MACROECONOMIC DETERMINANTS OF HOME FINANCING IN MALAYSIA: A COMPARATIVE ANALYSIS OF CONVENTIONAL AND ISLAMIC BANKS

By

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ABSTRAK

Kajian ini dijalankan adalah bertujuan untuk menganalisis dan membandingkan hubungan dinamik di antara pembolehubah makroekonomi (iaitu keluaran dalam negeri kasar, harga rumah, harga saham, dan kadar faedah) dengan pembiayaan rumah yang ditetapkan oleh bank konvensional dan bank Islam di Malaysia. Hal ini berhubungkait dengan krisis kewangan yang berlaku pada masa kini yang menekankan aspek kepentingan interaksi faktor makroekonomi dalam pembiayaan perumahan. Pengamalan sistem dwi-perbankan di Malaysia membawa kesan satu kajian kes yang penting dan berbeza daripada interaksi pembolehubah makroekonomi dan pembiayaan perumahan. Oleh demikian, kajian ini dianalisa dari suku pertama 2007 hingga suku kedua 2014. Kajian ini menggunakan teknik analisis seperti *autoregressive distributed lag* (ARDL) *bound-testing cointegration approach*, *impulse response function* (IRF), dan *forecast error variance decomposition* (FEVD) untuk menganalisis jangka masa panjang dan pendek jangka hubungan antara pembolehubah. Hasil kajian mendapati bahawa pembolehubah makroekonomi mempunyai perbezaan terhadap kesan jangka masa panjang dan kesan jangka masa pendek yang mempengaruhi pembiayaan perumahan yang ditetapkan oleh bank konvensional dan bank Islam. Kedua-dua kesan jangka masa panjang dan kesan jangka pendek turut memberi lebih implikasi terhadap pembiayaan rumah yang diberikan oleh bank-bank Islam yang mana ianya lebih dikaitkan dengan sektor ekonomi berbanding dengan pembiayaan rumah yang diberikan oleh bank konvensional. Walau bagaimanapun, kadar faedah didapati membawa pengaruh yang besar terhadap bank konvensional dan bank Islam dalam jangka masa panjang. Berdasarkan hasil kajian ini, dasar campur tangan diperlukan untuk merangsang pembiayaan rumah yang diberikan oleh bank-bank konvensional perlulah memberi tumpuan kepada harga saham dan dasar monetari. Dasar campur tangan ini juga dilihat penting dalam pembiayaan rumah yang diberikan oleh bank-bank Islam dan mesti memberi tumpuan kepada keluaran dalam negeri kasar, harga rumah, dan dasar monetari.

Kata Kunci: pembiayaan perumahan, penentu ekonomi makro, sistem dwi-perbankan, Malaysia, ARDL

ABSTRACT

The purpose of this study is to analyze and compare the dynamic relationship between macroeconomic variables (i.e. gross domestic product, house prices, stock prices, and interest rate) and home financing provided by conventional and Islamic banks in Malaysia. The recent financial crisis has highlighted the importance of the interactions of macroeconomic factors and home financing. The dual banking system in Malaysia provides an important and distinct case study of the interplay of macroeconomic variables and home financing. The period covered for this study is from first quarter of 2007 to second quarter of 2014. This study employs time series analysis techniques such as autoregressive distributed lag (ARDL) bound-testing cointegration approach, impulse response function (IRF), and forecast error variance decomposition (FEVD) to analyze the long-run and short-run relationships among the variables. This study finds that macroeconomic variables have different long-run and short-run influence on home financing provided by conventional and Islamic banks. Both in the long-run and short-run, home financing provided by Islamic banks are more linked to real sector economy as compared to home financing provided by conventional banks. However, interest rate is found to have significant influence on both conventional and Islamic banks in the long-run. Based on the findings of this study, policy intervention to stimulate or dampen home financing provided by conventional banks must focus on influencing stock prices and monetary policy. On the other hand, policy intervention to stimulate or dampen home financing provided by Islamic banks must focus on GDP, house prices, and monetary policy.

Keywords: home financing, macroeconomic determinants, dual banking system, Malaysia, ARDL

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In the name of Allah, the Most Gracious and the Most Merciful. All praise is due to Allah, The Creator and Guardian of the universe. Praise and peace be upon Prophet Muhammad S.A.W., the last messenger of Allah, his family and his companions, from whom we gain the enlightenment.

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LIST OF ABBREVIATIONS

AAOIFI	Accounting and Auditing Organization for Islamic Financial Institutions
ADF	augmented Dickey-Fuller
AIC	Akaike Information Criterion
ARDL	autoregressive distributed lag
BNM	Bank Negara Malaysia
CAGR	compound annual growth rate
CUSUM	cumulative sum of recursive residual
CUSUMSQ	cumulative sum of squares of recursive residuals
ECM	error correction
FEVD	forecast error variance decomposition
GDP	gross domestic product
HFC	home financing provided by convetional banks
HFI	home financing provided by Islamic banks
Ho	null hypothesis
HPI	house price index
IRF	impulse response function
KLCI	FTSE Bursa Malaysia Kuala Lumpur composite index
KLSI	FTSE Bursa Malaysia EMAS Shariah - Price Index
OIC	Organization of Islamic Cooperation
OPR	overnight policy rate
SBC	Schwarz–Bayesian Criterion
VAR	vector autoregression

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Malaysia operates a dual banking system wherein Islamic banks operate in parallel with conventional banks. Having established the first Islamic bank in 1983, Malaysia's Islamic banking industry is a global leader with a growth of 6-year compound annual growth rate (CAGR) of 21 percent and account for 20 percent of total domestic banking market share (Ernst & Young, 2013). The main difference between Islamic and conventional banks is that, the former operates in accordance with the rules of Shariah, the legal code of Islam, while the latter is based on secular principles, not religious laws (Shanmugam & Zahari, 2009). Conventional banks are primarily debt- and interest-based, and permit risk transfer. In contrast, Islamic banks are asset-based, prohibit interest (riba), and promote risk sharing (Hasan & Dridi, 2010). Primarily due to the prohibition of interest and asset-based structure, the dynamic relationship of macroeconomic variables and home financing provided by Islamic banks can be expected to be different from conventional banks.

From the Islamic perspective, the legitimacy of home financing as a means of securing housing is rooted from the basic principle of realizing maqasid al-Shariah (Ahmad, 2009; Ahmed, 2011). As Al-Ghazali identifies, maqasid Al-Shariah which refers to the objectives of Islamic law consists of three categories: essentials (daruriyyat), complementary requirements (hajiyyat), and beautifications or embellishments (tahsiniyyat). Essentials entail five basic elements which are

indispensible in themselves for the survival of mankind. These are safeguarding of religion (din), human life (nafs), lineage (nasl), wealth (mal), and intellect (aql). At the very least, having a home becomes a necessity to preserve and protect religion, human life, children, wealth and intellect. The importance of meeting the need for shelter, together with food and clothing, is also well discussed in Maslow's (1954) Theory of Motivation. In practice nowadays however, it is difficult to obtain a house without resorting to home financing.

Figure 1.1
Credit Lenders to Household Sector
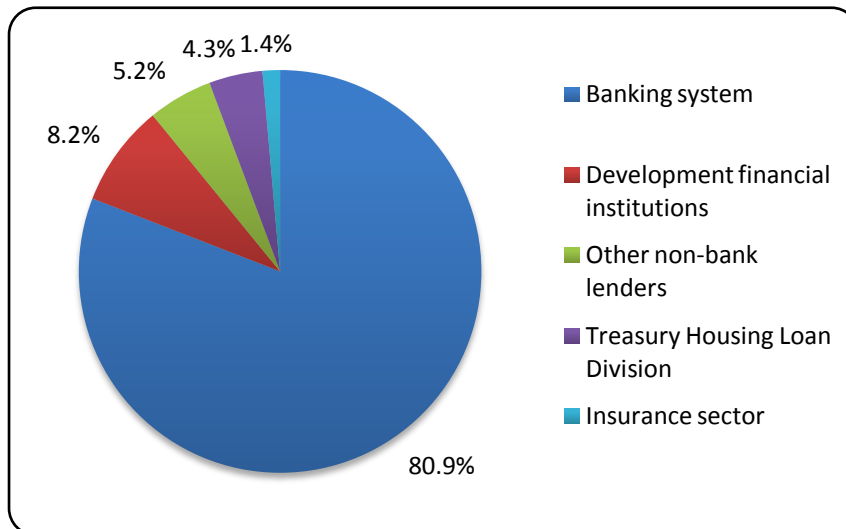
Source: BNM Financial Stability and Payment Systems Report 2013

Figure 1.2
Composition of Household Debt from Banking System
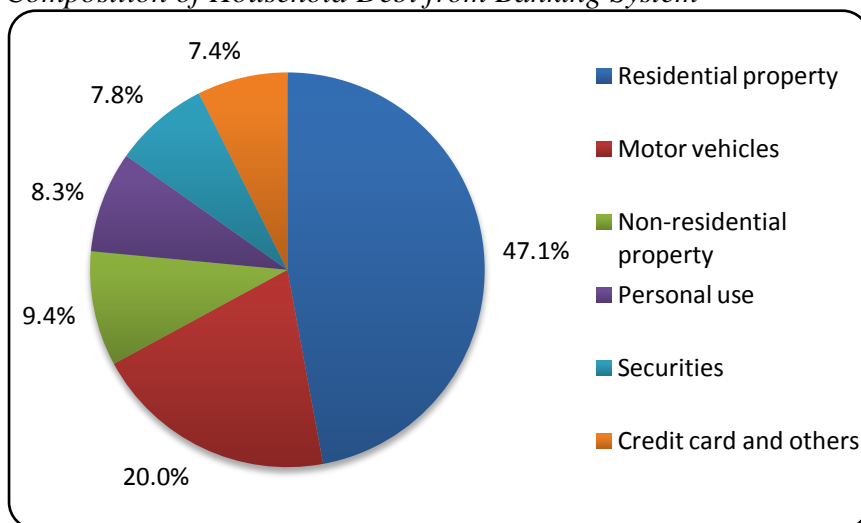
Source: BNM Financial Stability and Payment Systems Report 2013

In Malaysia, home financing is a key source of funding for households. According to Bank Negara Malaysia [BNM] (2014), many Malaysians believe that owning or investing in properties is an important financial goal. Figure 1.1 shows that in December 2013, Malaysian households obtain around 80.9 percent of their total credit from the banking sector (BNM, 2014). Moreover as shown in Figure 1.2, the purchase of residential properties in the same year amounted to 47.1 percent of total household debt from banking system in Malaysia (BNM, 2014). It can be inferred that Malaysian households mainly approach banks to obtain financing for their houses and housing-related expenditures, which take a big portion of the family budget.

Figure 2.3
Composition of Total Banking System Loans
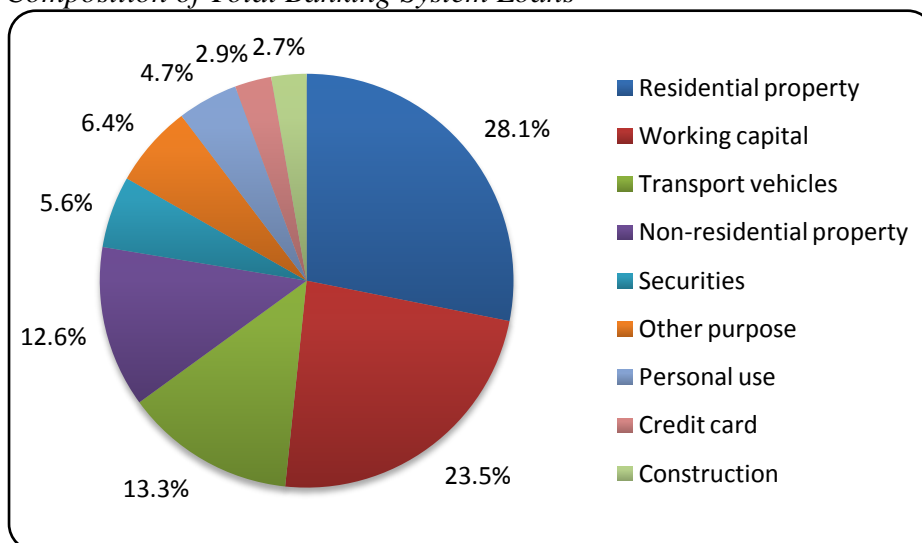
Source: BNM Monthly Statistical Bulletin as of December 2013

For banks, home financing is an important line of business. Household lending has increased over time and, in several countries banks grant more loans to households than to firms (Beck, Büyükkarabacak, Rioja, & Valev, 2012). As shown in Figure 1.3, home financing is the main lending activity of banks in Malaysia as it accounts for 28.1 percent of total banking system loans as of end of 2013. As compared to the previous year, growth in bank lending for the purchase of residential properties stands at 13.4 percent in 2013. As banks provide more loans for purchase of residential properties, their exposure to the residential property market also increases.

According to BNM (2014), the expansion of credit in general improves financial deepening in the market and induces investment and consumption activities that are essential for growth. However, credit expansion that exceeds economic fundamentals and output potential can pose risks that can destabilize the economy and financial system.

The 2007-2008 financial crisis has triggered a new interest in the study of credit fluctuations in the macroeconomy. Schularick & Taylor (2009) argue that credit fluctuations could have critical roles in amplifying, transmitting, and creating shocks both in normal times and, particularly, when there is financial distress. Home financing is crucial in analyzing the fluctuations in credit. Some researches have linked credit boom, which refers to a period in which credit extended to the private sector exceeds its long-run trend by more than during a normal business cycle expansion, as a precursor to a financial crisis (Schularick & Taylor, 2009). Although not all credit booms result to financial crises (Mendoza & Terrones, 2008), policymakers including central banks are paying greater attention on maintaining ideal levels of credit considering the trends and movements in the macroeconomy.

Several studies have been conducted to investigate the relationship of credit, macroeconomy, and financial crises (Bernanke, Gertler, & Gilchrist, 1999; Borio & Lowe, 2002; Brissimis & Vlassopoulos, 2009; Calza, Gartner, & Sousa, 2001; Fitzpatrick & McQuinn, 2007; Gerlach & Peng, 2005; Hofmann, 2004; Ibrahim, 2006; Kim & Moreno, 1994; Mendoza & Terrones, 2008; Schularick & Taylor, 2009;). This study is another effort to analyze the dynamic relationship between credit and macroeconomy by focusing on home financing provided by conventional and Islamic banks and several macroeconomic variables.

1.2 Problem Statement

The available empirical studies using cross-country and country-specific analyses on the relationship between credit and macroeconomic variables have produced mixed results (Brissimis & Vlassopoulos, 2009; Calza et al., 2001; Fitzpatrick & McQuinn,

2007; Gerlach & Peng, 2005; Hofmann, 2004; Ibrahim, 2006; Kim & Moreno, 1994). Most of these studies have been conducted in industrialized countries which operate only a conventional banking system. Despite its overarching importance, studies on emerging countries and countries with dual banking system have not been widely conducted. Moreover in investigating the relationship between credit and macroeconomic variables, most of these researches have used larger credit aggregates rather than home financing. As compared to larger credit aggregates such as total bank loans to the private sectors which may include personal credit, car financing, and other credit to domestic private non-financial sector, home financing may likely exhibit different long- and short-run dynamics given the original maturity is substantially longer than other consumer loans and is normally collateralized (Fitzpatrick & McQuinn, 2007). This gap in literature motivates this study to investigate the dynamic relationship of macroeconomic variables and home financing provided by conventional and Islamic banks in Malaysia.

The 2007-2008 global financial crisis has been directly linked to bank credit particularly to the subprime mortgage in the United States (Bianco, 2008; Crotty, 2009; Jickling, 2009; McKibbin & Stoeckel, 2010; Schularick & Taylor, 2009). It is argued that changes in macroeconomic variables have resulted to significant rise in home financing which led to credit booms and bust episodes during the financial crisis (Bianco, 2008; Crotty, 2009; Jickling, 2009; McKibbin & Stoeckel, 2010; Schularick & Taylor, 2009). At the very least, macroeconomic factors such as GDP, house prices, stock prices and interest rate, among others, are important determinants of credit (Borio & Lowe, 2002; Brissimis&Vlassopoulos, 2009; Calza et al., 2001;

Fitzpatrick &McQuinn, 2007; Gerlach& Peng, 2005; Hofmann, 2004; Ibrahim, 2006; Kim & Moreno, 1994; Mendoza & Terrones, 2008; Schularick & Taylor, 2009).

As a measure of real economic activity, GDP may positively or negatively influence home financing (Calza et al., 2001). A problem arises when there is a rise in credit while the economic activity is declining. Naturally in this case, the ability of the households to pay the periodic installments of their loans is impaired, increasing the likelihood of bank default. High rates of mortgage default, together with falling house prices, has triggered recent financial crisis (Crotty, 2009).

As a result of financial crises, the relationship of asset prices, which include house and stock prices, and credit has been critically studied. Borio & Lowe (2002) and Schularick & Taylor (2009) argue that if there is asset price boom (i.e. rapid increase in property and stock prices) and increase in bank lending, the probability of an episode of financial instability risk could be higher.

In general, interest rate which represents cost of financing may have negative influence on credit (Bernanke & Gertler, 1995). Many believed that the 2007-2008 financial crisis is also partly due to the historically low interest rates set by the US Federal Reserve in 2001 to 2004 which attracted many people to take mortgages to buy houses causing the prices of houses to go up (Bianco, 2008; Crotty, 2009; Jickling, 2009; McKibbin & Stoeckel, 2010).

1.3 Research Questions

Based on the discussion above, this research has been conducted with the aim to address and analyze the following questions:

i. What is the long-run relationship between macroeconomic variables (i.e. gross domestic product, house prices, stock prices, and interest rate) and home financing provided by conventional and Islamic banks?

ii. What is the short-run relationship between macroeconomic variables (i.e. gross domestic product, house prices, stock prices, and interest rate) and home financing provided by conventional and Islamic banks?

iii. What macroeconomic variables (i.e. gross domestic product, house prices, stock prices, and interest rate) strongly influence home financing provided by conventional and Islamic banks in the long run and in the short run?

1.4 Research Objectives

The general objective of this study is to compare the influence of macroeconomic variables to the amount of home financing provided by conventional and Islamic banks. Specifically, it aims:

i. to test whether there is long-run cointegration between macroeconomic variables (i.e. gross domestic product, house prices, stock prices, and interest rate) and home financing provided by conventional and Islamic banks,

ii. to test whether there is short-run relationship between macroeconomic variables (i.e. gross domestic product, house prices, stock prices, and interest rate) and home financing provided by conventional and Islamic banks, and

iii.   to measure the influence of each macroeconomic variable (i.e. gross domestic product, house prices, stock prices, and interest rate) on home financing provided by conventional and Islamic banks in the long run and in the short run.

1.5 Significance of the Study

This study will benefit academicians, bankers and other industry practitioners, policymakers and the general public by providing new knowledge and country-specific evidence on the dynamic relationship of gross domestic product, house prices, stock prices, and interest rate on home financing using Malaysia as a case study. More specifically, various lending policies and strategies may be taken by bankers and other industry practitioners in response to a favourable or unfavourable trend in the macroeconomic variables to ensure stability in credit demand. On the other hand, policymakers can also use the findings of this research in formulating macroeconomic policies that aim to either stimulate or dampen home financing such as implementation of monetary policy to influence the demand for home financing.

1.6 Scope and Limitations of the Study

The scope of this study is to test the dynamic relationship of macroeconomic variables and credit focusing on home financing provided by conventional and Islamic banks in Malaysia. The period covered for this study is from first quarter of 2007 to second quarter of 2014.

The discussion of this study is narrowed down to obtaining general understanding on the relationship of macroeconomic factors and home financing. This study limits itself

from analyzing credit booms and bust arising from the recent financial crisis. This is primarily because Malaysia, in general, has weathered out the effects of the 2007-2008 financial crisis (Abidin & Rasiah, 2009; Khoon & Lim, 2010; Lim & Goh, 2012). As compared to the 1997-1998 Asian financial crisis which resulted to a collapse of the stock market, swelling of foreign debt, widespread and increased defaults and non-performing loans, the effect of the 2007-2008 global financial crisis in Malaysia had been mainly on the contraction in aggregate demand created by a substantial fall in exports, either directly or indirectly, to the United States. It did not develop further to a banking crisis.

1.7 Organization of the Study

This paper is divided into five chapters. Chapter 1 discusses the importance of analyzing the dynamic relationship between macroeconomic variables and home financing in Malaysia. This chapter also specifies the problem statement, research questions, research objectives, scope and limitations, and significance of the study. Chapter 2 presents the literature review. It explains the theoretical underpinnings of this study which are wealth effects, financial accelerator, and credit view. Moreover, this chapter discusses the findings of other researches on the dynamic relationship between macroeconomic variables and credit. Research design, research framework, hypothesis development, definition and measurement of variables, data collection procedures, and time series analysis techniques are discussed in Chapter 3. Chapter 4 discusses the research findings of this study. This chapter explains in detail the results of the unit root test, ARDL bound testing cointegration approach, IRF, and FEVD. Chapter 5 reports the conclusion, policy implications, and recommendations of the study.

CHAPTER 2

THEORETICAL UNDERPINNINGS AND LITERATURE REVIEW

2.1 Introduction

This chapter provides the theoretical underpinnings and review of relevant literature for this study. The components of research framework are elaborated to get a better understanding of all the variables employed.

2.2 Theoretical Underpinnings

Home financing plays a significant role in today's modern banking system. Aside from the fact that home financing is necessary to provide for housing, it is also important to mobilize deposits of banks. Moreover, home financing is crucial for financial deepening, development of property sector, and economic growth.

The study of macroeconomic determinants of credit has often been linked to the standard economic theory of wealth effects, financial accelerator, and credit view. Credit which is often viewed as demand determined is affected by households' consumption behavior and wealth. Moreover, the cost of financing also affects the demand of households for credit.

2.2.1 Wealth Effects

Wealth effects, as cited by Case, Quigley, & Shiller (2005), is generally defined as the causal effect of exogenous changes in wealth upon consumption behavior. It is the change in spending that accompanies a change in perceived wealth. In the beginning,

the study wealth effects have been extensively focused on stocks. It is commonly viewed that stock market wealth affects positively household behavior, especially consumption (Poterba, 2000; Starr-McCluer, 1998). On the other hand, Case et al. (2005) extended the discussion of wealth effect to housing market. They argue that the stock market wealth may hardly explain the changes in households' behavior in real estate market. They argue that households have different views on house and stock investments. The permanent nature of house investment, bequest motives, and certainty of investment are among the differentiating features between house and stock investments. They find that consumption is positively and significantly affected by variations in housing market wealth. However, declines in housing market wealth have no influence upon consumption.

2.2.2 Financial Accelerator

In the presence of credit market frictions, Bernanke et al. (1999) find that financial accelerator play an important role in explaining why unexpected increase in asset prices raises borrowers' net worth which affects their creditworthiness to borrow from banks. Fitzpatrick & McQuinn (2007) argue that due to the collateralization of residential mortgages using the re-sale values of housing, the theory of financial accelerator could be applied to the housing market.

Financial accelerator refers to the amplification of initial shocks caused by changes in credit market conditions (Bernanke, Gertler, & Gilchrist, 1994). It is based on the observation that households and firms are likely to be financially exposed to cyclical peaks by which an adverse shock may significantly worsen their financial conditions, limiting their access to credit at the same time that their need for external funds may

be rising. The economic downturn is aggravated by the resulting declines in spending or production. Financial accelerator can be rationalized due to the presence of credit market frictions such as agency cost and information asymmetry. These credit frictions explain why external funds are more expensive than funds internally sourced in, unless if there is full collateralization of funds borrowed externally. Moreover, they also explain the inverse relationship of external finance premium and borrower's net worth. As the sum of the borrower's internal funds (liquid assets) and the collateral value of his illiquid assets increase (decrease), external finance premium decreases (increases).

The most important focus of financial accelerator is the effect of a rise or fall in the borrower's net worth. It argues that to the extent that a negative shock in the economy, such as increased external finance premium coupled with increasing amount of external financing required, reduce the net worth of borrowers, the spending and production effects of the initial shock will be amplified. Bernanke et al. (1999) explain that financial accelerator has impact on increased investments when asset prices go up. An unanticipated increase in asset prices raises the net worth of the borrowers by increasing the valuation of the real and financial assets that they hold. This will force the external finance premium, which refers to the difference in cost between funds externally generated and funds internally raised, to go down. In return, lower external finance premium stimulates demand for capital which increases investments. A borrower with high net worth may depend relatively less on external finance, reducing the risk of bankruptcy and requiring a small premium on external finance. A borrower with lesser net worth, on the other hand, has a high risk of bankruptcy and a high premium on external finance.

2.2.3 Credit View

Credit view explains that a change in monetary policy that increases or decreases open-market interest rates tend to affect the external finance premium in the same direction (Bernanke & Gertler, 1995). The impact of monetary policy on the borrowing cost and subsequently on real spending and real economic activity is magnified due to this added influence of monetary policy on external finance premium. Sustained declines in GDP and price level normally follow the unexpected contraction of monetary policy even though monetary policy usually has only transitory effects on interest rates. The initial impact of a monetary policy contraction is absorbed by final demand which falls relatively quickly after a change in policy. Accordingly, investment in residential properties is foremost affected by the sharp decline in final demand.

Monetary policy affects external finance premium through credit channel which has two components: balance sheet channel and bank lending channel. In general, the credit channel theory explains that endogenous changes in the external finance premium amplify the direct effects of monetary policy on interest rates. The balance sheet channel emphasizes the potential impact of changes in monetary policy on the balance sheets and income statements of the borrowers, including their net worth, cash flow, and liquid assets. The bank lending channel posits that monetary policy may also affect the external finance premium by changing supply of intermediate credit, especially bank loans. In cases where there is disruption in the supply of bank loans, bank-dependent borrowers would incur costs in finding new source of funding and in establishing credit relationship. Thus, an increase in the external finance

premium and reduced real activity is likely to occur if there is a drop in supply of bank credit, relative to other forms of credit.

2.3 General Components of Research on Credit and Macroeconomic Variables

Several studies have investigated the relationship between credit and macroeconomic variables (Brissimis & Vlassopoulos, 2009; Calza et al., 2001; Fitzpatrick & McQuinn, 2007; Gerlach & Peng, 2005; Hofmann, 2004; Ibrahim, 2006; Kim & Moreno, 1994). The focus of these studies is to draw general inferences on the macroeconomic drivers of bank lending. Motivated by the occurrence of recent economic downturns, these studies analyze the relationship between credit aggregates, economic activity, and property prices to obtain a potential explanation for the persistent financial cycles observed in the past.

In the following sections, this study explains in detail the conceptual definition of the variables and the findings of past researches on the relationship of home financing/credit and macroeconomic variables.

2.3.1 Home Financing Provided by Conventional and Islamic Banks

Home financing is offered both by conventional and Islamic banks in Malaysia. The difference in the nature and characteristics of home financing provided by conventional and Islamic banks are expected to affect the relationship of macroeconomic factors to home financing.

Figure 2.1
Conventional Home Financing
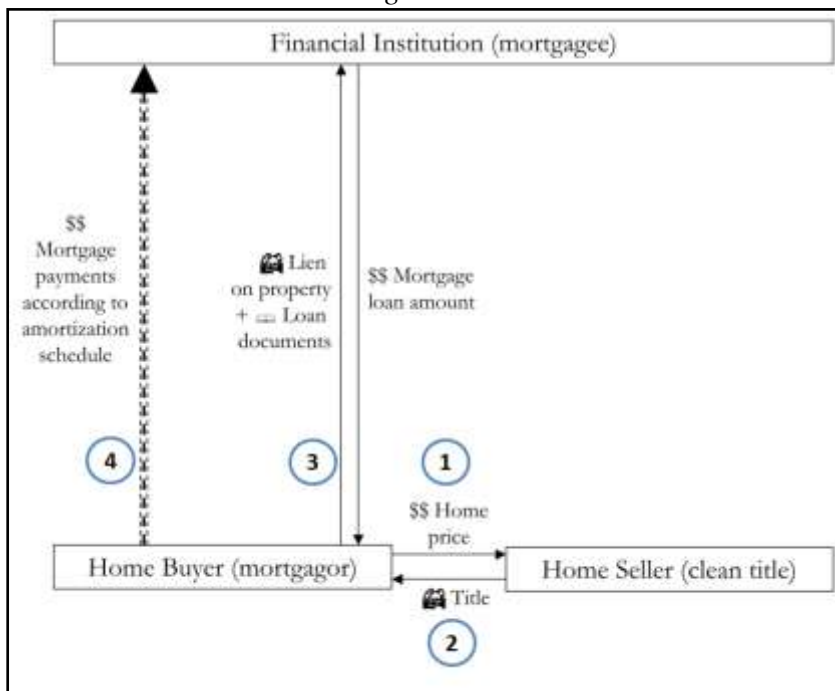
Source: El-Gamal (2006)

1. The home buyer pays the price of the house using the amount of mortgaged loan obtained from the bank and downpayment.

2. The home seller transfers the title to the home buyer.

3. The home buyer forwards the loan documents and the lien on property to the bank.

4. The home buyer pays the periodic interest and principal.

By definition, a typical housing loan provided by conventional banks which is commonly referred as mortgage is secured by real property and provides a schedule of payments of interest and repayments of the principal to a bank (Tse, 1997). The contract between the borrower and the conventional bank is a loan contract and the bank has a lien over the property loaned which restricts the ability of the borrower

(owner) to sell the real property without the bank's permission (El-Gamal, 2006).

Figure 2.1 shows the characterization of a typical conventional home financing.

Figure 2.2
Cost-plus-markup Credit Sale Home Financing
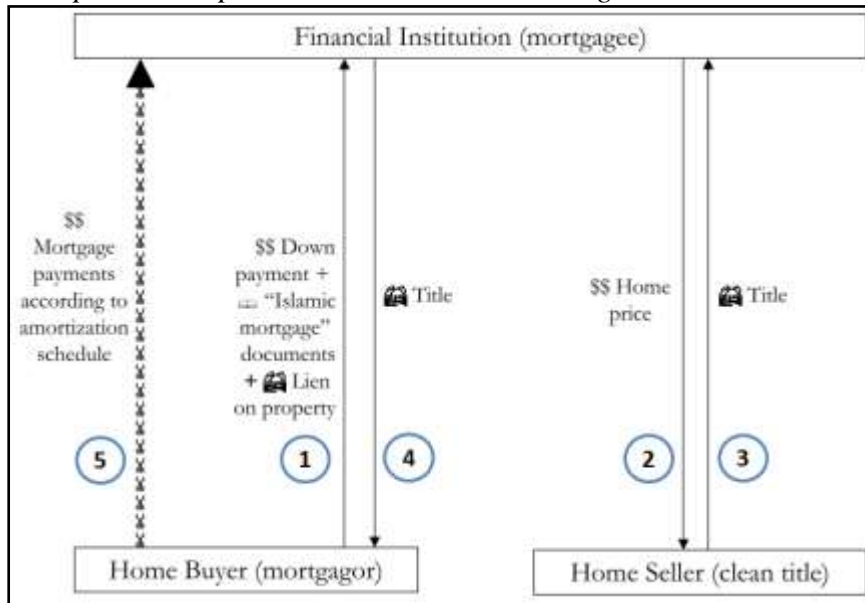
Source: El-Gamal (2006)

1. The home buyer pays the downpayment to the bank together with the submission of Islamic mortgage documents and lien on property.

2. The bank pays the total amount of home price to the home seller.

3. The home seller transfers the title to the bank.

4. The bank obtains the title of the real property and subsequently sells it back to the home buyer cost plus markup on credit.

5. The home buyer pays the bank the periodic installment payments.

Figure 2.3
Diminishing Partnership Home Financing
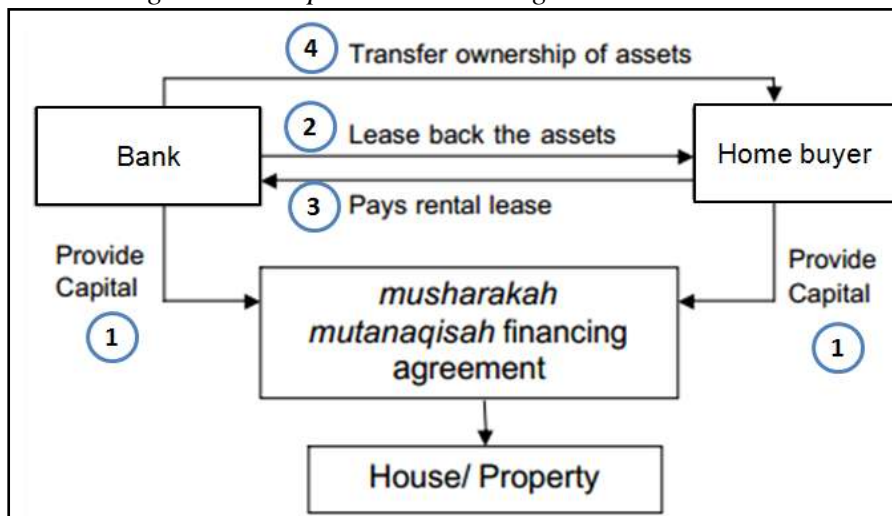
Source: BNM Guidelines on Musharakah and Mudharabah Contracts for Islamic Banking Institutions

1. Both the home buyer and bank contribute fund to buy the property from home seller.

2. The home buyer and bank subsequently jointly owns property as partners. The bank leases back its share of the property to the home buyer.

3. The homebuyer pays rental to the bank. The payment of the home buyer includes gradual acquisition of the bank's share in the property.

4. At the end of the lease period and upon completion of all rental payments, the home buyer would have acquired all the bank's shares and the partnership will come to an end with the home buyer being the sole owner of the property.

On the other hand, Islamic home financing is Shariah-based financing facility to finance the purchase of residential properties. The most common structure of Islamic home financing is cost-plus-markup credit sale and lease (ijarah) financing (El-Gamal, 2006). Home financing which is based on the concept of diminishing

partnership (musharakah mutanaqisah) is also becoming dominant (Meera & Abdul Razak, 2005). Figure 2.2 and Figure 2.3 shows the characterization of home financing based on cost-plus-markup credit sale and diminishing partnership.

The excess payment over the amount of principal loaned given by the home buyer to the bank constitutes the forbidden riba in Islam. Needless to say, the bank does not obtain ownership over the real property. In contrast, Islam allows sale (bay') transactions which occur in both cost-plus-markup credit sale and diminishing partnership. Shariah also emphasizes that for the sale to be valid, the object of sale which is the house in the case of home financing must exist at the time of contract, must be owned and possessed by the seller, and must be deliverable to the buyer (El-Gamal, 2006). The Holy Quran states in Surah Al-Baqarah (2), verse 275:

"Those who consume interest cannot stand [on the Day of Resurrection] except as one stands who is being beaten by Satan into insanity. That is because they say, "Trade is [just] like interest." But Allah has permitted trade and has forbidden interest. So whoever has received an admonition from his Lord and desists may have what is past, and his affair rests with Allah. But whoever returns to [dealing in interest or usury] - those are the companions of the Fire; they will abide eternally therein."

Indeed there are many other injunctions on the prohibition of interest in the Holy Quran and Hadith in the strictest and most compelling manner (Ayub, 2007; El-Gamal, 2006).

Another important distinction of conventional and Islamic home financing is the available recourse of the bank in case the borrower delays in payment. Conventional banks normally impose compounding of interest in cases where the borrower defaults. In contrast, as cited by Ayub (2007), all Shariah bodies like Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI), and Islamic Fiqh Council of

OIC, has allowed Islamic banks to impose penalty on the home buyer as a deterrent to delaying payment. However, the amount of penalty collected by the Islamic banks would not become part of revenue but would have to be given to charity. The court or any independent reconciliation committee shall decide on the amount of compensation. Actual loss must be the basis of the liquidated damages to be granted to banks in cases the home buyer defaults.

Finally, the nature of risk management of home financing provided by conventional and Islamic banks is also different. Conventional banks transfer the risk to the home buyer by requiring to pay interest independent of the return on the investment and/or condition of the home buyer. Islamic banks however share the risk inherent in owning the property in partnership-based financing (Hasan & Dridi, 2010).

In the empirical literature, credit aggregates are commonly assumed primarily to be demand determined (Bernanke & Blinder, 1988; Calza et al., 2001; Fase, 1995), depending positively on economic activity and negatively on costs of financing. The critical role that credit plays in ensuring financial stability has led many researches to analyze the determinants of credit. They find that GDP, interest rates, house prices and stock prices are significant determinants of the total amount of financing (Brissimis & Vlassopoulos, 2009; Calza et al., 2001; Fitzpatrick & McQuinn, 2007; Gerlach & Peng, 2005; Hofmann, 2004; Ibrahim, 2006; Kim & Moreno, 1994). The aspect of integrating all these variables in a single model has not been widely investigated although integrating a measure of real aggregate activity, lending rates, and asset prices are helpful in obtaining better estimates of the dynamic relationship of macroeconomy and credit. More so, a sectoral breakdown of total credit such as financing for purchase of residential properties of households would allow for a more

refined modeling of the behavior of credit demand (Calza et al., 2001; Fitzpatrick & McQuinn, 2007).

2.3.2 Home Financing and Macroeconomic Variables

In light with the findings of past researches on the relationship of home financing and macroeconomic variables, this study has selected gross domestic product, house prices, stock prices and interest rates as important macroeconomic determinants of home financing. The next sections provide the discussion on each independent variable and its effect to home financing based on previous researches.

2.3.2.1 Home Financing and Gross Domestic Product

GDP refers to the total value of all goods and services produced in a specific period after deducting the cost of goods and services used in the production process (Department of Statistics Malaysia [DOSM], 2014). GDP measures the value of economic activity within a country. It is an indicator of the growth of an economy.

There appears to be no clear agreement in the literature on how real economic activity, measured by GDP, influences the demand of credit of households (Calza et al., 2001). The first view is that the consumption and investment demand of households is positively affected by economic conditions, which is a reflection of the state of economic activity. As a result, it can be expected that economic activity may have a positive effect on demand for credit. The contrasting view is that GDP may have a negative relationship with credit demand since an increase in current productivity, which causes a rise in output and profits, may encourage households to

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take advantage of more income in expansionary phases to cut down their debt levels (Bernanke & Gertler, 1995).

In addition, a negative relationship between GDP and credit can also be plausible in the sense that when economic activity slows down and income declines, households' demand for credit increases to even out the impact of lower income and profits.

Studying the long-run relationship of real loans, GDP, and interest rates in the euro area from 1980 to 1999, Calza et al. (2001) find that GDP has long-run positive relationship with real loans. Hofmann (2004) obtains the same findings while studying the relationship of aggregate bank credit, aggregate economic activity, interest rates and aggregate property prices in 16 industrialized countries from 1980 to 1998. Gerlach & Peng (2005) and Brissimis & Vlassopoulos (2009) who conducted their study in Hong Kong using data from 1982–2001 and Greece using data from 1993 to 2005, respectively, have found the same long-run positive relationship between GDP and credit. Using impulse response function analysis to reveal the short-run dynamics of GDP and credit, Kim & Moreno (1994) and Ibrahim (2006) find different results. Kim & Moreno (1994), who studied credit fluctuations in Japan from 1970 to 1993, find that GDP has a negatively impact to credit. On the other hand, Ibrahim (2006) who carried out the IRF analysis in Malaysia using the data from 1978 to 1998, finds that there is a positive relationship between GDP and bank loan.

2.3.2.2 Home Financing and House Prices

Prevailing trends of residential house prices is commonly measured using a house price index (HPI). House price indices are normally estimated for a geographic are not larger than country or metropolitan area since housing markets are geographically localized (Case, Pollakowski, & Wachter, 1991).

Fitzpatrick & McQuinn (2007) investigated the relationship between domestic bank credit and house prices in Ireland. They find that there is a mutually reinforcing long-run relationship between credit and house prices. However, they also find that house prices influences credit less than credit influences house prices. This is somewhat contrasting to the findings of other researches. Gerlach & Peng (2005), for example, find that in Hong Kong bank lending adjusts to house prices, rather than the other way around. Using error-correction models, they show that bank lending is influenced by house prices, but that bank lending does not seem to affect property prices. Brissimis & Vlassopoulos (2009) study on Greece also reports a positive long-run relationship to housing loans. Using cointegration test, they further argue that housing prices do not adjust to disequilibria in the market for housing loans which means that in the long run mortgage lending does not affect housing prices. However, in the short-run, they find evidence of a contemporaneous bi-directional dependence.

Using a cross-country perspective, Hofmann (2004) finds long-run positive relationship between credit and property prices in 14 out of 16 countries. He argues that innovations to property prices which possibly reflect changing beliefs about future economic conditions or speculation in property markets, may result to significant and persistent cycles in bank lending.

2.3.2.3 Home Financing and Stock Prices

A stock market index is a statistical indicator intended to measure and report the changes in the market value of a group of stocks. It is an aggregate value of the selected stocks and is normally expressed as the percentage change of the total values of the stocks against a base value from a specific date.

Stock price indices are normally grouped based on some screening methodologies. With the advent of Islamic banking, Shariah-based screening methodologies are now being applied. Shariah screening standards are intended (1) to ensure that the counterparty selling the stocks is not involve in any activities that is not compliant with Shariah, and (2) to validate that (a) interest-bearing debt does not contribute significantly to the financing of the counterparty, (b) the counterparty generates revenue from illiquid assets, and (c) interest-bearing securities are not mainly used in the cash investments (Khan, 2012).

Stock prices may positive influence credit in two ways (Kim & Moreno, 1994). First, fluctuations in stock price may influence loan demand by reflecting changes in future economic activity. Decreasing stock prices may signal contraction in the stock market which influences lower loan demand and spending as the economy is perceived to be slowing down. Second, fluctuations in stock prices may influence the supply of loan by affecting the capital position of banks. Depending on the equity exposure of the banks, banks may be keen to lend more when stock prices are rising, and conversely, to provide less loans when stock prices are falling, since the bank can use capital gains on stocks to mitigate the effects of adverse shocks to assets.

On the other side, stocks and real estate may be regarded as substitute investments for households. Future expectations of risks and returns on stocks may affect the demand for loan. Stock price increases may attract more households to invest in equities over real estate.

Investigating the contributions of stock price movements to credit fluctuations, Kim & Moreno (1994) find that in Japan the response of loans to shocks in the stock price is positive. This is supported by Ibrahim (2006) who finds that in Malaysia, bank loans positively react to the rise in stock prices, however, banks loans appear to have no influence over stock prices.

2.3.2.4 Home Financing and Interest Rate

Interest rate is normally referred in the literature as an important determinant of credit primarily because it measures the cost of financing. In explaining the effect of interest rate to home financing, this study uses overnight policy rate (OPR), which is the used by the BNM as the target rate for the day-to-day liquidity operations and to signal monetary policy stance.

It is critical to test the influence of interest rate to home financing in a dual banking system. As it is prohibited for Islamic banks to engage in interest-related activities, it is generally expected that interest rate does not influence the financing activities of Islamic banks. On the other hand, in general, past researchers find a negative relationship between interest rate and home financing provided by conventional banks. Typically an increase in interest rates makes the loans more expensive, thus,

demand for loans is reduced. On the other hand, a low interest rate would induce borrowing.

Hofmann (2004) finds a negative and significant relationship of interest rate and credit in nine out of the sixteen countries under investigation. Interestingly, Fitzpatrick & McQuinn (2007) find a long-run positive relationship between interest rate and credit. They argue this may be due to the relatively high correlation of mortgage rates with other market interest rates such as deposit rates. Similarly, Ibrahim (2006) finds positive relationship of interest rate and credit in the short-run.

On the other side, Kassim, Majid, & Yusof (2009) studied the impact of monetary policy shocks on conventional and Islamic banks in Malaysia for the period of January 1999 to December 2006. Using impulse response function and variance decomposition analysis based on VAR, they find that contrary to the general expectations, Islamic banks' loans and deposits are relatively more sensitive to changes in monetary policy measured by overnight policy rate set by BNM.

Table 2.1
Summary of Past Studies on Macroeconomic Determinants of Credit

Research	Population	Dependent Variable	Independent Variables	Period	Methodology	Long-run / Short-run	Relationship to Credit			
							GDP	House Prices	Stock Prices	Interest Rate
Brissimis & Vlassopoulos (2009)	Greece	housing loans	GDP, residential property prices, and variable mortgage interest rate	1993 Q4 to 2005 Q2	VECM, OLS with Hausman Test	Long-run	+	+		-
						Short-run*				
Calza, et al. (2001)	Euro area	bank loans	GDP, short-term and long-term interest rates	1980 Q1 to 1999 Q2	Johansen Cointegration, VECM	Long-run	+			-
						Short-run				
Fitzpatrick & McQuinn (2007)	Ireland	housing loans	after-tax disposable income per household, new house prices, and mortgage interest rate	1980 Q1 to 2002 Q4	Dynamic OLS Method, OLS with Hausman Test	Long-run	+	+		+
						Short-run				
Gerlach & Peng (2005)	Hongkong	bank loans	GDP and property prices	1982 Q1 to 2001 Q4	Johansen Cointegration	Long-run	+	+		
						Short-run				
Hofmann (2004)	16 industrialized countries	bank loans	GDP, aggregate property prices, and interest rates	Quarterly, 1980 to 1998	Johansen Cointegration, VECM, IRF	Long-run	+	+		-
						Short-run	+	+		-
Ibrahim (2006)	Malaysia	bank loans	GDP, stock prices, price level, interest rate, and exchange rate	1978 Q1 to 1998 Q2	Johansen Cointegration, IRF	Long-run				
						Short-run	+	`	+	+
Kim and Moreno (1994)	Japan	bank loans	industrial production, consumer price index, Nikkei stock average, and call money rate	Jan. 1970 to May 1993	VAR, IRF, FEVD, and forecast error	Long-run				
						Short-run	-		+	-

* There is contemporaneous bi-directional causalities running between housing loans and housing prices.

2.4 Conclusion

Table 2.1 provides a summary of past studies that have investigated the dynamic relationship of macroeconomic variables and home financing. It is apparent that the findings of these studies on the relationship of macroeconomic variables and home financing are mixed. Moreover, most of these studies have focused on industrialized countries and conventional banks. In comparison to other researches especially to Ibrahim (2006) who has made a similar research in Malaysia, this study is distinct because (1) home financing and not larger credit aggregate is used as dependent variable, (2) house prices and Shariah-compliant stock index are included in the equation/model, (3) the relationship of macroeconomic variables to home financing is analyzed for both conventional and Islamic banks and not solely for conventional banks, and (4) the period covered of this study is more recent which integrates the 2007-2008 financial crisis.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the research methodology appropriate to answer the research questions of this study. This has been designed accordingly in line with the outcome of the literature review discussed in the previous chapter. The research methodology is developed to identify the dynamic relationship between home financing provided by conventional and Islamic banks and macroeconomic variables (i.e. gross domestic product, house prices, stock prices, and interest rate). Section 3.2 and Section 3.3 discuss the research design and research framework of this study, respectively. The hypotheses are presented in Section 3.4. Section 3.5 and Section 3.6 provide the definition and measurement of variables, respectively. Data collection procedures are outlined in Section 3.7. Finally, Section 3.8 explains the time series analysis techniques and relevant test models.

3.2 Research Design

Primarily due to the descriptive, empirical and deductive in nature of this study, quantitative research method is used. More specifically, this study uses time series econometrics modeling because the research aims to describe quantitatively the relationship of macroeconomic variables (i.e. gross domestic product, house prices, stock prices, and interest rate) and home financing provided by conventional and Islamic banks in Malaysia. The unit of analysis for this study is organization;

distinguishing between conventional and Islamic banks. The period covered for this study is from 1Q 2007 to 2Q 2014 which gives a total number of 30 observations.

3.3 Research Framework

Figure 3.1
Research Framework
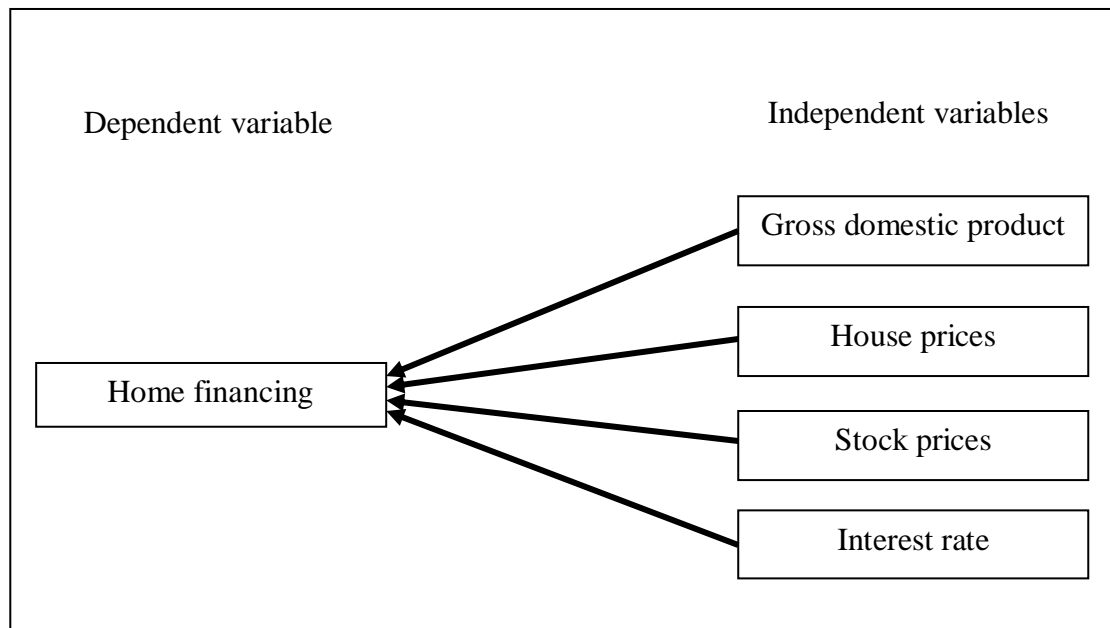
Figure 3.1 shows the research framework of the study. The dependent variable for this study is the amount of home financing provided by conventional and Islamic banks. The independent variables refer to macroeconomic factors that are important determinants of home financing. These include gross domestic product, stock prices, house prices, and overnight policy rate.

3.4 Hypotheses

With reference to the identified research questions and research objectives, this study aims to empirically test different hypotheses pertaining to the relationship of

macroeconomic variables and home financing. The following sub-sections explain the basis of each hypothesis.

3.4.1 GDP and Home Financing

The relationship of GDP to home financing can either be positive or negative. The proponents of positive relationship between GDP and home financing argue that the household's demand for credit, which they use for consumption and investment needs, is positively influenced by the economic conditions reflected by changes in economic activity. On the other hand, those who believe that GDP may have a negative relationship with credit demand argue that households actually reduce their demand for credit to take advantage of higher income in expansionary phases in which GDP is increasing. Households instead use their internal sources of funds to finance their consumption and investment needs. Thus, this study hypothesizes that:

H1: There is no significant relationship between GDP and home financing.

3.4.2 House Prices and Home Financing

House prices can have a direct relationship with credit demand. Increase in house prices can directly push the demand for home financing upwards since greater amount of borrowing will be required to acquire real property. Wealth effects also explains the positive relationship of house prices and home financing. A rise in house prices can stimulate economic activity which encourages consumption and investment spending which will indirectly increase the demand for home financing. On the other hand, the theory of financial accelerator also supports the positive relationship of

property prices and home financing. When asset prices go up, the collateral value of the real properties of the borrower also increase which improves their net worth. The higher net worth of borrowers allows them to obtain higher financing from banks. Thus, this study hypothesizes that:

H2: There is no significant relationship between house prices and home financing.

3.4.3 Stock Prices and Home Financing

In general, stock price changes may affect bank lending in two ways: by signalling changes in the economy which can affect spending behaviour of households, and by reflecting the market value of the capital positions of the banks which affects the ability of the banks to lend given a specific capital position requirement (Kim & Moreno, 1994). On the other hand, a negative relationship between stock prices and credit may exist when households view stocks and real estate as substitute investments. Increases in stock prices may attract more households to invest in equities over real estate. Thus, this study hypothesizes that:

H3: There is no significant relationship between stock prices and home financing.

3.4.4 Interest Rate and Home Financing

There is a general expectation that the interest rate which represents the cost of financing costs is negatively related to home financing/credit, since an increase in interest rates rise will result to credit becoming more costly, thus demand for

borrowing falls. In explaining the bank lending channel, Bernanke & Blinder (1988) argues that interest rates, being the monetary policy instrument, can also negatively affect supply of credit. Thus, this study hypothesizes that:

H4: There is no significant relationship between interest rate and home financing.

3.5 Definition of Variables

3.5.1 Home financing

Home financing refers to the home financing provided by conventional banks (HFC) amd Islamic banks (HFI). In Malaysia, home financing facility is used to finance the acquisition of residential properties such as houses, apartments, flats, or condominiums. It can also be used to refinance existing facilities (BNM, 2003a; BNM, 2003b).

According to BNM (2003a; 2003b), the amount of financing provided by both conventional and Islamic banks are based on the market value of completed properties or the price of the property. The common home financing packages are term loan, cash line (overdraft) facility, and combination of term loan and cash line (overdraft) facilities. Term financing entails periodic predetermined monthly installments which consist of the principal amount of financing plus the interest (conventional banks) or profit rate (Islamic banks). Cash line (overdraft) facility uses a credit line given based on predetermined limit. The interest (conventional banks) or profit (Islamic banks) is calculated based on daily outstanding balance and as such there are no longer fixed

periodic installments. Moreover, the interest rate (conventional banks) or profit rate (Islamic banks) in cash line is generally higher than the term financing.

3.5.2 Gross Domestic Product

GDP refers to the total value of all goods and services produced in a specific period after deducting the cost of goods and services used in the production process (DOSM, 2014). Seasonally adjusted real GDP is used to ensure that the holiday effects on GDP are removed. Real GDP using 2005 constant prices means that a revaluation based 2005 prices was applied on transaction of all goods and services.

3.5.3 House Prices

A type of a transaction-based house price index, Malaysian House Price Index reflects the change in prices paid for an average house. The change in price is computed by pricing a basket of house characteristics of an average house sold in the current period and comparing this price with the price of the same basket of house characteristics in the base year, 2000. Basically, it is a ratio on how much the price of housing has changed between the current period and the base period assuming that the homebuyers maintain the standard of living in the latter period.

3.5.4 Stock Prices

The FTSE Bursa Malaysia KLCI consists of the top 30 companies by market capitalization on the Bursa Malaysia Main Market. These companies must pass the

pertinent investability screens. FTSE Bursa Malaysia KLCI is the headline index of the FTSE Bursa Malaysia Index Series.

The FTSE Bursa Malaysia EMAS Shariah Index allows investors to have access to broad benchmark for Shariah-compliant investment. It is a Shariah-compliant subset of FTSE Bursa Malaysia EMAS Index (FBMEMAS) which constituents consists of FTSE Bursa Malaysia Top 100 Index and FTSE Bursa Malaysia Small Cap Index. FTSE Bursa Malaysia EMAS Shariah Index are screened according to the Malaysian Securities Commission's Shariah Advisory Council (SAC) screening methodology. In general, the screening criteria requires that the core activities of Shariah-compliant companies must not be engaged in any of the following: interest- or riba-based financial services, gambling, production or sale of non-halal products or related products, conventional insurance, entertainment activities that are prohibited by Shariah, manufacture or sale of tobacco-based products or related products, stockbroking or share trading in Shariah non-compliant securities, and other activities considered not permissible based on Shariah.

3.5.5 Interest Rate

The monetary policy stance of BNM is mainly depicted by the overnight policy rate. Moreover, OPR serves as a target rate for the day-to-day liquidity operations of the Central Bank. Monetary operations of BNM will target the overnight interbank rate. To study the impact of monetary policy shocks on banks in Malaysia, Kassim et al. (2009) use OPR as to depict monetary policy variable.

3.6 Measurement of Variables

Table 3.1
Measurement of Variables

Variables	Measurement	Period	Sources
Home financing by conventional banks	Amount of home financing provided by commercial banks (HFC)	1Q 2007 to 2Q 2014	BNM Monthly Statistical Bulletin
Home financing by Islamic banks	Amount of home financing provided by Islamic banks (HFI)	1Q 2007 to 2Q 2014	BNM Monthly Statistical Bulletin
Gross domestic product	Gross domestic product, 2005 constant prices, seasonally adjusted (GDP)	1Q 2007 to 2Q 2014	Oxford Economics
House prices	Malaysian house price index (HPI)	1Q 2007 to 2Q 2014	Department of Statistics, Malaysia
Stock prices of conventional stocks	FTSE Bursa Malaysia Kuala Lumpur composite index (KLCI)	1Q 2007 to 2Q 2014	FTSE
Stock prices of Shariah-compliant stocks	FTSE Bursa Malaysia EMAS Shariah - Price Index (KLSI)	1Q 2007 to 2Q 2014	FTSE
Interest rate	BNM Overnight Policy Rate - Middle Rate (OPR)	1Q 2007 to 2Q 2014	BNM Monthly Statistical Bulletin

This study uses home financing provided by conventional and Islamic banks to analyze its relationship with macroeconomic variables. Home financing provided by Islamic windows under the Islamic Banking Scheme of Bank Negara Malaysia is included in the home financing provided by Islamic banks. To measure economic activity, this study uses seasonally adjusted real GDP based on 2005 constant prices. For stock prices, FTSE Bursa Malaysia Kuala Lumpur composite index and FTSE Bursa Malaysia EMAS Shariah - Price Index are used to measure the conventional and Shariah-compliant stock indices, respectively. And to measure interest rate, this study uses the overnight policy rate set by the BNM. Table 3.1 provides the summary of the measurements of the variables.

3.7 Data Collection

The present study is based on the compilation of secondary data. The relevant time series data necessary for analyzing the dynamic relationship of macroeconomic factors to home financing are obtained various sources. Each time series is expressed on quarterly amounts beginning from 1Q 2007 to 2Q 2014. The primary reason for choosing this period is to be able to analyze the relationship of macroeconomic variables to home financing during and after the financial crisis 2007-2008. Secondary to this, the data also on FTSE Bursa Malaysia EMAS Shariah which is used to measure prices of Shariah-compliant stocks is only available from by the end of 2006. Finally, the data on Malaysian House Price Index, which has been revised and begins with the first quarter of 2000 data, also limits this research to use quarterly observations.

The data on the amount of financing provided by conventional (HFC) and Islamic banks (HFI), and overnight policy rate are obtained from Bank Negara Malaysia Monthly Statistical Bulletin. The data on gross domestic product (GDP) is obtained from Oxford Economics and house price index (HPI) is taken from the published report of Department of Statistics Malaysia. The data on FTSE Bursa Malaysia EMAS Shariah - Price Index (KLCI) and FTSE Bursa Malaysia EMAS Shariah - Price Index (KLSI) indices are sourced from FTSE. All data from Oxford Economics, Department of Statistics Malaysia and FTSE are retrieved with the use of Datastream.

3.8 Time Series Analysis

The model of this study follows Kim and Moreno (1994) by integrating real output, price level, and interest rate into the analysis of credit. The purpose behind the model is to capture cyclical factors that may affect bank lending behavior.

Ideally, for the purpose of this study, all variables are to be incorporated in a single model. However having a finite sample, the model can be poorly estimated as the addition of a variable will quickly exhaust the degree of freedom (Kassim et al., 2009). Thus, separate models are estimated. The ARDL models used in this study can be expressed as the following general models:

$$HFC_t = \alpha_0 + \alpha_2 GDP_t + \alpha_3 HPI_t + \alpha_4 KLCI_t + \alpha_5 OPR_t + e_t \qquad (1)$$

$$HFI_t = \alpha_0 + \alpha_2 GDP_t + \alpha_3 HPI_t + \alpha_4 KLSI_t + \alpha_5 OPR_t + e_t \qquad (2)$$

where HFC and HFI refers to home financing provided by conventional and Islamic banks, respectively, while the macroeconomic variables are real GDP, HPI which refers to Malaysian House Price Index, OPR set by Bank Negara Malaysia, KLCI and KLSI which refer to conventional and Islamic stock price indices, respectively. All series, except for OPR, are transformed into natural logarithms.

Consistent with previous studies, the model of this study assumes that credit is demand determined, although the observed credit developments are produced by the interaction of both supply and demand. Therefore, it is not implausible that supply factors also influence home financing.

Table 3.2
Research Objectives and Time Series Analysis Techniques

Research Objective	Time Series Analysis Techniques
i. To test whether there is long-run cointegration between macroeconomic variables (i.e. gross domestic product, house prices, stock prices, and interest rate) and home financing provided by conventional and Islamic banks	ARDL (Bound Testing Cointegration Approach)
ii. To test whether there is short-run relationship between macroeconomic variables (i.e. gross domestic product, house prices, stock prices, and interest rate) and home financing provided by conventional and Islamic banks	Impulse response function
iii. To measure the influence of each macroeconomic variable (i.e. gross domestic product, house prices, stock prices, and interest rate) on home financing provided by conventional and Islamic banks in the long run and in the short run	a. ARDL (long-run coefficient estimates) b. Forecast error variance decomposition (short-run)

For the empirical analysis, time series method is used. This involves the standard procedure of testing the stationarity of the variables of the models using unit root test and estimation of long-run relationship by means of cointegration test. In line with the research objectives, this study also performs impulse response function (IRF) and forecast error variance decomposition (FEVD) based on vector autoregression (VAR) model to explain how each shock affects the dynamic path of all of the variables of the system. Table 3.2 summarizes the time series analysis techniques employed in this study corresponding to the research objectives.

3.8.1 Unit Root Test

In time series, stationarity of variables is important for estimation. Applying least squares regressions on non-stationary variables can give incorrect parameter estimates of the relationships between variables. Testing using ordinary least squares (OLS)

may result to spurious regression in which the results show that the model is a good fit and there is a statistically significant relationship between variables where none actually exists. For macroeconomic variables, it is very common to find non-stationary series. Unit root test is used to verify whether a variable is stationary at level, $I(0)$ or stationary at first differencing, $I(1)$. If unit root exists, it suggests that the variable is not stationary. Performing differencing will reduce it to stationarity.

To test for the presence of unit root in variables, this study applies augmented Dickey-Fuller (ADF) test. The regression of ADF test allows lags of the first differences in order to solve the problem of serial correlation.

3.8.2 ARDL Bound Testing Cointegration Appoach (Long-run Analysis)

There are several cointegration techniques that allow empirical test for the existence of long-run relationship among variables. The most common approaches are the two-steps residual-based procedure by Engle and Granger (1987), the system-based reduced rank regression approach due to Johansen (1991), and autoregressive distributed lag (ARDL) model popularized by Pesaran, Shin, & Smith (1996). The first two approaches necessitate that the underlying variables are integrated of order $I(0)$ or $I(1)$. This unavoidably involves pre-testing which may introduce a degree of uncertainty which can affect the analysis of long-run relationships.

ARDL, on the other hand, can be used to reliably test hypotheses on coefficients when the variables are $I(0)$ or $I(1)$. Moreover, the ARDL model is applicable to studies involving small finite samples and it is robust against simultaneous equation bias and

autocorrelation problem provided that the orders of the ARDL model are adequately chosen based on a priori knowledge or estimated using a model selection process such as the Akaike Information Criterion (AIC) or Schwarz–Bayesian Criterion (SBC). Taking all these into consideration, ARDL model is chosen as appropriate for this study.

The error-correction representation of the ARDL models of this study can be expressed as follows:

$$
\Delta \ln HFC_t = a_0 + \sum_{j=1}^{k1} b_j \, \Delta \ln HFC_{t-j} + \sum_{j=0}^{k2} c_j \, \Delta \ln GDP_{t-j} + \sum_{j=0}^{k3} d_j \, \Delta \ln HPI_{t-j}
$$

$$
+ \sum_{j=0}^{k4} e_j \, \Delta \ln \text{KLCI}_{t-j} \; + \sum_{j=0}^{k5} f_j \, \Delta \, OPR_{t-j} + n_1 \ln HFC_{t-1}
$$

$$
+ n_2 \ln GDP_{t-1} + n_3 \ln HPI_{t-1} + n_4 \ln KLCI_{t-1} + n_5 \, \text{OPR}_{t-1}
$$

$$
+ \, \mathcal{E}_t \tag{3}
$$

$$
\Delta \ln HFI_t = a_0 + \sum_{j=1}^{k1} b_j \, \Delta \ln HFI_{t-j} + \sum_{j=0}^{k2} c_j \, \Delta \ln GDP_{t-j} + \sum_{j=0}^{k3} d_j \, \Delta \ln HPI_{t-j}
$$

$$
+ \sum_{j=0}^{k4} e_j \, \Delta \ln \text{KLSI}_{t-j} \; + \sum_{j=0}^{k5} f_j \, \Delta \, OPR_{t-j} + n_1 \ln HFI_{t-1}
$$

$$
+ n_2 \ln GDP_{t-1} + n_3 \ln HPI_{t-1} + n_4 \ln KLSI_{t-1} + n_5 \, \text{OPR}_{t-1}
$$

$$
+ \, \mathcal{E}_t \tag{4}
$$

Wherein, the error-correction dynamics is represented by the terms with the summation signs, while the long-run relationship is represented by second part. $\mathcal{E}_t$ refers to the random error term.

To test for the long-run relationship between home financing and macroeconomic variables, this study uses ARDL bound testing approach cointegration approach. This procedure allows testing for different long- and short-run dynamics which is relevant for the estimation of the equilibrium conditions.

The bound testing approach involves four stages. The first stage is to ascertain the presence of cointegration or long-run relationship among the variables based on estimating error correction models (ECM). Once it is confirmed that there is cointegration, the second stage is to estimate the long-run relationship between macroeconomic variables and home financing provided by conventional and Islamic banks using the selected ARDL models. The third stage is to estimate the associated ARDL ECM. Lastly, diagnostic and stability testing are performed to determine in the goodness of fit of the ARDL models.

ARDL bound testing approach is conducted using F-test, which checks the joint significance of the coefficients on the one period lagged levels of the variables (Narayan, 2005). F-test has a non-standard distribution which depends on (a) whether variables are $I(0)$ or $I(1)$, (b) number of regressors, (c) number of observations, and (d) whether the ARDL model has an intercept and/or a trend.

Narayan (2005) provides two sets of critical values of bound. The first set assumes that all the independent variables are $I(1)$ and the other set assumes that they are all $I(0)$. The null hypothesis that there is no cointegration among the variables is rejected if the computed value of F-test exceeds the upper bound. On the other hand, the null

hypothesis cannot be rejected if the computed value F-test is less than the lower bound. If the computed value F-test falls within the upper and lower bound, then the result becomes inconclusive. If this occurs, then the order of integration, $I(d)$, for the explanatory variables has to be ascertained before any conclusion is made.

The model selection of this study is carried out using SBC because it is more parsimonious with the lag length selection and is a consistent model selection criterion (Pesaran and Shin, 1999).

The ECM coefficient shows the speed of adjustment process to restore equilibrium following a disturbance in the long-run equilibrium relationship. A significant negative ECM coefficient suggests how fast variables return to equilibrium. A relatively high ECM coefficient in absolute amount indicates a quicker adjustment process.

Diagnostic testing is used to check the serial correlation, functional form, normality, and heteroscedasticity related with the ARDL models. On the other hand, the structural stability test are performed using cumulative sum of recursive residual (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMSQ). The CUSUM and CUSUMSQ tests use the cumulative sum of recursive residuals based on the first set of observations and is updated recursively and plotted against the break points. The null hypothesis that all coefficients in the ECMs, as in the ARDL models for HFC and HFI, is stable cannot be rejected if the plots of the CUSUM and CUSUMSQ statistics are established within the critical bounds of 5 percent significance level. Conversely, the null hypothesis of the stability of coefficients can be rejected if the lines are found to be crossed.

3.8.3 Impulse Response Function and Forecast Error Variance Decomposition (Short-run Analysis)

It is practically useful to ascertain the response of one variable to an impulse or shock in another variable in a system equation. Impulse response function (IRF) reveals the impulse response relationship between two variables in a higher dimensional system. If there is a significant reaction of one variable to an impulse in another variable, causal relationship from the latter variable to the former can be established.

IRF measures the dynamic marginal effects of each shock on all of the variables over a period of time. Forecast error variance decomposition (FEVD), on the other hand, examines how strong each of the shocks is as a component of the overall, unpredictable variance of each of the variables over time.

Based on VAR methodology, this study adopts IRF and FEVD analysis techniques to empirically explore the impact of shocks in macroeconomic variables (i.e. gross domestic product, house prices, stock prices, and interest rate) on home financing provided by conventional and Islamic banks.

Vector autoregression (VAR) was introduced by Sims (1980) as a technique that could be used to characterize the joint dynamic behavior of a collection of variables. When using IRF and FEVD following VAR model, it is important to highlight that shocks in VAR equations may be correlated contemporaneously. This happens when a shock in one variable work through the contemporaneous correlation with shocks in other variables. The problem of inadequate depiction of the responses of a variable to shocks in another variable occurs when isolated shocks to each variables cannot be

determined because of contemporaneous correlation. To solve this identification problem, Sims' (1980) strategy of orthogonalizing the shocks using Cholesky decomposition is normally employed. Orthogonalizing the VAR's shocks is critical in order that the shocks tracked by IRFs are not correlated.

The ordering adopted for this study is similar to Hofmann (2004) which is as follows: real GDP, house prices, stock prices, home financing, and interest rate. This ordering assumes that real GDP does not respond contemporaneously to shocks to any of the other variables, but may influence all other variables within quarter. This is commonly the standard assumption in the monetary policy transmission literature. Moreover, it assumes that property and stock prices are rather sticky such that they are not contemporaneously affected by home financing and interest rate. Interest rate is considered flexible such that it is permitted to respond within quarter to shocks to real GDP, property prices, stock prices and home financing. The chosen ordering also reflects the typical assumption that changes in interest rates are transmitted to the economy with a lag. Similar to Hofmann (2004), the ordering used in this study reflects the existing business cycle and monetary policy perspectives.

For robustness check, this study also performed (1) generalized impulse response function and (2) IRF based on another Cholesky ordering of variables: home financing, interest rate, house prices, stock prices, and GDP. According to Koop, Pesaran, & Potter (1996) and Pesaran & Shin (1998), generalized impulse response function avoids the ordering problem inherent in the orthogonalized impulse responses. The historical patterns of correlations among different shocks in generalized impulse response function approach are fully incorporated, allowing the

impulse responses to be unique and hence invariant to the orderings of the variables. On the other hand, the theoretical justification of performing IRF on the second set of ordering is the other view that home financing is expected to have strongest response to its own shock, followed by the shocks on interest rate, house prices, stock prices, and GDP.

CHAPTER 4

FINDINGS AND ANALYSIS

4.1 Introduction

This chapter provides the empirical results obtained using the time series analysis techniques discussed in Chapter 3. The findings and analysis are divided into four sections. The results of unit root tests which identify the order of integration of each variable is presented in Section 4.2. The unit root test is conducted using augmented Dickey Fuller (ADF) test. Section 4.3 shows the cointegration test employing ARDL model approach. This section also presents the results of testing for long relationship among the chosen variables. Section 4.4 and Section 4.5 present the results of impulse response function and forecast error variance decomposition analyses, respectively.

4.2 Results of Unit Root Test

To check the stationarity of the variables, unit root test is performed. This is an important preliminary test in time series analysis. Each variable is tested for unit root separately. The null hypothesis is that unit root exists.

Table 4.1

Summary of Unit Root Tests

Null Hypothesis: There is unit root.

Variables	Graph	At Level	At 1st Difference	Results at 10 percent
HFC	Trend and Intercept	-2.029	-3.5790*	I(1)
HFI	Trend and Intercept	-4.9354***	-2.4211	I(0)
GDP	Trend and Intercept	-2.6728	-4.1902**	I(1)
HPI	Trend and Intercept	-1.9527	-5.1696***	I(1)
KLCI	Trend and Intercept	-3.2513*	-3.5679*	I(0)
KLSI	Trend and Intercept	-3.0266	-3.8256**	I(1)
OPR	Intercept	-2.1551	-4.0358***	I(1)

At Level:
T-critical (Trend and Intercept) at 10 percent   -3.2253
T-critical (Intercept) at 10 percent   -2.6251

At 1st Difference:
T-critical (Trend and Intercept) at 10 percent   -3.2253
T-critical (Intercept) at 10 percent   -2.6251

     ***   - at 1 percent significance level
     **   - at 5 percent significance level
     *   - at 10 percent significance level

Table 4.1 presents the unit root test results for variables HFC, HFI, GDP, HPI, KLCI, KLSI, and OPR. At 10 percent significance level, the ADF unit root test shows that HFI and KLCI are stationary at level, $I(0)$, while HFC, GDP, HPI, KLSI and OPR are non-stationary at level but become stationary at first difference, $I(1)$. Having variables that are either integrated of order 0 or 1, this study justifies the use of ARDL model. Pesaran et al. (2006) suggests that ARDL approach can reliably test hypotheses on coefficients in which the variables are integrated of order 0 or 1.

4.3 Results of ARDL Model Approach

The ARDL model approach specifies a maximum lag length to search over the parameter space. Using SBC for model selection, a maximum number of 3 lags was chosen on the basis that the data are quarterly in nature and in light of the limited number of observations.

Table 4.2
Bound-testing Procedure Results

Cointegration hypotheses	ARDL Model	F-statistics
F(HFC|GDP, HPI, KLCI, OPR)	(1,0,0,1,0)	41884.9***
F(HFI|GDP, HPI, KLSI, OPR)	(3,2,2,1,3)	8531.3***

Notes: *F*-statistics exceeds the ***1 percent upper bounds; the relevant critical value bounds are taken from Narayan's (2005) Appendices A1-A3 for Case IV: with unrestricted intercept and restricted trend; number of regressors = 4, number of observations = 30. They are 5.205-6.640 at the 99 percent significance level, 3.715-4.878 at the 95 percent significance level and 3.097-4.118 at the 90 percent significance level.

Table 4.2 shows the ARDL model selected by SBC and *F*-statistics for ARDL models for HFC and HFI. The computed *F*-statistics for both models suggest that there are cointegrating relationships among the selected variables at the selected lag length. The findings suggest that home financing provided by conventional and Islamic banks are both significantly affected by macroeconomic variables. This is consistent with the findings of Ibrahim (2006) in which he finds cointegrating relationship between conventional credit and macroeconomic variables.

Table 4.3
Long-run ARDL Model Estimates

Regressors	HFC Model	T-ratio	HFI Model	T-ratio
GDP	-0.0198	-0.1477	-2.195**	-2.2249
HPI	-0.0984	-1.1193	1.3303***	5.2740
KLCI	-0.0541**	-2.1045	N/A	N/A
KLSI	N/A	N/A	-0.1363	-0.5975
OPR	3.6640***	4.3221	12.6367*	2.0121
C	26.9366***	8.7618	74.3028**	2.0121
T	0.0282***	17.7091	0.0563***	4.0289

*** - at 1 percent significance level

** - at 5 percent significance level

* - at 10 percent significance level

The next step is to estimate the long-run coefficients of ARDL models for HFC and HFI. Table 4.3 shows that KLCI and OPR have significant long-run relationship with HFC, while GDP, HPI, and OPR are significant determinants of HFI in the long-run. The subsequent discussions focus first on the individual subcomponents of each ARDL model before a comparative analysis is presented.

The long-run estimate for HFC model shows that in the long-run KLCI is negatively related to HFC while OPR is positively related to HFC. The negative coefficient KLCI means that one percent increase (decrease) in KLCI, HFC decreases (increases) by 0.054 percent. On the other hand, the positive coefficient of OPR means that for one percent increase (decrease) in OPR, HFC increases (decreases) by 0.036.

Figure 4.1
KLCI from 1Q 2007 to 2Q 2014
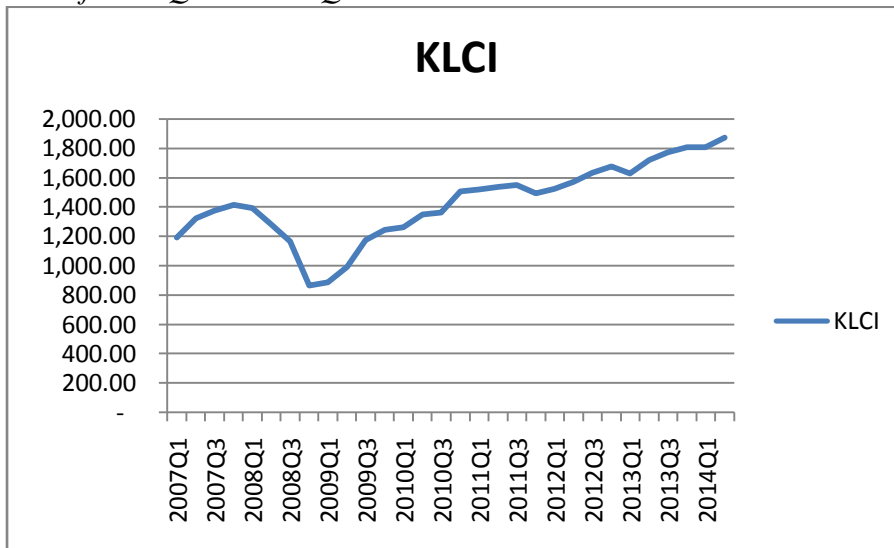
Source: BNM Monthly Statistical Bulletin as of June 2014

The result for KLCI suggests that households treat stocks as alternate investment to housing, and when stock prices go up households seem to prefer to hold equity shares which yield dividends rather than take additional housing loans to obtain housing which they can subsequently lease to earn rent income. However the same can be said when stock prices go down. High stock market volatility especially in times of economic downturn may push away households from putting their funds into equities and unit trusts. As shown in Fugure 4.1, stock prices represented by KLCI were very volatile from first quarter of 2007 to fourth quarter of 2008 as the effects of the financial crisis in the US remain to shaken financial markets all over the globe. However, regulations by the Malaysian Government have ensured that the collapse in exports during the global crisis resulting to a contraction in aggregate demand did not generate a bearish run on the stock market (Abidin & Rasiah, 2009). In 2009, Bursa Malaysia has remained fairly steady.

The households' preference to invest in equity shares is consistent with the findings of BNM regarding the composition of household's balance sheet. According to BNM (2014), the composition of the assets held by households has become more diversified wherein it is found out that the accumulation of assets in equities and unit trust funds has been rising although housing wealth continues to be the largest component of household assets. The relative lower fund needed to invest in equities and unit trust funds investments as compared to acquiring a house thru home financing and servicing installment payments may also contribute to increased preference for investment in financial assets.

A corroborating data from BNM (2014) shows that 84 percent of housing loan borrowers actually have only one outstanding housing loan account which implies that bulk of house purchases continued to be for own occupation and medium- to long-term investment rather than for active leasing to earn rental income. The growing diversification of household assets does not only reflect the development in financial markets offering a wider range of products and services, but it is also attributable to the growing sophistication and improving awareness of alternative savings instruments for households. After the 2007-2008 financial crisis, the equity market in Malaysia has exhibited favorable performance which has supported the value of financial assets (Alias, Huat, & Mohamad, 2014). The positive equity market performance seems to have contributed to the increased acquisition of equities and unit trust funds among households relative to house investment thru home financing.

The positive relationship of OPR and HFC may not be surprising at all. Although some research on credit demand and interest rate find a negative long-run relationship

partly attributable to the credit view of monetary policy transmission (Bernanke & Gertler, 1995; Calza et al., 2001; Hofmann, 2004), a positive relationship of overnight policy rate and home financing is also likely to occur due to the high correlation of OPR and deposit rate provided by banks (Fitzpatrick & McQuinn, 2007). This means that as OPR increases, deposit rate also increases which can attract more savings from depositors. Increased deposits held by banks allow them to offer more credit, thus potentially increasing home financing. This is consistent with the study of Kassim et al. (2009) who find that there is significant positive relationship between overnight policy rates and deposits in conventional banks in Malaysia.

Figure 4.2

OPR and Deposit Rate of Conventional Banks
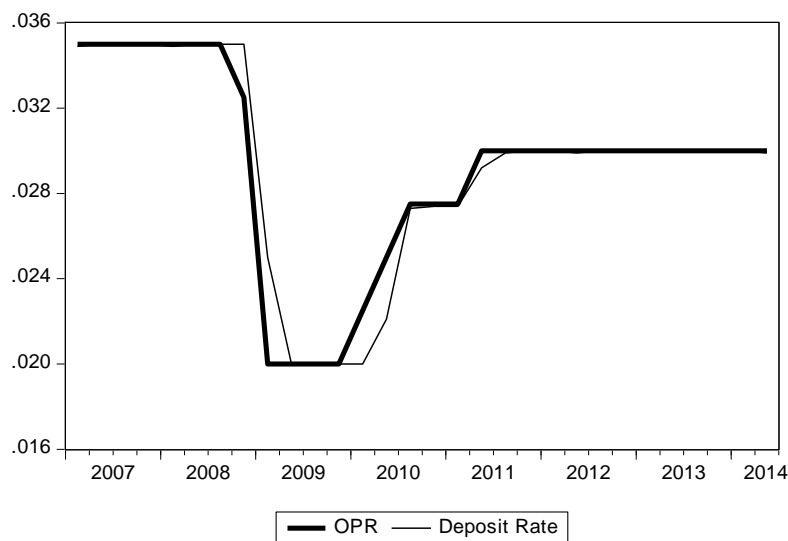
Source: BNM Monthly Statistical Bulletin as of June 2014

Figure 4.2 shows the graphical representation of OPR and interbank overnight deposit rate in Malaysia from 1Q 2007 to 2Q 2014. As it is apparent in the graph, the OPR and deposit rate move closely together with each other. Moreover, correlation test

shows that at 1 percent significance level, OPR is significantly correlated to deposit rate at 0.9657.

The long-run estimate for HFI model shows that in the long-run GDP is negatively related to HFI while HPI and OPR are positively related to HFI. The negative coefficient GDP means that one percent increase (decrease) in GDP, HFI decreases (increases) by 2.195 percent. On the other hand, the positive coefficient of HPI means that for one percent increase (decrease) in HPI, HFI increases (decreases) by 1.330 percent, while for one percent increase (decrease) in OPR, HFI increases (decreases) by 0.126.

Figure 4.3
GDP and HFI from 1Q 2007 to 2Q 2014 (in RM millions)
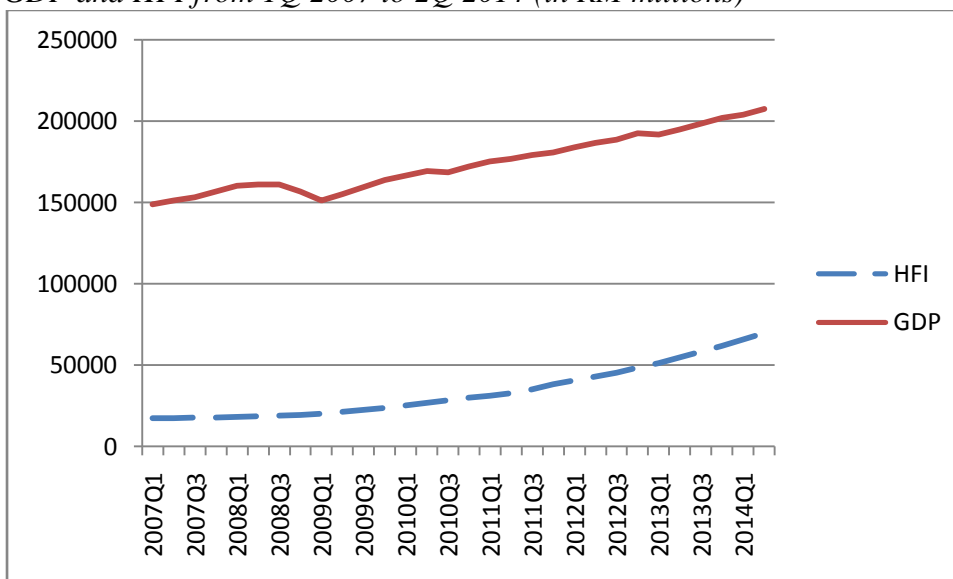
Source: BNM Monthly Statistical Bulletin as of June 2014

The negative relationship of GDP and HFI suggests that when GDP increases (decreases), the demand for Islamic home financing decreases (increases). The

findings is consistent with the observation by Bernanke & Gertler (1995) that in times of expansionary phase and high income, households tend improve their balance sheet by reducing their debt levels and use their internal sources of finance more in order to meet their consumption and investment needs. However, in times of economic contraction in which there is an overall decline in income, households' need for financing increases as less sources of funds are available. This is apparent in Figure 4.3 in which demand for home financing from Islamic banks has actually increased when GDP growth falls in the last quarter of 2008 and first two quarters of 2009.

The positive relationship of HPI and HFI suggests that when house prices increase (decrease), the demand for Islamic home financing increases (decreases). This findings support the theory on financial accelerator and wealth effects on household behavior to consume and invest. When prices of residential property increases, households' net worth increases due to higher valuation in real property assets. Similar to conventional banks, real property assets used as collateral in debt-based financing modes is important for Islamic banks to mitigate risks arising from information asymmetry (Ayub, 2007). Thus, higher collateral value allows potential borrowers to obtain more credit from banks. Consistent with the findings of previous studies (Brissimis & Vlassopoulos, 2009; Fitzpatrick & McQuinn, 2007; Gerlach & Peng, 2005; Hofmann, 2004), increases in residential property prices seems to influence demand for home financing via wealth effects.

Contrary to general expectations that Islamic banks are not affected by interest rates, the findings of this study show that OPR is positively related to HFI. This is similar to the findings on the relationship of OPR and HFC. The positive relationship of OPR

and HFI can be indirectly explained by the high correlation found between Islamic investment rates and the conventional deposit rates on a maturity-matched basis in Malaysia (Chong & Liu, 2009). As explained previously for HFC, the deposit rate provided by conventional banks is highly correlated to OPR. Thus, it can be inferred through the study conducted by Chong & Liu (2009) that Islamic investment rates are also highly correlated to OPR. This means that when OPR increases (decreases), Islamic investment rates also increases (decreases). High investment rates will attract more investment funds from depositors, thus increasing the ability of Islamic banks to provide more home financing.

The long-run ARDL model estimates for the macroeconomic determinants of home financing provided by conventional and Islamic banks can be further analyzed as follows:

1. Overnight policy rate is both significant and positively related to home financing provided by conventional and Islamic banks. However by analyzing the coefficients, Islamic banks seem to be more affected by OPR than conventional banks at 5 percent significance level. This is consistent with the findings of Kassim et al. (2009) in which they argue that since the Islamic banking industry is still underdeveloped and has limited options to do business as compared to the conventional banking industry which has a deep and wide market and global linkages, Islamic banks bear greater impact of monetary policy.

2. The results on GDP being negatively significant to HFI but not significant to HFC suggests that home financing provided by Islamic banks are more linked

to movements in real economic activity which affect households decision to borrow.

3. HPI is positively significant to HFI while it is not significant to HFC. This can be likely explained by the predominant use of murabaha or cost-plus-mark-up credit sale contracts in Islamic home financing. Among other conditions, the actual original price of the house in murabaha home financing must be disclosed to make the contract valid (Ayub, 2007). Thus, house price significantly influences households' decision to obtain home financing. However, for conventional home financing, such a condition to disclose is not required. This is an important advantage of Islamic home financing, especially murabaha contracts. Since murabaha contract is a *trust*-based contract, full disclosure allows parties to decide with free will and confidence (Ayub, 2007). Moreover, this strengthens the notion that home financing provided by Islamic banks reflect market conditions.

4. The negative and significant relationship of KLCI to HFC as compared to not significant relationship between KLSI and HFI may be explained by the households' risk-averse appetite on equity investments. Nurhanani, Ahmad, & Mohd (2012) find that during the economic down from 2007 to 2010, Islamic stock market index has higher volatility than conventional composite stock index.

Table 4.4
ECM Coefficients

	HFC	T-ratio		HFI	T-ratio	
ecm (-1)	-0.4280	-4.8453	***	-0.4389	-2.4875	**
R-Squared	0.82755			0.95774		
Durbin-Watson	2.3069			2.6838		

      *** - at 1 percent significance level
       ** - at 5 percent significance level

Table 4.4 shows the ECM coefficients of ARDL models for HFC and HFI. As apparent in the table, the speed of adjustment process to return to equilibrium is slightly faster for macroeconomic variables and home financing provided by Islamic banks. The model for HFI implies that 43.89 percent of the disequilibrium of the previous quarter's shocks adjusts back to the long-run equilibrium in the current quarter. On the other hand for the model for HFC, 42.80 percent of the disequilibrium of the previous quarter's shocks adjusts back to the long-run equilibrium in the current quarter.

The final step in estimating the ARDL model approach is to test the stability of the long- and short-run dynamics of the ARDL models for HFC and HFI.

Figure 4.4

CUSUM and CUSUMSQ Tests for HFC Model

Plot of Cumulative Sum of Recursive Residuals

The straight lines represent critical bounds at 5% significance level

Plot of Cumulative Sum of Squares of Recursive Residuals

The straight lines represent critical bounds at 5% significance level
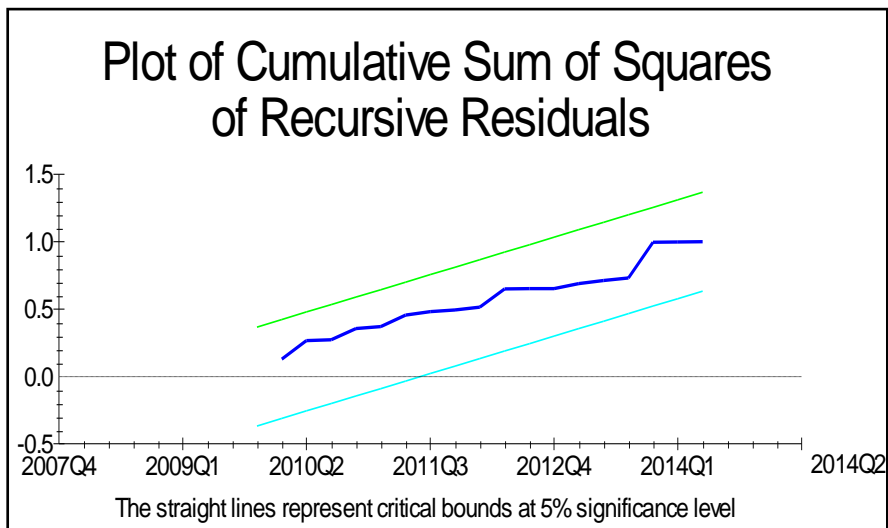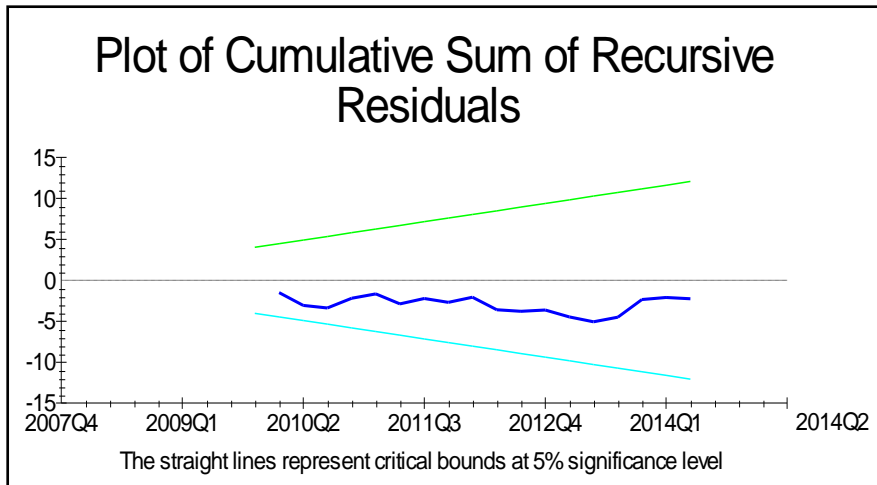
Figure 4.5

CUSUM and CUSUMSQ Tests for HFI Model

Plot of Cumulative Sum of Recursive Residuals

The straight lines represent critical bounds at 5% significance level

Plot of Cumulative Sum of Squares of Recursive Residuals

The straight lines represent critical bounds at 5% significance level
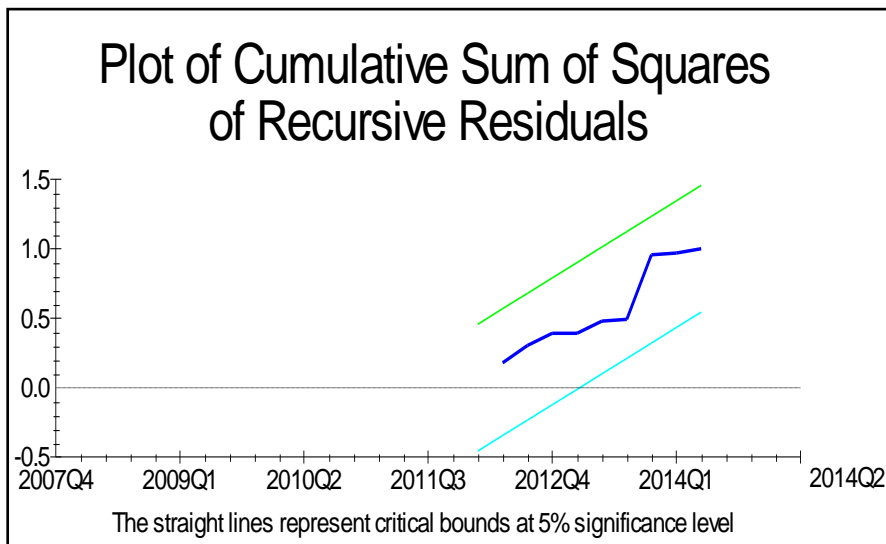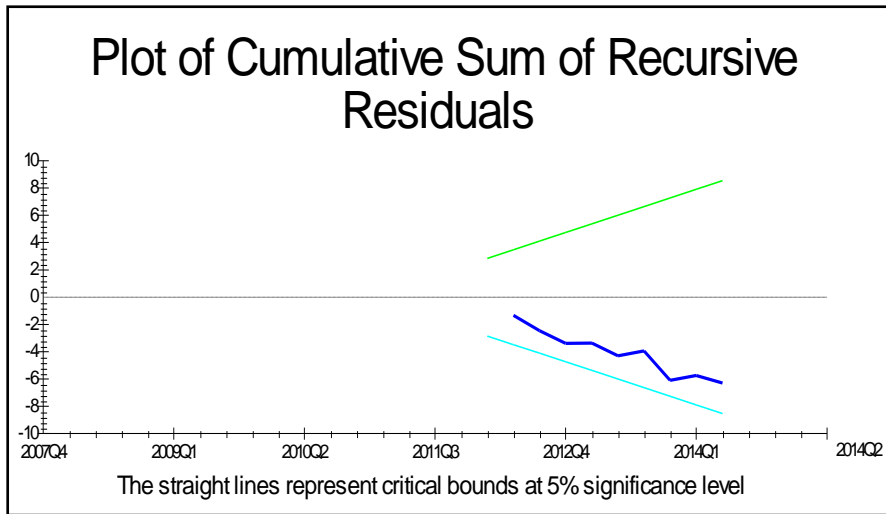
Based on Figures 4.4 and 4.5, the CUSUM and CUSUMSQ tests for both models suggest no evidence of any significant structural instability.

4.4 Results of Impulse Response Functions (IRF)

The study adopts the following order of variables to perform IRF analysis: GDP, house prices (HFI), stock prices (KLCI/KLSI), interest rate (OPR), and home financing (HFC/HFI).

Figure 4.6
Impulse Responses of Home Financing Provided by Conventional Banks to Macroeconomic Variables
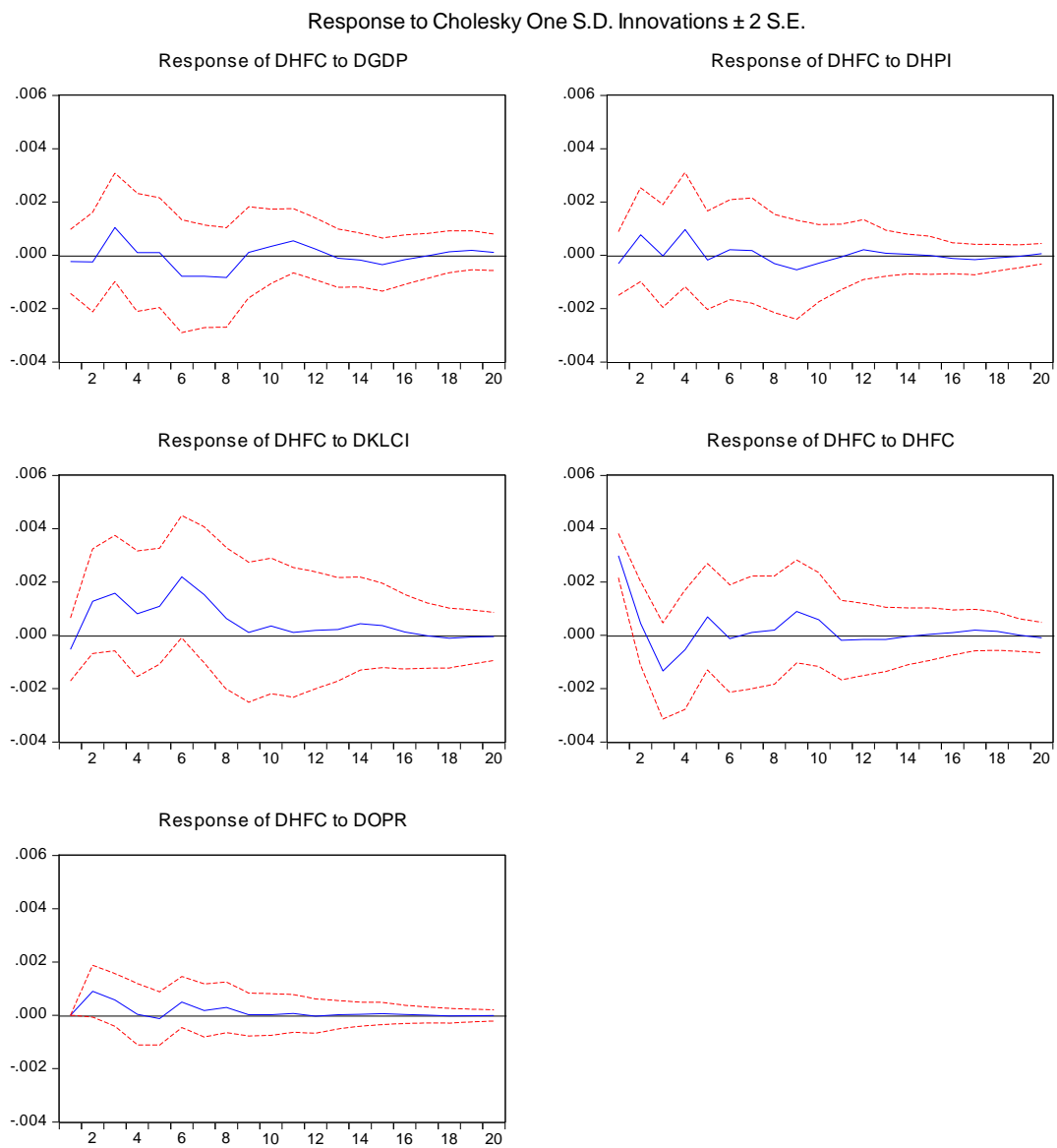
For robustness check, this study also performed generalized impulse response function and IRF based on another Cholesky ordering of variables i.e. home financing, interest rate, house prices, stock prices, and GDP. The resulting IRFs for both cases however, are qualitatively similar to the IRF of the first ordering set and thus no longer presented.

Figure 4.7
Impulse Responses of Home Financing Provided by Islamic Banks to Macroeconomic Variables

Response to Cholesky One S.D. Innovations ± 2 S.E.
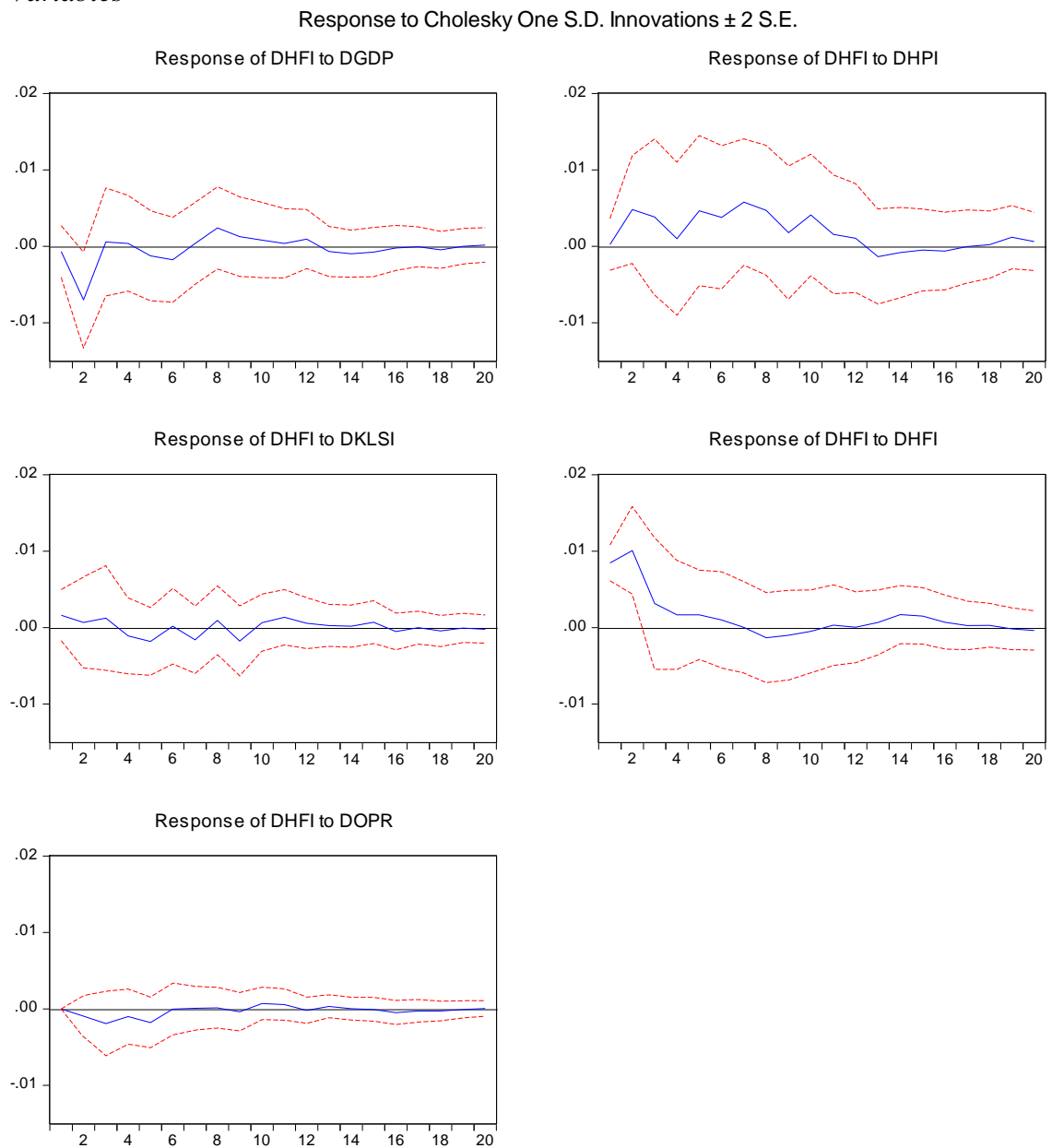
Figures 4.6 and 4.7 show the impulse responses of HFC and HFI, respectively, to the related macroeconomic variables. It can be inferred that the responses of home financing provided by conventional and Islamic banks to macroeconomic variables are not statistically significant, except for the natural positive response of home financing to its own shock in the first two quarters. Thus, there is no significant short-run effect of macroeconomic variables to home financing.

4.5 Results of Forecast Error Variance Decomposition (FEVD)

FEVD analysis is performed on the two sets of Cholesky ordering: (1) home financing, interest rate, house prices, stock prices, and GDP and (2) GDP, house prices, stock prices, interest rate, and home financing. Similar to IRF analysis, the test for more than one ordering is to increase the robustness of the FEVD analysis.

Table 4.5
Forecast Error Variance Decomposition of Home Financing Provided by Conventional Banks (Ordering 1)

Period	S.E.	DHFC	DOPR	DHPI	DKLCI	DGDP
1	0.003059	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.003560	74.06147	2.013296	2.192002	18.64242	3.090815
3	0.004288	65.92896	2.193317	1.917913	25.74079	4.219020
4	0.004503	62.73118	2.194153	5.713864	24.95302	4.407784
5	0.004692	58.92828	4.240015	5.692133	26.91807	4.221501
6	0.005269	47.50150	3.984204	4.660685	34.38490	9.468709
7	0.005547	42.88714	4.025441	4.309708	35.85489	12.92282
8	0.005665	41.22525	3.937220	4.828762	35.49174	14.51703
9	0.005763	42.27968	4.214741	4.844584	34.51547	14.14553
10	0.005820	42.22904	4.502263	4.754735	34.41174	14.10223
11	0.005850	41.95758	4.478821	4.738881	34.15380	14.67092
12	0.005863	41.90474	4.458116	4.949709	34.04760	14.63984
13	0.005871	41.89897	4.447952	4.942812	34.02167	14.68859
14	0.005891	41.65446	4.461427	4.919381	34.13353	14.83121
15	0.005913	41.34082	4.447743	4.890463	34.11484	15.20613
16	0.005919	41.28934	4.458613	4.918182	34.08769	15.24618
17	0.005924	41.34060	4.467834	4.945414	34.02710	15.21905
18	0.005929	41.34752	4.464100	4.938603	33.97655	15.27324
19	0.005933	41.29987	4.460329	4.934371	33.93983	15.36561
20	0.005935	41.29538	4.461312	4.941838	33.92017	15.38131

Cholesky Ordering: DHFC DOPR DHPI DKLCI DGDP

Table 4.6

Forecast Error Variance Decomposition of Home Financing Provided by Conventional Banks (Ordering 2)

Period	S.E.	DGDP	DHPI	DKLCI	DHFC	DOPR
1	0.009585	0.562258	1.018958	2.964609	95.45417	0.000000
2	0.015095	0.905944	5.452744	15.11587	72.08439	6.441047
3	0.017259	6.568517	3.760999	24.01903	59.40056	6.250892
4	0.018613	6.011051	7.985524	25.01739	55.30944	5.676594
5	0.020037	5.582902	7.503186	28.47241	53.14581	5.295697
6	0.020441	6.642002	6.112284	39.95498	42.19930	5.091430
7	0.020596	8.009142	5.617330	43.57011	38.10523	4.698191
8	0.021026	9.842160	5.687208	43.02996	36.66164	4.779028
9	0.021152	9.546974	6.384352	41.61459	37.83441	4.619675
10	0.021346	9.691108	6.515654	41.16699	38.09494	4.531301
11	0.021550	10.45239	6.459996	40.78265	37.80551	4.499449
12	0.021683	10.56679	6.560890	40.69313	37.69813	4.481058
13	0.021797	10.57211	6.561235	40.72659	37.66933	4.470729
14	0.021830	10.59277	6.523263	41.01263	37.42551	4.445820
15	0.021893	10.86015	6.474180	41.09317	37.14861	4.423884
16	0.021914	10.91629	6.499033	41.06095	37.10555	4.418173
17	0.021944	10.89782	6.559571	40.98552	37.14672	4.410370
18	0.021957	10.92812	6.572816	40.94705	37.14814	4.403886
19	0.021976	11.01446	6.569546	40.91149	37.10531	4.399194
20	0.021989	11.03941	6.574787	40.88796	37.10166	4.396182

Cholesky Ordering: DGDP DHPI DKLCI DHFC DOPR

Table 4.7
Forecast Error Variance Decomposition of Home Financing Provided by Islamic Banks (Ordering 1)

Period	S.E.	DHFI	DOPR	DHPI	DKLSI	DGDP
1	0.008642	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.015805	75.44992	1.914814	1.323758	12.27194	9.039567
3	0.016728	71.38902	1.730403	7.491825	11.31808	8.070680
4	0.016910	70.56192	1.770792	7.640328	11.62584	8.401118
5	0.017844	64.07840	2.749875	10.96049	14.64359	7.567644
6	0.018352	61.03494	3.340684	12.49987	14.62686	8.497646
7	0.019309	55.13747	5.972815	17.27683	13.92305	7.689837
8	0.020082	51.33798	5.877399	22.45046	13.22381	7.110350
9	0.020303	50.68219	6.168266	22.64853	13.07004	7.430982
10	0.020754	48.53186	6.560272	25.00128	12.57394	7.332655
11	0.020866	48.08189	6.503988	25.32431	12.65567	7.434138
12	0.020921	47.82920	6.470793	25.64238	12.65099	7.406643
13	0.020991	47.62763	6.461262	25.95780	12.57147	7.381843
14	0.021099	47.81742	6.406986	25.95860	12.48089	7.336107
15	0.021184	48.04121	6.409550	25.82185	12.38285	7.344532
16	0.021218	47.96000	6.398134	25.82924	12.43404	7.378592
17	0.021222	47.95837	6.402433	25.82034	12.44100	7.377852
18	0.021237	47.90212	6.402103	25.78350	12.54470	7.367580
19	0.021271	47.75578	6.424406	25.93782	12.52325	7.358745
20	0.021285	47.73127	6.445394	25.96578	12.50846	7.349091

Cholesky Ordering: DHFI DOPR DHPI DKLSI DGDP

Table 4.8
Forecast Error Variance Decomposition of Home Financing Provided by Islamic Banks (Ordering 2)

Period	S.E.	DGDP	DHPI	DKLSI	DHFI	DOPR
1	0.008234	0.629636	0.068602	3.507517	95.79424	0.000000
2	0.012328	19.87474	9.236924	1.219474	69.29084	0.378017
3	0.013517	17.84983	13.46267	1.640834	65.37381	1.672855
4	0.014976	17.51826	13.51217	2.026464	64.93815	2.004954
5	0.016724	16.22534	18.91430	2.866620	59.18326	2.810476
6	0.017069	16.27769	22.10473	2.719723	56.24054	2.657316
7	0.017516	14.73773	28.90100	3.159532	50.80005	2.401683
8	0.018536	15.04045	32.17677	3.142559	47.41554	2.224683
9	0.019070	15.09099	32.22816	3.831376	46.63493	2.214547
10	0.019520	14.58663	34.72386	3.762467	44.69299	2.234047
11	0.019655	14.46088	34.89797	4.125777	44.23461	2.280760
12	0.019744	14.58331	34.96512	4.173372	44.00083	2.277370
13	0.019766	14.59667	35.14898	4.161432	43.80746	2.285462
14	0.019822	14.66828	34.94817	4.125766	43.99548	2.262308
15	0.019873	14.68148	34.72416	4.201696	44.14680	2.245855
16	0.019889	14.64523	34.69966	4.251801	44.11069	2.292620
17	0.019912	14.64134	34.68817	4.250432	44.11096	2.309087
18	0.019976	14.67167	34.64730	4.291112	44.06587	2.324054
19	0.020011	14.62534	34.84458	4.278417	43.93338	2.318277
20	0.020014	14.61136	34.88064	4.283555	43.90868	2.315761

Cholesky Ordering: DGDP DHPI DKLSI DHFI DOPR

Tables 4.5 and 4.6 show the results of FEVD for the ordering (1) and (2) for HFC, respectively. On the other hand, Tables 4.7 and 4.8 show the results of FEVD for the ordering (1) and (2) for HFI.

For the model for HFC, the FEVD results for both sets of ordering are similar. Tables 4.5 and 4.6 show that in the short-run, other than the dominant effect of HFC's own shock, the variations in KLCI variable explain 36 to 43 percent of forecast error variances in home financing provided by conventional banks at the 20-quarter horizon. This means that KLCI is one of the most important variables in explaining the fluctuations in home financing provided by conventional banks. On the other hand, GDP contributes second to the forecast error variances in HFC by around 11 to 15 percent. This implies that effect of GDP to HFC is more pronounced in the short-run. HPI and OPR explain around 6 to 8 percent and 5 to 6 percent, respectively of the forecast error variances in HFC, respectively. From these results, it can be inferred that the immediate effect of movements in house prices and overnight policy rate has relatively little effect on HFC in the short-run.

For the model of HFI, the FEVD results for both sets of ordering are also similar. Tables 4.7 and 4.8 show that in the short-run, other than the dominant effect of HFI's own shock, the variations in HPI explain around 26 to 35 percent of forecast error variances in home financing provided by Islamic banks at the 20-quarter horizon. In contrast to the model of HFC, house prices and not stock prices are the most important determinant of home financing provided by Islamic banks in the short-run. GDP, on the other hand, contributes around 9 to 11 percent to the forecast error variances in HFI. This means that for households, both in the model of HFC and HFI,

movements in GDP affects households' decision to borrow in the short-run. Moreover, it is found that KLSI explain around 4 to 15 percent of forecast error variances in HFI. This suggests that Shariah-compliant stock index affect households' decision to borrow in the short-run. Finally, OPR explain 3 to 7 percent of the forecast error variances in HFI. From these results, it can be inferred that the immediate effect of movements in overnight policy rate has the smallest effect on HFI in the short-run.

Table 4.9
Hypotheses and Findings of the Study

Hypotheses	Long-run Analysis		Short-run Analysis	
	HFC Model	HFI Model	HFC Model	HFI Model
H1: There is no significant relationship between GDP and home financing.	Fail to reject H1	Reject H1	Fail to reject H1	Fail to reject H1
H2: There is no significant relationship between house prices and home financing.	Fail to reject H2	Reject H2	Fail to reject H2	Fail to reject H2
H3: There is no significant relationship between stock prices and home financing.	Reject H3	Fail to reject H3	Fail to reject H3	Fail to reject H3
H4: There is no significant relationship between interest rate and home financing.	Reject H4	Reject H4	Fail to reject H4	Fail to reject H4

In line with the hypotheses formulated in Chapter 3, Table 4.9 shows that based on the long-run analysis of the ARDL coefficient estimates, H3 and H4 are rejected for HFC model, while on the other hand, H1, H2, and H4 are rejected for HFI model. However, based on the short-run analysis using IRF, this study fails to reject all hypotheses for both HFC and HFI models. The findings of this study suggest that HFI, as compared to HFC, is more directly linked to real sector of the economy. However, both HFI and HFC are affected by interest rates in the long-run.

In contrast to previous studies that investigated the relationship between macroeconomic variables and credit provided by conventional banks (Brissimis & Vlassopoulos, 2009; Calza et al., 2001; Fitzpatrick & McQuinn, 2007; Gerlach & Peng, 2005; Hofmann, 2004; Ibrahim, 2006), the results of the long- and short-run analyses of this study show that in Malaysia, GDP and house prices are not significant determinants of home financing provided by conventional banks. Moreover, this study finds a negative relationship between stock prices and home financing provided by conventional banks. The difference in results may be due to the fact that (1) the past studies, except Ibrahim (2006), are conducted in industrialized countries which operate only a conventional banking system, and (2) most of these studies use larger credit aggregates as dependent variable instead of home financing.

On the other hand, the findings of this study that interest rate has positive influence on home financing provided by conventional banks is consistent with Ibrahim (2006) and Fitzpatrick & McQuinn (2007) who conducted their studies in Malaysia and Greece, respectively.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

The 2007-2008 financial crisis has spurred interests in determining the impact of macroeconomy and home financing. This study in particular analyzes the dynamic relationship between macroeconomic variables (i.e. gross domestic product, house prices, stock prices, and interest rate) and home financing provided by conventional (HFC) and Islamic banks (HFI). Using ARDL model approach, IRF, and FEVD, this study concludes that the dynamic relationship of macroeconomic variables and home financing provided by Islamic banks are different from the conventional banks. Both in the long-run and short-run, home financing provided by Islamic banks are more linked to real sector economy as compared to home financing provided by conventional banks.

For both ARDL models of HFC and HFI, this study finds cointegrating relationship between macroeconomic variables and home financing. However, the long-run and short-run relationships of macroeconomic variables with HFC and HFI are apparently different. This study finds that both in the long-run and short-run, home financing provided by Islamic banks are more linked to GDP, house prices, while home financing provided by conventional banks are more linked to movements in conventional stock price index. The impact of GDP to HFC is only pronounced in the short-run. The same may be inferred to the short-run effect of KLSI to HFI. More importantly, this study finds that overnight policy rate is significantly related to both Islamic and conventional banks in the long-run but not in the short-run which means

that monetary policy has a big impact to the home financing provided by the banks in the long-run. Thus, in order for Islamic banks to be differentiated from conventional banks, a different basis of profit rate, which is independent of interest rate, needs to be developed for Islamic banks.

5.2 Policy Implications

Home financing is important for various stakeholders including households and banking industry. The financial instability experienced in 2007-2008 financial crisis suggests that home financing can affect the soundness of the economy thru various channels. Thus, this study has highlighted that the existence of a dual banking system in Malaysia offers a unique case of policy intervention on home financing provided by banks. In the case of conventional banks, policy intervention to stimulate or dampen home financing must focus on influencing the stock market and implementing monetary policy. On the other hand, policy intervention to stimulate or dampen home financing provided by Islamic banks must focus on stabilizing house prices, GDP growth and implementing monetary policy.

5.3 Recommendation

This study has focused on analyzing the macroeconomic determinants of home financing. Movements in macroeconomy are critical to analyze the fluctuations in home financing. However, this study does not account for the effect of financial deregulation and improved information technology. As emphasized in the beginning, agency costs and information asymmetry which are major credit frictions are assumed to affect the interplay of macroeconomic variables and home financing. However, as

the impacts of financial deregulation and improved information technology take place incrementally over a number of years, it is difficult to pick up the macroeconomic impact empirically (Fitzpatrick & McQuinn, 2007). It is thus recommended that these factors are integrated for future study.

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