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THE EFFECTS OF COST OF LIVING AND HOUSEHOLD DEPENDENCY ON HOUSEHOLD DEBT AND ITS COMPOSITION IN MALAYSIA

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By

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ABSTRACT

The past decade has witnessed a notable increase in household debt across countries, which raises concerns on its impact on social and economic aspects. Although household debt plays an important role in supporting the economy to grow, a continuous rise in the debt level may bring serious economic consequences. Hence, understanding the potential factors that contribute towards the significant rise in the debt level is useful for policy implications. The main objective of this study was to investigate the effects of the cost of living and household dependency on household debt and its composition in Malaysia where the roles of income level, interest rates and housing prices are the control variables. By using the Autoregressive Distributed Lag (ARDL) modelling approach, this study revealed that in the long run, income level, housing prices and old age dependency have positive influences on both total household debt and mortgage debt while an inverse relationship was observed on the effects of interest rates, cost of living and young age dependency on both types of debt. This finding is also similar to the case of consumer debt except for the role of housing prices which exhibit a negative relationship. This study also discovered that in the event of any short-term deviation in the household debt model the mortgage debt will adjust faster compared to the consumer debt, which may be due to risks associated with mortgage debt which is typically lower since it is secured with assets and thereby any short-term deviation will be easily adjusted. Finally, the inclusion of the structural break in the debt model revealed that the break effects are significant in all the models and thereby support the importance of considering their presence in the analysis to prevent biased estimation.

Keywords: household debt, mortgage debt, consumer debt, ARDL, structural breaks

ABSTRAK

Sejak sedekad yang lalu, jumlah hutang isi rumah di semua negara telah meningkat dengan mendadak sehingga menimbulkan kebimbangan kesannya ke atas aspek sosial dan ekonomi sesebuah negara. Walaupun hutang isi rumah memainkan peranan penting dalam membantu pertumbuhan ekonomi negara namun, peningkatkan hutang isi rumah yang berterusan boleh memberi kesan buruk kepada ekonomi sesebuah negara. Oleh itu, adalah penting untuk memahami faktor-faktor yang menyumbang ke arah peningkatan mendadak jumlah hutang isi rumah bagi tujuan implikasi polisi. Objektif utama kajian ini adalah untuk menyiasat kesan kenaikan kos sara hidup dan kadar kebergantungan isi rumah terhadap jumlah hutang isi rumah dan komposisinya di Malaysia apabila tingkat pendapatan, kadar pinjaman dan harga rumah telah diambil kira sebagai pemboleh ubah kawalan. Kaedah analisa *Autoregressive Distributed Lag* telah digunakan dalam kajian ini dan didapati bahawa di dalam jangka masa panjang, tingkat pendapatan, harga rumah dan kadar kebergantungan golongan tua mempunyai kesan positif terhadap jumlah hutang isi rumah dan hutang bercagar. Sementara itu, kadar pinjaman, kos sara hidup dan kadar kebergantungan golongan muda memberi kesan negatif. Dapatan yang sama diperoleh bagi kesan ke atas hutang tidak bercagar kecuali kesan harga rumah yang didapati memberi impak negatif terhadap jenis hutang ini. Hasil kajian ini juga mendapati bahawa sekiranya sebarang ketidakseimbangan berlaku dalam jangka masa pendek di dalam model hutang isi rumah, ketidakseimbangan di dalam hutang bercagar akan dapat diseimbangkan dengan lebih cepat berbanding ketidakseimbangan yang berlaku bagi hutang tidak bercagar. Ini keranahutang yang bercagar kebiasaannya mempunyai risiko yang rendah. Akhir sekali, setelah mengambil kira kewujudan 'structural breaks' di dalam model hutang isi rumah, kajian ini mendapati bahawa hal ini adalah signifikan. Ini menyokong kepentingan untuk mempertimbangkan kewujudannya di dalam analisa kajian bagi mengelakkan daripada masalah bias.

Kata kunci: hutang isirumah, hutang bercagar, hutang tidak bercagar, ARDL, *structural breaks*

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LIST OF ABBREVIATIONS

ADF   Augmented Dicky-Fuller
AIC   Akaike Information Criterion
ANOVA   Analysis of variance
ARCH   Auto-Regressive Conditional Heteroskedasticity
ARDL   Auto-Regressive Distributed Lag modelling
BNM   Bank Negara Malaysia
CPI   Consumer Price Index
CUSUM   Cumulative Sum of the Residuals
CUSUMSQ   Cumulative Sum of the Residuals Squared
ECM   Error Correction Model
EPU   Economic Planning Unit
GDP   Gross Domestic Product
GMM   Generalized method of moments
GST   Good and Services Tax
LCM   Life Cycle Model
LM   Lagrange Multiplier
NAPIC   National Property Information Centre
OLS   Ordinary Least Squares
PIH   Permanent Income Hypothesis
RESET   Regression Specification Error Test
VAR   Vector Autoregressive

CHAPTER ONE

INTRODUCTION

1.1   Introduction

Household debt plays an important role in the household balance sheet since households usually use credit facilities to finance their consumption especially on durable goods. As a result, household debt will exert a positive influence on the aggregate demand and indirectly can help to enhance the nation economic growth. However, a rising demand for loans together with the greediness of the financial intermediaries in making profit by giving out loans excessively has contributed to large debt accumulation and may bring towards serious economic consequences (Karacimen, 2014; Moroke, 2014; Zakaria, Abdul Kader, Mohd Jaafar, & Marican, 2012).

Recent data shows that the level of household debt is growing in both developed and developing countries which raises concerns of the economists on the risk of financial instability (World Bank, 2014). Even though household debt can boost the nation economic growth, excessive debt level may eventually bring negative effects on the economic performances of a country (Cecchetti, Mohanty, & Zampolli, 2011). This is due to the fact that continuous increment in household debt may lead to financial crisis and slowing down the economic recovery process (Chmelar, 2013; Gartner, 2013).

Apart from that, an increase in the household financial commitment will also cause the households to be more sensitive to negative shock in the economy such as in

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income levels, asset prices and interest rates (Dynan & Kohn, 2007). Households who could not adjust with the shock may face difficulties to meet their financial obligations and thus may trigger a rise to default payments and non-performing loans. Hence, continuous rise in the household debt may be harmful for the economy especially in the long run if no necessary actions are taken to reduce the risk. Moreover, the monetary policy may be less effective in controlling the high debt level since raising the interest rate may cause a higher debt servicing and thereby increase the risk of default payment.

Previous studies conducted have found that the rise in household debt could be explained by various economics, demographic and psychological factors (Kim, Lee, Son, & Son, 2014; Meng, Hoang & Siriwardana, 2013; Meniago, Mukuddem-Petersen, Petersen, & Mongale, 2013; Turinetti & Zhuang, 2011; Lea, Webley, & Levine, 1993; Livingstone & Lunt, 1992). Studies conducted at micro and macro level have highlighted both the demand and supply factors in explaining the mounting household debt level. However, the demand side factor has been found to give a greater influence on the household debt (Paradiso, Kumar, & Lucchetta, 2014; Meng *et al.*, 2013)

Even though a lot of studies have been conducted to analyze the reasons behind the rising of household debt from various perspectives, this issue remains crucial and needs to be examined at domestic level due to differences in economic, cultural and environmental backgrounds across countries. Hence, by focusing on the composition of debt, this study intends to investigate the reasons behind the rising of household debt in Malaysia by incorporating the roles of structural breaks in the analysis.

Recently, the highly growing household debt in this country which is at par with the developed nations has raised concerns on the economic stability of the country and the results obtained from this study can assist policymakers in designing an effective policy to control the high debt level and indirectly can help in realizing the nation's vision in becoming a high-income country by the year 2020.

1.2   Background of the Study

Malaysia is previously regarded as one of the fastest growing economies in Southeast Asia with its achievement in having high growth rate. The growth has been supported by an effective policy growth and the development of the banking sector in order to have more efficient management on risks and challenges (Bank Negara Malaysia, 2011). However, recent data has shown that there is a surge in household debt among the developing countries especially in Malaysia which raises concern on the financial stability of the country (International Monetary Fund, 2014).

As shown in Figure 1.1, there is an increasing trend of household debt in Malaysia since the Global Financial Crisis in 2008. The crisis which started in the United States due to the U.S subprime crisis impacted almost all the economies in the world due to their connection with the U.S economies (Meniago *et al.*, 2013). During the pre-crisis period, the household debt level was slowing down but eventually started to hike following the crisis. Since then, the household debt in Malaysia had been nearly three quarter of the GDP and rose to 87.9 percent of GDP in 2014 which was among the highest in the developing and the Asian countries (Bank Negara Malaysia, 2014). This figure shows that the household debt issue is becoming a serious issue since it exceeds the threshold level of 84 percent of GDP calculated by Cecchetti *et al.* (2011)

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suggesting that household debt will start to dampen the economic growth once it achieves this level.
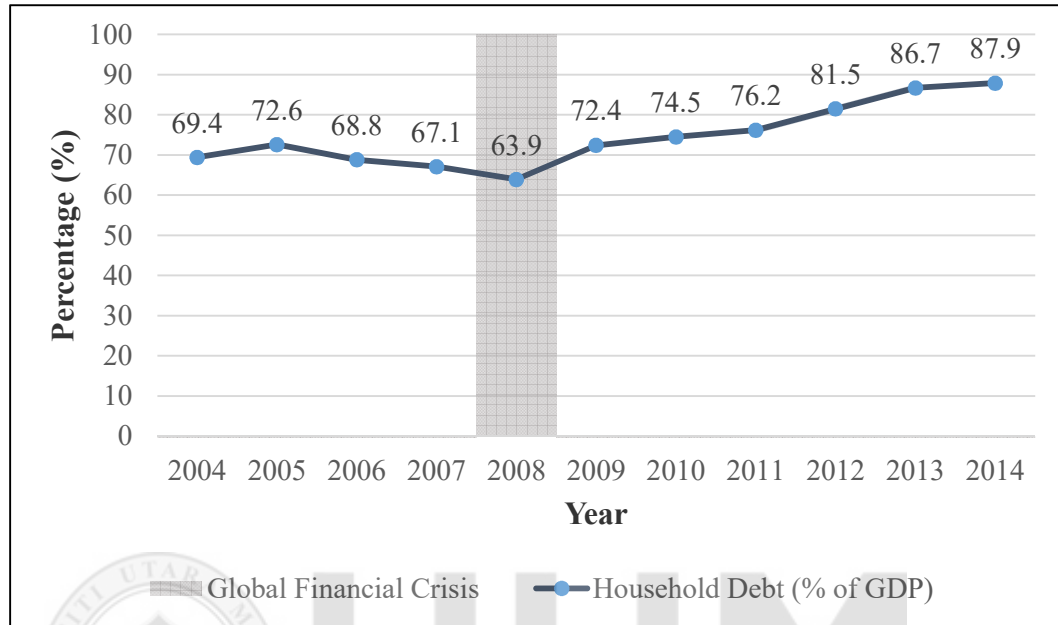
Figure 1.1
Household debt in Malaysia (Percentage of GDP)
Source: BNM Financial Stability and Payment Systems Report and BNM Monthly Statistical Bulletin

In Malaysia, the main component of the household debt is in the form of mortgage debt which represents about three quarter of the total household debt. This may due to this type of debt which is less risky and more preferable by the banking sector in giving out loans since they can use assets for collateral if borrowers unable to meet their financial obligations. As depicted in Figure 1.2 and Figure 1.3, the main contributors of household debt are in the form of mortgage debt which is dominated by the purchase of residential properties and followed by the purchase of vehicles, non-residential properties, personal loans and others (Bank Negara Malaysia, 2013).

Before the occurrence of the Global Financial Crisis that hit the world economies in 2008, the level of mortgage debt has been decreasing slowly but continues to rise during the post crisis period. It is also noticeable that after the crisis, the rise in the mortgage debt is due to the increase in the household borrowing for non-residential properties. The significant drop in housing prices in the United States that brings towards the U.S subprime crisis may have influenced the household behaviour in Malaysia by shifting their investment on the purchase of non-residential properties instead of residential properties. Besides that, continuous increment in the housing prices in Malaysia even after the crisis may also influence the households to increase their borrowing by using the mortgage equity withdrawal in order to get additional fund.
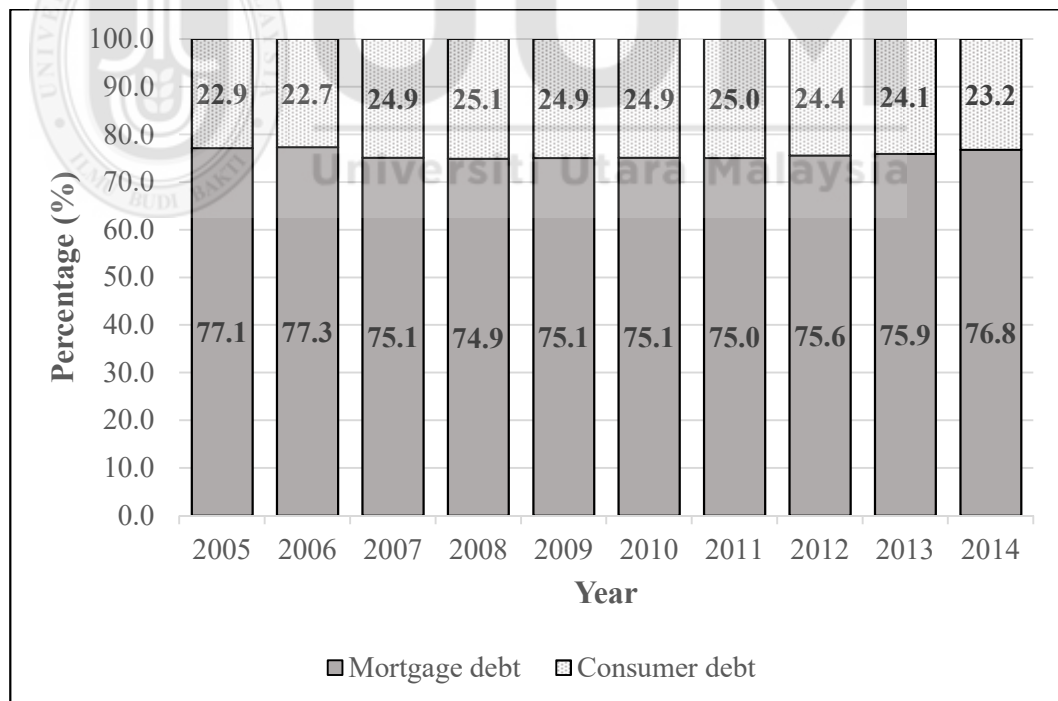
Figure 1.2
Composition of household debt (2005-2014)
Source: BNM Financial Stability and Payment Systems Report and BNM Monthly Statistical Bulletin

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On the other hand, the level of consumer debt which had been growing before the crisis eventually started to decline following the crisis in which suggests that the occurrence of the crisis may have shifted the household behaviour in borrowing activities. The decline in the consumer debt due to the reduction in the automobile loan suggesting that households face higher difficulties in financing the purchase of vehicles following the crisis since the banking sector may be more selective in giving out loans for unsecured borrowing to avoid risk of default payment that could trigger the crisis. In addition, the value of the asset which continues to depreciate over time may not be able to cover up the loans if households decide to default and thereby is less preferable by the lenders.
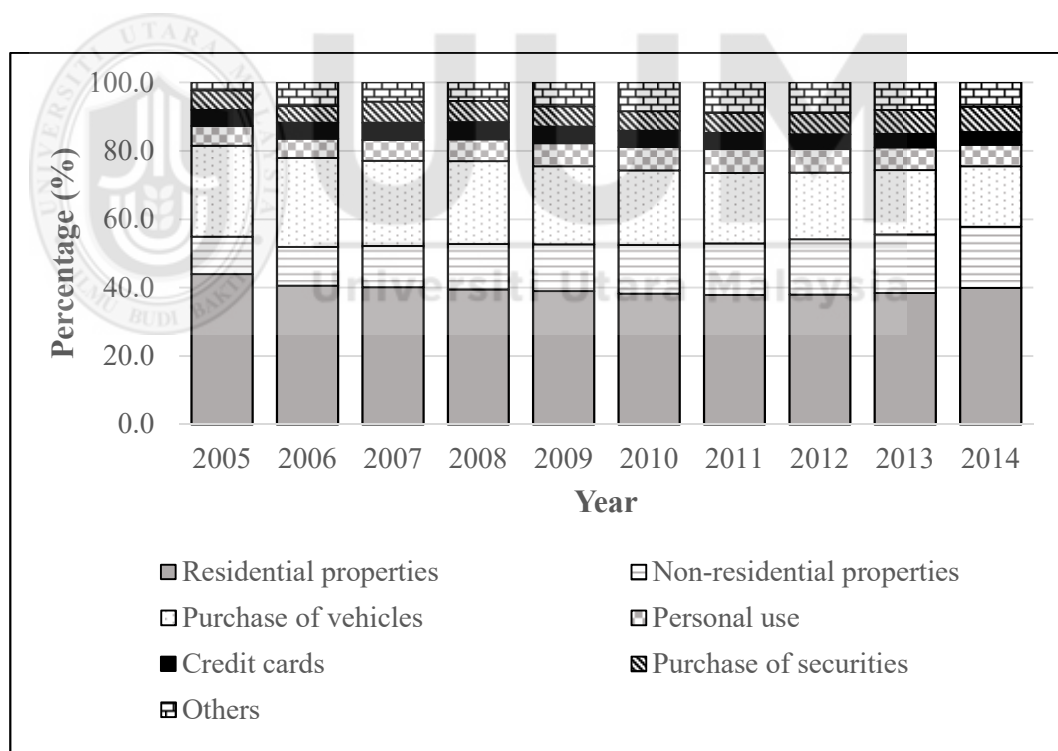
Figure 1.3
Composition of mortgage and consumer debt (% of total household debt)
Source: BNM Financial Stability and Payment Systems Report and BNM Monthly Statistical Bulletin
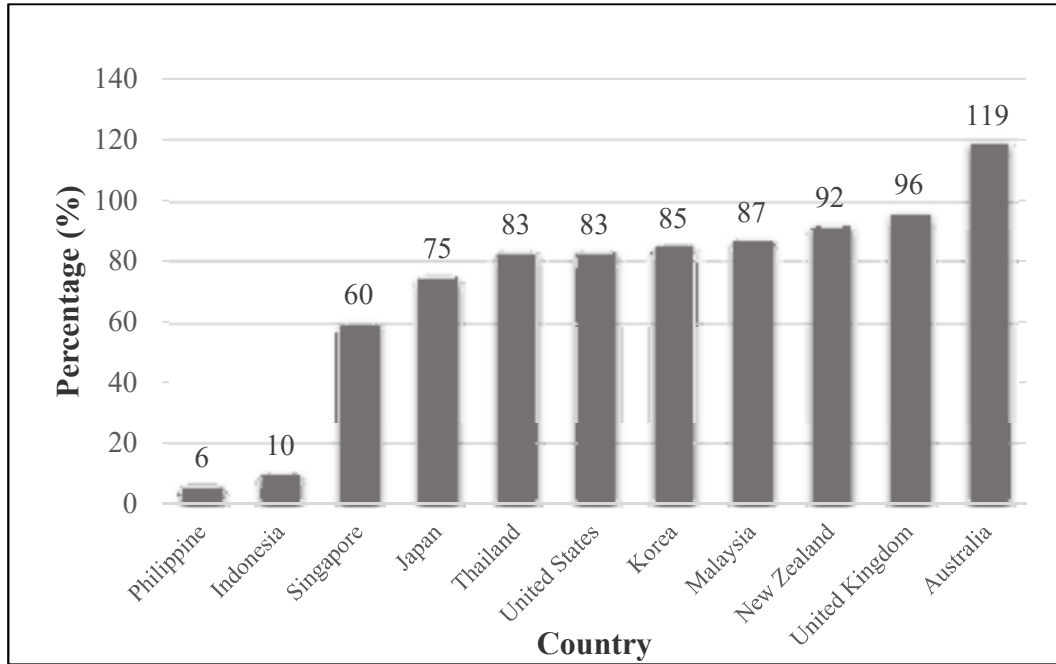
By comparing the level of household debt among countries in terms of GDP and disposable income for the year 2014, as depicted in Figure 1.4 and Figure 1.5 has proven that the household debt in Malaysia is the highest among the developing and Asian countries and also found to be higher in comparison with the developed countries such as the United States.

Figure 1.4
Comparison of household debt (% of GDP) between countries in 2014
Source: CEIC data
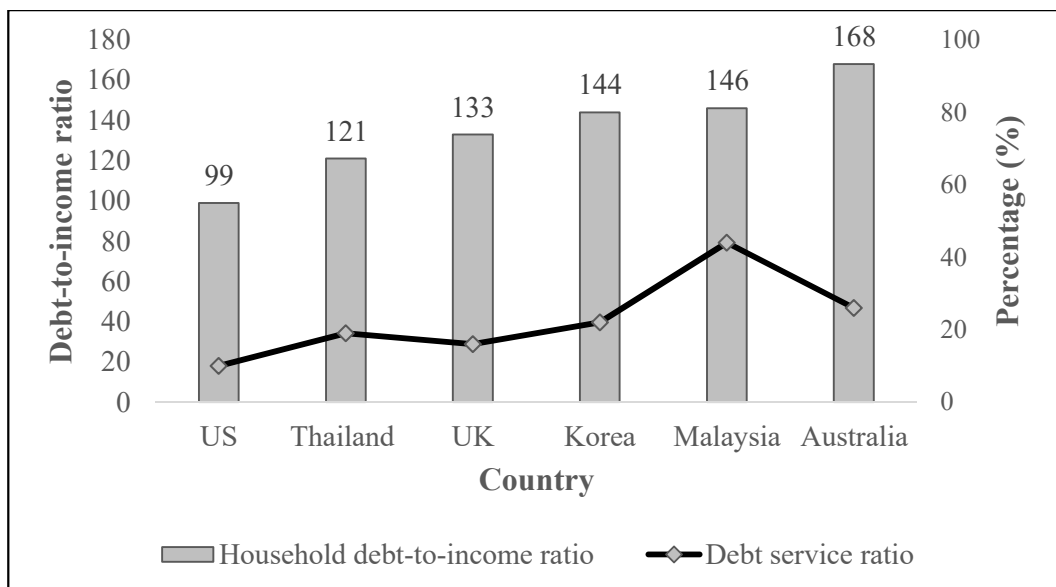
Figure 1.5
Household debt-income ratio and debt service ratio in 2014
Source: CEIC data

The debt-to-income ratio reported in Figure 1.5 suggests that the Malaysian household is highly indebted with their debt which is almost 1.5 times higher than their income. This is further supported by the debt service ratio which is found to be the highest in comparison with developed nations such as the United States and United Kingdom, implying that the Malaysian households allocate more than 40 percent of their income for debt servicing.

From one perspective, the growth in household debt shows that the financial market is performing well whereby the society has a good access to the credit market. However, the highly growing of household debt may only benefit the economy in the short run since households with higher debt commitment may face a high risk from an economic shocks and thereby may dampen the economic performance in the long run period (Gartner, 2013). Generally, the debt service ratio which exceeds the acceptable level of 30 percent as set by the central bank of the country suggests that Malaysian households have been too dependent on the debt to support their consumption and consequently increases the risk of the country to dive into recession if any negative shocks occur in the economy.

Although household debt is necessary for the economy to grow, high debt level if not associated with the growth in income and productivity will be harmful for the economy since it may lead to a higher default rate. Unfortunately, since the past decade, household debt in Malaysia has been growing faster than the growth in GDP

which suggests that a rapid rise in the household debt has hindered the economic growth.

As shown in Figure 1.6, before the Global Financial Crisis that occurred in 2008, the trend of the household debt and real GDP growth shows an inverse relationship whereby the growth in household debt was associated with a decline in the GDP growth but the relationship shifted significantly after the crisis. In particular, before the crisis, as the GDP had continued to grow, the growth in the household debt started to slow down which suggested that the economic growth had helped to moderate the growth in the household debt. Unfortunately, following the crisis, both the household debt and GDP had been growing with the growth in household debt is significantly greater which is more than double than the growth in the GDP in which suggest that a rapid rise in the debt level has hindered the nation economic performance.
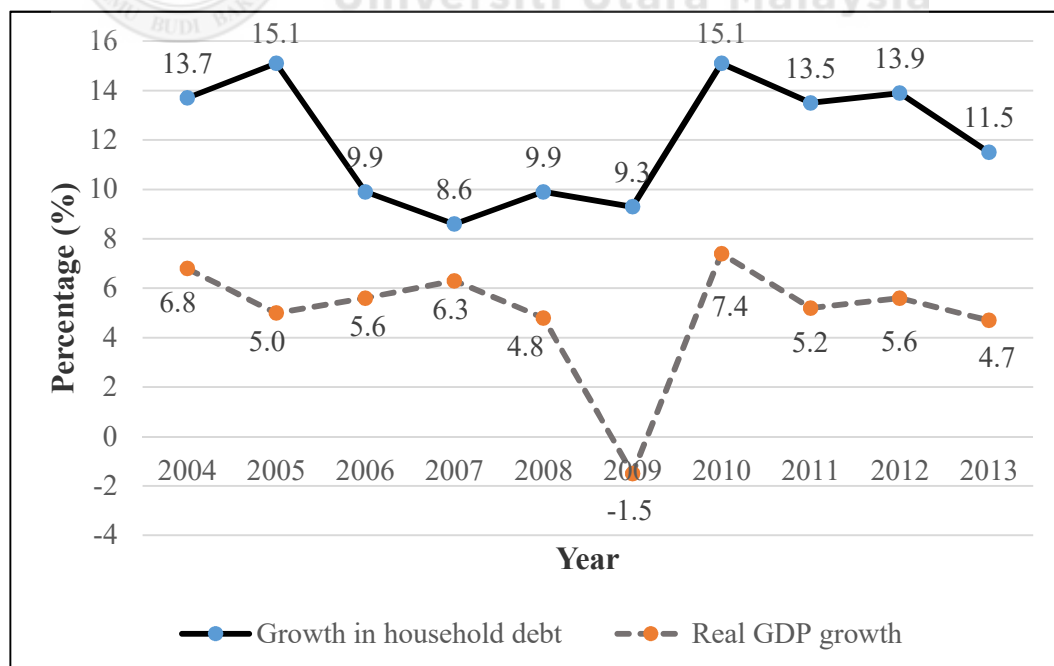
Figure 1.6
The growth in household debt and real GDP from 2004 to 2013

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Despite the slow growth in the GDP, the negative consequences of the rising of household debt can also be seen in Malaysia with the rising of bankruptcies rate in the country with the major reason is due to default in automobile loan and follows by housing and personal loans (Malaysia Department of Insolvency, 2013). Surprisingly, majority of the households who have been declared bankrupt are the individuals in the prime working age (35 to 55 years old) who normally have a stable income due to greater experiences in the labour market.
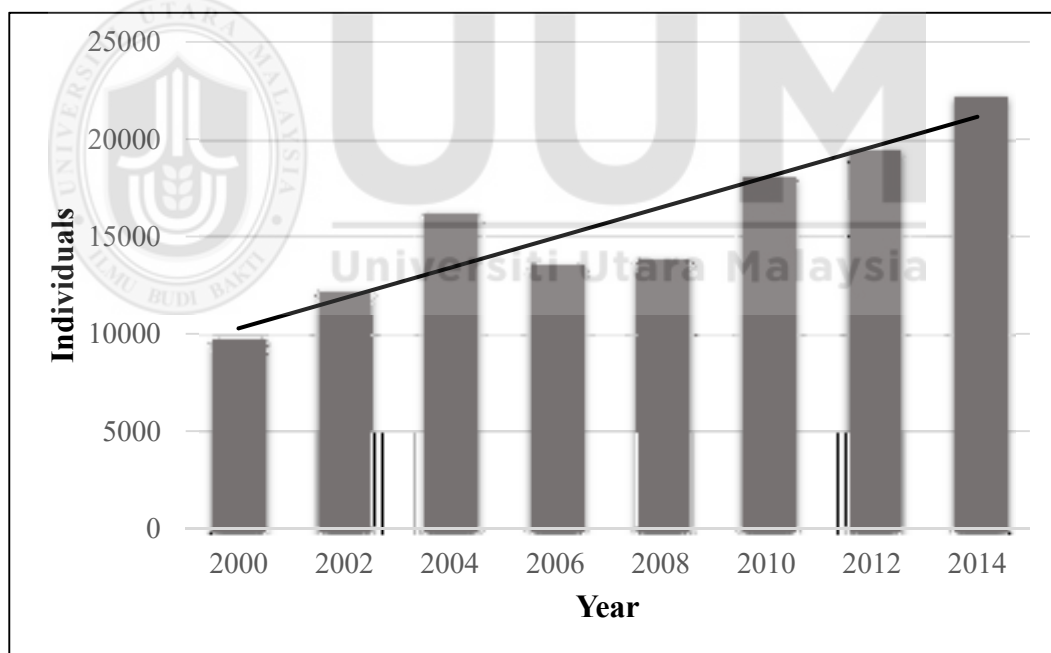
Figure 1.7
Personal bankruptcies in Malaysia
Source: BNM Monthly Statistical Bulletin
Notes: Refers to individuals only

As shown in Figure 1.7, in the early 2000s, the personal bankruptcies rate was rising but starting to decline before the Global Financial Crisis in 2008. However, following

the crisis, the bankruptcies level increased sharply with the number of bankruptcies reported in 2014 was more than 100 percent than the level in the early 2000s. Hence, the bulk of household debt associated with the change in the structure of the economy such as in the event of crisis may worsen the economic situation and thereby it calls upon for a policy formulation to control the highly growing of household debt.

In summary, as Malaysia aspires to achieve the status of a high-income country by the year 2020, the investigation on the prominent factors behind the sharp rise in the household debt is necessary to facilitate a policy formulation as well as to maintain the economic stability of the country. The trend in the household debt composition which was found to change significantly following the Global Financial Crisis suggests that the structural break may play an important role behind the bulk of household debt in the country thereby the inclusion of this factor in the analysis is useful to provide a better understanding on the issue of household debt. Unfortunately, there are very few studies especially in Malaysia that investigate the determinants of household debt based on its composition and consider the roles of structural breaks in the analysis. Therefore, it motivates this present study.

1.2.1 The trend in Malaysians' income level

As discussed in the previous section, household debt found to increase significantly in Malaysia which is at par with the developed nations. The rise in the debt level can partly be explained by the continuous rise in the household income since the household will have a higher capacity to borrow. As illustrated in Figure 1.8, there is an increasing trend in the average income since the past two decades with the income

growth also shows an upward trend except in 1999 and 2009 due to the Asian Financial Crisis and Global Financial Crisis that had hit the economy.

Besides the rise in the income growth, the income inequality in the country, as depicted in Figure 1.9, also shows a positive improvement in the income share among the households in the middle and bottom income levels, which has been rising as supported by the declining of Gini coefficient since the past few decades. In line with this, the poverty rate in Malaysia shown in Figure 1.10 has also been declining continuously, suggesting that various government policies implemented have helped the country to achieve its development goals.
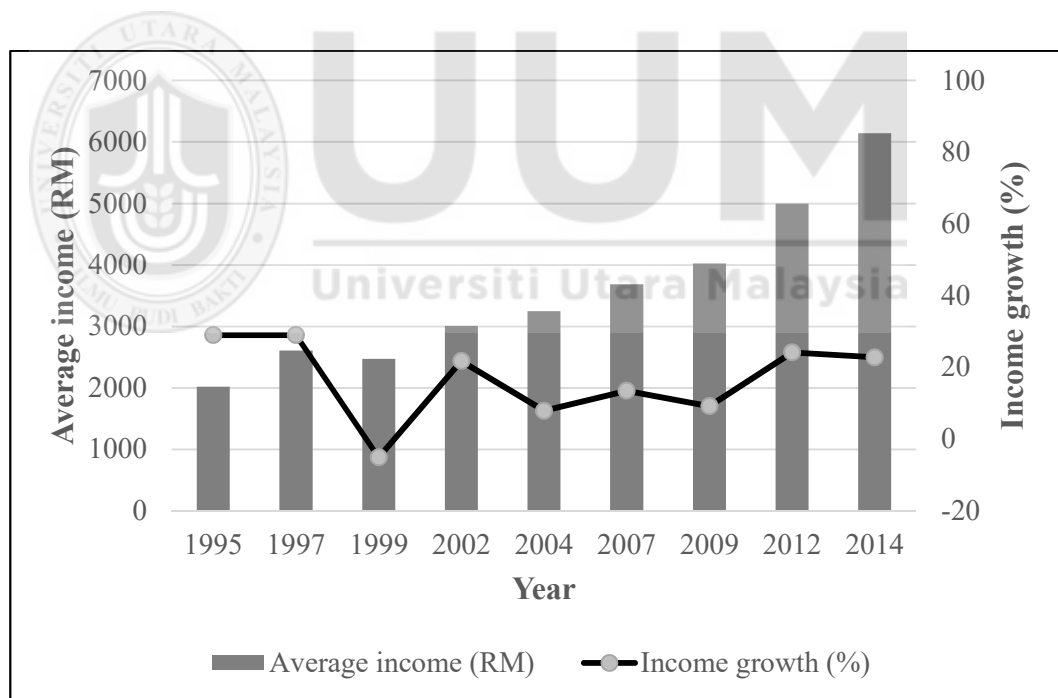
Figure 1.8
The mean of monthly household gross income (1995- 2014)
Source: Department of Statistics Malaysia (Household Income and Basic Amenities
Survey Report)

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Correspondingly, the positive improvement in the household income may partially help to explain the rise in the household debt level since households may choose to increase their borrowing with the expectation that they can afford to service a higher debt level. The positive income growth has also increases consumer confidence on the future economy and thereby may choose to borrow excessively by discounting a higher future income. Moreover, from the lenders' perspective, positive improvement in household income may have influenced the lenders to increase the supply of loans due to a rising of confidence on the borrower's ability to repay the loans.
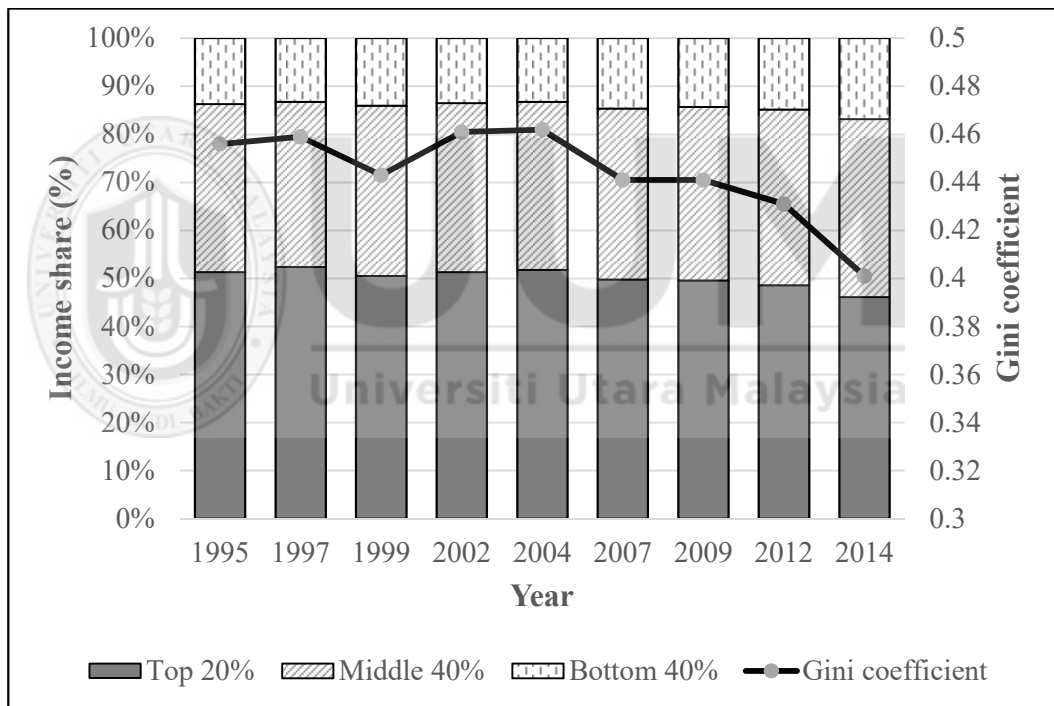
Figure 1.9
Income share of Malaysian households (1995-2014)
Source: Department of Statistics Malaysia (Household Income and Basic Amenities Survey Report)

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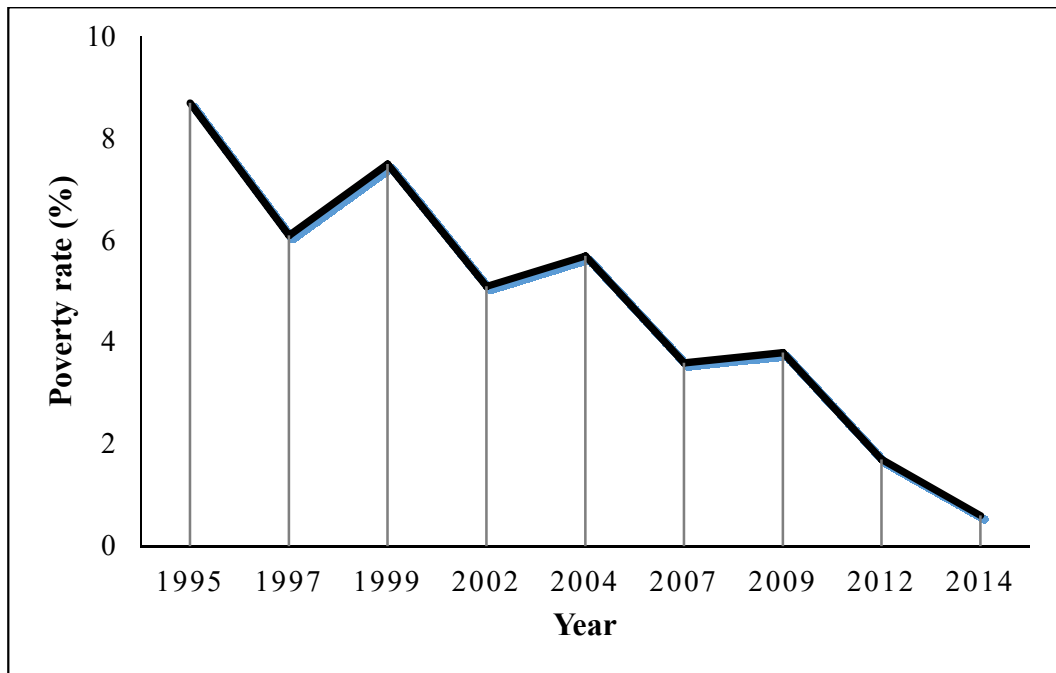
Figure 1.10
Poverty rate in Malaysia (1995-2014)
Source: Department of Statistics Malaysia (Household Income and Basic Amenities Survey Report)

Despite the rising income level, the debt service ratio which found to be rising and exceeding the optimal level sets by the central bank indicates that the rise in household borrowing has been higher than the growth in income level. Hence, there are other aspects that influence the household debt to rise and thereby need for further investigation to identify the factors.

1.2.2 Borrowing cost in Malaysia

Several past studies have highlighted the importance of borrowing cost in influencing the household debt. In particular, low cost of borrowing has led the households to take advantage of the easy credit and indirectly leads to high debt accumulation (Moroke, 2014; Paradiso *et al.*, 2014; Meng *et al.*, 2013; Meniago *et al.*, 2013; Turinetti & Zhuang, 2011; Hartropp, 1992). In addition, the greediness of the banking sector in making profit by loaning out excessively has also contributed to the significant increase in the debt level.

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Correspondingly, the overall loan applications and approval in Malaysia increase sharply due to a lower interest rate policy adapted by the country since the Asian Financial Crisis as illustrated in Figure 1.11. Since the crisis that occurred in 1998, the government that concerned on the low aggregate demand in the country had reduced the lending rates to provide an easy access to credit in order to stimulate the aggregate demand. Hence, the structural break that occurred in the economy had indirectly influenced the household behaviour and eventually led to a significant rise in the debt level.

Unfortunately, even though the low interest rate policy may play a significant role behind the sharp rise in the household debt level, the government's action in using the interest rate targeting method to reduce the mounting household debt may be inappropriate and harmful for the economy since it will bring about greater burden for the households in servicing their debt and as a result may cause a higher default rate. Hence, the policymakers should focus on other alternatives in controlling the debt level to avoid any serious economic consequences.
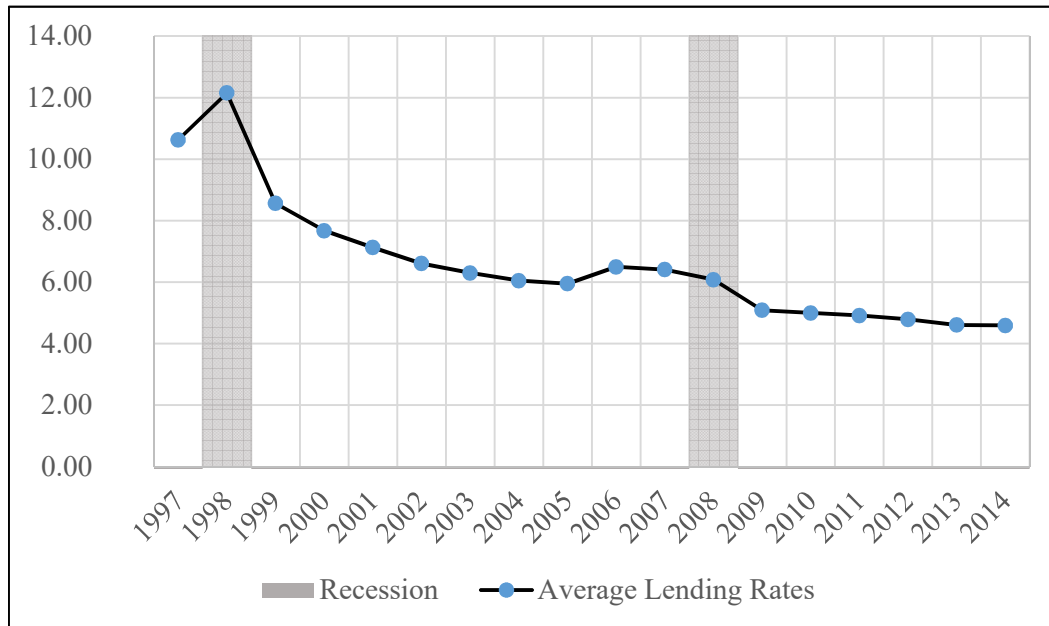
Figure 1.11
Malaysia average lending rates
Source: BNM Monthly Statistical Bulletin

1.2.3 Development in the housing market

The past decade has seen a significant rise in the amount of household debt in Malaysia dominated by mortgage debt. The rise in the demand for loans especially for mortgage has contributed to the rise in home ownership in Malaysia as shown in Table 1.1; with more than 75 percent of the Malaysian households own a house in 2014. Correspondingly, he availability of various government supports to help the society to own a house has have contributed to the rise in the demand for housing.

Table 1.1
Percentage of distribution of households by type of housing

Year	Type of housing		
	Owned	Rented	Others
2009	71.4	25.1	3.5
2012	74.5	20.2	5.3
2014	76.1	19	4.9

Source: Department of Statistics Malaysia (Household Income and Basic Amenities Survey Report 2014).

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There are various incentives provided by the government to fulfil the citizens' need to own a house. Firstly, in 2002, the government introduced the People's Housing Program (PHP) or also known as Program Perumahan Rakyat (PPR) to provide housing facilities for the poor population including the squatters. Under this program, two options are given for the households; whether they wish to purchase a low or average cost property or rent it at a lower rate. Secondly, with the aims to increase the homeownership among households in low and middle-income groups, the Malaysian government introduced My First Home Scheme (MFHS) and 1Malaysia Housing Program (PR1MA) in 2011 to help the society to afford buying their first house. Under this scheme, the buyers are eligible to get a full loan without having to prepare a down payment.

Thirdly, in 2015, the Youth Housing Scheme (YHS) has been introduced to assist the married couples with the age between 25 to 40 years old to purchase their first home. This scheme gives the opportunities for the borrowers to obtain full loans from Bank Simpanan Malaysia. Finally, in 2016, the Malaysian government has introduced MyDeposit scheme which aims to assist the low and middle-income households to prepare for the down payment in purchasing their first properties. Hence, the government incentive has indirectly resulted in a higher demand on houses and thereby triggered higher mortgage debt level.

Besides that, the significant increase in the housing prices in Malaysia since the past decade has also motivated the households to invest on properties with the expectation

to have a higher return in the future. In addition, as the asset price rises, households may use the opportunity to obtain additional borrowing by using the housing equity withdrawal. Hence, the hike in the housing prices helps to explain on why the mortgage debt has been rising and become the most preferable type of borrowing by the households. Despite the influence of rising house prices on household demand for loan, the positive development in the housing market may also attract the lenders to increase their supply of loans since this kind of lending is less risky for the banking sector because they can use the asset as collateral to recover the loan if the borrowers are unable to meet their financial obligations.

The trend in Malaysian housing prices as illustrated in Figure 1.12 supports that the housing prices has been escalating since the past decade and has been more alerting following the Global Financial Crisis. Despite the plunge in the housing prices experienced by the Unites States that triggered the crisis, the housing market in Malaysia still showing a positive improvement even though the presence of the crisis does give temporary effects on the housing prices in Malaysia. Hence, the government actions that corresponded to the crisis have helped the country to survive during the crisis.
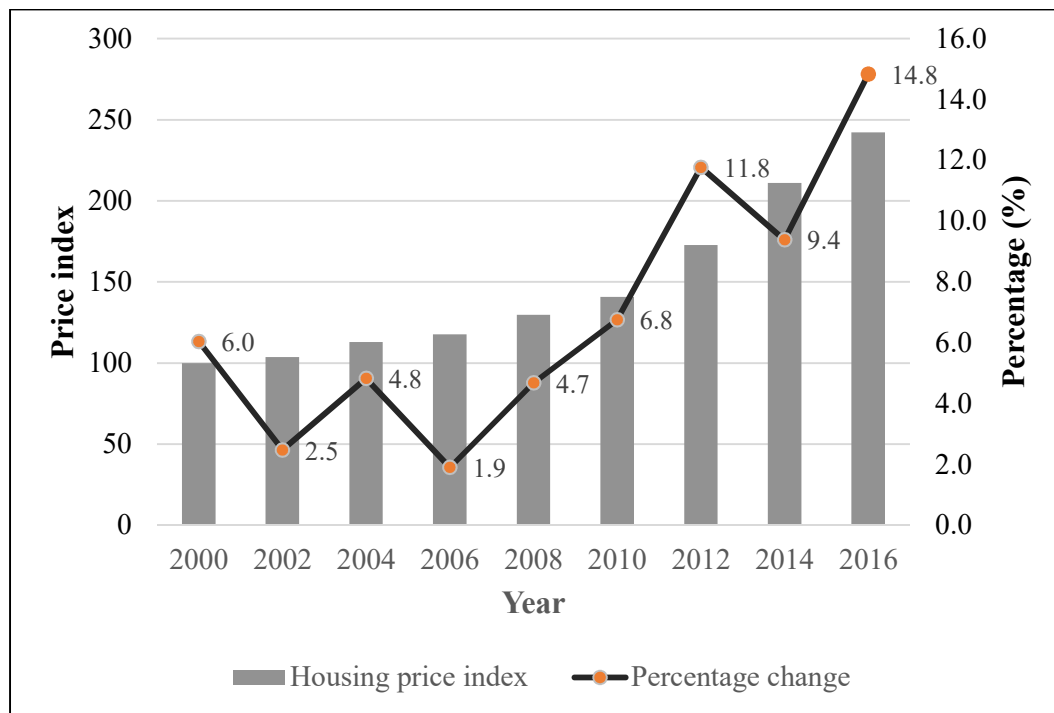
Figure 1.12
Malaysia housing price index and percentage change
Source: National Property Information Centre (NAPIC)

The significant rise in the housing prices was mainly in the urban areas such as Kuala Lumpur, Selangor, Johor Bharu and Penang which had shown a tremendous change. A survey conducted by Sime Darby Property Berhad has found that households must have approximately RM 14 580 monthly income in order to own a house in the Klang Valley (Sime Darby Property, 2014). Hence, the housing prices may play significant roles behind the mounting household debt in Malaysia since the rise in the housing prices has caused a higher burden for the households in housing services (Meng *et al.*, 2013; Meniago *et al.*, 2013; Iacoviello, 2004; Crook, 2001; Pollin, 1988).

Comparatively, Figure 1.13 demonstrates the housing prices in the four main cities in Malaysia, with the price in Johor Bharu has shown to be growing vastly in the recent years. It is also notable that the growth in housing prices in this state which was found to be relatively slower before the crisis, had changed rapidly after the financial crisis.

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On the other hand, the housing prices in Kuala Lumpur, Selangor and Penang which were positively growing before the crisis had eventually begun to shrink significantly during the crisis period except in Penang which only reduced slightly.
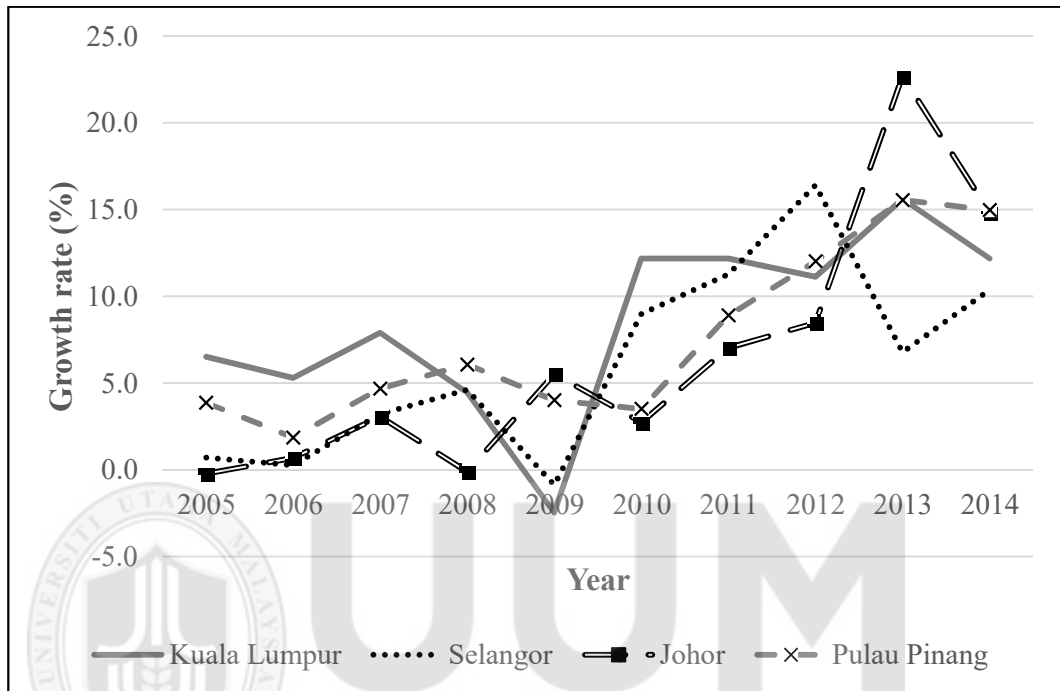
Figure 1.13
Growth of housing prices in big cities in Malaysia
Source: National Property Information Centre (NAPIC)

The trend in the housing prices suggests that the Global Financial Crisis that occurred due to the plunge in the U.S housing prices may have influenced the household behaviour in purchasing properties. Hence, this result may help to explain on why some of the households have started to shift to purchasing of non-residential properties. However, the government policy which follows with the recession period may have helped to build up the consumer confidence on the economy and thereby resulting in the housing prices to continue to rise tremendously following the crisis period.

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Consequently the rising of household debt associated with the high growth in housing prices has increased the risk of Malaysia to get caught in a credit bubble similar to what the United States had experienced in 2008 which had caused foreclosure and a collapse in major financial institutions such as the bankruptcy of the Lehman Brothers (Mian & Sufi, 2014). However, empirical studies which take into account the changes in the economic structure is very limited in the literature especially in Malaysia and hence should be given ample consideration in the study of household debt.

1.2.4   Cost of living in Malaysia

As discussed in Section 1.2, Malaysian households are found to be highly dependent on debt to finance their consumption (Bank Negara Malaysia, 2014). Even though the household income level has been rising, the income growth may not match up with the rising cost of living and thus households may have been using the debt as a form of income substitution. As shown in Figure 1.14, the price level in Malaysia has been climbing since the past decade with a significant rise in the food prices.

The substantial increase in the food price has contributed to a remarkable rise in the consumer prices since the food consumption is accounted for the highest weightage in the consumer price index as shown in Figure 1.15 due to its importance in household consumption (Brahmbhatt & Christiaensen, 2008). Consistently, Khazanah Research Institute (2016) in their analysis on household sector reveals that the food prices have been rising faster compared to the overall inflation; with the rise in the food at home prices has been found to be the main contributor to the rise in food prices.

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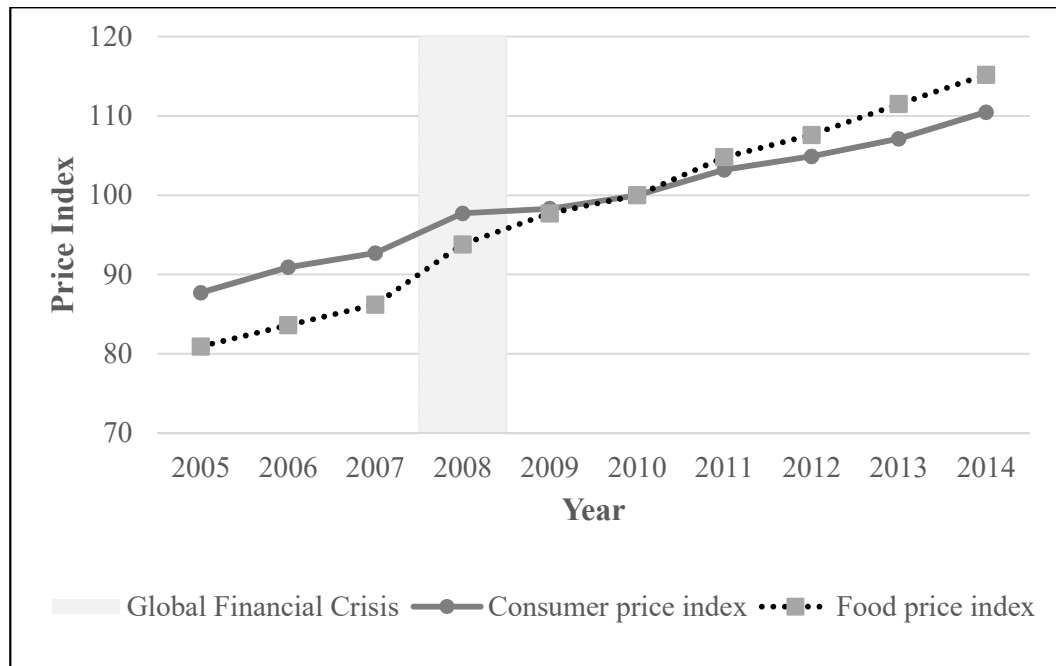
Figure 1.14
Malaysia Price Index (2005-2014)
Source: Department of Statistics Malaysia

Specifically, this study concludes that the rise in the food at home prices is driven by the sharp rise in the price of fish and seafood products and followed by dairy products and eggs, meat and also sugar and confectionery, which resulted in a higher cost of living since these products are basic necessities for the households. Correspondingly, the fish prices in Malaysia currently are believed to be the highest in the history (Hamid, 2016). In addition, although fishermen have received subsidy on diesel which could help to lower the transportation cost, however, it does not help to moderate the rise in the prices of seafood products.
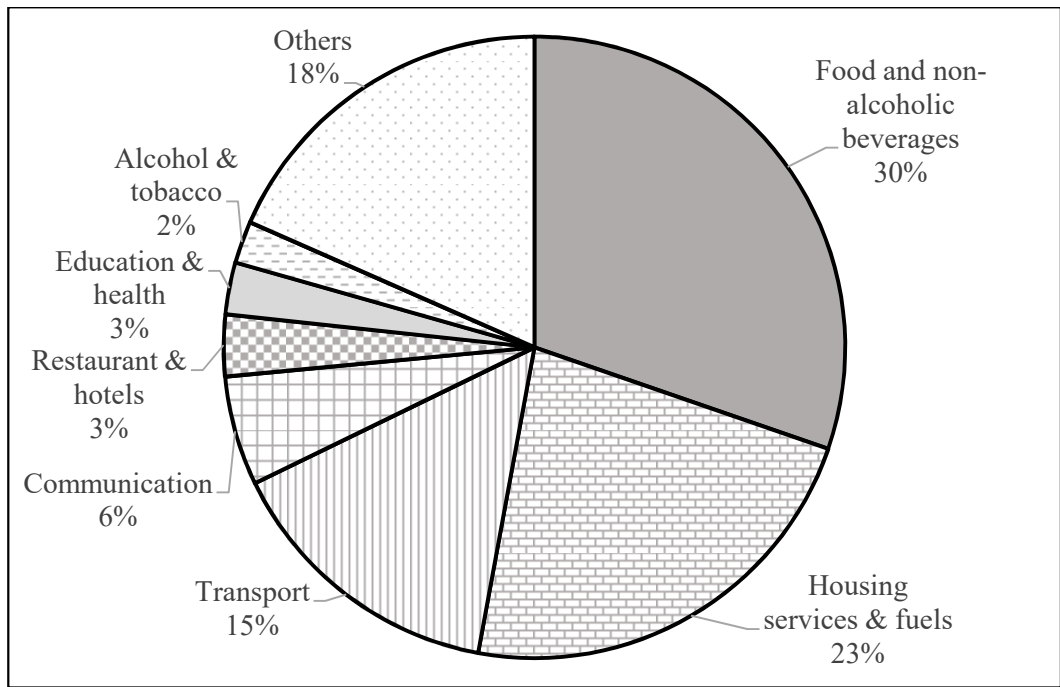
Figure 1.15
Weightage of Malaysia Consumer Price Index (2011-2014)
Source: Department of Statistics Malaysia
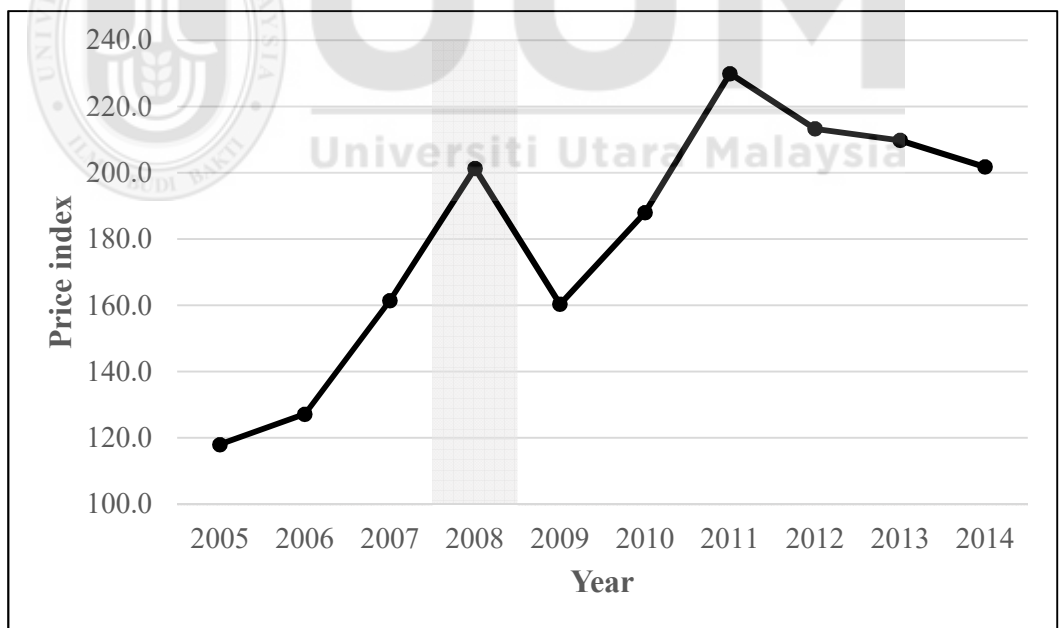
Figure 1.16
Global food price index
Source: Food and Agriculture Organization of the United Nations
Notes: 1) Malaysia food price index refers to the food and non-alcoholic beverages indicator in the consumer price index. 2) Global food price index consists of an average of five commodities (meat, dairy, cereals, vegetable oil and sugar)

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Besides that, evidence based on the global food price as depicted in Figure 1.16 also supports that the food prices have increased sharply for five main commodities namely meat, dairy products, cereals, vegetable oil and sugar. The rise in global food prices has resulted in a significant rise in Malaysia's food imports as it is found to increase by more than 100 percent between 2005 to 2015 (Khazanah Research Institute, 2016). Hence, the rise in food prices both locally and globally has contributed to a higher life burden for the households especially among the low and middle-income population and thereby affects their borrowing behavior.

In short, the cost of living in Malaysia rises significantly due to the rise in the food prices whereby this component accounts for the largest indicator in the consumer price index. In addition, even though the housing services represent the second largest contributor in the consumer price index, it is usually being included in the household debt model to capture the wealth effect. Hence, the use of food prices as a proxy for the cost of living is more appropriate in the study of household debt to avoid multicollinearity problem. Moreover, most of the studies on the impact of the cost of living on household debt have been carried out in a micro level study while there has been little discussion of this issue at the aggregate level and thereby will be addressed in this study.

1.2.5 Demographic transition in Malaysia

Malaysia has experienced significant changes in its demographic since independence due to prudent policy implementation aiming to achieve a sustainable development of the country. Following its independence in 1957, the Malaysian population has risen by fivefold from 6.3 million to 31.7 million people in 2016 and is projected to

continue growing to 41.5 million in 2040. However, Malaysia has been moving towards becoming an ageing country as it is supported by the old age population that has been rising due to the rise in life expectancy and the declining of the fertility rate.

As in 1957, there was 0.18 million of elderly population (2.9 percent of total population) and risen by tenfold to 1.8 million in 2016 (5.7 percent of the total population) with the old age dependency risen from 5.2 percent to 8.7 percent in six decades. On the other hand, although the number of young age population below 15 years old has also been rising which is 2.8 million in 1957 and risen to 7.8 million in 2016, the level of young dependency has been declining significantly since the past six decades from 82.1 percent to 35.3 percent. This is mainly due to a significant decline in fertility rate; from 6 children per woman in 1957 to only 2 children per woman in 2016 (Department of Statistics Malaysia, 2016).

Consistently, as argued by Hock and Weil (2012), the rise in old age dependency in a country will result to in declining fertility rate due to the response of the working population in order to reduce the burden that they face to support the elderly population and thereby explain why the young dependency has been declining. Given that the fertility level has been declining accompanied by a longer life expectancy, this has resulted in a decline of young age dependency level while the old age dependency has continued to rise in the economy. Unfortunately, the issue of household dependency mainly on the roles of aging population has been challenging for the country since it could trigger various economic and social implications.

The rise in dependency level may not only increase the economic burden of the working population but also increase the government expenditure to support the young and old age population through various government incentives. Findings of the past studies have supported that the rise in young and old age dependency has caused a decline in savings rate due to the rise in burden of the working population (Higgins & Williamson, 1997; Mason, 1988; Fry & Mason, 1982).

By looking at the Malaysia case, since the household debt in the country has been growing significantly, hence, the roles of demographic transition experienced by the country may have a significant influence on the household borrowing activities. In particular, greater emphasis should be given on the roles of household dependency mainly on the effects of aging population since this issue has previously not given ample consideration on the study of household debt. Hence, the roles of young and old age dependency should be examined separately in the household debt model since it may reveal a different story.

The investigation on the roles of household dependency is also useful to capture the roles of household size which been studied in a micro level study. Evidence from the past studies which includes the number of children as a proxy for household size has found that households with bigger family size will have a greater debt level since more resources are needed to sustain the consumption level (Beer & Schürz, 2007; Crook, 2001; Cox & Jappelli, 1993; Duca & Rosenthal, 1993; Lea *et al.*, 1993; Bryant & Wang, 1990; Sullivan & Worden, 1986; Tobin, 1967; Enthoven, 1957). Moreover, in this new era with a higher percentage of women enrols in the labour market, households may need to spend more money for childcare services and thereby

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increase their spending. However, study conducted by Livingstone and Lunt (1992) in the United Kingdom argues that a bigger household size does not influence the household debt due to budgeting strategies adopted by households to maintain the spending level.

Evidence based on the Malaysia Household Expenditure Survey depicted in Figure 1.17 has shown a positive relationship between household size and monthly expenditure but the positive effect is only noticeable up to five persons. Although the average household size in Malaysia has been decreasing with average 4.6 persons in year 2000 and decline to 4.1 person in 2016, however, the household debt accumulation in Malaysia keep rising continuously which indirectly suggest that the effects of household size may have an ambiguous effect on the household debt level. Hence, extending this factor to a macro level study is useful to identify the aggregate effects of household size on the debt level.

Besides that, despite the influence of children on household consumption function, household expenditure may also rise due to their responsibility to support their parents' consumption. For instance, evidence based on a study conducted by Greenhalgh-Stanley and Rohlin (2013) discovers that the bankruptcy filings among older population in the United States increases by 150 percent from 1991 to 2007 with a rising health care cost as one of the leading factors. This has indirectly increased the burden of the older population especially for those with higher life expectancy since a pension received by them upon retirement is usually flat thereby increases their dependency on children and the government to support their life.
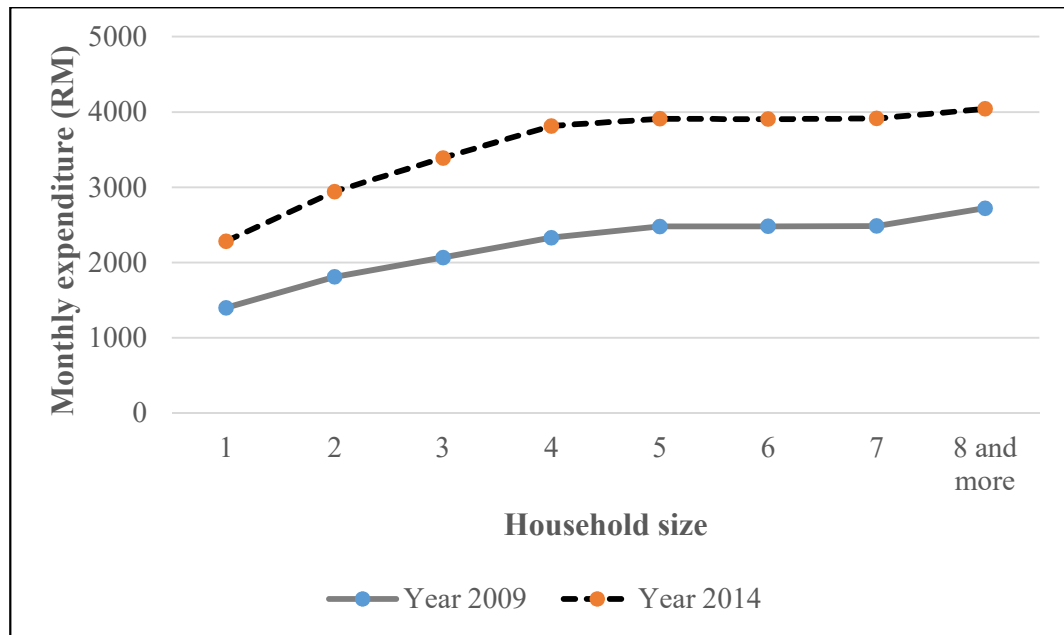
Figure 1.17
Average household monthly expenditure based on the household size
Source: Department of Statistics Malaysia (Report on Household Expenditure
Survey 2014)

Consistently, a study conducted by Mok, Gan, and Sanyal (2007) in Malaysia also argues that the old age population mainly those living in the urban area are likely to fall into poverty due to a higher cost of living. Hence, the issue of aging population can be seen as a serious concern in Malaysia since the demographic transition has been moving towards the old age population. Thus, the investigation on the effects of old age dependency on the household debt may reveal interesting information for policy implications.

The roles of household dependency as measured by the young and old age dependency may have a significant influence on the debt since it raises the burden of the working population. So far, the roles of dependency level have only been examined in the study of household savings behaviour while its effects on household debt are yet to be explored. Besides that, the inclusion of the roles of young age

dependency is useful to capture the effects of household size which so far have only been examined at a micro level study.

On top of that, incorporating the roles of old age dependency in the household debt model will also enable the study to investigate the effects of aging population since the demographic transition in Malaysia supported that this country has been moving towards becoming an aging country. Hence, the investigation on how far the changes in the young and old age dependency have affected the household debt and its composition in Malaysia is crucial for policy implications and thereby become the motivation for this present study.

1.2.6   Structural breaks in Malaysia

As discussed in Section 1.2, the household debt has been growing excessively in the country with the changes in the structure of the economy have been found to give a significant influence on the household debt trend. As supported by Perron (1989), the roles of structural break in the econometric modeling is necessary since the failure to take into account of its presence may lead to a misleading result of the analysis. Hence, the investigation of the reasons behind the rising household debt should take into account the structural breaks that take place in the country in order to determine how far the economic transition has affected the household debt.

So far, since the past decade, the most significance changes that occurred in the economy is the presence of the Global Financial Crisis in 2008 (Economic Planning Unit, 2010). Based on the household debt data presented in Section 1.2, the trend in Malaysian household debt has been found to rise significantly following the Global

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Financial Crisis in 2008. In addition, the household debt composition has also shifted with the mortgage debt found to be rising after the crisis with the rise in the purchase of non-residential properties. On the other hand, the level of consumer debt too has been found to be declining during the post crisis period which suggests that the presence of the crisis has affected the household borrowing behaviour. Hence, the structural break that occurred in the economy has eventually affected the borrowers and lenders behaviour in the credit market.

Since the empirical study on household debt which includes the roles of structural break in the analysis has been given less attention in the past, therefore, this issue should be addressed accordingly to avoid from spurious estimation. In particular, the determination of the break date endogenously by the model is useful to identify the economic phenomenon that occurs during the period which has a significant influence on the household borrowing behaviour.

1.3   Problem Statement

The past decades have witnessed a rapid growth in the household debt in Malaysia which is among the highest in the developing and Asian countries and at par with the developed nations (Bank Negara Malaysia, 2014). Although household debt is necessary for the economy to grow through its influence on the aggregate demand, however, high debt level if not associated with growth in income and productivity will be harmful for the economy since it could drag the country into a recession.

One good example on the negative consequences of high household debt is the U.S Great Recession. As argued by Mian and Sufi (2014) in their book "House of Debt",

the Global Financial Crisis which started in the United States was caused by a high level of household debt in that country that reached nearly 100% of GDP. Hence, this incident has served as a reminder for other countries on the negative consequences of high household debt. Correspondingly, with the trend of the household debt has been found to grow excessively following the Global Financial Crisis, the literature on the issue of household debt in developing countries has started to grow as the countries are becoming more concerned on its social and economic implications.

Looking at Malaysia, the household debt in the country has been rising significantly following the Global Financial Crisis, with the growth of the debt is found to grow faster than the growth in GDP in which implying that a rapid rise in the debt level has hindered the nation economic performance. In addition, there is also a significant rise in the personal bankruptcy in Malaysia mainly among households in the prime working age who are usually expected to have a stable income due to greater experiences in the labour market (Malaysian Department of Insolvency, 2013). Hence, the investigation on the prominent factors contributing to the mounting household debt in Malaysia is vital for a policy formulation to maintain the economic stability of the country and helps in realizing the nation economic goals.

As discussed in the previous section, even though most of past studies have highlighted the roles of income level, interest rate and housing prices as prominent factors contributing to large household debt, these factors could not solely be used to explain the significant rise in the debt level and thereby calls upon for further investigation to identify the factors. Firstly, even though the household income level has been rising, the income growth may not match up with the rising cost of living

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and as a result, household debt may grow excessively since households may regard the debt as a wage substitution (Zakaria *et al.*, 2012; Weller, 2007). Seemingly, the price level in Malaysia has been climbing continuously since the past decade with a significant rise in the food prices which mostly will affect the low and middle income population (Food & Agriculture Organization of the United Nations, 2015; Department of Statistics Malaysia, 2014).

The substantial increase in the food prices has contributed to a remarkable rise in the consumer prices since the food consumption has the highest weightage in the consumer price index due to its importance on household consumption and thus gives more influence on the cost of living (Brahmbhatt & Christiaensen, 2008). The use of the food prices as the measure of cost of living may be more suitable in the study of household debt to avoid multicollinearity problems since the use of consumer price index as the measure of cost of living in past studies may correlate with the housing prices which usually included in the model to capture the wealth effect.

Secondly, past studies conducted at the micro level have also highlighted the roles of household size in influencing the debt level. In this new era with a higher percentage of women enrolls in the labour market, households may need to spend more for childcare services and thereby increase their spending level. With the ambiguous effects of household size found in the literature, further investigation at the macro level is beneficial to determine the aggregate effect of household size since none of the previous studies have attempted to investigate this factor from a macroeconomic perspective by using the young age dependency as the proxy.

Besides that, since Malaysia is moving towards becoming an aging country, the role of old age dependency is also important in the household debt model since it will affect the household borrowing behaviour mainly among the working population. It can be expected that an increase in the young and old age dependency may result in a higher household debt due to the rising burden on the working population to support their children and parents' consumption but this issue has not been given ample consideration in the past studies and thereby this study will help to fill in the gap.

Finally, since the trend in the household debt composition has shifted significantly following the Global Financial Crisis, hence, the presence of structural breaks in the time series analysis should be addressed accordingly to avoid from spurious estimation. As supported by Perron (1989), the roles of structural break in the econometric modeling is necessary to avoid a misleading result. Unfortunately, empirical studies on household debt composition which take into account the roles of structural breaks are only a handful, especially in Malaysia and hence the inclusion of this factor is useful to determine how far the economic transition has affected the household debt model.

1.4   Research Questions

Although most of the past studies supported the importance of income level, interest rate and housing prices in explaining the rise in household debt across countries, however, evidence has shown that it could not solely be used to explain the reasons behind the bulk of household debt in Malaysia. Hence, in order to answer the problem statement which has been highlighted in the previous section, therefore, the following research questions are developed:

1)   What is the impact of the cost of living on the household debt and its
        composition?

2)   Does the change in young and old age dependency affect the household debt
        and its composition?

3)   How much will the household debt and its composition adjust when a state of
        disequilibrium exists in the model?

4)   How far the structural breaks that occur in the economy will affect the
        household debt model?

1.5   Research Objectives

This study aims to investigate the determinants of household debt composition in
Malaysia by using an economic modeling which includes the roles of structural break
in the analysis. In addition, greater emphasis will be given on the roles of the cost of
living and household dependency on the household borrowing activities. The specific
objectives for this study are as follows:

1)   To investigate the impact of the cost of living on the household debt and its
        composition.

2)   To examine the effects of young and old age dependency on the household
        debt and its composition.

3)   To estimate the speed of adjustment of the household debt and its composition
        when a state of disequilibrium occurs in the model.

4)   To evaluate the effect of structural breaks on the household debt model.

1.6 Significance of the Study

This study intends to contribute on the study of household debt by investigating the reasons behind the highly growing of household debt from a macroeconomic perspective. Basically, this study is motivated to extend the investigation of the factors which particularly been examined in a micro level study to a broader perspective in order to examine the effects at an aggregate level. In addition, the roles of structural breaks such as the presence of financial crisis will be included in the analysis to capture the roles of structural break in the model in order to provide a more comprehensive analysis and thereby ensure the robustness of the econometric analysis.

Since a country level analysis on the issues of household debt is very limited among the developing countries, hence, this study focuses on Malaysia as the case study since its household debt is among the highest in the developing and also in the Asian countries with the current debt level is at par with the developed countries. The findings obtained from this study can reveal interesting information from a policy perspective and thereby may provide a guideline for the policymakers in designing an effective policy to control the debt level in order to meet the country vision towards becoming a high-income country.

Insights from this study can also provide financial education to the society and help the banking and financial sectors in their lending decisions. The outcome of this study is also expected to contribute to the enhancement of knowledge related to theories by producing a research framework on the study of household debt and it benefited the

academicians and researchers by providing a platform for future investigation and opens more room for discussion on the issues highlighted.

1.7 Scope and Limitations of the Study

The focus of this study is to investigate the reasons behind the mounting household debt in Malaysia. This study utilizes quarterly time series data from Q1:1999 to Q4:2015 which covers the period of Global Financial Crisis and thus can be used to examine the effect of structural breaks on the household debt model. This will enable the study to determine on how far the changes in the structure of the economy has influenced the debt model.

The dependent variable in this study is household debt and its composition which consists of mortgage debt and consumer debt. This division is useful to isolate the effects of the factors examined in the model since both types of debt differ in terms of its risk and maturity period and hence may provide a different outcome. There are six independent variables in this study which cover the economics and demographic factors namely the income level, interest rates, housing prices, food prices and also the young and old age dependency.

In determining the effect of structural breaks on the household debt model, two dummy variables will be included to capture the role of structural break in the analysis whereby the break date will be determined endogenously by the model. This is due to the failure to take into account the presence of structural break in the analysis thus may result in a wrong economic interpretation (Perron, 1989). The data for this study will be collected from various sources which include the Department of

Statistics Malaysia, Economic Planning Unit (EPU), Bank Negara Malaysia (BNM) statistics and National Property Information Center (NAPIC).

Based on the previous literature related to the determinants of household debt, the roles of the cost of living have mostly been examined at the micro level study. Hence, a further investigation based on a broader perspective is useful to determine the effects at the aggregate level and can provide a greater insight in the policy response from the macroeconomic perspective. Correspondingly, this study includes food prices in the analysis in order to determine how far the change in cost of living has influenced the household borrowing behaviour.

Seemingly, the food prices have been growing significantly and thereby affect the low and middle-income population the most. Even though the consumer price index has normally been used to capture the cost of living, however, the changes in the price index has mostly been affected by the change in the food prices since it has the highest weightage in the price index (Brahmbhatt & Christiaensen, 2008). Moreover, the use of the food prices as a proxy for the cost of living is suitable in the study of household debt since the overall consumer price may be correlated with the housing prices variables that usually included in the debt model to capture the wealth effect.

Besides that, the inclusion of the young age dependency in the household debt model is useful to capture the roles of household size. So far, this factor has only been examined in a micro level study by using the number of children as the proxy and none of the past studies have attempted to extend the analysis to a broader level. With the mixed results found in the micro level analysis, the extension of the variable in a

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macro level analysis is practical to determine the aggregate effect of the variable and thereby provide significant contribution on a study of household debt. Besides that, since Malaysia is moving towards an aging country, the inclusion of the old age dependency in the analysis will enable this study to discover on how far the demographic transition has influenced the household borrowing behaviour.

There are a few limitations in this study. First, there are limitations in the data availability. The quarterly data of the housing price index only available since 1999 and thus has been chosen as the starting period for this study. Second, this study focuses on the investigation at the macro level. This is due to the reasons that analysis based on micro data may not able to identify a certain situation that occurs in the economy and thus requires an analysis from the macroeconomic perspective (Weil, 1994). A micro level data may have some weaknesses such as reporting problems and thereby the outcome of the analysis may be influenced by the current economic situation and cannot be used for long term economic planning. Thus, a study on the aggregate level may be more useful since it can be used for comparison among countries (Caju, Roelandt, Nieuwenhuyze, & Zachary, 2014).

Thirdly, the household debt used in this study does not account for the student loan which is usually counted as part of the consumer debt. This type of borrowing is usually offered by separate bodies such as Perbadanan Tabung Pendidikan Tinggi Nasional (PTPTN) and Majlis Amanah Rakyat (MARA) and there are limitations in obtaining the data especially on quarterly data and thereby has been excluded from this study to avoid misleading information.

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Finally, this present study only focuses on the demand side factor in investigating the reasons behind the rise in household debt and its composition since it has been found to have a dominant effect on the household debt model. As supported by Paradiso *et al.* (2014), the demand side factors have a greater influence on the debt than the supply side factors which postulated that the variation in the debt can mainly be explained by the household demand.

1.8   Organization of the Thesis

The plan for this study is as follows. In Chapter 1, the background, issues and the direction of the study will be discussed extensively. In Chapter 2, the whole review on the theoretical and empirical study related to the determinants of household debt will be presented. In Chapter 3, this study will explain the methodology used in conducting the research while Chapter 4 will discuss on the findings of this study. Finally, the main conclusion of this study together with the policy implications and recommendation on future research will be presented in Chapter 5.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

As highlighted in the previous chapter, the issues of household debt have become a major concern among economists and policymakers across countries since it can affect economic stability in a long run and may bring to its vulnerabilities. The high debt accumulation may increase the threat to household financial position since the households will become more sensitive to negative shocks that occur in the economy such as the shocks in income and interest rates (Dynan & Kohn, 2007; Debelle, 2004; Carroll & Dunn, 1997). Therefore, understanding the reasons behind the rising household debt is crucial for policy formulation in order to prevent any financial instability.

This chapter reviews the theoretical and empirical studies of household debt. Section 2.2 discusses on the theoretical underpinnings of the household debt follows by Section 2.3 which focuses on the discussion of the empirical studies of household debt and next is the review of the potential determinants of household debt in both developed and developing countries in Section 2.4. Finally, the research gap and conclusion for this chapter is discussed in Section 2.5 and Section 2.6 respectively.

2.2 Theoretical Underpinnings

This section discusses on the theoretical underpinning of the study of household debt. As highlighted by Lunt and Livingstone (1991), theories which have been discussed in the study of savings behaviour are applicable in the study of household debt since

the concept of savings is opposite to the concept of debt. Thus, the theories can be used interchangeable in the study of savings and debts.

The most prominent theory on the study of household debt is based on the neoclassical theory which assumes consumers are rational and forward looking. Two main popular theories are the Life Cycle Model (LCM), developed by Modigliani and Brumberg (1954) which later was revised by Ando and Modigliani (1963) and Permanent Income Hypothesis (PIH) proposed by Friedman (1957) which assumes that households are rational and thereby will choose to smooth their consumption over time based on their expected lifetime income (Jappelli, 2005).

According to the Life Cycle Model, household debt will be higher for individuals in the early working period since they will borrow against future income to finance current consumption which normally exceeds their current income. This is due to higher consumption in starting a career and family life such as purchasing a car, house and other personal expenses and thereby the gap is financed through borrowing. In the midst of working period, households may experience a positive income growth due to an increase in their skills, knowledge and experiences and indirectly able to enjoy a positive net worth. During this period, households will start saving for their retirement and finally will choose to dissave during retirement in order to finance their consumption activities since they will experience a significant reduction in income level during retirement. Therefore, the age structure is found to have a significant role in this theory since it can be used as a proxy for life cycle (Browning, Deaton, & Irish, 1985).

Apart from that, this theory is based on the intertemporal choice whereby household consumption is based on two-time periods (present and future time) and thus there is a trade-off between current and future consumption. The households may increase their borrowing if current consumption is preferred than the future consumption and will repay their debt in the future. In addition, the households too will choose to opt for a loan in order to smooth their consumption especially in purchasing commodities that are long lasting that may not be affordable by the households using their current income and savings. Therefore, households will choose to maximize their utility by smoothing their consumption over time which depends on their lifetime income including the initial and future wealth and the level of interest rates.

Consistently, a study conducted by Tobin (1957) supports that household consumption is determined by the income accumulated by the households over a life cycle and not by the current income level. Therefore, households may choose to engage in borrowing activities in order to finance their consumption during the low-income period and start saving money when their income level is higher. However, due to the behaviour of the banking sector of reducing the risk of default payment, they will normally use the household current income as the indicator in approving loans since it may effectively show the ability of the borrower to repay the debt. Thus, consumption will be greatly influenced by the current income level (Deaton, 1997).

Besides that, the interest rate also plays a significant role on household borrowing activities. If the level of interest rate is expected to rise, it will reduce the present value of future consumption and thereby encourages the households to borrow in the present time due to a cheaper cost of borrowing. Additionally, household wealth also

plays a significant role in this model, which is normally in the form of asset prices. As the asset price rises, households may expect a positive future income and thus may be encourage to top up their borrowing to increase the consumption in the current period. Hence, it can be concluded that the household incomes, interest rates and asset prices have significant roles in influencing the household debt level in the Life Cycle Model.

On the other hand, Friedman (1957) considers an infinite-lived household in discussing the household behaviour when their income fluctuates over time. He divides the income into two types which are the permanent and transitory income whereby the former is based on household wages or the expected average future income while the latter refers to random fluctuations in the average income earned by the households such as a lucky draw, bonus, incentive and others.

In addition, he argues that permanent consumption is proportionated to the permanent income and claims that households will use credit facilities as an alternative to smooth their consumption level during the period where there is a temporary shock in the household income level and thus this theory complements the Life Cycle Model. Although both theories are generally similar, they differ in terms of the time period whereby Life Cycle Model is based on a finite lifetime while Permanent Income Hypothesis postulates an infinite time horizon.

On the other hand, the neoclassical theory contradicts with the classical economic theory which predicts that consumer behaviour is irrational. The most popular classical economic theory is the Absolute Income Hypothesis proposed by Keynes (1936) which predicts that household consumption is determined by their current

disposable income whereby the marginal propensity to consume rises as the income level rises. This theory assumes that household behaviour is irrational and thereby unable to predict their future income expectation. Therefore, this theory suggests that household consumption is a function of current income rather than the future income expectation (Wessels, 2006).

According to Keynes (1936), household income is the sum of household consumption and savings whereby the part of income that is not consumed will be saved. When consumption level exceeds the income, therefore, the level of household saving is negative since households will use their saving and wealth to support the high consumption level. This impliedly explains the reasons behind growing household debts whereby households choose to go in with debts or borrow money from the financial intermediaries in order to smooth their consumption over time (Durkin, 2000).

2.3 Empirical Studies of Household Debt

Household debt refers to the amount of money that individuals owe from the banking and financial sectors in the form of loans. According to Bank Negara Malaysia (2013), household debt consists of loans for properties, personal use, credit cards, hire and purchase loans, loans for securities and others and thereby can be divided into two types; which are the secured and unsecured debt.

A secured debt or also refers to mortgage debt is a long-term debt whereby households use this type of borrowing in order to purchase properties such as houses or use their assets for refinancing purposes and thereby are less risky for the banking

sector since they can sell the asset to recover the debt if the borrower unable to meet their financial obligations. Apparently, more than half of the total household debts in countries all around the world have been in the form of mortgage debt (Pearce, 1985).

Besides that, Andersson and Mayock (2015) define the mortgage debt as a sum of outstanding balance on mortgages which includes the home equity loan (HELOANs) and home equity lines of credit (HELOCs) while Brown and Gray (2016) define the secured debt as a loan which is secured by the collateral with the other remaining debts that represent the unsecured debt. Similarly, based on a study conducted by Justiniano, Primiceri, and Tambalotti (2015) in the United States, mortgage refers to the residential properties held by the households and non-profit organizations which represent almost 70 percent of the total household debt. Similarly, the mortgage debt has been found to be the dominant type of debts in the European countries (Aristei & Gallo, 2016).

On the other hand, consumer debt refers to household instalment and non-instalment debts which exclude the mortgage debt (Sau, 1987). In addition, according to Kim (2015), consumer debt refers to loans made by the households to finance the purchase of automobiles, personal needs, credit cards and other reasons including for medical expenses and vacations. Usually, this type of debt refers to a loan which is not pledge by assets as collateral (Lotz & Zhang, 2015).

Consumer debt can also be regarded as a short-term debt since its maturity period is normally less than 10 years and riskier for the banking sector since it is not securitized and normally been used to finance the household personal consumption including the

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credit card debt. The debt servicing for consumer debt is normally higher than the mortgage debt due to the former which has a shorter maturity period. Therefore, the banking sector may be more selective in approving this type of loan by doing a background check on the borrower and charging a higher interest rate especially on the borrower with bad credit ratings in order to reduce the risk of default payment.

Seemingly, even though the rise in the household debt can boost the economy through its impact on aggregate demand, this may only give benefits to the economy in the short term since a high level of debt accumulation may lead the households to adjust their consumption in the future to service their debt. Continuous increase in the household debt will also become a threat to the financial stability of a country as it might cause an exposure to a greater risk (Chmelar, 2013; Gartner, 2013; Meng *et al.*, 2013; Hamilton, 2003).

Consistently, Mian and Sufi (2014) in their book House of Debt mention that the U.S Great Recession which began in 2007 was caused by a high level of household debt that reached nearly 100% of GDP. During this period, the unemployment rate increased sharply and led to a decline in consumer demand while the asset prices especially for housing reduced significantly and caused a rise to default payment. This incident has given a negative impact on other countries all over the world and caused the global financial crisis in 2008 since most countries are interconnected with the U.S economy (Meniago *et al.*, 2013).

Besides that, in a study conducted by Bezemer, Grydaki, and Zhang (2016) based on data of 46 economies concludes that the household debt will exert a negative

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influence on the growth level. This finding suggests that financial development will not always be useful for the economy since a high debt level will eventually give negative impact to the nation economic performance and eventually may trigger the recession.

Consistently, based on Granger causality test, Puente-Ajovín and Sanso-Navarro (2015) support that high household debt will cause a slower growth. As a result, the government action in stimulating the economic growth should avoid using the credit market to influence the rise of the aggregate demand since it will bring a greater threat to the economy. In addition, since majority of the households has been found to carry a high debt level accompanied with a little savings in their balance sheet, the presence of negative shock in the economy will make the households become more vulnerable and thereby give a greater risk to the economic stability of a country (Brown & Gray, 2016).

Previous studies have shown that there are many alternatives in measuring household indebtedness which includes total household debt, growth rate of household debt, debt service ratio or debt to income ratio. A study carried out by Jacobsen and Naug (2004) in Norway using the flexible dynamic model, has used growth rate of household domestic gross debt as the indicator to measure household debt. Since household debt is normally dominated by the mortgage debt, therefore, the used of household debt growth may not be able to explain how far the factors that being examined will affect the debt level according to the types of debt.

On the other hand, in an attempt to investigate the reason behind household indebtedness which includes demographic, institutional, economic and psychological aspects, Stone and Maury (2006) conducted a survey among Air Force personnel due to high level of personal debt among the members of military services. A logit model has been formulated by using the unsecured personal debt as the dependent variable which consists of credit card debt and education loans. However, this indicator may not be the best in explaining the actual reasons behind the rising of household debt since it excludes the role of mortgage and automobile debts which accounted for as the largest type of debts in the household balance sheet (Pearce, 1985).

Despite that, based on a data from the Survey of Consumer Finance (SCF), Dynan and Kohn (2007) employed a simple model of household behaviour in order to investigate the reasons behind the rise in household indebtedness in the United States. The household debt is measured in terms of debt-to-income ratio as the dependent variable of the study. However, this study only used statistical summary, graphical methods and simple regression in order to identify the relationship. Due to low level of income and high level of liabilities, this study uses median regression estimation in order to reduce the outliers' problem. However, the measurement of household debt in this study may be less appropriate since the income level has been used as the denominator which could be affected greatly by the economic condition.

On the other hand, the same type of study had been conducted in the U.S by using the quarterly data to measure the household debt by using debt service ratio and financial obligations ratio as the dependent variables to further explore the relationship. Due to time trend and seasonality problems which normally occur in time series data,

therefore, this study used four period lagged values of the explanatory variables since they claimed that it may take some time for the household debt to respond to the changes in the independent variables (Turinetti & Zhuang, 2011). However, the measurement of the household debt may be biased in explaining the reasons behind the rising debt level since the indicator will be greatly influenced when the income level changes.

Additionally, a study done by Kim (2011) who examines the relationship between household debt and aggregate income measures the dependent variable based on the growth rate of household debt and includes different types of household debt in order to investigate how the results might differ according to the types of debt. The analysis based on Vector Error Correction Model (VECM) approach reveals that there is a negative relationship between various measures of household debt and the output level. However, this study has failed to address the changes in the economic structure since the debt level may be affected when there is a change in the economic structure such as in the event of crisis.

Even though some of the previous research have found that the rise in household debt is due to housing market, this may only show that mortgage debt is one of the preferred type of debts whereby the amount is usually higher (Dynan & Kohn, 2007). Alternatively, Meniago *et al.* (2013) who explore the factors influencing household debt in South Africa based on quarterly data over the period 1985 to 2012, have used natural logarithm of real household debt as the dependent variable. Since all the variables are used in the form of natural logarithm, therefore, the results obtained are in the form of elasticity. However, the separation of household debt according to debt

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composition may be significantly useful for the analysis since households may act differently on different types of debt since the maturity period and risk associated are differ according to types of debt.

On the contrary, a research conducted by Meng *et al.* (2013) has considered both demand and supply side in analyzing the determinants of household debt in Australia. By using quarterly time series data, this study has used nominal data because it claims that the transformation of the variable in terms of real values may lead to even larger problems in the measurement. This study also suggests that the gearing ratio is not a good indicator to measure the household debt problem since it is not relevant for the society to pay back their mortgage loan by selling the property. However, results obtained in this study may be biased since the household debt is measured in terms of nominal values while some of the independent variables are based on the percentage and hence may influence the rise of auto-correlation problems.

A recent study conducted by Moroke (2014) who focuses in examining the relationship between the U.S household debt and macroeconomic determinants has used cointegration and VECM approach in his analysis. This study uses household debt ratio as the dependent variable which is calculated based on the real values in order to adjust to the inflation. The period chosen for the study is 1990 to 2013 in order to include the period of U.S financial crisis. However, this study has failed to explain on how the results might differ as the financial crisis had occurred. This is due to the fact that the presence of the crisis will eventually affect the household and the banking sector behaviour in the borrowing and lending activities. Therefore, the

inclusion of the roles of economic condition in the study of household debt is necessary to avoid from biased estimation.

In the Malaysian context, Endut and Hua (2009) in their study based on the data from the 2000 to 2007 have analyzed the household debt in Malaysia in terms of the composition of debt. By using debts to disposable income as the measures of household indebtedness, this study suggests that the Malaysian households are becoming more sensitive to shock in interest rates, income and asset prices. However, this study is only based on graphical analysis and not rooted to an empirical analysis.

On the other hand, Abdul Ghani (2010) has used household non-performing loans as the dependent variable since this study focuses on the financial stability aspect. The result shows that there is a significantly positive relationship between household non-performing loans and household indebtedness. However, the study of household debt may not be accurate if it is based on non-performing loans since it only measures the amount of loan defaulted by the borrower and not the total outstanding debt in the economy.

On the contrary, a study conducted using VECM approach is used to examine the household indebtedness in Malaysia from the perspective of consumers and their behaviour towards Islamic financing. In order to achieve a stationarity in variance, this study measures household debt by using natural logarithm of household debt and thereby may help to overcome the heteroskedasticity problem (Mokhtar & Ismail, 2013). Consistently, a similar indicator has been used in a study carried out by Rahman and Masih (2014) in Malaysia.

As a conclusion, all the previous studies have shown that there were many indicators to measure household debt either in terms of real value, growth rate or in ratio. Since the usage of real data may lead to a problem in the econometric estimation, therefore, it can be concluded that the measurement in terms of logarithm is more appropriate since it could help to reduce the problem of unequal variance in the estimation and thus may provide more accurate results. Apart from that, the division of the household debt according to the types of debt may be useful for the analysis in order to identify on how far the factors examined might differ when different types of debt are used as the dependent variable.

2.4 Determinants of Household Debt

This section discusses the empirical studies of household debt in developed and developing countries which covers the economics, demographic and the environmental aspects.

2.4.1 Income

Income level is found to play an important role in explaining the variations in the household debt. Higher income is normally associated with higher consumption level since more money could be spent in the economy. Households with higher income will be able to take higher amount of loan due to their ability to service a higher debt level. Therefore, most of the past studies have included income as one of the explanatory variables which can explain the rise in the household debt.

From the theoretical aspect, the consumption function introduced by Keynes (1936) suggests that consumption is positively related to income. If consumption is higher than income level, the gap will be financed through the household borrowing activities. In addition, according to the Life Cycle Model, households will smooth their consumption over time and thereby choose to save when their income is high and dissave when the income level is relatively low. Due to the expectation of the individuals that their income will increase in the future, therefore, households will choose to borrow money in order to finance their current spending at the expense of the future income and could be used to explain the growth in household debt level (Modigliani & Brumberg, 1954).

Most of the past studies have suggested that household debt has a positive relationship with the income level whereby as income level rises, the amount of debt level will also rise (Hofmann, 2004; Calza, Gartner, & Sousa, 2003; Crook, 2001). This is due to higher income and wealth increase debt limits for the households and thereby may indirectly increase the demand for loans (Duca & Rosenthal, 1993).

Evidence from the study conducted in the developed countries reveals that the income level has a positive influence on the household debt although some studies have found it to be a negative, while some found that there is no significant impact of income level on the debt level. For instance, evidence from the British Household Panel Survey for 1995 and 2000 using Probit regression supports that income level is the most important factor which exerted a positive influence on the level of unsecured debt (del Río & Young, 2006).

On the contrary, Livingstone and Lunt (1992) in their study of personal debt in the United Kingdom, using discriminant function analysis and multiple regression analysis have found that household disposable income does not influence household indebtedness but it may affect the debt level through its impact on personal savings. Additionally, this study suggests that individuals with greater number of debt will eventually give a greater impact on the household debt level. However, this finding may be biased since it only considers the number of debt taken and not the amount of loan made and thereby may not measure the actual debt burden in the economy.

Based on two-period model of consumption, findings have shown that households who expect a higher future income growth will eventually have a higher level of borrowing (Fan, Chang, & Sherman, 1993). Therefore, continuous improvement in a nation's growth and productivity may lead to optimistic expectations of the households on their future income growth and hence results in a greater household debt. However, if households become uncertain about their future income growth, they might be unwilling to increase their borrowing in order to avoid additional financial commitments (Pearce, 1985).

Besides that, a research carries out by Wasberg, Hira, and Fanslow (1992) has used the personal interview method to investigate the factors influencing consumer debts in the U.S by focusing on the role of credit card usage. The result shows that the rising in household monthly debt servicing and total debt is due to the impact of increasing income level and assets held by the households which is consistent with the Life Cycle Model. However, the results obtained in this research could not be generalized due to limitation in the sample size and geographical area. In contrast, analysis on

Survey of Consumer Finances using Tobit regression reveals that the income is negatively related to debt which in the form of credit card debt (Chien & Devaney, 2001). Thus, the relationship between income level and household debt may be ambiguous according to the types of debt.

Apart from that, by using disposable personal income per capita as one of the independent variables, a study done by Turinetti and Zhuang (2011) based on regression analysis has found that household income negatively affects household debt in the United States which contradicts with the findings by Cox and Jappelli (1993) in the United States using Tobit estimates and Hartropp (1992) in the United Kingdom based on OLS method. On the other hand, Barba and Pivetti (2008) have pointed out that the growth in household indebtedness is due to the income inequality whereby as the response to relatively stagnant real wages, the U.S households especially among the low and middle income populations have used the debt as a substitute for higher wages to finance the rising aggregate demand. However, this study is not based on empirical analysis.

In addition, a study done by Iacoviello (2008) using generalized method of moments (GMM) approach on data between 1963 to 2003 supports that the rise in the US household debt is due to the rise in income inequality. Consistently, by using the cointegration test as proposed by Johansen and Engle-Granger, Berisha, Meszaros, and Olson (2015) discover that there is a long run cointegration between household debt and income inequality also in the United States

Besides that, by using VECM approach, Kim (2011) explores the relationship between household debt and aggregate income in the United States and extends the household debt model by incorporating the variables; investment and corporate debt as the explanatory variables. The findings of this study suggest that there is bidirectional positive feedback process between aggregate income and household debt in the short run while negative relationship between various composition of household debt and GDP is found in the long run.

A review analysis done by Sullivan, Warren, and Westbrook (1989) in the United States reveals that most of the individuals who had been declared bankrupt were those in the middle class which had lower income level or higher expenses and thereby highly dependent on debts to support their life. However, a recent study conducted in the United States using a data which covers the period of 1990 to 2012 based on cointegration and Error Correction Model (ECM) approach finds that growth in GDP has caused optimistic expectations among the borrowers and lenders which raises the level of household debt in the country (Moroke, 2014). However, this latter study does not take into account the role of financial crisis that had occurred in the U.S in 2007 due to high household debt level since it may influence the behaviour of lenders and borrowers in the economy.

In a similar study conducted in Norway, a flexible dynamic model has been used to examine the effect of income level on household debt. This study uses wage income instead of disposable income as the proxy for income level due to tax-motivated fluctuations which had a large impact on the development measurement of household income during that period. The result shows that the rise in income level indicates that

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the households can afford to service higher debt and thereby will increase their borrowing (Jacobsen & Naug, 2004). This is further supported by the evidence from the regression analysis on data from U.S households which show that households with high service debt ratio are not found to be more sensitive to income shocks compared to the borrowers who have low debt service ratio since this group of borrowers has a greater opportunity of getting additional borrowing due to bank confidence on their affordability level (Johnson & Li, 2007).

Apart from that, a study conducted by Meng *et al.* (2013) in Australia using cointegration and VECM approach finds that the GDP has a positive influence on the household debt level since the improvement in the household balance sheet may raise the consumer confidence in making loans and thereby leads to a rising of household debt in the country. In contrast, some of the previous studies also suggest that income level is not a significant factor that contributes towards a rise in the household debt level.

For example, based on the survey conducted on 2000 Italian households, Cosma and Pattarin (2012) claim that current per capita income does not show an effect to household behaviour in taking debt. However, this study supports the Permanent Income Hypothesis whereby a positive expectation about the future income will indirectly affect individual decision making in taking debt. Unfortunately, findings of this study may be biased since the survey was conducted through a telephone interview and focused more on psychological factors which are difficult to be measured empirically due to reporting issues.

Based on a study conducted in the developing countries, Meniago *et al.* (2013) investigates household debt issues in South Africa using VECM approach has found a negative relationship between household debt and real income and a positive correspondence with the real GDP. Unfortunately, since this study has included both real income and real GDP as the independent variables, therefore, these findings may be misleading since both variables can be used interchangeably as the proxy for income and thus triggers a rise to multicollinearity problem.

In contrast, a study carried out by Mutezo (2014) in the South Africa using the Auto-regressive Distributed Lag (ARDL) bound testing approach reveals that the rise in the household income level has contributed to the rise in the household debt in the long run which indicates that the rise in income will encourage households to borrow due to greater ability in servicing the debt. However, a study carried out by Zimunya and Raboloko (2015) in Botswana based on VECM approach argues that the income level as measured by GDP per capita is inversely related with household debt in the long run since households with higher income able to achieve optimal consumption without having to be dependent on the debt.

In the context of Malaysia, a study conducted by Abdul Ghani (2010) which focuses on the financial stability in Malaysia based on OLS method over the period 2000 to 2009 has included the GDP as the proxy for income level to examine its impact on the household non-performing loans. The result shows that GDP has a negative influence on household non-performing loans whereby the sustained increase in the economic growth is necessary to help keeping the non-performing loans at a moderate level. However, it does not explain the household behaviour in taking debts. On the other

hand, a review analysis done by Zakaria *et al.* (2012) based on Islamic practices suggests that household income can be used as the indicator to examine the household ability to pay but this study is not rooted to an empirical analysis.

In a study focusing on consumer perspective and their attitudes towards Islamic financing, Mokhtar and Ismail (2013) employed VECM approach based on data from 1997 to 2011 to investigate the impact of income level on household debt. Findings of this study suggest that GDP is one of the leading factors which explains the rising of household debt level in Malaysia. In contrast, using similar method, a study conducted by Rahman and Masih (2014) who has used GDP as a proxy for income level find that the changes in GDP may not affect household debts. The inconsistency in the result obtained in both studies may be due to the failure of both studies to take into account the roles of structural break in the studies since the data period used had included the period of Asian financial crisis and the global financial crisis. Thus, it may lead to a wrong economic interpretation.

In a recent study conducted based on composition of debt carried out by Nizar & Karim (2016) using ARDL modelling approach in Malaysia, reveals that the GDP will exert a positive impact on both mortgage and consumer debts but the former is found to be insignificant. In addition, this study also includes the personal disposable income whereby a positive association is found in the case of mortgage debt while a negative effect is found on the consumer debt with the latter is found to be insignificant. Unfortunately, the inclusion of both GDP and disposable income in the study may result in a multicollinearity issue since both variables are usually used as the proxy for income level.

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Based on the discussion on the impact of income on household debt, most of the studies have found that income level has a positive impact on household debt. However, households may experience a shock in the income level due to the structural break such as in the event of economic crisis and thus the inclusion of the economic condition in the study of household debt may be plausible in determining the real effects of income level on household debt since it will affect household expectation on their future income and thereby will adjust their current consumption and savings activities.

2.4.2 Interest Rates

The basic Life Cycle Model developed by Modigliani and Brumberg (1954) suggests that interest rates play a significant role on the household borrowing activities. If the level of interest rate is expected to rise, this may reduce the present value of future consumption and thereby encourage the households to borrow in the present period due to cheaper cost of borrowing. On the other hand, the classical theory argued that there is an inverse relationship between interest rates and consumption level whereby it is not attractive to save money due to a lower rate of return and thereby will encourage borrowing activities by the households (Keynes, 1936).

Previous studies have found evidence that low level of interest rate will encourage borrowing activities among the households due to cheaper cost of borrowing (Livshits, 2015; Pearce, 1985). Even though higher interest rate will discourage borrowing, households who face difficulties in financing their consumption would thereby willing to pay a higher borrowing cost.

Apparently, the effects of interest rates on the household debt in developed countries have revealed some mixed results. In a study conducted using logistic regression, Dynan and Kohn (2007) argue that household debt accumulation will rise when the interest rate is low since the U.S households will prefer to use credit cards to finance their consumption activities instead of using cash. Consistently, Debelle (2004b) who has utilized a survey data and presented a simple simulation has also found that lower interest rates and an easing of liquidity constraints has led to a rise in household debt which suggested that the role of financial innovation which lowers the cost of credit especially for the existing borrowers has boosted household debt. In addition, he argues that the effect of interest rate on household debt may be ambiguous due to the presence of income and substitution effect.

On the contrary, Crook (2001) using Probit model in his study based on the U.S household level data which covers the period 1990 to 1995 has found that expectation about the future interest rate in the country has no effect on the level of household debt. This is further supported by Weller (2007) based on a data obtained from the Survey of Consumer Finance whereby he argues that the lower level of interest rates is not the main reason that contributes to the rapid increase in the U.S household debt but is due to other factors and thereby raises the need for further investigation.

In contrast, according to Allen and Giovannetti (2010) based on a review analysis, low interest rate policy adopted by the US Federal Reserve in the early 2000s has encouraged people to borrow money. The demand for loans which is mostly to buy assets such as houses has led to a sharp increase in housing prices in the United

States, Spain, Ireland, United Kingdom and other countries and later brings towards serious economic recession which is caused by housing bubble.

In a different study, Turinetti and Zhuang (2011) who use federal funds rate to examine the impact of interest rates on the U.S household indebtedness using finite distributed lag model claims that interest rate negatively influences household debt. Consistently, a study carried out by Crawford and Faruqui (2011) using a survey data also believes that the low level of interest rates has caused the household debt to rise due to ease in borrowing constraint that has encourage household borrowing.

Similarly, a study conducted by Hofmann (2004) using Johansen cointegration and VECM approach based on data from 16 industrialized countries and Hartropp (1992) using OLS method in the United Kingdom also have found a negative effect of interest rate on borrowing and thereby supported the Keynes (1936) proposition. In addition, the decline in the interest rate may also influence the housing prices to rise and indirectly give impact on the household debt. In particular, as supported by Xu (2013) based on overlapping generations model, in the case of the United States, low level of interest rates is the most important factor that drives the rise in housing prices and mortgage debt level while Waldron and Zampolli (2010) who also use the similar approach support the result based on the case of the United Kingdom.

A recent study conducted by Moroke (2014) in the Unites States using cointegration and ECM approach argues that the role of interest rate in the study of household debt is important to capture the effect of financial innovation by the banking sector whereby a low level of interest rate may be an incentive for the borrower due to

cheaper cost of borrowing. Thus, the policymakers could slow down the household debt accumulation by raising the interest rates. Additionally, a study conducted by Paradiso *et al.* (2014) using cointegration and various regression techniques suggests that consumer credit would be affected more by the long term interest rate instead of the short term interest rate which is consistent with Calza *et al.* (2003) who have found a significant relationship between demand for credit and long term interest rate using VECM approach.

In a study conducted in Norway using flexible dynamic model, Jacobsen and Naug (2004) who use banks' average lending policy as the measure of interest rates support that interest rates may influence the behaviour of borrowers and lenders in the market. From the borrower's perspective, as the interest rates is falling, it is more attractive for the households to borrow due to cheaper cost of borrowing. However, the lenders may be more selective in giving out loans during low interest rates to reduce the risk of default payment since their profit margin may be lower. Thus, the real effect of interest rates will depend on whether the influence is dominant for borrowers or lenders. The findings of this study suggest that interest rates have a positive influence on household debt which supports that the effect is more dominant for the supplier.

On the contrary, a study conducted in Australia by Meng *et al.* (2013) using cointegration and VECM approach based on quarterly data from 1988 to 2011 has found that interest rates has a negative impact on household debt which suggests that the rising cost of borrowing may discourage households from borrowing. Furthermore, rising interest rates will also reduce investment level and thereby may slower the economic growth and raises unemployment problem in the country. As a

result, it may bring a greater risk to the financial sector since some of the households may face difficulties in meeting their financial obligation. Consequently, the outcome of this study suggests that monetary policy can be used by policymakers to control the high debt level. However, interest rate targeting should be analyzed carefully so that it will not cause any serious economic fluctuations.

In the context of developing countries, a study carries out by Meniago *et al.* (2013) based on cointegration and VECM approach includes growth in real prime rate as one of the explanatory variables finds that there is a negative relationship between interest rate and household debt in South Africa. A decrease in the interest rate or the cost of borrowing will encourage households to increase their debt level since it is cheaper to service their debt.

Correspondingly, a study carries out by Mutezo (2014) in the same country using an ARDL bound testing approach also reveals the same result whereby he argues that the decline in interest rates has contributed to a higher household debt mainly through its influence on the household consumption. However, the findings of the former study are found to be insignificant which may be due to mutlicollinearity problem since the study includes both real income and real GDP as the measure of income in the study and thereby leads to biasedness in the estimation.

In contrast, a study done by Zimunya and Raboloko (2015) in Botswana using VECM approach reveals that the rise in borrowing cost as measured by the nominal interest rates will result in further incline in the household debt level both in the short run and long run. In particular, this study argues that this result is affected by the presence of inflation in the economy whereby the rise in inflation has reduced household real

income which makes the households becoming not sensitive to the change in the interest rate.

On the other hand, evidence based on a study conducted in Malaysia has found a mixed result. Endut and Hua (2009) in their review have highlighted that households will be vulnerable to shock in interest rate especially for household borrowing which is based on floating interest rates. They argue that the rise in the interest rates could give negative influence on household debt since their household debt servicing is increasing and thereby may limit the monetary policy implementation in the country. However, this study is not based on empirical analysis but only based on a graphical method. On the other hand, a study conducted using OLS has found that higher interest rate measured by the average lending rates has led to a higher debt servicing and thereby will give a positive impact on the household non-performing loans. However, this result is found to be insignificant (Abdul Ghani, 2010).

Apart from that, a review done by Zakaria *et al.* (2012) which highlights the Islamic practice on debt management argues that the rapidly rising household debt is due to the greediness of the financial intermediaries due to profit seeking behaviour which discriminates the borrowers by charging a high interest rate to a bad borrower and a lower rate to a potential household which has a good credit ratings. Therefore, adherence to the Islamic practice in debt management could help to manage the household debt level and avoid risk in the market. However, this study is not rooted to the empirical analysis.

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In a study conducted by Mokhtar and Ismail (2013) based on VECM method, interest rates which is measured by the log of Base Lending Rates is found to exert a positive influence on the household debt level. In contrast, by using a similar method, a research carried out by Rahman and Masih (2014) states that interest rates remains to be endogenous which suggests that any changes in the interest rates may not influence the household debt. However, the inconsistency of the result may be due to the measurement of the interest rates. The used of base lending rate as the proxy for interest rate may be inappropriate since it is determined by the central bank whereby its value does not change significantly over time and hence may not reveal the true effect of interest rate on household debt.

In a more recent study, by using a quarterly data from 1996 to 2013, a study done by Nizar & Karim (2016) in Malaysia using ARDL modelling approach has found that the interest rates have an inverse relationship with the mortgage debt while a positive association is found in the case of consumer debt. However, the effects found to be statistically significant only on the consumer debt. Unfortunately, the authors do not explain on why this result differs significantly from the theory. Correspondingly, the multicollinearity issue which is suspected to occur in this study due to the inclusion of both GDP and disposable income may be the reason on why the findings of this study contradict with findings in the literature.

As discussed above, the effect of interest rates on household debt may be ambiguous due to opposite influence on the borrowers and lenders. The past literature also highlighted different types of measurement for the interest rate in the studies. However, the measurement of interest rate in a study conducted in Malaysia may be

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inappropriate since the Based Lending Rates is determined by the central bank which does not change significantly over time and hence the use of average lending rates may be more useful in capturing the effect and thereby will be included in the present study. Moreover, the changes in the structure of the economy should also be given greater emphasis in the analysis since it could affect the lending policies in the country when there is a change in the structure of the economy.

2.4.3 Housing Prices

One of the most important decisions made by households during the life cycle is the homeownership. As a result, housing prices has been found to play a crucial role in explaining the rise in household debt across countries (Beer & Schürz, 2007). The rise in housing prices contributes to the escalating of household debt level mainly through its influence on the household consumption (Cooper & Dynan, 2016; Paiella, 2009). This is due to the mortgage debt which has found to be the highest component in the household debt. In addition, the inclusion of housing prices in the study of household debt helps to capture the wealth effect as proposed by the Life Cycle Model (Moroke, 2014).

The importance of housing wealth as one of the major contributors to the rise in debt accumulation is also supported by Minsky's Financial Instability Hypothesis (Minsky, 1992). In particular, the rise in asset prices has increased household confidence about the future economy and thereby resulted in high household debt accumulation mainly through equity extraction and higher loan by new homeowners. Although this study focuses on the corporate sector, similar condition can be seen in the household sector and thereby is relevant in the study of household debt.

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Consistently, previous studies have found that changes in housing wealth have a greater effect on household consumption rather than other form of assets held by individual (Carroll, Otsuka, & Slacalek, 2011; Case, Quigley, & Shiller, 2005; Benjamin, Chinloy, & Jud, 2004). So far, housing services represent the highest part of household consumption and the most dominant type of wealth in the household balance sheet (Aristei & Gallo, 2016). Moreover, the home equity has become an important source of wealth in household balance sheet since households could utilize it to apply for an additional borrowing.

Correspondingly, a study on the effects of housing prices on household debt in the developed countries has revealed a positive impact. For instance, evidence based on a study conducted in the United Kingdom using Probit regressions has found that housing property is the dominant form of wealth in the household portfolio (Banks & Tanner, 2000). The rise in the housing prices has encouraged the households to increase their debt level for investment purposes due to a higher expected future income. Moreover, some studies have found that the rising housing prices has a positive influence on household consumption due to the wealth effect and relaxation of the borrowing constraint (Campbell & Cocco, 2007; Ortalo-magné & Rady, 2006; Case *et al.*, 2005; Bhatia, 1987). Hence, this will encourage households to apply for an additional borrowing by securing their assets to finance the rising consumption.

Consistently, a recent study conducted by McCarthy and McQuinn (2015) using household survey data also measures the housing wealth as the current value of properties held by the households which indirectly highlights the roles of housing prices in the household balance sheet. Thus, a decline in the housing prices will result

in the reduction of housing wealth which could affect the household consumption since the wealth effect plays important roles on the consumption decision. (Arestis & González, 2014).

In a different viewpoint, there are studies conducted using regression analysis which found that consumption on housing declines with household age since households will normally purchase housing during the young working period (Green & Hendershott, 1996; Mankiw & Weil, 1989). However, households may experience a financial constraint in the early working period and thereby may purchase a house that is affordable based on their income during that period. As they move on the ladder, this households will eventually move to a more comfortable house which involves a higher mortgage loan (Clark, Deurloo, & Dieleman, 2003; Banks, Blundell, & Smith, 2002).

In a study using OLS method conducted in the Unites States, a rise in the housing prices has been found to exert an upward pressure on household debt level whereby both mortgage debt and consumer debt have increased since households who experience a decline in their income due to high housing services may need an additional fund to maintain their living standards (Pollin, 1988). Furthermore, using a logistic and Tobit regressions, a study carried out by Canner, Dynan, and Passmore (2002) has found that financial innovation increases the access of credit to the households by using their property as a collateral to make more borrowing which is later supported by Iacoviello (2004) using GMM estimates. However, the former study claims that the households will only use a quarter of their mortgage refinance to pay off their debt while the remaining fund will be spent.

On the other hand, evidence based on analysis using various cointegration and regression techniques in the OECD countries suggests that the housing prices has been escalating due to the rising income level and relatively low cost of borrowing and thereby could explain the continuous increase in the household debt (McQuinn & O'Reilly, 2008). Similarly, this result is supported by Crawford and Faruqui (2011) using household survey data in which higher house prices and financial innovations will contribute to growth in Canadian household debt.

Despite that, a review analysis done by Akerlof and Shiller (2009) argues that the rise in housing prices is normally associated with higher mortgage debt since the debtors need to borrow a large amount of money in order to afford buying a house since it will involve larger transaction costs. Moreover, rising house prices may also influence consumer confidence about the future economic situation and thereby affects the household borrowing activities. In addition, even though households choose to rent a house instead of purchasing it, they will still face risk since rents are subject to fluctuations which is supported by Sinai and Souleles (2005) using Probit regressions and OLS method in a study based on Metropolitan Statistical Area (MSA).

 Similarly, a study carries out by Turinetti and Zhuang (2011) in the United States using finite distributed lag model also supports that the rise in housing prices positively influences the nation household debt which is mainly due to the rise in mortgage payments. Alternatively, by using the purchase index as the measures of housing prices, a study carries out by Dynan and Kohn (2007) using logit regression

in the United States has found that there is a high correlation between housing prices and mortgage debt which postulates a positive relationship.

Besides that, the rise in the shares of homeowners will also foster the household debt which is consistent with a previous study conducted by Crook (2001) in the United States using Probit model. However, households with high debt levels due to an increase in asset holdings may be more sensitive to shocks in asset prices since households may misunderstood about their financial position and thereby may borrow excessively. In addition, a review analysis by Weller (2007) in the United Sates argues that the increase in the household net worth due to a rising house prices may not represent the actual wealth accumulation of the U.S households since it may occur due to inflated housing sector and thereby exposed the households to the risk of declining home value.

Consistently, a study carried out by Mian and Sufi (2011) in the United States using OLS and instrumental variable approach also argues that the appreciation in housing prices has contributed to the rise in household debt. This is later supported by Lavender and Parent (2013) based on graphical method whereby they point out that there is a high demand for real estate assets in the economy before U.S recession occurred in 2007 which was due to a low cost of borrowing that has led to an appreciation in the house price with almost 90% in 2006 as compared to early 2000. As a result, this has encouraged people to further increase their debt level due to an increase in their net worth of asset holding. Unfortunately, housing bubble hits the economy and eventually leads to a high default rate.

Recent study conducted by Moroke (2014) in the United States using cointegration and ECM method based on quarterly data over the period 1990 to 2013 has found that sustained increase in the housing prices has encouraged people to invest more on the property since they expect to gain from the rising price level. This result is consistent with a study conducted by Hofmann (2004) based on 16 industrialized countries using Johansen and VECM approach. Additionally, rising house prices may increase the household debt since the borrower need to take more loans in order to purchase the property (Debelle, 2004a).

In a similar study conducted in Norway using flexible dynamic model, Jacobsen and Naug (2004) include house price, housing stock and the number of house sales as the independent variables in order to examine the impact of housing market on the household debt. Their findings suggest that household debt growth is significantly influenced by the development in the housing market. The result shows that the rise in the house prices will significantly contribute to the rise in household debt in the long term. However, if house prices are affected by the change in the housing stock, therefore, the impact on the household debt will be inversed.

On top of that, this study also suggests that the level of household debt is influenced by a time lag when there are changes in the asset prices since the borrower and lenders will take time to adjust their behaviour. Even though the result of this study is consistent with the literature, the inclusion of housing prices, housing stock and house sales in the model of household debt may eventually lead to multicollinearity problem since the changes in the housing stock and sales will affect the housing price level and thereby the result obtained in this study may be biased.

In a research conducted in Australia, Meng *et al.* (2013) include housing prices and number of dwellings in order to examine the effect of housing market on the household debt since mortgage debt is the most dominant type of debt in the country. By using cointegration and VECM approach, findings of this study suggest that housing prices have a positive impact on the household debt. This is due to the fact that the rise in asset prices will lead to a higher borrowing to purchase the property while the existing property holders can take advantage in obtaining additional fund from the mortgage equity withdrawal.

Apart from that, the number of new dwellings has been found to give a negative influence on the household debt which suggests a rise in housing supply that is higher than the demand by the society may lead to a reduction in housing prices and thereby reduce the level of household debt in the country (Meng *et al.*, 2013). However, the findings obtained in this study may be misleading since it includes both housing prices and housing supply in the model of household debt and thereby may lead to spurious estimator.

Besides that, by using the real house price index as the measure for housing prices, a study conducted by Justiniano *et al.* (2015) in the United States which employs a dynamic general equilibrium model also suggests that housing prices plays important roles in influencing the household debt level whereby households can refinance their loans in order to get additional borrowing based on the rising collateral value. According to them, since the 1990s, there is a significant rise in the mortgage debt associated by the rise in the housing prices. However, the presence of the Global

Financial Crisis in 2008 that triggered a plunge in the housing prices has led the households to owe more than their net worth since the value of their properties has dropped significantly.

Correspondingly, since the mortgage debt has shown to be the most dominant type of liabilities in the household balance sheets, therefore, the dynamic in the household debt is mostly been influenced by the mortgage. Thus, by using the similar approach employed by Mian and Sufi (2011) which is the descriptive regression model to investigate the link between housing prices and household debt, a study conducted by Andersson and Mayock (2015) supports that the dynamics in the household debt is remarkably explained by the households with mortgage debt which are found to be more responsive to the changes that occur in the housing market. Hence, as the housing prices keep rising, households can take advantage to apply for an additional borrowing in the short periods of time by refinancing their existing mortgage.

In the context of developing countries, a study conducted by Meniago *et al.* (2013) in South Africa based on cointegration and VECM approach found that there is a positive impact of real housing price index on the household debt level. Consistently, based on the case of Malaysia, Zakaria *et al.* (2012) argue that Islam allows individuals to take debt to fulfill their basic needs such as consumption on housing and thereby a rising housing prices may influence the household debt. However, this study only reviews the Islamic practice to control household debt while no empirical analysis is being presented. On the contrary, a study carried out by Mokhtar and Ismail (2013) using VECM approach has found that housing prices is an endogenous factor in the model.

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Using the same method, Rahman and Masih (2014) have found that there is a positive relationship between housing prices and household debt in the long run since households need to borrow more money in order to finance higher housing consumption. However, both analysis do not separate the effect according to the types of debt since the effects of housing prices may be more dominant on the mortgage debt. Thus, the division of the debt in the form of mortgage debt and consumer debt may be more plausible to determine the real effect of housing prices on the household debt level.

In contrast, a study conducted by Nizar and Karim (2016) in Malaysia based on ARDL modelling approach has discovered that the housing price is inversely related with both mortgage and consumer debts but the effects are only significant on the mortgage debt level. However, the author does not justify the reasons on why a negative association is found in this study since this result contradicts with the theory. A possible reason for this is may be due to the multicollinearity issue which may arise in the analysis due to the presence of GDP and disposable income in the analysis which usually being used as a proxy for income level.

As a conclusion, the impact of housing prices on household debt has been found to be positive in some studies while several studies reveal a negative relationship. However, limited studies which separate the debt according to its types since housing prices may be the dominant effect to the mortgage debt. In addition, there are very limited studies which discuss on the impact of structural breaks such as due to policies transition especially on the housing market since it may affect the household

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borrowing behaviour. Therefore, the inclusion of the variable which captures the structural breaks is useful in determining on how far the rising household debt across countries could be explained through the change in the economic structure.

2.4.4 Consumer Prices

Consumer price index (CPI) which is used to capture the inflation rate in a country refers to the changes in the general price level of goods and services in an economy. The calculation of the consumer price index is based on the weightage given for each type of goods specified in the basket. Thus, CPI could also represent the cost-of-living index since it measures the cost of goods and services consumed in the market basket over time (Gillingham, 1983). However, most of the past studies included the inflation rate in the analysis with the expectation that it will affect the cost of borrowing. For instance, Dynan and Kohn (2007) who have utilized a logit regression in their study argue that the decline in the inflation rate indicates a lower nominal interest rates which leads to relaxation of the borrowing constraints.

A previous study conducted by Debelle (2004b) has used a simple simulation in order to explore the impact of inflation rate on household debt. Findings of this study suggest that a decline in the level of inflation rate would lead to a sharp rise in the household debt since high level of inflation reflects a higher cost of borrowing due to Fisher effect. However, using a regression analysis, Turinetti and Zhuang (2011) claim that the measurement of household debt in this study may be inconsistent. On a contrary, instead of using inflation rate to measure consumer confidence about the future economics, they include consumer sentiment index and claim that consumer

confidence about the economy is positively influenced their attitudes towards borrowing activities in the country.

Evidence found from the European countries based on pooled regression over the period 1982 to 2003 has shown that inflation rate which is measured by log of consumer price has shown a negative influenced on the mortgage debt (Wolswijk, 2006). Similarly, Waldron and Zampolli (2010) discover that a low level of inflation could explain the continuous rise in the household debt due to its impact on household financial constraints by reducing the initial nominal payments on mortgage. In particular, the former study argues that this situation is due to a rising of inflation rate which will make the cost of borrowing to become higher and thereby decreases the debt level. Consistently, a study conducted in Australia by Meng *et al.* (2013) using cointegration and VECM method reveals that the consumer price index has a negative impact on the household debt whereby a rise in the inflation rate will discourage lending by the banking sector since the real value of money has declined.

Besides that, by using OLS and Granger causality method, Verter and Osakwe (2014) based on their investigation in Czech Republic also found that rising inflation rate may lead to a lower household consumption and thereby may result in a lower household debt level. In addition, by using the consumer price index as the proxy for credit demand shock, a study conducted by Kim *et al.* (2014) in Korea based on the OLS method has found that the inflation rate will exert a negative influence on the household debt growth.

In the context of developing countries, a research carried out by Meniago *et al.* (2013) using cointegration and VECM approach has found that the consumer price index positively contributes to the rise in household debt in South Africa. This may be due to the rising inflation rate which indicates the mortgage debt to erode faster and make the housing investment become more attractive for the households (Chatterjee & Eyigungor, 2015). In the context of Malaysia, a study conducted by Abdul Ghani (2010) using OLS approach based on quarterly data over the period 2000 to 2009 has found that inflation rate had a positive relationship with the household non-performing loans which indicates that higher inflation would give the borrower greater capabilities to repay their debt and thereby may reduce the household debt level.

On the other hand, a study based on VECM approach over the period 1997 to 2011 has shown that inflation rate has a negative relationship with the household debt level (Mokhtar & Ismail, 2013). Apparently, the failure of the study to include the roles of economic condition may produce a biased result since Malaysia had experienced major economic crisis in 1998 and 2008 which may greatly affect the household behaviour.

In a more recent study conducted in Malaysia by using an ARDL modelling approach, Nizar and Karim (2016) has found that the roles of inflation which are measured by using the consumer price index will exert a negative influence on mortgage debt while a positive effect is found on the consumer debt level but the result is insignificant. However, the problem of biased estimation may occur in this analysis since all the variables included in the analysis have not been adjusted for inflation except for the

GDP which is in real terms. Hence, an estimation using a deflated variable is necessary to examine the real effects of inflation rate on the debt model.

Apparently, besides the inclusion of the consumer price index to capture the roles of inflation, this variable also often used to measure the cost of living of the household from the macroeconomic perspective. Correspondingly, some of the previous researches at a micro level have supported that the rise in the cost of living has a great influence on the household debt. For instance, in the context of developed countries, a study conducted by Weller (2007) in the United States using survey data supports that a sharp increase in the cost of living such as on food, house, transportation, healthcare services and others associated with stagnant income level have encourage households to use credit facilities excessively in order to fulfil their basic living expenses. Consistently, Dynan and Kohn (2007) who have utilized a logit regression method also supported that the majority of the U.S households borrow money to finance basic consumption.

Similarly, as supported by Nau, Dwyer, and Hodson (2015) in their analysis using logistic regression, debt can be regarded as a form of income since it can be used to finance household consumption and thereby serves as the substitute for cash to maintain the household lifestyle. In addition, with the stagnant income level, the credit facilities such as the credit cards debt has become an important instrument for the households to maintain their family consumption (Sullivan, Warren, & Westbrook, 2000). Hence, it can be concluded that relative stagnant wages level has influenced the households to use the debt to smooth their consumption.

Besides that, a research carried out by Boushey and Weller (2008) using descriptive statistics and Prais-Winsten regression also argues that a rise in consumer credit is due to the rising cost of living on housing, healthcare, food, transportation and energy whereby the labour market condition does not adjust accordingly to the rise in the cost of living. As a result, households utilize the credit services in order to finance their consumption activities as a respond to price changes However, this study does not investigate on how far the fluctuation in the price level has influenced the household behaviour on borrowing activities but instead they have focused on the impact of rising income inequality among households.

In the context of developing countries, some of the past studies have also highlighted the link of inflation rate on the cost of living. For instance, a study conducted by Abid, Ouertani, and Zouari-Ghorbel (2014) in Tunisia using GMM method has found that inflation rate has a positive influence on household non-performing loans through its impact on household financial position. They argue that the rise in the cost of living which heightens the burden on the society has indirectly forced them to increase their borrowing in order to smooth consumption. However, further investigation is necessary to determine how far the cost of living has affected the household debt model.

Consistently, as argued by Zimunya and Raboloko (2015) in a study of household debt in Botswana using VECM approach, the rise in inflationary pressure such as the rise in food and fuel price will result in credit growth due to a decline in household real income associated with larger income allocated for consumption. They also argue that although it is important to avoid the consumption to rise excessively since it has

contributed to the rise in household debt, however, it will be challenging for the households to control the rise in consumption associated with the rise in the cost of basic needs. Hence, the government intervention is crucial to maintain the price and the debt level.

In contrast, a study conducted by Zakaria *et al.* (2012) in Malaysia based on the Islamic perspective suggests that debt has been used as a wage substitution to accommodate basic living expenses and thereby the rise in the cost of living will eventually lead to the rising of household debt level. Since Islamic practices prohibit luxurious consumption, this study suggests that the household debt could be managed if households follow the Islamic practice by using debt to fulfil their consumption according to Islamic principle. However, this study is not rooted on an empirical analysis.

As a summary, most of the previous studies from the macroeconomic perspective have included the inflation rate in the study of household debt since they expect that it will greatly affect the borrowing cost. Besides that, the inflation rate has also been used to capture the effect of uncertainty and consumer confidence about the economy. However, the inclusion of consumer price index is also necessary to determine the changes in the debt level when the prices of goods and services fluctuate (Moroke, 2014). In particular, the rise in the cost of living will thereby reduce the household ability in debt repayment since they need to allocate a greater amount of income devoted to fulfil basic expenditures.

It can be seen that the past literature which highlighted the roles of the cost of living in the study of household debt has mostly been conducted at a micro level study while there is limited study which highlighted this issue in the macro level study. Moreover, since the housing prices is usually included in the household debt model to capture the wealth effect, hence, it may spark multicollinearity problem due to its influence on the consumer price index. Thus, the disaggregated data of the consumer price index may be more useful to capture the effect of the cost of living in the household debt study and thereby will be given ample considerations in this present study.

2.4.5 Demographic changes

The Life Cycle Model predicts that household borrowing is high in the early life cycle and starts to decline with the household age (Ando & Modigliani, 1963). This theory suggests that the age structure of the population will affect the household debt since an individual may need to borrow more money in the early working period to finance consumption especially on durable goods in order to start their career and family life. Therefore, demographic changes play important roles in explaining the rise in the household debt.

Previous researches on both micro and macro level studies have discovered that demographic effect plays significant roles in explaining the reasons behind the rising household debt across countries. According to Beer and Schürz (2007) based on survey data, as the population age increases, borrowing is expected to rise until the period of prime working age. Besides that, a study conducted in the United States based on the Survey of Consumer Finance has found that there is a negative relationship between household age and the debt level which suggests that the total

amount of debt decreases with age (Yilmazer & Devaney, 2005). As supported by Brown, Ghosh, Su, and Taylor (2015) based on Bayesian multivariate model, there is a negative relationship between household age and the debt level since the older households normally have paid their loan during retirement.

Consequently, a higher percentage of young households in the country may indirectly lead to a higher household debt accumulation (Pearce, 1985). This is due to higher consumption in the early working period through the purchase of durable goods such as property that exceeds the household current income level. Moreover, the young adult could utilize the credit facilities in starting their career and family life and thereby could help to increase the household standard of living (Nau *et al.*, 2015). However, a study conducted by Soman and Cheema (2002) which utilizes ANOVA and regression analysis argues that spending behaviour among young households and households with lower education attainment will be greatly influenced due to credit limit.

Similarly, a study conducted by Wasberg *et al.* (1992) using data from two period time has conducted a personal interview in order to investigate the factors influencing consumer debt in the United States. This study which focuses on household credit card usage has found that household age plays a significant role in influencing the consumer debt whereby young households have a higher financial commitment in debt servicing. However, the result obtained in this study could not be generalized due to a small sample size and limited geographical areas covered in this study. In contrast, Dynan and Koh (2007) based on findings from logistic regression analysis

claims that household debt holdings in all age groups is rising and debt is also rises with educational attainment which leading to a greater debt accumulation.

A research conducted in Australia based on cointegration and VECM method has found that population growth has a positive impact on the household debt but the effect is relatively low (Meng *et al.*, 2013). Similarly, Xu (2013) in a study of the U.S mortgage debt using general equilibrium model also has found that population aging has a positive influence on housing prices and the mortgage debt level but the effect is relatively small. Besides that, based on the result of OLS estimates, a rise in the percentage of working age and higher education attainment will lead to higher household debt since households may earn a higher income and thus have a greater ability in servicing a higher debt level (Magri, 2007). This is due to the households with higher education level may expect a positive income growth and thus will be willing to carry a higher debt (Beer & Schürz, 2007; Zhu & Meeks, 1994).

Besides that, a study carried out by Jacobsen and Naug (2004) in Norway using flexible dynamic model includes the number of students aged 20 to 24 years old as a percentage of total population in order to capture the demographic effect since students will normally take students loan to finance their education and life expenses. Findings of this study suggest that rising in the percentage of students in the country will give a positive impact on the household debt due to the rising of education loan. However, this result may be biased since this study does not consider the availability of scholarship and financial aid by the government and other institutions in the economy which will affect the result.

In contrast, Turinetti and Zhuang (2011) in a study of the factors influencing the U.S household debt using regression analysis has includes the share of retiring population, educational attainment and share of working age population to capture the demographic effects. The result shows that the share of retiring population and population with a minimum 4 years of high school education has a negative influence on the household debt while households with a minimum college education and working age population have shown to exert a positive impact on the household debt level. This result also implies that higher percentage of retiring population in an economy may reduce the household debt level since the loan taken by the households during their working age will normally reach its maturity.

Besides population age and educational attainment, household debt may also be influenced by the size of the household since bigger household reflects a higher consumption level due to the rising aggregate demand (McCarthy & McQuinn, 2017). The credit facilities provided in the economy have helped to facilitate the young household to have children by bringing forward their future consumption. Thus, the availability of the funding has made the parenthood could be attainable (Nau *et al.*, 2015). Moreover, in this new era with higher percentage of women enrol in the labour market, households may need to spend money for the childcare services.

So far, many previous studies have found that household size has a positive influence on household debt (Cox & Jappelli, 1993; Duca & Rosenthal, 1993; Sullivan & Worden, 1986). The size of the household which can be proxy by the number of children would have a positive influence on household debt since larger household may need to borrow more money in order to maintain the consumption level (Beer &

Schürz, 2007; Duca & Rosenthal, 1993; Enthoven, 1957; Tobin, 1967). In addition, a study conducted by Crook (2001) in the United States using Probit model has found that household size has a positive impact on U.S household debt level which suggests that the increasing number of children will increase household borrowing.

Similarly, by using a nonlinear three stage least squares approach, a study conducted by Bryant and Wang (1990) in the United States reveals that households with children will tend to consume more as a result of the rising demand for goods and services. Moreover, parents may regard their children as an investment which could bring them economic security during the retirement age. Since households normally expect that the return of investment on their children would be greater than the cost of debt, therefore, they will be willing to borrow in order to support their children.

Apart from that, findings based on OLS estimates support that the households may also experience a lower wealth accumulation due to higher spending level in raising their children (Stephens & Unayama, 2015). Consistently, a survey conducted by Zeldin and Rukavina (2007) among medically indebted household in the United States has found that households with children have a higher credit card debt. However, it is not sufficient in explaining the reasons behind mounting household debt since this study only focuses on medical expenses.

Besides that, a hierarchical and simultaneous analysis conducted based on cases of serious debtors discovers that households who have unfavourable economic condition such as households with lower income and socioeconomic class with a bigger size of household due to greater number of children may be more dependent on the debt to

support their life (Lea *et al.*, 1993). In addition, a study done by Schooley and Worden (2010) using a logistic regression reveals that households with bigger family size have a higher consumption due to a rise in demand. Hence, this may influence the household borrowing behaviour in maintaining their family consumption.

Correspondingly, findings based on Bayesian multivariate model supports that an increase in the number of children has also risen the probability of the households in holding unsecured debt since households may need additional sources of income in supporting the rising family consumption and thereby depend on the debt to support their expenditure (Brown *et al.*, 2015). Consistently, an analysis conducted by Danes and Hira (1990) based on structural equation modeling on the issue of credit card usage among households in the town area reveals that households with bigger family size are more dependent on the credit cards to finance their consumption.

In contrast, this finding is contradicted with a study conducted by Livingstone and Lunt (1992) in the United Kingdom using discriminant function analysis and multiple regression analysis discovers that the number of children does not affect the household debt since households with children may adopt budgeting strategies to maintain their consumption. Furthermore, an analysis carried out by Muellbauer (1994) based on survey data in the United Kingdom also discovers that young couples are less likely to borrow even though they expect a positive future income growth due to their expectation of higher spending in the future for child rearing.

In the context of Malaysia, findings by Mok *et al.* (2007) based on logistic regression model reveals that households with bigger family size are more likely to be trapped

under poverty due to higher family consumption. Consistently, as argued by Zakaria *et al.* (2012) in their review based on Islamic practice, if debt is used to finance household consumption in response to the rising cost of living, therefore, the number of children should give a positive influence on the household debt level.

Besides that, by using GMM estimates and quantile regression, a study conducted by Filoso and Papagni (2015) based on the issue of household fertility argues that the households may choose to raise their children with the expectation that they will get benefits from the investment on their children during the old age and thereby use the credit facilities to reduce their burden in raising their children. Even though the theoretical viewpoint predicts that the household debt will be lower during retirement since households may have settled larger part of their liabilities, the old age population may face a higher burden during retirement when the cost of living keeps rising since the pension received during this period is relatively low and remains flat. Evidence based on a study conducted in the United States using various techniques including logit and linear probability regression has discovers that the bankruptcy filings among older population in the United States increased by 150 percent between 1991 to 2007 with the rising health care cost as the leading factor (Greenhalgh-Stanley & Rohlin, 2013). Therefore, this has raised concerns that the old age population may need to be dependent on their children and the government aid to support their life during retirement and thereby will increase the burden of the working age population. However, none of the previous studies have taken into account the role of dependency rate especially the old age dependency in the household debt model.

So far, most of the past literature on the effects of age dependency has focused on its effects on savings rate across countries (Higgins & Williamson, 1997; Rossi, 1989; Mason, 1988; Fry & Mason, 1982; Ram, 1982; Leff, 1969). In particular, most of the studies have found that a rise in the age dependency has increased the burden of the working population which results in lower savings rate. However, to date, no studies have been done to investigate the effects on household borrowing behaviour since the rise in household dependency may result in higher demand for loans due to an increase of the burden of the working population. Moreover, since the level of household consumption vary across the lifecycle, hence the changes in the young and old age dependency ratio will give different impacts on the debt level and thereby should be examined separately.

As a summary, most of past studies have highlighted the importance of the demographic factor in the study of household debt. Even though various demographic factors have been included in the analysis, however, very little is known on the actual effect of household size on the household debt. So far, the impact of household size on household borrowing has only been examined at a micro level with the effect is found to be ambiguous. Hence, by extending the analysis to a macro level study using data on young age dependency is useful to provide a greater insight on the roles of household size in the household debt model.

Besides that, since Malaysia has been moving towards an aging country, the inclusion of the old age dependency in the household debt model will enable the study to investigate on how far the demographic transition has affected the household borrowing behaviour. Moreover, since the young and old age dependency has been

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found to play an important role in the study of household savings behaviour, hence, extending this factor to the household debt model could provide a significant contribution on the study of household debt.

2.4.6 Structural breaks

The presence of structural break in an economy may affect the household debt since it may influence the household behaviour in the borrowing activities when the economic structure changes. For example, the occurrence of the Global Financial Crisis in 2008 which started in the United States due to mortgage crisis has affected many developed and developing countries and found to be one of the biggest crisis in the history (Ozturk & Sozdemir, 2015). As a result, the structural breaks have significantly affect the household borrowing behaviour since the presence of the crisis has given a negative shock in the economy.

In the context of developed countries, a study conducted by Meng *et al.* (2013) who employ cointegration and VECM method in order to investigate the factors behind the highly growing of household debt in Australia has include the roles of structural break in the analysis in order to examine how far the household debt has been affected due to the presence of economic crisis. The findings of this study show that the household debt has declined sharply after the global financial crisis which may be due to the rising economic uncertainty that influences the household behaviour. However, due to the post-crisis data which only covers for two and a half years, thus, it raises the need for re-examining the issue using a longer data period.

Apart from that, this study also argued that the rise in housing prices has significantly contributed to the growing household debt whereby the government incentive for home ownership and other incentives which have been introduced to reduce the burden of the society since the implementation of the goods and services tax (GST) indirectly push up the housing prices in the country. However, the role of the policy reforms has not been examined empirically in this study and thus should be given ample consideration in the present study of household debt.

Consistently, by using a cointegration and ECM approach, a study conducted by Moroke (2014) to examine the macroeconomic determinants of household debt has chosen the United States as the case study since it is the country which had caused the Global Financial Crisis. By using the sample period from 1990 to 2013 to include the period of crisis, findings of this study have shown that only interest rates, household savings, unemployment rate and exchange rate are found to be significant while housing prices, consumer prices, household income, GDP and household consumption are insignificant and thus are inconsistent with the theory. This result may be biased due to statistical problem since it does not take into account the roles of structural break in the analysis since a study conducted by Paradiso *et al.* (2014) in the United States based on the modified Chow test has found that structural breaks presence in the data.

Besides that, based on a study conducted in Korea using descriptive analysis, Yu (2003) argued that the household debt in Korea increases sharply since the Asian financial crisis due to the rising of unemployment rate. Households which experienced loss in their income increase their borrowing in order to support their life.

In addition, the government policy which aims to boost domestic demand by encouraging the banking and financial sectors to increase their lending has led to high credit card debt in Korea. Therefore, the roles of structural breaks are crucial in the study of household debt.

Correspondingly, in a more recent study conducted in Korea using a Vector Autoregressive (VAR) analysis, Kim *et al.* (2014) separate the sample period of the household debt study between 2000 to 2007 and 2008 to 2011 in order to examine whether the impact of the determinants of household debt has been affected due to the presence of the crisis. Findings for the pre-crisis indicate that positive shock in housing prices and GDP has a positive influence on household debt while CD rate shows no impact. On the other hand, an analysis for the post-crisis has found that the factors change significantly especially for the housing prices which turn out to give a negative influence on the household debt after the Global Financial Crisis.

Based on study done in developing country, Meniago *et al.* (2013) utilized the VECM approach to investigate the reasons behind the growing household debt since they observed that the household debt in South Africa keeps rising following the crisis. However, this study does not include the roles of economic condition in the analysis and thereby results obtained in this study could not explain on why the household debt has been rising after the crisis.

On the other hand, in an attempt to investigate the effects of financial crisis on household debt in Malays, a study is carried out by Nizar and Karim (2016) has included a dummy variable to account for the presence of Asian Financial Crisis and

Global Financial Crisis during the study period. Although this study found that the presence of crisis has negatively influenced both the mortgage and consumer debts, however, this result is found to be insignificant. Hence, a further investigation using a methodological approach which allows for structural breaks in the analysis is necessary to determine whether any shocks that occur during the study period have given any significant influence on the debt model.

Therefore, it can be concluded that the structural break plays important roles in the study of household debt whereby these factors should be included in the analysis at macro level since the outcome of the analysis will be affected. This is due to a significant change in the economic structure such as in the event of financial crisis or major policy reforms will affect the household expectation on the current and future economic condition and thereby will influence their borrowing decision.

Unfortunately, past studies which include the roles of structural break in the data analysis are very limited especially in the developing countries and none of the studies that had been conducted in Malaysia have incorporated this issue in their investigation. Thus, the findings on the empirical examination of household debt in Malaysia may suffer with statistical issues and thereby this present study will help to fill in the gap.

2.5 Research Gap

From the discussion in the previous section, there are some important issues which can be highlighted in the study of household debt. Firstly, most of the past studies have found that the mortgage debt is the most dominant type of debt in the household

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balance sheet. As a result, the fluctuation in the household debt level will mostly be explained by the changes in the mortgage debt. Thus, the empirical analysis of household debt should be conducted based on the household debt composition which is in terms of mortgage and consumer debt in order to isolate the effect of the factors examined and thereby provide a more accurate result.

Besides that, since both types of debt differ significantly with one another especially in terms of its risk, hence the empirical analysis may provide different outcome according to the types of debt. As supported by Dunn and Mirzaie (2016), the composition of debt has shifted towards the unsecured debt during the recession which suggests that the study based on household debt composition is useful for policy formulation. However, there are very limited studies that have conducted the analysis according to the composition of debt especially in the case of Malaysia and thereby will be addressed in this present study.

Secondly, evidence from the past studies suggests that households may regard the debt as a substitute for income in financing their consumption. Hence, the roles of the cost of living may play important roles in influencing household borrowing behaviour in maintaining their lifestyle. For instance, a recent study conducted by Kim *et al.* (2014) supports that household borrowing to finance living expenditure is rising especially when the growth in disposable income is slower. Most of the past studies on the effect of the cost of living on household debt have been conducted at the micro level study (Boushey & Weller, 2008; Weller, 2007). However, there has been insufficient analysis from the macroeconomic perspective which examines the impact of the fluctuations to the prices of goods and services on the household debt.

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The roles of consumer price index in the debt model has usually been used to capture the effect of uncertainty and consumer confidence while less studies have been carried out in highlighting its importance on the cost of living. Moreover, since most of the studies include the housing prices as the proxy for wealth effect, therefore, the inclusion of the consumer price index may give a rise to multicollinearity problem. Thus, the use of the disaggregated data of the consumer price index is more useful in the study of household debt and thereby will be given ample consideration in this present study.

Thirdly, the importance of the demographic changes which usually been used to capture the roles of life cycle in the Life Cycle Model has motivated many researchers to consider various demographic factors in their model to explain the effect of demographic changes However, little is known on the actual effect of household size in the household debt model especially from the macroeconomic perspective. So far, the roles of household size has only being investigated at the micro level which shows a mixed results (Beer & Schürz, 2007; Crook, 2001; Cox & Jappelli, 1993; Duca & Rosenthal, 1993; Lea *et al.*, 1993; Livingstone & Lunt, 1992; Sullivan & Worden, 1986).

As a result, extending this factor to a macro level study by using the young age dependency is useful to determine its aggregate effect and provide a greater insight in the study of household debt. Besides that, since the issue of population aging has become a serious concern in Malaysia, the inclusion of the old age dependency in the household debt model is crucial for policy implications. Moreover, since the issue of young and old dependency has only been examined in the study of household savings

with significant effects found on the relationship, hence, further investigation in the studies of household debt could provide significant contribution and thereby has become the motivation for this present study.

Finally, despite the influence of the cost of living on the household debt, the structural break will also give a significant influence on the household borrowing behaviour such as in the event of economic crisis or policy transition and thereby should be included in the household debt model. Even though various econometric techniques have been used to examine the household debt model, however, there are very few studies which take into account the roles of structural break in the analysis (Kim *et al.*, 2014; Paradiso *et al.*, 2014; Meng *et al.*, 2013).

Apparently, the failure to include the roles of the structural break in the analysis of household debt may lead to a biasedness in the result since the presence of structural break will affect the cointegrating rank which causes a biasedness in the model and thereby leads to a wrong economic interpretation (Perron, 1989). So far, there are very little studies which consider this issue in the analysis especially in Malaysia and thereby this present study will help to fill in the gap.

2.6 Conclusion

This chapter has reviewed the theoretical and empirical studies on the issues of household debt in both developed and developing countries. Previous researches based on micro and macro level study have highlighted the roles of various economics, demographical and environmental factors which found a mixed result in explaining the reasons behind mounting household debt level across countries. From

the economics perspective, evidence has shown that the income level, interest rates, housing prices and inflation rate play significant roles in the household debt model. On the other hand, demographic factors which are the essence of the Life Cycle Model have shown that household age together with household education and size of the household could be used to explain the issue of household debt across countries. Apart from that, the structural break will also affect the household debt model and thus should be given ample consideration in the empirical study of household debt to avoid from spurious estimation.

CHAPTER THREE

METHODOLOGY

3.1   Introduction

This chapter aims to discuss the research methodology applied in order to investigate
the rise of household debt in Malaysia. The dependent variable is household debt and
its composition which consists of mortgage debt and consumer debt while the
independent variables focus on the factors that have been highlighted in the literature
review; the income levels, housing prices, interest rates, food prices and also the
young and old age dependency.

Section 3.2 discusses on the theoretical framework of this study and follows by
Section 3.3 which explains the research framework. In Section 3.4, the model
specification used in examining the reasons behind the rising household debt is
presented. Additionally, the justification of variables and the expected sign for each
independent variable is discussed in Section 3.5 while detailed economic procedure
for this study together with the diagnostic test are explained in Section 3.6 and finally
the data collection and the conclusion for this chapter is presented in Section 3.7 and
Section 3.8 respectively.

3.2   Theoretical Framework

This section discusses on the theoretical framework of Life Cycle Model and
Permanent Income Hypothesis in order to explain the theory behind the household
debt. Even though this two theories are used to explain the saving behaviour among
households, according to Lunt and Livingstone (1991), theories which have been

discussed in the study of savings behaviour are applicable in the study of household debt. This is due to the concept of debt which works oppositely to the savings concept.

3.2.1 The Life Cycle Model

This theory was initiated by Modigliani and Brumberg (1954) who suggest that households seek to smooth their consumption level throughout the life cycle. The Life Cycle Model argues that households reallocate their lifetime income in order to maximize their utility and thus will smooth out the fluctuations in their income level by opting to save during the period when their income is high and dissave during low income period.

In the early working period, households may experience a negative net worth since consumption usually exceed current income due to a higher household expenses in starting their career and a family. As a result, households will engage in borrowing activities in the current period at the expense of future income. Households who expect a higher future income are willing to take a higher debt level due to greater ability to service a higher debt. However, due to rules and regulations set by the banking sector, they can only borrow up to the level allowed by the lenders based on their current income. In addition, the borrowing made by the households is also motivated by the desire to make an investment with the expectation to get a higher return in the future through the asset prices appreciation.

In the prime working period, the household debt may start to reduce because households have settled some of their short run debts such as automobile and personal

loans since their maturity period are normally less than 10 years. As the income level is increasing, households will start planning for their retirement due to a sharp reduction in income level during that particular period thus relying on the savings to support their consumption. The households' net worth will reach the highest level at the end of their working age since they do not have any or less debts while their assets are being accumulated within that period. Upon retirement, these households may start to dissave since they need to support their life as their income level drops significantly during this period. The graphical model of the Life Cycle Model is presented in Figure 3.1.
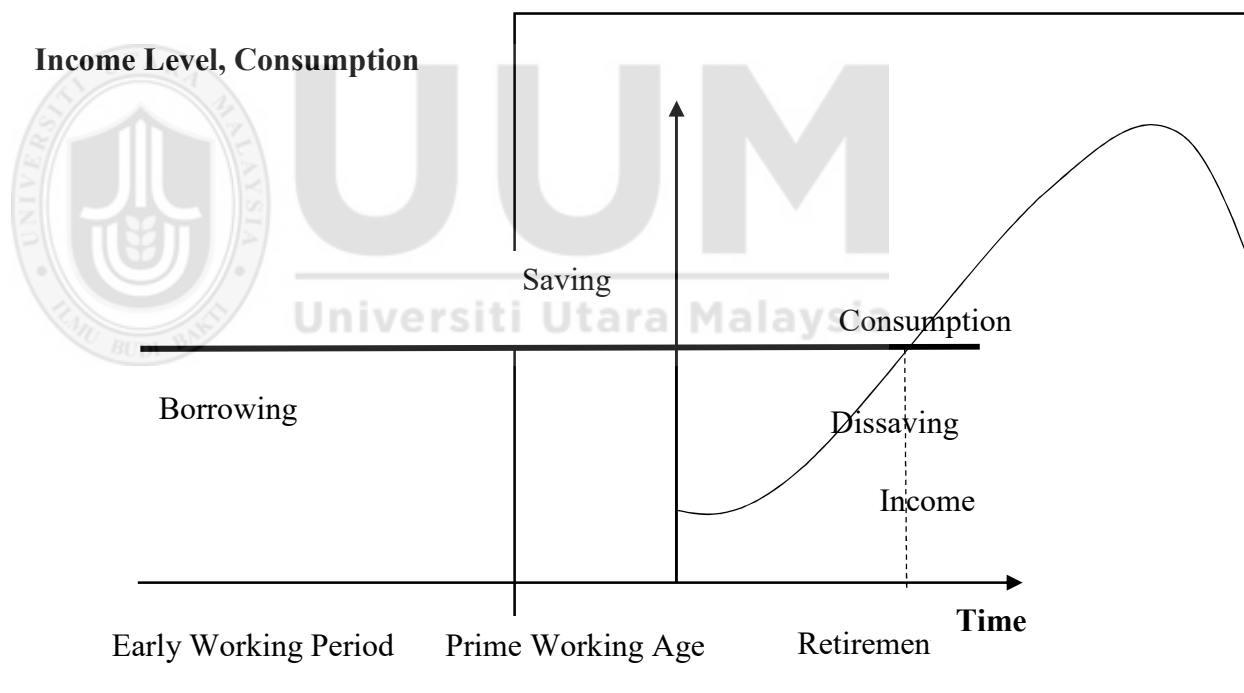
Figure 3.1
The Life Cycle Model
Source: Modigliani (1986)

Based on Figure 3.1, this model suggests that households become the net borrowers in the early working period, make more savings during the prime working age due to a higher income level and eventually dissave during their retirement to support their

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life. Therefore, this model predicts that households will have a greater savings during the prime working age.

This theory is based on the intertemporal choice whereby it highlights that household consumption is based on two time periods which are present and future time whereby the consumers will maximize their utility subject to their current and expected future income. The following equation shows the utility maximization function for the households.

$$\max U_t = \sum_t U(C_t)(1 + \delta)^{-t} \qquad (3.1)$$

subjects to:

$$\sum_t C_t(1 + r)^{-t} = \sum_t Y_t(1 + r)^{-t} + W_0 \qquad (3.2)$$

Where U (C_t) is the utility earned from consumption in the period t, C is the consumption level, Y is income, δ is the rate of time preference or the trade-off between current and future period that can be measured by the level of interest rate, r, while W_0 is the initial wealth or assets. Based on Equation 3.1, the following two period models are obtained where t = 0 and t = 1 refer to the present and future periods respectively.

$$\max U (C_0)(1 + \delta)^{-0} + U(C_1)(1 + \delta)^{-1} \qquad (3.3)$$

subjects to:

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$$C_0(1+r)^{-0} + C_1(1+r)^{-1} = Y_0(1+r)^{-0} + Y_1(1+r)^{-1} \qquad (3.4)$$

Thus, the objective function can be simplified as follows:

$$U(C_0) + U(C_1)(1+\delta)^{-1} \qquad (3.5)$$

As the value of δ increases, the satisfaction earned from the future consumption denoted by $U(C_1)$ decreases relatively to the satisfaction from the current consumption $U(C_0)$. Since there is a tradeoff between current and future consumption which is based on household lifetime income and the real interest rate for savings and borrowing, therefore, households with higher rate of time preference discounts the future more and thereby will spend more in the current period. As a result, households are encouraged to increase their borrowing to finance current consumption at the expense of future income. Specifically, the lifetime budget constraints for households are as follows:

$$C_0(1+r)^{-0} + C_1(1+r)^{-1} = Y_0(1+r)^{-0} + Y_1(1+r)^{-1} + W = I$$

(3.6)

Where C_0, C_1, Y_0 and Y_1 refer to consumption and income on current and future periods, r is the level of interest rates and W refers to wealth accumulation. Therefore, it can be concluded that household consumption depends on households' current and future income, the level of interest rates and the accumulated wealth. As to simplified, the following function represents household consumption in period t.

$$C_t = f(Y_t, r_t, W_t) \qquad (3.7)$$

3.2.2 Permanent Income Hypothesis

This theory was developed by Friedman (1957) which considers infinite-lived households in discussing the household behaviour when their income fluctuates over time. He argues that consumption is not solely depended on current income but also considered the future income and thus complemented the Life Cycle Model. Households will use credit facilities as an alternative to smooth their consumption level during a period where there is a temporary shock in the household income level. Thus, the objective of borrowing is to smooth the household consumption during the period when there are fluctuations in income so that constant marginal utility can be achieved over time.

According to this theory, actual consumption (C_t) and actual income (Y_t) consist of both permanent and transitory components. this theory too mentions, permanent income is based on household wages or salary, which is the expected average future income while transitory income is the random fluctuations in the average income earned by the household such as lucky draw, lottery, bonus, incentive and others. On the other hand, permanent consumption refers to a planned consumption such as consumption on basic needs while transitory consumption refers to an unexpected consumption such as medical expenses, car repairing and others.

Furthermore, he argues that households will react differently to the change in the permanent and transitory changes in income. As a result, changes in permanent income (Y_t^P) will bring almost equal changes in the permanent consumption (C_t^P)

while the transitory income shocks will smooth out over time. Thus, the household consumption can be simplified as follows:

$$C_t^P = \alpha \, Y_t^P \qquad\qquad (3.8)$$

$$C_t = C_t^P + C_t^T \qquad\qquad (3.9)$$

$$Y_t = Y_t^P + Y_t^T \qquad\qquad (3.10)$$

Whereby P and T refer to permanent and transitory components of the household consumption and income while α is the average and marginal propensity to consume out of permanent income which usually depends on the level of interest rates (r) and their wealth (W).

Based on the discussion on the theory, there is a close relationship between the Life Cycle Model and the Permanent Income Hypothesis whereby both theories agree that the economic and demographic variables significantly affect household consumption. However, both theories can be differentiated based on the time period with consumption level depends on lifetime income while the latter is based on the infinite time period with the consumption depends on the permanent income. Therefore, these two theories may complement each other and thereby can be used to explain the issues of household debt across countries.

3.2.3 Theory of the Cost-of-Living Index

The most appropriate theoretical approach that can be used to measure the consumer prices is the theory of cost-of-living index which is originally by Konüs (1939) and

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further discussed by Pollak (1989). In particular, the cost-of-living index refers to the ratio of minimum consumption required to attain the same level of utility or satisfaction across two different sets of price level (Pollak, 1989). Hence, this theory focuses on measuring the changes in consumption required to maintain the standard of living of the household (Triplett, 2001). This theory assumes that at a given price level, consumers will pay for goods and services in which maximize their utility subject to budget constraint.

In examining the effects of the changes in price level, the most appropriate measure is using the indirect utility function whereby household utility is a function of the income and price level. Hence, let u = f(x) represents the utility level achieved from the consumption of the vector x goods while C(p_t,u_t) is the consumption function which refers to the minimum amount of consumption required to achieve the utility level u_t at the prices p_t. Therefore, the standard Konüs (1939) cost-of-living index (I_t^K) can be specified as follows:

$$I_t^K \equiv c(p_t, u_{t-1}) / c(p_{t-1}, u_{t-1}) \qquad (3.11)$$

Equation 3.11 refers to the cost-of-living framework which represents the changes in the consumption level required to sustain the utility or satisfaction when the price changes from time to time. Hence, any changes in the cost-of-living index are caused by the change in the price level.

Apparently, the consumer price index (CPI) is the most common indicator used to measure the cost of living across countries since it measures the overall changes in the

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prices of goods and services in the market over time and thereby is commonly used to monitor the changes in the cost of living over time (Gillingham, 1983). A rise in the CPI indicates that more money is needed to be spent in order to attain the same standard of living during the previous period.

In order to understand the roles of cost of living in the household debt model, this study utilizes the roles of budget constraint in understanding the relationship between the fluctuations in the price level on the household borrowing behaviour. As supported by Fisher and Shell (1972), the cost-of-living index is grounded in the theory of consumer. Since the theory of consumer behaviour is concerned on how rational consumers would make their consumption decisions, therefore, it provides a useful basis in the analysis on the roles of cost of living on the household debt model.

Theoretically, the budget constraints indicate that consumption is equal to the income level. Hence, consumers will maximize their utility or satisfaction subject to budget constraints. In addition, since the budget constraint does not consider the presence of savings and debt in the model, hence, any changes in the price or income level will result to a change in the amount of goods and services purchased in the market. It is assumed that consumers will maximize their utility $f(x)$ subject to a budget constraint as shown in Equation 3.12.

$$\sum_{i=1}^{n} P_i x_i = Y$$

(3.12)

The budget constraint for an individual which is shown in Equation 3.12, assumes that there are n number of goods x for $i = 1, \ldots, n$ while P refers to the price of the goods

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and services in the market and Y represents the household income level. In particular, the budget constraint is influenced by two main factors that are the price and income level. The rise in income level or decrease in the price of goods and services will enable the households to buy more goods and services in the markets. However, given that the price of goods and services in the market has risen, this has resulted in a higher cost of living. Although according to this theory, the households will adjust their consumption in order to align with their income, however, with the rise in the price level mainly on the basic needs, this may result to a decline in the standard of living of the households.

From the theoretical viewpoint, Keynes (1936) argued that consumption is positively related to the income level. Hence, if the price level increases which resulted in the consumption level to exceed the household income, this will encourage household borrowing in order to maintain their consumption over time. Moreover, with the availability of credit facilities provided by the banking sectors such as in the form of credit cards, although the income level does not increase accordingly to the rise in the price level, households could still achieve the same level of satisfaction from their purchase by smoothing their consumption over time using the household debt. Hence, the role of household debt is included in the model in order to understand the link between the fluctuations in the price level and household debt as shown in Equation 3.13

$$\sum_{i=1}^{n} \Delta P_i x_i = \Delta Y + \Delta D \text{ where } \Delta \text{D} > 0 \text{ when } \Delta \text{P}_i > \Delta \text{Y} \qquad (3.13)$$

Equation 3.13 indicates that when the growth in the prices of goods and services is more than the growth in the income level, this means that the rise in cost of living is not associated in the rise in the real income. As a result, households will use the debt to finance the rising consumption level. Hence, this impliedly explains the household behaviour in using the debt as a substitute for wages to smooth their consumption over time as highlighted by Barba and Pivetti (2008).

3.2.4 Theory of Demographic Transition

The theory of demographic transition is a theory that describes the changes in demographic pattern due to the transition from high birth and death rates to lower birth and death rates when a country developed from a pre-industrial to an industrialized economy. This theory was initiated by Warren Thompson in 1929 who seek to explain the changes in the size of population and structure of a country and thereby helped to explain the population growth across countries (Kirk, 1996). This theory is found to be superior to other population theories since it is based on actual population growth trends and thereby has been widely used to explain the changes in the population structure across countries.

According to this theory, there are four main stages which explained the demographic transition across countries. Stage 1 is characterized by a rise in both the birth and death rates which resulted in a low population growth. During this period, the death rate is high mainly due to food shortages, poor sanitation and lack of healthcare facilities. The birth rates are also higher since there is less incentive for the societies to control their fertility level due to high death rates especially on infants.

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On the other hand, in Stage 2, the birth rate remains high but the death rate declines significantly especially on children due to the improvement in food supply and clean sanitation along with the improvement in healthcare facilities and thereby widen the gap between the birth and death rates. As a result, the population growth rises significantly with the age structure of the population which also changes due to an increase in the young age population resulting in higher young age dependency.

In Stage 3, the birth rate declines due to various factors including an increase in education which resulted in family planning and thereby resulted in slower population growth. In addition, as the death rate falls and income level increases, parents become confident that they could attain a comfortable life during old age even with a fewer children and thereby resulted in a declining birth rate. During this stage, the age structure continues to change with a decline in the young age dependency while the old age dependency keeps rising. Finally, in Stage 4, both the birth and death rates are low which leads to a stable population. However, due to higher life expectancy, the population age structure among the old age population has risen which resulted to a further rise in the old age dependency.

Following this theory, Coale and Hoover (1958) who were the first to introduce the dependency hypothesis concept have examined the impact of demographic changes on savings in Asia and found that the rise in young age dependency will result in lower savings rate. Following this hypothesis, studies on the effects of age structure mainly on savings behaviour have started to grow including an investigation on the effects of old age dependency on the savings rate since some countries have moved towards an ageing country (Fry & Mason, 1982; Higgins & Williamson, 1997; Leff,

1969; Mason, 1988; Ram, 1982). Consistently, as argued by Cutler, Poterba, Sheiner, Summers, & Akerlof (1990), the effects of young and old age dependency on consumption may differ and thereby should be examined separately.

Apparently, since the effects of demographic changes have long been discussed in a study of saving behaviour across countries, therefore, extending the investigation in the context of household debt studies is useful to examine the household borrowing behaviour. As supported by Lunt and Livingstone (1991), theories which have been discussed in the study of savings behaviour are applicable in the study of household debt since the concept of savings is opposite to the concept of debt. Thus, the theories can be used interchangeable in the study of savings and debt. Therefore, this study aims to investigate the effects of age structure on the household borrowing behaviour mainly on the household debt issue.

According to the demographic transition theory, the transition process will bring about to a change in the age structure of the population across countries (Leff, 1969). The decline in both the birth and death rates will lead to a change in the age structure of the population. This can be observed in Malaysia whereby the fertility level has continued to decline, associated with the rising life expectancy which resulted to a decline in young age dependency while the old age dependency keeps rising. Consistently, by utilizing the demographic transition theory, Tung & Comeau (2014) reveal that Malaysia is currently approaching the end of Stage 3 and thereby indicate that the baby boomer's generation in Malaysia is currently moving towards the old age population. Hence, the demographic transition that occurs in the country may

have an important implication on the economy and thereby should be given ample consideration in the economic analysis.

So far, studies on the effects of demographic changes on the household debt are limited especially on the roles of population size and population growth and have failed to notice the importance of the effects of age structure of the population since it could give significant influence on the household debt due to different behaviour among the economic agents in different age cohorts. Although all countries around the world went through the demographic transition process, however, the transition stage may differ. As a result, the age structure of the population may differ and thereby the investigation on the demographic effect may reveal a different outcome across countries.

Besides that, the roles of age dependency is also important in the macroeconomic analysis since changes in the age structure of the population could have social and economic implications on a country (Li, Zhang, & Zhang, 2007). Therefore, the focus of this study is to bring a new insight in the study of household debt through the investigation on the effects of/ concerning the effects of household dependency on the household debt model.

By following Filoso and Papagni (2015), this study considers four periods of households which are the young, young adult, adult and old age population in order to capture the main idea of this analysis. In particular, this model refers to household behaviour which is influenced by altruistic preferences whereby the working age population (young adult and adult) who are the income earners in the economy, are

concerns about the needs of their children and parents and thereby help to support their consumption through intergenerational transfers. Therefore, the following Equation 3.14 and Equation 3.15 are s used to represent the household dependency of the young and old age population on the working age population.

$$YA_t = A_t^Y / A_t^W \qquad (3.14)$$

$$OA_t = A_t^O / A_t^W \qquad (3.15)$$

Where YA refers to the young age dependency ratios, OA refers to the old age dependency ratios, A_t^Y refers to the population in the young age cohort, A_t^O refers to the population in old age cohort while A_t^W represents the working age population (young adult and adult).

3.3   Research Framework

As highlighted in the previous section, the Life Cycle Model and Permanent Income Hypothesis can be used to explain the household debt issue. In particular, the rise of debt level occurs when the consumption exceeds the income level thus forces households to use credit facilities to smooth their consumption over the life time. As supported by Lunt and Livingstone (1991), theories which have been discussed in the study of savings behaviour are applicable in the study of household debt since the concept of savings is opposite to the concept of debt. Thus, the theories can be used interchangeable in the study of savings and debt.

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Consistently, according to Jappelli (2005), both theories predict that household debt is due to households forward-looking behaviour which assume that households are rational and will choose to smooth their consumption over time based on their expected lifetime income. Similarly, by using a neo-Kaleckian growth model, findings by Setterfield and Kim (2016) also support that households will consume based on their income level and regards their debt service payment as a substitute for their savings.

In deriving the debt model, the following basic equation which relates the savings and consumption are presented in Equation 3.16 and Equation 3.17.

$$Y = C + S \qquad (3.16)$$

$$S = Y - C \qquad (3.17)$$

Where Y is income level, C is consumption and S is savings. Basically, if income, Y, is greater than the consumption level, C, the balance is regarded as savings. However, when the consumption level exceeds household income, the households will start dissaving which indirectly reflect the borrowing concept.

According to the intertemporal budget constraint, the variable S which is used to denote the savings can be used to represent either saving or borrowing and thereby the equation holds in both cases. If consumption in the first period is less than the income level in that period, this reflects that the households are saving. On the other hand, if consumption exceeds income in the first period, this indicates that the households are

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borrowing. Thus, the dissaving is now regarded as debt; denotes as D as shown in Equation 3.18.

$$D = - S \qquad (3.18)$$

By substituting Equation 3.18 into the savings equation shown in Equation 3.17, thus, the following debt model is derived which relates to debt with consumption as shown in Equation 3.19.

$$D = C - Y \qquad \text{where } D > 0 \text{ when } C > Y \qquad (3.19)$$

In this case, Y refers to the income level which is expected to rise due to greater skills and experiences of the household while C represents the consumption over the life cycle with the gap between income and consumption is financed by the household borrowing. As the household move up the ladder, they will experience a positive net worth due to rise in their income and thereby will start saving for retirement. Besides that, according to Nau *et al.* (2015), debt can also be regarded as income since it can be used to finance household consumption and served as a substitute for cash in maintaining the household lifestyle.

Since debt is used to finance the consumption, as a result, a rise in the consumption will influence the debt to increase, $\Delta C = \Delta D$. Thus, by substituting it in Equation 3.7, the following equation is derived:

$$\Delta C = f\left(\Delta Y, \Delta r, \Delta W\right) = \Delta D \qquad (3.20)$$

Based on Equation 3.20, consumption plays an important role in influencing the household to go into debt. A high level of household spending may lead to less income available for savings and consequently encouraging household borrowing in order to smooth consumption over time especially when there is a negative shock in their income level. For instance, a study carried out by Meniago *et al.* (2013) in South Africa found that there is a strong positive influence of household consumption on household debt which is consistent with the Life Cycle Model that predicts the household will increase their debt level to smooth consumption over the life cycle. Thus, the following Equation 3.21 for household debt is derived and is used as a ground for the conceptual framework of this study

$$HD_t = f\ (Y_t,\ r_t,\ W_t) \tag{3.21}$$

Where

HD_t = Household debt in period t

Y_t = Household income in period t

r_t = Interest rate in period t

W_t = Household wealth in period t

Based on the basic model shown above, household debt can be explained by the income level, the level of interest rate and wealth effect. Most of the past studies have also support that these factors are important in explaining the household borrowing behaviour. From the perspective of income level, most of the past studies suggested that household debt has a positive relationship with the income level whereby as income level increases, the amount of debt level will also rise (Moroke, 2014; del Río

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& Young, 2006; Hofmann, 2004; Calza *et al.*, 2003; Crook, 2001; Fan *et al.*, 1993; Wasberg *et al.*, 1992).

The positive relationship found is due to a higher income and wealth will increase the debt limits for the household and indirectly increase the demand for loans (Duca & Rosenthal, 1993). Hence, household who expect a positive income growth are influenced to take a higher debt level, which explains why the household debt has been rising. Thus, household income can be seen as an important determinant in household debt since it indicates the household capacity in the borrowing activities

Apart from the income level, the above model also highlights the role of interest rate on borrowing activities. If the level of interest rate is expected to rise, this may indirectly reduce the present value of future consumption and encourage the household to borrow in the present in order to finance current consumption due to cheaper cost of borrowing. An increase in the cost of borrowing may discourage some of borrowers in taking debt while on the other hand may increase borrowing among riskier borrowers in order to get an additional fund to finance their consumption. Evidence from the past study has also supported that low level of interest rate will have a negative influence on the household debt (Livshits, 2015; Meng *et al.*, 2013; Meniago *et al.*, 2013; Turinetti & Zhuang, 2011; Allen & Giovannetti, 2010; Dynan & Kohn, 2007; Debelle, 2004b; Pearce, 1985).

Finally, the role of wealth effect in the model raised the concerns on the effects of rising housing prices since the changes in housing wealth have greater effects on household consumption rather than other form of assets held by individual (Carroll *et*

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al., 2011; Case *et al.*, 2005; Benjamin *et al.*, 2004). A rise in the asset prices such as housing prices suggests that households can discount more consumption to the future and indirectly will influence their behaviour in taking additional debt in order to finance their current consumption. As a result, households will use their asset as collateral in order to obtain more funds.

Besides that, rising housing prices may also indicate that more debt needs to be taken in order to purchase the asset thus leads to higher household debt. Most of the past study have proven that the housing prices will exert a positive influence on the household debt to rise in mortgage payment and mortgage equity withdrawal (Justiniano *et al.*, 2015; Moroke, 2014; Meng *et al.*, 2013; Meniago *et al.*, 2013; Turinetti & Zhuang, 2011; Debelle, 2004a).

Even though the Life Cycle Model can be used to explain the household behaviour on borrowing activities, there are some limitations in the model. The theoretical model assumes that households are rational and forward looking and thus are motivated to borrow based on their expected lifetime income. Unfortunately, the occurrence of any negative shocks in the economy such as the shock in income level and interest rate will eventually affect the household borrowing decision. As supported by the Permanent Income Hypothesis, when there is a temporary shock in the income level, households will engage in borrowing activities to smooth their consumption over time.

Hence, in reality, households will depend on their current situation in deciding to engage in borrowing activities. For instance, the rise in the cost of living which is not

match with the growth in income level will eventually influence the households to utilize the debt to smooth their consumption level. Thus, the household debt has become the tools to maintain household consumption behaviour by using the debt as a form of a wage substitution. Hence, this study utilizes the theory of cost-of-living index to explain the household borrowing behaviour associated with changes in the price level.

Apparently, it can be seen that the cost of living in Malaysia has been climbing since the past decade with a significant rise in the food prices. This indirectly increases the burden of the households in maintaining their lifestyle and influences them to use the credit facilities to support the rising consumption. As supported by Sullivan *et al.* (2000), the credit cards debt has become an important instrument for the households to maintain their family consumption. Thus, a rise in the cost of living will significantly influence the household debt level.

Although some of the past studies have highlighted this issue, most of the studies conducted, focus on a micro level study. In addition, even though the consumer price index can be used to capture the role of the cost of living from the macroeconomic perspective, most of the past studies that include this variable in the model have focused their analysis on its effect on borrowing cost while only a few studies relate with the cost of living. Besides that, the inclusion of the consumer price index may also be a potential bias in the model since it may correlate with the housing prices which usually included in the household debt model to capture the wealth effect. Thus, the use of the disaggregated data of the consumer price index is more useful in capturing the role of the cost of living in the study of household debt.

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Hence, the food price index will be used as a proxy for the cost of living since it has the highest weightage in the consumer price index due to its importance on household consumption thus is expected to give more influences on the price index (Brahmbhatt & Christiaensen, 2008). As supported by Dynan and Kohn (2007) and Weller (2007), the run-up in the household debt is due to a rise in the spending on necessities instead of wasteful expenditure. Consistently, the trend in the food prices has also shown to be climbing significantly since the past decade basically indicates a higher living burden (Food & Agriculture Organization of the United Nations, 2015; Department of Statistics Malaysia, 2014).

Besides that, the Life Cycle Model also highlights the importance of demographic factor in explaining the households' behaviour. According to the model, consumption will follow a hump shape since the income will normally rise with age and eventually decline when households reach the retirement period. As a result, the demographic effect found to have a significant role in this model.

Based on the past literature discussed in the previous chapter, a study conducted in both micro and macro level studies have discovered various demographic factors that help in explaining the reasons behind the rising of household debt across countries including the roles of household age, population growth, educational attainment and household size. However, according to the demographic transition theory, all countries will experience a demographic transition process which will bring about a change in the age structure of the population (Leff, 1969). Hence, the effects of age structure of the population could give a significant influence on the economy due to

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different behaviour among the economic agents in different age cohorts and thereby should be given ample consideration in the economic analysis.

Besides that, since there is a mixed effects of household size on the household debt found in the literature and mainly been examined in a micro level study by using the number of children as the proxy, therefore, an investigation on the effects of demographic changes which emphasizes on the roles of age structure in the macroeconomic analysis is useful in determining the aggregate effects and thereby gives significant contribution on the study of household debt.

According to a study on the effects of financial development on the fertility level conducted by Filoso and Papagni (2015), based on four periods households, they argued that the households may choose to raise their children as a form of investment for their retirement and this lead them to use credit facilities to reduce their burden in raising their children. However, this study only focuses on the household fertility choice and not on the issue of household debt.

Thus, by following Filoso and Papagni (2015), this present study also considers four periods of households which are the young, young adult, adult and old age population in order to relate the roles of the young and old age dependency as the a measurement of household size in a macro level study. So far, this is the first attempt to extend this factor from macroeconomic perspective and hence can facilitate in providing significant contribution on the study of household debt.

Besides that, the inclusion of the old age dependency in the debt model enables this study to examine the effects of demographic transition since Malaysia is moving towards an aging country. In order to illustrate the four periods of households, this study modifies the basic diagram used in explaining the Life Cycle Model as depicted in Figure 3.1 and the modified model is presented in Figure 3.2. The four periods of households can be explained as follows. Firstly, period I refers to young age population or also regarded as children who are fully dependent on their parents to support their life during this period. Hence, the children consumption will appear in the parents' consumption function as a cost of child rearing.
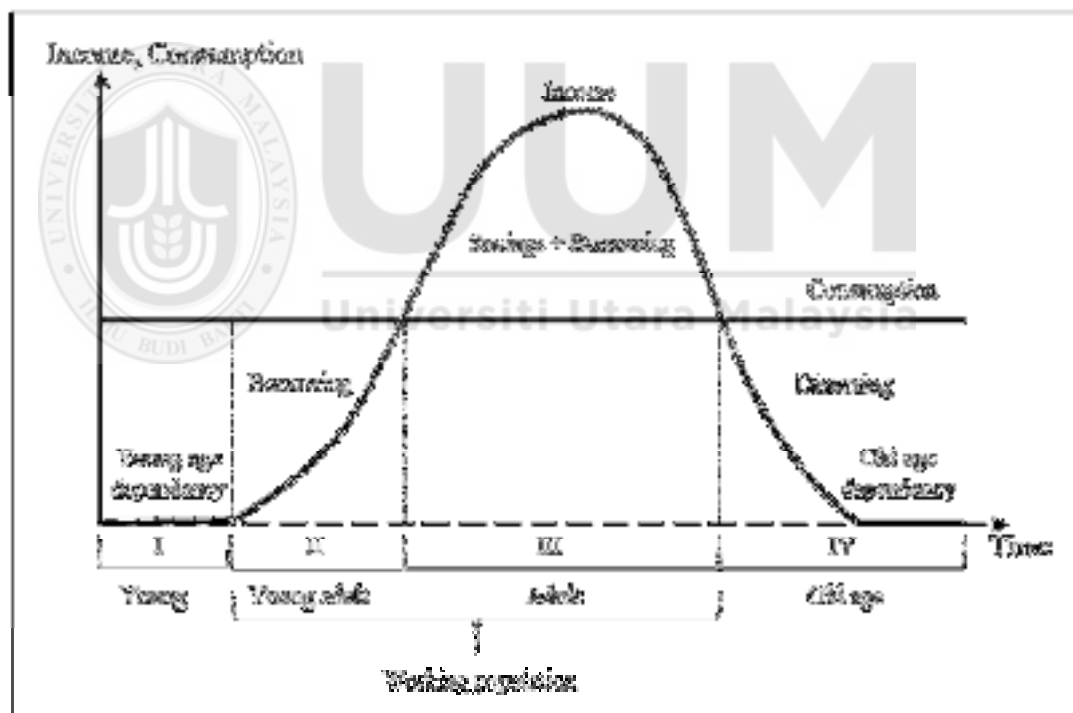
Figure 3.2
Modified Life Cycle Model based on four periods of household
Source: Author's own illustration based on the standard Life Cycle Model

Secondly, period II and period III refer to working population which consists of young adult and adult which is similar to the basic Life Cycle Model which regards them as households in early and prime working age. Despite engaging in borrowing

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and savings activities to smooth their consumption over time, households in this period will also have to take care of their children and parents. Hence, a rise in the young and old age dependency will eventually increases the burden of this working population and indirectly affects their borrowing behaviour.

Finally, period IV is similar to the third period in the Life Cycle Model whereby households are in the retirement period. During this period, households will experience a significant reduction in their income level, therefore, they will use the accumulated savings to support their life. However, as the cost of living and life expectancy risen, the old age population may face difficulties to finance their consumption and thus increases dependency on their children to support their life.

Contrary to the basic Life Cycle Model, this study also predicts that households in the prime working age will still engage in the borrowing activities in order to finance the rising consumption. In addition, the roles of household size may lead the households to postpone their savings decision for retirement due to the rising of households' burden to support their family. Unfortunately, this matter has not been given enough attention in the theoretical model. Hence, a rise in the household commitment for the young and old age population will indirectly increase the household debt, in which should be taken ample consideration in a study of household debt.

For instance, as supported by Brown *et al.* (2015), an increase in the number of children has risen the probability of the households in holding unsecured debt, which suggesting that households may need additional sources of income in supporting the rising family consumption. Hence, the presence of children has increased the

household burden in raising their children and lead to lower wealth accumulation (Stephens & Unayama, 2015).

Despite the influences of the cost of living and household dependency on the household debt, the theoretical model also fails to address the structural breaks issue since it will also give a significant influence on the household borrowing behaviour. This is due to significant changes in the economic structure such as in the event of crisis or policy reforms will affect the household expectation on the current and future economic condition and thereby influences the household debt model. For example, the occurrence of the Global Financial Crisis in 2008 has affected many developed and developing countries and found to be one of the biggest crisis in the history and has significantly affected the household borrowing behaviour (Ozturk & Sozdemir, 2015).

Based on the past literature, even though various econometric techniques have been used to examine the household debt model, there are very limited studies which take into account the roles of structural break in the analysis (Kim *et al.*, 2014; Meng *et al.*, 2013; Paradiso *et al.*, 2014). The failure to include the roles of structural break in the analysis of household debt may lead to a biasedness in the result since its presence will affect the cointegrating rank which causes a biasedness in the model and lead to a wrong economic interpretation (Perron, 1989). Hence, this study will address this issue in the analysis.

Based on the above discussion, this study incorporates additional three independent variables into the basic household debt model shown in Equation 3.16; namely the

food prices and also the young and old age dependency and the conceptual framework of this study is illustrated in Figure 3.3. This study also considers the composition of debt namely mortgage and consumer debts as the dependent variables so that the effects can be examined according to the types of debt. In addition, since the time series data may contain structural break, therefore, it is included in the model as an intervening variable.
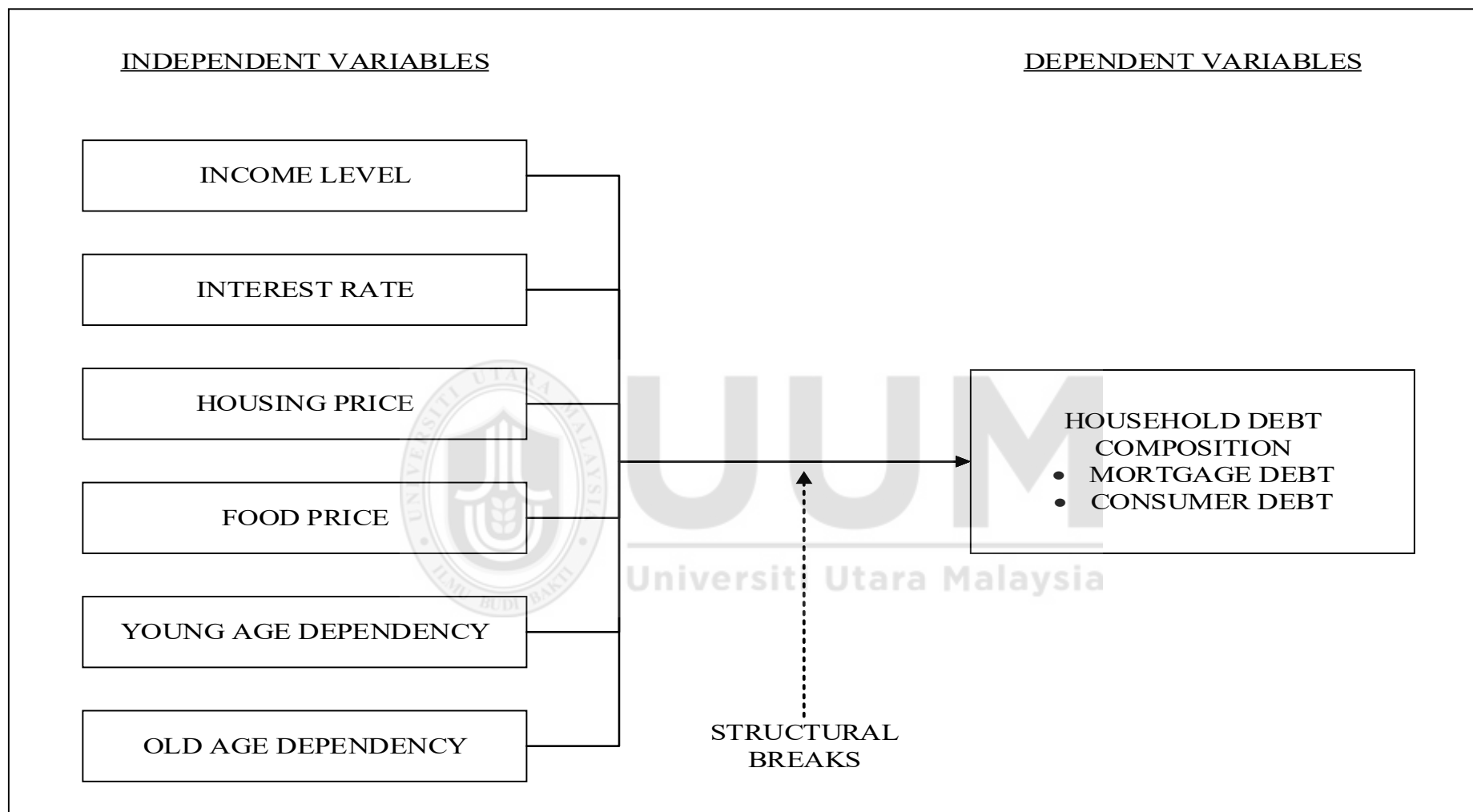
Figure 3.3
Conceptual framework on the determinants of household debt and its composition

3.4   Model Specification

This study aims to investigate the effects of the cost of living and household dependency together with other determinants on the household debt and is composition. The empirical model is developed based on the Life Cycle Model and Permanent Income Hypothesis in order to investigate the reasons behind the highly growing of household debt in Malaysia. The dependent variable in this study is the household debt and its composition which consists of mortgage debt and consumer debt. On the other hand, the independent variables in this study which cover the economic and demographic factors are the income level, interest rates, housing prices, food prices and the young and old age dependency.

This study is based on quarterly time series data from Q1:1999 to Q4:2015. This time period is chosen for the study due to limitations in the data availability for housing prices which only available from the first quarter of 1999 and thus has been chosen as the starting period for this study. In addition, the period chosen also allows the model to investigate the effects of structural break such as the presence of financial crisis and policy reform on the household debt model. The model specification for this study is as follows:

$$LHD_t = \beta_0 + \beta_1 LY_t + \beta_2 IR_t + \beta_3 LHP_t + \beta_4 LFP_t + \beta_5 LYA_t + \beta_6 LOA_t + \varepsilon_t$$

(3.22)

$$LMD_t = \beta_0 + \beta_1 LY_t + \beta_2 IR_t + \beta_3 LHP_t + \beta_4 LFP_t + \beta_5 LYA_t + \beta_6 LOA_t + \varepsilon_t$$

(3.23)

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$$LCD_t = \beta_0 + \beta_1\,LY_t + \beta_2\,IR_t + \beta_3\,LHP_t + \beta_4\,LFP_t + \beta_5\,LYA_t + \beta_6\,LOA_t + \varepsilon_t$$

$$(3.24)$$

Where

LHD	= Log of household debt
LMD	= Log of mortgage debt
LCD	= Log of consumer debt
LY	= Log of GDP per capita
LHP	= Log of housing price index
IR	= Interest rates
LFP	= Log of food price index
YA	= Log of young age dependency
OA	= Log of old age dependency
ε	= Error terms
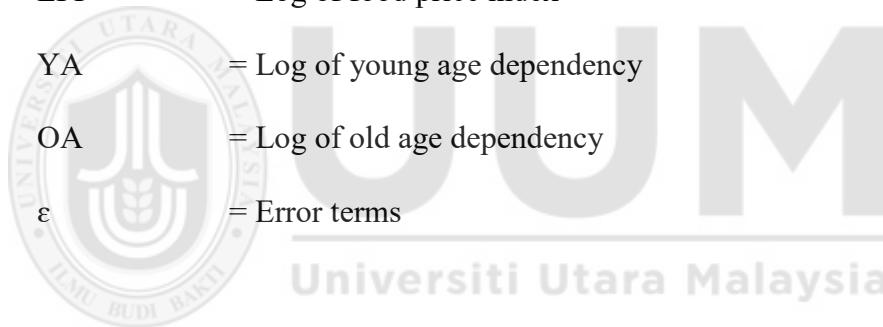
All of the variables are in real terms and have been transformed into natural logarithm except for the interest rates in order to obtain linearity and achieve consistency in the variance. The expected coefficients for the independent variables used in this study are presented in Table 3.1. The estimation equations are specified as follows:

Table 3.1
Determinants of household debt

Variables	Specific Variable	Expected Sign
Income level	GDP per capita	Positive (+)
Interest rates	Average lending rates	Negative (-)
Housing prices	Housing price index	Positive (+)
Cost of living	Food price index	Positive (+)
Demographic	Young and old age dependency	Positive (+)

3.5   Justification of Variables

In this section, this study provides a detailed description and measurement of the variables used in the models. The dependent variable in this study is the household debt and its composition which refers to the mortgage debt and consumer debt. On the other hand, the explanatory variables are the income level, interest rates, housing prices, food prices and the young and old age dependency. Detailed description and measurement of the variables are provided in the following section.

3.5.1   Household debt

Household debt can be defined as the sum of secured and unsecured debt which includes household borrowing for mortgages, personal loans, automobiles, securities and credit card debt (Bank Negara Malaysia, 2013). This study uses household debt and its composition namely; the mortgage debt and consumer debt as the dependent variable. In addition, a study based on the composition of debt is useful since both types of debt used in this study differ significantly in terms of the risk associated and the maturity period and thus the outcome of the analysis may differ. Hence, the estimation result will be more robust in explaining the reasons behind the highly growing of household debt across countries.

Mortgage debt or also known as secured debt refers to household debt which is secured by collateral thus is less risky for the banking sector. According to Bank Negara Malaysia (2013), residential properties represent the largest amount of mortgage debt and found to be the most dominant debt in the household balance sheet. On the other hand, consumer debt or also known as unsecured debt refers to the household debt which is not secured by collateral and thereby is riskier for the

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banking sector (Lotz & Zhang, 2015). Besides, according to Kim (2015), consumer debt refers to loans made by the households to finance the purchase of automobiles, personal loans, credit cards and other reasons including for medical expenses and vacations.

In particular, this study measures the total household debt as the sum of mortgage and consumer debt. The mortgage debt refers to the sum of residential and non-residential property while consumer debt refers to the sum of personal loans, automobile loans, credit card debt and other consumer durable goods. All the variables are measured in real terms in order to avoid the empirical model from suffering with the measurement problem.

3.5.2 Income level

Household income refers to average income received by all economic agents in the country which can also be used to capture the household ability to get fund. Usually, the banking and financial sectors will use the borrower's income level as a tool for credit rationing since it will indirectly indicate the household capacity in repaying the debt. By following Meng *et al.* (2013), this study uses the GDP as the proxy for household income. However, in order to examine the effects based on per household, this study will use the real GDP per capita as the measure of income level.

Apparently, households with a higher income level will be able to secure a higher amount of loan due to their ability to service a higher debt level. Moreover, higher level of GDP is also expected to increase in consumer confidence thus encouraging household borrowing. However, if a rise in the income level is used to repay the debt,

thus, the growth in income will have a negative impact on the household debt. Correspondingly, as supported in the literature, positive influences usually outweigh the negative impacts and thus positive coefficient is expected for this variable.

3.5.3 Interest rate

Interest rate refers to the cost of borrowing fund from the banking and financial institutions which can also be used as the measurement of financial liberalization. Even though some of the past studies in Malaysia have measured the interest rate by using the base lending rates (BLR), however, the findings are inconsistent. For instance, a study done by Mokhtar and Ismail (2013) using the base lending rate as the measure of interest rate has found a positive relationship between interest rate and household debt while a research conducted by Rahman and Masih (2014) using the same measurement has found that the interest rate has no effect. This may be due to the level of base lending rate which is normally set by the Central Bank and with its value does not change significantly over time thus it may not reveal the true effects of interest rate on household debt.

Therefore, in this study, the interest rate is measured by the real average lending rates with commercial banks which is similar to a study carried out by Jacobsen and Naug (2004). This variable is expected to give a negative influence on the household debt since the rise of interest rates will lead to higher debt servicing and encourage household borrowing. Moreover, even though the rise in the interest rate eventually leads to a higher supply of loans by the lenders, the demand side influence is expected to be dominant and a negative coefficient is expected for this variable.

3.5.4 Housing prices

The role of housing prices is important in the study of household debt since the largest type of household borrowing is in the form of mortgage debt specifically the purchase of residential properties (Bank Negara Malaysia, 2013). In addition, the inclusion of housing prices in the study of household debt helps to capture the wealth effect as proposed by the Life Cycle Model (Moroke, 2014).

By following Meniago *et al.* (2013), this study applies the real housing price index as the measure of housing prices. Apparently, most of the studies found that housing prices has a positive influence on the household debt since a rise in housing prices indicates a higher housing services for new buyers while the existing property owners can take the opportunity to get an additional fund by using the mortgage equity withdrawal (Justiniano *et al.*, 2015; Moroke, 2014; Meng *et al.*, 2013; Meniago *et al.*, 2013; Turinetti & Zhuang, 2011; Debelle, 2004a; Iacoviello, 2004; Canner *et al.*, 2002; Pollin, 1988). Thus, a positive coefficient is expected for this variable.

3.5.5 Food prices

According to Moroke (2014), the inclusion of consumer price index is necessary to determine the changes in the debt level when the prices of goods and services fluctuate. As supported by Dynan and Kohn (2007), the debt level has been rising since the majority of the U.S households borrow money to finance basic consumption which is consistent with researches carried out by Boushey and Weller (2008) and Weller (2007) who argue that the rise in consumer credit is due to a rising cost of living. As a result, households utilize the credit services in order to finance their consumption activities as a response to price changes

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Apparently, even though the consumer price index is usually being used to measure the cost of living in a country from the macroeconomic perspective, the presence of housing prices in the household debt model which is frequently used to capture the wealth effect may bring towards a multicollinearity problem since the housing prices is one of the important contributors in the consumer price index. Thus, the disaggregated data of the consumer price index may be more suitable to capture the effect of the cost of living in the study of household debt.

Therefore, this study uses the real food price index as the proxy for the cost of living since it has been increasing significantly since the past decade and can help to determine the changes in household debt as the price level fluctuates (Food & Agriculture Organization of the United Nations, 2015; Department of Statistics Malaysia, 2014). The substantial increase in the food prices has contributed to a remarkable rise in the consumer prices since the food consumption has the highest weightage in the consumer price index due to its importance in household consumption and give more influence on the cost of living (Brahmbhatt & Christiaensen, 2008). This variable is expected to carry a positive sign since a rise in the cost of living influences the households to use the credit facilities in maintaining their lifestyle.

3.5.6   Young and old age dependency

Past studies conducted at the micro level have highlighted the roles of household size in influencing the debt. In particular, the number of children which has been used as the proxy for household size have found a positive influence on household debt (Brown *et al.*, 2015; Beer & Schürz, 2007; Crook, 2001; Cox & Jappelli, 1993; Duca

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& Rosenthal, 1993; Bryant & Wang, 1990; Sullivan & Worden, 1986; Tobin, 1967; Enthoven, 1957). However, some studies have found that the household size does not influence the debt level as due to forward looking behaviour, the households adopt stricter budgeting strategies to maintain their consumption (Muellbauer, 1994; Livingstone & Lunt, 1992).

Despite the ambiguous effect of the household size found in the micro level study, further investigation on the roles of household size at the macro level is beneficial to determine the effect at the aggregate level. Therefore, by extending the factor to a macro level study, this study includes the young age dependency as the proxy for household size. Besides the influence of children on household consumption function, household expenditure may also rise due to their responsibility to support their parents' consumption. Thus, the inclusion of the young and old age dependency in the debt model could help to examine on how far the household commitment on each age group has affected the household borrowing behavior mainly among the working population.

In particular, young age dependency ratio refers to the ratio of population with the age below 15 years to the working aged population between 15 to 64 years old while the old age dependency ratio refers to the ratio of the population above the age of 64 years old which is dependent on the working aged population. The quarterly data for the population according to age cohort is estimated using the average yearly growth rate of the age structure of the population. Both young and old age dependencies are expected to carry a positive sign since a rising burden on the working population may encourage them to increase their debt to support the rising consumption.

3.5.7 Structural break

In order to answer the fourth objective, this study includes the roles of structural break in the analysis to determine how far the household debt model will be affected when the structure of the economy changes. For instance, the occurrence of the Global Financial Crisis which started in the United States and spread to the world economies in 2008 has negatively influenced the economic performance of most economies all over the world is considered one of the biggest crisis in the history (Ozturk & Sozdemir, 2015; Meniago *et al.*, 2013). The trend in the household debt in Malaysia which has been found to be rising tremendously following the crisis indirectly suggests that the presence of the crisis will have a significant influence on the household debt model.

This study considers multiple structural break which is chosen endogenously by the model. In order to accurately identify the break point based on the data, this study conducts the unit root test proposed by Narayan and Popp (2010) since it has been found to be more superior than other tests and also able to identify the break date very accurately even in the situation of very small breaks (Narayan & Popp, 2013).

3.6 Econometric Procedure

This study aims to examine the determinants of household debt in Malaysia based on composition of debt which focuses on the roles of the cost of living and household dependency. As a preliminary test, this study conducts a unit root test to identify the stationarity of the variables. In the next part, the Auto-regressive Distributed Lag (ARDL) modelling approach will be used to determine the short run and long run

models. This study also extends the model to include the roles of structural break in order to determine how far the structural break has affected the household debt model. A diagnostic test is also performed to ensure the robustness of the model.

3.6.1 Unit root test

Econometric theory requires that all variables to be stationary if the regressions are to be realistic. Therefore, all variables used in the study should be tested to determine whether they are influenced by economic factors of a relatively permanent nature or by self-correcting forces that indicate temporary elements in their dynamics. This study includes both the traditional and also the unit root tests which take into account multiple structural breaks in the analysis since this study identifies two major changes that occurred in the economy during the period covered in this study. This is due to the presence of structural break in the analysis which may give a permanent effect on the trend of the time series such as the existence of large economic shock or changes in the economic polices such as the presence of economic crisis (Glynn, Perera, & Verma, 2007).

3.6.1.1 Traditional unit root test

Prior to any time-series analysis, the investigation of the stationarity of the variables is important since a variable which is non-stationary will follow a random walk and thus will lead to spurious regression and wrong economic interpretation. As a preliminary test, this study employs the traditional unit root test by using the augmented Dicky-Fuller (ADF) test in order to check the stationarity of the variables. It is an augmented version of the Dickey–Fuller test for a larger and more complicated set of time series models.

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The augmented Dickey–Fuller (ADF) statistics, used in the test, is a negative number. The more negative it is, the stronger the rejections of the hypothesis that there is a unit root at some level of confidence. In order to test it, the equation is considered as follows:

$$\Delta y_t = \beta_1 + \beta_{2t} + \delta y_{t-1} + \alpha_i \sum \Delta y_{t-1} + \varepsilon_t \tag{3.25}$$

Where y_t is our variable of interest, Δ is the differencing operator, t is the time trend and ε is the white noise residual of zero mean and constant variance. B_1, β_2, δ and α_i are the set of parameters to be estimated. In order to determine the lag length, k, this study will use the Akaike Information Criterion (AIC) (Akaike, 1998). Specifically, the null and alternative hypothesis in unit roots tests are as follows:

H_0: $\delta = 0$ (y_t is non-stationary)

H_1: $\delta \neq 0$ (y_t is stationary)

The H_0 hypothesis can be rejected if the t-test statistics from this test is negatively less than the critical value tabulated. In other words, a unit root exists in the series y_t (implies non-stationary) if the null hypothesis of δ equals zero that is not rejected (Gujarati, 2003).

3.6.1.2 Unit root test in the presence of structural breaks

Besides the traditional unit root test, this study also conducts the unit root test which takes into account the roles of structural break. This is due to the weaknesses of the ADF test which may fail to reject the null hypothesis of non-stationary when the series contains a structural break. According to Perron (1989), the results of the traditional unit root test can be misleading due to the failure to take into account the role of structural break thus reducing the ability for the null hypothesis to be rejected.

Specifically, this study has extended the examination using the unit root test which is based on the endogenous structural break whereby the break point will be determined endogenously based on the data. The main advantage of this test is that it does not require any prior knowledge in determining the break date since the economic information available may not be sufficient for the determination of the break date. In addition, as supported by Christiano (1992), the exogenous determination of structural break may be inappropriate since the determination of the break dates based on the economic information may invalidate the distribution theory underlying the conventional testing.

So far, there are various techniques found in the literature on the unit root testing with multiple breaks. One of the famous tests is the Lagrange multipliers (LM) unit root test proposed by Lee and Strazicich (2003) which has been found to overcome the biased estimation of the test proposed by Zivot and Andrews (1992) since the latter does not allow for a break under the null hypothesis and may result in a biased test. However, recently, Narayan and Popp (2010) have proposed a new augmented Dicky-Fuller test for unit root test which account for two endogenous structural breaks with

the break determined endogenously by the model. Evidently, this new unit root test has been found to be more powerful and able to identify the breaks date more accurately compared to Lee and Strazicich (2003) and thus is used in this study.

As supported by Narayan and Popp (2013), by using the Monte-Carlo simulations, results obtained suggest that the unit root test proposed by Narayan and Popp (2010) has a higher power and able to determine the break point more accurately and found to be more superior than the test proposed by Lee and Strazicich (2003). In addition, this test also able to identify the break date very accurately although in the situation of very small breaks.

By following Narayan and Popp (2010), this study considers two model specifications known as Model 1 (M1) and Model 2 (M2). The first model allows two structural breaks in the level while the second allows two breaks in both levels and slope with both models differ in terms of how the deterministic component, d_t is defined. The equations of both models are specified as follows.

$$d_t^{M1} = \alpha + \beta_t + \psi^*(L)(\theta_1 DU'_{1,t} + \theta_2 DU'_{2,t}) \tag{3.26}$$

$$d_t^{M2} = \alpha + \beta_t + \psi^*(L)(\theta_1 DU'_{1,t} + \theta_2 DU'_{2,t} + \gamma_1 DT'_{1,t} + \gamma_2 DT'_{2,t}) \tag{3.27}$$

With $DU'_{i,t} = 1(t > T'_{B,i})$ and $DT'_{i,t} = 1(t > T'_{B,i})(t - T'_{B,i})$ for $i = 1,2$. In this case, $T'_{B,i}, i = 1,2$ refers to the actual break dates while the parameters θ_1 and γ_1 indicate the magnitude of the level and slope breaks. The inclusion of $\psi^*(L)$ in both Equations 3.26 and Equation 3.27 enables the breaks to occur slowly over time. Specifically, the

IO-type test regressions for the unit root hypothesis for Model 1 and Model 2 is shown in Equation 3 and Equation 4 below.

$$y_t^{M1} = \rho y_{t-1} + \alpha_1 + \beta^* t + \theta_1 D(T_B')_{1,t} + \theta_2 D(T_B')_{2,t} + \delta_1 DU_{1,t-1}' +$$
$$\delta_2 DU_{2,t-1}' + \sum_{j=1}^{k} \beta_j \Delta y_{t-j} + e_t \qquad (3.28)$$

$$y_t^{M2} = \rho y_{t-1} + \alpha^* + \beta^* t + \kappa_1 D(T_B')_{1,t} + \kappa_2 D(T_B')_{2,t} + \delta_1^* DU_{1,t-1}' +$$
$$\delta_2^* DU_{2,t-1}' + \gamma_1^* DT_{1,t-1}' + \gamma_2^* DT_{2,t-1}' + \sum_{j=1}^{k} \beta_j \Delta y_{t-j} + e_t \qquad (3.29)$$

Whereby $\alpha_1 = \psi^*(1)^{-1}[(1-\rho)\alpha + \rho\beta] + \psi^{*\prime}(1)^{-1}(1-\rho)\beta$, with $\psi^{*\prime}(1)^{-1}$ as the mean lag, $\beta^* = \psi^*(1)^{-1}(1-\rho)\beta, \emptyset = \rho - 1, \delta_i = -\emptyset\theta_i$ and $D(T_B')_{i,t} = 1(t = T_{B,i}' + 1), i = 1,2$ and $\kappa_1 = (\theta_i + \gamma_i), \delta_i^* = (\gamma_i - \emptyset\theta_i)$, and $\gamma_i^* = -\emptyset\gamma_i, i = 1,2$.

Furthermore, the t-statistics of $\hat{\rho}$ which is symbolize by $t_{\hat{\rho}}$ as in Equation 3.28 and Equation 3.29 will be used to test the unit root null hypothesis, $\rho = 1$ against the alternative hypothesis of $\rho < 1$. Since this test assumes that the actual break dates are unknown, hence the symbol $T_{B,i}'$ in both Model 1 and Model 2 need to be replaced by the estimates of the $\hat{T}_{B,i}'$ for $i = 1,2$, so that the unit root testing can be conducted.

By using sequential procedure comparable to Kapetanios (2005), the breaks date selection is made by maximizing the significance of the break dummy coefficient of θ_i and κ_i under the restriction of $\theta_2 = \delta_2 = 0$ for Model 1 and $\kappa_2 = \delta_2^* = \gamma_2^* = 0$ for Model 2 and the maximization equation is shown as below.

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$$\hat{T}_{B,1} = \begin{cases} \arg\max_{T_{B,1}} \left| t_{\hat{\theta}_1}(T_{B,1}) \right|, & \text{for Model 1} \\ \arg\max_{T_{B,1}} \left| t_{\hat{\kappa}_1}(T_{B,1}) \right|, & \text{for Model 2} \end{cases}$$

(3.30)

By imposing the first break obtained $\hat{T}_{B,1}$ into the test regression, the second break is estimated as shown in Equation 3.31.

$$\hat{T}_{B,2} = \begin{cases} \arg\max_{T_{B,2}} \left| t_{\hat{\theta}_2}(\hat{T}_{B,1}, T_{B,2}) \right|, & \text{for Model 1} \\ \arg\max_{T_{B,2}} \left| t_{\hat{\kappa}_2}(\hat{T}_{B,1}(T_{B,2})) \right|, & \text{for Model 2} \end{cases}$$

(3.31)

3.6.2 Auto-regressive Distributed Lag (ARDL) modelling approach

Having established the stationarity of the data, this study proceeds with the estimation by using the ARDL modeling approach in order to determine the long run relationship of the variables and determine the speed of adjustment of the model in the short run. There are several advantages of the ARDL approach in comparison with other econometric approaches.

Firstly, this analysis allows for testing the model which consists of variables of mixed order I(0) or I(1). Secondly, the ARDL modeling approach is suitable for a study with small sample size since the properties are found to be more superior than the cointegration test proposed by Johansen and Juselius (1990) which requires a large sample size (Pesaran, Shin, & Smith, 2001). Since this study is based on only 68 observations due to limitation in the data availability, hence, the ARDL modeling approach is more suitable to estimate the model (Narayan, 2005).

By following Pesaran *et al.* (2001), the ARDL procedure includes two steps. First, this study utilizes the ARDL bounds testing approach to determine the existence of a long run relationship among the variables. This test is useful since it allows lags in both the dependent and independent variables which indicates that the past values of the variables may help in determining the present value of the variables since the changes in variables may not always give an immediate effect on other variables and thus the lag variable is plausible to identify the issue. In addition, the ARDL bound testing is more flexible since it allows for different lags structure for different variables.

As highlighted in the model specification in Section 3.4, all of the variables which are in level have been transformed into natural logarithm in order to obtain linearity and reduce the problem of heteroscedasticity in the model. The estimation equations are specified as follows:

$$
\begin{aligned}
\Delta LHD_t = \ & \beta_0 + \sum_{i=1}^{p} \beta_1 \, \Delta LHD_{t-i} + \sum_{i=0}^{p} \beta_2 \, \Delta LY_{t-i} \sum_{i=0}^{p} \beta_3 \, \Delta IR_{t-i} + \sum_{i=0}^{p} \beta_4 \, \Delta LHP_{t-i} \\
& + \sum_{i=0}^{p} \beta_5 \, \Delta LFP_{t-i} + \sum_{i=0}^{p} \beta_6 \, \Delta LYA_{t-i} + \sum_{i=0}^{p} \beta_7 \, \Delta LOA_{t-i} + \sigma_1 LHD_{t-1} \\
& + \sigma_2 LY_{t-1} + \sigma_3 IR_{t-1} + \sigma_4 LHP_{t-1} + \sigma_5 LFP_{t-1} + \sigma_6 LYA_{t-1} + \sigma_7 LOA_{t-1} \\
& + \varepsilon_t
\end{aligned}
$$

(3.32)

$$\Delta LMD_t = \beta_0 + \sum_{i=1}^{p} \beta_1 \Delta LMD_{t-i} + \sum_{i=0}^{p} \beta_2 \Delta LY_{t-i} \sum_{i=0}^{p} \beta_3 \Delta IR_{t-i} + \sum_{i=0}^{p} \beta_4 \Delta LHP_{t-i}$$

$$+ \sum_{i=0}^{p} \beta_5 \Delta LFP_{t-i} + \sum_{i=0}^{p} \beta_6 \Delta LYA_{t-i} + \sum_{i=0}^{p} \beta_7 \Delta LOA_{t-i} + \sigma_1 LMD_{t-1}$$

$$+ \sigma_2 LY_{t-1} + \sigma_3 IR_{t-1} + \sigma_4 LHP_{t-1} + \sigma_5 LFP_{t-1} + \sigma_6 LYA_{t-1} + \sigma_7 LOA_{t-1}$$

$$+ \varepsilon_t$$

(3.33)

$$\Delta LCD_t = \beta_0 + \sum_{i=1}^{p} \beta_1 \Delta LCD_{t-i} + \sum_{i=0}^{p} \beta_2 \Delta LY_{t-i} \sum_{i=0}^{p} \beta_3 \Delta IR_{t-i} + \sum_{i=0}^{p} \beta_4 \Delta LHP_{t-i}$$

$$+ \sum_{i=0}^{p} \beta_5 \Delta LFP_{t-i} + \sum_{i=0}^{p} \beta_6 \Delta LYA_{t-i} + \sum_{i=0}^{p} \beta_7 \Delta LOA_{t-i} + \sigma_1 LCD_{t-1}$$

$$+ \sigma_2 LY_{t-1} + \sigma_3 IR_{t-1} + \sigma_4 LHP_{t-1} + \sigma_5 LFP_{t-1} + \sigma_6 LYA_{t-1} + \sigma_7 LOA_{t-1}$$

$$+ \varepsilon_t$$

(3.34)

where Δ is the first difference operator and p is the optimal lag length with β_1 to β_7 represent the short run dynamics of the model while σ_1 to σ_7 represent the long run relationship. Since this study is based on quarterly data, the maximum number of lag used is four which is selected using the Akaike Information Criterion (AIC).

Specifically, the hypothesis testing for each model shown in Equation 3.32 to Equation 3.34 is (H0: $\sigma_1 = \sigma_2 = \sigma_3 = \sigma_4 = \sigma_5 = \sigma_6 = \sigma_7 = 0$) which indicates that there is no cointegration among the variables. The critical value of this study will be based on the critical value as suggested by Narayan (2005) since it is more suitable based on the sample used in this study. If the result of the F-test statistics is greater than the

upper bound level shown in the critical value, it can be concluded that cointegration exists among the variables.

Based on the F-test, if the results based on the bound testing confirm the existence of the long run relationship, the second step requires the estimation of the following short run model in order to determine the long run and short run coefficients and thus helping to answer the first and second objectives of this study.

$$\Delta LHD_t = \beta_0 + \sum_{i=1}^{p} \beta_1 \, \Delta LHD_{t-i} + \sum_{i=0}^{p} \beta_2 \, \Delta LY_{t-i} + \sum_{i=0}^{p} \beta_3 \, \Delta IR_{t-i} + \sum_{i=0}^{p} \beta_4 \, \Delta LHP_{t-i}$$
$$+ \sum_{i=0}^{p} \beta_5 \, \Delta LFP_{t-i} + \sum_{i=0}^{p} \beta_6 \, \Delta LOA_{t-i} + \sum_{i=0}^{p} \beta_7 \, \Delta LYA_{t-i} + \lambda ECT_{t-1}$$
$$+ \varepsilon_t$$

(3.35)

$$\Delta LMD_t = \beta_0 + \sum_{i=1}^{p} \beta_1 \, \Delta LMD_{t-i} + \sum_{i=0}^{p} \beta_2 \, \Delta LY_{t-i} + \sum_{i=0}^{p} \beta_3 \, \Delta IR_{t-i} + \sum_{i=0}^{p} \beta_4 \, \Delta LHP_{t-i}$$
$$+ \sum_{i=0}^{p} \beta_5 \, \Delta LFP_{t-i} + \sum_{i=0}^{p} \beta_6 \, \Delta LOA_{t-i} + \sum_{i=0}^{p} \beta_7 \, \Delta LYA_{t-i} + \lambda ECT_{t-1}$$
$$+ \varepsilon_t$$

(3.36)

$$\Delta LCD_t = \beta_0 + \sum_{i=1}^{p} \beta_1 \, \Delta LCD_{t-i} + \sum_{i=0}^{p} \beta_2 \, \Delta LY_{t-i} + \sum_{i=0}^{p} \beta_3 \, \Delta IR_{t-i} + \sum_{i=0}^{p} \beta_4 \, \Delta LHP_{t-i}$$
$$+ \sum_{i=0}^{p} \beta_5 \, \Delta LFP_{t-i} + \sum_{i=0}^{p} \beta_6 \, \Delta LOA_{t-i} + \sum_{i=0}^{p} \beta_7 \, \Delta LYA_{t-i} + \lambda ECT_{t-1}$$
$$+ \varepsilon_t$$

(3.37)

where λ is the speed of adjustment parameter which should be significant and carry a negative sign will support the existence of cointegration among the variables while ECT is one period lagged of the error correction terms. Apparently, ECT measures the speed of adjustment at which the household debt returns to equilibrium due to changes in the explanatory variables and thus will be used to answer the third objective of this study.

3.6.3   The effects of structural break

Generally, the structural breaks are a common issue in the time series analysis which occurs mainly due to changes in the structure of the economy. For instance, the presence of shock in the economy such as in the event of economic crises, policy reforms and other significant changes that occur will result in a structural break in the data since the macroeconomic variables are usually affected when such changes occur.

Basically, the most common test that is widely used to detect the presence of structural break in a regression model is the Chow breakpoint test (Chow, 1960). In particular, this test divides the sample into two subsamples and tests whether there is an equality among the parameters in both subsamples by using the F-test statistics. If the findings support that there is a significant discrepancy among the subsamples, hence this indicates that the structural break has occurred. However, one challenging issue for this test is that the break date should be a priori known or exogenously determined (Hansen, 2001).

Therefore, this study uses the endogenous structural break obtained based on the Narayan and Popp (2010) unit root test and performs the Chow test to confirm the break date found in the data. In particular, the structural break can be tested using the following test statistics:

$$F = \frac{[SSR - (SSR_1 + SSR_2)]/k}{(SSR_1 + SSR_2)/[t + (T - t) - 2k]} \sim F_{k, t + (T - t) - 2k}$$

where SSR is the sum of squared residuals, t is the number of observation in the first subsample, $(T - t)$ is the number of observation in the second subsample while k refers to the number of regressors. The null hypothesis of the Chow test indicates that there is no structural break at the specified breakpoint. The hypothesis testing of the Chow test are as follows:

H_0: $\beta_1 = \beta_2$ (No structural break)

H_1: $\beta_1 \neq \beta_2$

If the p-value of the test statistics is greater than the significance level, thus the null hypothesis that there are no significant differences across time periods cannot be rejected hence implying that there is no structural break in the model and the original model is suitable to be used for reporting and forecasting purposes.

3.6.3.1 Auto-regressive Distributed Lag (ARDL) modelling approach

Once the presence of the structural break as found in the Narayan and Popp (2010) has been confirmed by using the Chow breakpoint test, thus, to answer the fourth

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objective, this study will include the roles of structural break as dummy variables in the existing model of the analysis so that a comparison can be made between the models to analyze whether the presence of the break has affected the debt model.

By following Pesaran *et al.* (2001), this study conducts the ARDL bound testing to assess whether all the variables are cointegrated in the long run. The estimation equations are similar to Equation 3.27 to Equation 3.29 but have been extended to include the dummy variables, D_{1t} and D_{2t}, in order to account for the structural break.

$$
\begin{aligned}
\Delta LHD_t = \ &\alpha_0 + \sum_{i=1}^{p} \alpha_1\, \Delta LHD_{t-i} + \sum_{i=0}^{p} \alpha_2\, \Delta LY_{t-i} \sum_{i=0}^{p} \alpha_3\, \Delta IR_{t-i} + \sum_{i=0}^{p} \alpha_4\, \Delta LHP_{t-i} \\
&+ \sum_{i=0}^{p} \alpha_5\, \Delta LFP_{t-i} + \sum_{i=0}^{p} \alpha_6\, \Delta LYA_{t-i} + \sum_{i=0}^{p} \alpha_7\, \Delta LOA_{t-i} + \alpha_8 D_{1t} + \alpha_9 D_{2t} \\
&+ \varphi_1 LHD_{t-1} + \varphi_2 LY_{t-1} + \varphi_3 IR_{t-1} + \varphi_4 LHP_{t-1} + \varphi_5 LFP_{t-1} \\
&+ \varphi_6 LYA_{t-1} + \varphi_7 LOA_{t-1} + v_t
\end{aligned}
$$

(3.38)

$$
\begin{aligned}
\Delta LMD_t = \ &\alpha_0 + \sum_{i=1}^{p} \alpha_1\, \Delta LMD_{t-i} + \sum_{i=0}^{p} \alpha_2\, \Delta LY_{t-i} \sum_{i=0}^{p} \alpha_3\, \Delta IR_{t-i} + \sum_{i=0}^{p} \alpha_4\, \Delta LHP_{t-i} \\
&+ \sum_{i=0}^{p} \alpha_5\, \Delta LFP_{t-i} + \sum_{i=0}^{p} \alpha_6\, \Delta LYA_{t-i} + \sum_{i=0}^{p} \alpha_7\, \Delta LOA_{t-i} + \alpha_8 D_{1t} + \alpha_9 D_{2t} \\
&+ \varphi_1 LMD_{t-1} + \varphi_2 LY_{t-1} + \varphi_3 IR_{t-1} + \varphi_4 LHP_{t-1} + \varphi_5 LFP_{t-1} \\
&+ \varphi_6 LYA_{t-1} + \varphi_7 LOA_{t-1} + v_t
\end{aligned}
$$

(3.39)

$$\Delta LCD_t = \alpha_0 + \sum_{i=1}^{p} \alpha_1 \Delta LCD_{t-i} + \sum_{i=0}^{p} \alpha_2 \Delta LY_{t-i} \sum_{i=0}^{p} \alpha_3 \Delta IR_{t-i} + \sum_{i=0}^{p} \alpha_4 \Delta LHP_{t-i}$$

$$+ \sum_{i=0}^{p} \alpha_5 \Delta LFP_{t-i} + \sum_{i=0}^{p} \alpha_6 \Delta LYA_{t-i} + \sum_{i=0}^{p} \alpha_7 \Delta LOA_{t-i} + \alpha_8 D_{1t} + \alpha_9 D_{2t}$$

$$+ \varphi_1 LCD_{t-1} + \varphi_2 LY_{t-1} + \varphi_3 IR_{t-1} + \varphi_4 LHP_{t-1} + \varphi_5 LFP_{t-1}$$

$$+ \varphi_6 LYA_{t-1} + \varphi_7 LOA_{t-1} + v_t$$

(3.40)

where Δ refers to the first difference operator while p indicates the optimal lag length
which is chosen based on the Akaike Information Criterion (AIC) with maximum of
four lag. The variables α_1 to α_9 represent the short run dynamics of the model while φ_1
to φ_7 represent the long run relationship. The null hypothesis indicates that there is no
long run relationship among the variables (H0: $\varphi_1 = \varphi_2 = \varphi_3 = \varphi_4 = \varphi_5 = \varphi_6 = \varphi_7 = 0$)
for each model shown in Equation 3.38 to Equation 3.40. If the F-test statistics is
greater than the critical value proposed by Narayan (2005), hence it can be concluded
that all the variables are cointegrated.

Once the cointegration has been confirmed, the estimation of the long run model can
be conducted and followed by the estimation of the short run model which can help to
answer the fourth objective of this study. Therefore, in order to investigate the roles of
the break in influencing the household debt model when a structural break occurs in
the economy, two intervention dummies variables, D_{1t} and D_{2t}, which are determined
endogenously by the data and confirmed by using the Chow test are incorporated into
the existing model. Hence, this will allow for a comparison to be made between the
two models in determining how far the structural break have affected the household

debt model. The estimated equations for the model with structural break are as follows:

$$\Delta LHD_t = \alpha_0 + \sum_{i=1}^{p} \alpha_1 \, \Delta LHD_{t-i} + \sum_{i=0}^{p} \alpha_2 \, \Delta LY_{t-i} + \sum_{i=0}^{p} \alpha_3 \, \Delta IR_{t-i} + \sum_{i=0}^{p} \alpha_4 \, \Delta LHP_{t-i}$$

$$+ \sum_{i=0}^{p} \alpha_5 \, \Delta LFP_{t-i} + \sum_{i=0}^{p} \alpha\beta_6 \, \Delta LOA_{t-i} + \sum_{i=0}^{p} \alpha_7 \, \Delta LYA_{t-i} + D_{1t} + D_{2t}$$

$$+ \lambda ECT_{t-1} + v_t$$

(3.41)

$$\Delta LMD_t = \alpha_0 + \sum_{i=1}^{p} \alpha_1 \, \Delta LMD_{t-i} + \sum_{i=0}^{p} \alpha_2 \, \Delta LY_{t-i} + \sum_{i=0}^{p} \alpha_3 \, \Delta IR_{t-i} + \sum_{i=0}^{p} \alpha_4 \, \Delta LHP_{t-i}$$

$$+ \sum_{i=0}^{p} \alpha_5 \, \Delta LFP_{t-i} + \sum_{i=0}^{p} \alpha_6 \, \Delta LOA_{t-i} + \sum_{i=0}^{p} \alpha_7 \, \Delta LYA_{t-i} + D_{1t} + D_{2t}$$

$$+ \lambda ECT_{t-1} + v_t$$

(3.42)

$$\Delta LCD_t = \alpha_0 + \sum_{i=1}^{p} \alpha_1 \, \Delta LCD_{t-i} + \sum_{i=0}^{p} \alpha_2 \, \Delta LY_{t-i} + \sum_{i=0}^{p} \alpha_3 \, \Delta IR_{t-i} + \sum_{i=0}^{p} \alpha_4 \, \Delta LHP_{t-i}$$

$$+ \sum_{i=0}^{p} \alpha_5 \, \Delta LFP_{t-i} + \sum_{i=0}^{p} \alpha_6 \, \Delta LOA_{t-i} + \sum_{i=0}^{p} \alpha_7 \, \Delta LYA_{t-i} + D_{1t} + D_{2t}$$

$$+ \lambda ECT_{t-1} + v_t$$

(3.43)

where λ is the speed of adjustment while ECT refers to one period lagged of the error correction terms.

3.6.4 Diagnostic test

In order to test the robustness of the model, the diagnostic test based on Auto-Regressive Conditional Heteroskedasticity (ARCH) test, Lagrange Multiplier (LM) test. Ramsey RESET test and Normality test will be performed. Finally, the stability test based on the CUSUM and CUSUMSQ will be conducted to determine the stability of the model. The entire tests are discussed in the following section.

3.6.4.1 Auto-Regressive Conditional Heteroskedasticity (ARCH) test

Heteroskedasticity refers to a situation whereby the variance of the model is not constant. Since heteroskedasticity is a common problem for time series data, therefore, the ARCH test will be conducted to detect the presence of this problem. The hypothesis testing for the test are as follows:

H_0: The variance is constant (No ARCH effect)

H_1: Unequal variance

If the p-value of the test is greater that the significance level, thus the null hypothesis of homoscedasticity is failed to be rejected which indicates that the model has a constant variance or no ARCH effect and thereby fulfills the classical assumption.

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3.6.4.2   Lagrange Multiplier (LM) test

In order to test the presence of autocorrelation problem, the Breusch-Godfrey serial correlation LM test will be performed. The hypothesis testing to detect the presence of autocorrelation is as follows:

Ho: $\rho = 0$ (No autocorrelation)

H_1: At least one of the ρ is not equal to zero (Error terms are serially correlated)

The null hypothesis indicates that there is no autocorrelation of any order. If the value of the test statistics exceeds the critical chi-square value at the chosen significance level or if the p-value of the test is lower than the significance level, thus the null hypothesis could be rejected suggesting that the model suffers with autocorrelation problem.

3.6.4.3   Normality test

Normality test is conducted to determine if the data set follows a normal distribution whereby the violation of this assumption may result in a misleading interpretation. This study will use both the statistical and graphical methods to test the normality of the data. For the statistical method, this study utilizes the Jarque-Bera normality test statistics to empirically detect the presence of normality in the model. The hypothesis test for Jarque-Bera test are as follows:

H_0: The error term follows a normal distribution

H_1: The error terms are not normally distributed

If the p-value of the test is greater than any significance level of either 1%, 5% or 10%, hence the null hypothesis cannot be rejected which indicates that the error terms are normally distributed. In addition, graphical methods based on the frequency distribution (histogram) should also illustrate that the residuals are a bell-shaped which resembles a normal distribution.

3.6.4.4   Ramsey RESET Test

In order to diagnose the general functional form misspecification and omitted variable biased, this study conducts the Ramsey RESET Test (Regression Specification Error Test) as proposed by Ramsey (1969). The null hypothesis indicates that the model is correctly specified. This test uses the F-statistics to test the null hypothesis of H_0: $\delta = 0$. If the null hypothesis that all of the $\delta = 0$ is rejected, hence it can be concluded that the model suffers with misspecification problem due to omission of important variables or incorrect functional form.

3.6.4.5   Stability test

In order to determine the stability of the model used, this study uses the cumulative sum of the residuals (CUSUM) and CUSUM squared (CUSUMQ) test. If the plot of the CUSUM and CUSUMSQ lies within the critical bound of 5 percent significance level, hence, the null hypothesis that the parameters of the model are stable will be accepted. However, if the plot is outside the area, thus the null hypothesis will be rejected which indicates that the model is not stable.

3.7   Data Collection

The data used in this study is quarterly time series data which is from Q1:1999 to Q1:2015. The data for the household debt, GDP per capita, interest rate and food price index are obtained from the Bank Negara Malaysia Monthly Statistical Bulletin. In addition, the quarterly data for housing price index is gathered from the National Property Information Centre (NAPIC) while the young and age dependency ratio is calculated from the data on population by the age groups obtained from the Department of Statistics Malaysia. This study also includes the multiple structural breaks in the analysis to determine how far the structural breaks has influenced the household debt model but the break point will be determined endogenously by the model

3.8   Conclusion

In conclusion, by using the Life Cycle Model and Permanent Income Hypothesis, this study aims in investigating the reasons behind the mounting household debt in Malaysia by focusing on the roles of the cost of living and household dependency. This study will employ the Auto-regressive Distributed Lag modeling approach to estimate the short run and long run coefficient of the model since it is more suitable for a study with a small sample size. Besides that, since the structural break usually presence in the time series data, therefore, this study will include multiple structural breaks in the analysis to examine its effects. Finally, the diagnostic test will be conducted to ensure the robustness of the estimation.   The summary of the econometric procedure used in this study is shown in Figure 3.4.
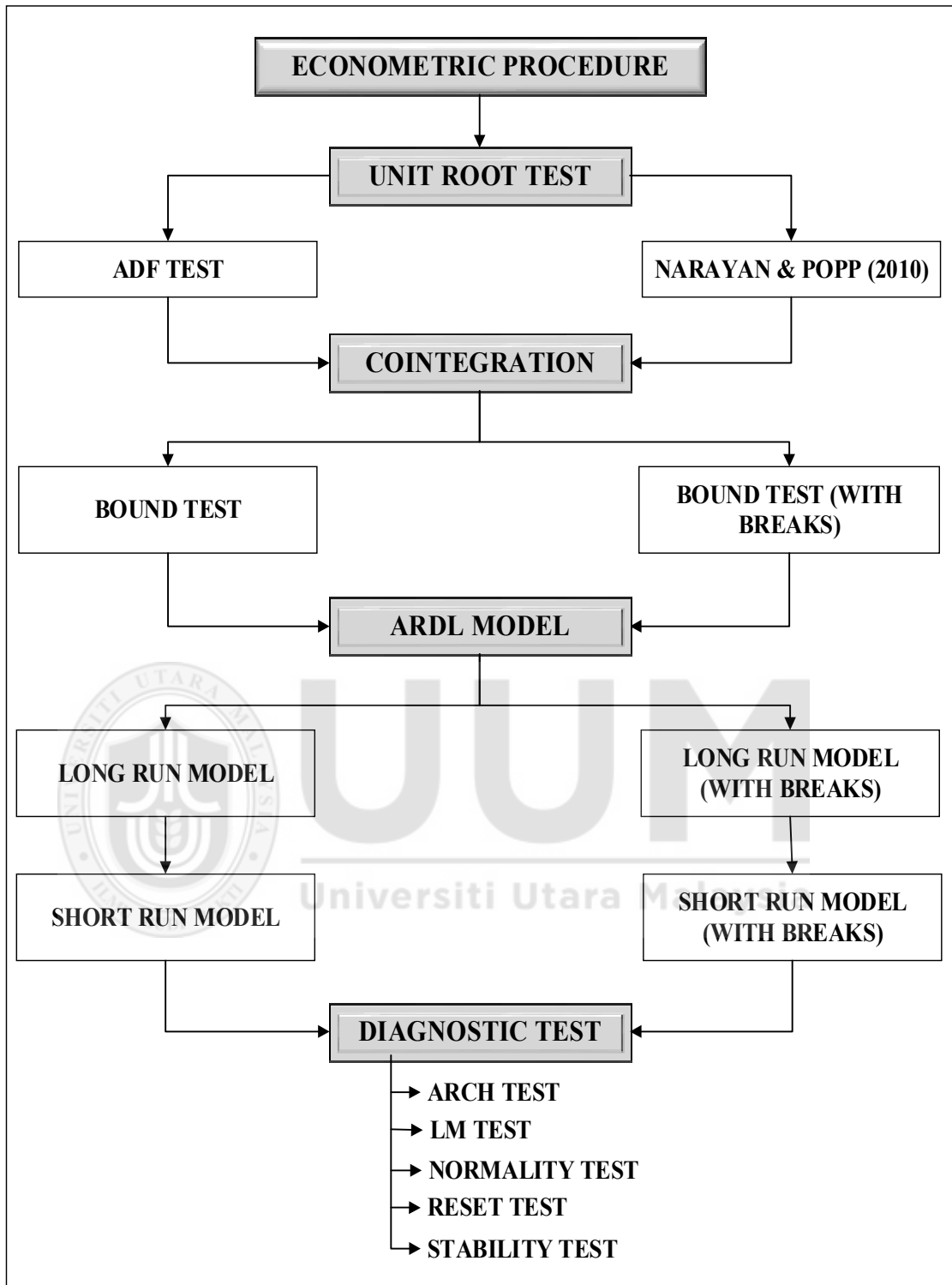
Figure 3.4
Summary of the econometric procedure

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1   Introduction

This chapter presents and discusses the major findings on the effects of the cost of

living and household dependency together with other determinants on the household

debt and its composition in Malaysia. There are four main objectives of this study that

are to examine the effects of the cost of living and household dependency on the

household debt and its composition, to estimate the speed of adjustment of the debt

model and finally to investigate the effects of structural break on the debt model. The

model used in this study is based on the Life Cycle Model and Permanent Income

Hypothesis whereby the roles of income level, interest rates and housing prices are

included in the estimation model as a control variable.

In particular, Section 4.2 provides the information of the data used in the study using

the descriptive statistics. Section 4.3 discusses on the unit root test of the variable and

determines the stationary of the variables before estimating the long run model. In

Section 4.4, the empirical examination on the effects of the cost of living and

household debt together with other determinants on the household debt and its

composition is presented while Section 4.5 presents the findings on the effects of

structural break on the debt model. Finally, the conclusion of the chapter is presented

in Section 4.6.

4.2 Descriptive analysis

A descriptive analysis is conducted to describe the variables of interest included in this study namely the household debt (HD), mortgage debt (MD), consumer debt (CD), income level (Y), interest rates (IR), housing prices (HP), food prices (FP) and also the young (YA) and old age (OA) dependency. The descriptive statistics could provide useful information about the data used in the study. The summary of the descriptive statistics which includes the mean, standard deviation together with the minimum and maximum value of the data is reported in Table 4.1 below.

Table 4.1
Descriptive statistics

Variables	Obs	Unit	Mean	Std. Dev.	Minimum	Maximum
HD	68	Million (RM)	339892	148394	141072	629555
MD	68	Million (RM)	217506	104727	90928	446183
CD	68	Million (RM)	122387	45416	50144	185640
Y	68	Million (RM)	5049	1181	3038	6901
IR	68	Percentage	5.9	1.2	4.5	9.6
HP	68	Index	138.0	39.3	93.4	229.3
FP	68	Index	122.9	21.4	95.0	163.5
YA	68	Ratio	45.7	6.6	36.2	56.6
OA	68	Ratio	7.2	0.6	6.3	8.5

Notes: Both the housing prices and food prices are index numbers with the base year 2000 =100. The nominal variables are expressed in real terms using the using the consumer price index with 2000 as the base year.

The summary of the descriptive statistics reveals the following information about the data. Firstly, the value of household debt ranges between RM 141 072 million to RM 629 555 million with the average value of RM 339 892 million. This finding highlights that the mortgage debt represents the most dominant type of debt in the country with the mean value of RM 217 506 million and varies between RM 90 928 million to RM 446 183 million. In contrast, the amount of the consumer debt level varied between RM 50 144 million to RM 185 640 million with the average value of

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RM 122 387 million between 1999 to 2015. In particular, the lowest level of household debt and its composition was during 1999 and reached the highest debt accumulation in 2015 which indicated that the debt level including both mortgage and consumer debts has been growing over time.

During the study period, the per capita income was on average at RM 5049 million and varied between RM 3038 million to RM 6901 million. Besides that, the average value of the interest rates was 5.9 percent with the highest lending rate, 9.6 percent in 1999 and declined to the minimum of 4.5 percent in 2014. The declining level of interest rate was mainly due to the government action to stimulate the aggregate demand following the Asian Financial Crisis with the aims to help the economy to recover from depression.

The findings of the descriptive statistics also show that the housing price index is higher in comparison with the food price index with the mean value of the former is 138 and has reached up to the maximum value of 229.3 in 2015 while the mean value of the latter is 122.9 and has climbed up to a maximum value of 163.5 in 2015. The dramatic rise in the housing prices is also corresponded to the rise in homeownership due to availability of various government incentives aiming to help the society in owning a house.

Finally, the data on young and old age dependencies show that the mean value is 45.7 person and 7.2 person respectively for every 100-working population with the maximum dependency level during the study period was 56.6 person and 8.5 person respectively for every 100 working populations. Although the data on age dependency

shows a greater dependency among the young age population on the working population, however, over time this figure has been declining which was from 56.6 person, who are dependent in every 100-working population in 1999 to 36.2 person in 2015 while the old age dependency has been growing from 6.3 person to 8.5 person who are dependent on every 100-working population mainly due to a decline in fertility rates and higher life expectancy.

In order to get a clearer picture of the data, a graphical representation of the data is presented in Figure 4.1. By looking at the trend between 1999 to 2015, it can be seen that there was a positive trend in the household debt, mortgage debt, consumer debt, income level, housing prices, food prices and old age dependency while the interest rates and young age dependency had shown to be declining over time. In addition, based on the graph, the mortgage debt is found to be the most dominant type of debt which represents more than half of the total household debt. Although the mortgage debt has shown to follow closely the trend in the total household debt, however the rise in the consumer debt should also be closely monitored since this type of debt has been escalating over time at a faster rate.

Besides that, the trend in the age dependency also reveals interesting information which worth to be pondered. The rise in the old age dependency accompanied by the declining of young age dependency mainly due to a rise in longevity and lower fertility rates in which indicates that Malaysia has been moving towards becoming an aging country and thereby the issue of aging population has become a serious concern for policy implications.
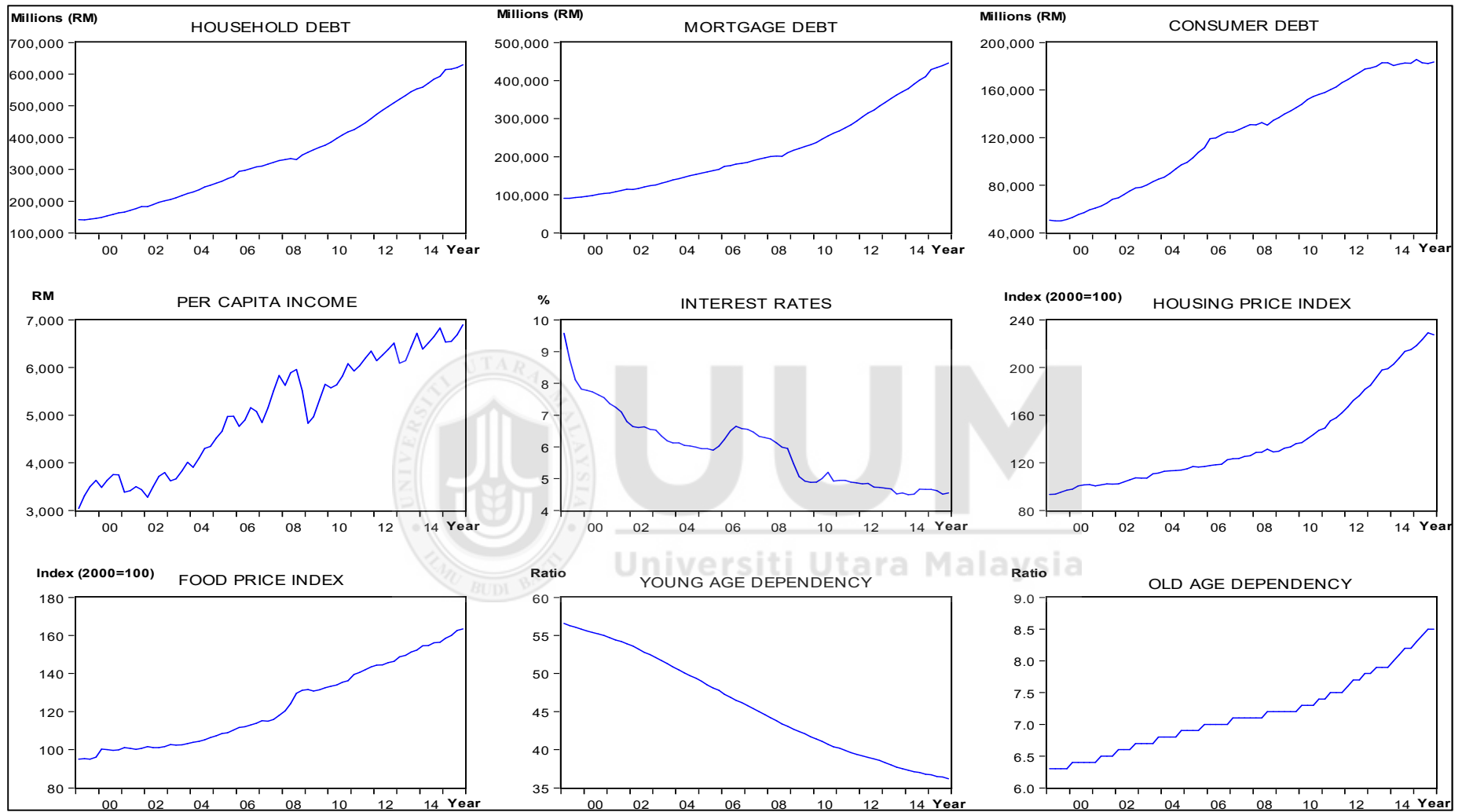
Figure 4.1
Trend analysis

Based on the trend analysis, it is expected that the income level, housing prices, food prices and old age dependency may have a positive relationship with the household debt and its composition while the interest rates and young age dependency may have an inverse relationship with all types of debt. However, further analysis is needed to examine this relationship empirically which will be uncovered in the following section.

4.3 Unit root test

As a preliminary test, this study has conducted the unit root test to determine whether the variables used in this study are stationary. The order of integration of the variables in the study is important in determining the appropriate econometric modelling to be used in answering the research objectives. All the variables are transformed into logarithm except for interest rate in order to obtain the linearity of the model and achieve consistencies in the variance in avoiding heteroskedasticity problem. This study conducts both the traditional unit root test which is based on the Augmented-Dickey Fuller (ADF) test and compares with the more recent test proposed by Narayan and Popp (2010) which accounts for two structural breaks.

4.3.1 Augmented-Dickey Fuller (ADF) Test

This study has performed the Augmented Dickey-Fuller test in order to determine the stationary of the variables. All variables have been tested at levels and first difference which included the constant and also the constant with trend and the estimation result is presented in Table 4.1. The optimal lag is chosen based on the Akaike Information Criterion (AIC). As shown in Table 4.2, the result of the ADF test supports that the null hypothesis of unit root is failed to be rejected for all the variables at level form

except for consumer debt (LCD) which is found to be stationary at 1 percent significance level. On the other hand, the findings at first difference support that all variables are stationary.

Table 4.2
Augmented Dicky-Fuller (ADF) unit root test

Variable	Level		1st difference	
	Intercept	Intercept & trend	Intercept	Intercept & trend
LHD	-1.260 [0]	-0.761 [0]	-7.318 [0]***	-7.621 [0]***
	(0.643)	(0.963)	(0.000)	(0.000)
LMD	1.434 [0]	-1.986 [0]	-7.327 [0]***	-7.323 [0]***
	(0.999)	(0.597)	(0.000)	(0.000)
LCD	-4.408 [0]***	1.221 [0]	-5.026 [0]***	-7.103 [0]***
	(0.000)	(0.999)	(0.000)	(0.000)
LY	-0.762 [5]	-1.541 [5]	-5.051 [4]***	-5.034 [4]***
	(0.822)	(0.804)	(0.000)	(0.000)
IR	-1.710 [1]	-2.608 [1]	-5.857 [0]***	-5.771***
	(0.421)	(0.278)	(0.000)	(0.000)
LHP	3.289 [0]	-0.173 [0]	-6.392 [0]***	-7.294 [0]***
	(1.000)	(0.992)	(0.000)	(0.000)
LFP	0.580 [1]	-1.996 [1]	-6.185 [0]***	-6.245 [0]***
	(0.988)	(0.592)	(0.000)	(0.000)
LYA	-1.335 [3]	-1.240 [1]	-3.947 [0]***	-3.916 [0]**
	(0.607)	(0.893)	(0.003)	(0.016)
LOA	2.743 [2]	1.113 [2]	-9.950 [0]***	-10.442 [0]***
	(1.000)	(0.999)	(0.000)	(0.000)

Notes: The optimal lag is shown in the square brackets while the value in parentheses represents the p-value of the test. ***,** indicate the significance level at 1% and 5% respectively.

Findings of this test indicate that household debt (LHD), mortgage debt (LMD), household income (LY), interest rates (IR), housing prices (LHP), food prices (LFP) and also the young (LYA) and old age dependency (LOA) are integrated at order one, *I(1)*, while the consumer debt (LCD) has been found to be stationary at levels, *I(0)*. Hence the estimation of the long run model based on the Ordinary Least Squares (OLS) is not suitable since it will result in spurious estimation. However, since the

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time series data usually been affected by the structural break that occur in the economy, thus, further analysis is necessary to determine whether the presence of structural breaks has influenced the result of the traditional unit root test.

4.3.2 Unit root test in the presence of structural breaks

Given that the time series data is often influenced by the structural break that occur in the economy, hence, the empirical analysis to determine the stationary of the variables has been expanding in order to account for the structural break. This study has conducted the Narayan and Popp (2010) unit root test which allows for multiple break since it has been found to be superior compared to Lee and Strazicich (2003) due to its ability to determine the break date more accurately (Narayan & Popp, 2013). This study considers both Model 1 (M1) which assumes two breaks in intercept and Model 2 (M2) which assumes two breaks in both intercept and trends and the estimation result is presented in Table 4.3.

Based on the findings at level form, the null hypothesis indicates that the variable containing unit root could not be rejected for all the variables except for household income (LY). During this period, two structural breaks have been detected in 2004 and 2008 which eventually affected the income level. In particular, the downturn in the global electronics cycle started in the mid-2004 due to oversupply has influenced the industry to undergo a structural adjustment in order to shift towards a higher value-added product and eventually results in expansion in export due to higher selling prices. Besides that, the presence of the Global Financial Crisis that hit the world economies in 2008 has also affected the economic performance of the country.

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Table 4.3
Narayan and Popp unit root test

Variable	k	M1 Test statistics	TB1	TB2	k	M2 Test statistics	TB1	TB2
Level
LHD	2	2.461	2005Q4	2008Q3	2	0.575	2005Q4	2008Q3
LMD	0	2.004	2001Q4	2008Q3	0	0.551	2001Q4	2008Q3
LCD	0	2.333	2005Q4	2008Q3	0	-0.549	2005Q4	2008Q3
LY	5	-2.198	2004Q4	2008Q3	4	-5.816**	2004Q4	2008Q3
IR	1	-3.091	2008Q4	2010Q3	1	-2.893	2008Q4	2010Q3
LHP	0	-2.983	2008Q3	2011Q1	0	-2.652	2008Q3	2011Q1
LFP	5	0.019	2008Q2	2010Q4	4	-2.028	2008Q1	2009Q3
LYA	2	-1.230	2005Q1	2005Q4	0	-2.939	2005Q4	2010Q4
LOA	3	1.697	2010Q3	2011Q1	2	-2.197	2011Q1	2012Q1
1st Difference
LHD	0	-8.700***	2005Q4	2008Q3	1	-9.816***	2005Q4	2008Q2
LMD	0	-7.136***	2001Q4	2008Q3	0	-7.237***	2001Q4	2008Q3
LCD	0	-10.72***	2005Q4	2008Q2	0	-9.894***	2005Q4	2008Q3
LY	4	-5.838***	2004Q4	2008Q3	4	-5.890**	2005Q4	2008Q3
IR	0	-4.307*	2008Q4	2010Q3	0	-5.024*	2008Q4	2010Q3
LHP	0	-7.912***	2003Q2	2008Q3	4	-1.409	2003Q1	2008Q3
LFP	4	-5.631***	2008Q2	2010Q4	4	-7.344***	2007Q1	2008Q2
LYA	1	-3.344	2005Q1	2008Q2	0	-8.194***	2005Q3	2010Q4
LOA	2	-7.426***	2010Q3	2011Q1	2	-7.340***	2010Q3	2011Q1

Notes: k refers to the number of lag while TB1 and TB2 refer to the break dates at the trimming percentage of 20%. ***, **, * indicate the significance at 1%, 5% and 10% respectively. Critical values are obtained from Table 3 in Narayan and Popp (2010). For M1, the critical values at 1%, 5% and 10% are -5.259, -4.514 and -4.143 respectively while the critical values for M2 are -5.949, -5.181 and -4.789 respectively.

On the other hand, the test at first difference supports that all the non-stationary variables are found to be stationary at first difference at 1 percent significance level except for interest rates (IR) which are found to be significant at 10 percent significance level. This result indicates that all the variables are integrated at order one, *I(1)*, except for income level (LY) which is found to be stationary at levels, *I(0)*. Consistently, the unit root test proposed by Zivot and Andrews (1992) and Perron

(1997) which allows for a single break also supports that all the variables are stationary at first difference except for the income level (LY) which is found to be stationary at level. The findings of this additional test are reported in Appendix 1 and Appendix 2.

Correspondingly, findings of this test are consistent with the ADF test except for consumer debt (LCD) and income level (LY). The result of ADF test suggests that the consumer debt (LCD) is stationary at levels while income level (LY) has been found to be stationary at first difference *I(1)*. However, by taking into consideration the effects of structural break, only income level (LY) is found to be stationary at levels. Hence, findings of this study suggest that the presence of structural break does give a significant effect in determining the stationary of the variables as supported by Perron (1989). Therefore, the roles of structural break should not be taken for granted in the time series analysis since it will affect the modelling approach used to examine the short run and long run models.

4.4 Determinants of household debt and its composition

This section discusses the long run and short run determinants of household debt and its composition in Malaysia. In particular, the bound test for cointegration is conducted to confirm the existence of long run cointegration among the variables and proceed with the estimation of the ARDL model in order to answer the research objectives of this study. The details of the finding are discussed below.

4.4.1 Bound test for cointegration

Once all the variables have been tested for the unit root, this study proceeds with the cointegration test to determine the presence of long run relationship between the variables. The cointegration test implies that all the variables move together and thereby any disequilibrium that occurs among the variables represents the short run phenomenon. Since the result of the unit root test confirms that there is mixed order of integration among the variables of *I(0)* and *I(1)* while none of the variables are integrated at order two, *I(2)*, hence the ARDL bound testing is the most appropriate method to estimate whether all the variables are cointegrated (Pesaran *et al.*, 2001). This approach is also suitable for short sample period since this study is based only on 68 observations (Narayan, 2005).

Since this study is based on quarterly data, the maximum number of lag used is four and the optimal lag is selected using the Akaike Information Criterion (AIC). This selection criterion is useful since it allows for selection of model with higher lag before the lag length is reduced until the model which is parsimonious and passes the diagnostic test is obtained.

Specifically, the null hypothesis of this study indicates that there is no cointegration among the variables. The result of the F-test based on the bound testing is compared with the critical value proposed by Narayan (2005) since it is more suitable for a study with a small sample size. If the test statistic is higher than the upper bounds level, it can be concluded that there is a long run relationship among the variables and thereby the long run model could be estimated.

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Based on the result of the F-statistics presented in Table 4.4, the value of the test statistic is found to be greater than the upper bound level which confirms there is a cointegration between income level (LY), interest rate (IR), housing prices (LHP), food prices (LFP) and also the young (LYA) and old age dependency (LOA) with the household debt which is significant at 1 percent significance level. In addition, the result based on the composition of debt also supports that all the variables are cointegrated and thereby the long run model could be estimated.

Table 4.4
Bound test for cointegration

Test statistic	Model 1: LHD (1,4,2,0,0,0,1)	Model 2: LMD (1,4,2,3,0,1,1)	Model 3: LCD (1,4,2,0,0,0,0)
F-statistic	36.531***	10.833***	22.976***
k	6	6	6
Narayan (2005) critical values (k = 6, n = 70)			
Critical value	Lower bound	Upper bound	
10%	2.100	3.121	
5%	2.451	3.559	
1%	3.180	4.596	

Notes: The critical values for the lower I(0) and upper I(1) bounds are taken from Narayan (2005). *** indicates the significance at 1% significance level.

4.4.2   ARDL Estimations - Long run model

As supported by the result of the bound test, there is a long run relationship income level (LY), interest rate (IR), housing prices (LHP), food prices (LFP) and also the young (LYA) and old age dependency (LOA) with the household debt and its composition. Hence, this study proceeds with the estimation of the long run and short run models to examine the impact of each independent variable on the dependent variables and thereby help to answer the first and second objectives of the study.

Table 4.5 reports the estimated coefficients of the long run model for Model 1 to Model 3 which refer to the determinants of household debt and its composition. The detailed results of the long run coefficients are reported in Appendix 3 to Appendix 5. Based on the findings, the null hypothesis that all the variables have no significant influence on the household debt model is rejected at 1 percent significance level which indicates that any changes in all the variables will have a significant impact on the household debt (LHD).

This result is also consistent when tested on the mortgage debt (LMD) model whereby all the variables carry the similar sign as found in the total household debt model and are found to be significant at 1 percent significance level except for income level which is significant at 5 percent significance level. On the other hand, in the case of consumer debt (LCD) model, all the variables are found to be statistically significant at 1 percent significance level except for housing prices (LHP) and old age dependency (LOA) which are found to be insignificant.

Table 4.5
Results of the Long Run Coefficient Estimates

Variables	Model 1: LHD (1,4,2,0,0,0,1)	Model 2: LMD (1,4,2,3,0,1,1)	Model 3: LCD (1,4,2,0,0,0,0)
C	24.720***	21.978***	26.768***
	(0.000)	(0.000)	(0.000)
LY	0.306***	0.110**	0.887***
	(0.000)	(0.031)	(0.000)
IR	-0.050***	-0.037***	-0.128***
	(0.000)	(0.000)	(0.000)
LHP	0.221***	0.553***	-0.238
	(0.0013)	(0.000)	(0.227)
LFP	-1.351***	-0.995***	-2.123***
	(0.000)	(0.000)	(0.000)
LYA	-2.853***	-2.609***	-2.884***
	(0.000)	(0.000)	(0.002)

LOA	0.989***	0.793***	0.275
	(0.000)	(0.000)	(0.666)

Notes: The lag length is chosen based on the Akaike Information Criterion (AIC). ***,** indicate the significance at 1% and 5% respectively. Figures in the parentheses represent the p-value of the test.

In particular, the estimated coefficients for income level (LY) are positive in the entire model (0.31, 0.11 and 0.89) which are significant at 1 percent significant level except in the case of mortgage debt (LMD) model whereby it is significant at 5 percent significance level. On the other hand, the coefficient of interest rates (IR) is found to carry a negative sign in all of the models (-0.05, -0.04 and -0.13) and found to be statistically significant at 1 percent significance level. In terms of housing prices (LHP), the estimated coefficients reveal a positive sign in both household debt (LHD) and mortgage debt (LMD) model (0.22 and 0.55) and carry a negative sign (-0.24) in the case of consumer debt (LCD) and this result is found to be statistically significant at 1 percent significant level for the entire model.

Meanwhile, the estimated coefficient of the food prices (LFP) is negative for the entire model (-1.35, -1 and -2.1) and found to be significant at 1 percent significant level. Finally, the findings of this study reveal that the estimated coefficient for young age dependency (LY) are negative (-2.85, -2.61 and -2.88) while the coefficient of the old age dependency (LOA) are found to carry a positive sign (0.99, 0.79 and 0.28) with both variables are found to be statistically significant at 1 percent significant level except on the roles of old age dependency (LOA) in the consumer debt (LCD) model.

There are several important information based on this finding. First, the roles of income level (LY) are found to be positive in the entire model which are consistent

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with the expected sign. This result indicates that as the income level rises, the household debt level will also rise which suggests a positive relationship exhibited between the two variables. Correspondingly, the household debt level rises since the households could afford to service a higher amount of debt (Jacobsen & Naug, 2004; Duca & Rosenthal, 1993). Besides that, the rise in income level also raises the borrowers and lenders confidence about the future economic condition and thereby influences the household debt to rise (Moroke, 2014; Meng *et al.*, 2013).

Findings of this study imply that a 10 percent increase in household income will result in 3 percent increase in total household debt while mortgage debt and consumer debt will rise by 1.1 percent and 8.9 percent respectively. This result suggests that the changes in household income will exert a greater influence on consumer debt such as in their credit card usage since these household can afford to service a higher debt. Consistently, studies done by del Río and Young (2006) in the United Kingdom and Wasberg *et al.* (1992) in the United States support that the income level plays an important role in exerting a positive influence on the consumer debt.

Besides that, the negative impact of interest rate (IR) on household debt and its composition also consistent with the past studies which state that lower cost of borrowing will result in higher debt accumulation. This is due to the decline in the interest rate which has encouraged household borrowing as a result of cheaper debt servicing cost (Livshits, 2015; Meniago *et al.*, 2013; Debelle, 2004b; Pearce, 1985). In addition, as argued by Jacobsen and Naug (2004), the real effect of interest rate on household debt will depend on whether the influence is greater on the lenders or borrowers. Hence, the negative effects found in this study suggest that in the case of

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Malaysia, the effect is more substantial on the borrowers and thereby advocates that the demand side plays a greater role in influencing the household debt model.

Findings of this study also reveal that the effect of interest rate changes is much greater in the case of consumer debt whereby 10 percentage point decrease in the borrowing cost will result in 1.3 percentage point increase in consumer debt while the total household debt and mortgage debt will increase by 0.5 percent and 0.37 percentage points. Although past study conducted by Endut and Hua (2009) in Malaysia based on graphical analysis has argued that the household will become vulnerable to the shock in borrowing cost, however, this present study reveals that the effect of interest rate is relatively small especially in the case of mortgage debt.

Correspondingly, the low interest rate policy adopted in Malaysia since the Asian Financial Crisis is not the prominent factor that contributed to the high debt accumulation which contradicts with a study carried out by Allen and Giovannetti (2010) in the United States who has claimed that the low interest rate policies has encouraged household borrowing and thereby result in greater debt accumulation especially in the form of mortgage debt. Hence, findings of this present study suggest that the monetary policy mainly the interest rate targeting method is not the best measure to control the high debt level in the country.

Besides that, the role of housing prices (LHP) which is used as a proxy for wealth effect is found to have a positive influence on household debt which is consistent with the findings of the past studies including studies done by Justiniano *et al.* (2015) and Meniago *et al.* (2013) in the United States, Moroke (2014) in South Africa and Meng

et al. (2013) in Australia. In addition, although past studies done by Rahman and Masih (2014) in Malaysia also found that the housing prices has a positive impact on the household debt, this present study reveals that the positive association were mainly driven by the positive impact of housing prices on the mortgage debt which has found to be the most dominant type of debt in the country. In contrast, the effect of housing prices is found to be inversely related with the consumer debt but this result is insignificant.

Findings of this present study reveal that as the housing prices increase by 10 percent, the household debt and mortgage debt are expected to rise by 2.2 and 5.5 percent respectively while the consumer debt is expected to decline by 2.4 percent. This findings are consistent with the past studies such as by Andersson and Mayock (2015) and Turinetti and Zhuang (2011) in the United States who have found that the household debt has been rising mainly due to the rise in mortgage debt which is sensitive to the development in the housing market. Hence, the investigation based on the composition of debt is useful to determine the effect according to the type of debt.

Correspondingly, the positive impact of housing prices on the household debt mainly on the mortgage debt found in this present study is due to various reasons. Firstly, as the housing prices rise, this indirectly resulted in positive improvement in the household financial position of the existing homeowners due to the wealth effect and thereby has encouraged the households to take advantage by borrowing against the asset and thereby result in a higher mortgage debt level (Justiniano *et al.*, 2015; Moroke, 2014; Iacoviello, 2004; Canner *et al.*, 2002). This is due to the rise in

housing prices has led to relaxation of the borrowing constraint and increased the borrowing limit (Campbell & Cocco, 2007; Ortalo-magné & Rady, 2006).

Secondly, the positive impact of housing prices on household debt also affects the new homeowners since higher housing prices indicates a rise in the housing services which resulted in higher demand for loan. The rise in housing prices has resulted in higher mortgage debt since greater amount of debt is needed to purchase the asset and thereby explain the reasons behind the rising household debt. (Meng *et al.*, 2013; Turinetti & Zhuang, 2011; Akerlof & Shiller, 2009). This can be seen in Malaysia whereby there is a rise in the homeownership rate which has charted substantial growing since the past decade.

Thirdly, the growth in housing prices has also increased both lenders' and borrowers' confidence about the future economic and thereby increases the supply and demand for loans especially for investment purposes. Hence, as the housing prices increase, the household debt also rises since some of the households may be encouraged to invest on housing in order to gain from the properties appreciation (Moroke, 2014).

Finally, the availability of various government incentives to help the society especially among the poor and middle-income population to own a house such as My First Home Scheme, People's Housing Program (PHP), 1Malaysia Housing Program (PR1MA), Youth Housing Scheme (YHS), MyDeposit scheme and others has increased the demand for houses and thereby results in higher mortgage debt level.

In contrast, the findings on the effects of housing prices on consumer debt is contradicted with the evidence found in the United States by Pollin (1988) who claims that the consumer debt also keeps rising since the households need to maintain the living standards as the result of higher housing services. Despite the fact that the effects of housing prices on the consumer debt are found to be insignificant in this present study, however, the negative relationship found does make sense. As the housing prices increase, households who have assets can take advantage to increase their borrowing by using the mortgage equity withdrawal instead of making a personal loan since the former type of borrowing is usually cheaper due to a lower risk for the bank. Hence, this may explain the negative relationship between housing prices and the consumer debt found in this study.

Next, the roles of the cost of living (LFP) which is proxied by the food price index have been found to exert a negative influence on the household debt and its composition which contradicts with a study done by Zimunya and Raboloko (2015), Abid *et al.* (2014) and Boushey and Weller (2008) who argue that the rise in the cost of living has led to higher burden on the households and thereby influence their borrowing behaviour to smooth consumption over time. Hence, findings of this present study reject the idea that the households have been using the debt as a substitute for wage as argued by Nau *et al.* (2015).

In particular, findings of this study reveal that a 10 percent increase in food prices will result in 13.5 percent reduction in total household debt whereby both mortgages and consumer debts will be decreasing by 10 percent and 21.2 percent respectively. Correspondingly, the negative effects found in this present study may be due to

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various reasons. Firstly, the rise in the cost of living will indirectly affect the household ability to fulfil their debt repayment due to a decline in their real income. As a result, the banking sector may be more selective in approving loans in order to mitigate the risk of default payment and thereby results in a lower debt level. This indirectly explains why the negative impact is larger in the case of consumer debt since this type of borrowing is riskier for the lenders.

Secondly, the rise in the cost of living may affect the households to adopt more tighter budgeting strategies to cope with the rising cost especially among those households who have financial knowledge since they will be more aware of the threat of borrowing beyond their means. Thirdly, since the macroeconomic data only represents the household debt in the formal sector, hence, the negative effects found on the roles of the cost of living indirectly suggest that the households may be depending on the borrowing from an informal sector including friends, families and illegal money lenders since they might face difficulties to obtain the fund from the banking sector. However, further analysis from the household level is needed to confirm this prediction.

Finally, the effect of demographic changes which is measured by the young (LYA) and old age dependency (LOA) suggests that both young and old age dependency will give different impacts on the household debt composition. Firstly, this study discovers that the young age dependency will give a negative influence on household debt for both mortgages and consumer debt. This result contradicts with most of the past studies conducted at a micro level study which have found a positive relationship between the number of children and household debt level due to the rise in household

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burden to support the child rearing cost (Beer & Schürz, 2007; Crook, 2001; Cox & Jappelli, 1993; Duca & Rosenthal,1993; Sullivan & Worden, 1986).

Interestingly, findings of this present study reveal a more important issue. By looking at the demographic trend in Malaysia, the young age dependency has been declining continuously which suggests that although the Malaysian households relatively have a smaller family size, however, their consumption has been rising as shown by the rise in both mortgages and consumer debt. Moreover, the availability of various government incentives for parents including Child Welfare Benefits, tax relief for child rearing, Schooling Assistance Programme and Supplementary Food Programme and also the innovations of insurance and takaful for children which support the protection for infants have indirectly helped to reduce the parents' burden in raising their children. Hence, one possible reason for the rise in household debt associated with smaller family size is that the parents may have overindulged their children which may result in a higher consumption and debt accumulation.

As highlighted by Bredehoft, Mennicke, Potter, and Clarke (1998), children nowadays are labelled as a prosperous generation since they have been pampered by their parents with material wealth. The overindulge parenting also occurs due to the parents' response to meet their own need by compensating for the hardship that they had experienced during childhood for their own satisfaction by spending lavishly on their children. Besides that, Wimalasiri (2004) reveals that households with a smaller family size tend to spend lavishly on their children since the influence of the children is greater on their parents since they do not have many siblings and thereby have a greater purchasing power compared to children raised in a bigger family.

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Hence, this argument supports the findings of the present study that a rise in the number of children may decrease the household debt since children will have less influence on their parents spending decision since the parents may be more concerned on their affordability level and thereby spending more cautiously and adopting a stricter budgeting strategy as argued by Livingstone and Lunt (1992). In addition, Brown *et al.* (2015) also claimed that the amount of debt held will decline as the number of children rises which indicates negative effects of household size on the household debt level may prevail.

Besides that, Higgins and Williamson (1997) also supported that the consumption level may rise either due to the number of children (quantity) or due to a rise in consumption per child (quality). According to them, as the income level rises, parents will favour quality over quantity. Hence, findings of this present study reveal that parents may choose quality over quantity which may be due to a rise in participation of women in the labour market which resulted in higher parents' income and thereby explains why the household debt keeps rising although households have a relatively smaller family size.

The negative association found between the young age dependency and the household debt and its composition also reveals an interesting finding which could relate to cultural effects. For instance, a comparative study done by Mahima and Puja (2008) on the relationship between parental overindulgence and spending behaviour between two different cultures reveals that Indian parents are more likely to indulge their children compared to the Western parents who found to spend more cautiously.

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Besides that, a study carried out by Robertson, Ward, Gatignon, and Klees (1989) on the effects of advertising on children focusing on cultural differences found that Japanese and British children are less demanding for product purchase than the U.S children due to lesser television viewing among children in these countries. Thus, the effects of cultural differences among countries may also explain why this present study has found that the Malaysian households have been experiencing a rise in their household debt accumulation despite having a smaller family size.

In particular, the result obtained in this study indicates that a 10 percent reduction in young age dependency will lead to 28.5 percent increase in the total of household debt with the effect on mortgage and consumer debt are estimated to be rising by 26.1 percent and 28.8 percent respectively. Therefore, it is important for the parents to realize the importance of good parenting approach in dealing with their kids to avoid from spending excessively since it will result in high debt accumulation.

Besides, the findings on the effect of old age dependency also reveal an important information. As highlighted by the Life Cycle Model, the household debt will increase during the early working period and eventually start to decline as the households reach the retirement period. Hence, the rise in the old age population in the country will result in a decline in the household debt level. For instance, a study carried out by Brown et. al (2015) in the United States supports that the increase in the share of retiring population will result in a lower household debt since the older household may have repaid their debt during retirement which is consistent with the findings by Turinetti and Zhuang (2011).

In particular, this study found that a 10 percent increase in the old age dependency will result in 9.9 percent increase in the household debt while both mortgages and consumer debt will rise by 7.9 percent and 2.8 percent respectively. Although findings of this present study contradict with the prediction of the Life Cycle Model; that the rise in retired population will result in lower debt accumulation, however, it is consistent with the findings of the past studies on the negative effects of old age dependency on savings rate (Higgins & Williamson, 1997; Rossi, 1989; Mason, 1988; Fry & Mason, 1982; Ram, 1982 Leff, 1969).

As the older households become more depending on the working age population, the household debt and its composition will also rise since the old age population has been depended on their children to support their life during retirement and thus resulted in the rising burden of the working population. Consistently, as argued by Filoso and Papagni (2015), parents may regard their children as an investment for their retirement and thereby are willing to invest on child rearing which is consistent with a study carried out by Bryant and Wang (1990).

Correspondingly, although households will receive their retirement benefits during retirement whereby the government servants will receive their pension scheme while the private sector workers will receive their retirement contribution under the Employee Provident Fund (EPF), however, the outcome of this study reveals that the retirement fund is insufficient to support the consumption of the old age population. Moreover, as argued by Mok *et al.* (2007), more than half of Malaysian citizens do not have a life insurance policy to protect themselves from any unexpected events.

As a result, as the life expectancy has risen, this will give a greater pressure on the old age population in supporting their life during retirement and thereby results in a greater dependency on their children. Hence, there is a need for reformation of the retirement scheme used in the country and the government incentive for the older population should also be revised to help the households to survive during retirement.

4.4.3 ARDL Estimations - Short run model

As discussed in the previous section, since all the variables are found to be cointegrated, therefore, any disequilibrium that occurs in the model represents the short run phenomenon. The estimation of the short run model helps to answer the third objective of this study that is to estimate the speed of adjustment of the household debt and its composition when a state of disequilibrium occurs in the model. The result of the short run estimation is reported in Table 4.6 while the detailed results of the short run estimates are reported in Appendix 6 to Appendix 8.

Based on the estimation result, the error correction terms for the entire model have a negative sign and significant at 1 percent significance level which confirms the result of the cointegration test that indicates the existence of a long run relationship among the variables. The coefficient of the error correction terms indicates that any short-term deviation that occurs in the household debt will be adjusted by 54.2 percent in a quarter.

On the other hand, the speed of adjustment of both mortgage debt (LMD) and consumer debt (LCD) are 64.3 percent and 24 percent respectively which imply that any short-term deviation in the mortgage debt and consumer debt will take

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approximately 1.5 quarter and 4 quarter respectively to completely return to the equilibrium. This result suggests that the speed of adjustment of the mortgage debt is much faster compared to the consumer debt which may be due to the former which is more preferable by the banking sector since it is less risky and thereby any disturbance that occurs in the short run will be corrected faster.

Table 4.6
Results of the Short Run Coefficient Estimates

Variable	Model 1: LHD (1,4,2,0,0,0,1)	Model 2: LMD (1,4,2,3,0,1,1)	Model 3: LCD (1,4,2,0,0,0,0)
ΔLY	-0.113***	-0.128***	-0.035
	(0.000)	(0.000)	(0.304)
ΔLY_{t-1}	-0.190***	-0.133***	-0.201***
	(0.000)	(0.000)	(0.000)
ΔLY_{t-2}	-0.148***	-0.099***	-0.127***
	(0.000)	(0.000)	(0.001)
ΔLY_{t-3}	-0.149***	-0.106***	-0.145***
	(0.000)	(0.000)	(0.000)
ΔIR	0.013*	0.006	0.011
	(0.088)	(0.364)	(0.318)
ΔIR_{t-1}	0.025***	0.032***	0.016
	(0.005)	(0.000)	(0.184)
ΔLHP	0.134*	0.195**	0.052
	(0.066)	(0.011)	(0.620)
ΔLHP_{t-1}		-0.043	
		(0.586)	
ΔLHP_{t-2}		-0.184**	
		(0.022)	
ΔLFP	-0.705***	-0.596***	-0.510***
	(0.000)	(0.000)	(0.004)
ΔLYA	-1.241***	0.990**	-0.535
	(0.000)	(0.030)	(0.194)
ΔLOA	0.195	0.056	-0.188
	(0.165)	(0.668)	(0.354)
ECT_{t-1}	-0.541***	-0.643***	-0.241***
	(0.000)	(0.000)	(0.000)

Notes: ***,**,* indicate the significance at 1%, 5% and 10% respectively. Figures in the parentheses represent the p-value of the test.

Based on the estimated coefficients, findings of this study show that the income level (LY) has a negative sign in the entire model and statistically significant at 1 percent significant level except on the effects of current income level in the consumer debt model which is found to be insignificant. This finding reveals that the effects of current income is dominant on the mortgage debt while the past value of income level has been found to exert more influences on the consumer debt. Besides that, the past values of income level also found to exert negative influences on the household debt and its composition and the result is significant at 1 percent significance level.

In addition, the result of the F-test for the joint coefficient of the lagged income level presented in Appendix 9 supports that the income level has a lagged effect on the household debt and mortgage debt but the effects on consumer debt is found to be insignificant. Although the negative effects of income level on household debt and its composition found in the short run contradicts with the expected sign, however, these findings are consistent with the findings by Turinetti and Zhuang (2011) in the United States.

Correspondingly, as argued by Zimunya and Raboloko (2015), an income level has negative effects on the household debt since households with higher income are able to achieve optimal consumption without having to be dependent on the debt. However, the negative association found between the income level and household debt only holds in the short run whereby in the long run as the income level keeps rising, households may experience a change in their taste and preference and thereby

willing to hold a higher debt level due to a rise in confidence on their ability in debt servicing which eventually resulted in a higher debt level.

On the other hand, the interest rate (IR) has been found to carry a positive sign in the entire model and found to be statistically significant at 10 percent significance level only in the case of total household debt while the effects on both mortgage and consumer debts are found to be insignificant. However, the findings on the past values of interest rates support that the effects are significant on the household debt and mortgage debt at 1 percent significance level while the effects are insignificant in the case of consumer debt model.

Although this finding contradicts with the expected sign, that a negative relationship may exist between interest rates and debt, however, it is consistent with a study carried out by Jacobsen and Naug (2004) in Norway. In particular, Jacobsen and Naug (2004) argued that the real effects of interest rates will depend on whether their influence is greater on borrowers or lenders. Positive association found in this present study indicates that in the short run, the effects are more dominant on lenders.

Besides that, the roles of current housing prices (LHP) have been found to carry a positive sign and are significant at 10 percent and 5 percent respectively for both household debt (LHD) and mortgage debt (LMD) models but insignificant in the case of consumer debt (LCD) model which is consistent with the findings in the long run. Although the past values of housing prices have been found to negatively affect the mortgage debt, however, the result of the Wald test for joint coefficient of the lagged housing prices reported in Appendix 9 reveals that the effect is insignificant.

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In contrast, the estimated coefficients of the food price (LFP) are negative and significant at 1 percent significance level for the entire model, which is consistent with the findings in the long run and supports that the rise in cost of living will result in a lower debt accumulation for both mortgage and consumer debts since households may face difficulties in obtaining loans from the banking sector since the lenders may be more selective in giving out loans in order to mitigate the risk of default payment.

Finally, the estimated coefficient for the demographic effect shows a mixed result. In particular, the young age dependency (LYA) has been found to exert a negative influence on both household debt (LHD) and consumer debt (LCD) which is consistent with the findings in the long run but the effects are statistically significant only on the household debt at 1 percent significance level. In contrast, a positive association is found in the case of mortgage debt (LMD) with the result found to be significant at 5 percent significance level, in which contradicts with the findings in the long run. In particular, the positive effects found indicate that in the short run, as the young age dependency is declining, the mortgage debt level will also decline since households may think that it is not necessary to purchase a big house due to a small family size.

On the other hand, the old age dependency (LOA) shows a positive sign in both household debt (LHD) and mortgage debt (LMD) models while a negative sign is found in the case of consumer debt (LCD) but the variables are insignificant in the entire model. Hence, this result indicates that the old age dependency has no effects on the household debt and its composition in the short run since the retired population

may still have savings to support their life during the early retirement period. However, as the life expectancy has risen, this has resulted in greater burden to support their life in the long run and thereby provides a significant impact on the working population in the long run.

4.4.4 Diagnostic test

In order to determine the robustness of the estimation model, firstly, this study has conducted the ARCH test for heteroscedasticity to determine whether there is an equal variance. Secondly, this study has performed the Breusch–Godfrey serial correlation LM test to detect the presence of autocorrelation problem. Thirdly, this study has conducted the Normality test based on the Jarque-Bera test to examine whether the error terms is normally distributed, Finally, the Ramsey RESET test for model specification and functional form and stability test based on CUSUM and CUSUMSQ is performed to determine whether the functional form are correct and the model is stable.

4.4.4.1 ARCH Test

The null hypothesis of the ARCH test indicates that the variance is constant or also known as homoscedasticity. The rejection of the null hypothesis indicates that the model suffers with the heteroskedasticity problem which may result in biased estimation result. The results of the test which is tested for four lags are presented in Table 4.7 below.

Table 4.7
ARCH Test

Indicator	Test statistic	p-value	Result
Model 1: LHD	4.963	0.291	Do not reject H_0.

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			No ARCH effect
Model 2: LMD	5.224	0.265	Do not reject H_0.
			No ARCH effect
Model 3: LCD	4.817	0.306	Do not reject H_0.
			No ARCH effect

Based on the findings, this study has found that the null hypothesis is failed to be rejected in all the models which indicates that the estimation model used in this study has a constant variance which fulfilled the classical assumption of homoscedasticity.

4.4.4.2 Serial correlation LM Test

Besides the homoscedasticity condition, the classical assumption also highlights that the error terms should be independent which indicates that no autocorrelation problem. Violation of this assumption may also result in spurious estimation which makes the interpretation of the findings to be misleading.

Table 4.8
Breusch-Godfrey Serial Correlation LM Test

Indicator	Test statistic	p-value	Result
Model 1: LHD	2.619	0.623	Accept H_0.
			No autocorrelation
Model 2: LMD	3.791	0.430	Accept H_0.
			No autocorrelation
Model 3: LCD	2.046	0.727	Accept H_0.
			No autocorrelation

The result of the test which is tested up to four lags is reported in Table 4.8. The null hypothesis of the LM test indicates that there is no autocorrelation problem. Findings of this test supports that none of the model used in this study suffers with autocorrelation problem and thereby fulfil the classical assumption.

4.4.4.3   Normality test

The normality test is used to examine whether the error terms of the estimation model are normally distributed. It is important to have a normal distribution since the violation of this assumption may also result in misleading interpretations. Based on the result of Jarque-Bera test as reported in Table 4.9, findings of this test indicate that the null hypothesis of normal distribution could not be rejected only in the case of consumer debt while the error terms in both household debt and mortgage debt models are found to be abnormally distributed which violate the classical assumption.

Table 4.9
Jarque-Bera Test

Indicator	Test statistic	p-value	Result
Model 1: LHD	5.851*	0.053	Reject H_0. Not normal
Model 2: LMD	6.736**	0.034	Reject H_0. Not normal
Model 3: LCD	3.189	0.202	Do not reject H_0. Normal distribution

Notes: **,* indicate the significance at 5% and 10% significance level.

The graphical representation of the normality test for the entire model is presented in Appendix 10 to Appendix 12. The non-normality of the error terms found in this study indirectly give a signal on the potential presence of structural break in the model and thereby should be considered in the analysis to avoid biased estimation.

4.4.4.4   Ramsey RESET Test

The Ramsey RESET (Regression Specification Error Test) is used to examine whether the functional form is correct and is necessary to avoid biased estimation. As highlighted by Tang (2004), this test is useful to test for omitted variables biased, incorrect functional form and also the simultaneous equation biased.

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Table 4.10
Ramsey Reset Test

Indicator	Test statistic	p-value	Result
Model 1: LHD	0.471	0.626	Accept H_0. Correct model specification
Model 2: LMD	1.102	0.341	Accept H_0. Correct model specification
Model 3: LCD	0.302	0.740	Accept H_0. Correct model specification

The null hypothesis of this test indicates that the functional form is correct. As shown in Table 4.10, the findings support that the functional form of the entire model used in this study is well specified and thereby it does not suffer from misspecifications problem.

4.4.4.5 Stability test

Besides all the diagnostic tests discussed above, this study also conducts the cumulative sum of the residuals (CUSUM) and the cumulative sum of squares residuals (CUSUMQ) test to determine the stability of the parameters in the model (Brown, Durbin & Evans, 1975). The findings of the test which are presented in Figure 4.2 to Figure 4.7 support that all the models of household debt and its composition are stable over time.

This is shown by both the CUSUM and CUSUMSQ graphs which lay within the critical boundaries indicating that the parameters are stable over time at 5 percent significance level. Besides that, findings of this test suggest that there is a potential of the occurrence of structural break in the model of mortgage debt as shown by the

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graphical representation of the CUSUMSQ test that shows some of the points have exceeded the critical boundaries.

Figure 4.2
CUSUM Test for Model 1

Figure 4.3
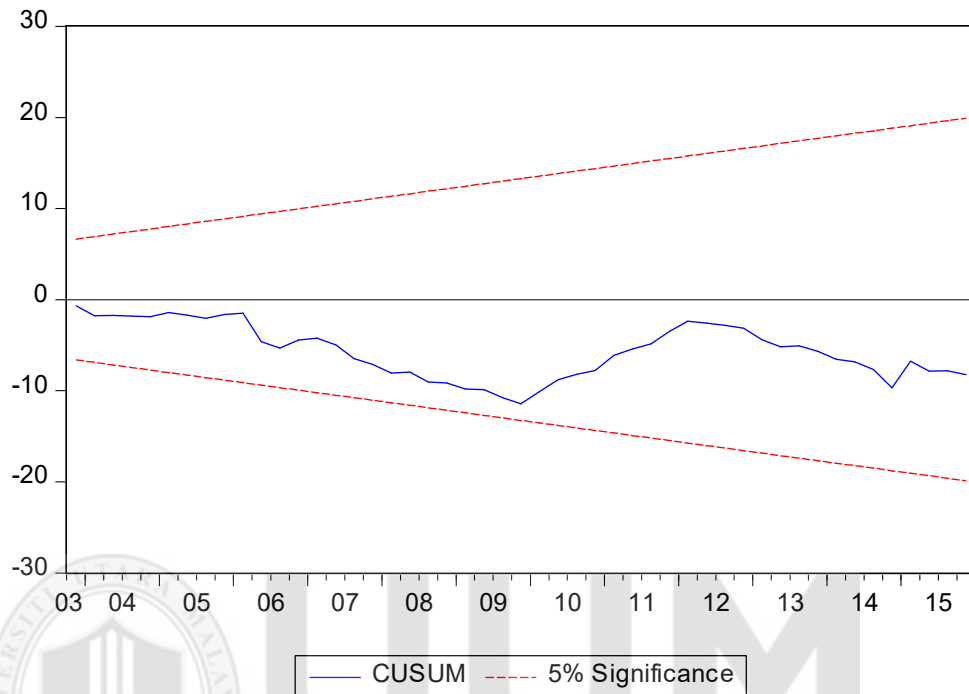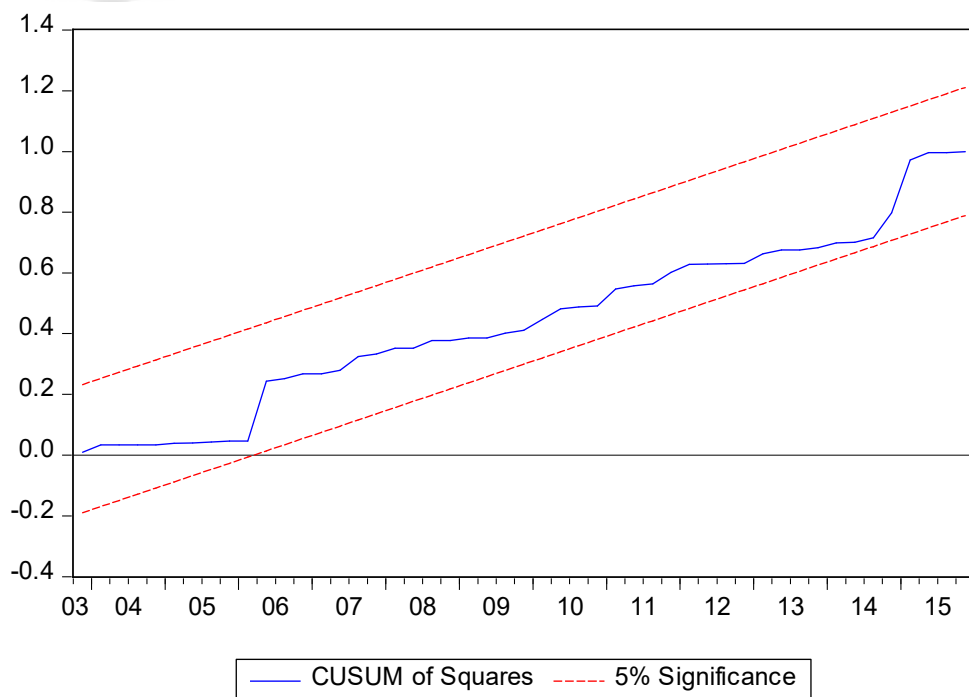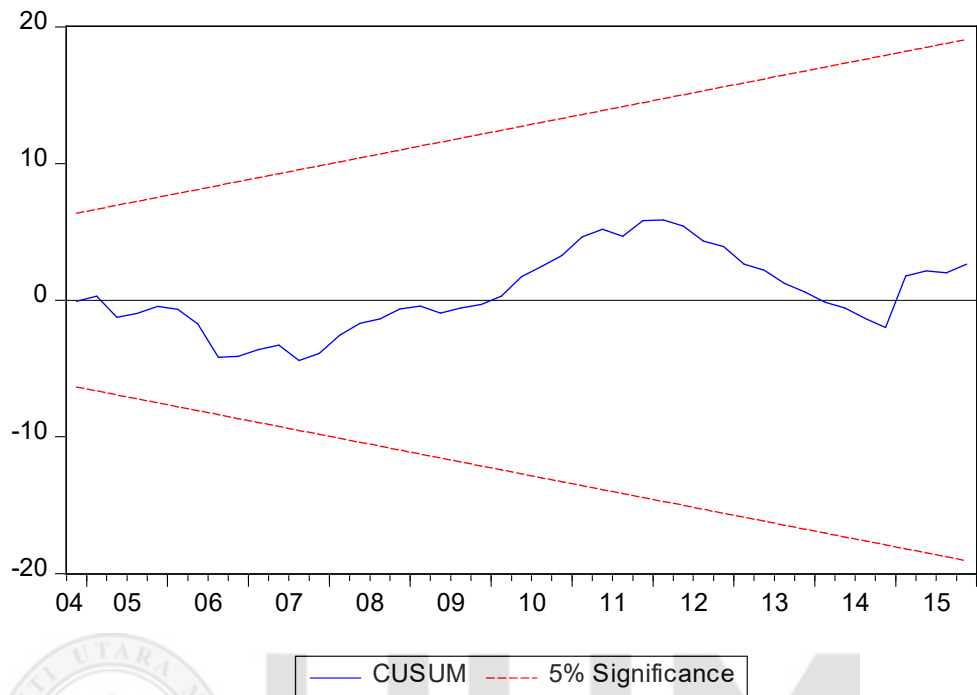
CUSUMSQ Test for Model 1
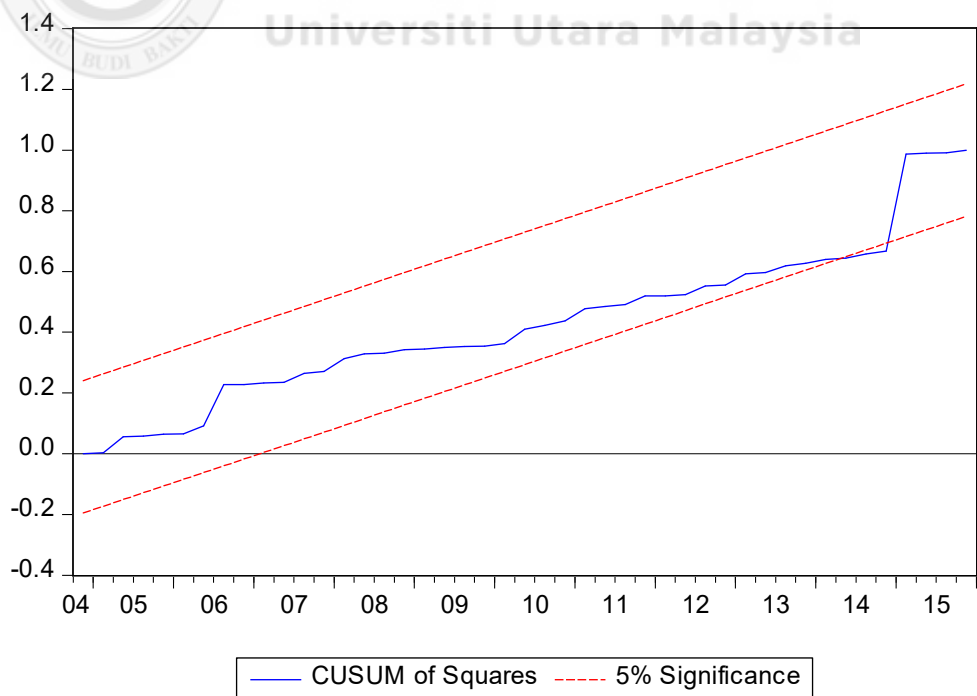

Figure 4.4
CUSUM Test for Model 2
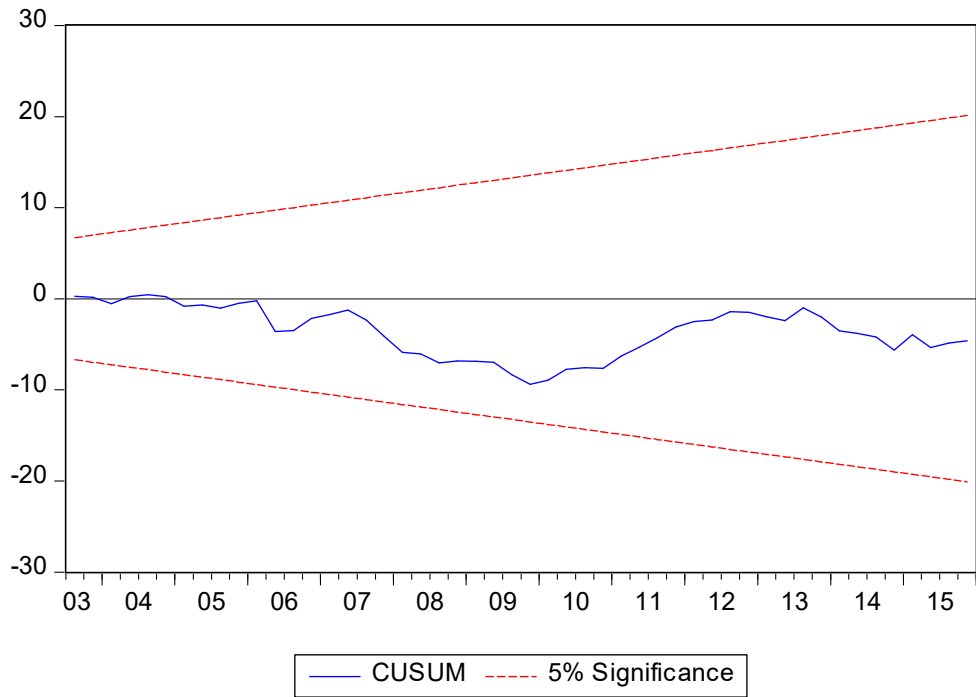

Figure 4.5
CUSUMSQ Test for Model 2

Figure 4.6
CUSUM Test for Model 3
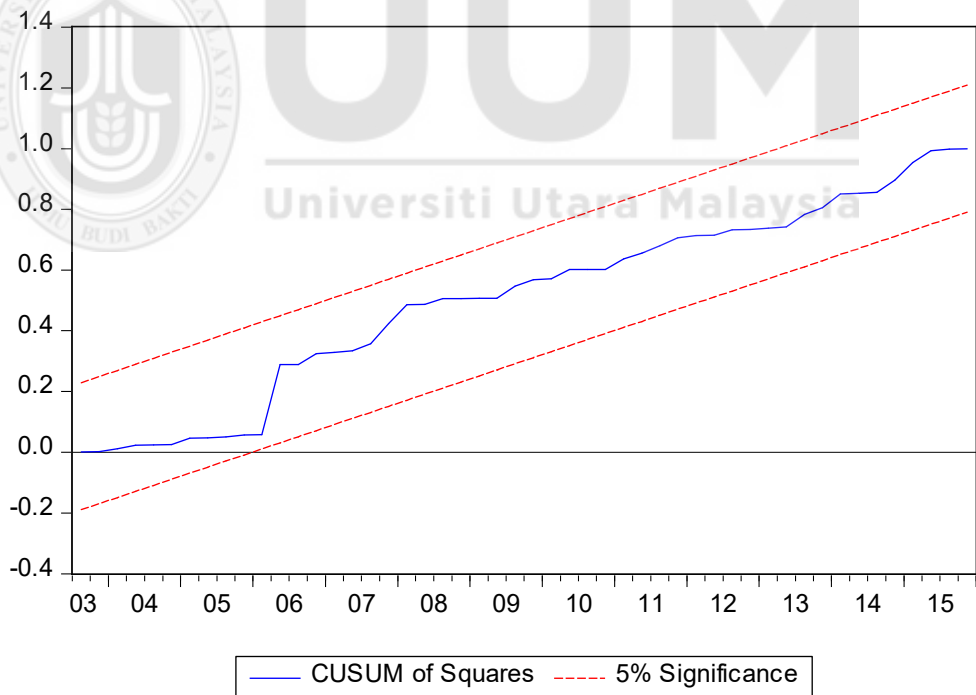
Figure 4.7
CUSUMSQ Test for Model 3

As a summary, the model used in this study passes the diagnostic test whereby there is

no issue of heteroskedasticity, autocorrelation, functional form and stability of the

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model. However, the findings on the normality test reveal that the household debt and mortgage debt models suffer with non-normality issue. Hence, this indirectly raises the concern on the possibility of structural break problem to occur which has impacted the time series analysis.

4.5   The effects of structural breaks

The issue of structural break is a common problem that usually arises in a time series analysis due to various reasons such as the presence of economic crisis, policy reforms, political changes and others. As highlighted in the previous section, there are potential of a break to occur in the time series data since the diagnostic test indicates that normality issue occurs in the estimated model. As a result, the estimated long run and short run coefficients may not be valid. Hence, the inclusion of the structural breaks in the analysis is important to determine on how far the structural break that occurs in the economy has affected the household debt model and thereby helps to answer the fourth objective of the study.

As highlighted by Perron (1989), the failure to address the issue of structural break that presence in the analysis will lead to spurious estimation and thereby results in wrong economic interpretation. Consistently, findings by Kim *et al.* (2014) reveal that the magnitude of the effect of housing prices on the household debt had shifted significantly from a positive sign to a negative sign when the Global Financial Crisis occurred which supports that the structural break plays a significant role and thereby should be considered in the model. As a result, this could also ensure the robustness of the model used in this study.

In particular, this present study considers the endogenously determine break of up to two structural breaks as proposed by Narayan and Popp (2010) since it has been found to be more powerful and able to identify the break date accurately even though in the case of a very small break (Narayan & Popp, 2013). Based on the result of the Narayan and Popp (2010) unit root test reported in Table 4.3, the break dates of the dependent variable are in 2005:Q4 and 2008:Q3 in the case of household debt (LHD) and consumer debt (LCD) while the break dates for the mortgage debt (LMD) model are 2001:Q4 and 2008:Q3.

Before these breaks are incorporated in the ARDL model as a dummy variable to answer the fourth research objective, this study performs the Chow breakpoint test to confirm whether the structural break plays a significant role in the debt model (Chow, 1960). The objective is to examine whether the relationship between the independent variables with the household debt and its composition is stable over time. The null hypothesis of the Chow test indicates that there is no structural break in the model.

Table 4.11
Result of Chow test

Model	Break date	F-statistic	p-value
Model 1: LHD	2005Q4	15.038***	0.000
Model 1: LHD	2008Q3	4.949***	0.000
Model 2: LMD	2001Q4	3.032***	0.009
Model 2: LMD	2008Q3	1.641	0.143
Model 3: LCD	2005Q4	27.245***	0.000
Model 3: LCD	2008Q3	10.856***	0.000

Notes: *** indicates the rejection of the null hypothesis at 1% significance level.

The empirical findings provide evidence that a structural break has occurred in the economy which affected the debt model. In particular, the result of the Chow test reported in Table 4.11 supports that two structural breaks presence in the household debt (LHD) and consumer debt (LCD) models which are during 2005:Q4 and 2008:Q3 as suggested by the p-value of the F-statistics which are lower than 1 percent significance level.

On the other hand, in the case of mortgage debt (LMD) model, the findings of the Chow test reveal that the null hypothesis of no structural break during 2001:Q4 is rejected at 1 percent significance level while the null hypothesis of no break at 2008:Q3 could not be rejected which indicates that only one structural break is significant in the mortgage debt (LMD) model which is during 2001:Q4.. Hence the inclusion of dummy variables should be considered in the debt model to capture the effect of structural break. This findings are similar to Paradiso *et al.* (2014) in the United States using the modified Chow who claim that the presence of structural breaks in the data has emphasizing on the importance of considering the break in the time series analysis.

Correspondingly, the structural break found in 2005 occurred due the policy shift in the exchange change regime whereby in mid-2005, the Malaysian government has replaced the fixed exchange rate regime with the managed floating exchange rate system and eventually resulted in the Ringgit to strengthen. On the other hand, the second break that occurred in 2008 found in the case of household debt and consumer debt is associated with the Global Financial Crisis that started in the United States and impacted the world economies including Malaysia. Finally, the structural break found

in 2001 in the case of mortgage debt is associated with the crash of the dot-com bubbles that happened during that year which has resulted in a fall down in the stock market and influenced the investors to shift towards the investment in real estate market.

Considering the potential of structural break found in the time series data, therefore, this study incorporates the dummy variables in the household debt model to account for the structural break issue and proceeds with the estimation of the ARDL model to examine the effects of income level (LY), interest rate (IR), housing prices (LHP), food prices (LFP) and also the young (LYA) and old age dependency (LOA) on the household debt and its composition in both long run and short run periods. Finally, a diagnostic checking is performed for the entire model to ascertain the robustness of the model.

4.5.1 Bound test for cointegration with structural breaks

This study conducts the bound test in order to investigate whether cointegration exists among the variables in the debt model. Since the result of the Chow test reported in Table 4.10 suggests that structural break does exist in the model, hence dummy variables is included in the model to account for the effects of structural breaks. As supported by Pesaran *et al.* (2001), the inclusion of such dummy variables will not affect the asymptotic theory and thereby no modification is required for the critical values.

This study has applied a single break dummy variable for both structural breaks found in 2001 and 2005 while an intercept dummy variable is used for the break found in 2008. In particular, the Global Financial Crisis which had hit the economy in 2008,

has been found to be one of the biggest crisis in the history and affected many developed and developing countries (Ozturk & Sozdemir, 2015). Hence, an intercept dummy variable is appropriate to represent the structural break that occurred in 2008 since the presence of the crisis is expected to have a larger impact on the household debt and its composition.

Specifially, a single break dummy variable took the value of one during the break date and zero otherwise while an intercept dummy variable for the crisis took the value of zero before the crisis and 1 after the crisis. The null hypothesis of the bound test indicates that there is no cointegration among the variables after controlling the structural break. Findings of the bound test which are reported in Table 4.12 suggest that the null hypothesis of no long run relationship is rejected at 1 percent significance level for the entire model.

Table 4.12
Bound test for cointegration with structural breaks

Test statistic	Model 1: LHD (1,4,3,0,0,0,0)	Model 2: LMD (1,3,2,3,1,1,2)	Model 3: LCD (1,4,2,0,0,0,0)
F-statistic	32.223***	9.789***	24.108***
k	6	6	6
Break date	2005Q4, 2008Q3	2001Q4	2005Q4,2008Q3
Narayan (2005) critical values (k = 6, n = 70)			
Critical value	Lower bound	Upper bound	
10%	2.100	3.121	
5%	2.451	3.559	
1%	3.180	4.596	

Notes: The critical values for the lower I(0) and upper I(1) bounds are taken from Narayan (2005). *** indicates the significance at 1% significance level.

It can be concluded that a long run relationship exists between the income level (LY), interest rate (IR), housing prices (LHP), food prices (LFP) and also the young (LYA) and old age dependency (LOA) with the household debt and its composition after controlling for the structural break. This result is consistent with the findings for the model without structural break discussed earlier that has discovered that all the variables are cointegrated.

4.5.2   ARDL Estimations - Long run model with structural breaks

As supported by the result of the bound test that all the variables move together in the long run, hence the long run model could be estimated. Table 4.13 reports the estimated coefficient of the long run model for Model 1 to Model 3 after controlling for the structural break. The detailed results of the long run coefficients are reported in Appendix 13 to Appendix 15.

Findings of this study discover that the null hypothesis that all the variables have no influence on the household debt is rejected either at 1 percent and 5 percent suggesting that the variation in income level (LY), interest rate (IR), housing prices (LHP), food prices (LFP) and also the young (LYA) and old age dependency (LOA) will significantly affect the household debt. This finding is also similar in the case of mortgage debt (LMD) model whereby the result is significant at 1 percent and 10 percent significance level.

Finally, the result of this study found that the null hypothesis of no long run relationship between the income level (LY), interest rate (IR), housing prices (LHP), food prices (LFP) and also the young (LYA) and old age dependency (LOA) with the

consumer debt (LCD) is rejected at 1 percent and 5 percent significance level except on the roles of old age dependency (LOA) which are found to be insignificant.

Specifically, the estimated coefficients for the income level (LY) are found to carry a positive sign in the entire model (0.27, 0.09 and 0.84) which is statistically significant at 1 percent significance level except in the case of mortgage debt (LMD) model whereby the coefficient of the income level is significant at 10 percent significance level. In contrast, the estimated coefficients of the interest rate (IR) are negative (-0.06, -.0.03 and -0.15) and significant at 1 percent significance level for the entire model.

Table 4.13
Results of Long Run Coefficients for Model with Structural Breaks

Variables	Model 1: LHD (1,4,3,0,0,0,0)	Model 2: LMD (1,3,2,3,1,1,2)	Model 3: LCD (1,4,2,0,0,0,0)
C	22.916***	21.502***	23.318***
	(0.000)	(0.000)	(0.000)
LY	0.273***	0.093*	0.844***
	(0.000)	(0.096)	(0.000)
IR	-0.058***	-0.032***	-0.146***
	(0.000)	(0.000)	(0.000)
LHP	0.127**	0.511***	-0.384**
	(0.013)	(0.000)	(0.021)
LFP	-0.909***	-0.909***	-1.391**
	(0.000)	(0.000)	(0.024)
LYA	-2.683***	-2.581***	-2.530***
	(0.000)	(0.000)	(0.005)
LOA	0.900***	0.941***	0.179
	(0.000)	(0.000)	(0.728)
D01Q4		0.034***	
		(0.000)	

D05Q4	-0.013**	-0.010
	(0.017)	(0.692)
D08Q3	-0.044**	-0.077*
	(0.000)	(0.096)

Notes: ***,**,* indicate the significance at 1%, 5% and 10% respectively. Figures in the parentheses represent the p-value of the test.

Besides that, the coefficient of the housing prices (LHP) carries a positive sign in both household debt and mortgage debt model (0.13 and 0.51) and statistically significant at 1 percent and 5 percent respectively while a negative sign (-0.38) is found in the case of consumer debt (LCD) which is statistically significant at 1 percent significance level. In contrast, the roles of food inflation show a negative sign in the entire model (-0.91, -0.91 and -1.39) and found to be significant at 1 percent and 5 percent significance level.

Finally, the effect of demographic changes reveals a mixed result whereby in the case of young age dependency (LYA), a negative association is found in the entire model (-2.68, -2.58 and -2.53) and significant at 1 percent significance level while the coefficient of the old age dependency (LOA) exhibits a positive sign for all the models (0.9, 0.94 and 0.18) and significant at 1 percent significance level except in the case of consumer debt (LCD) model whereby the variables are found to be insignificant.

In comparison, after controlling for the structural break, the sign of the estimated coefficients for the income level (LY), interest rate (IR), housing prices (LHP), food prices (LFP) and also the young (LYA) and old age dependency (LOA) is consistent with the model without structural break reported in Table 4.4 but the coefficient and significance level are somewhat affected especially on the effects of food prices (LFP)

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and housing prices (LHP) on the household debt and its composition. Hence, this finding supports that the inclusion of the structural break does have a significant influence on the debt model.

Consistently, the result presented in Table 4.12 supports that the structural break that occurred in the economy during 2005 and 2008 has been found to exert a negative influence on both household debt (LHD) and consumer debt (LCD) models which indicates that the policy changes and financial crisis that occurred in the economy has given a negative shock on both debt level. On the other hand, the structural break found in the mortgage debt (LMD) model shows a positive effect which mainly due to a shift in investor behaviour following a crush in the dot-com bubbles towards a less risky asset such as properties, has resulted in the growth of the mortgage debt.

Hence, after taking an account of the presence of structural break, this study presents the following information on the determinants of household debt and composition in Malaysia. Firstly, income level plays an important role in the household debt model whereby the effect is much larger for the consumer debt. This is due to the rise in income level provides the households with a greater opportunity of getting the fund especially for unsecured debt due to the rise in bank confidence on the household ability to repay back the debt.

The positive effects of income level found in this study is consistent with most of the past studies including Mokhtar and Ismail (2013) in Malaysia, Meng *et al.* (2013) in Australia and Mutezo (2014) in the South Africa. This study has found that a 10 percent increase in the income level will lead to the rise in the household debt by 2.7

percent with both mortgage and consumer debt will rise by 0.9 percent and 8.4 percent respectively. This result is statistically significant at 1 percent significance level except for the mortgage debt which is found to be significant at 10 percent significance level.

Secondly, the findings on the effect of interest rates (IR) which is measured by the average lending rate, have been found to exert a negative influence on all types of debts even after adjusting for structural break. The negative effects found in this study is consistent with most of the past studies since the rise in the interest rates will discourage household borrowing (Allen & Giovannetti, 2010; Crawford & Faruqui, 2011; Livshits, 2015; Meng *et al.*, 2013; Pearce, 1985).

In particular, findings of this present study reveal that a decline in the borrowing cost will eventually lead to a rise in consumer demand for loans, which explains the negative relationship that exhibits between the interest rate and household debt. However, the household debt has been found to be less sensitive to the interest rate changes as shown by the coefficient of the variable, which is very small especially in the case of mortgage debt.

Correspondingly, this result indicates that the low interest rates policy adopted by the country following the Asian Financial Crisis is not the main contributor to the rise in household debt. Hence, this may limit the monetary policy implementation in the country mainly through the interest rates targeting method since it will not give much effects on the debt level. As argued by Zakaria *et al.* (2012) in a study conducted in Malaysia, a rapid rise in the household debt is due to the greediness of the financial intermediaries in making profits and thereby discriminates the borrowers by charging

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a high interest rate to a bad borrower and a lower rate to those with good credit ratings.

Consequently, households who need an additional source of income to smooth their consumption will still be willing to continue borrowing despite the level of interest rates. Besides that, households may also consider other factors when borrowing such as the positive expectation on the rise in their net worth, associated with the rise in housing prices, which will make the households become less sensitive to the interest rate changes and thereby explains why this present study has found that the effects of interest rates are smaller especially on the mortgage debt level. In particular, this study has found that a 10 percent decrease in the interest rate will result in the rise of both mortgage and consumer debt by 0.3 percent and 1.5 percentage point respectively with the total household debt is expected to rise by 0.6 percentage point.

Thirdly, in correspond to the rise in housing prices experienced by Malaysia, findings of this study suggest that the rise in the housing price level (LHP) will exert a positive impact on the mortgage debt while the effect on the consumer debt is found to be inversely related. The positive effects of housing prices on the household debt and mortgage debt are consistent with the outcome of the past studies which reveal that the rise in housing prices will increase the debt level due to higher housing services for new homeowners while the existing property owners could use the mortgage equity withdrawal to apply for an additional loan (Dynan & Kohn, 2007; Justiniano *et al.*, 2015; Meng *et al.*, 2013; Meniago *et al.*, 2013; Turinetti & Zhuang, 2011).

On the other hand, the negative effects of housing prices on consumer debt found in this present study may be due to the household behaviour in borrowing against their properties since this type of borrowing usually been charged with lower interest rates due to its lower risk compared to the consumer debt. Specifically, this study has found that a 10 percent rise in the housing prices will lead to the rise in the mortgage debt by 5.1 percent while the consumer debt is expected to decrease by 3.8 percent which supports that the development in the housing market has a greater influence on the mortgage debt as expected by this study.

Besides that, the overall effect of housing prices on the total household is found to be positively related whereby it is expected to rise by 1.3 percent. In short, findings of this study suggest that as the housing prices rises, households have been taking advantage to increase their borrowing for mortgage debt by using the mortgage equity withdrawal instead of using the consumer debt which usually being charged with a higher interest rate since it is riskier for the lenders.

Fourthly, since the rising cost of living has become a serious concern in Malaysia, the inclusion of this variable in the analysis is useful to determine whether the Malaysian households have been using the debt as a form of wage substitution to finance the rising cost of living. Findings of this study reveal that as the cost of living (LFP) as measured by the food price index increases, the effects on all types of debt are negative which indicate that the households are not using the debt as a wage substitution, which contradicts with the findings by Barba and Pivetti (2008) and Nau *et al.* (2015) in the United States. Although this result is not consistent with the predictions of this study, however, the negative association found is reasonable since

households may face difficulties to obtain loans from the banking sector since the lenders will be more selective in giving out loans to mitigate the risk of default associated with rising cost of living.

The evidence on the effect of the cost of living suggests that a 10 percent rise in the food price index has resulted in a decline in both mortgage and consumer debt by 9.1 percent and 13.9 percent respectively whereby the aggregate effect on total household debt is estimated to be approximately 9 percent. The impact of the cost of living which is found to be greater on the consumer debt does make sense since this type of debt is riskier for the bank since it is not secured with assets and thereby the lending policy may be tightened to mitigate the risk of default. However, since the household debt data used in this study only represents household borrowing from a formal sector, hence, it may be possible that some of the households have been borrowing from other informal sectors including illegal money lenders. However, further analysis at a household level is needed to confirm this prediction.

Fifthly, in term of demographic effect, findings of this study suggest that the rise in the young age dependency (LYA) will give a negative influence on all types of debt while the findings for the old age dependency have revealed a positive influence. The young age dependency which used to capture the effect of household size contradicts with most of the findings at a micro level study which found that households with bigger family size will have a higher debt accumulation (Beer & Schürz, 2007; Crook, 2001; Cox & Jappelli, 1993; Duca & Rosenthal, 1993; Sullivan & Worden, 1986; Tobin, 1967; Enthoven, 1957).

By looking at demographic transition in Malaysia, the young age dependency has been declining due to a decline in fertility rate. This study has found that a 10 percent decrease in the young age dependency will result to a rise in the total household debt by 26.8 percent whereby both mortgage and consumer debt are expected to rise by 25.8 percent and 25.3 percent respectively. The negative association found on the impact of young age dependency on household debt and its composition indirectly reveals interesting information that worth to be pondered.

Given that the young age dependency has been declining over time, however, the household debt and its composition has continued to rise which indicates that the households has been borrowing excessively despite having a smaller family size. Moreover, the availability of various government incentives for parents in raising their children has at least reduced some burden in raising their children. Hence, the most possible reasons for this incident is that the children may have been overindulged by their parents by providing both their needs and wants since young (Mahima & Puja, 2008; Bredehoft et al., 1998).

As argued in the previous section, children from a smaller family have a greater influence on their parents which resulted in higher spending expenses for the children (Wimalasiri, 2004). Hence, the rise in the number of children may decrease the household debt since the parents are less influenced by their children and thereby spend more cautiously. Besides that, the rise in income level will influence the parents to choose quality over quantity, which resulted in a higher consumption per child (quality) and thereby explains the negative association found in this present study (Higgins & Williamson, 1997).

In contrast, the effect of old age dependency (LOA) which exhibits a positive relationship suggests that a 10 percent increase in the old age dependency will lead to a 9 percent increase in total household debt with both mortgage and consumer debt are expected to rise by 9.4 percent and 1.8 percent respectively. Although this result contradicts with the prediction of the Life Cycle Model; that the rise in old age population will result in lower debt, however, this result is consistent with the prediction of this present study due to its influence on the working population. Since the old age population usually faces difficulties to obtain a borrowing due to a relatively low income during retirement, this has resulted in a higher dependency on the working population to support their life during retirement and thereby results in higher debt accumulation.

In the meantime, as the baby boomers' generation in Malaysia is currently moving towards the old age population, this will bring towards a greater burden on the working age population which may affect the debt level to continue rising. Findings of this study reveal that the retirement savings may be insufficient to support the old age population during retirement and thereby call upon for reformation in the retirement scheme to help the old age population to survive during retirement.

Finally, the roles of structural break have shown a mixed result whereby the breaks found in 2005 and 2008 have shown to exert a negative influence on both household debt and consumer debt while the break discovered in 2001 reveals that it has a positive impact on the mortgage debt level. Apparently, the findings on the effects of structural break have been found to be statistically significant at 5 percent and 10

percent significance level except the effect of policy changes that occurred in 2005 is found to be insignificant in the case of consumer debt.

In summary, findings of this study reveal that the policy changes that took place in 2005 due to changes in exchange change regime used in Malaysia and also the presence of Global Financial Crisis in 2008 have given a negative influence on both household debt and consumer debt. Consistently, a study carried out by Meng *et al.* (2013) in Australia also discovers that the household debt has decreased tremendously after the Global Financial Crisis due to a rise in uncertainty which supports a negative impact of crisis on the household debt model. On the other hand, the crush in the dot-com bubble that occurred in 2001 has been found to exert a positive effect on the mortgage debt level due to shift in an investor choice towards a lower risk investment by investing on properties has resulted in a rise in asset prices and thereby leads to a greater mortgage debt accumulation.

4.5.3   ARDL Estimations - Short run model with structural breaks

The investigation on the short run determinants of household debt and its composition is useful to determine on how fast any deviation in the model will be corrected to achieve the long run equilibrium. The outcome of the short run model estimation is reported in Table 4.14 while the detailed results of the short run estimates are reported in Appendix 16 to Appendix 18.

Findings of this study reveals that the speed of adjustment of the household debt (LHD) is 62.7 percent in a quarter while any short-term deviation in both mortgage debt (LMD) and consumer debt (LCD) will be corrected by 56.1 percent and 23.9

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percent in a quarter. It will take about 1.5 quarter for the deviation in the household debt to completely return to the long run equilibrium while both the mortgage and consumer debt will take approximately 2 quarter and 4 quarter to adjust back to the equilibrium. Hence, after considering the presence of structural breaks, the mortgage debt model will still adjust faster mainly due to lower risk associated with this type of debt.

Table 4.14
Results of Short Run Model with Structural Breaks

Variable	Model 1: LHD (1,4,3,0,0,0,0)	Model 2: MD (1,3,2,3,1,1,2)	Model 3: CD (1,4,2,0,0,0,0)
ΔLY	-0.128***	-0.105***	-0.027
	(0.000)	(0.000)	(0.421)
ΔLY_{t-1}	-0.184***	-0.049**	-0.162***
	(0.000)	(0.041)	(0.001)
ΔLY_{t-2}	-0.190***	-0.065***	-0.146***
	(0.000)	(0.002)	(0.000)
ΔLY_{t-3}	-0.161***		-0.119***
	(0.000)		(0.000)
ΔIR	0.010	0.010	0.002
	(0.199)	(0.191)	(0.809)
ΔIR_{t-1}	0.023**	0.015**	0.016
	(0.012)	(0.039)	(0.157)
ΔIR_{t-2}	0.017**		
	(0.012)		
ΔLHP	0.103	0.171**	-0.018
	(0.144)	(0.022)	(0.854)
ΔLHP_{t-1}		-0.007	
		(0.927)	
ΔLHP_{t-2}		-0.165**	
		(0.042)	
ΔLFP	-0.545***	-0.804***	-0.362*
	(0.000)	(0.000)	(0.052)
ΔLYA	-1.597***	0.503	-0.427
	(0.000)	(0.262)	(0.276)
ΔLOA	0.462***	0.085	0.001
	(0.001)	(0.544)	(0.993)
ΔLOA_{t-1}		-0.209	
		(0.155)	
$\Delta D01Q4$		0.024***	

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		(0.000)	
ΔD05Q4	-0.015***		-0.017**
	(0.002)		(0.010)
ΔD08Q3	-0.034***		-0.032***
	(0.000)		(0.003)
ECT $_{t-1}$	-0.627***	-0.561***	-0.238***
	(0.000)	(0.000)	(0.000)

Notes: ***,**,* indicate the significance at 1%, 5% and 10% while figures in parentheses is the p-value.

By referring to the findings of the estimated coefficients of the short run model, firstly, this study has found that the income level (LY) has a negative impact on both household debt and mortgage debt whereby the result is statistically significant at 1 percent significant level while the negative influence found on the consumer debt is found to be insignificant. Besides that, the past values of income level also found to exert a negative influence on all types of debt and the result is significant at 1 percent significance level. In addition, the joint coefficient of the lagged income reported in Appendix 19 also supports that income level has a lagged effect on the household debt and its composition.

Although negative effects of income on debt level found in this study is not in line with the findings in the long run, however, this result is consistent with the findings by Turinetti and Zhuang (2011) in the United States. In addition, as argued by Zimunya and Raboloko (2015), a rise in income level may have a negative impact on household debt since households with a higher income are able to achieve an optimal consumption without having to be dependent on the debt. However, this effect will only hold in a short run since households may experience a shift in their needs and

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preferences in the long run thus resulted in higher spending and thereby may use the debt to finance the rising consumption.

Secondly, the roles of interest rate (IR) are found to exert a positive influence on household debt and its composition but the result is insignificant. On the other hand, the past value of interest rates have been found to exert a positive influence on both household debt and mortgage debt whereby the result is statistically significant at 5 percent significance level. In addition, the result of the Wald test for the lagged interest rate reported in Appendix 19 also supports that interest rate has a lagged effect on the total household debt.

Although this finding is not consistent with findings in the long run, however, as argued by Jacobsen and Naug (2004), the real effects of interest rates will depend on whether the lenders or borrowers who are greatly affected. Positive association found in the short run indicates that the change in the interest rate in the short run will exert more influences on the lenders while the long run effects will be more prominent on borrowers.

Thirdly, the estimated coefficients of the housing prices (LHP) are positive in the case of household debt and mortgage debt while a negative sign is found in the case of consumer debt which is in line with the findings in the long run. However, the result found is significant only on the mortgage debt at 5 percent significance level. In addition, although the lagged housing prices reveal a negative association on the mortgage debt, however, the result of the Wald test of the lagged housing prices reported in Appendix 19 reveals that the joint coefficient is insignificant.

Fourthly, the coefficient signs for the food prices (LFP) are negative for the entire model and significant at 1 percent and 10 percent significant level which is in line with the findings in the long run. Hence, this result supports that a rise in the cost of living will result in a lower household debt since the banking sector may be more selective in approving loans in order to mitigate the risk of default payment.

Finally, the coefficients of the young (LYA) and old age dependency (LOA) show a mixed result. In particular, young age dependency has been found to exert a negative influence on both household debt and consumer debt, which is consistent with the findings in the long run. However, the effects are significant only in the case of household debt whereby it is significant at 1 percent significance level. On the other hand, although the young age dependency is found to exert a positive influence on the mortgage debt, however, this result is insignificant.

On the other hand, the positive impact of old age dependency on household debt and its composition found in the short run is consistent with the findings in the long run but the result is insignificant. In addition, the lagged effects of the old age dependency found on the mortgage debt are also insignificant. Hence, it can be concluded that the old age dependency has no effects on the household debt and its composition in the short run since the retired population may still have enough savings to finance their consumption during the early retirement period and thereby does not give much burden on the working population during the short run period.

The study also supports the importance of the structural breaks since it is also found to have a significant impact in the short run which is similar as figured out in the long run. In particular, both the policy shift exchange change regime in 2005 and the presence of Global Financial Crisis in 2008 have negatively influenced both household debt and consumer debt whereby this is statistically significant at 1 percent and 5 percent significant level. In addition, the crash of the dot-com bubbles in 2001 is found to exert a positive influence on the mortgage debt in which is consistent with the findings in the long run.

4.5.4   Diagnostic test

Following the long run and short run estimation, this study has conducted the diagnostic test to check for the robustness of the model. In particular, the ARCH test, Breusch–Godfrey serial correlation LM test, Jarque-Bera test, Ramsey RESET test and the stability test were carried out and the details of the findings are discussed below.

4.5.4.1   ARCH Test

In order to test whether the homoscedasticity assumption is fulfilled, this study has conducted the ARCH test which considered up to four lags and the result obtained for the test is reported in Table 4.15.

Table 4.15
ARCH Test

Indicator	Test statistic	p-value	Result
Model 1: LHD	3.621	0.459	Do not reject H_0. No ARCH effect
Model 2: LMD	1.765	0.778	Do not reject H_0. No ARCH effect

Model 3: LCD	5.794	0.215	Do not reject H_0.
			No ARCH effect

The outcome of the test supports the null hypothesis that an equal variance could not be rejected which indicates that there are no ARCH effects in all the models which satisfy the classical assumption.

4.5.4.2 Serial correlation LM Test

As a robustness check, this study also has performed the autocorrelation test based on the Breusch–Godfrey serial correlation LM test to examine whether the error terms are serially correlated. If autocorrelation problem occurs in the model, hence the estimation result will be biased and thereby does not represent the actual economic inference. Based on the result of the test which is reported in Table 4.16, findings support that the null hypothesis of no serial correlation which is tested for up to four lags could not be rejected for the entire model which indicates that all the models do not suffer from autocorrelation problem.

Table 4.16
Breusch-Godfrey Serial Correlation LM Test

Indicator	Test statistic	p-value	Result
Model 1: LHD	1.535	0.820	Accept H_0.
			No autocorrelation
Model 2: LMD	5.730	0.220	Accept H_0.
			No autocorrelation
Model 3: LCD	1.975	0.740	Accept H_0.
			No autocorrelation

4.5.4.3 Normality test

This study has carried out the Jarque-Bera test in order to examine whether the error terms are normally distributed. This test examines both the skewness and kurtosis to determine whether they follow the normal distribution. Rejection of the null hypothesis indicates that there is a non-normal distribution which resulted in a spurious estimation result. As reported in Table 4.17, the result of the normality test of all models supports that the residuals are normally distributed which satisfied the classical assumption. The histogram of the normality test for the entire model is presented in Appendix 18 to Appendix 20.

Consequently, after been adjusted for structural break in the analysis, this finding reveals that the inclusion of the break has helped to cater for the normality issue that arises in the model without break. Hence, it can be concluded that the model which takes into account the presence of structural break is more robust and thereby should be used for economic inference and forecasting purposes.

Table 4.17
Jarque-Bera Test

Indicator	Test statistic	p-value	Result
Model 1: LHD	0.425	0.808	Do not reject H_0. Normal distribution
Model 2: LMD	3.743	0.153	Do not reject H_0. Normal distribution
Model 3: LCD	1.327	0.514	Do not reject H_0. Normal distribution

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4.5.4.4 Ramsey RESET Test

In order to determine whether all the models used in this study are well specified, this study has conducted the Ramsey RESET test and the result obtained for the test is reported in Table 4.18.

Table 4.18
Ramsey Reset Test

Indicator	Test statistic	p-value	Result
Model 1: LHD	0.263	0.769	Accept H_0. Correct model specification
Model 2: LMD	1.967	0.152	Accept H_0. Correct model specification
Model 3: LCD	0.397	0.674	Accept H_0. Correct model specification

As reported in Table 4.18, the p-value of the Ramsey RESET (1) test is greater than 10 percent significance level suggesting that the null hypothesis stating that the model is well specified is failed to be rejected for all models. Hence, it can be concluded that all of the models does not suffer from misspecification problems and thereby could be used for forecasting purpose.

4.5.4.5 Stability test

Finally, this study has applied the stability test to examine whether all the models used in this study are stable. In particular, both the CUSUM and CUSUMSQ tests are carried out and the graphical representation of the tests are presented in Figure 4.8 to Figure 4.13.
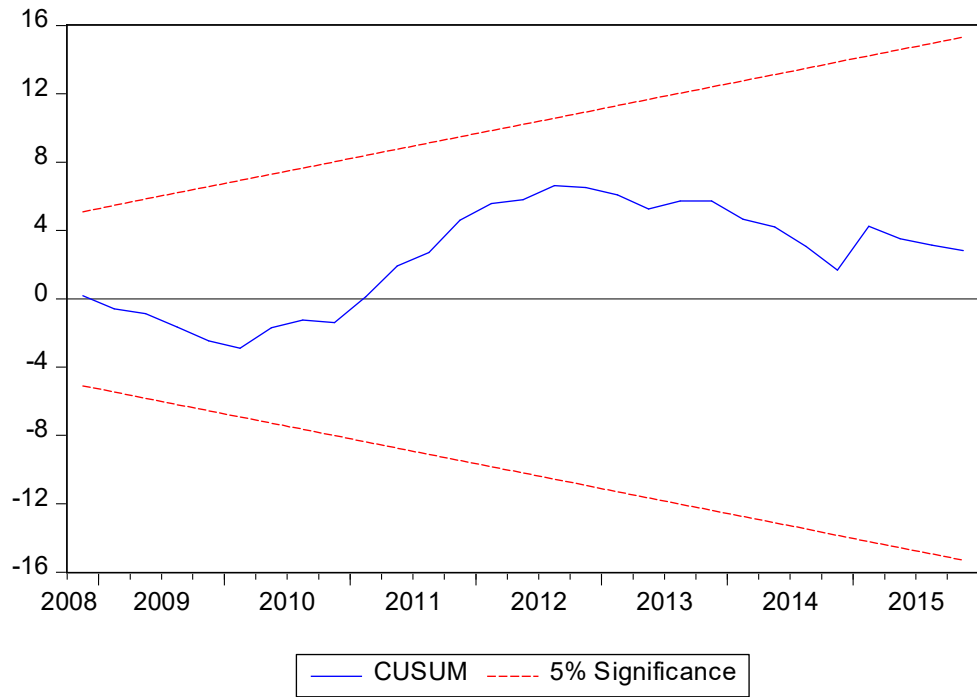
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Figure 4.8
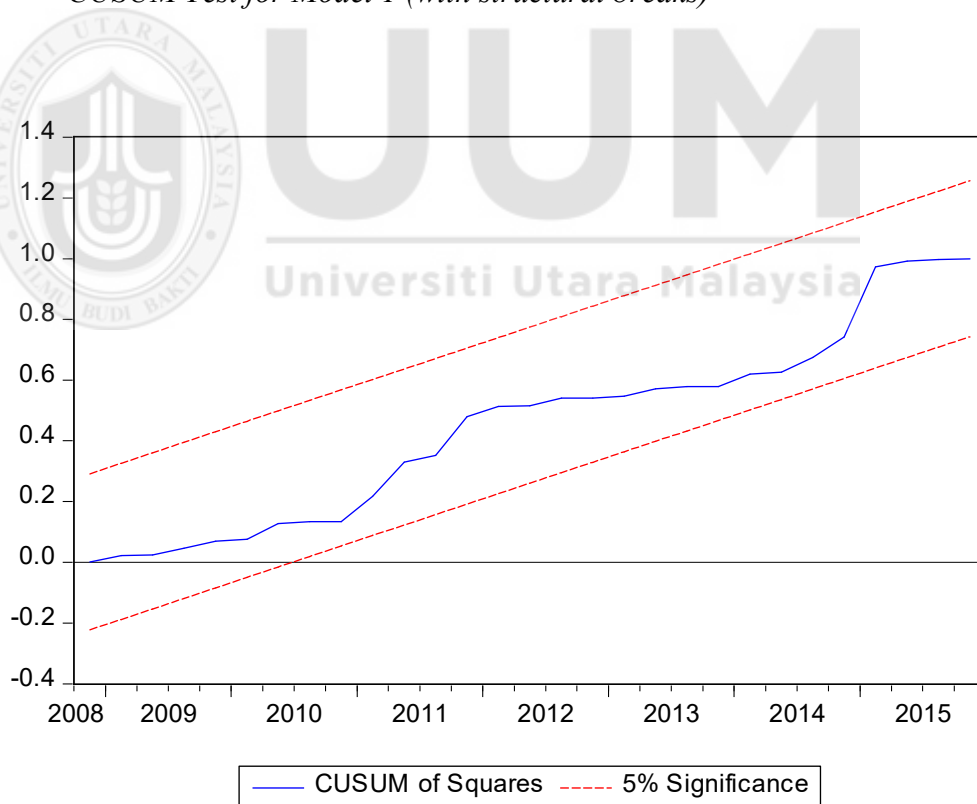*CUSUM Test for Model 1 (with structural breaks)*

Figure 4.9
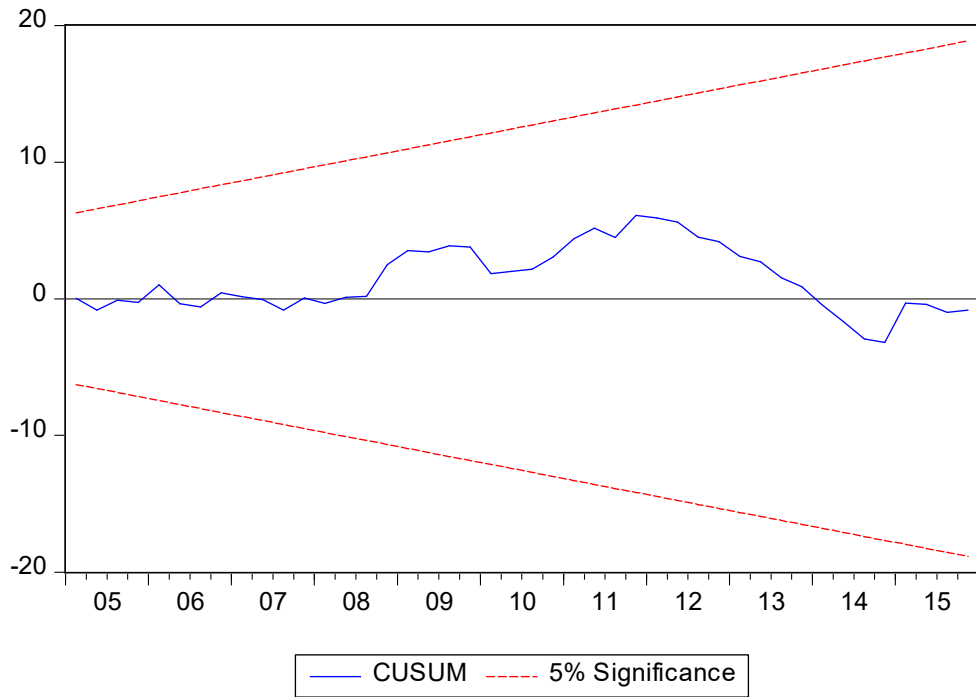*CUSUMSQ Test for Model 1 (with structural breaks)*

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Figure 4.10
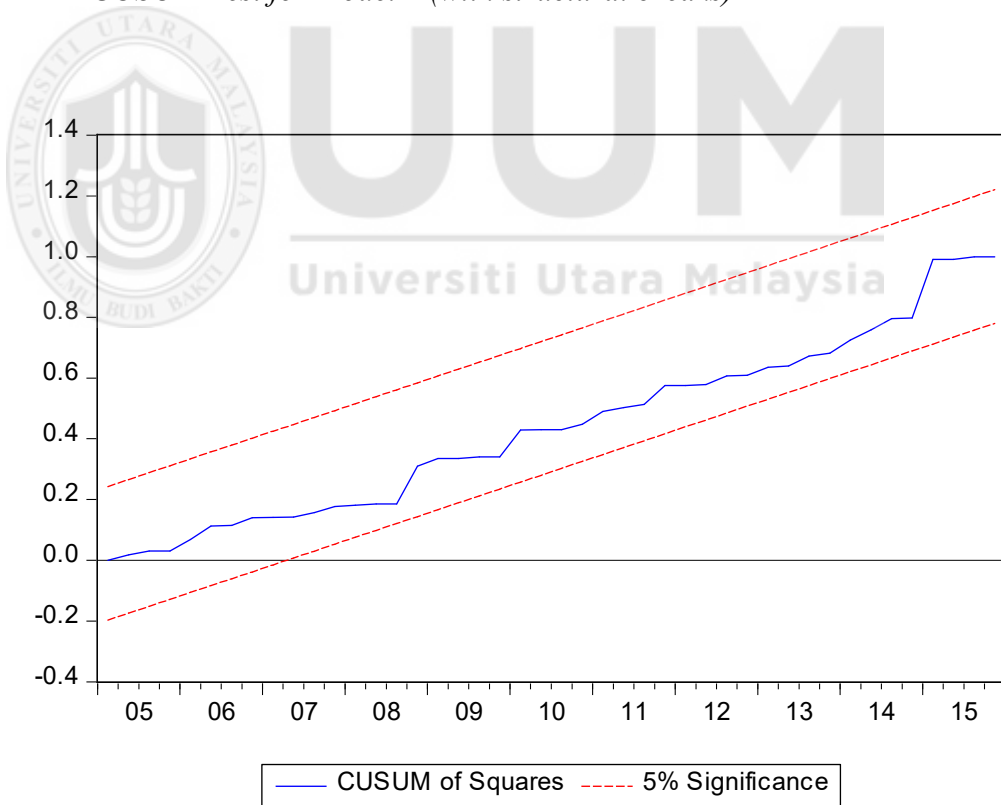*CUSUM Test for Model 2 (with structural breaks)*

Figure 4.11
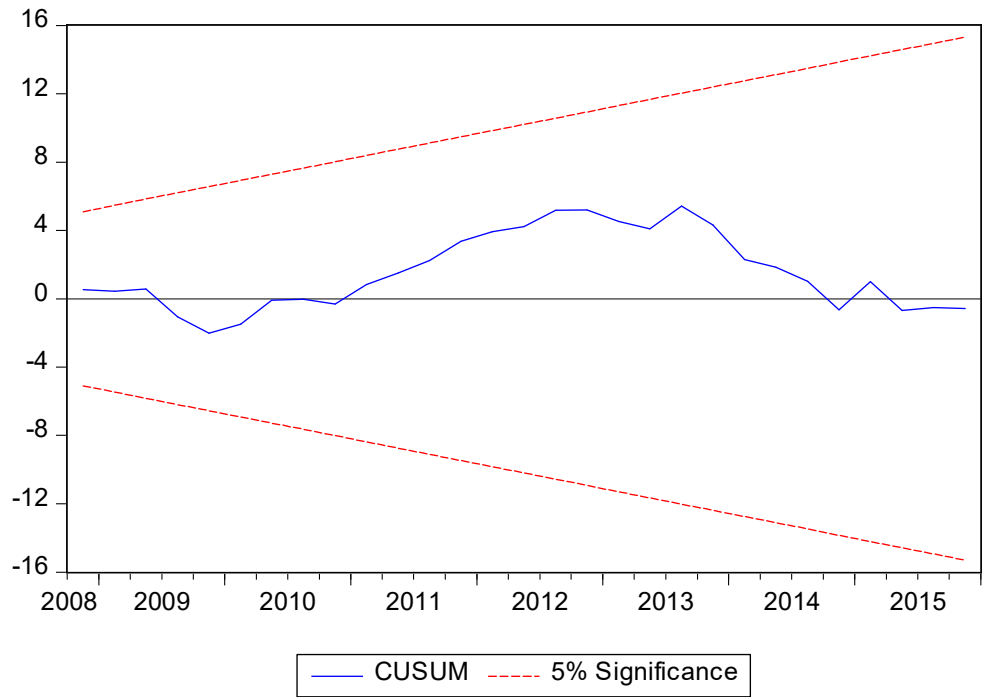*CUSUMSQ Test for Model 2 (with structural breaks)*

Figure 4.12
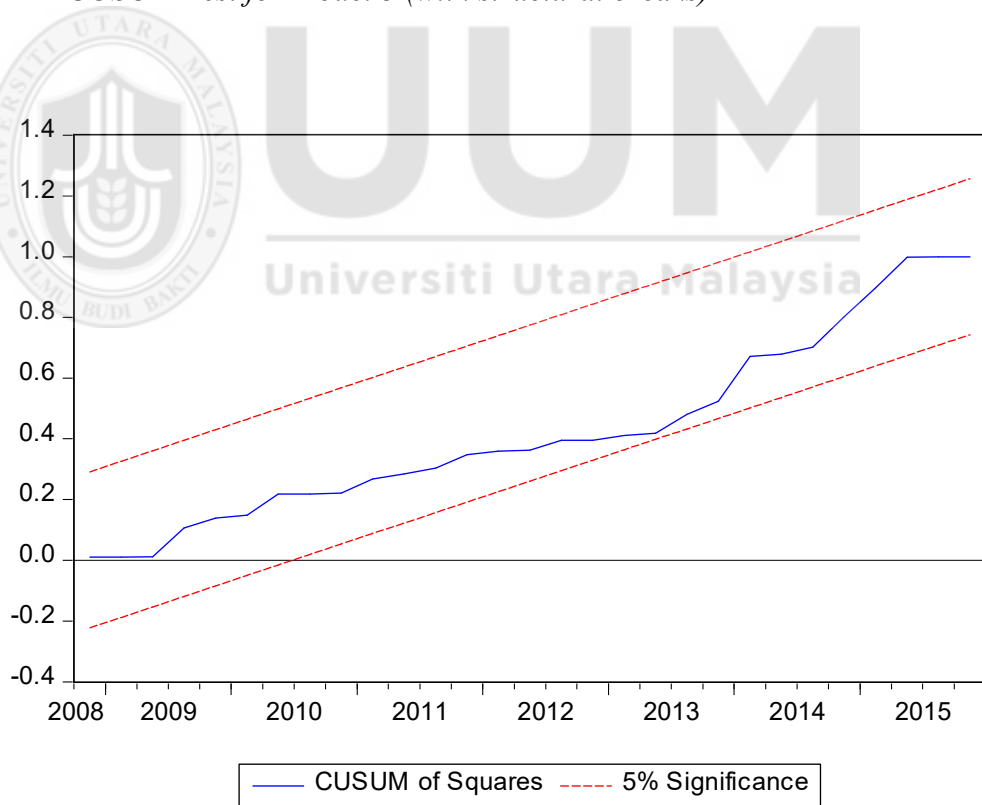*CUSUM Test for Model 3 (with structural breaks)*

Figure 4.13
CUSUMSQ Test for Model 3 (with structural breaks)

The illustration of the CUSUM and CUSUMSQ graphs shows that the residuals do not drift beyond the critical bound. Thus, the null hypothesis stating that the parameter is stable could not be rejected at 5 percent significance level. Hence, it can be concluded that the entire models; namely household debt, mortgage debt and consumer debt are stable over time and thereby the models could be used for forecasting. Findings of this test also suggest that the inclusion of structural break in the analysis has helped to improve the stability of the models especially in the case of mortgage debt which has been found to be less stable in the model without break.

As to sum up the discussion, the models used in this study which takes into account the presence of structural break have passed the diagnostic test whereby the variance is homoscedasticity, no serial correlation among the residuals, error terms are normally distributed, correct functional form and the parameters of the model are stable. Hence, this result confirms that the ARDL estimation is efficient and reliable for interpretation.

4.6   Conclusion

This chapter has discussed the reasons behind the escalating household debt in Malaysia mainly on the effects of cost of living and household dependency. In the long run, the rise in the cost of living will give a negative influence on the household debt and its composition mainly due to stricter lending policies by the banks by reducing the borrowing limit due to lower confidence on the household ability on debt repayment. Besides that, the roles of household dependency as measured by the young and old age dependency reveal that although the level of dependency of the young population has declined, the household debt and its composition has continued to rise

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which suggest that parents may be overindulging their children and thereby resulted in excessive spending. On the other hand, the rise in old age dependency has shown that the burden of the working population has increased which results in a higher debt accumulation.

This study also has found that the income level and housing prices will exert a positive influence on household debt and the mortgage debt level while interest rate has been found to be negatively affecting the debt level. This finding is also similar in the case of consumer debt except for the roles of housing prices. Findings in the short run reveals that the speed of adjustment of the debt model is relatively faster especially for the mortgage debt since this type of debt is less risky and thereby any deviation in the short run will be easily adjusted. Finally, this study also supports that the structural break has a significant influence on all of the debt models both in the long run and short run and thereby should be given ample consideration in the time series analysis.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter presents the summary of empirical findings drawn from this study and provides some guidelines on policy formulation in controlling the high household debt level in the country. Finally, this chapter also discusses on the limitation of the study and give recommendations for future studies in the area of household debt.

5.2 Conclusions

The purpose of this study is to investigate the effects of cost of living and household dependency on the household debt and its composition in Malaysia. This study also includes the roles of income level, interest rates and housing prices as the determinants of household debt as emphasized by the Life Cycle Model and Permanent Income Hypothesis. Besides that, since the issue of structural break has often arise in the time series analysis, this study also considers the presence of structural break during the period of analysis in order to control the structural effects. This study used a quarterly time series data which covers the period from the first quarter of 1999 to the fourth quarter of 2015.

In order to answer the objectives of the study, firstly this study conducts the unit root test based on Augmented Dicky-Fuller (ADF) test and Narayan and Popp (2010) unit root test to determine the stationarity of the variables used in this study. Since the findings of the stationarity test suggest that there is mixed order of integration among the variables used in this study, hence, the Autoregressive-Distributed Lag (ARDL)

modelling approach is the most suitable method that can be used in order to answer the research questions.

As reported in the previous chapter, the findings based on the ARDL modelling approach on the long run impact reveal that long run relationship exists among the variables with income level, housing prices and old age dependency have been found to exert a positive influence on household debt and the mortgage debt level while interest rates, food prices and young age dependency are found to be inversely related with both household debt and mortgage debt. The same result is also found in the case of consumer debt except for the roles of housing prices which have been found to carry a negative sign in the consumer debt model. The signs and significance of the long run coefficient of the variables tested in the debt model are summarized in Table 5.1 while the findings for the model with structural break are reported in Table 5.2.

This study helps to answer the research objectives as follows. Firstly, the rise in the food prices which is measured by the food price index has been found to negatively affect all types of debt. Although it is expected that households will borrow more when the cost of living has risen, households also face difficulties to obtain approval for loans since the banking and financial institutions may be stricter in their lending decision to reduce the risk of bad borrowing. As a result, households who need an additional source of income to support the rising consumption may eventually have to engage in a part time job, adopt a stricter budgeting strategy, or borrow from an informal sector such as friends and families or illegal money lenders.

Table 5.1
Summary on the findings of the long run model

Variables	Household debt	Mortgage debt	Consumer debt
Income level	+ve***	+ve**	+ve***
Interest rates	-ve***	-ve***	-ve***
Housing prices	+ve***	+ve***	-ve
Food prices	-ve***	-ve***	-ve***
Young age dependency	-ve***	-ve***	-ve***
Old age dependency	+ve***	+ve***	+ve

Notes: ***,**,* indicate the significance at 1%, 5% and 10% significance level.

Table 5.2
Summary on the findings of the long run model (with structural breaks)

Variables	Household debt	Mortgage debt	Consumer debt
Income level	+ve***	+ve*	+ve***
Interest rates	-ve***	-ve***	-ve***
Housing prices	+ve**	+ve***	-ve**
Food prices	-ve***	-ve***	-ve**
Young age dependency	-ve***	-ve***	-ve***
Old age dependency	+ve***	+ve***	+ve
D01Q4		+ve***	
D05Q4	-ve**		-ve
D08Q3	-ve**		-ve*

Notes: ***,**,* indicate the significance at 1%, 5% and 10% significance level.

Secondly, the findings on the effects of household dependency reveal that both young and old age dependencies do not have similar influence on the household debt and its composition. In particular, a negative sign has been found in the case of young age dependency while a positive association has been found on the impact of old age dependency on the household debt and its composition. Although the young age dependency level in Malaysia has declined, however, the debt level has kept rising and thereby contradicts with the findings of the past studies which postulate that the rise in the number of children will result in a higher debt level due to the rise in parents' burden.

Findings on the effects of young age dependency reveal interesting information on the household borrowing behaviour. Although parents have a relatively smaller family size, they have been borrowing excessively. Moreover, with the availability of various government incentives for parents and the existence of various insurance and takaful schemes for children including the infants, this has helped to reduce the parents' burden in child rearing. One possible reason for such incident to occur is that the children may have been overindulged by their parents which result in higher consumption and debt accumulation.

On the other hand, the roles of old age dependency have been found to positively affect the household debt and its composition which indicate that the households have become more dependent on their children during retirement. This finding thereby supports that the retirement savings may not be sufficient to fulfil the consumption of the old age population especially for those with high longevity and thereby call upon for government intervention to improve the current retirement scheme for both public and private sectors. Moreover, since the baby boomer generation in Malaysia is currently moving towards the old age population, hence, it is expected that the household debt will further rise.

Thirdly, the findings of the short run model reveal that the speed of adjustment of the mortgage debt is almost three times faster in comparison with the speed of adjustment of the consumer debt whereby any short-term deviation in the mortgage will take approximately one and half quarter to completely return to the equilibrium while a period of four quarter is required for the consumer debt to adjust back to the equilibrium. This may due to the former type of debt which is less risky since it has

been secured by an asset and thereby any deviation in the short run equilibrium will be easily adjusted. In addition, this study also discovers that any deviation that occurs in the total household debt will take nearly two quarter to move back to the equilibrium. The summary result of the speed of adjustment is shown in Figure 5.1
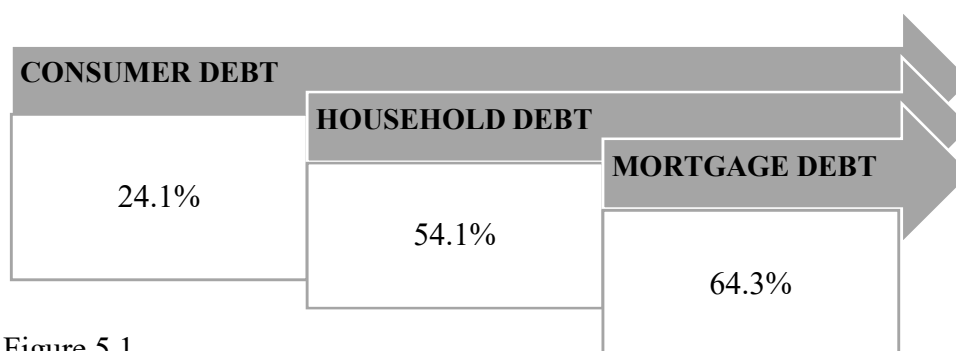

Figure 5.1
Speed of adjustment of the debt model

Finally, as reported in Table 5.2, by taking into account the presence of structural break in the household debt model, findings of this study also reveal that the structural breaks do have a significant effect on the household debt and its composition. The inclusion of structural break variable not only helps to cater the normality issue in the residual but also found to estimate a model which is more stable and thereby is found to be more robust compared to the model without break. Hence, considering the presence of structural break in the analysis is crucial not only for economic inference and forecasting purpose but also helps to prevent biased estimation.

5.3   Policy recommendations

This section discusses various actions that can be taken by the policymakers towards the sustainability of the household borrowing and help to sustain the economic stability of the country. This is important since Malaysia is aiming towards becoming

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a high-income country by 2020 and thereby it is crucial for the government to maintain a positive and stable economic growth.

5.3.1 Cost of living

This study has discovered that the rise in the cost of living as measured by the food prices will negatively affect the household debt primarily on the consumer debt level. In particular, with the risen of high cost of living, the lenders may eventually revise their lending decision to prevent from giving out loans to risky borrowers. The difficulties to obtain loans from the formal sectors to finance the rising consumption may encourage the households to borrow from an informal sector such as the illegal money lenders. This will eventually create a more serious economic problem which can cause the households to be more vulnerable due to higher interest rate charged and expose them to danger if the households are unable to pay back their loan. Hence, continuous government actions to prevent such activities from taking place in the economy should be strengthen in order to protect the households' economic well-being.

Besides that, it is also crucial for continuous government intervention in the market to help maintaining the price level. Although the government has recently implement a cash transfer scheme to reduce the households living burden, however, this incentive is only given for certain individuals mainly among low and middle-income groups and not for the society as a whole. Hence, it is important for the government to evaluate the effectiveness of existing policies in reducing the households living burden and making continuous improvement to cater the society needs.

5.3.2 Household dependency

The young age dependency has been found to exert a negative influence on the household debt and its composition which contradicts with most of the findings at a micro level study. Although the young age dependency in Malaysia has lowered, the debt level keeps rising. Moreover, the presence of various government incentives for parents including the children welfare benefits programme and various tax reliefs for child rearing has helped to reduce some of the parents' burden in raising their children. In addition, the availability of various insurance and takaful schemes in the market which give protection for children including the infant at a lower premium rate has also helped to reduce the parents' dilemma in raising their children. Hence, this study suggests that the rise in household debt associated with lower young age dependency is due to parents' action that has been overindulging their children.

Thus, it is important to educate the parents not to overspend on their children especially in fulfilling all their needs and wants since it can spoil the children. In addition, it is also important to increase the parents' awareness regarding the future cost that they need to consider in raising their children. For example, the use of the Child Raising Calculator developed by the United States Department of Agriculture (USDA) is beneficial for the parents in order to plan for their family consumption and indirectly help them to improve their financial management skills. This will avoid the parents from overspending and thereby can help to control their borrowing behaviour.

On the other hand, findings on the effects of old age dependency revealed that the rise in the old age dependency in the country has a positive influence on the household debt mainly on the mortgage debt level. This finding suggests that the retirement

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savings for the old age population may not be sufficient to cover their life expenses during retirement. Since the parents regards their children as a form of investment that can provide economic security during retirement, hence, this has increased the dependency level of the old age population on their children to support life during retirement (Bryant & Wang, 1990; Filoso and Papagni, 2015). This has eventually raised the burden of the working population and resulted in higher debt accumulation among the working population.

Consistently, findings from a survey conducted by the Employees Provident Fund reveal that the savings for retirement is not enough since half of the retired population has depleted their retirement savings within the first five years of retirement (Employees Provident Fund, 2015). Hence, the retirement benefits implemented by the country should be critically evaluated and revised to ensure the survival of the population during retirement. For instance, the pre-retirement withdrawal should be tightened while the percentage contribution for this type of account that allows for early withdrawal should be reduced to enable a greater fund accumulation for retirement.

Besides relying on the retirement benefits to support the consumption during retirement, it is also crucial for the individuals to have a personal savings to finance unexpected living expenses during retirement mainly to accommodate the rising cost of living. Despite the compulsory savings policy and a pension scheme implemented by the government, further actions should be taken to encourage the household savings for retirement. For instance, the government can offer a tax relief incentive for individuals who make additional contribution to their retirement scheme including

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those working in the public sector and choose to opt in the pension scheme. Most importantly, the incentives offered should be flexible whereby an individual who contributes more can receive a greater percentage of tax relief since it can help to boost the household savings.

5.3.3   Income level

The income level has been found to play a positive role in the debt model whereby a rise in income will result in a rise in total household debt especially in the form of consumer debt. This result indicates that as income level rises, households will eventually increase their spending by utilizing the credit facilities such as in the form of credit card debt and personal loan. However, since the personal bankruptcy in Malaysia has been rising especially among households in the prime working age, this indirectly suggests that households with higher income level will still face difficulties in managing their debts (Malaysia Department of Insolvency, 2013). Hence, it is important to equip the households with knowledge on financial management so that it can help them to make a sound financial decision.

The roles of financial education are important since it can increase the household awareness about the threat that can arise when holding a higher debt especially when any negative shocks occur in the economy. Therefore, continuous government initiatives in enhancing the financial literacy among households by providing a support system for the society to obtain the knowledge that can help to improve the household economic well-being. Although there are platforms such as the bankinginfo.com, insuranceinfo.com and duitsaku.com that are developed by the Central Bank to provide the consumers including the children with the knowledge on

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various financial products available in the market, however, the existence of such programmes is not widely known. Thus, it is crucial for the government to spread the information through various channels including campaigns in schools and higher institutions, mass media and mainly the social media since it can reach the target audience at a lower cost. Further enhancement should also be made through the development of application and financial educational games for mobile phone since it can attract the children and youth to learn various aspects of financial management.

5.3.4 Interest rates

The roles of interest rates have been found to exert a negative influence on the household debt mainly on its effects on total consumer debt but the magnitude of the impact is relatively low. This study reveals that the low interest rate policies adopted by the country since the Asian Financial Crisis are not the main drivers to the rise in the total household debt. Hence, the interest rate targeting method is not the best measure to curb the high debt level. As a result, the implementation of an effective macroprudential policy along with the monetary policy which can help to mitigate the risk of high household debt should be considered in order to control the high debt accumulation in the country.

For instance, the policymakers can control the loan-to-value (LTV) ratio and debt-to-income (DTI) ratio which can help to slow down the credit growth. In addition, the implementation of ceilings on credit growth can also help to moderate the growth in credit. However, the tools should be cautiously implemented to avoid any negative disturbance to the economy. In addition, continuous development in new

macroprudential tools is also necessary to help overcome future obstacles that may arise.

5.3.5 Housing prices

The roles of housing wealth have been found to exert a positive effect on the household debt mainly due to its impact on the mortgage debt which is the most dominant type of debt in Malaysia. On the other hand, the rise in housing prices will negatively affect the consumer debt which suggests that the continuous rise in housing prices has influenced the consumer to take advantage of mortgage equity withdrawal by borrowing against the rise in their asset prices.

Despite the fact that the housing prices have been rising significantly, the appreciation in the asset price does not indicate that the household balance sheet has improved since it may occur due to inflated housing sector (Weller, 2007). Hence, this will become a threat to the economy and increases the risk of financial instability if the property's value starting to depreciate. As an example, the crash in housing market together with large debt accumulation in the United States has caught the country in a severe recession which eventually led to the Global Financial Crisis (Lavender & Parent, 2013). Hence, early prevention should be taken by policymakers to avoid such incident to ensure a stable and continuous economic stability of the country.

Since the rise in housing prices has been found to be one of the important drivers contributed towards the rise in the mortgage debt, the policymakers should revise the homeownership policy adopted by the country to ensure that it will not put more pressure on the housing market. The existing housing policy including My First Home Scheme, People's Housing Program, Youth Housing Scheme and MyDeposit scheme

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have encouraged more people to own a house and resulted to a rise in a housing demand. This indirectly put an upward pressure on the housing prices and consequently leads to higher debt.

There are various approaches that can be utilized by the policymakers to control the demand for housing. Firstly, despite the greater rise in housing prices, the rent level in Malaysia is still affordable. Hence, instead of providing credit facilities to citizens to buy houses, the government through the partnership with the private sectors and NGOs should encourage the renting housing scheme. This not only will help to control the housing prices and debt level but also gives more time to the household to make their home purchasing decision and prepare their financial in owning a house.

Besides that, since there are no standard tools that can be used to evaluate the rent charged by landlords, hence, the establishment of rent estimator tools which consider various information about the building including the year it is built, type, number of rooms, location, designs and facilities available should be developed to protect the renters from being exploited. This can also assist the country to create a more effective renting system and help the housing market to be more systematic.

Secondly, the government should consider implementing the shared ownership scheme for the new residential properties as implemented in the developed countries such as in the United Kingdom and Australia whereby households are allowed to purchase a part of the property while the remaining part will be rented by the developer at a subsidized rate (Cambridge City Council, 2013; Homes & Communities Agency, 2016). In addition, this type of scheme can also be used for

existing properties whereby households can purchase the shared ownership from the previous owner who want to let go of their ownership.

Consequently, the shared homeownership scheme can help to solve buyers' dilemma in preparing the down payment to purchase a house. Through this scheme, households do not have to take a large amount of debt since they can purchase part of it according to their affordability level. As the households move up the income ladder, they can continue to purchase the remaining part of the property and reduce the payment for rent until they get the full ownership of the properties. This will enable the households to plan their budgeting strategies and adapt with the economic changes rather than taking a large amount of debt which can be riskier especially if any negative economic shock occurs in the economy. Hence, this can indirectly help to maintain the stability of the housing prices and mortgage debt level and thereby help to reduce the risk of bad loans.

Thirdly, the policymakers can also consider implementing a rent-to-buy scheme similar with that in the United Kingdom whereby the society are able to rent a property at a subsidized rate in order to help them to prepare for the down payment to purchase the house. Interestingly, this scheme is based on the principle 'try before you buy' which opens an opportunity for households to make decision before buying the house (Cambridge City Council, 2014; Homes & Communities Agency, 2016).

Finally, since the housing services are high, the government should also encourage the homeowners to utilize their properties to get some returns which can be used to finance part of their debt servicing. For instance, the government can implement the

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Rent-a-Room scheme as used in the United Kingdom whereby the property owners can rent their spare room at a tax-free rate (HM Revenue & Customs, 2014). In addition, the property owners also able to rent out their parking space if the properties are located at a strategic area such as near the train station, shopping complex, university, or when there are any events or occasion nearby the place. However, a systematic procedure should be developed so that the property owners can utilize the available options to reduce their housing services without having to face any negative consequences of renting out their place. In addition, the monitoring system should also be enhanced to strengthen the protection for both the landlord and tenant and ensure the effectiveness of such programme.

5.4 Recommendation for future studies

This present study investigates the effects of cost of living and household dependency on the household debt and its composition in Malaysia and considers the effects of structural breaks in the time series analysis. However, due to the limitation of this study, further investigation is essential to provide more insight in the study of household debt. Firstly, in order to fully understand the issue of household debt at a global scale, further investigation should be carried out in other countries so that the outcome of the study can be compared. In addition, further analysis using a panel data is also useful to explore on how far the country's differences have impacted the household debt model across countries.

Secondly, this study focuses more on the demand side factor since it has been found to have dominant effects on the debt model (Paradiso *et al.*, 2014). Hence, the inclusion of more supply side determinants such as the effects of financial

deregulation and liberalization, marketing plan, banks competition, banks performance and technological improvements would enable the researcher to investigate the behaviour of both borrowers and lenders in affecting the household debt model. In addition, the investigation from the lenders side is also beneficial to examine a bank's lending decision in order to understand why the banking sector keeps giving out loans although the current debt accumulation is high.

Thirdly, this study also focuses on a macro level study in order to examine the impact at an aggregate level. Although the study which utilizing the macroeconomic data can give the picture of the whole economy and help in policy formulation, further investigation using household level data may help to supports the findings at the macro level. Since the macroeconomic data on the household debt only represents the debt taken from the formal sector, hence, it may not represent the actual debt accrued in the economy. Therefore, further investigation at a micro level is useful to provide information on household borrowing in informal sector. Finally, since the effects of young age dependency found in this study contradict with the theory, therefore, further investigation using a nonlinear Autoregressive Distributed Lags (NARDL) modelling approach is useful since it will take into account of the asymmetric impact.

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APPENDICES

Appendix 1. Zivot-Andrews unit root test

Variables	t-statistics (Intercept)	Break date	t-statistics (Both)	Break date
LHD	-2.242183[0]	2002Q2	-4.264895[0]	2007Q1
LMD	-3.722229[0]	2006Q2	-4.350909[0]	2008Q1
LCD	-0.452139 [0]	2001Q3	-2.828744[0]	2005Q2
LY	-5.554456***[4]	2005Q1	-5.305605**[4]	2005Q1
IR	-3.444789[1]	2009Q1	-3.733902[1]	2009Q1
LHP	-3.106281[0]	2011Q2	-4.795213[0]	2008Q4
LFP	-3.593904[1]	2008Q1	-4.064556[1]	2007Q4
LYA	-2.395033[4]	2007Q1	-4.165868[4]	2010Q3
LOA	-0.082575[3]	2012Q2	-2.369974[3]	2009Q2

The value in parentheses indicates the optimal number of lag, k. The critical values at 1, 5 and 10% for break in intercept are -5.34, -4.93 and -4.58 respectively while the critical values for variable with break in both intercept and trend are -5.57, -5.08 and -4.82 respectively.   ***,** indicate the significant at 1% and 5% respectively.

Appendix 2. Perron (1997) unit root test

Variables	t-statistics (Intercept)	Break date	t-statistics (Both)	Break date
LHD	-2.274712[0]	2002Q2	-4.228988[0]	2006Q4
LMD	-3.776585[0]	2006Q3	-4.494751[0]	2007Q4
LCD	-0.348336[0]	2001Q3	-2.805681[0]	2005Q1
LY	-5.482534**[4]	2004Q4	-5.116200[4]	2004Q4
IR	-3.416268[1]	2008Q4	-3.715258[1]	2008Q4
LHP	-3.041981[4]	2011Q1	-5.126682[4]	2008Q3
LFP	-3.522619[1]	2007Q4	-4.262038[1]	2007Q4
LYA	-3.061526[3]	2013Q2	-4.321113[3]	2010Q2
LOA	-0.671693[2]	2012Q1	-2.946449[2]	2009Q1

The value in parentheses indicates the optimal number of lag, k. The critical values at 1, 5 & 10% are -5.92, -5.23, -4.92 for intercept & -6.32, -5.59 and -5.29 respectively for intercept & trend. ** indicates the significant at 5% significance level.

Appendix 3. Long run coefficients of household debt model, ARDL (1, 4, 2, 0, 0, 0, 1)

Variables	Coefficient	Std. error	t-statistics	Prob
C	24.720037	1.763130	14.020538	0.0000
LY	0.306296	0.064701	4.734001	0.0000
IR	-0.050672	0.009041	-5.604805	0.0000
LHP	0.221392	0.064638	3.425092	0.0013
LFP	-1.351883	0.117866	-11.469687	0.0000

Variables	Coefficient	Std. error	t-statistics	Prob
LYA	-2.853552	0.239735	-11.902966	0.0000
LOA	0.989210	0.215306	4.594440	0.0000

Appendix 4. Long run coefficients of mortgage debt model, ARDL (1, 4, 2, 3, 0, 1, 1)

Variables	Coefficient	Std. error	t-statistics	Prob
C	21.978302	1.513091	14.525437	0.0000
LY	0.110492	0.049877	2.215270	0.0318
IR	-0.037142	0.006553	-5.667639	0.0000
LHP	0.553476	0.061289	9.030543	0.0000
LFP	-0.995103	0.100327	-9.918605	0.0000
LYA	-2.609043	0.198839	-13.121378	0.0000
LOA	0.793363	0.214260	3.702805	0.0006

Appendix 5. Long run coefficients of consumer debt model, ARDL (1, 4, 2, 0, 0, 0, 0)

Variables	Coefficient	Std. error	t-statistics	Prob
C	26.768653	6.239628	4.290104	0.0001
LY	0.887393	0.234014	3.792057	0.0004
IR	-0.128012	0.035218	-3.634871	0.0007
LHP	-0.238063	0.195003	-1.220818	0.2279
LFP	-2.123362	0.369275	-5.750091	0.0000
LYA	-2.884080	0.894914	-3.222744	0.0022
LOA	0.275959	0.636304	0.433691	0.6664

Appendix 6. Short run estimates of household debt model, ARDL (1, 4, 2, 0, 0, 0, 1)

Variables	Coefficient	Std. error	t-statistics	Prob
D(LY)	-0.113769	0.024504	-4.642976	0.0000
D(LY(-1))	-0.190725	0.036807	-5.181699	0.0000
D(LY(-2))	-0.148739	0.027557	-5.397463	0.0000
D(LY(-3))	-0.149839	0.029256	-5.121712	0.0000
D(IR)	0.013934	0.008021	1.737065	0.0887
D(IR(-1))	0.025232	0.008720	2.893646	0.0057
D(LHP)	0.134750	0.071790	1.877000	0.0665
D(LFP)	-0.705972	0.117656	-6.000318	0.0000
D(LYA)	-1.241006	0.286294	-4.334727	0.0001
D(LOA)	0.195834	0.139195	1.406904	0.1658
ECT(-1)	-0.541736	0.049755	-10.888150	0.0000

Appendix 7. Short run estimates of mortgage debt model, ARDL (1, 4, 2, 3, 0, 1, 1)

Variables	Coefficient	Std. error	t-statistics	Prob
D(LY)	-0.128181	0.022659	-5.656853	0.0000
D(LY(-1))	-0.133270	0.030839	-4.321509	0.0001
D(LY(-2))	-0.099345	0.023651	-4.200501	0.0001
D(LY(-3))	-0.106268	0.026247	-4.048719	0.0002
D(IR)	0.006930	0.007567	0.915771	0.3647
D(IR(-1))	0.032291	0.008431	3.829842	0.0004
D(LHP)	0.195805	0.073912	2.649151	0.0111
D(LHP(-1))	-0.043205	0.078876	-0.547759	0.5866
D(LHP(-2))	-0.184354	0.077688	-2.373017	0.0220
D(LFP)	-0.596331	0.112729	-5.289947	0.0000
D(LYA)	0.990083	0.441740	2.241326	0.0300
D(LOA)	0.056458	0.131017	0.430925	0.6686
ECT(-1)	-0.643111	0.063697	-10.096449	0.0000

Appendix 8. Short run estimates of consumer debt model, ARDL (1, 4, 2, 0, 0, 0, 0)

Variables	Coefficient	Std. error	t-statistics	Prob
D(LY)	-0.035716	0.034396	-1.038399	0.3041
D(LY(-1))	-0.201927	0.050508	-3.997890	0.0002
D(LY(-2))	-0.127902	0.038351	-3.335013	0.0016
D(LY(-3))	-0.145334	0.041172	-3.529942	0.0009
D(IR)	0.011680	0.011590	1.007774	0.3184
D(IR(-1))	0.016325	0.012141	1.344626	0.1848
D(LHP)	0.052097	0.104516	0.498462	0.6203
D(LFP)	-0.510439	0.173016	-2.950238	0.0048
D(LYA)	-0.535154	0.406693	-1.315865	0.1942
D(LOA)	-0.188091	0.201299	-0.934386	0.3546
ECT(-1)	-0.241456	0.024279	-9.945198	0.0000

Appendix 9. Wald test of the lagged variables

Variable	LHD	LMD	LCD
Income	5.236***	3.899**	1.888
	(0.003)	(0.014)	(0.143)
Housing price	-	0.912	-
		(0.409)	

Notes: The figures in table represent the F-test with the value in parentheses represents the p-value of the test. ***,** indicates that the variable is significant at 1% and 5% respectively.
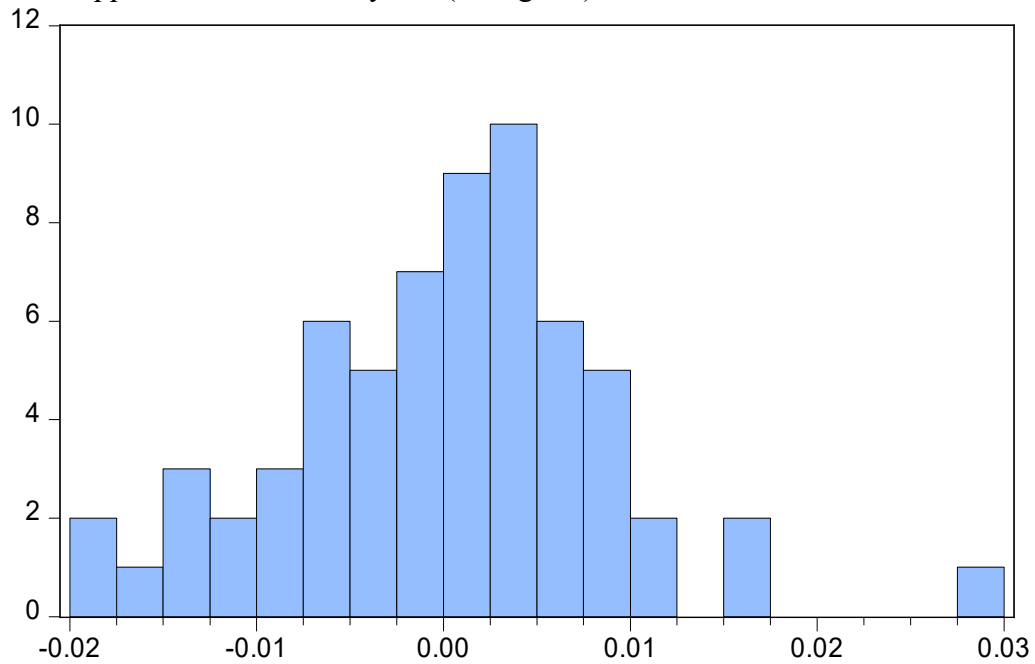
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Appendix 10. Normality test (histogram) for the household debt model
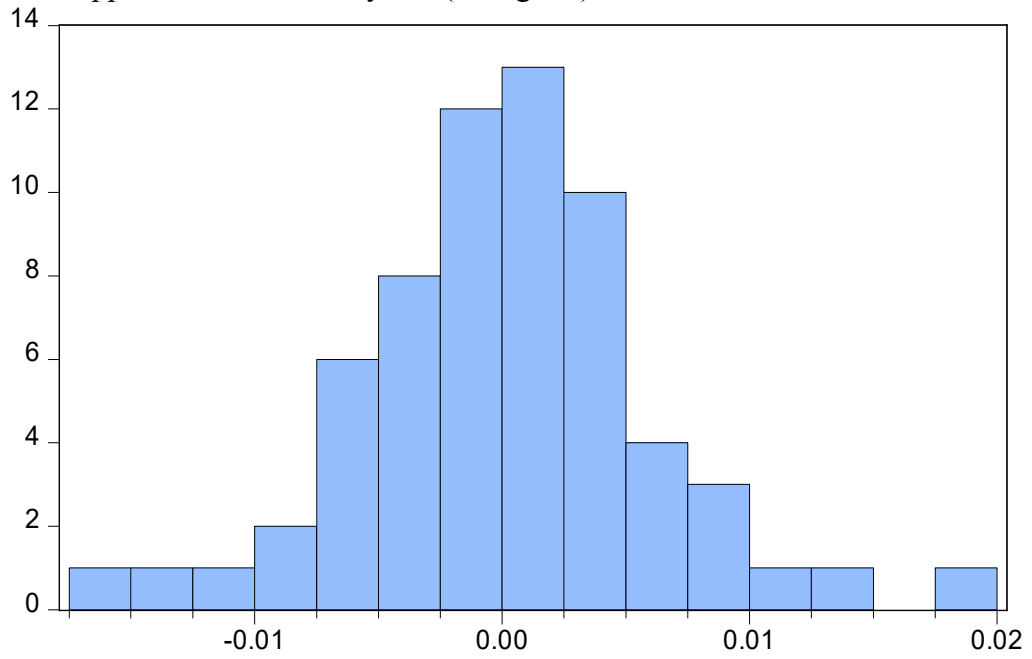
Appendix 11. Normality test (histogram) for the mortgage debt model
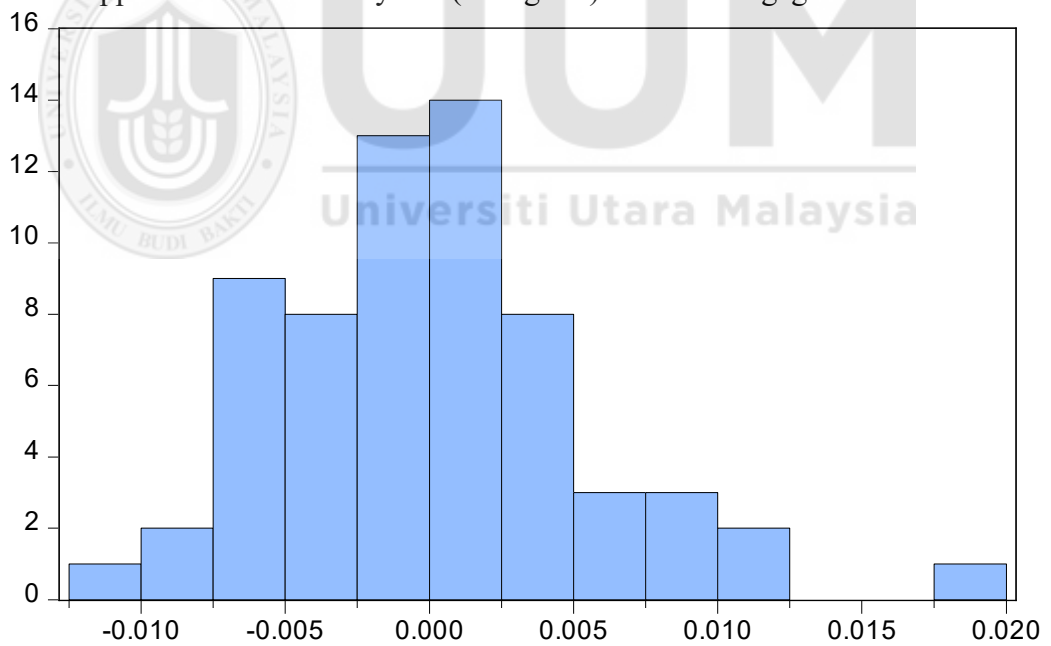
Appendix 12. Normality test (histogram) for the consumer debt model

Appendix 13. Long run coefficients of household debt model with breaks,
ARDL (1, 4, 3, 0, 0, 0, 0)

Variables	Coefficient	Std. error	t-statistics	Prob
C	22.916846	1.651150	13.879323	0.0000
LY	0.273063	0.056913	4.797907	0.0000
IR	-0.058291	0.008464	-6.887312	0.0000
LHP	0.127488	0.061815	2.062408	0.0447
LFP	-0.909337	0.191867	-4.739413	0.0000
LYA	-2.683159	0.214263	-12.522743	0.0000
LOA	0.900702	0.170156	5.293382	0.0000
D2005Q4	-0.013458	0.012076	-1.114468	0.2707
D2008Q3	-0.044009	0.016714	-2.632966	0.0114

Appendix 14. Long run coefficients of mortgage debt model with breaks,
ARDL (1, 3, 2, 3, 1, 1, 2)

Variables	Coefficient	Std. error	t-statistics	Prob
C	21.502082	1.824540	11.784936	0.0000
LY	0.093257	0.056823	1.641181	0.1079
IR	-0.032877	0.006699	-4.907940	0.0000
LHP	0.511332	0.073581	6.949260	0.0000
LFP	-0.909724	0.120241	-7.565851	0.0000
LYA	-2.581478	0.234646	-11.001587	0.0000
LOA	0.941058	0.271375	3.467741	0.0012
D2001Q4	0.034165	0.012418	2.751131	0.0086

Appendix 15. Long run coefficients of consumer debt model with breaks,
ARDL (1, 4, 2, 0, 0, 0, 0)

Variables	Coefficient	Std. error	t-statistics	Prob
C	23.318210	7.157513	3.257865	0.0021
LY	0.844692	0.233190	3.622337	0.0007
IR	-0.146382	0.040428	-3.620821	0.0007
LHP	-0.384556	0.218507	-1.759930	0.0848
LFP	-1.391714	0.718434	-1.937150	0.0586
LYA	-2.530195	0.977842	-2.587528	0.0128
LOA	0.179451	0.638905	0.280873	0.7800
D2005Q4	-0.010906	0.045463	-0.239881	0.8114
D2008Q3	-0.077079	0.062934	-1.224751	0.2266

Appendix 16. Short run estimates of household debt model with breaks,
ARDL (1, 4, 3, 0, 0, 0, 0)

Variables	Coefficient	Std. error	t-statistics	Prob
D(LY)	-0.128600	0.025375	-5.068016	0.0000
D(LY(-1))	-0.184310	0.038410	-4.798518	0.0000
D(LY(-2))	-0.190216	0.028710	-6.625385	0.0000
D(LY(-3))	-0.161127	0.031501	-5.114962	0.0000
D(IR)	0.010287	0.007900	1.302235	0.1992
D(IR(-1))	0.023591	0.009090	2.595285	0.0126
D(IR(-2))	0.017195	0.006640	2.589664	0.0128
D(LHP)	0.103363	0.069700	1.482972	0.1448
D(LFP)	-0.545851	0.126381	-4.319084	0.0001
D(LYA)	-1.597281	0.254052	-6.287224	0.0000
D(LOA)	0.462300	0.139882	3.304940	0.0018
D(D2005Q4)	-0.015079	0.004807	-3.136961	0.0029
D(D2008Q3)	-0.034654	0.007530	-4.601848	0.0000
ECT(-1)	-0.627428	0.061099	-10.268963	0.0000

Appendix 17. Short run estimates of mortgage debt model with breaks,
ARDL (1, 3, 2, 3, 1, 1, 2)

Variables	Coefficient	Std. error	t-statistics	Prob
D(LY)	-0.105076	0.022665	-4.636058	0.0000
D(LY(-1))	-0.049445	0.023539	-2.100557	0.0414
D(LY(-2))	-0.065479	0.020666	-3.168482	0.0028
D(IR)	0.010248	0.007722	1.327094	0.1913
D(IR(-1))	0.015099	0.007115	2.121984	0.0395
D(LHP)	0.171507	0.072428	2.367982	0.0223
D(LHP(-1))	-0.007335	0.079556	-0.092204	0.9270
D(LHP(-2))	-0.165779	0.079174	-2.093852	0.0421

Appendix 17. (Continued)

Variables	Coefficient	Std. error	t-statistics	Prob
D(LFP)	-0.804059	0.104224	-7.714706	0.0000
D(LYA)	0.503331	0.443324	1.135357	0.2624
D(LOA)	0.085059	0.139220	0.610967	0.5444
D(LOA(-1))	-0.209892	0.145314	-1.444399	0.1557
D(D2001Q4)	0.024840	0.004598	5.402154	0.0000
ECT(-1)	-0.561365	0.063534	-8.835716	0.0000

Appendix 18. Short run estimates of consumer debt model with breaks
[ARDL (1, 4, 2, 0, 0, 0, 0)]

Variables	Coefficient	Std. error	t-statistics	Prob
D(LY)	-0.027221	0.033594	-0.810290	0.4218
D(LY(-1))	-0.162617	0.049062	-3.314542	0.0018
D(LY(-2))	-0.146205	0.037442	-3.904827	0.0003
D(LY(-3))	-0.119607	0.040462	-2.955996	0.0048
D(IR)	0.002714	0.011197	0.242390	0.8095
D(IR(-1))	0.016913	0.011776	1.436152	0.1574
D(LHP)	-0.018525	0.100369	-0.184567	0.8543
D(LFP)	-0.362791	0.182570	-1.987132	0.0526
D(LYA)	-0.427518	0.388181	-1.101336	0.2762
D(LOA)	0.001707	0.199478	0.008557	0.9932
D(D2005Q4)	-0.017981	0.006776	-2.653737	0.0108
D(D2008Q3)	-0.032151	0.010616	-3.028557	0.0039
ECT(-1)	-0.238574	0.024030	-9.928092	0.0000

Appendix 19. Wald test of the lagged variables for model with break

Variable	LHD	LMD	LCD
Income	4.911***	4.930**	1.433
	(0.004)	(0.011)	(0.244)
Interest rate	4.605**	-	-
	(0.014)		
Housing price	-	1.099	-
		(0.342)	

Notes: The figures in table represent the F-test with the value in parentheses represents the p-value of the test. ***,** indicates that the variable is significant at 1% and 5% respectively.
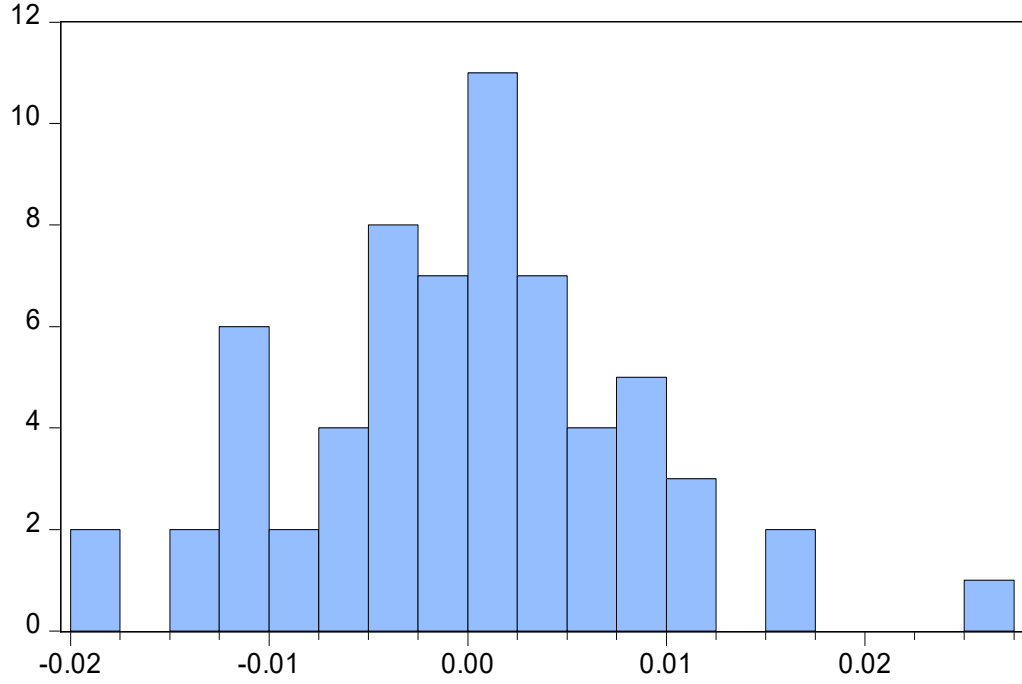
Appendix 20. Normality test (histogram) for the household debt model with breaks
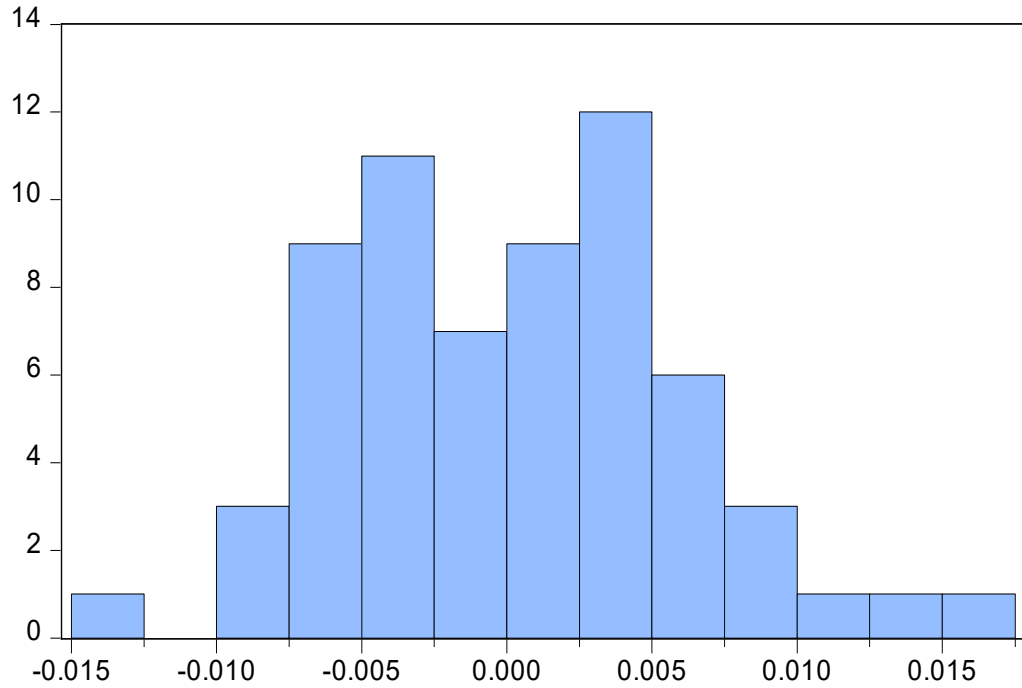
Appendix 21. Normality test (histogram) for the mortgage debt model with breaks
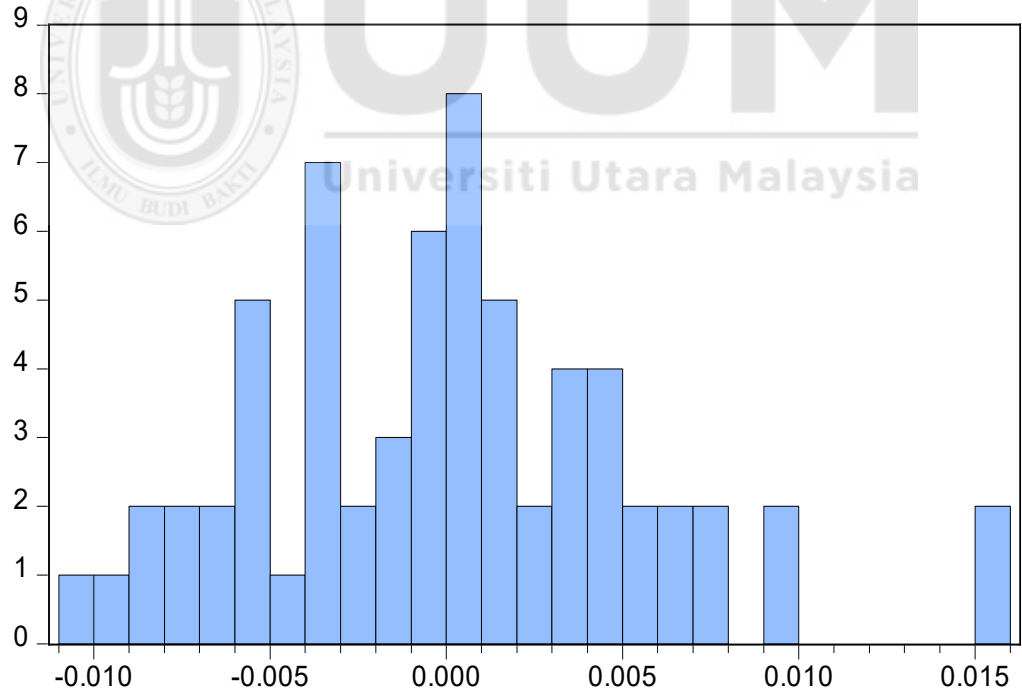
Appendix 22. Normality test (histogram) for the consumer debt model with breaks