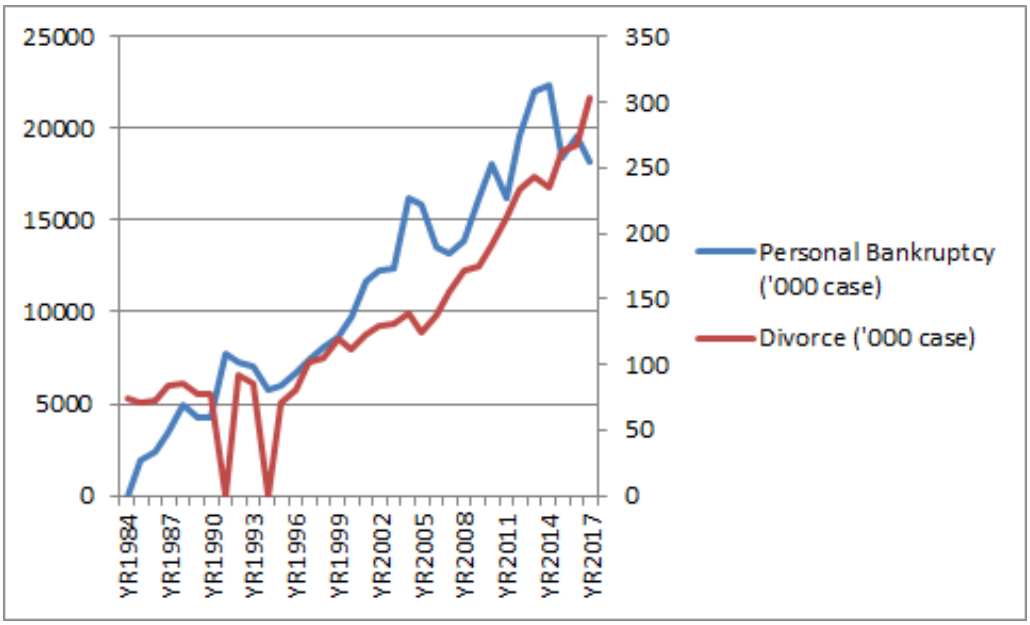
Normally, lending rate and personal bankruptcy has positive relationship i.e. these two variables are increasing together. However, the trend in Malaysia shows negative relationship. The phenomena can be explained by The Edge Markets (2017) which stated housing loan is the highest cause for personal bankruptcy in Malaysia during 2012. It is because Malaysians are taking multiple loans at the same time for speculative activities. For further explanation, due to the low lending rate given by

banks, the borrower borrows a large loan to buy a house not knowing that a large amount of interest payment that has to be repaid. When the financial obligation becomes heavier due to the interest payment, eventually the borrower will default the payments and roll up more debt that the borrower does not have the ability to repay, in the end the borrower is forced to file for bankruptcy.

Similarly, The New York Times (2019) also reported that when the government lowers down the lending rate, it could encourage borrowing but it is not effective toward mortgage repayment. Thus, the authors are concerned whether the government of Malaysia should increase or lower down the lending rate to control the borrowing activities. Hence, this has raised an interest to study the effect of this macroeconomic variable on affecting the personal bankruptcy.

From another perspective, divorce could lead to personal bankruptcy. In developed countries, for instance the United Kingdom, are having a positive relationship between divorce and personal bankruptcy, i.e. these two variables are either increasing or decreasing together. Global News (2017) explained that the different income level among the spouse like females are more financially vulnerable than male after divorce. If one of the spouses could not afford the cost of living after divorce, they will have higher chances to file for bankruptcy. Thus, the increase of divorce cases might bring towards high personal bankruptcy in future.

Figure 1.4: The Relationship between Divorce Case and Personal Bankruptcy in Malaysia



Source: Department of Statistics Malaysia (2019)

In Malaysia, Business Insider Malaysia (2019) reported that divorce is one of the causes that leads to personal bankruptcy. Figure 1.4 shows the trend of divorce case and personal bankruptcy in Malaysia from 1984 to 2017. By looking at Figure 1.4, the overall trend of divorce case and personal bankruptcy in Malaysia is also having a positive relationship, same as United Kingdom. As Malaysia is under the transition of becoming a developed country from a developing country, the scenario in developed countries can be served as the reference for Malaysia in handling the issue of economic development. Thus, government should concern the changes of the trend in divorce, as it affects the personal bankruptcy directly.

1.3 Research Objective

In this research, general objectives and specific objectives are stated to identify the goals for this study.

1.3.1 General Objective

The general objective is to identify the effect of microeconomic and social element towards personal bankruptcy in Malaysia.

1.3.2 Specific Objectives

Specific objectives are the objectives narrowed down from the general objective in order to provide a clearer objective for the research. Four specific objectives are included in this research which are shown as below:

a. To examine the relationship between personal bankruptcy case and unemployment rate.

b. To examine the relationship between personal bankruptcy case and lending rate.

c. To examine the relationship between personal bankruptcy case and divorce case.

d. To examine the overall significant relationship between personal bankruptcy case, unemployment rate, lending rate and divorce case.

1.4 Research Questions

The research questions include:

a. Is there any significant relationship between personal bankruptcy case and unemployment rate?

b. Is there any significant relationship between personal bankruptcy case and lending rate?

c. Is there any significant relationship between personal bankruptcy case and divorce case?

d. Is there any overall significant relationship between personal bankruptcy case, unemployment rate, lending rate and divorce case?

1.5 Hypothesis of the Study

1.5.1 Unemployment Rate

H_0: Unemployment rate does not have significant relationship with personal bankruptcy case.

H_1: Unemployment rate have significant relationship with personal bankruptcy case.

1.5.2 Lending Rate

H_0: Lending rate does not have significant relationship with personal bankruptcy case.

H_1: Lending rate have significant relationship with personal bankruptcy case.

1.5.3 Divorce Case

H_0: Unemployment rate does not have significant relationship with personal bankruptcy case.

H_1: Unemployment rate have significant relationship with personal bankruptcy case.

1.5.4 Overall Hypothesis

H_0: Overall independent variable does not have significant relationship with personal bankruptcy case.

H_1: Overall independent variable have significant relationship with personal bankruptcy case.

1.6 Significance of Study

Based on previous researchers, many factors are found that it is able to affect personal bankruptcy in a country. This research focuses on the macroeconomic factors and social element which would affect personal bankruptcy, the factors are unemployment rate, lending rate and divorce case. This study aims to identify whether these three variables have relationship with the personal bankruptcy case in Malaysia.

This study would be able to contribute in the academic field. This is because there are very few research studies of the effect of divorce case towards personal bankruptcy in Malaysia. The research study by Fisher and Lyons (2006) found that divorce is statistically insignificant towards personal bankruptcy. But the study of Bissenbina (2017) on personal bankruptcy in US shows that divorce is significant

and has a positive impact toward personal bankruptcy. Other than that, most of the study that research in factors affecting personal bankruptcy in Malaysia uses primary data but very less in using secondary data. This study would be able to fill up the research gap in the academic field and may help future researchers to acquire more information on personal bankruptcy.

Other than that, this study also contributes to policy makers. Policy makers will be able to get more information and understand more about the factors which lead to personal bankruptcy. This study will be able to provide a recommendation to the policy makers to construct a better policy in order to control the case of personal bankruptcy which is increasing every year. For example, the unemployment rate and lending rate is the independent variables of this research. If the unemployment rate is a significant variable towards personal bankruptcy, the policy makers could come out with policies that are able to lower the unemployment rate and thus control the personal bankruptcy of the country. The same goes for lending rate, policy makers can control the lending rate from banks or financial institutions at its optimum level to reduce the financial burden of the lenders if lending rate significantly affects personal bankruptcy.

Last but not least, this research would be able to provide useful information towards the society as well. This study would be able to help people to understand more about personal bankruptcy and the factors of personal bankruptcy. This research may help to increase the financial knowledge of the society which might help them to prevent in declaring bankruptcy. For example, if lending rate is one of the significant variables, then the people would understand even though the lending rate is low, but if the amount of debt is too large, it would force them into declaring bankruptcy as well. This study might help the society to understand that it is important to have a better financial management or financial plans.

1.7 Chapter Layout

Chapter One discussed about the introduction of this research which includes the title, sample size, period and the variables. Other than that, this chapter also includes research background that focus on the dependent variable while problem statement focus on independent variable. Furthermore, this chapter consist of research objective, research question, hypothesis of the study and significant of the study.

Chapter Two consists of the review of literature regarding the variables. Research gap of this study will be further discussed. Theoretical model and theoretical framework show the theories that will affect the dependent variable.

Chapter Three has further explanation of the methodology which includes data description, proposed data analysis tool, preliminary test, estimation and diagnostic checking. Flow of the methodology is provided for a clearer understanding.

Chapter Four will carry out the tests that is stated in Chapter Three. Thus, the results of tests will be elaborated in this chapter and a short summary of the results will be stated at the end of the chapter.

Chapter Five is separated into a few categories which includes discussion of the major findings, implication and limitation of the study. At the same time, discussion of the recommendation for future research will be based on limitation of this study.

1.8 Conclusion

In conclusion, Chapter 1 explaining the concept of this research is to examine the relationship of macroeconomic factors and social element towards personal bankruptcy in Malaysia. In this research, personal bankruptcy is a dependent variable and the independent variables include lending rate, unemployment rate and divorce case. The reason of choosing unemployment rate and lending rate as

independent variables is because there are previous researchers shows that these variables plays a significant role on personal bankruptcy of a country. Furthermore, there are many different results from different studies of divorce case that affects personal bankruptcy in other countries. Thus, the purpose of choosing divorce case as independent variable is to investigate whether it is significant or insignificant towards Malaysia's personal bankruptcy. This research aims to identify whether the independent variables have a positive or negative relationship towards personal bankruptcy in Malaysia. Lastly, these justifications and results will be presented in the following chapters for further elaboration.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

In this chapter, a review on the theories and previous studies related to personal bankruptcy and our variables where most researchers have been extensively investigating the variables of the personal bankruptcy such as unemployment rate, lending rate, and divorce case. In addition, the theoretical models, theoretical framework will be discussed in this chapter.

2.1 Review of Literature

2.1.1 Unemployment Rate

According to Deng, Quigley and Van Order, (2000), the authors prefer to involve the unemployment rate as a variable to study the relationship with personal bankruptcy. This is from the hypothetical point of view; the unemployment rate should be statistically significant and have a positive impact on personal bankruptcy. Hussain (2002) posited that, when an individual unemployed, he or she is unable to cover personal spending and need to bear the family expenses alone, this may cause the individual lose the resources of income and slowly move toward bankruptcy. Zywicki (2005) and Virmani (2002) also found that bankruptcy is seen as a largely involuntary act, due to sudden factor such as unemployment. Moreover, Herkenhoff (2018) found that when supply of borrowing increased, individual would optimally search for a better way to get money in order to looking for better jobs. This is because in individuals' mind set there will always be an alternative way to get money although they fail to get a better

job. This situation is because when an individual has loss their job or is a fresh graduate, he or she will lost ability to repay their debts such as student loan, car loan and housing loan.

Athreya, Sánchez, Tam and Young (2015) stated that unemployed individuals had higher risk lead to bankruptcy because individuals are unable to pay the loans which they got from financial institutions after they are unemployed. Warren (2004) stated that unemployment and the decreasing of salaries will cause the personal bankruptcy cases to increase in a country. Warren (2004) gave the observation that the individuals will have insufficient salary to maintain their daily life and file for bankruptcy in the end.

On the other hand, from the report of Mahani (2002) stated that unemployment rate negatively affects personal bankruptcy. Malaysia struggled to adapt to the regional economic collapse in order to maintain the industrial gains from the financial crisis in East Asia in the late 1990s. Malaysia's golden age fall in between 1986 to 1997 where sustained high growth in Malaysian was recorded as the longest period starting from 1990 to 1996 in Malaysian history. As a result, financial crisis had brought troubles to the individuals and caused personal bankruptcy to increase, the unemployment rate dropped because many companies need employees to carry out the businesses.

In general, as observed from prior studies, most of the researchers also found that the unemployment is a statistically positive variable to influence the personal bankruptcy in their studies. Therefore, this research expected the unemployment rate is statistically positive to influence the personal bankruptcy.

2.1.2 Lending Rate

According to MacGee (2012); Gropp, Scholz and White (1997) and Han and Li (2011), lending rate and personal bankruptcy are found to have positive relationship. MacGee (2012) and Han and Li (2011) proposed that most people who file for bankruptcy is because they are unable to meet all financial obligations such as automobile loan, credit card debt and home loan and fillings are such a useful proxy to reduce financial stress. The findings are consistent with findings of past studies by Li, Meghir and Oswald (2017), which found that the higher or lower lending rate depend on an individual's probability of repayment of the loan which means that if an individual is suspect to be filling for personal bankruptcy the higher lending rate will be charged by the bank and vice versa. Moravec (2019) also found that the rise in lending rates will cause the costs of debt financing to increase and thus increase individual financial stress. Research findings by Lin and White (2001) also points towards that when bankruptcy exemption levels increase, the probability of default risk will be higher and since the trustee is not entitle to sell the property to pay unsecured creditors thus the higher lending rate will be charged which is consistent with literature found by Gropp et al. (1997) and Goodman and Levitin (2012).

But, Chatterjee (2006) also found that, the credit card companies will offer a lower lending rate to those borrowers who suspect to have less default risk but in the long run, the cheaper debts could lead to higher indebtedness and also higher personal bankruptcy filings. This study suggests that lending rate negatively affects personal bankruptcy.

However, interestingly, it was later shown by Ausubel (1997) and Rougeau (1996) that there is no relationship between the lending rate and personal bankruptcy. This is because both of them believe that the interest rate deregulation will expand personal credit and loan thus lead to an increase in personal bankruptcy while interest rate will not cause personal credit and loan to increase because it is control by government. According to Ausubel

(1997), the changes in the interest rate might not relevant to personal bankruptcy because only those consumers who underestimate their credit card balance or irrational consumer will borrow large sums of credit and defaults and cause the costs of debt become higher and higher thus fill for personal bankruptcy. While according to Rougeau (1996), credit card market and the lack of interest rate control by regulation has produced a dramatic transfer of wealth from consumers to the credit card issuer which is bank because deregulation of interest rate will cause most of the large nation bank increase their interest rate on loans because the higher the interest rate that is charged from credit card, the higher the profit they gain from consumers. The above finding is consistent with findings of part studies by Livshits, Macgee and Tertilt (2009), which mentioned that no ceiling of interest rate will lead to some of the individual to borrow large amount at very high interest rate with no intention of repaying them. Furthermore there is also an interesting contrary study by Athreya, Sánchez, Tam, and Young (2018), which mentioned that borrower who faced high lending rate from their debts can either file for bankruptcy protection or just simply fail to repay their debts as promised which referred as delinquency. In short, the higher lending rate cause the higher the delinquency instead of the higher the personal bankruptcy.

In conclusion, there are a majority of researchers found that lending rate significantly affects personal bankruptcy but minority of researchers found insignificant and no significant relationship. Thus, the relationship is expected to be positive.

2.1.3 Divorce Case

The increasing of divorce cases recently has become one of the highly concerned issues by the researchers and policy makers because the increase of divorce cases has an extraordinary effect on the increase of personal bankruptcy of a country. The reason why divorce cases is related to personal

bankruptcy is due to the fact of divorce implies the financial costs of these families. When divorce occurred to either man or woman, it would result in a sustainable drop on household income which may increase the aspect of living cost on social welfare either it will fall into poverty or bankruptcy (Duncan & Hoffman, 1985).

According to Edmiston (2006), Fisher and Lyons (2005), Duncan and Hoffman (1985), positive relationship is found between divorce and personal bankruptcy. Edmiston (2006), found that divorce will cause huge and unexpected expenses which is not occurred pre-divorce status which may lead to bankruptcy. This relationship is supported and particularly for women that they will face a decrease of 30% in economic status in the first year after divorce happened in United States between 1970 and 2000. Edmiston (2006) proved with results that when divorce increases by 1% among the population, it will cause an increase of 7.8 people to declare bankruptcy in every 10,000 households. These shows the divorce rates are highly related among the population of the country that declare bankruptcy.

In addition, Duncan and Hoffman (1985) found the net income of men will drop instantly after divorce. This situation occurred is because men most likely need to pay alimony, payments of children support, and income losses from spouse. These types of losses will be offset if the personal net income increase. Del Boca and Ribero (2001); Fisher and Lyons (2005) also supported the evidence above by studying the same types of expenses like payment of child support, alimony, and redistribution of property in the research. Researchers stated that these types of expenses can become supplemental income for one of the selected divorced spouses and help him to reduce the financial burden.

Fay, Hurst and White (2002) also provided a similar evidence which showed the individual has higher chances with an increase of 86% in personal bankruptcy in the following year after divorce. The previous researcher also stated lawyers is one of the main factors which influence their clients to file for bankruptcy because there are many benefits after they file for bankruptcy

for example the male no need to pay alimony to female after file for bankruptcy. The evidence above also supported by Domowitz and Sartain (1999) which mentioned that people after divorce has higher chances to file for bankruptcy as compared to married individuals.

However, interestingly, this is contrary to a study conducted by Caplovitz (1974) and Sullivan, Warren, and Westbrook (1995) which mentioned that negative relationship is found between divorce and personal bankruptcy. Sullivan et al. (1995) indicated that most of the debtors who filed for bankruptcy were married people. This statement is also supported by Caplovitz (1974) which stated that married families have a higher financial burden than individual person because married people have more expenses needs to be counted compared to individual. For further explanation, the inability to repay debt for married family is higher compared to individual.

Zywicki (2005) also supported that divorce negatively affects personal bankruptcy. He proved it with American peak divorce rate in 1981 which counted 5.3% divorces per 1 million population. After the peak divorce year, the divorce has been stable or fall a bit over time but the number of bankruptcies increased continuously even the divorce rate have fallen. In conclusion, previous researchers have found positive and negative between divorce and personal bankruptcy. Thus, the relationship between divorce and personal bankruptcy is expected to be positive.

2.2 Research Gap

There are some research gaps found in this study after the literature review. For lending rate and unemployment rate, past studies found results that are positive relationship (Hussain, 2002 & MacGee, 2012) and negative relationship (Chatterrjee, 2006 & Mahani, 2002). The context of MacGee (2012) and Han and Li (2011) found lending rate and personal bankruptcy has positive relationship which stated that high personal bankruptcy is caused by high lending rate while

Chatterjee (2006) argued that lending rate negatively affects personal bankruptcy which stated low lending rate lead to high personal bankruptcy. For unemployment rate, Hussain (2002) and Herkenhoff (2018) stated there is an unemployment rate positively affects personal bankruptcy but Mahani (2002) stated unemployment rate negatively affects personal bankruptcy.

For other perspectives, there are only few previous researchers have done the research of divorce cases against personal bankruptcy in Malaysia. However, these types of studies are frequently carried out in some of the countries such as the United State, Canada, England and other European countries which show the importance of the effect of this social element in this research.

2.3 Theoretical Model

2.3.1 Efficiency Wage Theory

According to Pettinger (2017), the concept of efficiency wage theory is, by increasing wages will be able to increase labour productivity. If the company increase the wages of employees, the higher cost of wages will be able to be recovered through the low turnover of employees and reach higher productivity, however, this might lead to involuntary unemployment because of the efficiency wage (Pettinger, 2017).

Based on Keynesian theory of involuntary unemployment which was developed by Keynes during the 1930s, involuntary unemployment is willing to work at the market wage or below the market wage but unable to get a job because of insufficient demand for workers thus it is related to unemployment rate. In this situation, the firms did not cut down the wages in order to increase the demand for workers with lower wages, instead they

implement the efficiency wage where wages are higher than normal wage level (Keynes, 1937).

Based on the study of Yellen (1995), firms observed it is not profitable to cut wages when the situation of involuntary unemployment occurs. The hypothesis of efficiency wage is where labour productivity depends on the wages that is paid by the firm, when the wages are being reduced, it would harm the productivity, hence by cutting wages might cause the rise of labour costs (Yellen 1995).

The study of Coddington (1982) states that the issue of involuntary unemployment increases due to the malfunction of the economic system, it is not caused by individuals which lack the ability to work but it is an economy that fails to provide employment opportunities to them. Based on the efficiency wage theory, Yellen (1995) observed that the excess of labour supply does not result in cutting the wages of the workers.

Previous research of Deng et al. (2000) has shown that unemployment rate is positively related towards bankruptcy. The authors proposed that when an individual is involuntarily unemployed for a long time due to the efficiency wage theory, they would not be able to sustain daily expenses and repay bank loans, hence they are forced to file for bankruptcy.

2.3.2 Liquidity Preference Theory

Liquidity preference theory was developed by Keynes in 1937. Liquidity preference theory is to explain the determination of interest rate by using the supply and demand of money. According to Keynes (1937), liquidity preference means the demand for money which is considered as liquidity. Keynes thinks that interest rate is not a reward for savings that is deposited in the bank, he gave an example where a person saves all his savings in cash and keep it under the mattress, even though he did not use any of the income,

the cash will not generate any interest. Keynes thinks that interest is a reward for parting with liquidity and the most liquid asset is money.

According to Chen (2018), the theory suggests an investor demanding for a higher interest rate or premium on securities that comes with long-term maturities, but it carries greater risk, due to all other factors are equal, the investors would prefer higher liquid holdings such as cash. The theory proposed that short-term securities will have lower interest rate because short-term securities does not need to sacrifice liquidity as long as long-term securities. This is why investors demand higher interest rates on long-term securities.

Based on the theory of Keynes, one of the motives of liquidity preference theory is speculative motive. According to Keynes (1937), speculative demand is to take advantage of interest rates that would change in the future. Therefore, the demand for money will decrease when the rate of interest increases, on the other hand, the lower the interest rate, the demand for money will be higher.

Previous studies of Ausubel (1997) and Rougeau (1996) states that the lower the interest rate, the higher chance for people to file for bankruptcy. This is because people would tend to borrow more due to the low interest rate and thus result in the increase of personal debt. The authors proposed that when the interest rate is low, it attracts people to borrow loans, when the borrowings exceed the individuals' ability to repay the debt, the number of people filing for bankruptcy will increase.

2.3.3 Economic Theory of Marriage and Divorce

According to Weiss (2001), from an economic point of view, marriage has a purpose of joint consumption and production, it is comparable to the aim of economic organizations to maximize one's self interest. However, a

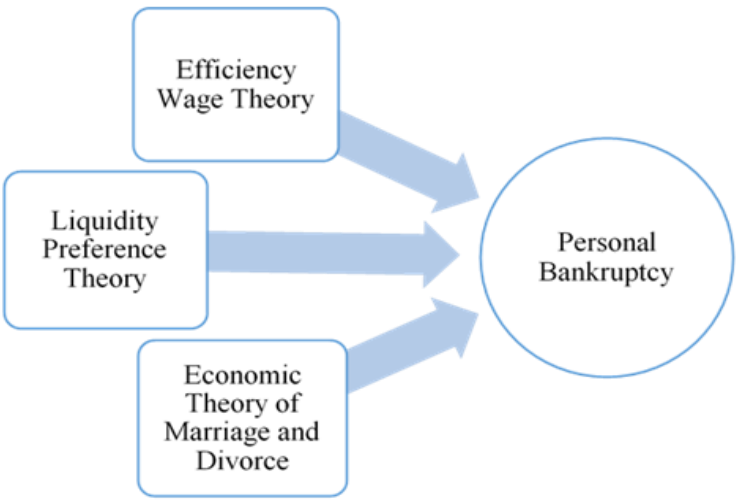
divorce between the two parties will face different problems, one of it would be the issue of financial problem.

Based on the study of Friedberg and Stern (2003), one of the gains from marriage is acquire higher efficient use of resources which refers to both money and time. When divorce happens, the living cost of the both parties would become heavier. Previous study of Fay et al. (2002) states that divorce requires a large amount of money to pay for the court filing fees, attorney fees, alimony fee and so on which proposed that divorce is actually costly.

The study of Duncan and Hoffman (1985) state that divorce would result in both husband and wife facing a decrease in household income hence an increase in daily expenses which might increase the probability of filing for bankruptcy. In short, the authors proposed that due to the separation of husband and wife, the concentration of income in the family would be separated as well, where the living costs increase, in the end causes them to file for bankruptcy.

2.4 Theoretical Framework

Figure 2.1: Theoretical Framework for the Factors of Personal Bankruptcy in Malaysia



Source: Developed for the research

As illustrated in Figure 2.1, there are three theories that affects the dependent variable of this research. The dependent variable is personal bankruptcy that will be affected by the three theories which are efficiency wage theory, liquidity preference theory and economic theory of marriage and divorce.

2.5 Conclusion

Based on the literature review, factors found to be influencing personal bankruptcy have been explored in several studies. There is a significant effect on the personal bankruptcy case among the unemployment rate, lending rate, and divorce case. Given from the literature review, different researchers have a different point of view and different findings were found. Therefore, the majority of researchers found that unemployment rate, lending rate, and divorce case positively affects personal bankruptcy case. On the other hand, a minority of researchers found that the variables are negatively correlated with personal bankruptcy. The following chapter will discuss about the methodology.

CHAPTER 3: METHODOLOGY

3.0 Introduction

Further discussion of methodology about this study will be carried out in this chapter. Furthermore, data collection will be discussed and preliminary test, estimation and diagnostic checking will be executed to make sure the result of analysis is reliable. Firstly, conducting the pre-test on stationarity of data by using unit root test and bounds test. After that, estimation will be done using Autoregressive Distributed Lag (ARDL) model and Error Correction Term (ECT) and Granger causality will be reported. Lastly, diagnostic checking consists of normality test, autocorrelation, heteroscedasticity, model specification and stability diagnostic.

3.1 Data Description and Proposed Data Analysis Tool

Data collection method is a process for researchers to measure and gathering information for research purpose or decision making. There are two types of data collection method, which consist of primary and secondary data. Primary data refers to first-hand-experience information collected by researchers for doing exploratory research such as questionnaires method or interview method Secondary data is the information that has already been published to the public such as books, internet sources and government databases. This study uses secondary data and it is collected from the Department of Statistics Malaysia (DOSM), Bank Negara Malaysia (BNM) and World Bank. The sample size consists of 34 years of annual data, covering form year 1984 to 2017. The reason for using 34 sample size is because the degree of freedom (n-k-1), must be more than or equal to 30, where k is the number of independent variables. 30 sample size is the minimum sample size for small sample size research. The Table 3.1 shows the data sources and data explanation.

Table 3.1: Sources and Data Explanation

Variables	Units	Explanation	Sources
Personal Bankruptcy	Number of cases	Number of personal bankruptcy cases reported in Malaysia	Bank Negara Malaysia
Unemployment	Percentage	Unemployment rate in Malaysia	Department of Statistic Malaysia
Lending	Percentage	Lending rate in Malaysia	World Bank
Divorce	Number of cases	Number of divorce cases reported in Malaysia	Department of Statistic Malaysia

In this research, the software of E-View 10 is used to analyse the data. E-View is an interactive econometric software which used to do data analysis, data estimation and data forecasting. An empirical analysis of Autoregressive Distributed Lag (ARDL) model will be carried out by using E-View 10.

3.2 Preliminary Test

3.2.1 Unit Root Test

Unit root test such as Dickey-Fuller (DF), Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) is used to test for whether the series (or its first or

second difference) is stationary. A series can be either stationary or not stationary (nonstationary). A Stationary means that the mean and autocovariances of the series do not depend on time which can be also said that they are constant over time. In contrast, when the mean and autocovariances of series depend on time or change over time it is consider as a nonstationary. The following parts is to show the difference between DF, ADF and PP.

3.2.1.1 Dickey Fuller (DF) Test

One of the unit root test which is DF test, the objective of the test is to test the null hypothesis that $\beta = 1 \; in \; y_t = \beta y_{t-1} + \mu_t$ against the one sided alternative $\beta < 1$. So, H_0: Series is non-stationary (Unit Root) while H_1: Series is stationary (No Unit Root). In other words, it can be said that DF test tests the null hypothesis that a unit root is present in an autoregressive model. While the alternative hypothesis is different depending on stationary or trend-stationary of the test is used. However, there is also an extension test by DF test which called augmented Dickey Fuller (ADF) test and it will be explained in the following part.

3.2.1.2 Augmented Dickey Fuller (ADF) Test

The ADF test is the extension test by DF test. ADF test is the simple and easy method to test whether a variable has a unit root or not. ADF test will be carried out due to μ_t is white noise in DF test. Especially, μ_t will be autocorrelated when there is autocorrelation in the dependent variable of the regression. So, to "augment" the test the solution is to use ρ lags of the dependent variable. Furthermore, the augmentation ($\rho > 0$) will not affect the asymptotic distribution of the test statistic and the test can be performed on variable in first differences. In addition, actually the test statistic value in ADF test mostly will be in negative number and when the test statistic has

higher magnitude of negative number it may have higher chances to reject the null hypothesis of the test (Dickey & Fuller, 1981).

Null hypothesis and the alternative hypothesis are shown as below:

H_0: Yt is a unit root or non-stationary

H_1: Yt is stationary

According to Gujarati and Porter (2009), the H_0 of ADF test will be rejected if the test statistic value is negatively less than the test critical value and this means that the data is stationary with integrate order I(0) and if do not reject H_0 mean the data is non-stationary with integrated order I(1).

3.2.1.3 Phillips-Perron (PP) Test

Phillips-Perron (PP) test is one of the unit root test which carry out by Phillips and Perron. PP test is almost similar to ADF tests, the only difference is PP test incorporate an automatic correction to the DF procedure to allow for autocorrelated residuals. PP test usually carry out the same conclusion with ADF tests but the calculation of the test statistic is complex as compared to ADF test.

Null hypothesis and the alternative hypothesis are shown as below:

H_0: Yt is a unit root or non-stationary

H_1: Yt is stationary

The H_0 of ADF test will be rejected if the computed PP test statistic value is larger than test critical value in absolute value and when H_0 of PP test is rejected means data is stationary and vice versa (Gujarati & Porter, 2009).

3.2.2 Cointegration Test

In 1987, Engle and Granger published a paper about cointegration and error correction. Cointegration tests is designed to analyse time series with non-stationary variables where the means and variances change over time (Rao, 2007). In further explanation, cointegration test allows researchers to estimate long-run relationships with unit root variables (Rao, 2007).

Research from Engle and Granger (1987) states that economic theory frequently suggests two or more variables have long run relationship. Even though the variables can be obtained on a short run relationship, but the original equilibrium between the variables will be restored due to economic forces during long run relationship, in this case, it is said that the variables are cointegrated (Engle & Granger, 1987).

3.2.2.1 Bounds Test

ARDL bounds test is a test is a cointegration approach that is introduced by Pesaran, Shin and Smith in 2001 (Pesaran, Shin & Smith, 2001). The purpose of bounds test is to identify whether the variables of ARDL models have long run relationship.

Null hypothesis and the alternative hypothesis are shown as below:

$$H_0: \textit{No long-run relationship}$$

$$H_1: \textit{Long-run relationship exists}$$

According to Pesaran et al. (2001), if the F-statistic is more than critical value, the null hypothesis can be rejected where cointegration is found between the variables which also means long run relationship exists. The critical values for small sample data analysis are extracted from a table in a

study by Narayan (2005) according to the number of independent variables and sample size.

There are a few advantages of ARDL bounds test compared to other cointegration test (Pesaran et al., 2001). For example, the tests can be carried out no matter the result from unit root test is I(0), I(1) or contains both. Other than that, ARDL bounds test is design for model that has smaller sample size where different variables can assign with different lag length (Pesaran et al., 2001).

Unit root test and cointegration test is a part of a preliminary test, when both preliminary tests are finished, estimation will be continued where it consists of ARDL and granger causality.

3.3 Estimation

3.3.1 Autoregressive Distributed Lag (ARDL) Model

Auto-regressive Distributed Lag (ADRL) models are standard least squares regressions which include lags of the dependent variable and independent variables as regressions (Greene, 2008). ADRL models usually is used to test, estimate long-run and short-run dynamics when a combination of stationary and non-stationary time-series is included (Pesaran & Shin, 1997).

An ARDL regression model can be written as:

$$y_t = \alpha + \sum_{i=1}^{p} \gamma_i y_{t-i} + \sum_{j=1}^{k} \sum_{i=0}^{q_j} X_{j,t-i}' \beta_{j,i} + \varepsilon_t$$

Based on the regression model, y_t is explained by lagged values of itself. It also has a distributed lag component, in the form of successive lags of X_j, explanatory variables. Some of the X_j have no lagged term in the model $(q_j = 0)$ which called as static or fixed regressors. Explanatory variables with at least one lagged term are called dynamic regressors.

3.3.2 Error Correction Term (ECT)

The cointegration regression only show the long-run dynamics of the model but it does not show the short-run dynamics explicitly. Hence, to describe both short-run dynamics and long-run equilibrium simultaneously, Error Correction Model (ECM) is used for this purpose.

Define error correction term by;

$$\varepsilon_t = y_t - \beta(x_t)$$

Where β is a cointegrating coefficient. In fact, ε_t is the error from a regression of y_t on x_t, then an ECM is simply defined as:

$$\Delta y_t = \alpha\varepsilon_{t-1} + \gamma\Delta x_t + u_t$$

Null hypothesis and the alternative hypothesis are shown as below:

H_0: There is no error correction term.

H_1: There is error correction term.

H_0 is rejected if the p-value is less than significance level. If the p-value is more than significance level, the H_0 is not rejected. The coefficient of error correction term is estimated fall between -1 and 0, otherwise the error correction term is explosive.

3.3.3 Granger Causality Test

Granger was the first proposer of the Granger Causality test. There are two methods to detect causality effects which are Pairwise Granger Causality test and VEC Granger Causality Wald test. The granger causality test is usually used to study the casual relationship between two time series variables. It is a statistical hypothesis test in order to determine whether the time series variables are useful for the prediction of another time series variable (Jiang & Bai, 2017). Granger (1969) also stated that Granger Causality is a way to study causality between two variables in a time series; it is a probabilistic account of causality and used empirical data sets to investigate the patterns of correlation. If variable Y contains useful information to affect variable X, it will present the result of Y causes X. It means that variable Y is Granger causality of variable X. Then Y causes X denoted as (Y→X) and X causes Y is denoted as (X→Y); the arrow represents the direction of causality (Oguntade, Olanrewaju & Ojieniyi, 2014).

Pierce and Haugh (1977) stated that the past values of variable X and Y which contained in the time series data and other relevant information being used in the forecast prediction. The concept of Granger causality test is analysed by predictability methods and the direction of the time stream is used to obtain the causal order of the relevant variables. There are three possible types of Granger causality.

$$H_0 = Xt \text{ does not Granger cause } Yt$$

H_1 = *Xt does Granger cause Yt*

H_0 = *Yt does not Granger cause Xt*

H_1 = *Yt does Granger cause Xt*

The first type is do not reject the null hypothesis and represented two variable series were independent. Then there is the second type, reject both null hypotheses tests, the series will have a two-way casual effect. The third is, if only one the null hypotheses testing rejected, it will lead to a one-way casual effect (Granger, 1969).

3.4 Diagnostic Checking

Null hypothesis in diagnostic checking will be rejected at a significance level of 5%. It means that if the significance level of the test is more than p-value, the null hypothesis will be rejected. Hence, the test is significant at 5%.

However, in this research, the authors are expecting results that do not reject the null hypothesis. This is because the null hypothesis for all of the tests in diagnostic checking indicates there is no specific problem for the data from the respective tests. Diagnostic checking includes autocorrelation, heteroscedasticity, normality test and model specification.

3.4.1 Autocorrelation

Gujarati and Porter (2009) define autocorrelation as the error term for any observation is related to the error term of another observation. Autocorrelation will cause the estimated variances of the regression coefficients to be biased and inconsistent which lead to invalid hypothesis testing. Therefore, we have to detect and solve it.

Autocorrelation consist of Durbin-Watson test, Durbin's h test and Breusch-Godfrey LM test that we can detect and solve the autocorrelation problem. The Durbin-Watson test is for the model that use cross sectional data to detect autocorrelation problem while the Durbin's h test only applies for autoregressive model. Thus, we use the Breusch-Godfrey LM test to detect autocorrelation problem due to the test is applicable to model that uses time series data.

Null hypothesis and the alternative hypothesis are shown as below:

H_0: *There is no autocorrelation problem.*

H_1: *There is autocorrelation problem.*

Hence, in order to get a data without autocorrelation problem, null hypothesis must not be rejected. In this case, the probability of LM test should be larger than significant level so the null hypothesis could not be rejected thus get data without autocorrelation problem.

3.4.2 Heteroscedasticity

Heteroscedasticity is a substantial writing on evaluating and testing heteroscedasticity. A single change to the response may result in a correct functional relationship between the response and the explanatory variables, the residuals may be heteroscedastic. When the issue of functional form is a necessary concern, a true result of expecting the same variance error is that the estimate of response transformation is frequently one-sided toward the direction of stabilizing the error variance (Yang & Tse, 2003). Heteroscedasticity is one of the hypotheses of Ordinary Least Square (OLS) estimator. As heteroscedasticity influence the variance and standard error, the variance become extensive and standard error become underestimated. It prompts T test and F test end up become invalid. So, the estimator is still

unbiased and consistent due to homoscedasticity is not a prerequisite for unbiasedness.

Null hypothesis and the alternative hypothesis are shown as below:

H_0: *The model has homoscedasticity.*

H_1: *The model has heteroscedasticity.*

There are few ways to detect heteroscedasticity issues which is Park test, Glesjer test, Breusch-Pagam-Godfrey test, Whites' test and Autoregressive Conditional Heteroscedasticity (ARCH) test. In this research, the heteroscedasticity issue in the model identified by approaching ARCH test. ARCH test is more suitable to detect heteroscedasticity issue in time series data compare to other tests. The null hypothesis represents there is no heteroscedasticity issue in the model. Therefore, the p-value must greater than the significance level; if p-value lower than significance level then reject the null hypothesis.

3.4.3 Normality Test

Jarque-Bera (JB) test is one of the normality tests that is used to identify whether the model is normally distributed. In further explanation, normality test is to measure a goodness of fit. It means that if the model if fit, then the data are well modelled. JB test is introduced by Carlos Jarque and Anil Bera in 1980. It is a test to check the residual normality of the model where the test statistic is always positive. According to Jarque and Bera (1980), when the probability is around 1 it indicates the data is not normally distributed, but if the probability is close to 0 then it is normally distributed where the null hypothesis will not be rejected.

Null hypothesis and the alternative hypothesis are shown as below:

H_0: *Data is normally distributed*

H_1: *Data is not normally distributed*

When the data is normally distributed, JB will not be significant as null hypothesis is not rejected. In order to get normally distributed data, the probability of JB test should be larger than the significant level because the null hypothesis of JB test is rejected when the significant level is more than probability of JB test (Jarque & Bera, 1980).

3.4.4 Model Specification

Model specification is used to for diagnostic checking of the data analysis by forming a regression model and test the regression model has any specification error problem. Ramsey Regression Equation Specification Error (RESET) Test is used for model specification. Ramsey-Reset is used to detect the specification error. If there is specification error exist, the regression model may not be unbiased and efficient, it may cause adverse effects on the sampling property. Specification error occur is due to incorrect functional form employed, independent variable with high relationship with dependent variable had been omitted or one of the irrelevant independent variables included in the model.

Null hypothesis and the alternative hypothesis are shown as below:

H_0: *There is correctly specified.*

H_1: *There is not correctly specified.*

The null hypothesis indicates there is no specification bias. So, the p-value needs to greater than the significant level of 5%. This signifies the model is free form specification bias as well.

3.4.5 Stability Diagnostic

3.4.5.1 CUSUM Test

According to Brown, Durbin and Evans (1975), CUSUM test is used to test the constancy of the coefficients in a model. It is based on the cumulative sum of the recursive residuals. This option shows a plot of cumulative sum together with significant level of 5 percent. In this test, if the cumulative sum goes outside the area between the two 5 percent significant level lines, it means that parameter has instability. The statistic of CUSUM test is shown as below:

$$W_t = \sum_{r=k+1}^{t} w_r / s$$

In the equation above, W is the recursive residual while S is the standard deviation of the recursive residuals. As mentioned by Brown, Durbin and Evans (1975), if the β vector remains constant overtime, W_t will equal to 0. However, if β changes overtime, W_t will diverge from the zero mean value line which is the line of 5 percent significant level.

3.4.5.2 CUSUM of Square Test

CUSUM square test is almost similar with CUSUM test which is if the cumulative sum of square is within the lines of 5 percent significant level, it means that the residual variance is stable. In contrast, if the movement is

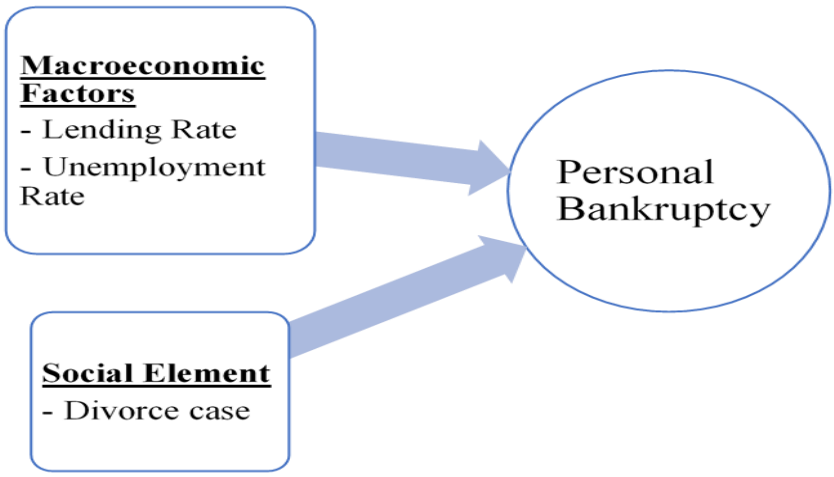
outside the 5 percent significant level lines it means that the parameter or variance is not stable. The different between CUSUM test and CUSUM square test is that CUSUM square test used to test for standard deviation but mean for CUSUM test. Thus, the statistic will be different as well. The statistic of CUSUM of squares test is shown as below:

$$S_t = \sum_{r=k+1}^{t} w_r^2 / \sum_{r=k+1}^{T} w_r^2$$

In the equation above, the expected value of S_t goes from zero at t = k until unity at t = T. A pair of parallel straight lines which exist around the expected value can determine the significant of departure of S_t (Brown, Durbin & Evans, 1975).

3.5 Conceptual Framework

Figure 3.2 Conceptual Framework for the Factors of Personal Bankruptcy in Malaysia



Source: Developed for the research

Figure 3.2 shows the three independent variables which are unemployment rate, lending rate and divorce case that will affect this study's dependent variable which is personal bankruptcy.

Lending rate is expected to have positive relationship with personal bankruptcy. The same goes for unemployment rate where the unemployment rate is expected to have positive relationship with personal bankruptcy. In addition, divorce is expected to have positive relationship with personal bankruptcy as well.

3.5.1 Economic Model

$LOGBANKRUPTCY_t = B_0 + B_1UNEMPLOYMENT_t + B_2LENDING_t + B_3LOGDIVORCE_t + u_t$

Where,

LOGBANKRUPTCY = Logarithms of Personal Bankruptcy Case

UNEMPLOYMENT = Unemployment Rate

LENDING = Lending Rate

LOGDIVORCE = Logarithms of Divorce Case

The reason the authors apply logarithms for the data of personal bankruptcy case and divorce case is because the data is not in percentage form. Meanwhile the data for unemployment rate and lending rate is in percentage form. Therefore, by applying logarithms to both the data of personal bankruptcy case and divorce case will convert the data into percentage form. Thus all the data would be in the same form.

3.6 Conclusion

Autoregressive Distributed Lag (ARDL) model is used in this study, where the survey period was from the year 1984 to 2015, and the frequency was annually. There was 34 sample size were taken from independent variables as mentioned in this research and the dependent variable in this research. Data is obtained from DOSM, World Bank and BNM and processed by using E-Views 10. Furthermore, preliminary test, estimation and diagnostic checking will be carried out to ensure the result is reliable. Finally, the empirical results will be discussed further in the next chapter which is Chapter 4.

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

Chapter 4 will be carrying out data analysis which covers preliminary test, estimation and diagnostic checking as mentioned in Chapter 3.

4.1 Preliminary Test

4.1.1 Unit Root Test

Table 4.1: Unit Root Test

Variable	Level		First Difference	
	ADF	PP	ADF	PP
PB	0.0988*	0.1097	0.0004***	0.0000***
DIV	0.5513	0.7831	0.0424**	0.0000***
UM	0.8309	0.8309	0.0015***	0.0009***
LR	0.2983	0.3854	0.0018***	0.0002***

*Denotes rejection significant at 10 percent level (0.1)

**Denotes rejection significant at 5 percent level (0.05)

***Denotes rejection significant at 1 percent level (0.01)

Source: Developed for the research

A preliminary test of Unit Root Test has been carried out before proceed to the Bound Test.

From Table 4.1, there are two types of results which all variable has been tested. Firstly it is test at level and secondly test at first difference. The result

from Table 4.1 also carried out two unit root test which is Augmented Dickey Fuller (ADF) Test and Phillips-Perron (PP) Test.

Based on Table 4.1, the overall result of variables from ADF and PP which tested at level show that do not reject H_0 which mean there is unit root or non-stationary. However, there is one exclusion which is Personal Bankruptcy Case which tested at level under ADF test will be reject H_0 at 10 percent significant level.

In addition, the overall result of variables from ADF and PP which tested at first difference show that reject H_0 at 1 percent significant level which mean there is no unit root or stationary overtime. However, there is also one exclusion which is only Divorce Case reject at 5 percent significant level.

Thus, it can be concluded that the overall result will be test at the 5 percent significant level and will proceed to the others preliminary test which is bound test.

4.1.2 Bound Test

Table 4.2: Bound Test Result

F-Statistic		5.147487**
Critical Value	1%	7.063
	5%	5.018
	10%	4.150

**denotes significant level 5%

Source: Developed for the research

After carrying out unit root test, bound test is carried out to test whether the cointegration exists between the non-stationary variables.

The null hypothesis will be rejected if the f-statistic is more than critical value. Critical values for bound test are extracted from a table that is named Case III: Unrestricted intercept and no trend which is in the study by Narayan (2005). Based on Narayan (2005), the critical values for small sample size for 1%, 5%, 10% are 7.063, 5.018 and 4.150 respectively.

Table 4.2 shows that f-statistic is 5.147487 which is more than critical value at 5% and 10%, which are 5.018 and 4.150 respectively. This means that H_0 is rejected at both 5% and 10% which indicates f-statistics is significant where cointegration exists between the variables, it also means that there is long run relationship. In short, bound test is significant at 5%.

With both preliminary tests done, the authors will proceed to estimations which consists of ARDL and Granger causality.

4.2 Estimation

4.2.1 Autoregressive Distributed Lag (ARDL) Model

4.2.1.1 Error Correction Term (ECT)

Table 4.3: ARDL Cointegrading and long run form

C	9.973446	2.030485	4.911854	0.0001
CointEq(-1)	-0.871994	0.177172	-4.921734	0.0001

Cointeq = LNPB - (-0.0921*LNDIV -0.1926*LR -0.1017*UM)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.

LNDIV	-0.092071	0.262242	-0.351092	0.7298
LR	-0.192628	0.044131	-4.364920	0.0004
UM	-0.101679	0.040921	-2.484794	0.0237

Source: Developed for the research

Based on the Table 4.3 above, the ECT results show there is a negative coefficient at -0.871994 and the ECT is significance at $\alpha = 0.001$ and the p-value is 0.0001 ($\alpha > p-value$)

The long-run equation is written as:

$$\ln Pb = 9.973446 - \underset{(0.7298)}{0.092071}\ln Div - \underset{(0.0004)}{0.192628}LR - \underset{(0.0237)}{0.101679}UM$$

The ECT model is written as:

$$u_{t-1} = \ln PB - (-0.092071\ln Div - 0.192628LR - 0.101679UM)$$

From the equation above, the long-run and short-run relationship between the dependent variable and independent variables can be estimated. First of all, when the divorce cases increased by 1%, the personal bankruptcy cases will decreases by 0.092071% ceteris paribus. Next, when the lending rate increased by 1%, the personal bankruptcy cases will decreases by 0.192628% ceteris paribus. Lastly, when the unemployment rate increased by 1%, the personal bankruptcy cases will decrease by 0.101679 ceteris paribus.

4.2.1.2 Granger Causality Test

Table 4.4: Granger Causality Test

Pairwise Granger Causality Tests

Date: 06/27/19 Time: 11:17

Sample: 1984 2017

Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
DLR does not Granger Cause DPB	27	0.54649	0.7387
DPB does not Granger Cause DLR		1.23484	0.3385
DDIV does not Granger Cause DPB	27	0.55631	0.7317
DPB does not Granger Cause DDIV		2.98258	0.0433
DUM does not Granger Cause DPB	27	3.18585	0.0348
DPB does not Granger Cause DUM		2.29902	0.0937
DDIV does not Granger Cause DLR	28	3.61267	0.0208
DLR does not Granger Cause DDIV		0.92558	0.4885
DUM does not Granger Cause DLR	28	1.79686	0.1672
DLR does not Granger Cause DUM		0.66987	0.6516
DUM does not Granger Cause DDIV	28	0.65442	0.6624
DDIV does not Granger Cause DUM		5.61232	0.0031

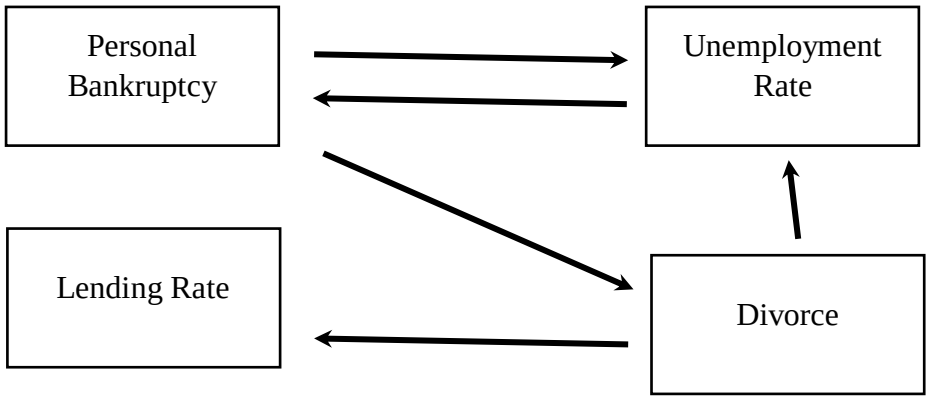
Source: Developed for the research

In this research, Pairwise Granger Causality test had been choosing to detect the causality effect between two variables and it is using lags 5 as shown in Table 4.4. Through Pairwise Granger Causality method, there are four possible results will be analysed:

- Unidirectional Granger causality from variable Yt to variable Xt,
- Unidirectional Granger causality from variable Xt to Yt,
- Bi-directional causality and
- No causality

There are six pairs of variables in this test. The Table 4.4 represent the result of causality effects among the variables. If the p-value if greater than the significant level at 10%, then there is no causality effect between two variables and vice versa.

Figure 4.5: Direction of Causality



Source: Developed for the research

The result showed that personal bankruptcy has bi-directional causality with unemployment rate. In additional, personal bankruptcy has unidirectional Granger causality to divorce. Then divorce has unidirectional Granger causality to unemployment rate and lending rate. For lending rate, there is no causality to personal bankruptcy and unemployment rate.

4.3 Diagnostic Checking

4.3.1 Autocorrelation

After estimations are done, Autocorrelation will be carried out to examine the autocorrelation problem. This study will examine the autocorrelation problem by using Breusch-Godfrey Serial Correlation LM Test with lags 4.

Table 4.6: Breusch-Godfrey Serial Correlation LM Test

F-statistic	1.018322	Prob. F(4,13)	0.4337
Obs*R-squared	7.157299	Prob. Chi-Square(4)	0.1278

Source: Developed for the research

As shown in Table 4.6, the probability of Breusch-Godfrey Serial Correlation LM test is 0.1278 which is greater than 10% significance level, it indicates Breusch-Godfrey Serial Correlation LM test is not significant at 10%, which means null hypothesis could not be rejected. Hence, the model is free from autocorrelation problem.

4.3.2 Heteroscedasticity

Heteroscedasticity will be carried out to examine the heteroscedasticity problem. This study will examine the heteroscedasticity problem by using ARCH test with lags 4.

Table 4.7: ARCH Test

F-statistic	0.190818	Prob. F(4,21)	0.9405
Obs*R-squared	0.911860	Prob. Chi-Square(4)	0.9229

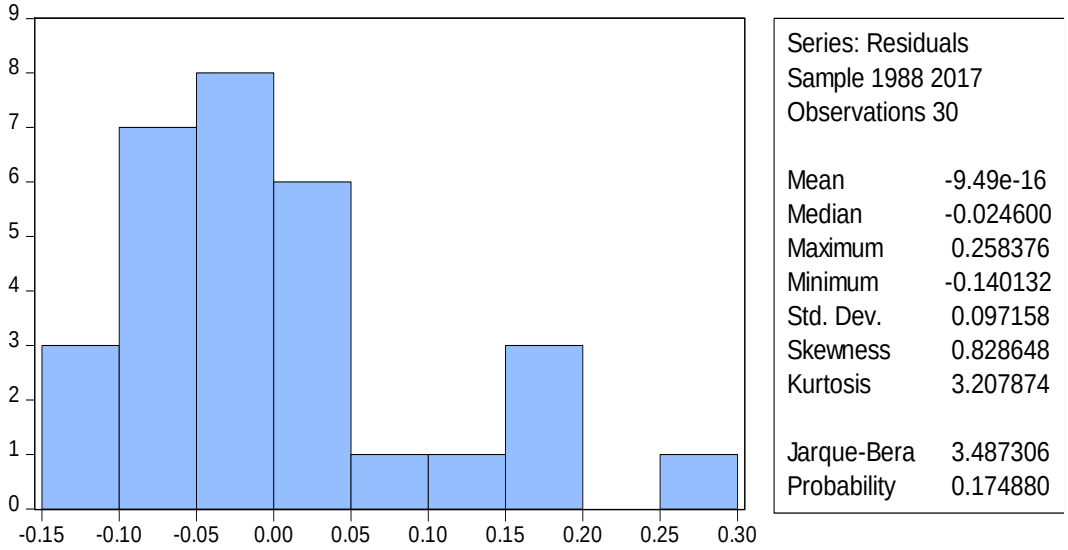
Source: Developed for the research

As shown in Table 4.7, the probability of ARCH test is 0.9229 which is greater than 10% significance level, it indicates ARCH test is not significant at 10%, which means null hypothesis could not be rejected. Hence, the model is free from heteroscedasticity problem.

4.3.3 Normality Test

Normality test by using Jarque-Bera (JB) test is followed after ARCH test which tests for heteroscedasticity. The purpose of JB test is to check residual normality.

Table 4.8: Jarque-Bera Test



Source: Developed for the research

As shown in Table 4.8, the probability of JB test is 0.17488 which is greater than 10% significance level, it indicates JB test is not significant at 10%, which means null hypothesis could not be rejected. Hence, the model is normally distributed.

4.3.4 Model Specification

Ramsey RESET test is used to check model specification.

Table 4.9: Ramsey RESET Test

Ramsey RESET Test
Equation: ARDL
Specification: LNPB LNPB(-1) LNDIV LNDIV(-1) LNDIV(-2) LNDIV(-3) LNDIV(-4) LR LR(-1) UM UM(-1) UM(-2) UM(-3) C
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.656064	16	0.5211
F-statistic	0.430420	(1, 16)	0.5211

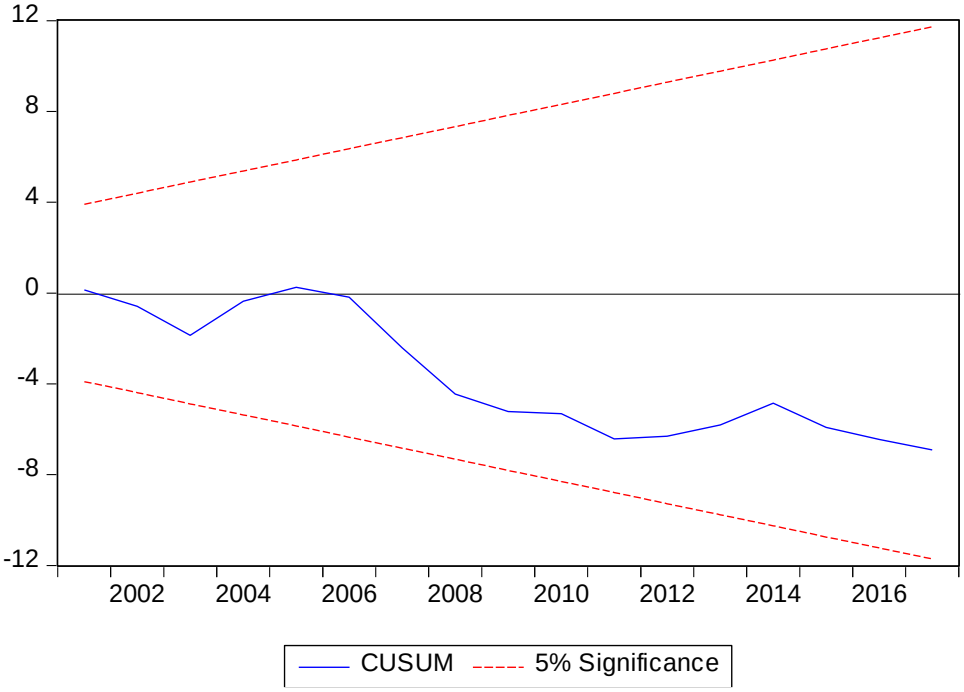
Source: Developed for the research

As shown in Table 4.9, the probability of Ramsey Reset test is 0.5211 which is greater than 10% significance level, it indicates the test is not significant at 10%, which means null hypothesis could not be rejected. Hence, the model is correctly specified.

4.3.5 Stability Diagnostic

4.3.5.1 CUSUM Test

Figure 4.10: CUSUM Test

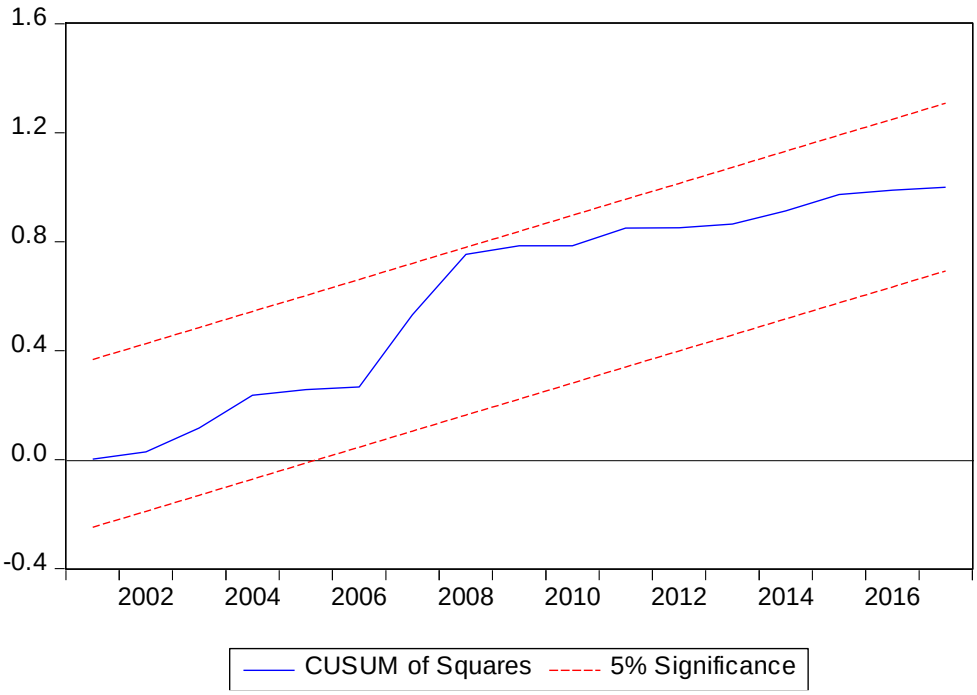


Source: Developed for the research

The Figure 4.10 above is the graph of CUSUM test. The pair of dashed line is the 5 percent critical lines while the straight line is CUSUM line. The test above clearly represent that, the movement of CUSUM line is within the 5 percent critical line, thus suggesting that the parameter or variance is in stable form.

4.3.5.2 CUSUM of Square Test

Figure 4.11: CUSUM Square Test



Source: Developed for the research

The Figure 4.11 above is the graph of CUSUM of squares test. The parallel line is the 5 percent critical lines while the straight line is CUSUM of squares line. The test above clearly indicate that the cumulative sum of squares is within the 5 percent critical line, thus suggesting that the residual variance is in stable form.

4.4 Conclusion

First of all, the unit root test was executed in this chapter and found that most of the variables are stationary at first difference. However, only one variable is found stationary at level which is Personal Bankruptcy. Thus, the overall result from unit root test will be test at significant level of 5%. The result of bounds test show that the probability is larger than critical value at 5% and 10%, this indicates that bounds test is significant at 5%. The result on ECT shows that all the independent variables

is significant except divorce case. Furthermore, the outcome of ECT also indicates independent variables negatively affects the dependent variable in long-run dynamic. Granger causality test show the direction of causality between dependent variable and independent variable. Personal bankruptcy case has short-run bi-directional causality with unemployment rate and short-run unidirectional causality to divorce case. Since the probability is greater than significant level 10% so there is no autocorrelation. The outcome of ARCH test indicates the probability which is greater than the significant level at 10%, so there is no heteroscedasticity. JB test proves that the model is normally distributed because the null hypothesis is not rejected where the probability of JB test is greater than significant level 10%. Model specification by using Ramsey RESET test prove that the model is correctly specified where the probability is greater than significance level at 10%. Lastly, both the CUSUM test and CUSUM of Squares test indicates the parameter or residual variance is stable since both of the CUSUM and CUSUM of Squares line move within the 5% critical line.

CHAPTER 5: DISCUSSION, CONCLUSION AND IMPLICATION

5.0 Introduction

Major findings on divorce case, unemployment rate and lending rate will be discussed further in this chapter. Furthermore, a discussion on the implication of the study based on society and government in Malaysia. In addition, this chapter also consists of limitation of the study and recommendations for future study.

5.1 Discussion of Major Finding

5.1.1 Unemployment Rate

The findings in the previous chapter indicates unemployment rate is significant and negatively affects personal bankruptcy. The result shows when unemployment rate increases by 1%, personal bankruptcy decrease by 0.101679%. The result of this study contradicts with the expected result. This negative effect can be explained by a few reasons. One of the reasons might be due to lag effect of unemployment rate towards personal bankruptcy, it means that effect comes in late where the unemployment rate of three years ago affect the personal bankruptcy case three years after.

Furthermore, rational expectation theory also can explain the results that is found. Rational expectation theory is introduced by Muth (1961). In the study of Muth (1961), rational expectation theory consists of three assumptions of how individuals make their decisions which are, based on

past experience, based on information that is accessible to them and human rationality. In this case, based on rational expectations theory, the result can be explained that when unemployment has a high percentage in the country, people would become afraid to lose their job due to the high unemployment rate, so they will tend to spend less and save more. When people spend less, it means that people will not borrow loan in that situation which would increase their burden but save more of the income compared to spending. Thus, this explains why personal bankruptcy decreases when unemployment rate increases.

5.1.2 Lending Rate

Based on the result in the previous chapter, lending rate significantly and negatively affects the personal bankruptcy. Therefore, the authors found that the expected result contradicts with the real results because the results show that if the lending rate increase by 1%, the personal bankruptcy case will reduce by 0.192628%.

Although the result does not tally with the expected result but there is a previous researcher that acquires the same result. According to Chatterjee (2006), for borrowers who have lesser default risk is able to get a lower lending rate from credit card companies. Even though the lending rate is lower but in the long run the lower debts will lead to higher indebtedness thus the chances to file for personal bankruptcy will also be higher.

5.1.3 Divorce Case

The result in the previous chapter shows that divorce case is insignificant and it negatively affects personal bankruptcy case. This outcome contradicts with the expected outcome which is positively related to personal bankruptcy case. In this research, the results show when divorce case

increase by 1%, the personal bankruptcy case will decrease by 0.0092071% while the authors expect divorce case positively affects personal bankruptcy.

However, the authors also found few studies of previous researchers to support the outcome which shows divorce case negatively affects personal bankruptcy. Sullivan et al (1995) and Caplovitz (1974) stated that most of the people that filed for bankruptcy are married people because they have higher financial burden compared to individual person and might increase the inability to repay debt in the future. Based on this statement, it can be assumed that married people have higher chances to file for bankruptcy compared to divorced people that tally with the outcome of the authors in this research

5.2 Implication of Study

Based on the results found in chapter four, lending rate and unemployment rate are found to be significant and negatively affects personal bankruptcy in Malaysia. As lending rate will affect all types of loans, the government is recommended to monitor and control the lending rate in a manageable range so that it could not fluctuate too much to affect the bankruptcy case in Malaysia. Some of the measures taken by the government is recommended to be implemented for a longer period. For example, in response to housing loan, Finance Minister Lim Guan Ying stated that government will fix the interest rate at 3.5% and will extend the loan period from 5 to 40 years to reduce the financial burden of the borrowers (New Straits Times, 2018).

Other than maintaining the lending rate, there are other efforts can be made to lower down the financial burden of Malaysians in repaying the housing loan. The government may encourage people to join housing development program, "1 Malaysia People's Housing Programme" (PR1MA), especially for the middle-income households who want to purchase a house in the urban areas (PR1MA, 2017). In the PR1MA, low cost and high quality apartments and houses are

constructed with the price range within RM100,000 to RM400,000. Thus, people can buy the house at a lower price, implying that lower loan amount is needed by the house owner. It also reduces the possibility that the house owner filing for bankruptcy due to the high amount of unpayable loan repayment.

According to The Star Online (2019), the developments from PR1MA shows a positive result through the Home Ownership Campaign (HOC). There are around 10,200 of home has been booked by the potential buyers within 3 months and most of the buyers are Malaysian household with lower (B40) and middle (M40) income who want to own a house in an urban area. Due to the high demand of low cost houses for Malaysian household, government is suggested to build more PR1MA units in rural areas besides urban area. This measure can attract more people to buy houses in the rural area, thus it could encourage the development of rural areas. Besides, government is suggested to reduce the lending rate of the conventional banks for the PR1MA buyers to lower their financial burden, so that the vision of every Malaysian owning a house can be achieved soon.

From the others perspective, The Star Online (2019) shows that Malaysia's unemployment rate is reported to be remained at 3.3% in November 2018. Since the effect of unemployment rate towards personal bankruptcy is little (0.1%) but is significant and negative. A 3% of unemployment rate in developing countries is considered favourable and low (Blanchard & Johnson, 2013). Hence, policy makers should make an effort to maintain the unemployment rate around 3% in Malaysia. Furthermore, the government is recommended to control or maintain the unemployment rate in a specific rate so that it could not fluctuate too much to affect the bankruptcy case in Malaysia.

5.3 Limitation of Study

Throughout this study, few limitations are found where one of the limitations of this research is data collection problem. Data collection problem means that every database got different data. For example, the data for one of the variables for 2015

is different in every database, where the data from Bank Negara Malaysia (BNM) is 75.3%, the data from Department of Statistics Malaysia (DOSM) is 77.2% and the data from World Bank is 76.9%. This situation is known as inconsistency of data from database.

Because of data collection problem, it would cause a decrease in the accuracy of the result in data analysis. In this case, researchers have to choose a more reliable source of data so that the result will be more accurate. During the collection of data for this study, the authors faced a situation where the data for divorce case in 2017 collected from World Bank and DOSM had different values. In the end, the authors chose to use the data from DOSM because this study's research area is in Malaysia, so using the data from DOSM would be more accurate.

Another limitation of this study is missing data. Missing data means that there will be data missing in a specific year. For example, from the period 1970 to 2017, there is data missing for year 2001 and 2003 for one of the independent variables which is divorce case. When this situation occurs, econometric methods for example forecasting and exponential smoothing will be carried out to fill up the gap, but it will be unable to reflect true story.

As a result, missing data and data collection problem is the limitations for a secondary data research because as long as there is data missing for the variables or there is problem in collecting data, then it will be a problem to the research where the researchers have to find a solution to resolve the matter in order for the research to go on.

5.4 Recommendations for Future Research

The authors recommend future researchers to collect primary data to fill up the missing data and to enhance the consistency and accuracy of data needed to be used in secondary data. This may help to improve the accuracy of the result outcome for future researchers who use a complete secondary data for other research as well.

Besides, the authors also recommend the future researchers to collect data not only based on macroeconomic aggregate level but also collect data based on the disaggregate level of individual families to have a more consistent and accurate result from data collection. This data collection method will highly improve the effectiveness and accuracy of the final results outcome and enhance the accuracy of other research.

As a result, having a precise and accurate data collection is highly recommended for future researchers to improve the effectiveness of the final result of overall research. This may avoid the chances of research mistakes which may lead to wrong recommendation and decision making for future researchers.

5.5 Conclusion

First of all, the outcomes show lending rate and unemployment rate is significant and negatively affects personal bankruptcy while divorce rate is insignificant and negatively affects personal bankruptcy. This outcome does not tally with the expected result of what the authors expected. Thus, in implication of study the authors only gave recommendation on lending rate and unemployment rate policies. Divorce is not recommended in the policy because it is insignificant towards personal bankruptcy. The policy for lending rate recommended by authors is peer-to-peer (P2P) financing scheme which performs a low lending rate policy for purchasing property. For unemployment rate, authors recommended government to maintain unemployment rate around 3.3% since the unemployment has low negative effect on personal bankruptcy. In the limitation and recommendation, the authors found data collection is lack of consistency and accuracy so authors recommend to use survey to fill up the missing data to improve the outcome accuracy for future researchers. The purpose for the authors of doing this research is to give some guidance and knowledge for policy makers, investors, future researchers and consumers to increase the awareness of the macroeconomic and society factors on personal bankruptcy.

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LIST OF APPENDICES

Appendix 4.1 ADF (Level Form)

Personal Bankruptcy

Null Hypothesis: LNPB has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.218418	0.0988
Test critical values:	1% level	-4.273277	
	5% level	-3.557759	
	10% level	-3.212361	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNPB)
Method: Least Squares
Date: 06/11/19 Time: 15:38
Sample (adjusted): 1986 2017
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNPB(-1)	-0.404222	0.125597	-3.218418	0.0032
C	3.402748	1.004776	3.386575	0.0021
@TREND("1984")	0.020796	0.008742	2.378753	0.0242

R-squared	0.338556	Mean dependent var	0.070856
Adjusted R-squared	0.292939	S.D. dependent var	0.172532
S.E. of regression	0.145077	Akaike info criterion	-0.934051
Sum squared resid	0.610369	Schwarz criterion	-0.796638
Log likelihood	17.94482	Hannan-Quinn criter.	-0.888503
F-statistic	7.421733	Durbin-Watson stat	1.921113
Prob(F-statistic)	0.002495		

Divorce Case

Null Hypothesis: LNDIV has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.054002	0.5513
Test critical values:	1% level	-4.262735	
	5% level	-3.552973	
	10% level	-3.209642	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNDIV)
Method: Least Squares
Date: 06/11/19 Time: 15:39
Sample (adjusted): 1985 2017
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNDIV(-1)	-0.235711	0.114757	-2.054002	0.0488
C	0.968766	0.468624	2.067256	0.0474
@TREND("1984")	0.012098	0.005100	2.372002	0.0243

R-squared	0.171985	Mean dependent var	0.042839
Adjusted R-squared	0.116784	S.D. dependent var	0.084197
S.E. of regression	0.079128	Akaike info criterion	-2.149002
Sum squared resid	0.187835	Schwarz criterion	-2.012956
Log likelihood	38.45853	Hannan-Quinn criter.	-2.103226
F-statistic	3.115610	Durbin-Watson stat	1.779616
Prob(F-statistic)	0.058962		

Unemployment Rate

Null Hypothesis: UM has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.436098	0.8309
Test critical values:	1% level	-4.262735	
	5% level	-3.552973	
	10% level	-3.209642	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(UM)
Method: Least Squares
Date: 06/11/19 Time: 15:40
Sample (adjusted): 1985 2017
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UM(-1)	-0.142353	0.099125	-1.436098	0.1613
C	0.613628	0.610710	1.004777	0.3230
@TREND("1984")	-0.007184	0.015381	-0.467085	0.6438

R-squared	0.077118	Mean dependent var	-0.073706
Adjusted R-squared	0.015592	S.D. dependent var	0.629558
S.E. of regression	0.624631	Akaike info criterion	1.983195
Sum squared resid	11.70490	Schwarz criterion	2.119241
Log likelihood	-29.72272	Hannan-Quinn criter.	2.028971
F-statistic	1.253424	Durbin-Watson stat	1.447898
Prob(F-statistic)	0.300052		

Lending Rate

Null Hypothesis: LR has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.563052	0.2983
Test critical values:	1% level	-4.262735	
	5% level	-3.552973	
	10% level	-3.209642	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LR)
Method: Least Squares
Date: 06/11/19 Time: 15:40
Sample (adjusted): 1985 2017
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LR(-1)	-0.364417	0.142181	-2.563052	0.0156
C	4.011704	1.729797	2.319177	0.0274
@TREND("1984")	-0.080995	0.037740	-2.146133	0.0401

R-squared	0.184665	Mean dependent var	-0.230303
Adjusted R-squared	0.130309	S.D. dependent var	0.903377
S.E. of regression	0.842465	Akaike info criterion	2.581538
Sum squared resid	21.29240	Schwarz criterion	2.717584
Log likelihood	-39.59537	Hannan-Quinn criter.	2.627313
F-statistic	3.397337	Durbin-Watson stat	1.556784
Prob(F-statistic)	0.046778		

Appendix 4.2 PP (Level Form)

Personal Bankruptcy

Null Hypothesis: LNPB has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.163616	0.1097
Test critical values:	1% level	-4.273277	
	5% level	-3.557759	
	10% level	-3.212361	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.019074
HAC corrected variance (Bartlett kernel)	0.011916

Phillips-Perron Test Equation
Dependent Variable: D(LNPB)
Method: Least Squares
Date: 06/11/19 Time: 15:53
Sample (adjusted): 1986 2017
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNPB(-1)	-0.404222	0.125597	-3.218418	0.0032
C	3.402748	1.004776	3.386575	0.0021
@TREND("1984")	0.020796	0.008742	2.378753	0.0242

R-squared	0.338556	Mean dependent var	0.070856
Adjusted R-squared	0.292939	S.D. dependent var	0.172532
S.E. of regression	0.145077	Akaike info criterion	-0.934051
Sum squared resid	0.610369	Schwarz criterion	-0.796638
Log likelihood	17.94482	Hannan-Quinn criter.	-0.888503
F-statistic	7.421733	Durbin-Watson stat	1.921113
Prob(F-statistic)	0.002495		

Divorce Case

Null Hypothesis: LNDIV has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 14 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.570291	0.7831
Test critical values:	1% level	-4.262735	
	5% level	-3.552973	
	10% level	-3.209642	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.005692
HAC corrected variance (Bartlett kernel)	0.002492

Phillips-Perron Test Equation
Dependent Variable: D(LNDIV)
Method: Least Squares
Date: 06/11/19 Time: 15:54
Sample (adjusted): 1985 2017
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNDIV(-1)	-0.235711	0.114757	-2.054002	0.0488
C	0.968766	0.468624	2.067256	0.0474
@TREND("1984")	0.012098	0.005100	2.372002	0.0243

R-squared	0.171985	Mean dependent var	0.042839
Adjusted R-squared	0.116784	S.D. dependent var	0.084197
S.E. of regression	0.079128	Akaike info criterion	-2.149002
Sum squared resid	0.187835	Schwarz criterion	-2.012956
Log likelihood	38.45853	Hannan-Quinn criter.	-2.103226
F-statistic	3.115610	Durbin-Watson stat	1.779616
Prob(F-statistic)	0.058962		

Unemployment Rate

Null Hypothesis: UM has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.436098	0.8309
Test critical values:	1% level	-4.262735	
	5% level	-3.552973	
	10% level	-3.209642	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.354694
HAC corrected variance (Bartlett kernel)	0.354694

Phillips-Perron Test Equation
Dependent Variable: D(UM)
Method: Least Squares
Date: 06/11/19 Time: 15:56
Sample (adjusted): 1985 2017
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UM(-1)	-0.142353	0.099125	-1.436098	0.1613
C	0.613628	0.610710	1.004777	0.3230
@TREND("1984")	-0.007184	0.015381	-0.467085	0.6438

R-squared	0.077118	Mean dependent var	-0.073706
Adjusted R-squared	0.015592	S.D. dependent var	0.629558
S.E. of regression	0.624631	Akaike info criterion	1.983195
Sum squared resid	11.70490	Schwarz criterion	2.119241
Log likelihood	-29.72272	Hannan-Quinn criter.	2.028971
F-statistic	1.253424	Durbin-Watson stat	1.447898
Prob(F-statistic)	0.300052		

Lending Rate

Null Hypothesis: LR has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.374013	0.3854
Test critical values:	1% level	-4.262735	
	5% level	-3.552973	
	10% level	-3.209642	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.645224
HAC corrected variance (Bartlett kernel)	0.521615

Phillips-Perron Test Equation
Dependent Variable: D(LR)
Method: Least Squares
Date: 06/11/19 Time: 15:55
Sample (adjusted): 1985 2017
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LR(-1)	-0.364417	0.142181	-2.563052	0.0156
C	4.011704	1.729797	2.319177	0.0274
@TREND("1984")	-0.080995	0.037740	-2.146133	0.0401

R-squared	0.184665	Mean dependent var	-0.230303
Adjusted R-squared	0.130309	S.D. dependent var	0.903377
S.E. of regression	0.842465	Akaike info criterion	2.581538
Sum squared resid	21.29240	Schwarz criterion	2.717584
Log likelihood	-39.59537	Hannan-Quinn criter.	2.627313
F-statistic	3.397337	Durbin-Watson stat	1.556784
Prob(F-statistic)	0.046778		

Appendix 4.3 ADF (First Difference)

Personal Bankruptcy

Null Hypothesis: D(LNPB) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.571466	0.0004
Test critical values:	1% level	-4.284580	
	5% level	-3.562882	
	10% level	-3.215267	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNPB,2)
Method: Least Squares
Date: 06/11/19 Time: 15:47
Sample (adjusted): 1987 2017
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNPB(-1))	-1.048894	0.188262	-5.571466	0.0000
C	0.170442	0.076518	2.227473	0.0341
@TREND("1984")	-0.005635	0.003590	-1.569759	0.1277

R-squared	0.525779	Mean dependent var	-0.010144
Adjusted R-squared	0.491906	S.D. dependent var	0.239943
S.E. of regression	0.171033	Akaike info criterion	-0.602154
Sum squared resid	0.819065	Schwarz criterion	-0.463381
Log likelihood	12.33339	Hannan-Quinn criter.	-0.556917
F-statistic	15.52207	Durbin-Watson stat	2.025040
Prob(F-statistic)	0.000029		

Divorce Case

Null Hypothesis: D(LNDIV) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 7 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.685555	0.0424
Test critical values:	1% level	-4.374307	
	5% level	-3.603202	
	10% level	-3.238054	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNDIV,2)
Method: Least Squares
Date: 06/11/19 Time: 15:48
Sample (adjusted): 1993 2017
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNDIV(-1))	-3.581924	0.971882	-3.685555	0.0022
D(LNDIV(-1),2)	2.338277	0.846766	2.761419	0.0145
D(LNDIV(-2),2)	2.178666	0.743073	2.931968	0.0103
D(LNDIV(-3),2)	1.775650	0.707594	2.509421	0.0241
D(LNDIV(-4),2)	1.218712	0.555440	2.194139	0.0444
D(LNDIV(-5),2)	1.198462	0.391697	3.059665	0.0079
D(LNDIV(-6),2)	0.753644	0.323832	2.327271	0.0344
D(LNDIV(-7),2)	0.402764	0.229318	1.756351	0.0994
C	-0.036872	0.046238	-0.797435	0.4376
@TREND("1984")	0.009139	0.003252	2.809928	0.0132

R-squared	0.788430	Mean dependent var	0.001863
Adjusted R-squared	0.661489	S.D. dependent var	0.121342
S.E. of regression	0.070599	Akaike info criterion	-2.174433
Sum squared resid	0.074763	Schwarz criterion	-1.686883
Log likelihood	37.18041	Hannan-Quinn criter.	-2.039207
F-statistic	6.210965	Durbin-Watson stat	1.889394
Prob(F-statistic)	0.001039		

Unemployment Rate

Null Hypothesis: D(UM) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.035684	0.0015
Test critical values:	1% level	-4.273277	
	5% level	-3.557759	
	10% level	-3.212361	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(UM,2)
Method: Least Squares
Date: 06/11/19 Time: 15:48
Sample (adjusted): 1986 2017
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(UM(-1))	-0.852809	0.169353	-5.035684	0.0000
C	-0.346096	0.229796	-1.506099	0.1429
@TREND("1984")	0.014136	0.011547	1.224245	0.2307

R-squared	0.470374	Mean dependent var	-0.034759
Adjusted R-squared	0.433848	S.D. dependent var	0.795831
S.E. of regression	0.598808	Akaike info criterion	1.901308
Sum squared resid	10.39855	Schwarz criterion	2.038720
Log likelihood	-27.42092	Hannan-Quinn criter.	1.946856
F-statistic	12.87782	Durbin-Watson stat	2.186739
Prob(F-statistic)	0.000099		

Lending Rate

Null Hypothesis: D(LR) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.977498	0.0018
Test critical values:	1% level	-4.273277	
	5% level	-3.557759	
	10% level	-3.212361	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LR,2)
Method: Least Squares
Date: 06/11/19 Time: 15:48
Sample (adjusted): 1986 2017
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LR(-1))	-0.911847	0.183194	-4.977498	0.0000
C	-0.418215	0.358964	-1.165062	0.2535
@TREND("1984")	0.010928	0.017890	0.610870	0.5460

R-squared	0.461612	Mean dependent var	-0.008125
Adjusted R-squared	0.424482	S.D. dependent var	1.229242
S.E. of regression	0.932539	Akaike info criterion	2.787248
Sum squared resid	25.21923	Schwarz criterion	2.924661
Log likelihood	-41.59597	Hannan-Quinn criter.	2.832796
F-statistic	12.43224	Durbin-Watson stat	1.974122
Prob(F-statistic)	0.000126		

Appendix 4.4 PP (First Difference)

Personal Bankruptcy

Null Hypothesis: D(LNPB) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 14 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-7.125346	0.0000
Test critical values:	1% level	-4.284580	
	5% level	-3.562882	
	10% level	-3.215267	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.026421
HAC corrected variance (Bartlett kernel)	0.006185

Phillips-Perron Test Equation
Dependent Variable: D(LNPB,2)
Method: Least Squares
Date: 06/11/19 Time: 15:56
Sample (adjusted): 1987 2017
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNPB(-1))	-1.048894	0.188262	-5.571466	0.0000
C	0.170442	0.076518	2.227473	0.0341
@TREND("1984")	-0.005635	0.003590	-1.569759	0.1277

R-squared	0.525779	Mean dependent var	-0.010144
Adjusted R-squared	0.491906	S.D. dependent var	0.239943
S.E. of regression	0.171033	Akaike info criterion	-0.602154
Sum squared resid	0.819065	Schwarz criterion	-0.463381
Log likelihood	12.33339	Hannan-Quinn criter.	-0.556917
F-statistic	15.52207	Durbin-Watson stat	2.025040
Prob(F-statistic)	0.000029		

Divorce Case

Null Hypothesis: D(LNDIV) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 31 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-10.56951	0.0000
Test critical values:	1% level	-4.273277	
	5% level	-3.557759	
	10% level	-3.212361	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.006616
HAC corrected variance (Bartlett kernel)	0.000434

Phillips-Perron Test Equation
Dependent Variable: D(LNDIV,2)
Method: Least Squares
Date: 06/11/19 Time: 15:57
Sample (adjusted): 1986 2017
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNDIV(-1))	-0.995246	0.185933	-5.352711	0.0000
C	0.014389	0.032420	0.443834	0.6605
@TREND("1984")	0.001758	0.001667	1.054210	0.3005

R-squared	0.496980	Mean dependent var	0.005159
Adjusted R-squared	0.462289	S.D. dependent var	0.116521
S.E. of regression	0.085444	Akaike info criterion	-1.992859
Sum squared resid	0.211718	Schwarz criterion	-1.855446
Log likelihood	34.88574	Hannan-Quinn criter.	-1.947311
F-statistic	14.32592	Durbin-Watson stat	1.977851
Prob(F-statistic)	0.000047		

Unemployment Rate

Null Hypothesis: D(UM) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 5 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.249046	0.0009
Test critical values:	1% level	-4.273277	
	5% level	-3.557759	
	10% level	-3.212361	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.324955
HAC corrected variance (Bartlett kernel)	0.172846

Phillips-Perron Test Equation
Dependent Variable: D(UM,2)
Method: Least Squares
Date: 06/11/19 Time: 15:57
Sample (adjusted): 1986 2017
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(UM(-1))	-0.852809	0.169353	-5.035684	0.0000
C	-0.346096	0.229796	-1.506099	0.1429
@TREND("1984")	0.014136	0.011547	1.224245	0.2307

R-squared	0.470374	Mean dependent var	-0.034759
Adjusted R-squared	0.433848	S.D. dependent var	0.795831
S.E. of regression	0.598808	Akaike info criterion	1.901308
Sum squared resid	10.39855	Schwarz criterion	2.038720
Log likelihood	-27.42092	Hannan-Quinn criter.	1.946856
F-statistic	12.87782	Durbin-Watson stat	2.186739
Prob(F-statistic)	0.000099		

Lending Rate

Null Hypothesis: D(LR) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 12 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.789720	0.0002
Test critical values:	1% level	-4.273277	
	5% level	-3.557759	
	10% level	-3.212361	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.788101
HAC corrected variance (Bartlett kernel)	0.194387

Phillips-Perron Test Equation
Dependent Variable: D(LR,2)
Method: Least Squares
Date: 06/11/19 Time: 15:57
Sample (adjusted): 1986 2017
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LR(-1))	-0.911847	0.183194	-4.977498	0.0000
C	-0.418215	0.358964	-1.165062	0.2535
@TREND("1984")	0.010928	0.017890	0.610870	0.5460

R-squared	0.461612	Mean dependent var	-0.008125
Adjusted R-squared	0.424482	S.D. dependent var	1.229242
S.E. of regression	0.932539	Akaike info criterion	2.787248
Sum squared resid	25.21923	Schwarz criterion	2.924661
Log likelihood	-41.59597	Hannan-Quinn criter.	2.832796
F-statistic	12.43224	Durbin-Watson stat	1.974122
Prob(F-statistic)	0.000126		

Appendix 4.5: Bound Test

ARDL Bounds Test
Date: 06/27/19 Time: 11:12
Sample: 1988 2017
Included observations: 30
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	5.147487	3

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.72	3.77
5%	3.23	4.35
2.5%	3.69	4.89
1%	4.29	5.61

Test Equation:
Dependent Variable: D(LNPB)
Method: Least Squares
Date: 06/27/19 Time: 11:12
Sample: 1988 2017
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNDIV)	0.572194	0.339615	1.684831	0.1103
D(LNDIV(-1))	0.947012	0.399562	2.370123	0.0299
D(LNDIV(-2))	0.479675	0.423995	1.131322	0.2736
D(LNDIV(-3))	0.387581	0.424644	0.912721	0.3742
D(LR)	-0.073681	0.049352	-1.492949	0.1538
D(UM)	0.081634	0.075277	1.084448	0.2933
D(UM(-1))	0.055462	0.066704	0.831466	0.4172
D(UM(-2))	-0.045447	0.046295	-0.981683	0.3400
C	9.973446	2.330370	4.279769	0.0005
LNDIV(-1)	-0.080286	0.223382	-0.359408	0.7237
LR(-1)	-0.167971	0.046716	-3.595579	0.0022
UM(-1)	-0.088664	0.042662	-2.078282	0.0531
LNPB(-1)	-0.871994	0.204506	-4.263896	0.0005

R-squared	0.663198	Mean dependent var	0.056069
Adjusted R-squared	0.425455	S.D. dependent var	0.167413
S.E. of regression	0.126897	Akaike info criterion	-0.992195
Sum squared resid	0.273750	Schwarz criterion	-0.385009
Log likelihood	27.88293	Hannan-Quinn criter.	-0.797951
F-statistic	2.789559	Durbin-Watson stat	1.996150
Prob(F-statistic)	0.026379		

Appendix 4.6: ARDL

Dependent Variable: LNPB
Method: ARDL
Date: 06/27/19 Time: 10:43
Sample (adjusted): 1988 2017
Included observations: 30 after adjustments
Maximum dependent lags: 4 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (4 lags, automatic): LNDIV LR UM
Fixed regressors: C
Number of models evalulated: 500
Selected Model: ARDL(1, 4, 1, 3)
Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNPB(-1)	0.128006	0.204506	0.625928	0.5397
LNDIV	0.572194	0.339615	1.684831	0.1103
LNDIV(-1)	0.294533	0.470459	0.626054	0.5396
LNDIV(-2)	-0.467337	0.458784	-1.018643	0.3227
LNDIV(-3)	-0.092094	0.516286	-0.178378	0.8605
LNDIV(-4)	-0.387581	0.424644	-0.912721	0.3742
LR	-0.073681	0.049352	-1.492949	0.1538
LR(-1)	-0.094290	0.052730	-1.788173	0.0916
UM	0.081634	0.075277	1.084448	0.2933
UM(-1)	-0.114835	0.079467	-1.445065	0.1666
UM(-2)	-0.100909	0.075742	-1.332278	0.2004
UM(-3)	0.045447	0.046295	0.981683	0.3400
C	9.973446	2.330370	4.279769	0.0005

R-squared	0.963572	Mean dependent var	9.297667
Adjusted R-squared	0.937857	S.D. dependent var	0.509046
S.E. of regression	0.126897	Akaike info criterion	-0.992195
Sum squared resid	0.273750	Schwarz criterion	-0.385009
Log likelihood	27.88293	Hannan-Quinn criter.	-0.797951
F-statistic	37.47235	Durbin-Watson stat	1.996150
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

Appendix 4.7: LR Model and Error Correction Test

ARDL Cointegrating And Long Run Form
Dependent Variable: LNPB
Selected Model: ARDL(1, 4, 1, 3)
Date: 06/27/19 Time: 11:11
Sample: 1984 2017
Included observations: 30

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNDIV)	0.572194	0.282180	2.027761	0.0586
D(LNDIV(-1))	0.947012	0.294423	3.216505	0.0051
D(LNDIV(-2))	0.479675	0.350681	1.367838	0.1892
D(LNDIV(-3))	0.387581	0.337250	1.149241	0.2664
D(LR)	-0.073681	0.035347	-2.084504	0.0525
D(UM)	0.081634	0.052957	1.541501	0.1416
D(UM(-1))	0.055462	0.057300	0.967922	0.3467
D(UM(-2))	-0.045447	0.040336	-1.126723	0.2755
C	9.973446	2.030485	4.911854	0.0001
CointEq(-1)	-0.871994	0.177172	-4.921734	0.0001

Cointeq = LNPB - (-0.0921*LNDIV -0.1926*LR -0.1017*UM)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNDIV	-0.092071	0.262242	-0.351092	0.7298
LR	-0.192628	0.044131	-4.364920	0.0004
UM	-0.101679	0.040921	-2.484794	0.0237

Appendix 4.8: Granger Causality Test

Pairwise Granger Causality Tests
Date: 06/27/19 Time: 11:17
Sample: 1984 2017
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
DLR does not Granger Cause DPB	27	0.54649	0.7387
DPB does not Granger Cause DLR		1.23484	0.3385
DDIV does not Granger Cause DPB	27	0.55631	0.7317
DPB does not Granger Cause DDIV		2.98258	0.0433
DUM does not Granger Cause DPB	27	3.18585	0.0348
DPB does not Granger Cause DUM		2.29902	0.0937
DDIV does not Granger Cause DLR	28	3.61267	0.0208
DLR does not Granger Cause DDIV		0.92558	0.4885
DUM does not Granger Cause DLR	28	1.79686	0.1672
DLR does not Granger Cause DUM		0.66987	0.6516
DUM does not Granger Cause DDIV	28	0.65442	0.6624
DDIV does not Granger Cause DUM		5.61232	0.0031

Appendix 4.9: Autocorrelation

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.018322	Prob. F(4,13)	0.4337
Obs*R-squared	7.157299	Prob. Chi-Square(4)	0.1278

Test Equation:
Dependent Variable: RESID
Method: ARDL
Date: 06/27/19 Time: 11:13
Sample: 1988 2017
Included observations: 30
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNPB(-1)	0.052521	0.407688	0.128826	0.8995
LNDIV	-0.301305	0.377592	-0.797966	0.4392
LNDIV(-1)	0.134905	0.534438	0.252425	0.8047
LNDIV(-2)	-0.080081	0.479948	-0.166853	0.8701
LNDIV(-3)	0.061733	0.641095	0.096293	0.9248
LNDIV(-4)	0.099299	0.460615	0.215580	0.8327
LR	-0.009089	0.058659	-0.154953	0.8792
LR(-1)	-0.001225	0.066393	-0.018456	0.9856
UM	0.081087	0.090954	0.891516	0.3889
UM(-1)	-0.068888	0.099080	-0.695277	0.4991
UM(-2)	0.001196	0.084780	0.014106	0.9890
UM(-3)	0.010393	0.047306	0.219694	0.8295
C	-0.048010	4.458591	-0.010768	0.9916
RESID(-1)	-0.170766	0.499236	-0.342055	0.7378
RESID(-2)	-0.531619	0.304406	-1.746415	0.1043
RESID(-3)	0.053083	0.324048	0.163812	0.8724
RESID(-4)	-0.519035	0.376907	-1.377090	0.1917

R-squared	0.238577	Mean dependent var	-9.49E-16
Adjusted R-squared	-0.698560	S.D. dependent var	0.097158
S.E. of regression	0.126625	Akaike info criterion	-0.998094
Sum squared resid	0.208439	Schwarz criterion	-0.204082
Log likelihood	31.97141	Hannan-Quinn criter.	-0.744083
F-statistic	0.254580	Durbin-Watson stat	2.034106
Prob(F-statistic)	0.994304		

Appendix 4.10: Heteroscedasticity

Heteroskedasticity Test: ARCH

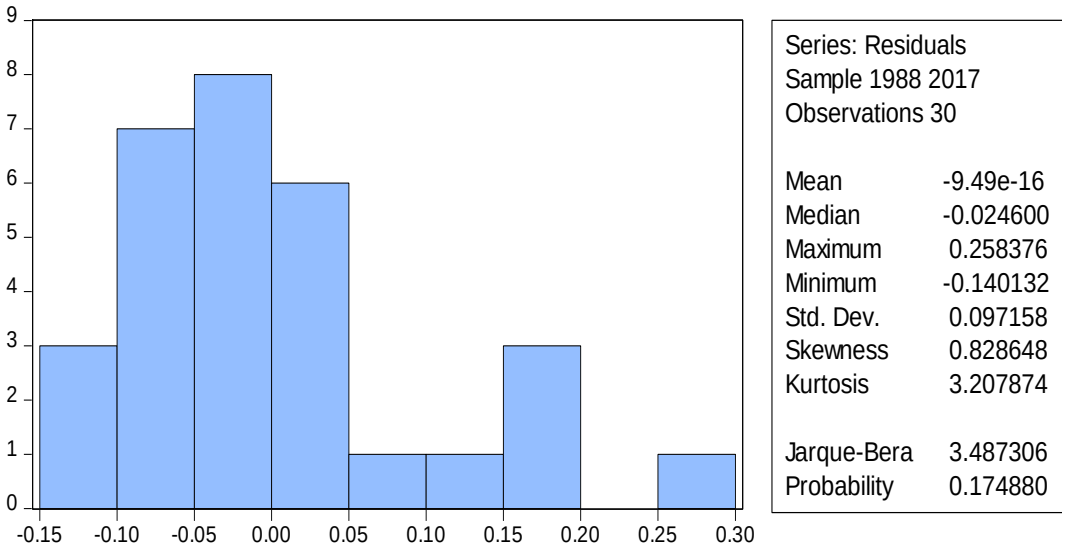
F-statistic	0.190818	Prob. F(4,21)	0.9405
Obs*R-squared	0.911860	Prob. Chi-Square(4)	0.9229

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 06/27/19 Time: 11:14
Sample (adjusted): 1992 2017
Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.006790	0.002579	2.632578	0.0156
RESID^2(-1)	0.027930	0.122109	0.228727	0.8213
RESID^2(-2)	-0.099994	0.122361	-0.817206	0.4230
RESID^2(-3)	-0.009453	0.122508	-0.077165	0.9392
RESID^2(-4)	-0.021112	0.124148	-0.170057	0.8666

R-squared	0.035072	Mean dependent var	0.005828
Adjusted R-squared	-0.148724	S.D. dependent var	0.008107
S.E. of regression	0.008689	Akaike info criterion	-6.482550
Sum squared resid	0.001585	Schwarz criterion	-6.240609
Log likelihood	89.27316	Hannan-Quinn criter.	-6.412880
F-statistic	0.190818	Durbin-Watson stat	1.815841
Prob(F-statistic)	0.940512		

Appendix 4.11: Jarque Bera Test



Appendix 4.12: Model Specification

Ramsey RESET Test
Equation: ARDL
Specification: LNPB LNPB(-1) LNDIV LNDIV(-1) LNDIV(-2) LNDIV(-3) LNDIV(-4) LR LR(-1) UM UM(-1) UM(-2) UM(-3) C
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.656064	16	0.5211
F-statistic	0.430420	(1, 16)	0.5211

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.007171	1	0.007171
Restricted SSR	0.273750	17	0.016103
Unrestricted SSR	0.266578	16	0.016661

Unrestricted Test Equation:
Dependent Variable: LNPB
Method: ARDL
Date: 06/27/19 Time: 11:14
Sample: 1988 2017
Included observations: 30
Maximum dependent lags: 4 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (4 lags, automatic):
Fixed regressors: C

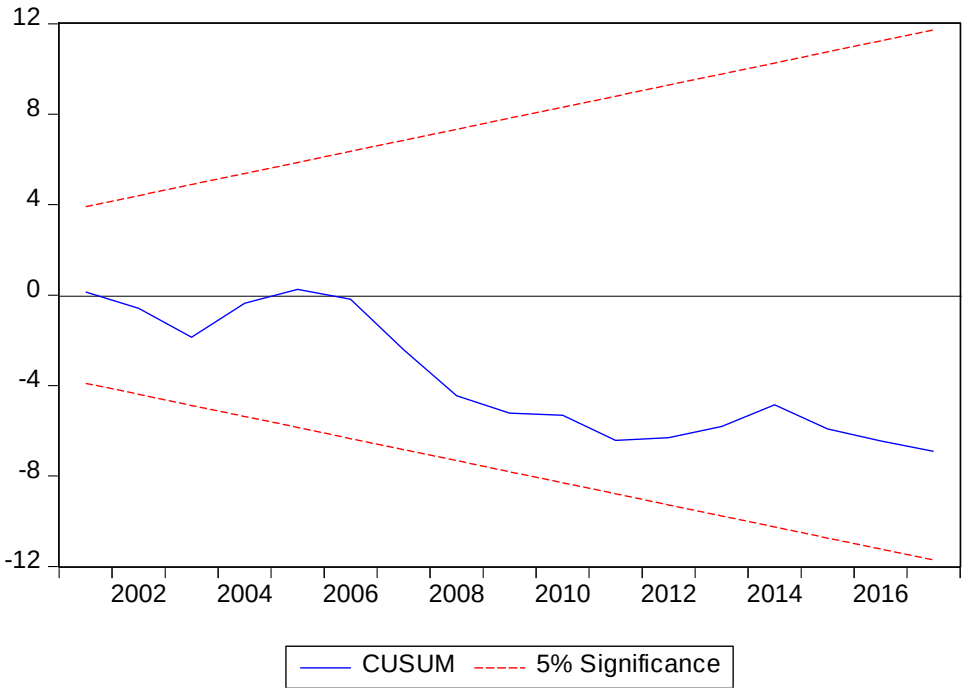
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNPB(-1)	0.527376	0.643297	0.819801	0.4244
LNDIV	2.614522	3.132110	0.834748	0.4161
LNDIV(-1)	1.436896	1.805799	0.795712	0.4378
LNDIV(-2)	-2.088276	2.514388	-0.830531	0.4185
LNDIV(-3)	-0.393532	0.697782	-0.563976	0.5806
LNDIV(-4)	-1.754616	2.127990	-0.824542	0.4218
LR	-0.331960	0.396869	-0.836449	0.4152
LR(-1)	-0.430257	0.514896	-0.835620	0.4157
UM	0.364313	0.437622	0.832484	0.4174
UM(-1)	-0.513389	0.612846	-0.837713	0.4145
UM(-2)	-0.448369	0.535188	-0.837780	0.4145
UM(-3)	0.206995	0.250700	0.825667	0.4211
C	28.83971	28.85426	0.999496	0.3324
FITTED^2	-0.194879	0.297042	-0.656064	0.5211

R-squared	0.964526	Mean dependent var	9.297667
Adjusted R-squared	0.935703	S.D. dependent var	0.509046
S.E. of regression	0.129078	Akaike info criterion	-0.952074
Sum squared resid	0.266578	Schwarz criterion	-0.298182
Log likelihood	28.28111	Hannan-Quinn criter.	-0.742888
F-statistic	33.46405	Durbin-Watson stat	1.994181
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

Appendix 4.13: Stability Diagnostic

CUSUM Test



CUSUM of Square Test