The SEACEN Centre

HOUSEHOLD DEBT in SEACEN Economies

Maria Teresa Punzi

HOUSEHOLD DEBT in SEACEN Economies

By Maria Teresa Punzi

The **SEACEN** Centre

The South East Asian Central Banks (SEACEN)
Research and Training Centre
Kuala Lumpur, Malaysia

FOREWORD

Since 2010, many SEACEN economies have experienced rapid growth in household debt, stressing the need for intervention from policy makers. From the great financial crisis, we have learnt that increasing household debt can lead to possible threats to growth and global financial stability. Increasing household debt-to-GDP in SEACEN economies is associated with a run-up in house prices. A strong preference for investing in the real estate sector and accommodative monetary policy are the main drivers of co-movements between household debt and house prices in SEACEN economies. Moreover, asset prices tend to peak before GDP downturns, meaning that asset prices are good predictors of recessions. Indeed, changes in asset prices increase the probability of GDP downturns, and a burst in asset prices amplifies the chance of current and future recessions. Therefore, monitoring the housing market is essential to prevent an excessive increase in the household debt-to-GDP ratio.

Many SEACEN economies have been implementing measures to slow down the increase in household debt and house prices. While macroprudential measures have been used extensively, these tools have had marginal impact in leaning against excess credit and housing boom. This is due mainly to strong capital inflows and lower interest rates, which makes macroprudential tools less effective.

Therefore, it is important to balance the short-term benefits with the long-term costs of increasing household debt, and adopt a combination of good policies, institutions, and regulations, as only macroprudential tools are not enough.

The collaborative research project on "Household Debt in SEACEN Economies" studies causes and consequences for SEACEN economies, both from a cross-economy and an economy-specific perspective, and discusses policy responses to the excessive increase in the levels of household debt.

The project was led by Maria Teresa Punzi, Assistant Professor of Economics at the Vienna University of Economics and Business, Austria, and Visiting Research Economist at SEACEN in 2017. The project team consisted of representatives from the Central Bank, Chinese Taipei; Reserve Bank of India; Bank Negara Malaysia; The Bank of Mongolia; Bangko Sentral ng Pilipinas; Bank of Thailand; and, State Bank of Vietnam. The SEACEN Centre wishes to express it sincere gratitude to the participating central banks for their support.

The assistance of SEACEN staff members, in particular, Dr. Ole Rummel, Director, and Ms. Jami'ah Jaffar, Research Associate, Macroeconomic and Monetary Policy Management Department, respectively, is most gratefully acknowledged. SEACEN is pleased to have been able to provide input for the project at a research workshop and seminar held at the SEACEN Centre, where the findings of the project were presented and discussed. We would also like to acknowledge the helpful comments and suggestions from Florian Huber, Assistant Professor in Economics at Vienna University of Economics and Business on the integrative report prepared by Dr. Punzi. The views expressed in this study are those of the authors and do not necessarily reflect those of the SEACEN Centre or SEACEN member central banks/monetary authorities.

Hans Genberg
Executive Director
The SEACEN Centre

April 2018

EXECUTIVE SUMMARY

Since the great financial crisis (GFC), household debt has attracted considerable attention. Even though policy authorities have gradually introduced specific macroprudential interventions to reduce risks associated with increasing levels of household debt, borrowing by households is still growing worldwide, and it is now at very high levels in many SEACEN economies. Increasing household debt across economies heightens possible threats to growth and global financial stability. From the perspective of SEACEN economies, the increase in the household debt-to-GDP ratio pose a challenge to monetary, fiscal, regulatory and macroprudential policies:

- Increasing household debt is very often associated with the run-up in house prices.
- Across SEACEN economies, productivity and house preference shocks are the main drivers of a contemporaneous increase in household debt and house prices. Also, an increase in income class, i.e., larger share of top and middle-income classes, boosts house prices and household debt. Increasing household debt is also driven by accommodative monetary policy and by a slowdown in the construction sector.
- A strong macro-financial linkage appears to be present across SEACEN economies and empirical analysis finds that asset prices usually increase and peak before a GDP downturn (i.e., recession), while peaks in the household debt-to-GDP ratio coincide with GDP downturns. This suggests that asset prices and household debt-to-GDP ratios are key variables for predicting a recession.
- Downturn phases of asset price increase the probability of recession across SEACEN economies.
- In this context, macroprudential policies have been used very frequently in SEACEN economies in order to lean against excess growth of household debt. However, such policies work mainly on the supply side of credit, while the increase in the levels of household debt depends mostly on demand channels.

TABLE OF CONTENTS

Chapter 1

INTEGRATIVE REPORT: HOUSEHOLD DEBT IN SEACEN ECONOMIES

By

Maria Teresa Punzi[1]

1. Introduction

This research project study focuses on the increase in household debt that many SEACEN economies have been experiencing during the last number of years. Since the global financial crisis (GFC), household debt has attracted considerable attention. Even if policy authorities have gradually introduced specific macroprudential interventions to reduce risks associated with increasing levels of household debt, borrowing by households is still growing worldwide, and it is now at very high levels in many Asian economies. Increasing household debt across economies heighthens possible threats to growth and global financial stability. Chinese Taipei, India, Malaysia, Mongolia, the Philippines, Thailand and Vietnam have also experienced a rapid growth in household debt since 2010, and therefore this research study focuses on understanding the causes and consequences of the surge of household debt in these selected SEACEN economies.

Increasing household debt is very often associated with the run-up in house prices. Therefore, part of this study focuses on the interdependence between asset prices, household debt and macroeconomic fluctuations.[2] In this chapter, the macro-financial linkages across the 7 SEACEN eonomies included in this study are analyzed and it is found that asset prices usually increase and peak before a GDP downturn (i.e., recession), while peaks in household debt-to-GDP ratio coincide with GDP downturns. This suggests that asset prices are key variables to predict a recession.[3] A probit model is also estimated to evaluate the predictors of a recession. Results show that asset prices and the loan-to-GDP ratio are good predictors of a recession. Equity prices increase the probability of a future recession, while interest rate spread, inflation and current account to GDP are not statistically significant. If I estimate the probability of recessions including downturns phases of asset prices, then the probability of recession increases by 13% (11%) and 17% (15%) at current (1-quarter ahead) recession, respectively. House price downturns are no longer good predictors for 4-quarter ahead recession. Increase in equity prices raises the probability of recession by about 90%. Downturns in loan-to-GDP are statistical insignificant in all three cases. These results suggest that asset prices are more vulnerable variables relative to loan-to-GDP ratio.

In order to understand what causes the increase in household debt and house prices, I simulate a dynamic stochastic general equilibrium (DSGE) model for Malaysia. Results show that productivity and house preference shocks generate a contemporaneous increase in household debt and house prices. Also an increase in income class, i.e., larger share of top and middle income classes, boosts house prices and household debt. Increasing household debt is also driven by accommodative monetary policy and by a slowdown in the construction sector.

---

1. Vienna University of Economics and Business.
2. Throughout the paper, I use the terms “household debt” and “loans” interchangeably.
3. Similar results are found in Haavio, Mendicino, and Punzi (2014) for 21 OECD countries over the period 1960-2007.

Finally, I run a Panel VAR for the 7 economies included in this study. Results show that, across these economies, house preference shock, productivity shocks and accommodating monetary policy all lead to increasing household debt and house price boom.

The chapter is developed as follows. Section 2 describes the problem of rising household debt. Section 3 gives an overview of the most important literature review. Session 4 analyzes the macro-financial linkages in the 7 SEACEN economies. Session 5 delves into the development of a DSGE model for Malaysia to highlight the main macroeconomic and financial shocks driving household debt. Session 6 estimates the drivers of household debt with a Panel VAR for the 7 SEACEN economies. Session 7 estimates the probability of recessions though a probit analysis for the 7 SEACEN economies. Session 8 summarizes the team project papers prepared by the respective project team members from the SEACEN central banks. Session 9 discusses policy implications and Session 10 concludes.

2. Household Debt

Debt represents all money that individuals borrow in the form of loans that are to be repaid later. Loans are in general supplied by banks or other financial institutions. A notable example is a mortgage, but household debt include also personal loans, car loans, student loans, the balance on credit cards, and overdrafts on bank accounts. The sum of all the various outstanding loans in the form of mortgages and unpaid balances on credit cards represent household debt, i.e., the total of all borrowing accumulated over time that has not yet been paid off. Household debt can be supplied as secured and unsecured debt. Secured debt is a loan secured by the value of an asset which serves as collateral. This means that if households are not able to repay it, the lender has the right to repossess the asset. Typical secured debt are mortgages where the borrower can pledge the value of the house. Unsecured debt is not secured on an asset. The most obvious examples of unsecured lending are credit cards, personal loans, student loans and loans from payday lenders. In general, household debt growth is viewed as beneficial for individuals and the economy as a whole, as debt allows people to borrow money today to buy a house and to purchase durable goods and improve their standard of living. Therefore, people are able to finance their consumption today with the commitment to have sufficient income to pay off the negotiated loan in the future.

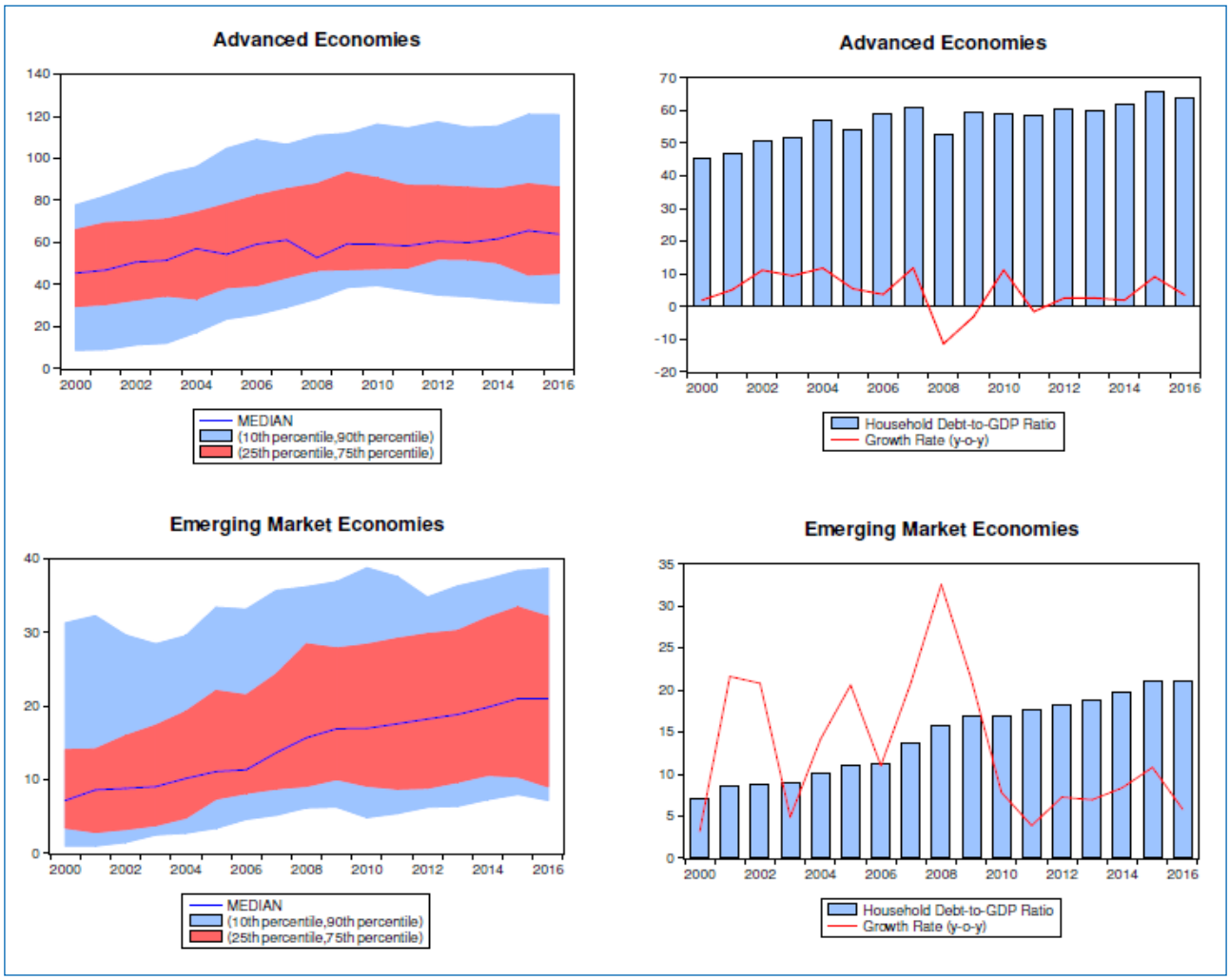
According to the permanent income hypothesis, higher debt indicates higher expected income. For example, younger people will borrow money in the expectation that they will receive higher earnings in the future when they will be able to pay back the borrowed money. It also allows households to make large investments in housing and education and helps smooth consumption over time. Moreover, household debt can enhance stability to the economy by smoothing out spending during periods of temporary falls in income. In other words, debt allows households to acquire goods and services now and repay gradually, through higher (anticipated) income. Having a high level of debt among households and private businesses is often seen as a sign of financial development, and more advanced economies do generally have higher private debt levels than developing economies. Levine (2005) reported positive correlations between private sector credit as percentage of GDP and economic growth, thus showing that “financial deepening” is beneficial: a growing banking and shadow banking systems can provide more credit to business and households. This phenomenon is in principle good as more credit will supposedly drive economic growth and enable more people to become home owners. However, recent studies have shown that the beneficial effects of economic growth decline when leverage becomes too high. The recent global financial crisis in 2007 has proven that a strong increase in private sector debt, in particular

household debt, could lead to financial crisis and deep recession. Indeed, high levels of household debt are not always beneficial for individuals and the economy. For example, if households lose their jobs, it will become more difficult for them to repay outstanding debts, which they will still be required to make despite the loss of income. In order to continue making these repayments, the individuals may cut back on their consumption spending. In turn, companies will face lower revenues and will consequentially cut back their costs including labor costs either by lowering pay or reducing the labor force. Other factors such as rising debt repayments due to higher interest rates may also lead to reductions in spending. Furthermore, high household debts can negatively impact the economy via the financial sector, as the banking system tends to relax lending standards to acquire new customers. Lower lending standards, such as a lower down-payment requirement, lead banks to extend credit to riskier borrowers and more defaults may occur during downturns in the economy. If a large share of the banking system is exposed to these bad loans, either directly or via having lent money to banks that do, a credit crunch and banking crisis could ensue. The US sub-prime mortgage market in the run-up to the 2008 Great Recession is an obvious example of this scenario. According to the IMF (GFSR, 2017), rising household credit becomes dangerous for a country's medium-term growth when its level is in excess of 30% of GDP, and potentially jeopardize financial stability if levels are higher than 65% of GDP.[4] Cecchetti, Mohanty, and Zampolli (2011) estimate that when household debt-to-GDP exceeds a threshold value of 85%, then increases in household debt have a negative medium-term relationship to macroeconomic aggregates such as GDP growth, consumption, and employment. Those threshold values are estimated for a general sample of advanced economies and emerging market economies. So far, there is no threshold value only for Asia or SEACEN economies, and such indicators would be simple general warning indicators.

During the ex-post crisis period, household debt increased in many advanced economies (AEs) and emerging market economies (EMEs), although for EMEs, the household debt was significantly lower than in AEs. Household debt has been growing quickly in AEs that did not carry the weight of the 2008 financial crisis, but has declined in those that suffered the most between 2008-2011. Between 2010 and 2016, the household-debt-to-GDP ratio increased by more than 21 percentage points of GDP in EMEs , compared to 7 percentage points of GDP in AEs. At the same time, the 75th percentile fell from 90% to 86% in AEs while increasing from 28% to 32% in EMEs. See Figure 1.

4. See IMF (2017).

Figure 1:
Household Debt-to-GDP Ratio in Advanced and Emerging Market Economies



Some of these increases can be attributed to some extent to low interest rates set by central banks in accommodating their monetary policy. However, the risk to financial stability warrants attention as it may increase the probability of financial crisis and possible future economic slowdown. The IMF (GFSR, 2017) reports that the conditional probability of a banking crisis for 34 countries (including AEs and EMEs) is still low but considerably higher than the unconditional one. Indeed, the peak in the household debt-to-GDP ratio occurs, in general, three years before a banking crisis, contributing to the higher probability. Moreover, the household debt-to-GDP ratio increase with non-performing loans three years after the banking crisis, showing the further risk associated with faster growth in household debt due to banking stress that can occur in the future. For countries where household debt is not growing, a high ratio of household debt-to-GDP can still have some negative impact on long-term income per capita growth.

2.1 Key Factors Driving Household Debt

Several factors may influence the increasing household debt in SEACEN economies. Drivers of the supply of and demand for household debt can include government policies, macroeconomic stability and financial sector development. Sustained economic growth allows households to raise their incomes through borrowing and boost consumer confidence, which in turn, induce optimistic expectations of future income. A low interest rate environment and low inflation rate reduce the cost of borrowing, allowing households to borrow more in order to smoothen their desired path of consumption over the life cycle. Developments in the financial and banking system also contribute to the growth in household credit. In particular, financial deregulation and liberalization and technological progress can be prominent factors leading to the excess supply of loans. Indeed, more diversified and competitive banks induce an evident downward pressure on lending rates, widen credit coverage and increase loan amounts, while a strengthened risk management of household credit portfolios lead the banking system to lend more to households. Fiscal policy can also play a big role in allocating credit to households. Government can promote home ownership by encouraging banks to offer housing loans to low income borrowers. Moreover, governments can introduce measures and fiscal incentives for the property market. Finally, government-sponsored lending institutions have played a pivotal role in the housing market. These specialized secondary market institutions purchase and/or refinance mortgage loans from originators and provide them with long-term funding, thus contributing to an easier supply of mortgage loans.

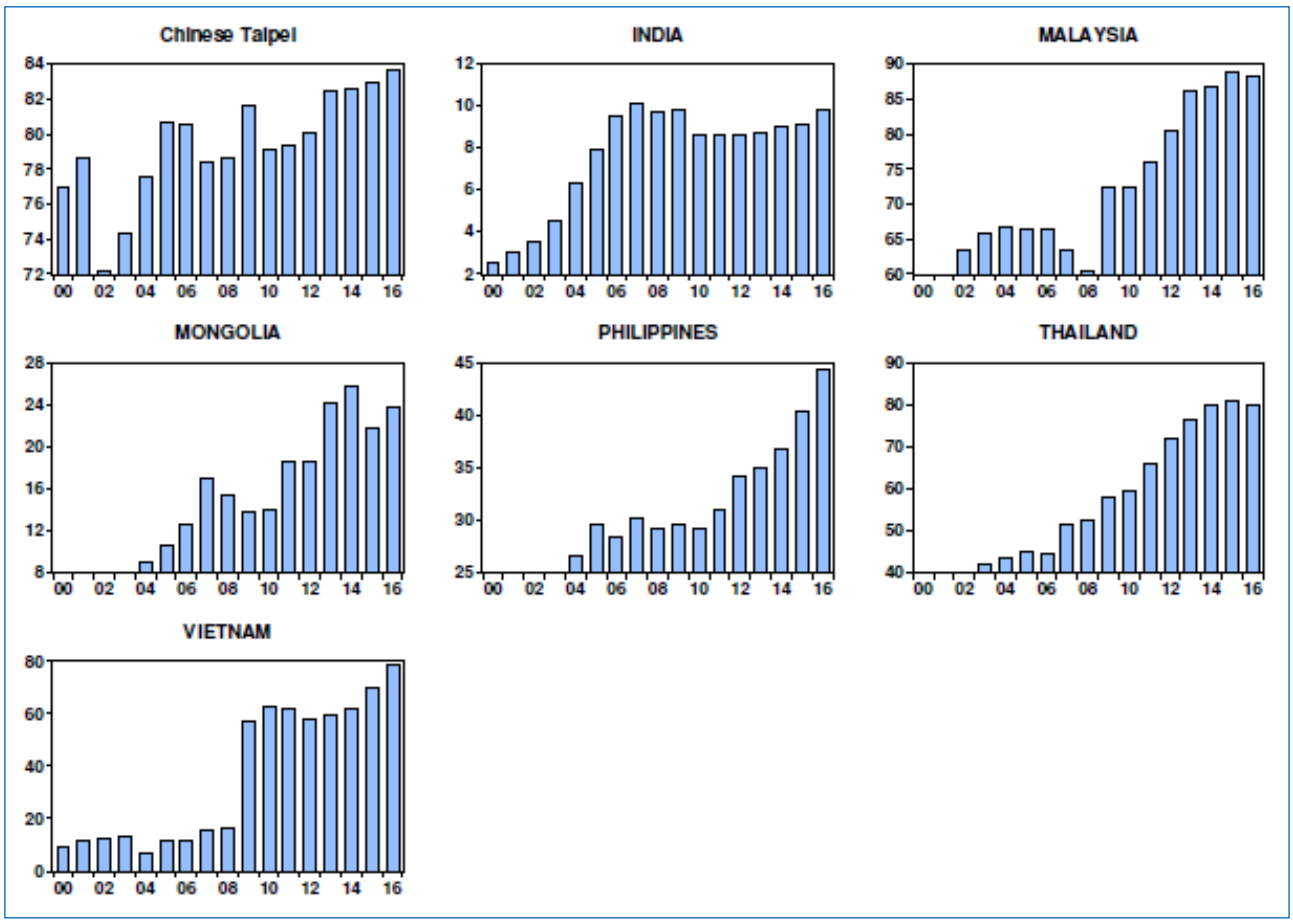
2.2 Household Debt in SEACEN Economies

The objective of this research project is to study the causes and consequences of the increase in household debt that many SEACEN economies have been experiencing during the last years. In particular, the study delves into the following economies:

- Chinese Taipei
- India
- Malaysia
- Mongolia
- Philippines
- Thailand
- Vietnam

Figure 2 shows that the stock of household debt as percentage of GDP has increased in all economies under study.

Figure 2:
Household Debt-to-GDP Ratio in SEACEN Economies



The household debt-to-GDP ratio has increased from 77% and 3% in 2000 to 84% and 10% in 2016 in Chinese Taipei and India, respectively. The household debt-to-GDP ratio has increased from 9%, 35% and 9% in 2004 to 84%, 10% and 78% in 2016 in Mongolia, the Philippines and Vietnam, respectively. The household debt-to-GDP ratio has increased from 42% in 2003 to 80% and 10% in 2016 in Thailand while it has increased from 63% percent in 2002 to 80% and 88% in 2016 in Malaysia. The ratio for all economies, except India and Mongolia, reached extremely high levels in 2016, warning of potential financial vulnerability. Even though the ratio is not that high in India and Mongolia, nevertheless the speed of increase can also result in an alarming situation which need to be kept under control by policy makers.

2.2.1 When does the Debt become an Evil?

Lombardi, Mohanty, and Shim (2017) indicate that for a set of advanced economies and emerging market economies during the period 1990-2015, a 1% increase in the household debt-to-GDP ratio leads to lower long-run growth, and the impact is amplified when the household debt- to-GDP ratio exceeds 80%. While there is no threshold value for individual SEACEN economies, since the estimation includes Malaysia, Philippines and Thailand, we can take such values as possible warning indicators for the other economies analyzed in this study. Moreover, it can be generalized that when household debt-to-GDP growth exceed GDP growth, sustainability can be difficult to achieve. Table 1 shows that except for Chinese Taipei, India and Vietnam, all the other economies show a rapid household debt-to-GDP growth relative to their GDP growth. If the economy is not growing at the same pace as household debt, then households may encounter hard times in repaying their outstanding debts in the future.

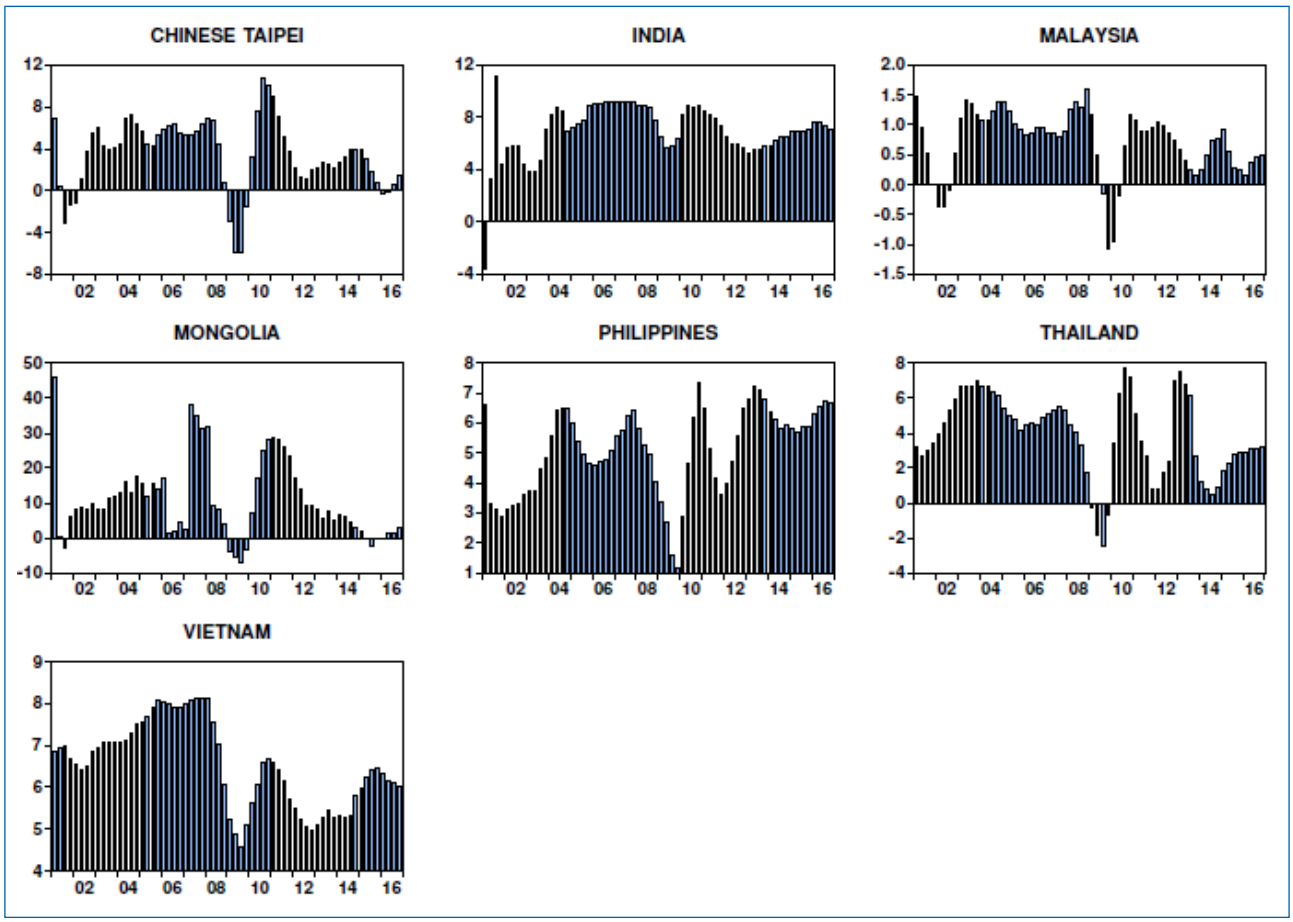
Table 1:
Household Debt-to-GDP
(Growth Rate 2010-2016)

	Household Debt-to-GDP	GDP
Chinese Taipei	6%	14%
India	13%	40%
Malaysia	20%	4%
Mongolia	52%	43%
Philippines	42%	35%
Thailand	30%	18%
Vietnam	22%	34%

Meanwhile, GDP growth rates have not increased that much around the region (see Figure 3).

Some SEACEN economies do not show a slowdown in their level of borrowing. Indeed, it seems that there has been further acceleration since 2017. The Future Consumer Borrowing Index (FCBI) is an indicator based on survey responses on how consumer borrowing in the present month changed from the borrowing a year ago and how households expect their consumer borrowing to change in the next six months.[5] Figure 4 shows the FCBI for Malaysia (top panel) and Thailand (bottom panel).[6] While the FCBI index shows a decreasing trend for both Malaysia and Thailand, it appears that since 2017, the index has been increasing again, meaning that households expect expansionary changes in borrowing levels in the coming two quarters. Therefore, the survey confirms that for both Malaysia and Thailand, the household debt hangover is still an ongoing process.

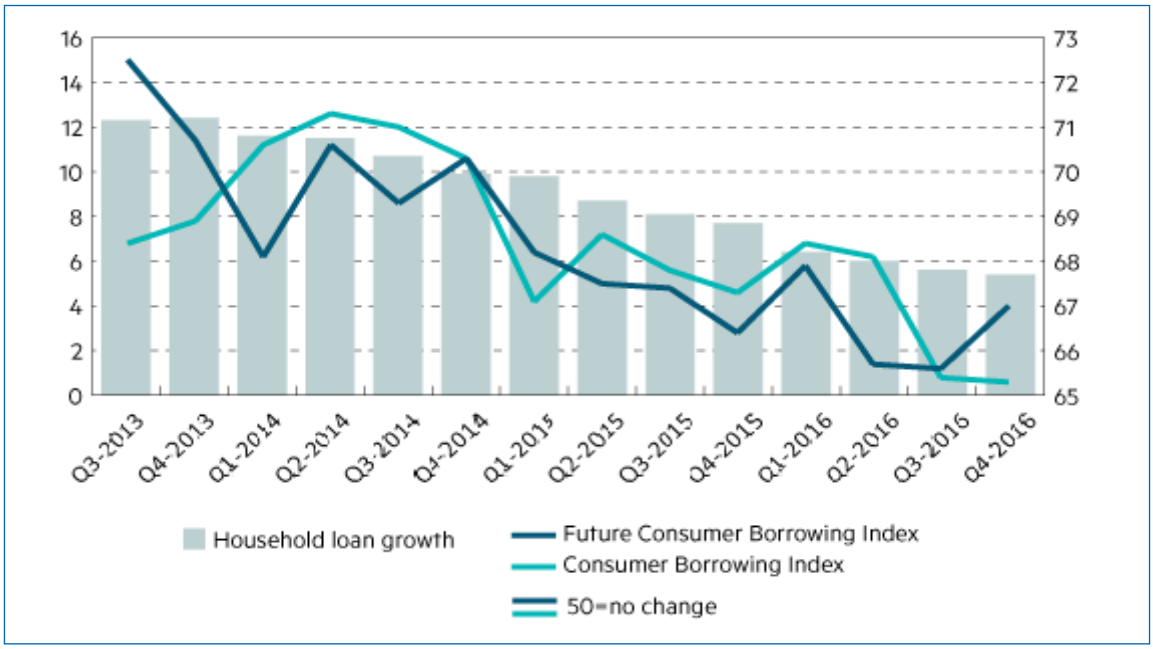
Figure 3:
GDP Growth Rate
(Y-o-Y)



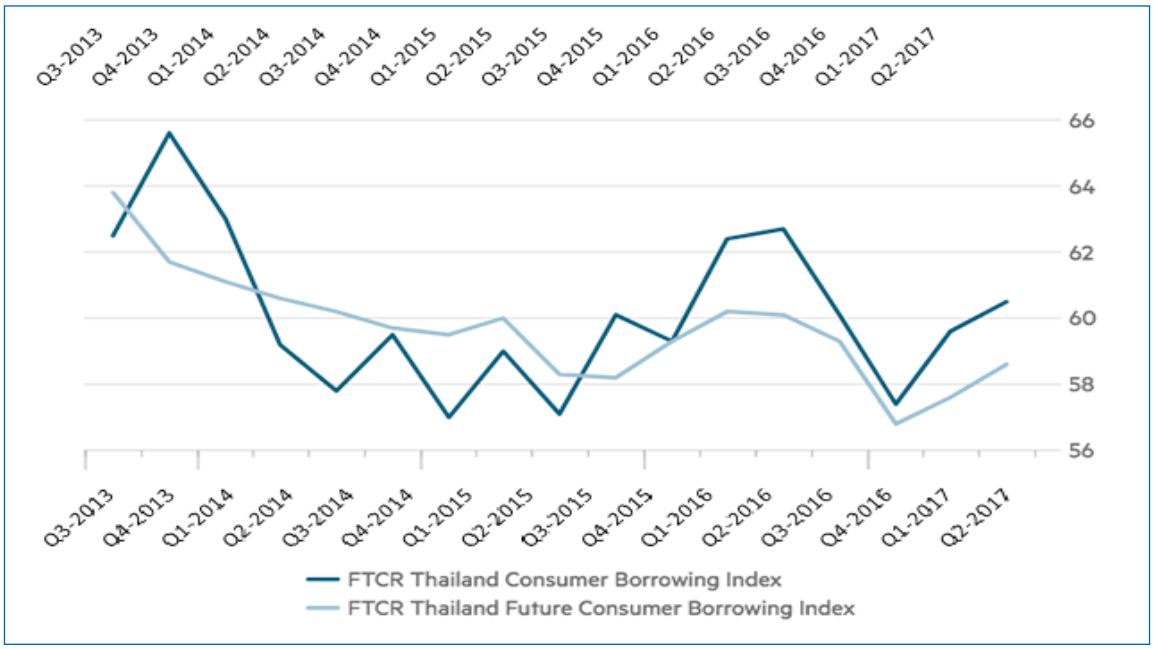
5. The measure indicates an increase if the index is above 50 or a decrease if it is below 50.
6. FCBI is not available for other SEACEN economies.

Figure 4:
Future Consumer Borrowing Index

Malaysia



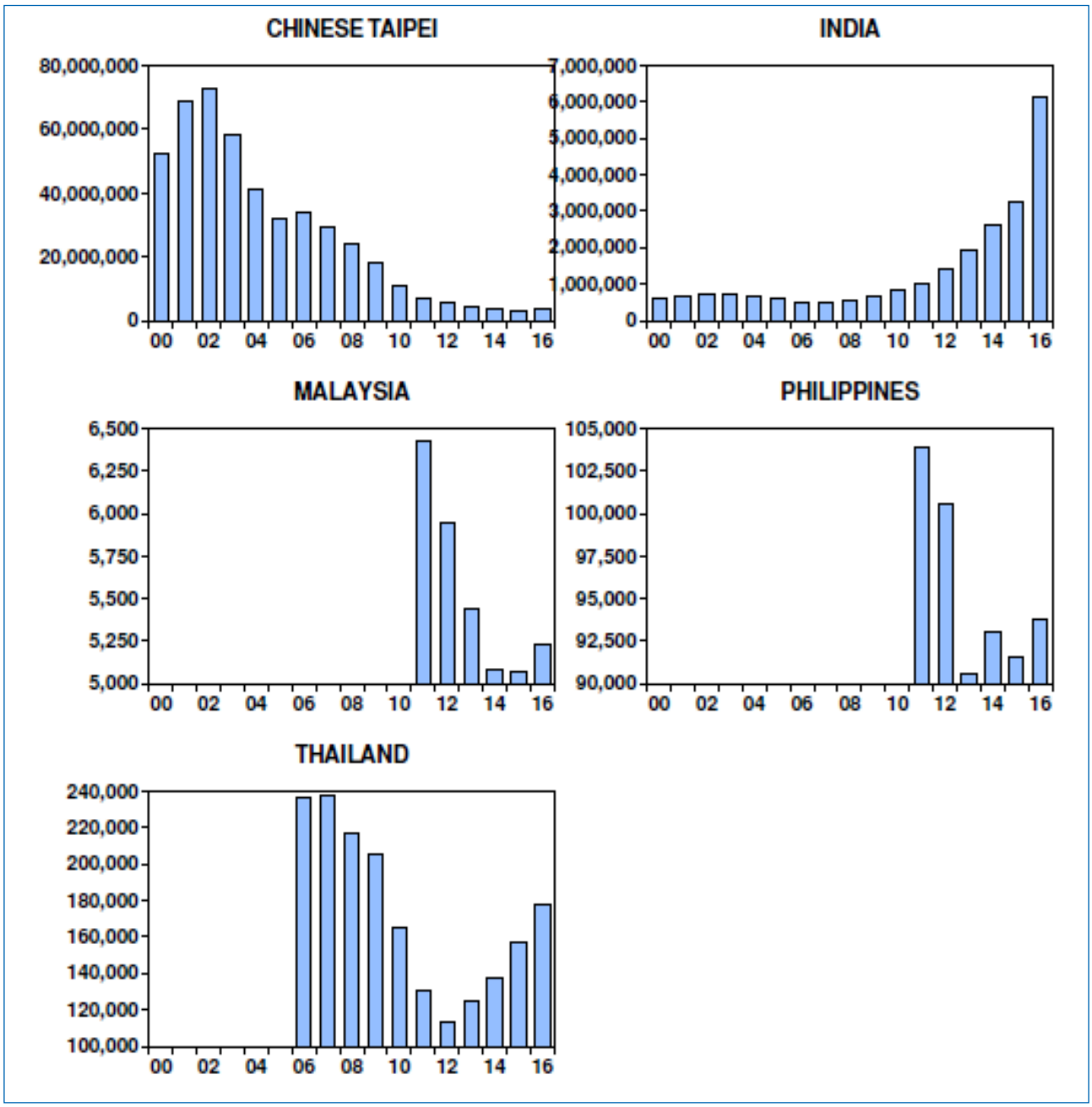
Thailand



Note: Bar represent household debt growth (Y-o-Y) on the left side. FCBI is on the right side. FCBI indicates an increase if the index is above 50 or a decrease if it is below 50.

Finally, even if many central banks in SEACEN economies have taken measures to lean against excess borrowing, non-performing loans have increased in all the economies, warning of a possible future default (see Figure 5).

Figure 5:
Non-Performing Loans



Note: NPL expressed in local currency.

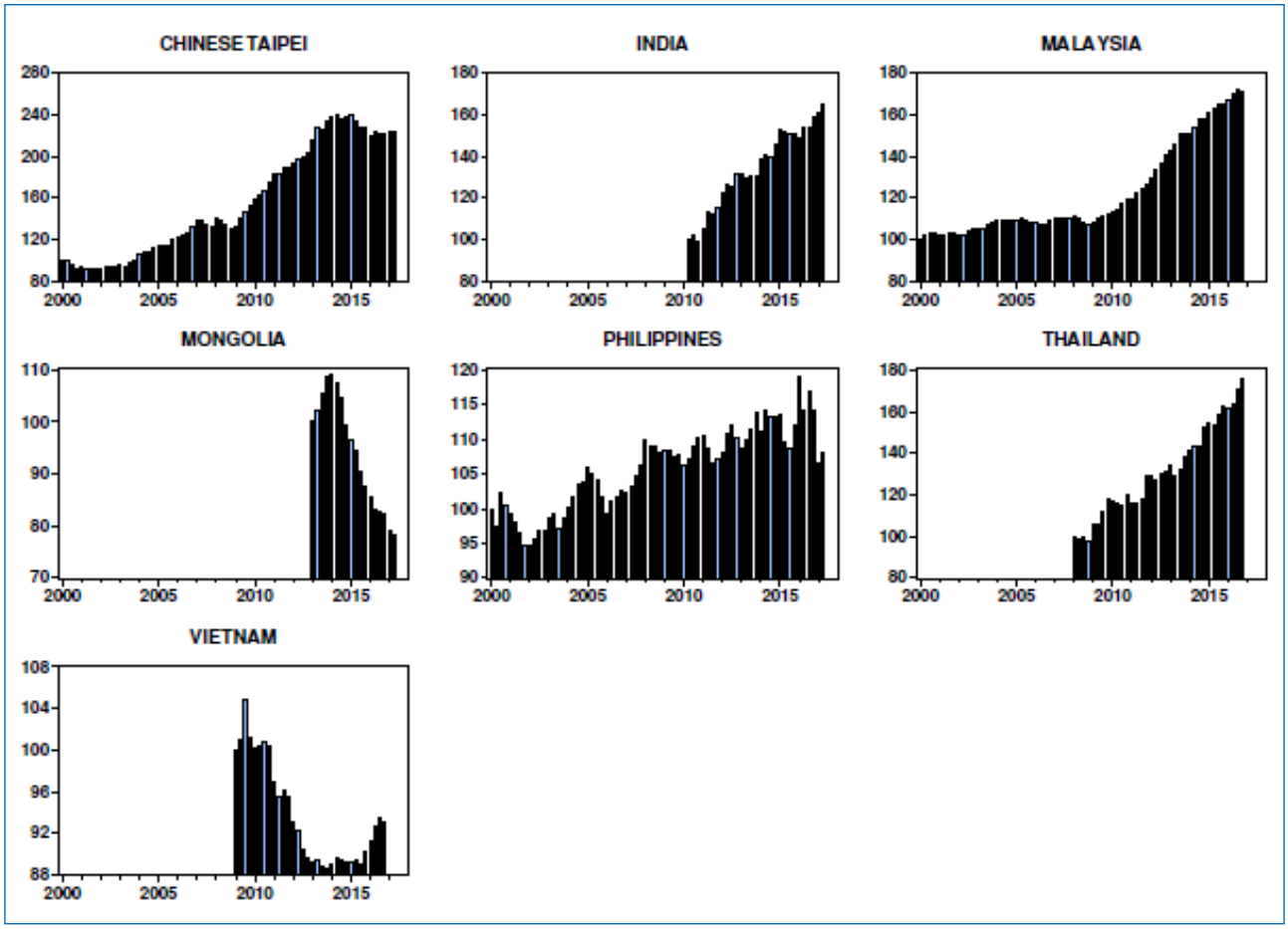
2.3 Household Debt and House Prices

Increasing household debt is very often associated with the run-up in house prices. First of all, house prices affect the economy through the wealth effect. The idea is that wealth effects from housing appreciation is able to boost household consumption. Indeed, an increase in house prices leads to more wealthy households, who will be more confident about spending and borrowing on credit cards, as they can always sell their houses in case of financial emergency. Houses are durable goods, which provide valuable services and serve as collateral for loans. Better access to credit reduces household consumption volatility, improves investment opportunities, eases the borrowing constraints on families and small businesses, and diversifies household and financial sector assets. A flexible financial sector and financial liberalization help global liquidity by augmenting funding to the banking sector and the whole economy. As a result, turnovers in housing markets have increased, the share of investment-oriented house purchases has risen, and novel mortgage products (such as interest-only loans, innovative forms of adjustable rate mortgages and the allowance for a limited amount of negative amortization) have proliferated in many advanced economies. These products enable many marginally qualified and highly leveraged borrowers to purchase homes at inflated prices.

Housing price booms have been characterized, on average, by hump-shaped co-movement in GDP, consumption, investment, hours worked, real wages and housing investment. More precisely, these macroeconomic variables generally grow during the boom phase of housing prices and fall during the bust phase. Leamer (2015) reports that house prices and real residential investments peak several quarters before recessions, meaning that the housing market lead the business cycle. In particular, on average, the peak in house prices is anticipated by the peak in housing investment and followed by macroeconomic recessions. One possible interpretation is that the run-up in house prices and residential investments encourages household expenditure and household loans. Once the demand for housing slows down, house prices start declining, pushing towards an economic downturn. As a result, a decline in house prices and worsened economic conditions can cause credit conditions to also become tighter with further negative implications for housing and macroeconomic developments.

Figure 6 describes the latest trend in the housing market for our selected SEACEN economies. All economies show a strong run-up in house prices that many Asian economies have been experiencing since 2000. Mongolia is the exception with a decreasing trend since 2015. For Vietnam, Ho Chi Minh City houses prices have been dropping since the end of 2009 until the end of 2013, but a larger increase appear to occur since the 2016. As a result, these economies have a clear positive correlation between the house price index and household debt-to-GDP ratio.

Figure 6:
Real House Price Index



Note: Vietnamese house price index is represented by Ho Chi Minh City.

3. Literature Review

Since the failure of the housing market that ended in a global financial crisis, household debt is again rising, with the household debt-to-GDP ratio reaching historical high levels in several economies, including those of SEACEN. Higher credit demand from households or strong supply of credit from lenders can both contribute to rising household debt. Ando and Modigliani (1963) show that households demand credit to smooth consumption when an income shock hit the economy. Kim et al. (2016) estimates that urbanization, stable macroeconomic conditions and rising asset price contribute to an increase in household indebtedness. Kaplan, Violante and Weidner (2014) show that borrowers demand for credit is to finance investment in illiquid assets (i.e., housing) with the prospect of higher long-term returns. Higher credit demand can reflect optimistic views about future income or lower borrowing costs. Indeed, periods of ex-post crisis have seen extremely low interest rates and low returns on safe assets, shifting demand for bonds into demand for housing. Debelle et al. (2004) discuss the macroeconomic implications of higher household indebtedness. They find that a high debt-to-GDP ratio makes borrowers more sensitive to changes in interest rate when income shocks hit the economy. As the larger share of household debt is represented by mortgage loans, increased indebtedness strongly affects housing prices, causing possible housing bubbles. Therefore, a drop in housing prices as a consequence of a bubble burst, will decrease

households' equity value, confidence, and consumption. Levine, Loayza, and Beck (2000) find that a developed financial system leads to positive economic growth. However, Law and Singh (2014) suggest that more finance is not necessarily good for the economy. They estimate the optimal threshold level of financial development to boost economic growth and find that higher values above the optimal level can harm GDP growth. Gourinchas and Obstfeld (2012) show that, although debt contributes to economic growth, excess and rapid growth in household debt was the driver of the twentieth century financial crisis. Similarly, Buyukkarabacak and Valev (2010) find that private credit expansions are an important predictor of subsequent banking crises. Schularick and Taylor (2012) analyze a large-scale dataset for 14 countries over the period of 1870-2008 and find that credit growth is a powerful predictor of financial crises.

Banks' and firms' financing conditions are key mechanisms that are able to turn financial crises into recessions: collapsing collateral values lead to increasing cost of external financing which forces banks and firms to deleverage and lower real investment, thus contracting output. Procyclical leverage generates an amplification mechanism in propagating financial shocks to the real economy (Bernanke and Gertler (1995)). Kalemli-Ozcan, Sorensen, and Yesiltas (2012) also find that bank leverage is procyclical for investment banks and for large commercial banks in the US. Claessens, Kose, and Terrones (2009) investigate the macro-financial links during periods of financial and economic downturns for 21 OECD countries over the period of 1960-2007. They find that the change in house prices is the key variable to predict economic recession. Claessens, Kose, and Terrones (2012) analyze the degree of synchronization of real and financial cycles for 44 advanced and emerging economies over the period of 1960-2010 and find a stronger interaction of cycles in house prices and credit with real cycles relative to equity prices. A large strand in the literature has focused on incorporating the financial sector in standard dynamic stochastic general equilibrium (DSGE) models. The introduction of financial variables, and an explicit consideration of friction in financial markets, finds its pioneers in the seminal contributions of Kiyotaki and Moore (1997) and Bernanke and Gertler (1989), who introduce the ability for constrained households or investors to borrow from collateral. Similar model setups can be found in Iacoviello (2005), Iacoviello and Neri (2010), Mendicino and Punzi (2014), Campbell and Hercowitz (2009), Gerali, Neri, Sessa and Signoretti (2010), Brzoza-Brzezina, Gelain and Kolasa (2014), Justiniano, Primiceri and Tambalotti (2015), Lambertini, Mendicino and Punzi (2013), Paries, Sørensen, Rodriguez-Palenzuela, et al. (2011) and Kannan, Rabanal, Scott, et al. (2012).

The most recent literature has refocused on the empirical study of the implications of rising household debt. Mian, Sufi, and Verner (2017) estimate 30 countries from 1960 to 2012 and find that high levels of household debt-to-GDP ratio lead to lower GDP growth and higher unemployment in the medium-term. Moreover, credit supply shocks in the form of low mortgage spreads tend to increase the household debt-to-GDP ratio, and therefore contributing to the lower GDP growth in the medium-run. Lombardi, Mohanty, and Shim (2017) estimate a panel of 54 advanced and emerging market economies over the period 1990-2015 and find that increasing household indebtedness raises consumption and GDP growth in the short-run, but a reverse effect appears in the longer run. In particular, a 1 percentage point increase in the household debt-to-GDP ratio leads to a 0.1 percentage point decrease in GDP growth in the long-run. Similarly, Drehmann, Juselius, and Korinek (2017) estimate a panel of 17 mainly advanced economies from 1980 to 2016 and find that an increase in new debt relative to GDP boosts spending and GDP growth in the short-run but depresses output growth in the medium-term. The reason is found in the fact that the rise of new debt implies higher debt service burdens only after the peak in new borrowing, which leads to adverse effects on output in the longer term.

There is very little literature for the SEACEN economies included in this study. Khan, Abdullah and Samsudin (2016) estimate an autoregressive distributed lag model to explore the determinants of household debt composition in Malaysia using quarterly time series data from 1999 to 2014. They find that the change in income levels, housing price and population positively affect mortgage lending while higher interest rates and cost of living will have a negative effect. Ghani (2009) analyzes the relationship between non-performing loans, household debt and interest rate in Malaysia. He finds that the probability of default increases for higher levels of household debt. Moreover, the likelihood of delinquencies increases with interest rate hike because of higher debt service burden in terms of interest payment. Ariyapruchya, Sinswat, Chutchotitham, et al. (2007) and Subhanij et al. (2009) analyze systemic risk from household indebtedness in Thailand. They find insignificant systemic risk in the household sector as vulnerable households are those with low income - they carry heavy debt service burdens but are limited by poor financial access.

4. Financial and Real Cycles in SEACEN Economies

This section focuses on macro-financial linkages to understand how financial cycles are related to business cycles for the 7 SEACEN economies. In particular, the question is whether economic recessions are usually followed by asset price and credit bursts. First, the peaks and troughs of real GDP and of the financial variables are identified using the Bry and Boschan (1971) algorithm. A downturn phase in a time series is a period between a peak and a trough, while an upturn is a period starting with a trough and ending with a peak. Second, the concordance index (CI) developed by Harding and Pagan (2002) is used to study the linkages between downturns in financial markets and the real economy. GDP, housing prices and lending activities are highly procyclical, but it is not clear which variables lag or lead the business cycle. The concordance index provides a measure of the fraction of time the two time series are in the same phase (expansion or downturn) of their respective cycles. In particular, CIs of real GDP with lags and leads of the financial variables are computed to test if the phases of the real economy are more related to the past or to the future phases of financial variables. The findings are that the concordance of real GDP with the past phases of real house prices and real stock prices is somewhat higher than the concordance with the contemporaneous phases, while the index with the future phases of spread is lower than with the contemporaneous phases. These findings indicate that asset prices tend to lead real activity, while developments in credit and money markets typically lag developments in the real economy.

Traditional approaches identify the business cycle with phases of expansion and contraction in which time periods move from peak to trough. Harding and Pagan (2002) proposed the concordance index between macroeconomic variables to identify turning points, i.e., the average number of periods in which two variables move from a high point (peak) to a low point (trough) in the same phase of the cycle. The turning points define a binary variable $w_{z,t}$ as follows:

$$w_{z,t} = \begin{cases} 1, & \text{if } z \text{ is in expansion at time } t \\ 0, & \text{otherwise} \end{cases}$$

where $z=(x,y)$ and $w'_{z,t}$ is a vector containing the two variables for which we want to calculate the concordance index. One variable in z is going to be the country's GDP, since we are interested in the synchronization of business and financial cycles.

The concordance index is a measure of the fraction of time the two variables $w_{x,t}$ and $w_{y,t}$ are in expansion or in downturn during the same phase, as follows:

$$C_{x,y} = \frac{1}{T}\sum_{t=1}^{T}[w_{x,t}w_{y,t} + (1-w_{x,t})(1-w_{y,t})]$$

If the concordance index takes values close to 1, then the two variables are always in the same phase (i.e., pro-cyclical), otherwise, for values close to 0 they are in opposite phases (i.e., countercyclical).

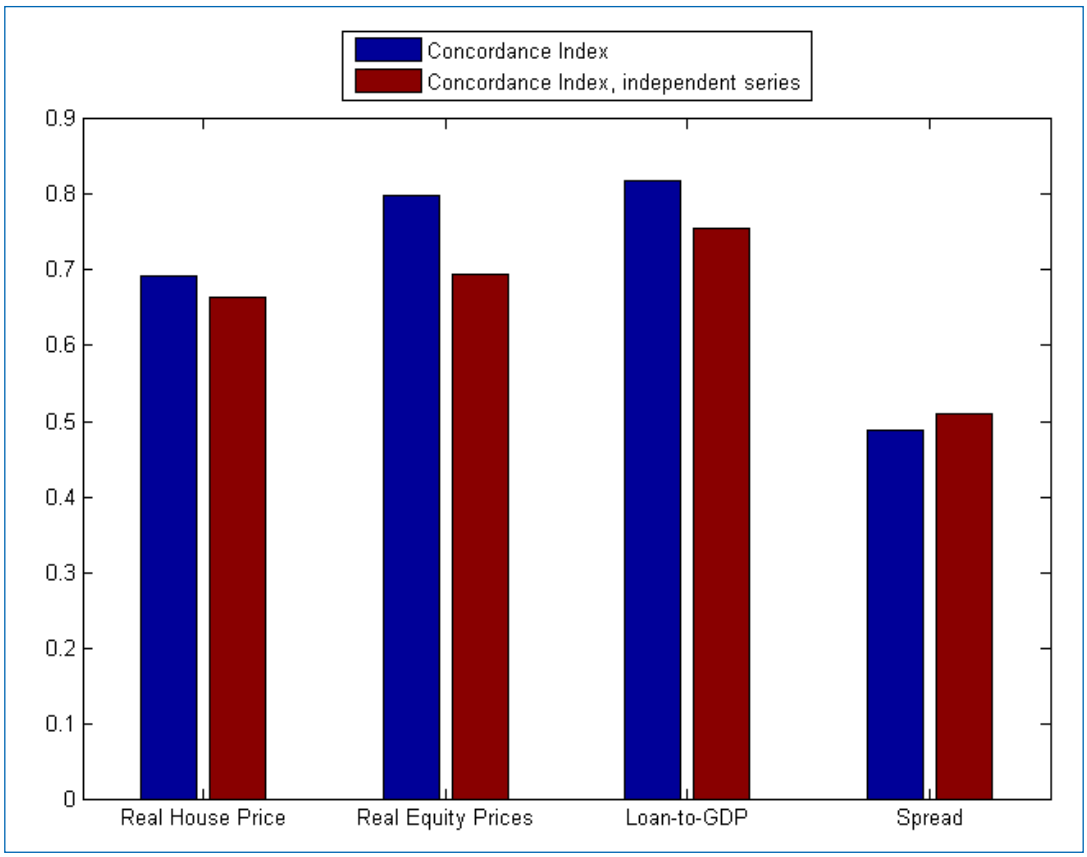
The sample includes India, Malaysia, Mongolia, Philippines, Chinese Taipei, Thailand and Vietnam over the period from 2000 until 2016, at quarterly frequency.[7] House and stock prices are indicators of asset prices; loans measure total lending activities to households and spread rates are calculated as the difference between 10-year government bonds and policy rates.

Relative to independent cycles, Figure 7 shows that for real house prices, real stock prices and the loan-to-GDP ratio, the value of the CI exceeds the value corresponding to independent cycles, meaning that financial variables are procyclical. On the other hand, interest rate spread are acyclical as the value of the CI is lower than the value corresponding to independent cycles.

In order to evaluate how phases of the real economy are related to past or future phases of financial variables, the concordance index is constructed taking into consideration leads and lags over the business cycle in order to evaluate if the current phase of the business cycle is related to previous or future financial cycles. Figure 8 computes the concordance index relative to GDP for real house prices, real stock prices, spread interest rate and loan-to-GDP. The vertical line at time 0 indicates the average of real GDP peaks. Therefore, periods between -10 and 0 indicate phases of GDP expansion, while periods between 0 and 10 indicate phases of contraction. Every interval indicates a change in quarter. Real house prices and real stock prices peak before time 0, meaning that developments in asset prices anticipate the developments in real variables. Past phases of asset prices and spread rates are higher than current or future phases, indicating that asset prices lead real activities. A different behavior is found for credit. The loan-to-GDP shows an higher concordance index exactly at the GDP peaks, meaning that this ratio moves with real activities.

7. For some economies, the series start later than 2000.

Figure 7:
Conditional Concordance Index



During phases of expansion in GDP, the conditional probabilities that the financial variables are in an upturn phase only slightly differ from the unconditional probabilities (left panel of Figure 9). However, during economic downturns, real GDP and financial variables are more tightly tied together (See right panel of Figure 9).

However, the conditional probability of real house and stock prices being in both upward and downward phases is still higher when we consider lags of this variables, with the highest conditional probability value reaching at one lag. Thus, an economy may experience a recession when real asset prices fall. In contrast, the loan-to-GDP ratio shows the highest conditional probability when the real GDP downturns, and at the same point, spread shows the lowest conditional probability (see Figure 10).

Figure 8:
Concordance Index

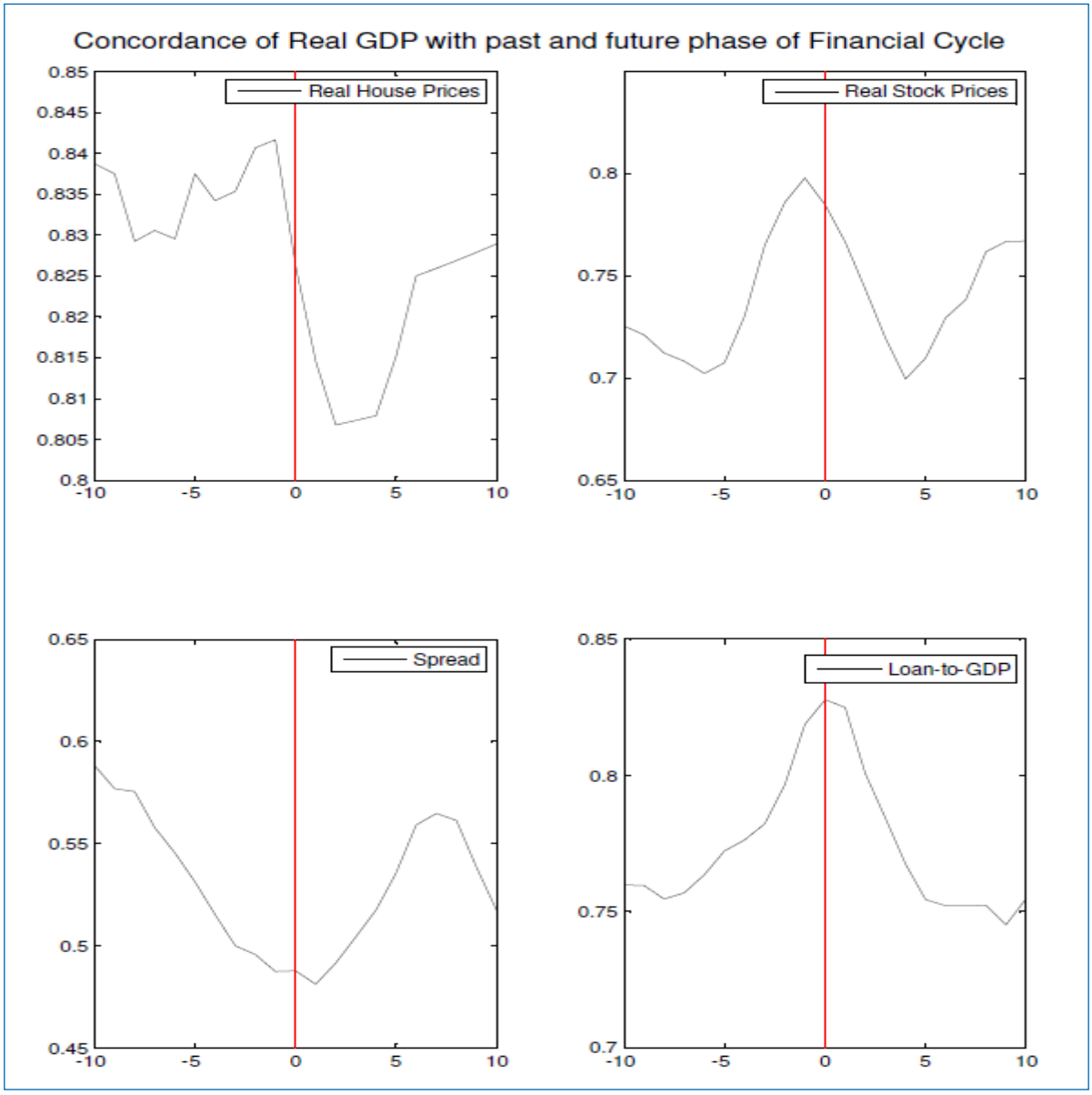


Figure 9:
Conditional Concordance Index

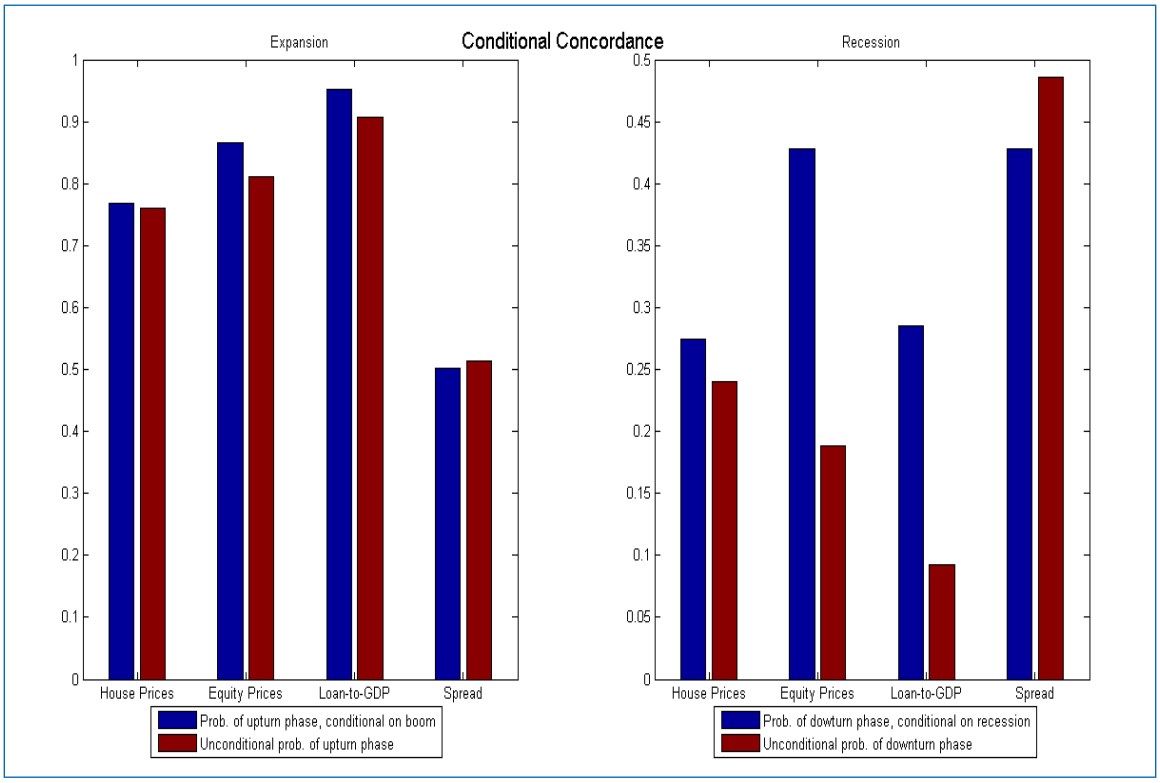
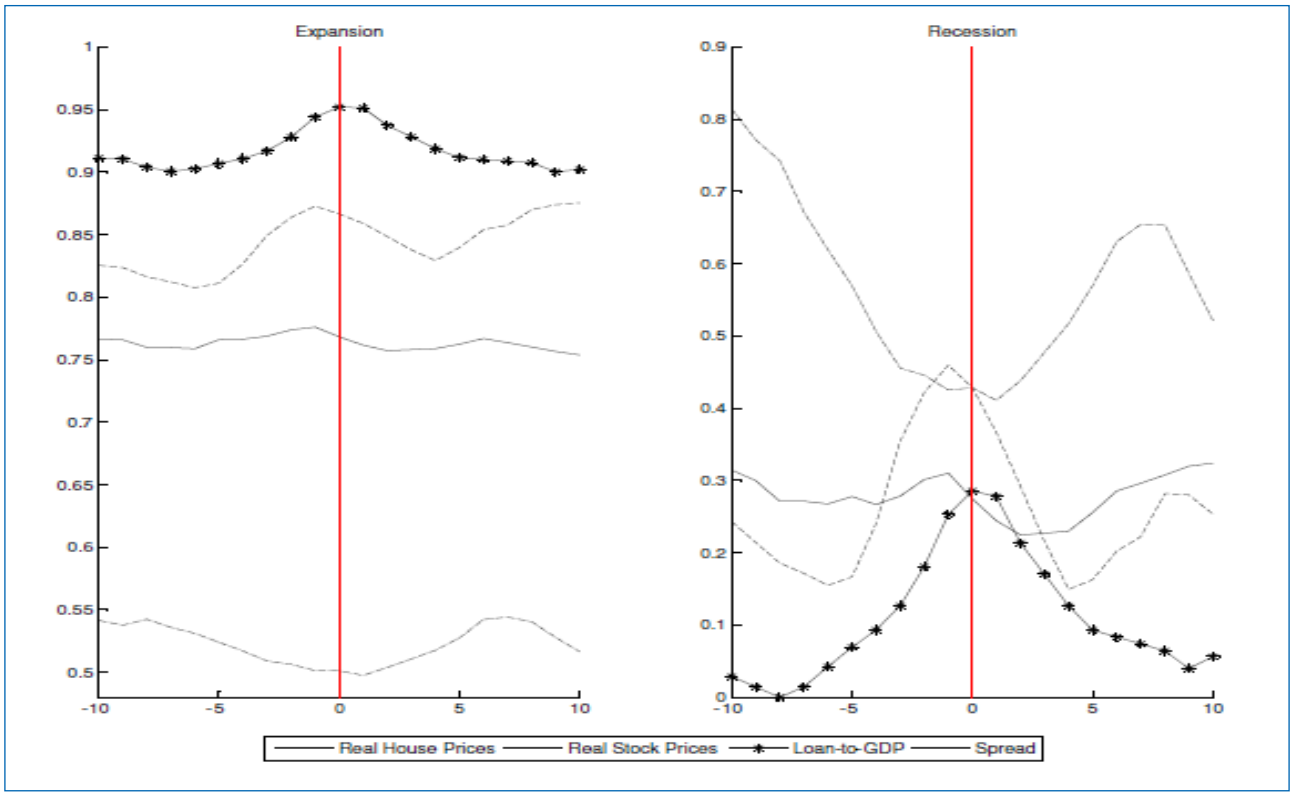


Figure 10:
Conditional Probability



5. Case Study for Malaysian Economy

5.1 DSGE Model Applied to Malaysia

This section develops a two-country dynamic stochastic general equilibrium (DSGE) model with the housing market.[8] The model accounts for heterogeneous households who differ in terms of their time preferences. Each country is populated by two types of households that trade domestic loanable bonds: patient (lenders) and impatient (borrowers). Lenders have higher propensity to save, while borrowers dislike to save and they prefer to consume as much they can. In order to increase their consumption, borrowers collateralize the value of their homes, therefore they are financial constrained. This financial friction results in the familiar financial accelerator mechanism. Housing enters in the utility function and is treated as a durable good with its demand depending on both the service flow and asset value of housing units. The service flow is assumed to be proportional to the real value of the individual housing stock holding. The economy is also populated by perfectly competitive intermediate-goods-producing firms, retailers that operate in a monopolistically competitive market, capital and house producers, and a monetary authority that follows a standard Taylor-type interest rate rule. The model allows the domestic country to borrow from the foreign country.

5.1.1 Households

Patient households are denoted with 1 and impatient are denoted with 2. Patient households have a higher propensity to save, i.e. $\beta_1 > \beta_2$. Households supply labour and derive utility from consumption, $c_{j,t}$, housing services, $h_{j,t}$, and hours worked, $L_{j,t}$,

$$\max E_0 \sum_{t=0}^{\infty} (\beta_j)^t \left[\ln(c_{j,t}) + \gamma_{h,t} \grave{u} \ln h_{j,t} - \frac{\nu_L}{\eta} (L_{j,t})^{\eta} \right], \tag{1}$$

where $j = \{1,2\}$ denotes the two types of households and $\grave{u}$ is the housing weight in the utility. As common in the literature, housing services are assumed to be proportional to the stock of houses held by the household and $\gamma_{h,t}$ is a shock to the preference for housing services.[9]

Lenders. Patient households accumulate properties for housing purposes, $h_{1,t}$, trade domestic-currency loanable bonds, $b_{1,t}$, and foreign-currency bonds, b_t^*, and receive dividends from firms, F_t. They also invest in physical capital, k_t, that is then rented to the final-goods-producing firms at the rate R_t^k. Thus, they maximize their expected utility subject to the following budget constraint:

$$\begin{aligned} c_{1,t} + q_{h,t}(h_{1,t} - (1-\delta_h)h_{1,t-1}) + q_{k,t}(k_t - (1-\delta_k)k_{t-1}) + b_{1,t} + s_t b_t^* = \ldots \\ = w_{1,t} L_{1,t} + R_t^k k_{t-1} + \frac{R_{t-1} b_{1,t-1}}{\pi_t} + s_t \frac{\varsigma_{t-1} R_{t-1}^* b_{t-1}^*}{\pi_t^*} + F_t, \end{aligned} \tag{2}$$

where $q_{h,t}$ is the price of housing, $q_{k,t}$ is the price of capital, $w_{1,t}$ are real wages, $\pi_t = P_t / P_{t-1}$ and $\pi_t^* = P_t^* / P_{t-1}^*$ are, respectively, the domestic and foreign gross inflation rate, and s_t is the real exchange rate. The stock of housing and capital depreciate at rates δ_h and δ_k, respectively. All the variables, except for the gross nominal interest rates on domestic and foreign bonds, R_t, and R_t^*, are expressed in real terms. The return on foreign debt depends on a country specific risk premium, ς_t, that is

8. For simplicity, the model assumes the domestic and foreign economies are at equal size.

9. See, for example Iacoviello (2005b), Iacoviello and Neri (2010b) and Liu, Wang and Zha (2013).

required for the model to feature a stationary distribution.[10] This risk premium, ς_t, is a positive convex function that depends on the ratio of net foreign assets to domestic output:

$$\varsigma_t = \exp\left[\varphi\left(\frac{s_t b_t^*}{Y_t}\right) + \gamma_{\varsigma,t}\right], \tag{3}$$

where γ_ς represents a risk-premium shock.

Borrowers. Impatient households maximize their expected utility subject to the following budget constraint:

$$c_{2,t} + q_{h,t}(h_{2,t} - (1-\delta_h)h_{2,t-1}) = w_{2,t}L_{2,t} - \frac{R_{t-1}b_{2,t-1}}{\pi_t} + b_{2,t}, \tag{4}$$

and a borrowing constraint:

$$b_{2t} \le mE_t \frac{q_{h,t+1}\pi_{t+1}h_{2t}}{R_t}\gamma_{m,t}. \tag{5}$$

Borrowing is limited to a fraction of the value of the borrowers' housing stock, where $(1-m)$ is the cost that lenders pay when repossessing the asset in the case of default.

5.1.2 Firms and Price Setting

The Intermediate Sector. There is a continuum of monopolistically competitive firms indexed by $i \in (0,1)$ that produce intermediate goods, $y(i)$ using the following technology:

$$y(i)_t = \gamma_{z,t}\left[\left(L(i)_{1,t}\right)^{\gamma}\left(L(i)_{2,t}\right)^{1-\gamma}\right]^{1-\alpha}k(i)_{t-1}^{\alpha}, \tag{6}$$

where $\gamma_{z,t}$ is an aggregate productivity shock, k is rented capital, L_1 and L_2 is labor supplied by patient and impatient agents, respectively. As in Iacoviello (2005) and Iacoviello and Neri (2010), different labor types are complements.[11]

Price rigidities is introduced in the model following the New Keynesian literature. Thus, at time t, each intermediate firm revises its price with a probability $(1-\theta)$ as in Calvo (1983), leading to the following New Keynesian Phillips curve:

$$\log\left(\frac{P_t}{P_{t-1}}\right) = \beta_1\left[E_t \log\left(\frac{P_{t+1}}{P_t}\right)\right] + \varepsilon_\pi \log\left(\frac{X_t}{X}\right) \tag{7}$$

where $\varepsilon_\pi = \frac{(1-\theta)(1-\beta_1\theta)}{\theta}$ and X_t represents the marginal cost of production. Intermediate firms are owned by the patient households.

10. See Schmitt-Grohe and Uribe (2003) for further details.

11. The primary motivation for this assumption is to obtain a closed-form solution for the steady-state of the model.

The Final-Goods-Producing Firms. The final good, Y_t, is produced by perfectly competitive firms using $y_t(i)$ units of each type of intermediate good i and a constant return to scale, a diminishing marginal product, and a constant elasticity of substitution technology:

$$Y_t \leq \left[\int_0^1 y_t(i)^{\frac{\xi-1}{\xi}} di\right]^{\frac{\xi}{\xi-1}}, \tag{8}$$

where $\xi > 1$ is the constant-elasticity-of-substitution parameter. The price of an intermediate good, $y_t(i)$, is denoted by $P_t(i)$ and is taken as given by the competitive final-good-producing firms. Solving for cost minimization yields a constant-price-elasticity demand function for each goods type i which is homogeneous to degree one in the total final output, $y_t(i) = \left[\frac{P_t(i)}{P_t}\right]^{-\xi} y_t$, and the domestic price index $P_t = \left[\int_0^1 P_t(i)^{1-\xi} di\right]^{1/(1-\xi)}$.

5.1.3 Capital Producers

Capital producers combine a fraction of the final goods purchased from retailers as investment goods, $I_{k,t}$, to combine it with the existing capital stock in order to produce new capital goods.[12] Capital production is subject to an adjustment cost specified as $\frac{\psi_k}{2}\left(\frac{I_{k,t}}{k_{t-1}} - 1\right)^2 I_{k,t-1}$, where ψ_k governs the slope of the capital producers adjustment cost function. Capital producers choose the level of $I_{k,t}$ that maximizes their profits:

$$\max_{I_{k,t}} q_t^k I_{k,t} - \left(I_{k,t} + \frac{\psi_k}{2\delta_k}\left(\frac{I_{k,t}}{k_{t-1}} - \delta_k\right)^2 k_{t-1}\right). \tag{9}$$

From profit maximization, it is possible to derive the supply of capital:

$$q_t^k = \left[1 + \frac{\psi_k}{2\delta_k}\left(\frac{I_{k,t}}{I_{k,t-1}} - 1\right)\right], \tag{10}$$

where q_t^k is the relative price of capital. In the absence of investment adjustment costs, q_t^k ,is constant and equal to one.

The usual capital accumulation equation holds:

$$I_{k,t} = k_t - (1 - \delta_k)k_{t-1}. \tag{11}$$

12. See, among others, Bernanke, Gertler and Gilchrist (1999), Christiano, Eichenbaum and Evans (2005) and Christensen and Dib (2008).

5.1.4 Housing Producers

In the following, I introduce housing production which combines labor supplied by both agents, fixed capital and land in the production function, as in Iacoviello and Neri (2010).

The production of new houses follows a CobbDouglas specification, such as:

$$IH_t = \gamma_{h,t} \left[\left(L^H_{1,t}\right)^{\gamma} \left(L^H_{2,t}\right)^{1-\gamma} \right]^{1-\alpha_h-\alpha_L} k^{\alpha_h}_{h,t-1} \, l^{\alpha_L}_{t-1} \tag{12}$$

where $L^H_{1,t}$ and $L^H_{2,t}$ is labor supplied by the Savers and Borrowers in the housing sector, respectively. k_h is capital used in the housing sector and l is land. Supply of land is fixed and equal to 1. Similar to Iacoviello and Neri (2010), land plays a role of housing adjustment cost.

The aggregate stock of housing, $h_t = h_{1\,t} + h_{2\,t}$, is accumulated according to:

$$I_{h,t} = h_t - (1-\delta_h) h_{t-1}. \tag{13}$$

5.1.5 Monetary Policy

The policy rate is defined as a variable set by the Central Bank that responds to inflation, GDP gap and exchange rate.[13] Therefore, the monetary authority follows a simple interest-rate rule:

$$R_t = \left(\frac{\pi_t}{\pi}\right)^{\phi_\pi} \left(\frac{Y_t}{Y}\right)^{\phi_Y} \left(\frac{s_t}{s}\right)^{\phi_s} \varepsilon_{r,t} \tag{14}$$

$\varepsilon_{r,t}$ is an i.i.d. monetary policy shock.

5.1.6 Current Account Equation

The trade balance equals:

$$TB_t = Y_t - C_t - q_{k,t} I^k_t - q_{h,t} I^h_t = -D^*_t, \tag{15}$$

and the current account is defined by the following equation:

$$CA_t = -TB_t + \frac{s(R^*_{t-1}-1) b^*_{t-1}}{\pi^*_t} = s\left(b^*_t - \frac{b^*_{t-1}}{\pi^*_t}\right). \tag{16}$$

where $D^*_t = s\left(b^*_t - \frac{R^*_{t-1} b^*_{t-1}}{\pi^*_t}\right) - \frac{\varphi}{2}\left(b^*_t - b^*\right)^2$.

The last equation states that the current account is the sum of the service account, i.e., the interest required to service existing debt, and the trade account, which is the trade balance expressed as the difference between output, consumption and investments.[14]

13. This specification follows the rule set by Bank Negara Malaysia.

14. 1A similar definition is found in Obstfeld and Rogoff (1995) and Ghironi (2006).

5.1.7 Rest of the World

Finally, the domestic country borrows from the foreign country which is populated only by patient agents (denoted by s).

The foreign economy is assumed to be a saver economy that runs a current account surplus. For simplicity, there is only one representative household in the foreign economy. The foreign agent's expected utility is summarized by:

$$\max E_0 \sum_{t=0}^{\infty} \beta_s^t \gamma_{b,t} \left[\ln(c_{s,t}) + ù \ln h_{s,t} - \frac{\nu_L}{\eta} \left(L_{s,t} \right)^{\eta} \right], \tag{17}$$

where $\beta_s^t = \beta_1^t$ and $\gamma_{b,t}$ is an exogenous shock to the foreign consumer's impatience.

All the rest of the model is defined identically to the domestic economy.

5.1.8 Exogenous Factors

Shocks to aggregate productivity, $\gamma_{z,t}$, house sector productivity, $\gamma_{h,t}$, house preferences, ù, $\gamma_{m,t}$, the risk premium, $\gamma_{\varsigma,t}$, and the income class, $\gamma_{b,t}$, follow an autoregressive process of order one:

$$\ln \gamma_t = \rho_\gamma \ln \gamma_{t-1} + \varepsilon_{\gamma,t}, \tag{18}$$

where $\gamma = \{z, h, ù, \zeta, b\}$, ρ_γ is the persistence parameter and $\varepsilon_{\gamma,t}$ is a i.i.d. white noise process with mean zero and variance σ_γ^2. Monetary policy shocks, $\varepsilon_{r,t}$, are instead i.i.d.

5.2 Calibration

The model is calibrated for Malaysia. The parameters are choosen such that the model matches the ratios in the data (see Table 2).

The discount factor of the lenders, β_1, is set equal to 0.9926, such that the average annual rate of return is about 2.98%.

The model assumes that the lenders own all the physical capital wealth, therefore lenders are assumed to represent the top 20 of the wealth distribution of households in the model economy. According to Khalid (2011), real estate assets represent 96% of total wealth and the top 20% of Malaysian households per capita owns 52% of the country's wealth, respectively.[15] Therefore, the discount factor of the borrowers, β_2, is set equal to 0.965 in order to match the two ratios for the borrowers: a share of income of about 51% and a share of housing wealth of about 48%.

15. [?] studies the composition and inequality of wealth among the household per capita in Malaysia, using the 2007 Malaysia's Household Income Survey (HIS).

The depreciation of the housing stock, δ_h, is equal to 0.0089 in order to match a ratio of residential investment to GDP of 8.23%. The loan-to-value ratio, $m = 0.75$, and the housing weight in the utility, $\grave{u} = 0.20$, are jointly calibrated to match the ratio of household credit to GDP of 88.3%, as in the data.

The World Bank shows that the average Malaysian trade balance as a percent of GDP has been equal to 7.72 between 1960 and 2016.[16] Therefore, the following steady state relationship is used to calibrate the stock of foreign debt relative to GDP. (b^*) aims to match the Malaysian trade deficit to GDP of 7.72% and a standard deviation of current account to GDP of 4% :

$$b^*(1-R^*) = -TB \tag{19}$$

The labor disutility parameter ν_L is a normalized one. The parameter η is set to 2 such that the Frisch elasticity of labor supply equals one. The average net markup equals 10% and the Calvo parameter, θ, is set to 0.67. Capital share in production, α, is set equal to 0.30 and the depreciation of productive capital δ_k to 0.025. The adjustment cost parameters are set equal to 0.5.

Table 2:
Targets

Ratio	Data	Model
Annual rate of return	2.98%	2.98%
Borrowers share housing wealth	48%	49%
Borrowers share of income	51%	55%
Residential investment/GDP	8.8%	7.94%
Household Credit to GDP	88.3%	87.4%

5.3 Theoretical Impulse Responses

Figures 11-12 report impulse responses for the selected exogenous shocks. Productivity shocks in Malaysia lead to increasing GDP and residential investments. Indeed, the aggregate technology shock, $\gamma_{z,t}$, affects both sectors as the goods sector can produce some intermediated goods used in the construction sector, while a sector-specific shock $\gamma_{h,t}$ only affects the real estate market. Higher productivity generates lower inflation and interest rate increases. Lower prices boost demand of goods and households are willing to borrow in order to finance their present consumption. Moreover, GDP growth coupled with higher investments in the real sector lead to higher demand for housing, and as a result, house prices increase. Due to the collateral constraint, the increase in house prices lead to higher borrowing, even if the interest rate is initially higher (see Figure 11, solid line).

Income class shock and house preference shocks show similar dynamics. According to Table 3, the share of the top 10% of the income distribution in Malaysia has increased enormously: from 14.7% in 2002 to 45.1% in 2014. Income class shock represents an increase in the share of lenders (i.e., richest households in the model). The impulse response shows a clear preference for buying

16. See http://www.theglobaleconomy.com/Malaysia/tradebalance.

houses by this income class and house prices show a larger response to this shock. Similar to the case of productivity shock, higher house prices generate higher collateral value and thus, constrained households are able to borrow more. Booming housing prices lead to expectations of future higher prices, incentivizing construction companies to invest more in the real sector, with a clear spillover effect on the rest of the economy (see Figure 11, starred line). Finally, the house preference shock increases house prices with a positive impact on household debt and residential investments. In this case, GDP increases are less, relative to the other two shocks, ending up in a negative responses after 1 year (see Figure 11, dotted line).

Table 3:
Percentage Distribution of Households by Income Class, Malaysia

Income Class			1995	1997	1999	2002	2004	2007	2009	2012	2014
499 and below			10.6	6.3	6	3.8	2.8	1.7	1.2	0.5	0.1
500	-	999	23.9	18.6	19	15.4	13.5	6.8	6.1	4.5	1.5
1,000	-	1,499	19.9	18.3	18.8	16.5	15.8	15.8	14.2	8.5	4.1
1,500	-	1,999	13.1	13.7	13.9	13.4	13.2	13.5	11.9	9.3	6
2,000	-	2,499	8.9	10.1	10.1	10.4	10.8	11.2	10.7	8.9	6.5
2,500	-	2,999	6.1	6.9	7.3	8.3	8.2	8.6	8.6	7.1	6.1
3,000	-	3,499	4.2	5.4	5.7	6.3	6.5	7.1	7.3	9.4	9.8
3,500	-	3,999	2.8	4	3.9	4.7	5.2	5.8	6.3	7.3	8
4,000	-	4,999	3.8	5.6	5.5	6.7	7.2	8.6	9.5	11.1	12.8
5000 and above			6.7	11.1	9.8	14.7	16.8	20.8	24.2	33.6	45.1

Figure 11:
Impulse Responses

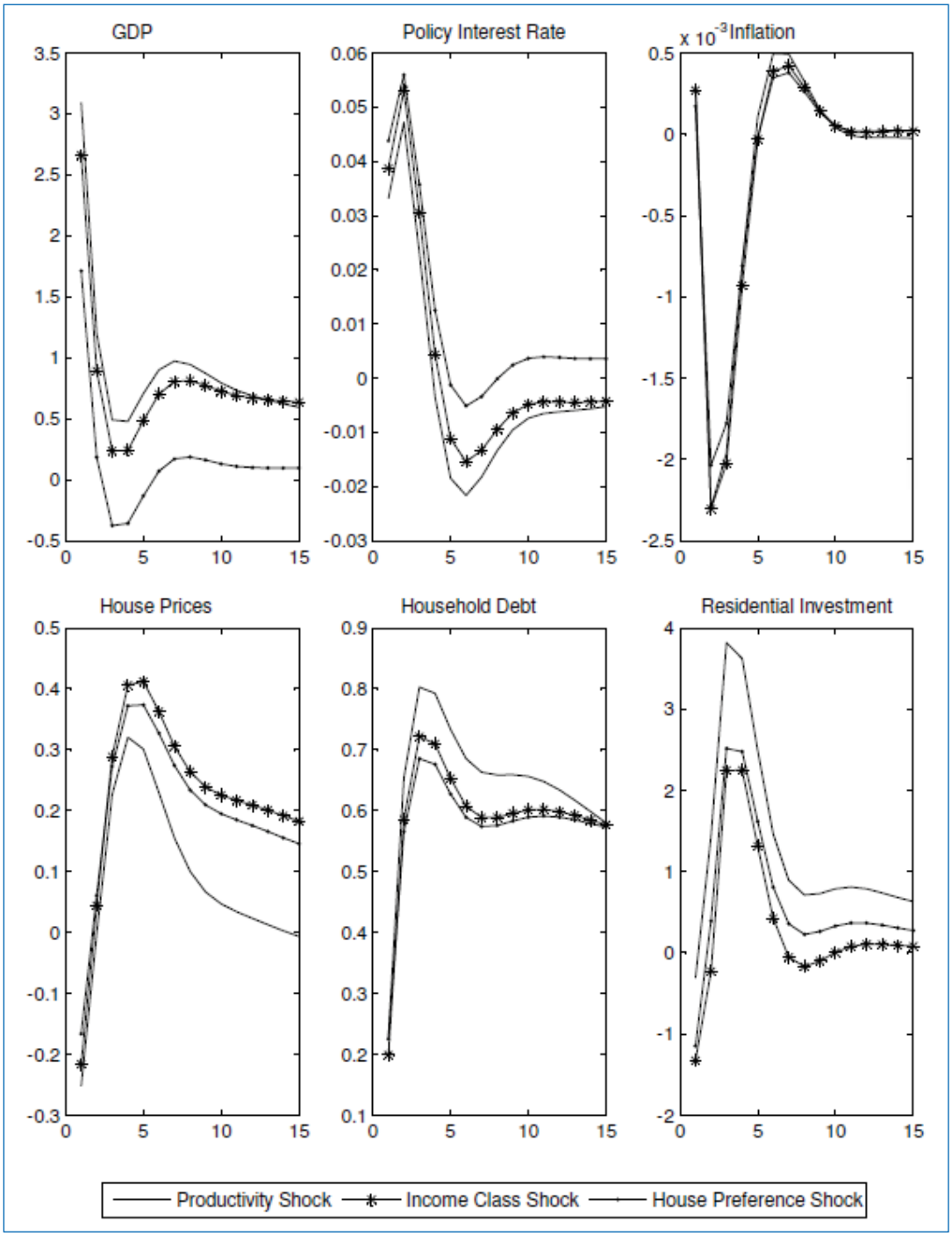
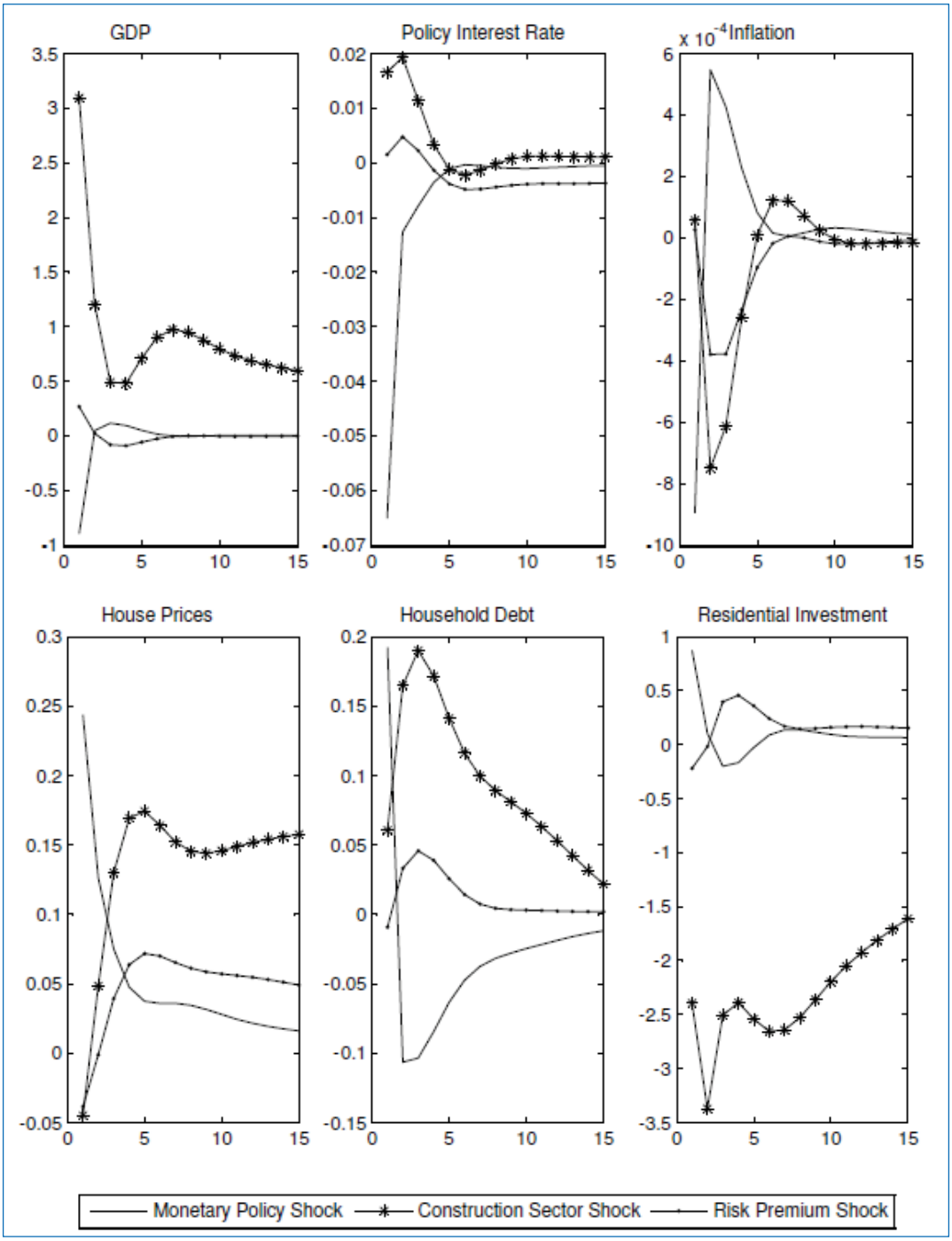


Figure 12 (solid line) reports impulse responses to a negative interest rate shock. Lower rates lead to cheaper cost of borrowing and therefore, affect positively the household debt, residential investment, house prices and GDP. Figure 12 (starred line) reports impulse responses to a negative productivity shock on the construction sector. This shock leads to a slowdown in the supply of dwellings, generating higher house prices because of lower supply. Higher house prices allow constrained household to borrow more to finance their consumption, leading to decreases in inflation and GDP increases. Finally, Figure 12 (dotted line) shows the impulse response for the only foreign shock present in the model: a negative risk premium. A lower risk premium increases the willingness

of foreign investors to accumulate Malaysian assets, therefore increasing capital inflows and thus, a current account deficit.[17] The greater availability of foreign funds generates a greater availability of credit for domestic borrowers as well as an increase in the domestic consumption of both nondurable goods and housing. Due to the higher demand for housing, house prices rise which exacerbate the financial accelerator effects linked to the existence of housing collateral. These findings are consistent with the findings of Bernanke (2005) and Sa and Wieladek (2011).

Figure 12:
Impulse Responses



17. Even if Malaysia is running a current account surplus, since 2008 the current account shows a clear decrease till 2017.

Table 4 reports the forecast error variance decomposition and shows the proportion of the unanticipated changes of a variable that can be attributed to innovations in the variable itself and to other variables in the system. House preference shocks and income class shocks explain about 36% and 35% of the variation of household debt, respectively. Productivity shocks explain about 26% of the debt fluctuations. These shocks are also important in explaining fluctuations in housing prices, but the main shock affecting house price variation in Malaysia is the slowdown in the construction sector.

Table 4:
Variance Decomposition

Contribution of Shocks (%)	Productivity Shock	Income Class Shock	House Preference Shock	Monetary Policy Shock	Risk Premium Shock	Construction Sector Shock
GDP	42.97	47.07	7.35	1.66	0.18	0.77
Consumption	20.47	59.13	17.82	0.26	0.26	2.06
House Price	10.52	29.88	21.29	1.89	1.96	34.45
Household Debt	26.02	35.41	36.03	0.19	0.08	2.26
Residential Investment	25.23	7.78	11.36	0.55	0.68	54.41

6. Panel VAR applied to SEACEN Economies

In this section, I develop a Panel Vector Auto Regression (Panel VAR) model for the SEACEN economies under consideration in this project.[18] The sample period range from the first quarter 2000 until the first quarter 2016. The following system is estimated:

$$Y_{it} = AY_{it-1} + BX_{it-1} + u_i + e_{it}$$

where Y_{it} is a *(kx1)* vector of dependent variables, X_{it-1} is a $(1x1)$ vector of exogenous covariates, A is a *(kxk)*-dimensional matrix of the VAR coefficients on lagged domestic quantities and B is a regression coefficient to be estimated. u_i and e_{it} are *(kx1)* vectors of dependent variable-specific panel fixed-effects and idiosyncratic errors, respectively. For all $t > s$, $E(e_{it}) = 0$, $E(e_{it}e_{it}^{'}) = \Sigma$, and $E(e_{it}\, e_{it}^{\prime}) = 0$ for $t<s$.

I use the General Method of Moments (GMM) to estimate the Panel VAR, which regresses each endogenous variable on its own lag(s) as well as the lags of all other variables in the system. Following Love and Zicchino (2006), I apply forward mean differencing or orthogonal deviations (the Helmert procedure) to remove the fixed effects; all variables in the model are transformed in deviations from forward means (see Arellano and Bover (1995)).

To identify the shocks, the Cholesky's decomposition of the covariance matrix is adopted, which assumes a recursive exogeneity structure. Therefore, the first variable in the VAR is only

18. Mongolia is not included in the sample as the available data series are too short.

affected contemporaneously by the shock to itself; the second variable in the VAR is affected contemporaneously by the shocks to the first variable and the shock to itself, and so on.

The variable included in the Panel VAR are: GDP, inflation, short-term interest rate, house prices, household debt, exchange rate and trade balance (% of GDP). All variables are expressed in real terms and their *log* , with the exception of the short-term interest rate and the trade balance which is expressed as a percentage of GDP. The model selection has included one lag.[19]

The ordering of economic activity, inflation and interest rates is standard in the monetary transmission literature. DenHaan and Sterk (2011) and Musso et al. (2011) order inflation before economic activity. However, ordering inflation after economic activity does not alter the results. Household debt and house prices are placed lower in the ordering. Assenmacher-Wesche and Gerlach (2010) argue that they should follow interest rates because monetary policy only reacts to asset price movements if these are prolonged, while asset prices react immediately to changes in monetary policy. Household debt is ordered after house prices because an increase in this variable makes more collateral available for mortgages, which eases the borrowing constraint of households (see Aoki et al., 2004 and Muellbauer and Murphy, 2008). Goodhart and Hofmann (2008) suggest that house prices should appear before financial variables because prices are probably stickier. Similarly, Musso et al. (2011) order house prices before credit because they interpret credit as a mortgage loan demand function. However, Christiano et al. (1997) and Assenmacher-Wesche and Gerlach (2010) order credit before housing prices, arguing that a shock to credit affects output and the price level with a lag, while house prices can react within one quarter to a shock. I order the exchange rate and the trade balance to GDP as the last variables, as it is assumed that the exchange rate respond to changes in monetary policy, thus attracting capital flows.

Figure 13 shows the impulses responses to a house preference shock. Real GDP, household debt and interest rate increase on impact, while trade balance runs a deficit and the exchange rate appreciates.

A positive productivity shock leads to increasing household debt, house price and interest rate, while the exchange rate appreciates and trade balance becomes negative (see Figure 14).

Finally an accommodating monetary policy also leads to a house price boom with consequential household debt increases. GDP drops initially but increases with some lag after 3 quarters. Similar to the other two shocks, the responses of trade balance and exchange rate are negative on impact (see Figure 15).

Overall, the results from the empirical exercise are similar to the theoretical impulse responses found in the simulation of a DSGE model: household debt increase is associated with a housing price boom, which is driven by better economic performance, strong preference in investing in the real estate sector, and an accomodating monetary policy.

19. The lag has been selected following Andrews and Lu (2001) by choosing the smallest BIC, AIC and QIC based on GMM estimation.

Figure 13:
Response to House Preference Shock

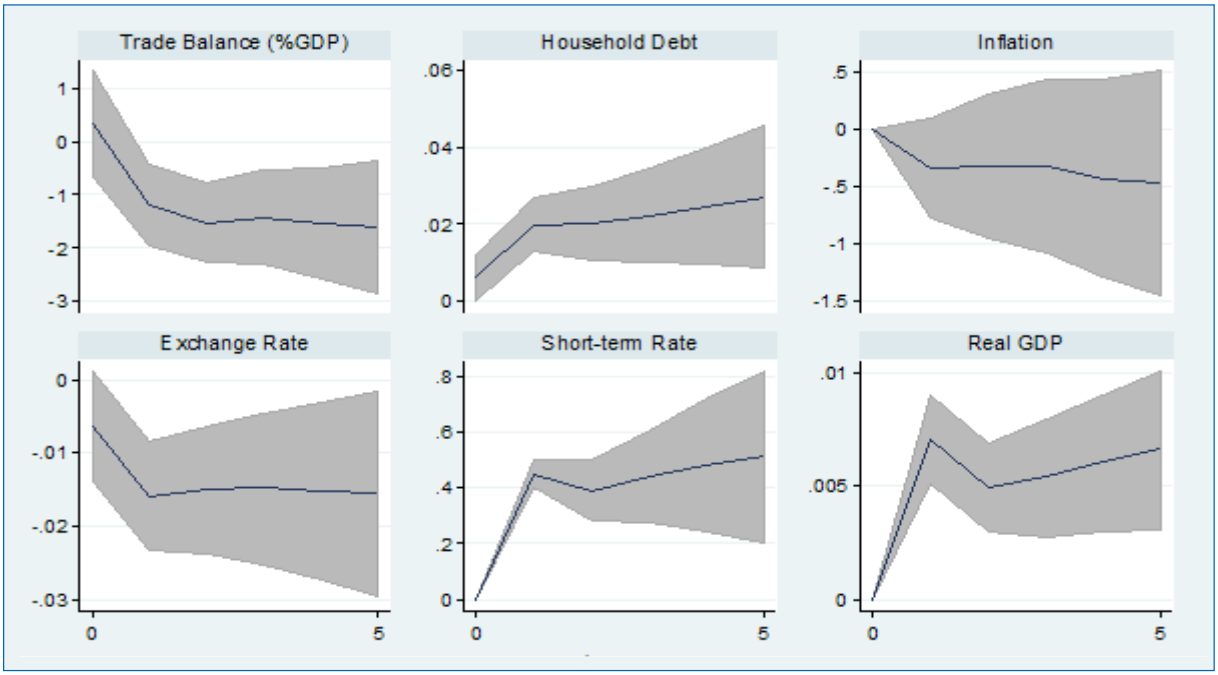


Figure 14:
Response to a Productivity Shock

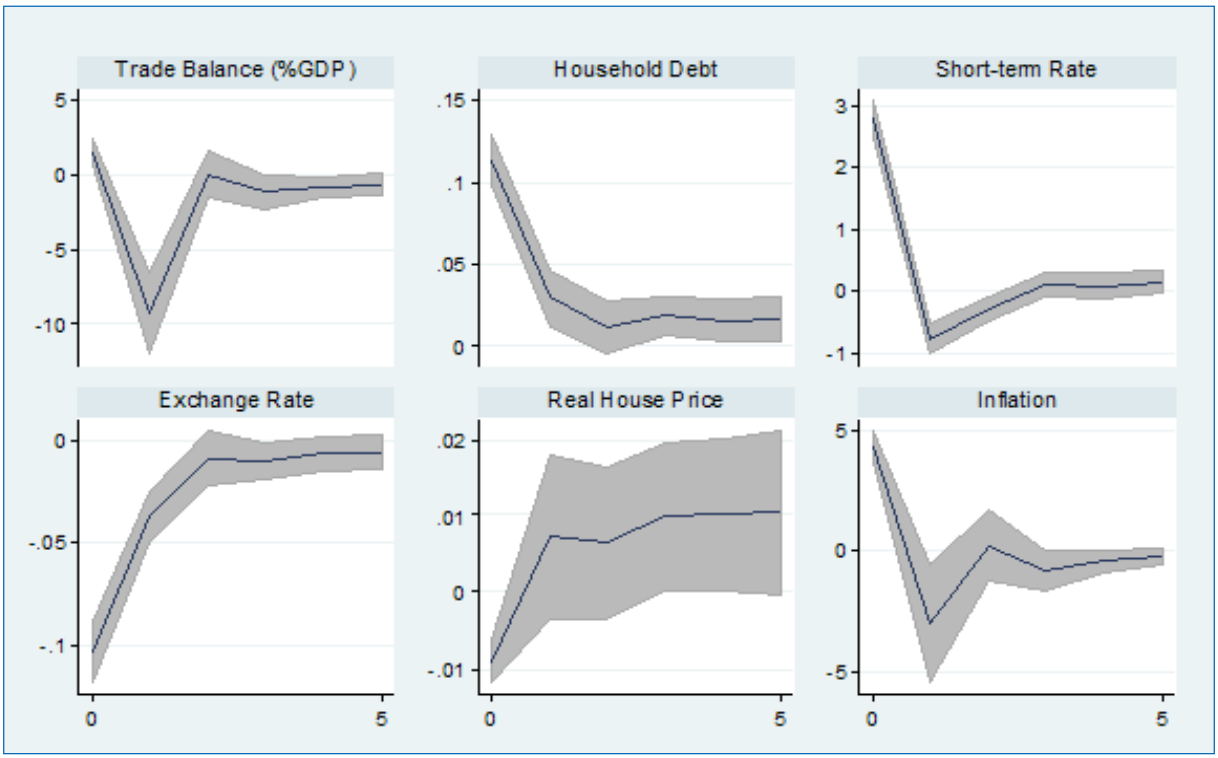


Figure 15:
Response to a Negative Monetary Policy Shock

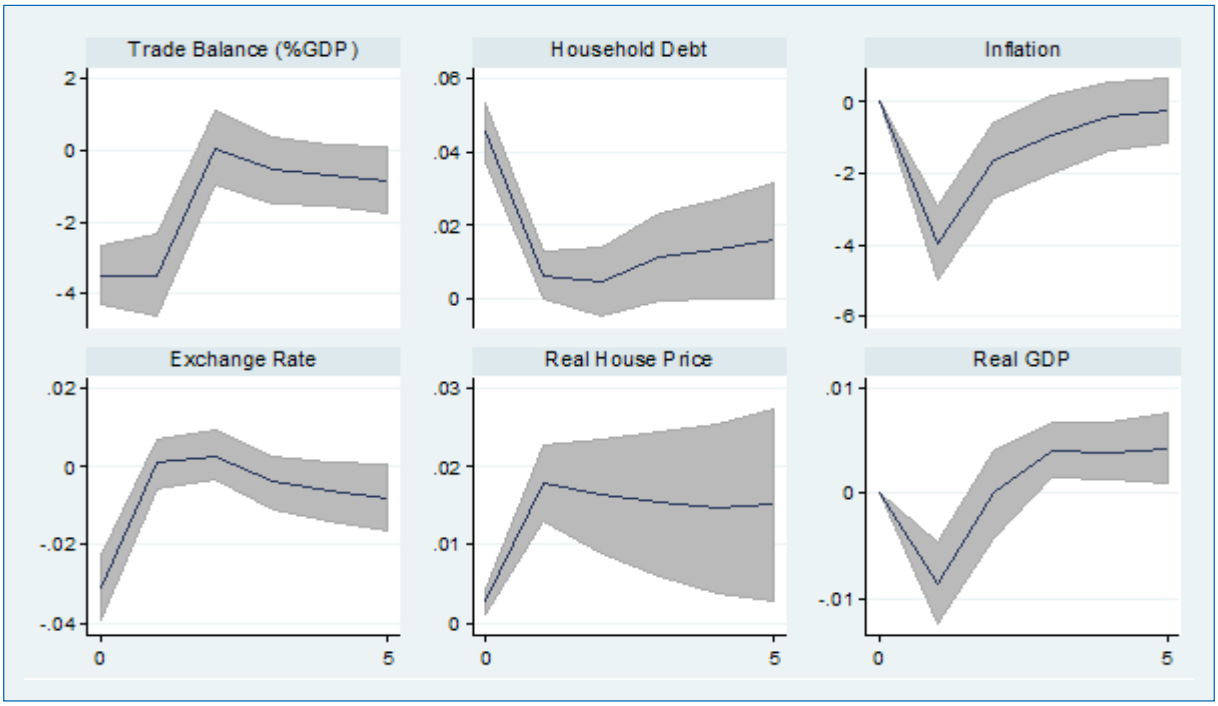


Table 5 reports the forecast error variance decomposition and shows the proportion of the unanticipated changes of a variable that can be attributed to innovations in the variable itself and to other variables in the system.

The monetary policy shocks explain about 20% of the variation of house prices and about 12% of the variation of the household debt over 10-steps ahead of the forecast error variance, while productivity shocks explain about 45% volatility of household debt. Increasing house prices also explain about 29% fluctuations of household debt over a longer time.

Table 5:
Variance Decomposition (Panel Data - Sample size: 2000m1 -20016q4)

Response Variable and Forecast Horizon	Real GDP	Inflation Rate	Short-Term Rate	Real House Price	Household Debt	Exchange Rate	Trade Balance (%GDP)
Real House Price							
0	0	0	0	0	0	0	0
1	0.091765	0.525136	0.00911	0.37399	0	0	0
2	0.075012	0.261154	0.182548	0.393679	0.072228	0.002704	0.012675
3	0.066906	0.181216	0.225097	0.426291	0.088335	0.003514	0.008642
4	0.076678	0.136493	0.23228	0.448614	0.095093	0.004447	0.006394
5	0.082017	0.108045	0.229071	0.472575	0.097941	0.005325	0.005028
6	0.085279	0.087778	0.224693	0.492701	0.099302	0.006171	0.004077
7	0.087572	0.072584	0.221016	0.508417	0.10005	0.007002	0.003359
8	0.089116	0.06088	0.218198	0.520807	0.100384	0.007812	0.002803
9	0.09019	0.051677	0.216054	0.530704	0.10041	0.0086	0.002364
10	0.09092	0.044322	0.214397	0.538777	0.100202	0.00937	0.002012
Debt							
0	0	0	0	0	0	0	0
1	0.703728	0.061108	0.113806	0.001953	0.119405	0	0
2	0.67116	0.058194	0.103614	0.021254	0.140293	0.001172	0.004312
3	0.648637	0.057082	0.100165	0.039341	0.146747	0.00366	0.004369
4	0.624874	0.053768	0.099686	0.058655	0.153565	0.005278	0.004175
5	0.598115	0.050672	0.101246	0.08038	0.159046	0.006594	0.003947
6	0.57005	0.047431	0.10442	0.103636	0.163315	0.007452	0.003696
7	0.541085	0.04412	0.108498	0.128424	0.166556	0.007878	0.003439
8	0.511644	0.040821	0.113118	0.154484	0.168804	0.007948	0.003182
9	0.48211	0.037567	0.118122	0.181403	0.170135	0.007736	0.002928
10	0.452835	0.034402	0.12338	0.208769	0.170615	0.007319	0.00268

7. Probit Analysis

A probit model is used to evaluate what affects economic recessions. I estimate a binary variable, $S_t = \{0,1\}$ as a proxy for the state of the economy, where the value of 1 indicates a GDP downturn and 0 otherwise. To be more specific, S_t is derived from the turning points calculated in Section 4. Therefore, $S_t = w_{y,t}$.

Table 6 shows that a 10-percentage point increase in real house prices and loan-to-GDP relative to their trend, increases the probability of a recession in the current period by about 3.5% and 3.1%, respectively. Equity prices, inflation and current account to GDP are not significant predictors of current recessions. See Table 6, Panel (a) - (b).

Table 6, Panel (c) to (f), explores the role of financial variables in predicting economic downturns 1 and 4-quarter ahead periods, $Prob(S_{t+i} = 1), i = 1,4$. Similar results hold as in Panel (a) and (b) with the exception of equity prices which become statistical significant and increase the probability of future recession by about 77% at 4-quarter ahead periods. Moreover, loans become more important in predicting 4-quarter ahead recessions. The predictive power over longer horizon is higher.

Table 6:
Probit Regression - GDP Recessions

	$Prob(S_t = 1)$		$Prob(S_{t+1} = 1)$		$Prob(S_{t+4} = 1)$	
	Panel (a)	Panel (b)	Panel (c)	Panel (d)	Panel (e)	Panel (f)
House Price	0.035 ***	0.034 ***	0.038 ***	0.035 ***	0.035 **	0.032 **
	(3.05)	(2.87)	(3.12)	(2.95)	(2.41)	(2.12)
Equity Price	0.044	-0.012	0.026 **	0.206	0.77 ***	0.752 ***
	(0.34)	(-0.09)	(1.88)	(1.38)	(4.63)	(4.21)
Loan-to-GDP	0.031 ***	0.037 ***	0.042 ***	0.049***	0.047 ***	0.050 ***
	(3.55)	(3.77)	(4.58)	(4.68)	(4.75)	(4.39)
Spread		0.000		0.000		-0.000
		(0.57)		(0.47)		(-1.37)
Inflation		-0.022		0.051		0.084
		(-0.59)		(1.26)		(1.90)
CA-to-GDP		0.005		0.007		0.012
		(0.67)		(0.87)		(1.24)
Pseudo R^2	0.0514	0.0621	0.0896	0.1067	0.1632	0.1825

Notes: ***, **, * denote significance at 1%, 5%, and 10%, respectively. Variables are measured as deviations from the HP filter.

Finally, the probability of recessions is estimated including downturn phases of financial variables, i.e., how would the probability of recession change if financial variables experience a bust after a boom phase. Table 7 show that when house and equity prices experience a deep downturn, the probability of recession increases by 13% (11%) and 17% (15%) at current (1-quarter ahead) recession, respectively. House price downturns are no longer good predictors for 4-quarter ahead

recession. Increase in equity prices increases the probability of recession by about 90%. Downturns in loan-to-GDP are statistical insignificant in all three cases. The Pseudo R^2 improves substantially relative to Table 6.

Table 7:
Probit Regression - GDP Recessions

	$Prob(S_t = 1)$	$Prob(S_{t+1} = 1)$	$Prob(S_{t+4} = 1)$
House Price	0.0597 ***	0.0613 ***	0.0303 *
	(3.34)	(3.36)	(1.79)
House Price Downturns	0.1301 ***	0.1146 ***	0.0430
	(3.32)	(2.84)	(0.95)
Equity Price	0.9139 ***	0.9952 ***	1.4301 ***
	(4.38)	(4.65)	(5.95)
Equity Price Downturns	0.1702 ***	0.1527 ***	0.1481 ***
	(5.22)	(4.59)	(3.92)
Loan-to-GDP	0.0305 ***	0.0414 ***	0.0519 ***
	(3.20)	(4.20)	(4.85)
Loan-to-GDP Dowturns	-1.2755	-2.2252	0.8609
	(-1.02)	(-1.57)	(0.67)
Pseudo R^2	0.1322	0.1508	0.2058

Notes: ***, **, * denote significance at 1%, 5%, and 10%, respectively. Variables are measured as deviations from the HP filter. Downturns are calculated as a decrease in a variable during its own recession.

8. Team Project Papers - Policy Implications

This section gives an overview of the studies conducted by project team members of the selected SEACEN economies.

8.1 Chinese Taipei

The household debt of Chinese Taipei has been increasing together with a run-up in house prices. In order to evaluate the possible negative effects on financial stability, the team project member built a model to examine the most important factors affecting the non-performing loan (NPL) ratio of household loans in Chinese Taipei. Empirical results show that an increase in housing prices (e.g., real housing price, housing price/GDP), real GDP and real money supply, all lead to a decrease in the NPL ratio. On the other hand, the real lending rates, real interest rate spreads, debt burden and real loans tend to increase the NPL ratio. Among them, the lending rate is the main driver of NPL fluctuations. It has significant and long-lasting positive effect on the NPL ratio. The empirical result is in line with many findings maintaining that monetary policy is not enough to address the run-up in house prices and household debt overhang.

8.2 India

The project team member examined various dimensions of Indian banks' household credit, including growth rate of household credit vis-á-vis other sectors, macroprudential regulations of the Reserve Bank of India, Government initiatives for housing loans and the behavior of the components of household bank credit. The study on India also compares the return on housing and equity prices. It found that household debt supplied by banks grew at a higher rate than the overall bank credit, dominated by mortgage loans. The study also highlights that over the years, house prices have been recording steady increases and these have outpaced equity prices, implying more returns on investment in housing as an asset. Different from many other economies, the study finds a marginal role of interest rate in influencing household debt in India. Interestingly, the findings show strong evidence of a negative relationship between household debt and equity prices. Further, there is no evidence of mortgage loans influencing GDP and private final consumption expenditures. These findings are based on bank credit to households and may not be the same when the credit extended by non-banking financial companies is taken into consideration.

8.3 Malaysia

Malaysia's team project member provides empirical evidence on the determinants of household debt and the implications of various household debt growth scenarios on private consumption and house prices in Malaysia. The household debt-to-GDP ratio has increased from 64% in 2007 to a peak of 89% as at end-2010. The household debt growth had outpaced the average income growth by almost 2 times, raising concerns over its sustainability. Across type of loans, the increase is most prominent in residential properties and personal loans, which account for 47% and 14% of total household debt, respectively. At the same time, the Malaysian House Price Index (MHPI) saw an accelerated growth from 1.5% in 4Q 2009 to 14.3% in 2012 (peak). This trend can be attributed to easy access to house financing, which also fueled credit-driven speculative activities in the housing market. For example, households can obtain housing loans with loan-to-value (LTV) ratio of up to 100% and loan tenure of up to 45 years.

The study used an Autoregressive Distributed Lag (ARDL) model and conditional structural vector auto-regression (VAR), showing that increases in consumption and house prices are associated with an increase in household debt, while cost of borrowing and inflation have the opposite effects. In addition, moderation or decline in household debt growth is found to lower both private consumption and house prices growth.

8.4 Mongolia

Mongolia's project team carried out a study on the impact of macroeconomic variables on household debt quality. Household debt in Mongolia has been increasing steadily, especially because of a subsidized mortgage program implemented by the government and the Central Bank. The study estimated income and debt for 38,000 households included in the annual "Household Socio-Economic Survey" conducted by the National Statistical Office of Mongolia covering data from 2013 to 2015. They used the survey to assess outstanding risky loans to total loans outstanding for those households. In particular, the team ran a stress test to forecast financial sector stability and found that the impact of the policy rate on the household debt has been decreasing in the last several years. Also, the impact of fiscal policy through salary, pension and social welfare on the household debt has been increasing constantly. Finally, the impact of real estate valuation on debt quality has been consistently increasing.

8.5 Philippines

The team project member showed that household debt has rapidly increased in recent years and does not show any signs of slowing down. At the beginning of 2017, the household debt-to-GDP ratio reached a level of 45%, well below the 85% threshold specified by Cecchetti, Mohanty, and Zampolli (2011) in their research on sectoral debt sustainability. In terms of loan quality, non-performing consumer loans (NPCL) to total consumer loans ratio registered 4.06% only, while non-performing residential real estate loans (RREL) to total RREL ratio is recorded at 2.95%. Nonetheless, continued vigilance is warranted. The recent implementation of the first package of the Tax Reform for Acceleration and Inclusion (TRAIN) will have significant effects on the Filipino households' income and spending, which could increase inflation and pose risks of an interest rate hike and risk of future repayments. Lastly, the Philippines registered considerable household borrowing activity with non-bank institutions/companies (i.e., shadow banking) as well as with informal lending channels, which also pose significant credit risks.

The project team member estimated a structural vector autoregressive (SVAR) model with sign restrictions to analyze the feedback loop between household credit, housing prices and monetary policy. An expansionary monetary policy shock, a boom in housing prices, and a positive credit supply shock are found to be drivers of contemporaneous increase in household debt and housing prices. In particular, a negative monetary policy shock leads to consumption growth in the short-run, while an increase in housing prices enhances household consumption through the price-induced wealth effect and improved access to credit.

8.6 Thailand

Thailand's team project members provided a comprehensive look at the Thai household debt, including its impact on private consumption and financial stability. The team conducted a comprehensive macro (administrative) and micro (household surveys) data analysis. They also explored the policies that have been implemented to alleviate the problem. The paper finds that, although a gradual household debt deleveraging has been seen for six consecutive quarters, Thai household remains vulnerable due to the high level of household debt and weakening prospect of debt serviceability. The relationship between household debt and private consumption also shows that a rise in the household debt-to-GDP ratio is associated with an increase in private consumption in the short-term, yet the relationship reversed in the medium- to long-term. Therefore, the existing deleveraging process, if done in a slow and careful manner, would mitigate the risk of economic recession and yield long-run benefits because households' adjustment would alleviate financial vulnerabilities and strengthen their balance sheets. In order to support the smooth deleveraging process, Thai policy makers have implemented comprehensive measures for household debt management.

8.7 Vietnam

The project team showed that although household debt levels in Vietnam remain under control, there is a continuous positive trend in the household debt-to-GDP ratio. However, this percentage is still below 60%, lower than other economies in the region. In addition, the proportion of outstanding real estate business loans to total outstanding loans tended to decrease, while the proportion of real estate debt balance of households to total debt increased, indicating that the increase in outstanding loans in the real estate sector was mainly due to the increase in debt by household rather than the real estate business.

This also depicts that credit continues to flow into the production sector, contributing to economic growth and there is less worry about the possibility of a real estate bubble in Vietnam. Due to the impact of the global financial crisis and the loosening of monetary policy in general, more households in Vietnam have been financing their consumption patterns through debt, and tend to invest in real estate in the context of rising housing prices. The trend towards new consumer products amongst the youth also accelerates consumer lending. In addition, lower interest rate and easing of credit constraints have led to a substantial rise in household debt. However, the increase in household debt in Vietnam only comprises an outstanding portion of loans in credit institutions while a large share of informal lending is present in the country. The Vietnamese people commonly borrow from relatives, friends and possibly borrow from the black credit market. Therefore, in addition to controlling the credit of household debt at credit institutions to ensure the proper use of capital, Vietnam also needs to have household debt statistics outside credit institutions in order to have a comprehensive and in-depth evaluation of household debt. This will enable the government to implement more appropriate policies.

9. Policy Implications

The previous sections have shown that house price peaks preceded by larger increases in household debt are associated with deeper recessions, weaker recoveries, and more pronounced household deleveraging. The fall in economic activity cannot be simply explained by a decline in house prices. Rather, it is a mix of falling house price and deleveraging of households. Indeed, recent theoretical models predict that household debt and deleveraging drive deep and prolonged slumps. In this context, macroeconomic policies are crucial to avoid excessive contractions in economic activity during phases of household deleveraging. While household debt can be beneficial in the short-term, economic growth and financial stability can suffer in the medium- and long-term. Even in countries with low stock levels of household debt, a rapid expansion in credit may lead to an increasing fraction of highly leveraged households that may be vulnerable to shocks. The trade-off between benefits in short-term and cost of financial instability in the medium-term can be attenuated by a combination of good policies, institutions and regulations. For example in 1990, Scandinavian economies proposed fiscal transfers to unemployed households to sustain household incomes and improve their ability to repay their outstanding loans. If mortgages contracts are written with variable interest rates, an easing monetary policy can help reduce mortgage payments and prevent household defaults. Also strong support for the banking sector can reduce the risk of household balance sheet distress affecting banks' willingness to supply credit. It is also important to strengthen the protection of consumer finance. For example, policymakers can develop an efficient system for credit registries to improve the welfare of households vulnerable to overborrowing, such as transparency of financial contracts, financial education, prohibition of predatory lending, and regulation of certain financial innovation products. Shiller (2014) and Mian and Sufi (2015) suggest mortgage contracts to increase risk sharing between mortgage lenders and borrowers. Such contracts automatically write down the principal when the local property value falls below a specified threshold. In this way, lenders are better able to evaluate the local house price before extending credit and reduce the debt overhang problem of households when house prices fall. The most common policies implemented since the global financial crisis are macroprudential measures, with the main goal of avoiding excess household leverage. Demand-side measures, such as limits on the debt-service-to-income ratio and loan-to-value ratio, seem highly effective. Supply-side measures targeted at loans, such as limits on bank credit growth, loan contract restrictions, and loan loss provisions, are equally effective. However, most of previous literature and most of the macroprudential measures that have been implemented by policymakers have targeted

all borrowers or all types of loans. For example, lower loan-to-value ratio for all borrowers or higher capital requirements for all banks. Punzi and Rabitsch (2017) suggest targeting only risky borrowers in the design of an efficient macrorpudential policy. In particular, Punzi and Rabitsch (2017) consider the implications of macroprudential policies with the aim to lean against the excess in household debt by constraining the ability of the banking system to extend credit to only the highest leveraged households. They find that if macroprudential authorities target only higher leveraged borrowers, then a rule that countercyclically responds only to the growth of household debt-to-GDP for only this particular group, improves welfare relative to a macroprudential tool that targets all borrowers. Thus, it may be advisable for policymakers to consider the LTV ratio distribution and tailor their policy towards highly leveraged agents in an economy.

10. Conclusion

This study aims to understand the causes and consequences of the surge of household debt in Chinese Taipei, India, Malaysia, Mongolia, the Philippines, Thailand and Vietnam.

Since 2010, these economies have experienced a rapid growth in household debt, stressing the need for intervention from policy makers. From the global financial crisis, we have learnt that increasing household debt can lead to possible threats to growth and global financial stability. As we learn from history, SEACEN economies do not want to repeat the experience of 2007.

Similar to many advanced economies, increased household debt-to-GDP in SEACEN economies is associated with the run-up in house prices. Analyzing Malaysia through the lens of a DGSE model and a cross-country Panel VAR, it is found that good economic performance, strong preference in investing in the real estate sector, and accomodating monetary policy are the main drivers of co-movements between household debt and house prices. Moreover, asset prices tend to peak before loan-to-GDP and GDP downturns, meaning that asset prices are good predictors of recessions. Indeed, changes in asset prices increase the probability of GDP downturns, and a burst in asset prices amplifies the change of curent and future recessions. Therefore, monitoring the housing market is essential to prevent further increase in household debt-to-GDP.

In order to avoid this, many SEACEN economies have been implementing measures to slow down the increase in household debt and house prices. While macroprudential measures have been used extensively, these tools have had marginal impact in leaning against excess credit and housing boom. This is due mainly to strong capital inflows and lower interest rates, which makes macroprudential tools less effective.

Therefore, it is important to balance the short-term benefits with the long-term costs of increasing household debt, and adopt a combination of good policies, institutions, and regulations, as only macroprudential tools are not enough.

References

Ando, A. and F. Modigliani, (1963), "'The Life Cycle' Hypothesis of Saving: Aggregate Implications aAnd Tests," *The American Economic Review*, 53(1), pp. 55–84.

Andrews, D. W. and B. Lu, (2001), "Consistent Model and Moment Selection Procedures for Gmm Estimation with Application to Dynamic Panel Data Models," *Journal of Econometrics*, 101(1), pp. 123-164.

Aoki, K.; J. Proudman and G. Vlieghe, (2004), "House Prices, Consumption, and Monetary Policy: A Financial Accelerator Approach," *Journal of Financial Intermediation*, 13(4), pp. 414–435.

Arellano, M. and O. Bover, (1995), "Another Look at the Instrumental Variable Estimation of Error-Components Models," *Journal of Econometrics*, 68(1), pp. 29–51.

Ariyapruchya, K.; W. Sinswat; N. Chutchotitham, et al. (2007), "The Wealth and Debt of Thai Households: Risk Management and Financial Access," *Discussion Pape*r.

Bernanke, B., (2005), "The Global Saving Glut and the U.S. Current Account Deficit," Speech at the Sandridge Lecture, Virginia Association of Economists, Richmond, Virginia.

Bernanke, B. and M. Gertler, (1989), "Agency Costs, Net Worth, and Business Fluctuations," *The American Economic Review*, pp. 14–31.

Bernanke, B. S. and M. Gertler, (1995), "Inside the Black Box: The Credit Channel of Monetary Policy Transmission," *Discussion Paper,* National Bureau of Economic Research.

Bernanke, B. S.; M. Gertler and S. Gilchrist, (1999), "The Financial Accelerator in a Quantitative Business Cycle Framework," *Handbook of Macroeconomics*, 1, pp. 1341–1393.

Bry, G. and C. Boschan, (1971), "Standard Business Cycle Analysis of Economic Time Series," in Cyclical Analysis of Time Series: Selected Procedures and Computer Programs, pp. 64–150, National Bureau of Economic Research.

Brzoza-Brzezina, M.; P. Gelain and M. Kolasa, (2014), "Monetary and Macroprudential Policy with Multiperiod Loans," Available at: SSRN 2646611.

Bu Yu Kkarabacak, B. and N. T. Valev, (2010), "The Role of Household and Business Credit in Banking Crises," *Journal of Banking & Finance*, 34(6), pp. 1247–1256.

Campbell, J. R. and Z. Hercowitz, (2009), "Welfare Implications of the Transition to High Household Debt," *Journal of Monetary Economics*, 56(1), pp. 1–16.

Cecchetti, S. G.; M. S. Mohanty and F. Zampolli, (2011), "The Real Effects of Debt," *BIS Working Papers,* No 352.

Christensen, I.; P. Corrigan; C. Mendicino and S.-I. Nishiyama, (2013), "Consumption, Housing Collateral, and the Canadian Business Cycle," *Canadian Journal of Economics,* Forthcoming.

Christensen, I. and A. Dib, (2008), "The Financial Accelerator in an Estimated New Keynesian Model," *Review of Economic Dynamics,* 11(1), pp. 155–178.

Christiano, L. J.; M. Eichenbaum and C. L. Evans, (2005), "Nominal Rigidities and the Dynamic Effects of a Shock to Monetary Policy," *Journal of Political Economy*, 113(1), pp. 1–45.

Claessens, S.; M. A. Kose and M. E. Terrones, (2009), "What Happens During Recessions, Crunches and Busts?" *Economic Policy*, 24(60), pp. 653–700.

Claessens, S.; M. A. Kose and M. E. Terrones, (2012), "How Do Business and Financial Cycles Interact?" *Journal of International Economics*, 87(1), pp.178–190.

Debelle, G., et al., (2004), "Household Debt and the Macroeconomy," *BIS Quarterly Review*, 51, March.

Drehmann, M.; M. Juselius and A. Korinek, (2017), "Accounting for Debt Service: The Painful Legacy of Credit Booms," *BIS Working Paper,* No. 645, June.

Gerali, A.; S. Neri; L. Sessa and F. M. Signoretti, (2010), "Credit and Banking in a DSGE Model of the Euro Area," *Journal of Money, Credit and Banking*, 42(S1), pp. 107–141.

Ghani, N. A., (2009), "Household Indebtedness and its Implications for Financial Stability in Malaysia," pp. 67–88.

Ghironi, F., (2006), "Macroeconomic Interdependence Under Incomplete Markets," *Journal of International Economics,* 70(2), pp. 428–450.

Gourinchas, P.-O. and M. Obstfeld, (2012), "Stories of the Twentieth Century for the Twenty-First," *American Economic Journal: Macroeconomics*, 4(1), pp. 226–265.

Haavio, M.; C. Mendicino and M. T. Punzi, (2014), "Financial and Economic Downturns in OECD Countries," *Applied Economics Letters*, 21(6), pp. 407–412.

Harding, D. and A. Pagan, (2002), "Dissecting the Cycle: A Methodological Investigation," *Journal of Monetary Economics*, 49(2), pp. 365–381.

Iacoviello, M., (2005a), "House Prices, Borrowing Constraints, and Monetary Policy in the Business Cycle," *The American Economic Review*, 95(3), pp. 739–764.

Iacoviello, M., (2005b), "House Prices, Borrowing Constraints and Monetary Policy in the Business Cycle," *American Economic Review*, 95(3), pp. 739–64.

Iacoviello, M. and S. Neri, (2010), "Housing Market Spillovers: Evidence from an Estimated DSGE Model," *American Economic Journal: Macroeconomics*, 2(2), pp. 125–164.

IMF, (2017), "Household Debt and Financial Stability," in Global Financial Stability Report October 2017: Is Growth at Risk? pp. 53–89, International Monetary Fund.

Justiniano, A.; G. E. Primiceri and A. Tambalotti, (2015), "Household Leveraging and Deleveraging," *Review of Economic Dynamics*, 18(1), pp. 3–20.

Kalemli-Ozcan, S.; B. Sorensen and S. Yesiltas, (2012), "Leverage Across Firms, Banks, and Countries," *Journal of International Economics*, 88(2), pp. 284–298.

Kannan, P.; P. Rabanal; A. Scott, et al., (2012), "Monetary and Macroprudential Policy Rules in a Model with House Price Booms," *B.E. Journal of Macroeconomics*, Contributions, 12(1), Article 16.

Kaplan, G.; G. L. Violante and J. Weidner, (2014), "The Wealthy Hand-to-Mouth*," Discussion Paper*, National Bureau of Economic Research.

Khalid, M. A., (2011), "Household Wealth in Malaysia: Composition and Inequality Among Ethnic Groups," *Jurnal Ekonomi Malaysia*, 45(1), pp. 71–80.

Khan, H. H. A.; H. Abdullah and S. Samsudin, (2016), "Modelling the Determinants of Malaysian Household Debt," *International Journal of Economics and Financial Issues*, 6(4).

Kim, Y. K., et al., (2016),"Macroeconomic Effects of Household Debt: An Empirical Analysis," *Review of Keynesian Economics*, 4(2), pp. 127–150.

Kiyotaki, N. and J. Moore, (1997), "Credit Cycles," *Journal of Political Economy*, 105(2), pp. 211–248.

Lambertini, L.; C. Mendicino and M. T. Punzi, (2013), "Leaning Against Boom–Bust Cycles in Credit and Housing Prices," *Journal of Economic Dynamics and Control*, 37(8), pp. 1500–1522.

Law, S. H. and N. Singh, (2014), "Does Too Much Finance Harm Economic Growth?" *Journal of Banking & Finance,* 41, pp. 36–44.

Leamer, E. E., (2015), "Housing Really is the Business Cycle: What Survives the Lessons of 2008–09?" *Journal of Money, Credit and Banking*, 47(S1), pp. 43–50.

Levine, R., (2005), "Finance and Growth: Theory and Evidence," Handbook of Economic Growth, 1, pp. 865–934.

Levine, R.; N. Loayza and T. Beck, (2000), "Financial Intermediation and Growth: Causality and Causes," *Journal of Monetary Economics*, 46(1), pp. 31–77.

Liu, Z.; P. Wang and T. Zha, (2013), "Land-Price Dynamics and Macroeconomic Fluctuations," *Econometrica*, 81(3), pp. 1147–1184.

Lombardi, M. J.; M. S. Mohanty and I. Shim, (2017), "The Real Effects of Household Debt in the Short and Long Run," No. 607, Bank for International Settlements.

Love, I. and L. Zicchino, (2006), "Financial Development and Dynamic Investment Behavior: Evidence from Panel Var," *The Quarterly Review of Economics and Finance*, 46(2), pp. 190–210.

Mendicino, C. and M. T. Punzi, (2014), "House Prices, Capital Inflows and Macroprudential Policy," *Journal of Banking & Finance*, 49, pp. 337–355.

Mian, A. and A. Sufi, (2015), House of Debt: How They (And You) Caused the Great Recession, and How We Can Prevent it from Happening Again, University of Chicago Press.

Mian, A.; A. Sufi and E. Verner, (2017), "Household Debt and Business Cycles Worldwide," *The Quarterly Journal of Economics*, Vol. 132, Issue 4, 1 November, pp. 1755–1817.

Obstfeld, M. and K. Rogoff, (1995), "The Intertemporal Approach to the Current Account," *Handbook of International Economics,* 3, pp. 1731–1799.

Pari`E S, M. D.; C. K. Sørensen; D. Rodriguez-Palenzuela, et al., (2011), "Macroeconomic Propagation Under Different Regulatory Regimes: Evidence from an Estimated DSGE Model for the Euro Area," *International Journal of Central Banking*, 7(4), pp. 49–113.

Punzi, M. T. and K. Rabitsch, (2017), "Effectiveness of Macroprudential Policies Under Borrower Heterogeneity," *Journal of International Money and Finance.*

Sa, F. and T. Wieladek, (2011), "Monetary Policy, Capital Inflows and the Housing Boom," Globalization and Monetary Policy Institute, WP 80, Federal Reserve Bank of Dallas.

Schmitt-Grohe, S. and M. Uribe, (2003), "Closing Small Open Economy Models," *Journal of International Economics*, 61(1), pp. 163–185.

Schularick, M. and A. M. Taylor, (2012), "Credit Booms Gone Bust: Monetary Policy, Leverage Cycles, and Financial Crises, 1870–2008," *The American Economic Review*, 102(2), pp. 1029–1061.

Shiller, R. J., (2014), "Why is Housing Finance Still Stuck in Such A Primitive Stage?" *The American Economic Review*, 104(5), pp. 73–76.

Subhanij, T., et al., (2009), "Household Sector and Monetary Policy Implications: Thailand's Recent Experience," p.136, Ch 4002 Basel, Switzerland.

Chapter 2

MACROECONOMIC DIMENSIONS OF INDIA'S HOUSEHOLD DEBT

By

Dirghau Keshao Raut[1]

1. Introduction

Borrowing by individuals for different purposes such as acquiring assets, consumption, purchasing consumer goods and for education are considered as household debt. Individuals borrow from banks, other financial institutions, relatives and friends (Box). While borrowing from banks and financial institutions can either be secured or unsecured, money borrowed from relatives and friends is generally unsecured. Borrowing helps households to improve their income or standard of living by allowing them to smoothen consumption/investment over time. Thus, borrowing for consumption as well as investment by the households can augment economic activity. However, household debt beyond a threshold level could be vulnerable for the financial system and the individual. For example, individuals can default on loans in case of income/job loss; individuals can default when the price of the asset they use as collateral decreases because they will be paying a higher loan relative to the market value; or individuals could spend a lower amount of money on goods and services. Harari (2017) pointed out that a high level of household debt could lead to a reduction in consumer spending other than posing risks to the financial system such as the sub-prime mortgage crisis in the U.S. in 2008.

Credit to households in India is provided by both banks and non-banking financial companies (NBFCs). However, the detailed time series data are available only on bank credit to the household sector which is called personal loans. The data on bank credit to household sector is available at monthly frequency from April 2007. Bank credit to households includes advances for consumer durables, housing loans, advances against fixed deposits, advances against shares and bonds, credit card outstanding, loans for education purpose, vehicle loans and other personal loans.

1. Assistant Adviser, Department of Economic and Policy Research, Reserve Bank of India. The views expressed in the paper are those of the author and not of the Reserve Bank of India or The SEACEN Centre.

Box: Household Indebtedness: All India Debt and Investment Survey

The comprehensive data on household debt in India is based on the All India Debt and Investment Survey conducted by the National Sample Survey Office (NSSO) at a frequency of every ten years. This survey provides data on household debt classified into institutional and non-institutional sources, different rates of interest, varying duration of loans, types of security and purposes of loan. It also provides separate data on outstanding debt for rural and urban households, state-wise, occupation-wise etc. As per the latest survey, the data is available for 2012. The survey was conducted for the whole of India covering a total 110,800 households (62,135 rural households and 48,665 urban households) in visit 1 and 108,421 households (61,650 rural households and 46,771 urban households) in visit 2,in 4,529 rural villages and in 3,507 urban blocks. As per the survey, the incidence of indebtedness i.e., the percentage of indebted households as of June 30, 2012 was 31.4 % in rural households and 22.4 % for urban households and their average amount of debt was Rs. 103,457 for rural households and Rs. 378,238 for urban households. The survey pointed out the significant role played by institutional agencies in providing credit with a moderate rate of interest (6% to 15%). The survey also observed that the percentage of outstanding cash debt at interest rate higher than 15 %stood at 38.6% for rural households and 16.4% for urban households.

Source: Government of India, (2016), Household Indebtedness in India, Ministry of Statistics and Programme Implementation, Report of National Sample Survey Office, 70th Round.

A cross-country comparison shows that India's household debt as a percent of GDP is much lower than the average of all countries and also the average for emerging markets. It is also lower than other major economies in South-east Asia, viz., Malaysia and Thailand (Table 1). Further, the household debt to GDP ratio of India remained unchanged at 10.7 % as against an increase recorded in Malaysia, Thailand and an average of emerging markets, over the period of 2008-2017.

Table 1: Household Debt to GDP ratio (%)*

End-March	Emerging Markets	All Countries	Advanced Economies	India	Malaysia	Thailand
2008	22.9	66.8	82.9	10.7	50.7	44.2
2009	20.0	59.9	75.7	10.2	51.4	46.2
2010	25.7	63.8	79.8	9.2	58.6	50.0
2011	26.8	63.6	81.6	9.2	59.8	53.5
2012	26.1	58.4	75.6	8.9	61.2	60.2
2013	28.5	58.0	74.6	9.0	64.9	62.6
2014	30.0	58.6	75.5	9.0	68.0	66.6
2015	30.3	54.7	69.3	9.4	69.6	69.3
2016	34.3	60.0	75.2	10.2	70.7	70.5
2017	37.1	59.8	73.4	10.7	68.9	69.2
Variation (2017-2008)	**14.2**	**-7.0**	**-9.5**	**0.0**	**18.2**	**25.0**

* Refers to 'credit to households and non-profit institutions serving households' as % of GDP (updated on December 3, 2017).

Source**:** Bank for International Settlements.

Against this backdrop, this paper examines the macroeconomic dimensions of household debt in India, using cointegration and the vector error correction model. Section 2 covers a brief review of literature whereas stylized facts about household credit in India are outlined in Section 3. Data, methodology and empirical results are presented in Section 4. Some concluding observations are provided in Section 5.

2. Review of Literature

The macroeconomic impact of household debt has been an area of interest among researchers. However, the issue of household debt emerged as an important research topic in the aftermath of the global financial crisis. Various aspects of household debt such as its relationship with macroeconomic variables, quality of bankruptcy law and the impact of debt on income inequality have been analysed by researchers in central banks and academics. A paper by Crawford and Faruqui (2012) analyzed household debt in Canada and observed that income growth and low interest supported increase in home-ownership rates and mortgage debt. Soh et al. (2017), examined the impact of different types of household credit on income growth and inequality in Malaysia and found that housing credit is positively associated with future income growth. However, they did not find such evidence with regard to consumption credit. Further, they observed that the accumulation of housing credit for existing borrowers may worsen income inequality.

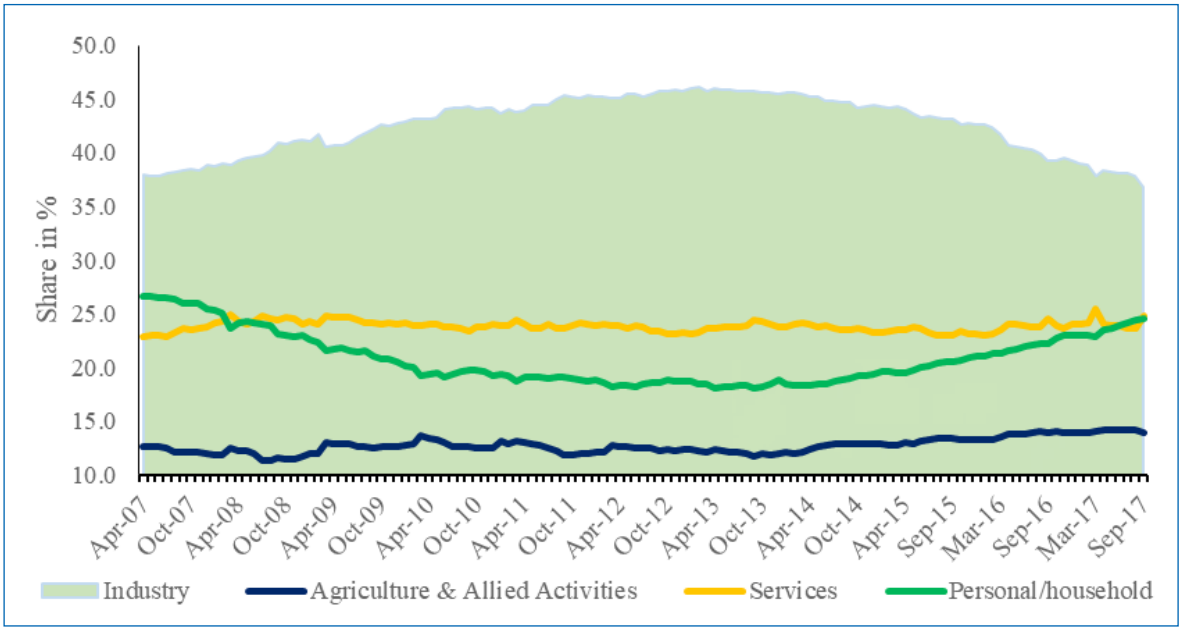
Carr and Jaydev (2014), examining indebtedness among U.S. households based on the Panel Study of Income Dynamics data for 1999-2009, found that there is a positive link between debt growth and income growth. Further, they also found that the rate of increase in leverage was quicker among lower income households compared to other households. Coletta et al. (2015), studied determinants of household debt in a panel framework consisting of data for 33 countries for the period 1995-2013. They observed that the debt is greater in countries with higher per capita GDP and household wealth. They also found that a positive relationship exists between the quality of bankruptcy law and the level of household debt.

In the Indian context, a study by Badarinza et al. (2016) analyzed household balance sheets based on the All India Debt and Investment Survey (AIDIS) and observed that non-financial assets dominate Indian households' wealth. Further, they also found that the differences among households in terms of share of non-financial assets in their balance sheet are associated with rural-urban divide, education, family composition, wealth and age. A strong substitution effect between gold and real estate in the household balance sheet was also observed by them. The Committee on Household Finance (Chairman - Prof. Tarun Ramadorai) constituted by the Reserve Bank of India submitted its report in 2017 and observed that besides dominance of physical assets in Indian household wealth; durable goods and gold comprised the largest fraction among young households while the largest share of wealth is held in land and housing as households approach retirement age. The committee opined that holding of assets and liabilities by Indian households cannot be explained by differences in the demographic characteristics, wealth, or income. The committee also observed that the properties of Indian household balance sheets are difficult to explain using a standard lifecycle portfolio choice model.

3. Household Credit in India - Stylized Facts

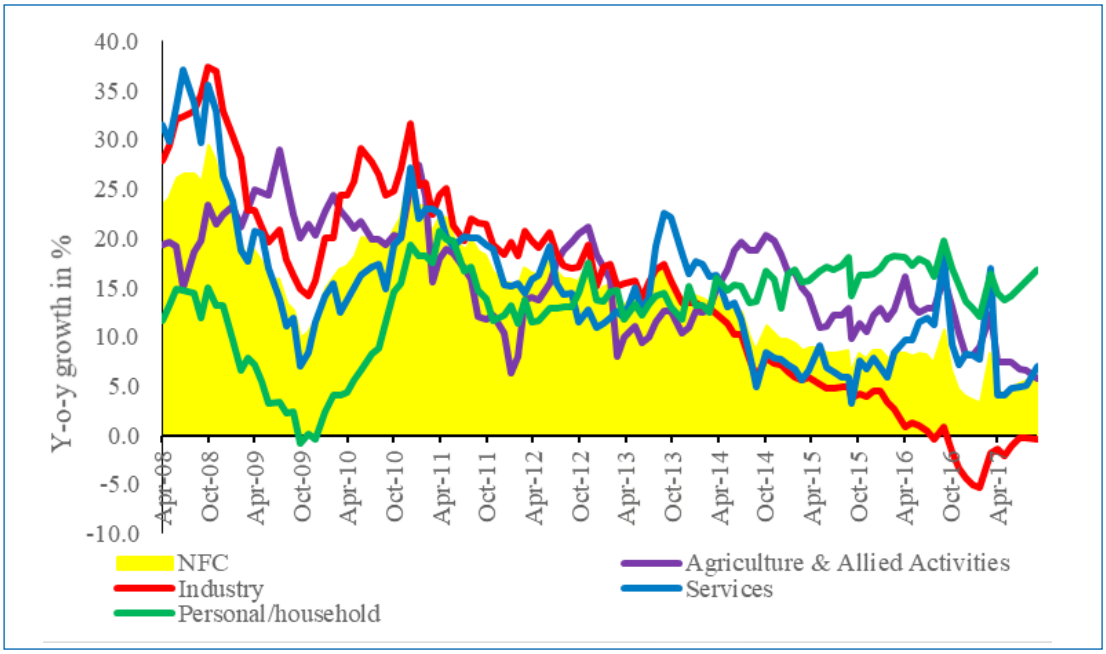
Household credit is an important part of credit portfolio of banks in India. The share of household credit in total non-food credit has increased in recent years (Chart 1). As at end-November 2017, household credit by banks accounts for around 25 % of the total non- food credit.

Chart 1: Share of Major Sectors in Non-food Credit



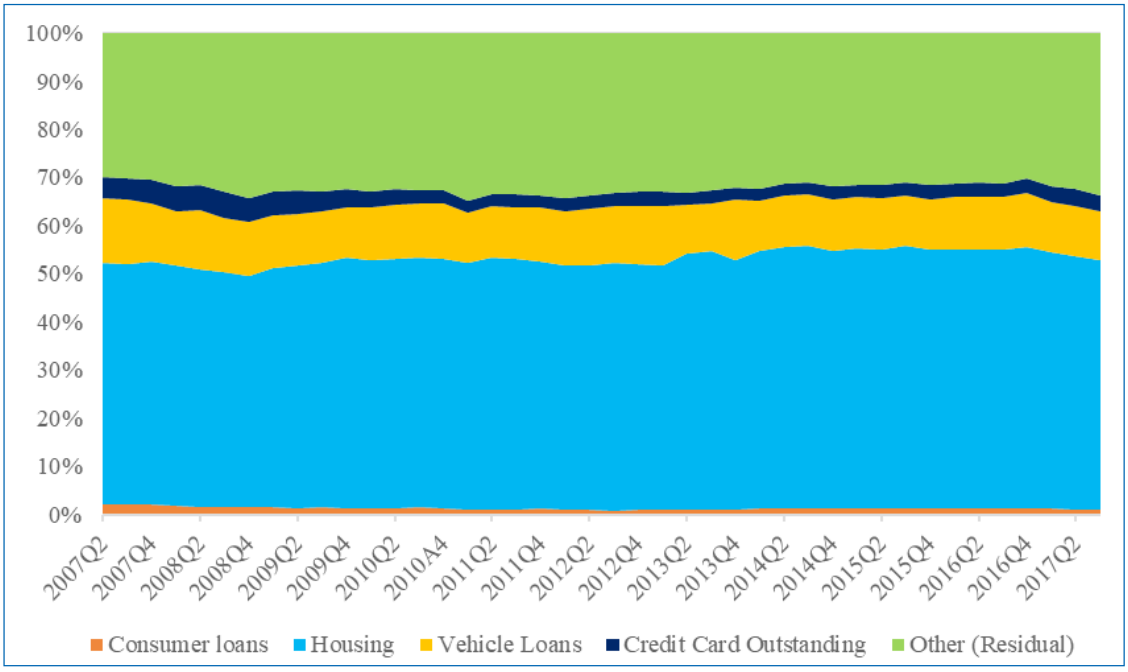
The long-term trend in bank credit reveals that there has been a slowdown in credit growth in the aftermath of the global financial crisis in mid-2009 (Chart 2). While all major sectors recorded credit slowdown during this period, the slowdown was more pronounced in the household sector. Contrary to this trend, household credit has picked up since then, and has grown steadily and outpaced overall credit growth in recent years. However, sectoral credit data shows that there is a divergence in credit growth across sectors during the previous three years. For example, credit to the industrial sector which has been decelerating gradually from the second half of 2010 became negative in 2017 due to various factors including a high level of non-performing assets (NPAs) and growth slowdown in the industrial sector. Credit to the services and agriculture sector has also been moderating generally, albeit with an intermittent uptick for a short period.

Chart 2: Credit Growth across Sectors



The healthy growth of household credit is driven largely by housing loans. Bank credit to the household sector in India is dominated by housing loans which account for more than 50% followed by other personal loans accounting for 25% (Chart 3). Among others, vehicle loans comprise around 10% of the bank credit to households.

Chart 3: Composition of Household Credit by Banks



The growth of household credit by banks has been varying across its components (Chart 4). While growth in housing loans, personal loans and credit card has been relatively stable at around 15%, 25% and more than 25% respectively, consumer loan and vehicle loan growth remained volatile. On the other hand, the growth in education loans recorded a gradual decline during the last 10 years. The high growth of housing loans could be attributable partially to incentives provided by the government such as income tax benefit for principal and interest amount, and interest subvention for housing loans of small amounts. In 2015, the government launched a scheme called 'Housing for All by 2022' under which the government provides an interest subsidy on housing loans availed by beneficiaries. The Reserve Bank of India has been rationalizing the prudential measures with respect to individual housing loans from time to time (Table 2). For example, in June 2017, the Reserve Bank of India rationalized risk weights, the standard asset provisioning rate and loan-to-value (LTV) ratio for individual housing loans, as a countercyclical measure.

Chart 4: Growth in Household Credit - Components

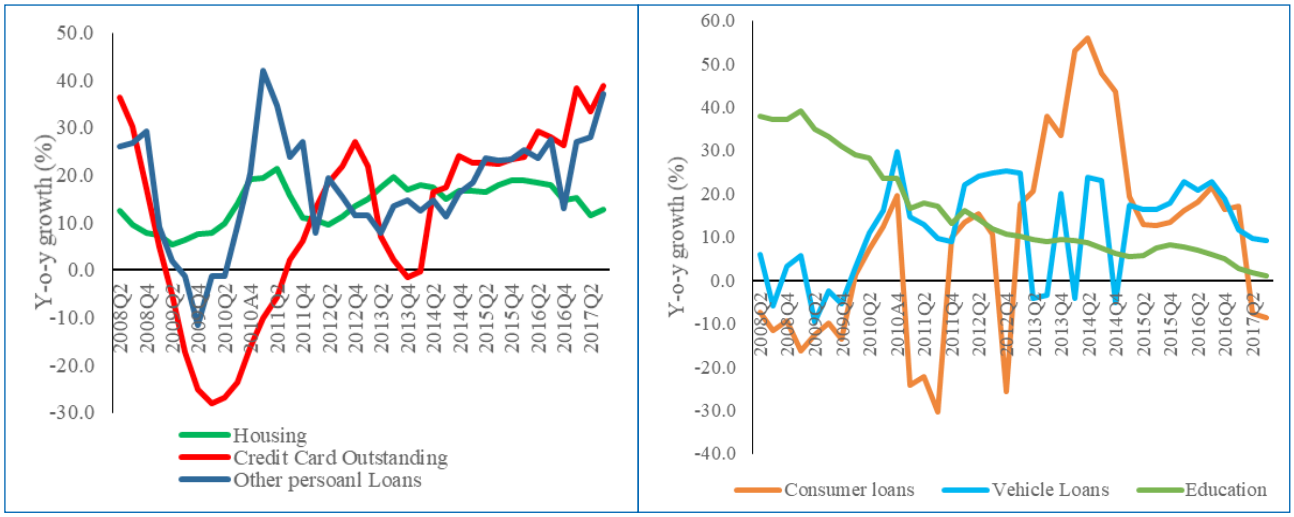


Table 2: Loan to Value Ratio, Risk Weights and Standard Asset Provision

Outstanding Loan	LTV Ratio (%)	Risk Weight (%)	Standard Asset Provision (%)
June 7, 2017			
Up to Rs.30 lakh	≤ 80	35	0.25
	> 80 and ≤ 90	50	
Above Rs.30 lakh and upto Rs.75 lakh	≤ 80	35	
Above Rs.75 lakh	≤ 75	50	
October 8, 2015			
Upto ₹ 30 lakh	≤ 80	35	
	> 80 and ≤ 90	50	
Above ₹ 30 lakh and upto ₹ 75 lakh	≤ 75	35	
	> 75 and ≤ 80	50	
Above ₹ 75 lakh	≤ 75	75	
June 21, 2013			
(a) Individual Housing Loan			
(i) Up to ₹ 20 lakh	90	50	0.40
(ii) Above ₹ 20 lakh and upto ₹ 75 lakh	80	50	0.40
(iii) Above ₹ 75 lakh	75	75	0.40
(b) CRE-RH	NA	75	0.75
(c) CRE	NA	100	1.00

CRE-RH: Commercial Real Estate–Residential Housing.
Source**:** Reserve Bank of India.

4. Data and Empirical Results

The study analyses both quarterly and annual data on household debt. The quarterly data on bank credit to household sector used in the study is from April 2007 to September 2017 (2007Q2:2017Q3- a total of 42 observations). The analysis is based on data on outstanding bank credit to household sector (used as a proxy of household debt) and 10-year G-sec yield (a proxy for interest rate) sourced from the Reserve Bank of India, real gross value added (GVA)/gross domestic product (GDP) of base year 2011-12[2] sourced from the Ministry of Statistics and Programme Implementation, equity price index i.e., BSE Sensex (1978-79=100) sourced from the Bombay Stock Exchange and Consumer Price Index-Industrial Workers (CPI-IW Base year 2001) sourced from the Labour Bureau, Government of India. The analysis has also been done based on annual data for 31 years from 1986-87 to 2016-17. The data included in the annual exercise pertains to changes in households' financial liabilities

2. GDP factor cost at 2004-05 prices spliced with GVA at basic price of 2011-12 in order to make a consistent series of 2011-12 base.

(a proxy for household debt) sourced from Ministry of Statistics and Programme Implementation, Government of India, 10-year G-sec yield and real GVA/GDP (base year 2011-12).

There is a presence of seasonality in the quarterly data of GVA/GDP emanating from the pattern of slack and busy season of industrial production and agricultural production which is typically divided into kharif and rabi season. Similarly, there appears to be a seasonality in the data of household credit and private final consumption expenditure. Accordingly, the quarterly data on GVA/GDP, household credit and private final consumption expenditure is seasonally adjusted.

The long-run relationship between household debt and macroeconomic variables is examined estimating the Johansen cointegration test and vector error correction model. As a first step toward this method, all the variables used in this study are checked for stationarity both in levels and in the first difference. The Augmented Dickey Fuller (ADF) test and Phillips Perron test were deployed to obtain evidence on stationarity. The results of these tests revealed that the variables used in this study were non-stationary at level but stationary in first difference (Table 3).

Table 3: Results of Unit Root Test

Variable	Phillips Perron Test		ADF Test	
	Level	First Difference	Level	First Difference
Quarterly 2007Q2:2017Q3				
lrhhd_sa	2.45	-3.55*	0.45	-4.94*
lrgdp_sa	-1.62	-7.00*	-0.91	-6.54*
rate	-2.24	-7.49*	-2.19	-6.84*
lequity	-1.14	-4.00*	-0.90	-4.29*
lpfce_sa	-1.03	-11.94*	-0.61	-8.59*
Annual 1987-2017				
lrchhl	-0.22	-7.74*	-0.59	-6.83*
lrgdp	3.03	-4.49*	2.74	-4.49*
rate	-0.98	-3.44**	-1.26	-3.49**
lequity	-1.60	-5.40*	-1.62	-5.40*

Note: * and ** indicates that the variable is stationary or I(0) at 1 % and 5 % level of significance, respectively.
Quarterly data are seasonally adjusted (except 10 year G-sec yield and equity prices).
Automatic lag selection based on SIC criteria.

lrhhd_sa: natural logarithm of seasonally adjusted real household credit
lrgdp_sa: natural logarithm of seasonally adjusted real gross domestic product/gross value added
rate: Weighted average 10-year G-sec yield
lequity: natural logarithm of BSE Sensex
lpfce_sa: natural logarithm of seasonally adjusted real private final consumption expenditure
lrchhl: natural logarithm of real flow (change) of households' financial liabilities

In view of the evidence of non-stationary processes, we proceed to the cointegration analysis to examine the relationship between household debt, GDP and interest rate in the long-run which were non-stationary at level form. Accordingly, cointegration among these variables was examined using the Johansen cointegration test (Table 4). The results show a cointegrating relationship between household debt, GDP and interest rate. This cointegrating relationship also holds when the variable representing equity prices is added. Further, the cointegrating relationship between changes in household liabilities, GDP and interest rate was also observed when the Johansen cointegration test was performed based on annual data. However, the long-run cointegrating relationship expected between private final consumption expenditure and household debt was not evident.

Table 4: Results of Johansen Cointegration Tests

	Trace Test			Eigenvalue Test			Conclusion
Variables	Trace Statistics	0.05 Critical Value	Prob.**	Max-Eigen Statistics	0.05 Critical Value	Prob.**	
lrhhd_sa, lrgdp_sa, rate **(Quarterly)**	82.56	35.19	0.00	44.55	22.30	0.00	Cointegrated*
lrhhd_sa, lrgdp_sa, rate,lequity **(Quarterly)**	55.23	47.85	0.00	29.95	27.58	0.02	Cointegrated*
lrchhl, lrgdp, rate **(Annual)**	33.47	29.79	0.02	24.68	21.13	0.02	Cointegrated*
lpfce_sa, lrhhd_sa **(Quarterly)**	8.22	15.49	0.44	8.22	14.26	0.36	Not cointegrated

*Both trace test and max-eigenvalue tests indicate cointegrating equation(s) at the 0.05 level of significance.
Lag selection is based on AIC criteria.

lrhhd_sa: natural logarithm of seasonally adjusted real household credit
lrgdp_sa: natural logarithm of seasonally adjusted real gross domestic product/gross value added
rate: Weighted average 10-year G-sec yield
lequity: natural logarithm of BSE Sensex
lpfce_sa: natural logarithm of seasonally adjusted real private final consumption expenditure
lrchhl: natural logarithm of real flow (change) of households' financial liabilities

As discussed above, the empirical method used is the cointegration analysis and vector error correction model. After testing for stationarity and cointegration, the relationship between household debt and its determinants viz., GVA/GDP, interest rate and equity prices is analysed by estimating the vector error correction model (equation 1 and equation 2)[3]. The results show the expected signs of coefficient in both the equations. For example, household debt is found to be positively related to GDP. A one percent increase in GDP leads to 0.84% increase in household debt (equation 1). In order to obtain evidence on the direction of causality between household debt and GDP, the granger causality test based on quarterly data was carried out which revealed unidirectional causality running

3. Quarterly data from 2007Q2 to 2017Q3.

from GDP to household debt. On the other hand, a negative relationship between interest rate and the level of household debt is also on the expected lines. However, the impact of increase in interest rate on household debt is relatively smaller i.e., a one percent increase in interest rate leads to 0.11% decline in household debt.

*Log (rhhd_sa)=-3.77+0.84*log(rgdp_sa)-0.11*rate……..*(1)
(9.53) (-6.70)
Error correction term:-0.19
(-2.95)
(Note: Figures in the bracket are t-values)

Variables definition:
rhhd_sa: seasonally adjusted real household credit; *rate:* Weighted average 10-year G-sec yield
rgdp_sa: seasonally adjusted real gross domestic product/gross value added

Similar results were observed when the impact of interest rate and GDP on changes in household liabilities was analysed based on annual data for the period 1987 to 2017[4].

From the investment point of view, the return on equities are often compared with the return from investment in real estate. Therefore, the movement in equity prices can impact the level of real estate investment particularly housing, and thus the level of household debt. For example, an investor can either invest his money in stock market or he/she can invest his/her funds in housing by borrowing some money from banks. A study by Jorda et al. (2017) argued that investor returns on housing and equity may differ due to differences in transaction costs, taxes, liquidity and financial structure of the investment claim. Kim (2014) identified stock prices as one of the reasons for an increase in household debt coupled with GDP, interest rate and housing price. In view of this phenomenon, the equity prices are included in the estimation (equation 2). With the inclusion of equity price, the relationship of household debt with GDP and interest rate in terms of signs of coefficient remained unchanged. However, the impact of GDP on household debt cannot be compared with the estimation without equity prices on grounds of low t-value even though the coefficient of GDP shows positive sign. On the other hand, the impact of interest rate on household debt was higher as compared to the estimation without equity prices. As expected, the equity prices are found to be negatively associated with the level of household debt. A one percent increase in equity price leads to a decline in household debt by 0.72%.

4. Results based annual data from 1987 to 2017

*Log (rchhl)=-6.04+0.85*log(rgdp)-0.11*rate…….* (3)
(6.55) (-3.60)
Error correction term:-0.57
(-3.67)
(Note: Figures in the bracket are t-values)

Variables definition:
rchhl: real flow (change) of households financial liabilities; *rate:* Weighted average 10-year G-sec yield
rgdp: real gross domestic product/gross value added

*Log (rhhd_sa)=5.83+0.59*log(rgdp_sa)-0.17*rate-0.72*log(equity)…….(2)*
(1.63) (-2.76) (2.68)
Error correction term: 0.05
(5.41)
(Note: Figures in the bracket are t-values)

Variables definition:
rhhd_sa: seasonally adjusted real household credit; *rate:* Weighted average 10-year G-sec yield
rgdp_sa: seasonally adjusted real gross domestic product/gross value added
equity: equity price index (BSE Sensex)

The Committee on Household Finance (2017) pointed out that in India, the average household holds 77% of its total assets in the form of real estate and 5% in the form of financial assets. This indicates that the asset portfolio of Indian households is dominated by the real estate. The trend in the house price index compiled by the Reserve Bank of India and the equity price index i.e., BSE is shown in Chart 5a and 5b. As depicted in Chart 5a, frequent ups and downs in the equity price index reflects its sensitivity to economic and financial market development in both the domestic as well as global economy. On the other hand, the house price index generally shows a gradual increase over a period of time. Further, a comparison of the cumulative increase in both these indices over a period of around six years (2011Q2 to 2017 Q2) shows that the increase in house prices was higher than that of equity prices.

Chart 5a: House Price Index vis-a-vis Equity Price Index

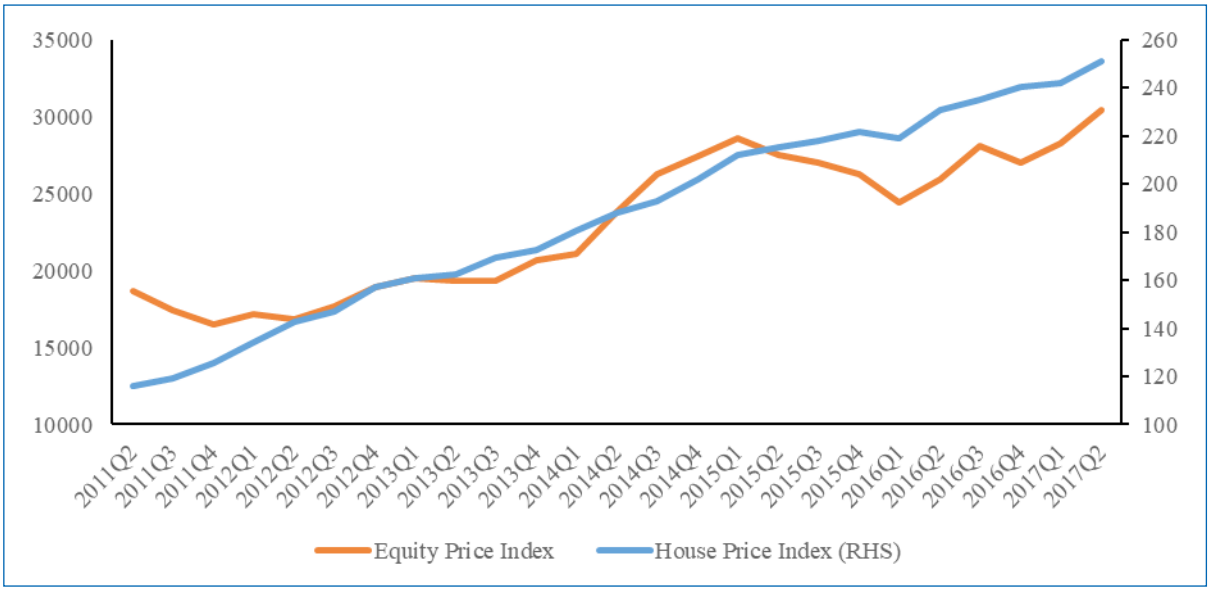
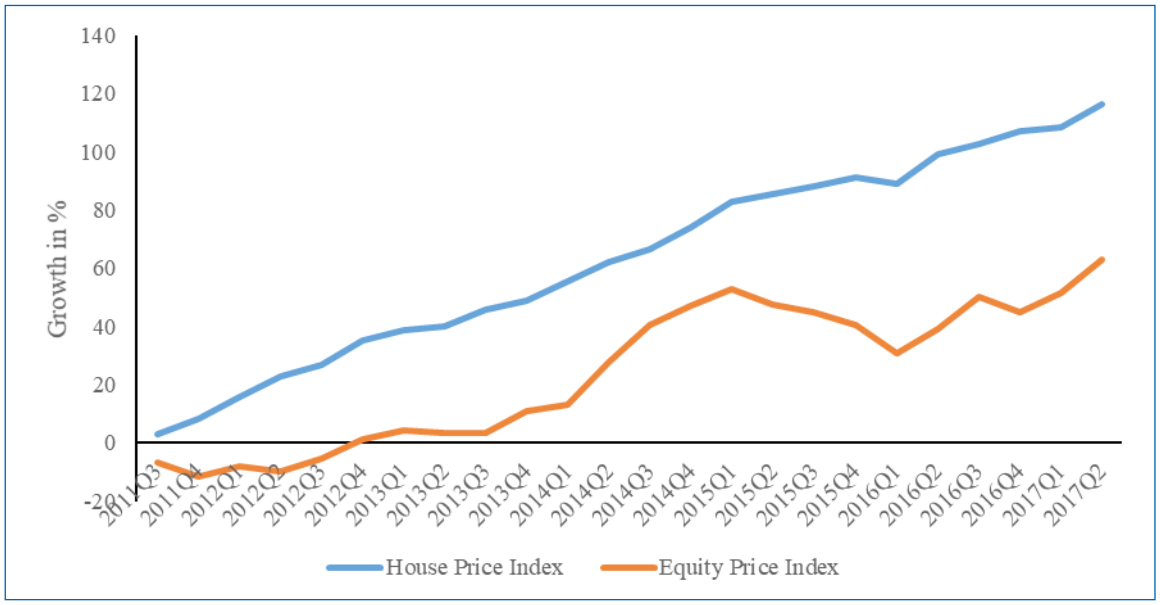


Chart 5b: Cumulative Growth in House and Equity Price Indices



5. Concluding Observations

The study has examined various dimensions of the household credit of banks in India which includes the growth rate of household credit vis-à-vis other sectors, macroprudential regulations by the Reserve Bank of India, government initiatives for housing loans and the behavior of the components of bank credit to the household sector. It also compares the return on housing and equity prices by comparing both the indices. The study observed that bank credit to the household sector grew at a higher rate than the overall bank credit, dominated by housing loans. It also observed that over the years, house prices recorded a steady increase and outpaced equity prices, implying more return on investment in housing as an asset. Empirical evidence revealed the robust income elasticity of household credit. However, the role of interest rate in influencing household credit was somewhat muted. As expected, there has been evidence of a negative relationship between household debt and equity prices. With regard to the role of household debt in influencing private final consumption expenditure, this study could not find any such evidence. These findings are based on bank credit to households and may not be the same when the credit extended by non-banking financial companies are taken into consideration. From the sustainability perspective, even though the household debt to GDP ratio of India has been rising over the past three years, it is much lower than other countries in South-east Asia. Further, low interest rates, improved financial savings and proactive macroprudential regulations provide an additional impetus for ensuring the sustainability of household debt going forward.

References

Badarinza C.; V. Balasubramaniam and T. Ramadorai, (2016), The Indian Household Savings Landscape, NCAER India Policy Forum 2016, Available at: http://www.ncaer.org/events/ipf-2016/IPF-2016-Paper-Badarinza-Balasubramaniam-Ramadorai.pdf

Carr M. D. and A. Jayadev, (2014), "Relative Income and Indebtedness: Evidence from Panel Data," *Review of Income and Wealth 2014*, Available at: http://faculty.www.umb.edu/michael.carr/carr_jayadev2014.pdf

Coletta M.; R. D. Bonis and S. Piermattei, (2015), Household Debt: A Cross-country Analysis, Available at: https://www.bancaditalia.it/pubblicazioni/altri-atti-convegni/2015-analysis-household-finances/papers/3.Coletta_DeBonis_Piermattei.pdf

Crawford A. and U. Faruqui, (2012), "What Explains Trends in Household Debt in Canada?" *Bank of Canada Review,* Winter 2011–2012.

Government of India, (2016), Household Indebtedness in India, Ministry of Statistics and Programme Implementation, Report of National Sample Survey Office, 70th Round.

Harari D., (2017), Household Debt: Statistics and Impact on Economy, Briefing Paper Number 7584, The House of Commons Library, Available at: http://researchbriefings.parliament.uk/ResearchBriefing/Summary/CBP-7584

Jordà Ò.; K. Knoll; D. Kuvshinov; M. Schularick and A. M. Taylor, (2017), "The Rate of Return on Everything, 1870–2015," *Working Paper Series*, Federal Reserve Bank of San Francisco.

Kim, H. J.; D. Lee; J. C. Son and M. K. Son, (2014), "Household Indebtedness in Korea: Its Causes and Sustainability," *Japan & the World Economy*, Volume 29, pp. 59-76.

Reserve Bank of India, (2017), Committee on Household Finance, Final Report, 24 August.

Soh J.; A. Chong and K. Chuah, (2017), "Household Credit, Growth and Inequality in Malaysia: Does the Type of Credit Matter?" *Bank for International Settlements Papers,* No 91, Financial Systems and the Real Economy.

Chapter 3

THE NEXUS BETWEEN HOUSEHOLD DEBT, CONSUMPTION AND HOUSE PRICES IN MALAYSIA

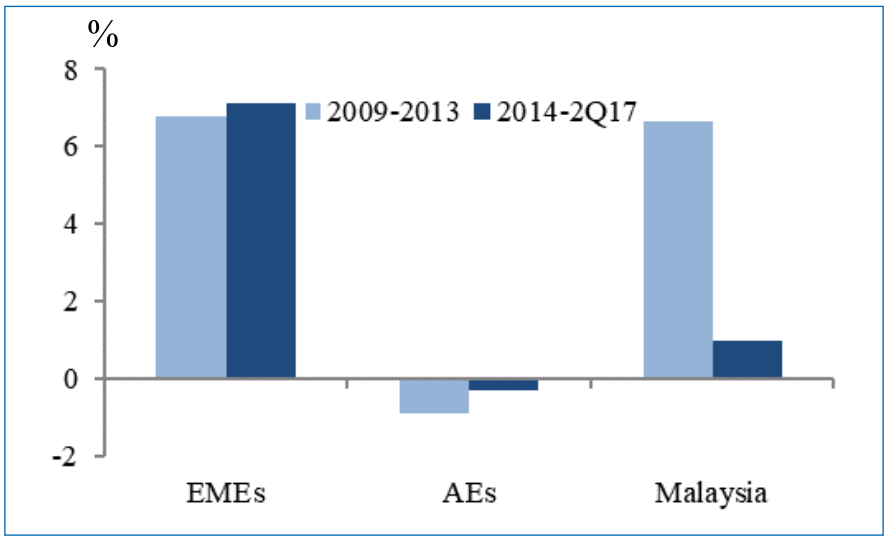
By

Muizz Aziz[1]

1. Introduction

During the period leading up to the Global Financial Crisis, household debt across the advanced economies (AEs) surged to historic highs. The collapse of house prices ushered in the recession and the ensuing household deleveraging. Following this, growing attention has been paid towards household debt amid its significant role in propagating shocks. Although the annual change in average household debt level, as a share of GDP, has been slowly declining in the advanced economies (AEs), the opposite trend is observed among the emerging market economies (EMEs) (Chart 1). For Malaysia, the household debt-to-GDP ratio has experienced a steep increase from 64% in 2007 to a peak of 89% as at end-2010, with a double-digit average growth of 10.6% (end-2010: 14.2% (peak)).

Chart 1:
Average Annual Growth of Household Debt-to-GDP



Source: Bank for International Settlements and Bank Negara Malaysia.

1. Associate Analyst, Financial Surveillance Department, Bank Negara Malaysia. The author would like to thank Qaiser Iskandar Anwarudin, Shasha Kartini Ridzam, Lau Chin Ching, Siti Hanifah Borhan, Khirul Ezar Mohd Khir, Lim Sheng Ling and participants of the SEACEN Household Debt Seminar for their comments. Email: muizz@bnm.gov.my

Disclaimer: This paper represents the views of the author and may not necessarily be those of Bank Negara Malaysia (BNM) or BNM policy. The views expressed herein should therefore be attributed to the author and not to BNM.

Household debt accumulation allows households to undertake large investment or smooth consumption over their life time. However, when acquired excessively, it can also be a source of vulnerability to financial stability and the broader economy. Various studies have shown that an excessive increase in household debt is a good early warning indicator for banking crisis (see Gourinchas and Obstfeld, 2012; Drehmann and Tsatsaronis, 2014; and Jorda et al. 2016) Further, the finding by Mian and Sufi (2011) where regions with higher household debt growth prior to the financial crisis tend to experience more severe and prolonged recession supported this concern.

Against this backdrop, understanding the determinants of household debt and how it could affect the macroeconomic and financial stability is crucial in ensuring sustainable household debt levels. The aim of this paper is twofold. First, to identify the determinants of Malaysia's household debt by employing an autoregressive distributed lag model (ARDL). Secondly, it attempts to provide empirical evidence of potential implications of household debt on house prices and private consumption. This is achieved using conditional structural vector auto-regression (VAR) based on various growth paths of household debt.

The rest of this paper is structured as follows. Section 2 will give a brief overview of the theory and literature on the determinants of household debt and the nexus between household debt, house prices and private consumption. Section 3 will cover recent developments on household debt in Malaysia. Section 4 will describe the empirical strategy and the data utilized. The results are presented in Section 5. Finally, Section 6 discusses the policy implications of the findings and concludes.

2. Literature review

2.1 Theoretical Determinants of Household Debt

This section will shed some light on both the demand- and supply-side factors that can contribute to changes in household debt based on existing theoretical and empirical literatures. A particular focus will be on the influence of macroeconomic variables in determining the changes in household debt.

Life-cycle/permanent income hypothesis is one of the most prominent models in explaining households' demand for credit (Modigliani and Brumberg, 1954; Friedman, 1957). The model suggests that households choose the consumption path which maximize their utilities over their lifetime, subject to their intertemporal budget constraints. When households are faced with lower income levels in the earlier stage of life (i.e., studying or starting work), they tend to borrow to finance large expenditure or investments, in anticipation of higher future income. This allows households to consume more than their current income levels, hence smoothing their consumption path over time. In estimating the empirical evidence of this model, macroeconomic variables such as consumption, income or economic activities are common proxies.

Households will also consider the cost of borrowing or interest rate when acquiring debt. Lower interest rate is often associated with increased household debt, as cheaper cost of borrowing will increase households' borrowing capacity (Crawford and Faruqui, 2011; Martins and Villanueva, 2003; Debelle, 2004). While evidence has supported the negative relationship between interest rates and demand for loans, the link is more nuanced with regard to the supply of loanable funds by financial institutions. Although higher net interest income due to an increasing interest rate could induce financial institutions to lend more, it could also be associated with increasing credit risks of borrowers (Stiglitz and Weiss, 1981).

Besides income and interest rates, other types of assets owned by households – usually in the form of real properties – can improve their access to financing (Iacovello, 2005). Positive wealth effects (i.e., due to appreciation of asset values) is associated with higher expected income - through higher rental income or reselling profit - which could lead to an increase in current consumption. With respect to the supply of credit, the information asymmetry[2] often faced by financial institutions is significantly reduced by requiring borrowers to pose these assets as collateral. As a result, the reduction of lenders' credit risks for collateralized loans would increase their willingness to lend.

As a common yardstick for the cost of living, higher inflation is expected to lead to an increase in household borrowings, particularly for loans for consumption purposes (e.g., credit cards). However, inflation could also have the opposite effect – as higher inflation is associated with higher nominal borrowing rates and upfront payment – limiting households borrowing capacity given limits on debt service (Debelle, 2004; Bank of England, 2002; Miles, 1994). Therefore, the overall effect of inflation on household debt depends on the magnitude of each of the opposing effects.

There are growing empirical studies in Malaysia that attempt to estimate the determinants of household debt. For example, Khan et al. (2016) found that income, house price, inflation and an increase in working population contribute positively to household debt, while interest rate has a negative relationship. Nizar (2015) claimed that consumption contributes positively to the increase in consumption debt. While most studies focus on the influence of macroeconomic variables on household debt in Malaysia, largely due to the data availability, there are various other factors that could influence changes in household debt. These include: (i) development and liberalization of the financial sector; (ii) greater competition between financial institutions; (iii) financial innovation; and, (iv) government policies (Endut and Hua, 2009).

2.2 The Effects of Household Debt on Consumption and House Prices

As discussed in the previous section, the life-cycle/permanent income theory argues that access to credit allows households to smooth their consumption over their lifetime, hence improving their utility or welfare. This smoother intertemporal consumption pattern is also beneficial for macroeconomic and financial stability. However, household debt could also have adverse effects once the assumptions underpinning this theory are relaxed (e.g., when consequences of borrowing constraints and negative externalities are considered) (IMF 2017). For example, the theory assumes that households make rational and forward-looking decisions. In practice, excessive indebtedness could be due to short-sighted households – who tend to strongly value current consumption over future consumption (hyperbolic discounting) – with higher tendency to acquire consumption loans and postpone saving decisions (Laibson 1997).

As evidenced during the Global Financial Crisis, household debt can be a source of vulnerability to financial and economic stability. Of significance, an increase in household debt is found to be a good early warning indicator for banking crisis (see Gourinchas and Obstfeld, 2012; Drehmann and Tsatsaronis, 2014; and Jorda et al. 2016). With regards to the financial sector, potential risks to its stability from high household indebtedness usually emanate from the collateral or housing channel. Weaker household balance sheets – due to high level of household debt relative to assets or income – can significantly reduce their debt repayment capacity. As a result, negative shocks to their

2. Refers to situation where borrowers possess more information (e.g., on their debt repayment capacity) than the lenders

balance sheets (e.g., lower income, increase in debt servicing cost, reduction in assets) will increase the likelihood of default. Concurrently, the ensuing increase in credit risks for lenders will reduce the appetite to lend to households. As a majority of collateralized loans are backed by houses, the constraint in accessing credit will eventually put a downward pressure on house prices. Subsequently, the reduction in household assets will bring about further deterioration in debt servicing capacity and more defaults (i.e., second-round effects). In addition, the negative wealth effects due to the decline in house prices could also result in reduced consumption (Mian and Sufi, 2016).

Over-indebtedness can also pose risks to the stability of the broader economy, generally through consumption. In an attempt to deleverage – typically due to debt overhang or negative shocks - highly indebted households may cut their current consumption. This will result in a reduction of aggregate demand and investments in the economy. The negative effects to the real economy could be compounded by the second round effects through lower employment or income levels, inducing households to cut their spending further.

Various studies have provided empirical evidence on the trade-offs between the positive effect of household debt on consumption in the short-run, and a negative one in the medium- to long-run. For example, a panel study by Lombardi et al. (2017) found that higher debt boosts consumption and GDP growth in the short-run, but tend to lower growth in the long-run. Similar findings were reported by the IMF (2017) and Mian, Sufi and Verner (2015) where the adverse effects to GDP are found to take place in the next three to five years. These findings underscore the importance of understanding and estimating the potential risks that household debt may pose to house prices and consumption.

3. Household Debt in Malaysia

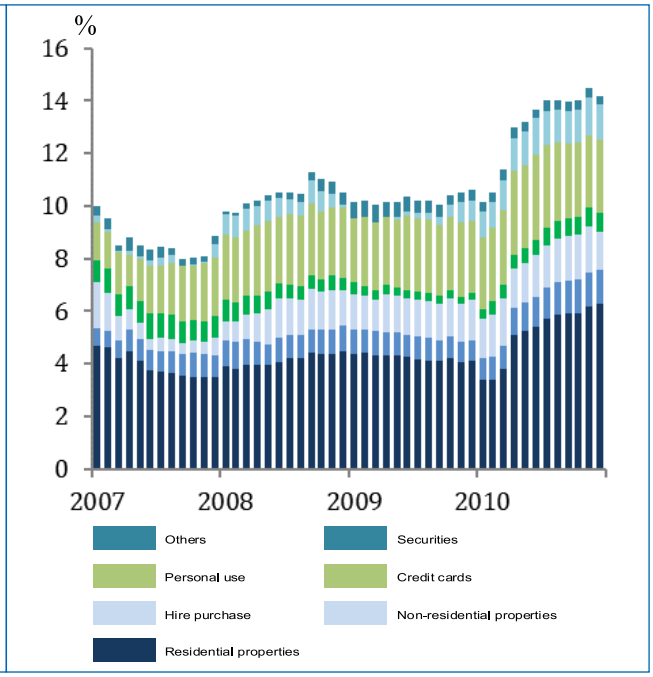
Household debt in Malaysia comprises loans extended to households by both banks and major non-bank financial institutions (NBFIs, including development financial institutions) which account for about 80% and 20% of total debt, respectively. As at 2Q 2017, outstanding household debt stood at RM1,108 billion, 64% of which are for asset accumulation purposes.[3] On the other side of the household balance sheet – aggregate household assets remained high, providing the sector with ample buffers against potential shocks. Aggregate financial assets and liquid financial assets were above 2 and 1.4 times of total outstanding debt, respectively. Including housing wealth, this ratio stood at more than 4 times of total debt.

Malaysia experienced a period of rapid increase in household debt from 2005 to 2010, reaching its peak growth of 14.2% as at end-2010 (Chart 2). Of significance, the household debt growth had outpaced the average income growth by almost 2 times, raising concerns over its sustainability. Across type of loans, the increase was mainly driven by the residential properties and personal loans, which account for 47% and 14% of total household debt, respectively. As shown in Chart 3, the loans for the purchase of residential properties and personal use had consistently been the main drivers of overall household debt growth.

3. Loans for the purchase of residential, non-residential properties and securities.

Chart 2: Annual Growth of Household Debt and Income

Chart 3: Contribution to Growth of Household Debt by Purpose



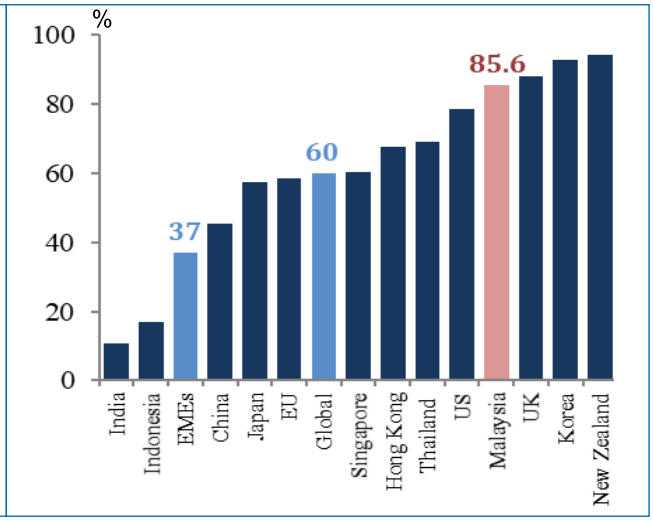
Source: Bank Negara Malaysia.

The increasing role that NBFIs play had contributed to the marked increase in personal financing, which recorded an average growth of 15% over the period of 2007-2010. At the same time, the Malaysian House Price Index (MHPI) saw an accelerated growth from 1.5% in 4Q 2009 to its peak of 14.3% in 2012 (peak) (Chart 4). This trend was largely due to easy access to house financing, which also fueled the credit-driven speculative activities in the housing market. For example, households can obtain housing loans with loan-to-value (LTV) ratio of up to 100% and loan tenure of up to 45 years. As a consequence of these developments, household debt-to-GDP ratio, a common measure of aggregate household leverage, had increased from 64% in 2007 to 89% as at end-2015 (peak).

Chart 4: Annual Growth of Malaysian House Price Index

Source: National Property Information Centre.

Chart 5: Household Debt-to-GDP Comparison across Countries



Source: Bank of International Settlements and Bank Negara Malaysia.

In order to rein in the double-digit growth in household debt and MHPI, a series of cross-cutting measures were implemented since 2010. This included macroprudential measures such as: (i) maximum loan-to-value limit of 70% on third and above housing loans; and, (ii) capping of financing tenure for housing and personal financing at 35 and 10 years, respectively (please refer to Appendix: Table 1 for a complete list of measures). Following these measures, the growth in household debt has moderated since 2010 to 5.1% in 2Q 2017. Of significance, household debt-to-GDP ratio declined to 85.6% as at 2Q 2017, from its peak of 89% in 2015. However, concerns over its sustainability remain as this ratio continues to be higher than the average of global and peer countries (Chart 5).

4. Empirical Approach and Data

Methodology

4.1 Autoregressive Distributed Lag (ARDL) Model

This paper employs the autoregressive distributed lag (ARDL) model to identify the determinants of the change in housing and consumption loans, as recommended by Narayan (2005) for a small sample study. This is similar to the methodology used by Khan et al. (2016) and Nizar and Karim (2016) in modeling the determinants of household debt in Malaysia. Considering the fact that macroeconomic variables can affect household debt differently depending on the purpose of debt, two separate models are estimated: (i) housing loans model; and, (ii) consumption loans model.

The main dependent variables are: (i) housing loans or the loans for the purchase of residential properties (HL) for the first model; and, (ii) consumption loans which comprise hire purchase, credit cards and personal loans (CL) for the second model. The household debt data used for this study covers loans extended to households by both banks and NBFIs. For the independent variables in both models, the private consumption (C), average lending rate (ALR), Malaysian House Price Index (MHPI) and consumer price index (CPI) are selected based on the permanent income theory (Appendix: Table 2). All data is on a quarterly basis for the period of 2000Q1- 2017Q2.

Firstly, to ensure the validity of the methodology, the Augmented Dicky-Fuller (ADF) unit root test is employed to confirm that each of the variables is integrated at order zero or one (I (0) or I (1)). Next, the existence of a long-run relationship is determined using the ARDL bounds test where the resulting F-statistic value should be higher than the upper bound value tabulated by Narayan (2005). The following equation is estimated for both models:

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{p} \beta_1 \Delta Y_{t-1} + \sum_{i=0}^{p} \beta_2 \Delta C_{t-1} + \sum_{i=0}^{p} \beta_3 \Delta ALR_{t-1} + \sum_{i=0}^{p} \beta_4 \Delta MHPI_{t-1} + \sum_{i=0}^{p} \beta_5 \Delta CPI_{t-1} + \sigma_1 RPDEBT_{t-1} + \sigma_1 C_{t-1} + \sigma_1 ALR_{t-1} + \sigma_1 MHPI_{t-1} + \varepsilon_t$$

where Y is the dependent variable (HL or CL), $\triangle$ is the first difference operator, p is the optimal lag (determined using Akaike Information Criteria), $\beta_1 - \beta_5$ are the short-run dynamics coefficients and $\sigma_1 - \sigma_5$ are the long-run relationship coefficients.

Once the bounds test confirms the existence of a long-run relationship between the variables, the following error correction model will be estimated:

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{p} \beta_1 \Delta RPDEBT_{t-1} + \sum_{i=0}^{p} \beta_2 \Delta C_{t-1} + \sum_{i=0}^{p} \beta_3 \Delta ALR_{t-1} + \sum_{i=0}^{p} \beta_4 \Delta MHPI_{t-1} + \sum_{i=0}^{p} \beta_5 \Delta CPI_{t-1} + \gamma_{t-1} ECT + \varepsilon_t$$

where γ is the speed of the adjustment parameter, which should be negative and significant and ECT is the one quarter lagged error correction term.

4.2 Conditional Structural VAR

In estimating the effects of various household debt growth scenarios on private consumption and house prices, a structural VAR model is constructed. The model is defined as:

$$Ay_t = c + B(L)y_{t-1} + \sum \varepsilon_t Ay_t = c + B(L)y_{t-1} + \sum \varepsilon_t$$

where y is a vector of endogenous variables, c is a constant, A is a matrix of the contemporaneous interactions, $\sum$ is the covariance matrix and ε is a vector of structural shocks.

The endogenous variables that are included in the vector y are similar to the first part, in the following order: (i) consumption (C); (ii) consumer price index (CPI); (iii) Malaysian House Price Index (MHPI); (iv) average lending rate (ALR); and, (iv) household debt (HHDEBT)

$$y = [C, CPI, MHPI, ALR, HHDEBT]$$

The VAR is identified using Choleski decomposition based on the variable ordering above.

Next, upon stable identification of the VAR structure, the scenario analyses are conducted based on the methodology used by Waggoner and Zha (1999). The growth paths of private consumption and house prices are forecasted conditional on future household debt growth scenarios, which are exogenously imposed (Table 1). The resulting impact of household debt on consumption and house prices are estimated by comparing the growth path projected under each scenario to that of the baseline. It is important to note that this paper does not consider second round effects of the scenarios.

Table 1:
Household Debt Growth Scenarios for 3Q 2017 - 4Q 2019

Baseline (BL)	Unconditional forecast
Scenario 1 (S1)	Sustain at 2Q 2017 level of 5%
Scenario 2 (S2)	Decline to 0% within 2 quarters, and sustain at 0% for the consecutive quarters
Scenario 3 (S3)	Gradually decline to -5% (similar to Asian Financial Crisis level) and gradually recover to 5%
Scenario 4 (S4)	Sudden decline to -5% and remain for the consecutive quarters

5. Empirical Results

5.1 Autoregressive Distributed Lag (ARDL) Model

The ARDL bounds test employed after the ADF unit root test confirms that none of the variables are integrated at order two (i.e., the variables are stationary). The results of the bounds test both show that the F-statistic is significantly higher than the upper bound value for both models, hence confirming the existence of cointegration and long-run relationship among the variables (Table 2). Next, the long run coefficient and the speed of adjustment can be estimated, as shown in the Table 3 and 4.

Table 2:
ARDL Bound Test

	Housing Loans Model	Consumption Loans Model
F-statistic	28.052	10.648
Critical value bound (k=5, n=64)	**Lower bound**	**Upper bound**
10%	2.20	3.09
5%	2.56	3.49
1%	3.29	4.37

Critical value bounds are based on Narayan (2005).

Table 3
Main Results: Long Run Model

Dependent Variables	Housing Loans Model	Consumption Loans Model
Consumption	0.834***	1.503 *
	(0.202)	*(0.858)*
House price index	0.407***	-0.534**
	(0.052)	*(0.266)*
Average lending rate	-0.100***	-0.211***
	(0.011)	*(0.074)*
Consumer price index	-0.275*	-2.748
	(0.763)	*(2.764)*

Standard errors are in parentheses. *** Significant at 1% ** Significant at 5% * Significant at 10%

Table 4:
Speed of Adjustment

	Housing Loans Model	Consumption Loans Model
Error Correction Term $_{t-1}$	-0.447*** *(0.032)*	-0.113*** *(0.015)*

Standard errors are in parentheses. *** Significant at 1% ** Significant at 5% * Significant at 10%

The results in Table 3 show that an increase in consumption by 10% is associated with 8.3% and 15% increase in housing and consumption loans, respectively. Similar relationship is observed for house prices and housing loans, where a 10% increase in MHPI contributes to 4.1% increase in housing loans. While it is expected that an increase in house prices would lead to higher amount of financing to households, this relationship can also be explained by higher demand for housing as it becomes more attractive form of investment compared to other type of assets.

Next, an increase in the cost of borrowing tends to lower housing and consumption loans. A one ppt or 100 bps increase in the cost of borrowing is associated with 10% and 21.1% decline in housing and consumption loans, respectively. Interestingly, a similar relationship is observed between inflation and housing loans, where 2.7% increase in inflation will lead to a 10% decline in housing loans. As higher inflation could have opposing effects on household borrowings – while higher inflation or cost of living could increase demand for loans, higher nominal interest rates could limit household borrowing capacity – the effect of the latter seems to outweigh the former for housing loans. However, the effect of inflation on consumption is insignificant.

With regard to the speed of adjustment, the error correction term for both models is negative and significant, confirming that the variables have long-run relationship. Any short-term deviations for housing and consumption loans from their long-run equilibrium will be adjusted by 44.7% and 11.3% in the following quarter, respectively.

5.2 Conditional Structural VAR

5.2.1 Effects of Household Debt on Private Consumption

Chart 6:
Projected Path of Real Private Consumption Growth Conditional on Household Debt Growth Scenarios

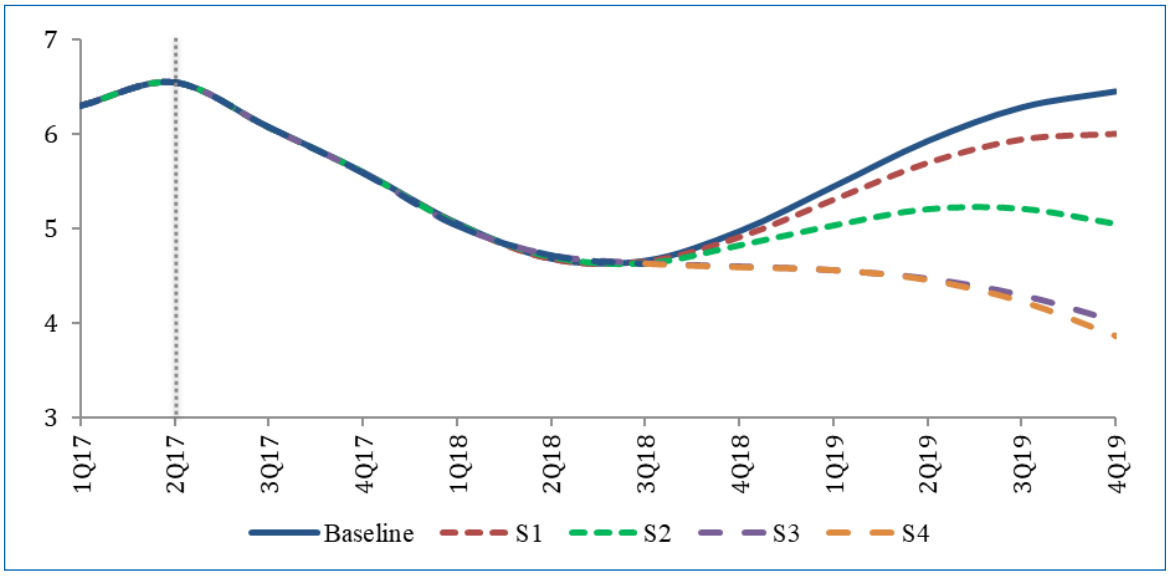


Table 5

Household Debt Growth Scenarios		Average Growth of Real Private Consumption*	Real Private Consumption Growth in 2019 Q4
BL	Unconditional forecast	5.51	6.45
S1	Remain at 5%	5.39	6.00
S2	Decline to 0% in 2 quarters and remain	5.13	5.05
S3	Decline to -5% in 2 quarters and gradually recover to 5%	4.80	4.02
S4	Decline and remain at -5%	4.78	3.87

*Average for 3Q2017- 4Q2019.

The projected paths of real private consumption conditional on various household debt growth scenarios are shown in Chart 6. The baseline scenario (BL) based on the unconditional forecast of the model is projecting a moderation in the growth of real private consumption to about 4.6% (2Q 2017: 6.5%), followed by a turnaround in 3Q 2018.

The impact of household debt growth scenarios on private consumption is the difference between the projected growth paths of private consumption under the baseline scenario with the resulting growth path under the conditional scenarios. Overall, no significant deviations in private consumption growth paths can be observed in the first 5 quarters. However, the paths start to diverge in 3Q 2018, after which the private consumption growth paths are consistently lower than the baseline.

The severity of the effects of household debt on private consumption depends on the magnitude of the imposed path. The least (S1) and most (S4) severe scenarios are associated with 0.45 ppt. and 2.58 ppt. lower growth in 4Q 2019, respectively (Table 5).

5.2.2 Effects of Household Debt on House Prices

Chart 7:
Projected Path of Real House Price Index Growth Conditional on Household Debt Growth Scenarios

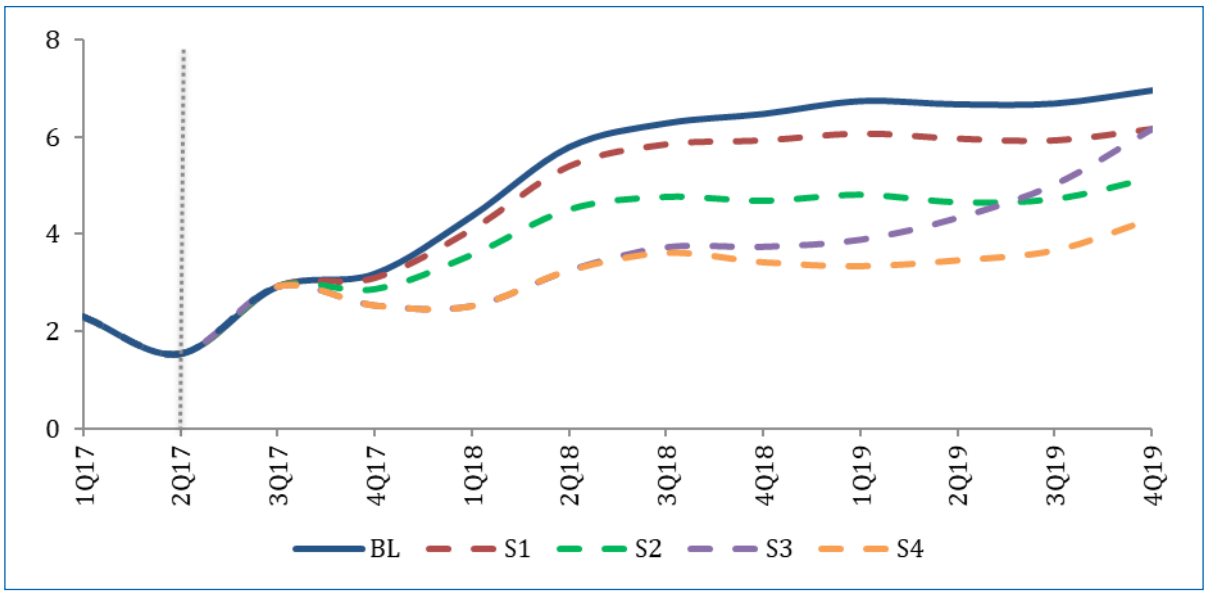


Table 6

Household Debt Growth Scenarios		Average Growth* of Real House Price Index	Real House Price Index Growth in 2019 Q4
BL	Unconditional forecast	5.61	6.96
S1	Remain at 5%	5.13	6.15
S2	Decline to 0% in 2 quarters and remain	4.27	5.16
S3	Decline to -5% in 2 quarters and gradually recover to 5%	3.81	6.15
S4	Decline and remain at -5%	3.31	4.32

*Average for 3Q2017- 4Q2019.

Chart 7 shows the projected paths of real MHPI growth conditional on household debt growth scenarios. In line with the findings in the first part of this paper, there is a strong positive relationship between household debt and MHPI growth, highlighting a significant role that credit plays in Malaysia's housing market.

Overall, the projected MHPI growth paths for all scenarios are lower than the baseline, signifying the negative implication of moderation or decline in household debt growth on the growth of house prices. In the most severe scenarios (scenario 3 and 4), where household debt experienced negative growth, real MHPI growth moderated to about 2.5% in 4Q 2017. Of significance, the resulting average MHPI growth is 1.8 ppt. and 2.3 ppt. (Table 6) lower than the baseline for scenario 3 and 4, respectively. In terms of the responsiveness of house prices to changes in household debt, the deviation in growth paths takes place after one quarter, which is relatively faster than the impact on consumption. This finding suggests that, in the event of negative shock to household sector balance sheets, the negative implications on financial stability through the collateral (housing) channel will materialize before the subsequent impact on the real economy (via consumption channel).

6. Conclusions

The findings in this paper indicate that household debt in Malaysia is determined by private consumption, house prices, average lending rate and inflation. Both consumption and house prices exert positive and significant influence on household debt, while the average lending rate influences household debt negatively. In addition, results for inflation are weak and insignificant for both housing and consumption loan models. Given growing empirical evidence on the negative effects that elevated household debt levels may pose to macroeconomic and financial stability, it is imperative for policy makers to have analytical models at hand to conduct surveillance and assessment on credit developments. Additionally, understanding the forces involved in determining household debt growth could improve forecasts and provide insights on its future behavior.

In reducing the household debt to more sustainable levels, policy makers need to be mindful of the intended as well as unintended consequences that each policy might cause. The empirical findings presented in this paper show that a moderation or negative household debt growth could result in lower private consumption and house prices growth, where the severity increases with the magnitude of reduction. However, a more comprehensive assessment would require complementing this analysis with micro-level data (e.g., distribution of debt, income and housing wealth by income groups) in order to identify vulnerabilities in specific groups.

References

Bank of England, (2002), "Structural Factors Affecting House Prices," Inflation Report, August, pp. 8–9.

Cecchetti, Stephen; M. S. Mohanty and Fabrizion Zampolli, (2011), "The Real Effects of Debt," *BIS Working Papers,* No. 352.

Crawford, A. and U. Faruqui, (2012), "What Explains Trends in Household Debt in Canada?" *Bank of Canada Review*, 2011–2012.

Debelle, Guy, (2004), "Household Debt and the Macroeconomy," *BIS Quarterly Review*, Vol. 2004, March, pp. 51-64.

Drehmann, Mathias and Kostas Tsatsaronis, (2014), "The Credit-to-GDP Gap and Countercyclical Capital Buffers: Questions and Answers," *BIS Quarterly Review,* March.

Endut, N., and T. G. Hua, (2009), "Household Debt in Malaysia," *BIS Papers*, No. 46.

Friedman, M., (1957), "The Permanent Income Hypothesis," in M. Friedman, A Theory of the Consumption Function, Princeton, NJ: Princeton University Press (for NBER), pp. 20-37.

Gourinchas, Pierre-Olivier and Maurice Obstfeld, (2012), "Stories of the Twentieth Century for the Twenty-First," *American Economic Journal*: *Macroeconomics*, 4(1), pp. 226-65

Hall, Robert E., (1978), "Stochastic Implications of the Life Cycle–Permanent Income Hypothesis: Theory and Evidence," *Journal of Political Economy,* 86 (6), pp. 971–87.

Iacoviello, Matteo, (2005), "House Prices, Borrowing Constraints and Monetary Policy in the Business Cycle," *American Economic Review.*

IMF, (2012), "Dealing with Household Debt," *IMF World Economic Outlook*, April.

Jordà, Òscar; Moritz Schularick and Alan M. Taylor, (2016), "The Great Mortgaging: Housing Finance, Crises and Business Cycles," *Economic Policy,* 31 (85), pp. 107–52.

Khan, A.; H. Hammad; A. Hussin and S. Shamzaeffa, (2016), "Modelling the Determinants of Malaysian Household Debt," *International Journal of Economics and Financial Issues*, Mersin, Vol. 6, Iss. 4.

Laibson, David, (1997), "Golden Eggs and Hyperbolic Discounting," *Quarterly Journal of Economics,* 112 (2), pp. 443–78.

Lombardi M.; M. Mohanty and I. Shil, (2017), "The Real Effects of Household Debt in the Short and Long Run," *BIS Working Papers,* No. 607.

Mian, A. and A. Sufi, (2016), "Who Bears the Cost of Recessions? The Role of House Prices and Household Debt," *NBER Working Paper,* 22256.

Mian, Atif; Amir Sufi and Emil Verner, (2017), "Household Debt and Business Cycle Worldwide," *Quarterly Journal of Economics,* 132, pp. 1755–1817.

Mian, Atif and Amir Sufi, (2011), "House Prices, Home Equity-Based Borrowing, and the U.S. Household Leverage Crisis," *American Economic Review,* 101 (5), pp. 2132–56.

Mian, Atif; Kamalesh Rao and Amir Sufi, (2013), "Household Balance Sheets, Consumption, and the Economic Slump," *Quarterly Journal of Economics,* 128 (4), pp. 1687–726.

Miles, D., (1994), "Fixed and Floating-rate Finance in the United Kingdom and Abroad," *Bank of England Quarterly Bulletin*, February, pp. 34–45.

Modigliani, M. and B. Brumberg, (1954), "Utility Analysis and Aggregate Consumption Functions: An Attempt at Integration," in A. Abel, Ed., *The Collected Papers of Franco Modigliani*, Vol. 2. MIT Press: Cambridge, pp. 128-97.

Murugasu, D.; C. W. Huei and T. B. Hwa, (2015), "Implications of Evolving Household Balance Sheets for Private Consumption in Malaysia," *Bank Negara Malaysia Working Papers*, WP7/2015, pp. 1-25.

Musso, A.; S. Neri and L. Stracca, (2010), "Housing, Consumption and Monetary Policy - How Different are the US and the Euro Area?" *Working Paper Series,* 1161, European Central Bank.

Narayan, P.K., (2005), "The Saving and Investment Nexus for China: Evidence from Cointegration Tests," *Applied Economics*, Vol. 37, No. 17, pp. 1979-90.

Nieto, F., (2007), "The Determinants of Household Credit in Spain," *Bank of Spain Working Paper.*

Nizar, N., (2015), "Determinants of Malaysia Household Debt: Macroeconomic Perspective," in Proceeding of the Kuala Lumpur International Business, Economics and Law Conference, Vol. 1, pp. 97-107.

Son, Jong Chil, (2014), "The Effect of Household Debt on Consumption: Deleveraging and Financial Stability in Korea," in *SEACEN Research Project on Mortgage Finance and Consumer Credit: Implications on Financial Stability in SEACEN Economies,* Chapter 5.

Stigliz, J. and A. Weiss, (1981), "Credit Rationing in Markets with Imperfect Information," *American Economic Review*, 71, pp. 393-410.

Valckx N. et al., (2017), "Household Debt and Financial Stability," International Monetary Fund, Global Financial Stability Report, pp. 53-89.

Waggoner, Daniel F. and Tao Zha, (1999), "Conditional Forecasts in Dynamic Multivariate Models," *Review of Economics and Statistics*, November, 81:4, pp. 639–51.

Appendix

Table 1:
Series of Cross Cutting Measures Implemented Since 2010

Year	Macroprudential policies	Microprudential policies	Monetary policy	Fiscal and other measures
2010	• Maximum 70% loan-to-value (LTV) on third and above housing loan		• Open market operations to manage liquidity • Increase in Overnight Policy Rate (OPR): (2.00% to 2.75%)	• Real property gains tax (RPGT): ○ 5% within 5 years
2011	• Stricter credit card requirements • Maximum 60% LTV on any housing loan of non-individuals	• Higher risk weights requirements	• Increase in OPR: (2.75% to 3.00%) • Increase in Statutory Reserve Requirement (SRR): (1.00% to 4.00%)	• Increase in RPGT: ○ 10% (1-2 years) ○ 5% (3-5 years)
2012		• Guidelines on Responsible Financing		• Increase in RPGT: ○ 15% (1-2 years) ○ 10% (3-5 years) • Prohibition of Developers' Interest Bearing Scheme
2013	• Maximum tenure: ○ 10 years for personal financing ○ 35 years for housing loans ○ 9 years for auto-financing	• Guidelines on Personal Financing		• Increase in RPGT: ○ 30% (1-3 years) ○ 15-20% (4-5 years) • National Housing Council • Increase of floor house price for purchase by non-residents
2014		• Guidelines on Risk-informed Pricing	• Increase in OPR: (3.00% to 3.25%)	• Increase supply of low-cost and affordable housing
2015		• Minimum Collection Impairment Provision (CIP) and regulatory reserves of 1.2%		
2016			• Decrease in OPR: (3.25% to 3.00%) • Decrease in SRR: (4.00% to 3.50%)	

Source: Bank Negara Malaysia and Ministry of Finance, Malaysia.

Table 2

Variables		Definition	Source
Private consumption	C	Real GDP *(as a proxy for income)*	BNM
Inflation rate	CPI	Consumer Price Index (CPI)	BNM
House prices	MHPI	Real Malaysian House Price Index (MHPI)	NAPIC
Lending rates	ALR	Weighted average of banks' lending rates	BNM
Household debt	HHDEBT	Loans for the purchase of residential properties, non-residential properties, motor vehicles, personal use, credit cards, securities and others (from both banks and non-bank financial institutions)	BNM

Note: BNM – Bank Negara Malaysia; DOSM – Department of Statistics, Malaysia; KPKT – The Ministry of Urban Wellbeing, Housing and Local Government; NAPIC - National Property Information Centre.

Chapter 4

STRESS TESTING HOUSEHOLD DEBT IN MONGOLIA [1†]

By

Byambatsogt Tserendejid *and* **Ganchimeg Ganpurev**[†]

1. Introduction

Household debt in Mongolia has been increasing sharply, doubling in the last 5 years. The Government of Mongolia and the Bank of Mongolia (BOM) have been implementing the subsidized "mortgage program" that substantially contributed to this rise in household debt.

Based on other countries' experiences, it is observed that the negative consequences of any macroeconomic shock on household's ability to repay worsen as household debt increases. Moreover, there are cases where household loans affect financial stability and macroeconomic developments unfavorably as household loans rise. Therefore, this research paper studies the impacts of fiscal (wage, social welfare benefit) and monetary policy (policy rate), real sector (real estate price), and external sector (foreign exchange rate) aggregates on household financial position and household credit quality.

In this paper, we used the annual "Household Socio-Economic survey" (HSES) conducted by the National Statistical Office of Mongolia (NSO) for 2013-2016 (12-16 thousand households included for each year) to: (i) estimate the credit risk for each household and assess the share of outstanding risky loans in total outstanding loans; (ii) study and assess how policies and economic shocks affect the household financial and credit risks; and, (iii) assess how these measures have changed in the recent years.

This research paper has the following two main features: (i) the paper employed the micro-stress testing methodology used widely in other central banks to assess macroeconomic shocks and (ii) the paper modified the macroeconomic shocks to fit the shocks for the Mongolian economy specifically.

For our country, Ariun-Erdene and Gan-Ochir (2016) conducted the research for the first time utilizing the same method based on the same data for 2014. However, the Bank of Mongolia has yet to complete a similar type of research.

---

1. † The views expressed in this paper are those of the authors and do not represent those of the Bank of Mongolia or the SEACEN Centre. All errors or the omissions are the responsibility of the authors.

Byambatsogt Tserendejid, Senior Economist, Research and Statistics Department, Bank of Mongolia, Baga Toiruu 3, Ulaanbaatar, Mongolia. Tel: +976-11-450025, byambatsogt@mongolbank.mn;

Ganchimeg Ganpurev, Economist, Monetary Policy Department, Bank of Mongolia, Baga Toiruu-3, Ulaanbaatar, Mongolia. Tel: +976-11-327087, ganchimeg.g@mongolbank.mn.

The authors are grateful to the Bank of Mongolia and the SEACEN Centre for providing us an opportunity to work on this collaborative research project, "Household Debt in SEACEN Economies," organized by The SEACEN Centre. We would like to thank Gan-Ochir Doojav (PhD), Tsevelmaa Khyargas (PhD), the project leader, Maria Tereza Punzi (PhD), and participating researchers of this project for their fruitful comments and discussions on early versions of this paper.

In the next section of the paper, we introduce the household debt dynamics in Mongolia and the factors that have impacts on them, while we present the common approaches used to assess household credit risk and their applications in Section 3. Data and debt at risk are discussed in Section 4, while Section 5 discusses the stress-test results. In the final section, we discuss conclusion, limitations, and recommend possible policy options.

2. Household Loan and its Dynamics

2.1 Household Loan Level

Not only has household debt of Mongolia increased, but also both household loan composition and terms have changed in recent years. Mortgage loan contributed substantiallly to credit growth during 2013-2016, while wage and pension loan rose sharply since 2016. The average maturity is 10 times longer and the weighted average interest rate is twice higher for wage and pension loans compared to those for the mortgage loans. Therefore, wage and pension loans carry a higher risk of putting more pressure on household loans.

Moreover, as of October 2017, the number of citizens with double counting who have outstanding debt at banks and other financial institutions is more than 1.0 million which exceeds the number of households (approximately 870 thousand households as of 2016). In other words, it shows that there is at least one person in each household who has outstanding debt at financial institutions.

Figure 1:
Individuals' Loan /Including Mortgage Loan Portfolio Transferred to MIK*/

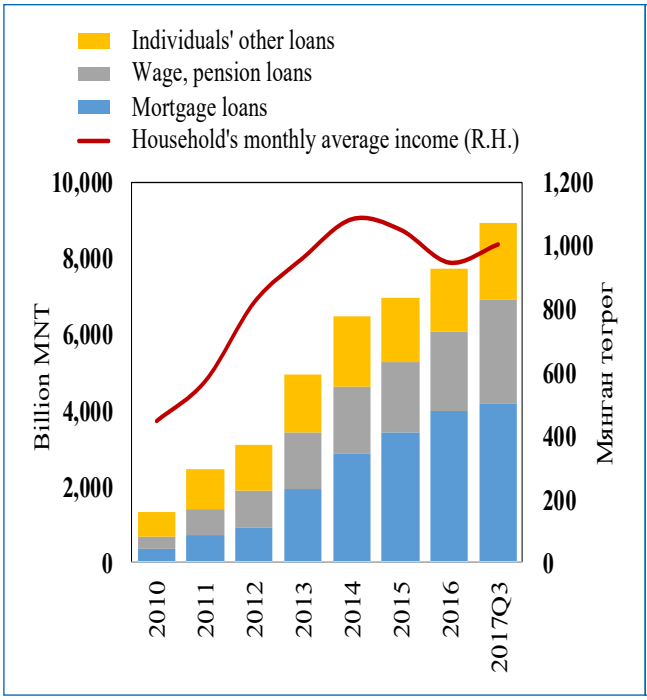
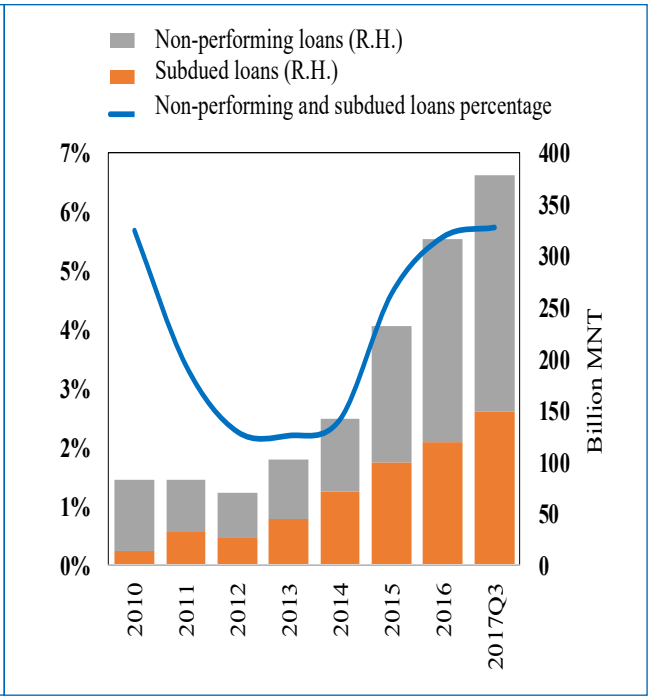


Figure 2:
Individuals' Overdue and Non-performing Loans



Sources: BOM and NSO

Although the share of individuals' overdue and non-performing loans to total loans is relatively lower than that of other sectors, it has been increasing since 2015. There are several factors for this increase, including collateral price valuation and economic stance. Besides these two factors, one more possible factor would be the impact of unexpected negative shock for household income on the household's loan repayment ability caused by the increased loan amount issued to households. For example, in 2015 and 2016, decreased household income caused the overdue and non-performing household loans outstanding to increase, although total household loan outstanding increased. Meanwhile, it is shown that the share of overdue and non-performing household loans outstanding to total household loans outstanding has been relatively stable as a result of increased household average income in 2017 (Figure 1 and 2).

2.2 Factors Affecting the Household Loans

There exist many factors that affect the household loan level to rise except economic circumstances, government support, policies, and changes in loan criteria at the banks. In this section, in order to define the macroeconomic shocks used in the stress testing, we introduce factors that affect the household loan growth based on economic models and international practice.

The life-cycle model of consumption links aggregate demand for borrowing in an open small economy to consumption, the expected income path and real interest rate. A younger demographic profile would suggest a higher aggregate debt level, as people in their youth tend to finance current consumption with borrowing against expected future income. As incomes grow in later years, households accumulate assets and reduce debt. Once they retire, they begin dissaving, drawing down assets accumulated during their working lives (Karasulu 2008).

Based on this model, it is concluded that the relatively young demographics of Mongolia can be considered as one of the factors inducing high aggregate demand for the loans.

Figure 3:
Individuals with Mortgage Loans by Age Category (by the Number of Individuals) – as of October 2017

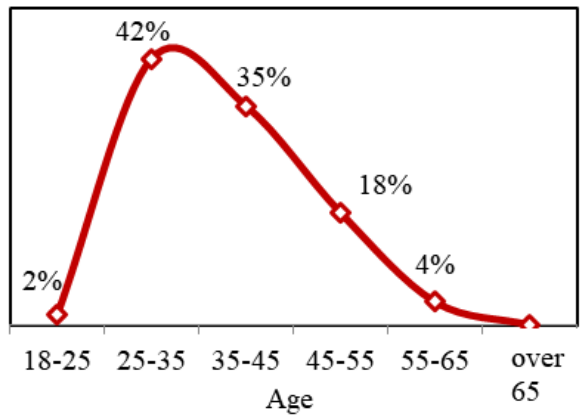
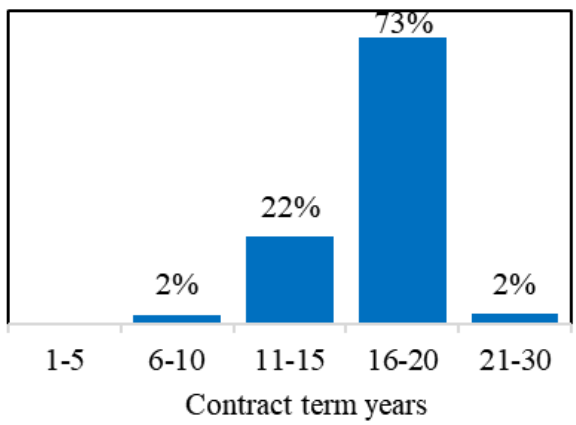


Figure 4:
Individuals with Mortgage Loans by Average Contract Terms – as of October 2017



Source: Monthly Mortgage Loan Report for October 2017, BOM.

Also, the effect of real interest rate changes on aggregate net household debt is ambiguous. According to the life-cycle hypothesis, a decline in real interest rates would have opposing effects on different age cohorts (Muellbauer 1994). For young cohorts, a decline in interest rates would reduce debt servicing costs while increasing present value of future income, providing incentives for higher debt levels. However, for older cohorts this would mean lower returns on accumulated assets and hence a desire to dissave less, leading to lower net aggregate debt levels (Karasulu 2008).

Housing needs and housing price: One of the main factors that cause the household debt to rise is a consumer's decision to buy any type of housing. If the consumers choose to purchase housing through loans instead of renting, they have to cut the expense for other consumptions in short-run when the housing price is not expected to rise in near future. Furthermore, the cost incurred to buy housing for the household is highly correlated with the level of the household's debt. In other words, whenever the housing price exceeds the household income, it triggers the household debt level to rise.

For our country, the subsidized "mortgage program" was implemented without taking into consideration the aggregate housing supply. As a result, a housing bubble occurred in the market which can be considered as one of the possible stimulants for the jump in household debt.

Financial regulations and requirements: Supply-side factors including banks' requirements adhered to by the borrowers, market competition, and financial sector development have impacts on the household debt level.

Habibullah, Smith, and Azman-Saini (2006) studied 10 Asian developing economies and concluded that financial liberalization resulted in the reduction of liquidity-constraints, eventually causing the household debt to increase in Korea, Sri Lanka and Chinese Taipei. For instance, Korea's household debt was 38% of GDP in 1997 and reached 66% of GDP in 2007 after credit card service became widespread in the 2000s, causing the ratio to increase to 66%.

In our country, even though the consumers' housing needs and associated loan demand have been high due to the relatively young demographics, consumers' opportunity to take out loans has been limited due to the household income level, loan terms and conditions and collateral requirements. However, the interest rate declined and the term length of loans was extended under the subsidized "mortgage program" implemented in the last several years. Such a decline in the interest rate and extension in loan length served to bring about favorable conditions for household debts to increase.

3. Methodologies to Assess the Household Loan Risks

When the household debt is at a high level, the sensitivity of household balance sheets and the risk of becoming unable to service their loans increase. Furthermore, as illustrated by the credit card crisis in 2003–04, a subsequent retrenchment of credit from the household sector could further depress consumption and economic growth (Meral 2008).

Stress testing is used by private financial institutions to manage their internal risks and by policymakers to determine potential vulnerabilities that might occur in the financial sector, to assess the financial system as a whole, to safeguard financial stability as well as to estimate the effects of macro economic shocks, and such.

The prominence of system-wide stress testing has been increasing since the global financial crisis and it is being used widely to assess credit risk – the risk that borrowers will not repay their debts (Bilston, Johnson and Read, 2015).

Due to limited data availability some countries use macroeconomic indicators such as the debt-to-income (DTI) ratio to assess the risk. This approach has several shortcomings, such as failing to estimate the impacts of macroeconomic shocks precisely. Furthermore, for the indebted households with substantial amount of savings and assets, the impact of adverse macroeconomic shocks on credit risk is low even when the DTI increases (Djoudad, 2012).

Therefore, many central banks around the world started developing micro stress testing that uses detailed household-level data to assess credit risk. In general, these methodologies are divided into 3 main categories depending on the approach used, to assess credit risk and data used in the assessment.

3.1 "Threshold" Approach

The threshold approach is based on the simple assumption that each household will default or face difficulty in repaying their loans when the loan repayment amount exceeds a certain share of household income. The main advantage of this approach is that it is simple to estimate requiring fewer assumptions (it does not require detailed data).

The increase in the debt-service ratio (DSR) yields negative consequences on both the real economy and financial system and cuts household consumption, eventually leading to a decline in economic growth. In other words, in the case of a high DSR, the pressure caused by unforeseen negative changes of household income and loan repayment on household finance is substantial. This has adverse impact on lending institutions as well. For wage and pension loans, which account for a substantial share of individuals' loans in Mongolia, the DSR is high[2] and this can be one of the possible factors that result a high debt level.

$$DSR_i = \frac{P_i + r_i}{Y_i}; \qquad r_i = rm_i + ro_i + rn_i \tag{1}$$

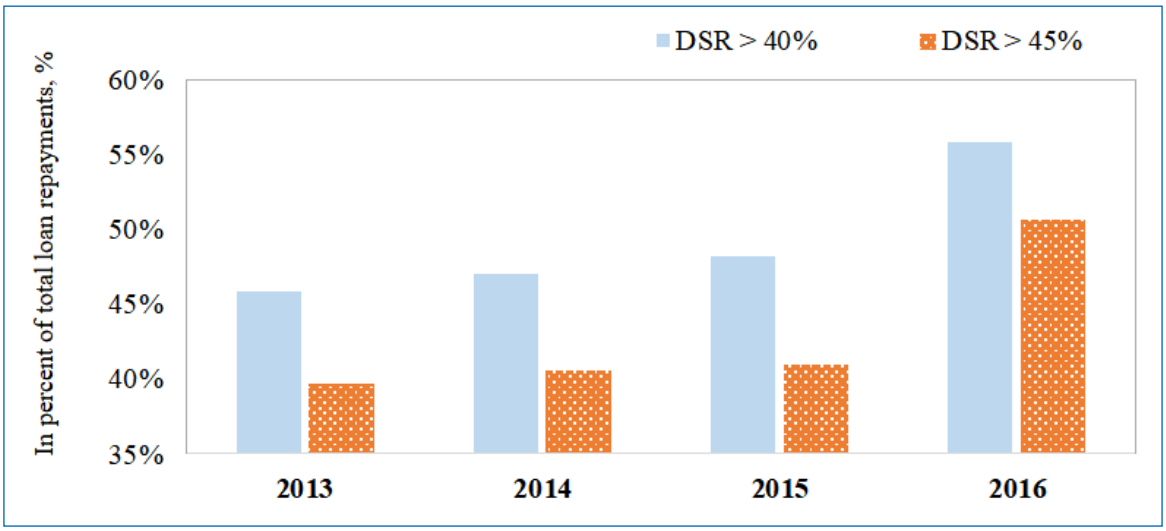
where DSR_i – Debt service to income ratio for household i, P_i - principal repayments for household i, r_i – interest repayments for household i, rm_i - interest repayments for mortgage loan for household i, ro_i- interest repayment for non-mortgage loans taken prior to the last 12 months for household i, rn_i - interest repayment for non-mortgage loans taken in the last 12 months for household i, Y_i - total disposable income for household i.

In other research papers, the researchers utilize two common methodologies to estimate the threshold for the risky level of DSR which are: (i) two standard deviation higher than the mean; and, (ii) more than 40% in other research papers. Furthermore, DTI limits can be used as macroprudential policy instrument and are often used in mortgage loans. In Mongolia, the banks commonly require the DTI limit on mortgage loan to be less than 45% for pre-tax income. In this paper, we conduct the estimation for DTI for two thresholds of 40% and 45%, respectively.

2. DSR is 50%-80% for wage loan and 100% for pension loan for banks.

When the threshold is taken at 40%, the portion of risky loans in total loans outstanding is 50% on average and the portion elevated sharply in 2006 because of the decline in household income and increased wage and pension loans. Furthermore, when the threshold is taken at 45%, which is reflected on the "Regulation on Mortgage Lending Process", proportion of vulnerable households which face difficulties in repaying their loans is reduced by 7 unit percent. Even though the proportion of the risky loans outstanding in total loan outstanding decreased by 7% for threshold of 45%, it is still higher than the average of other countries (Figure 6).

Figure 5:
Debt Service to Income Ratio



Sources: BOM, NSO, and authors' calculations.

However two of the shortcomings of this approach are: (i) it does not take account of household expenditure and consumption level when estimating household's loan repayment ability; and, (ii) universal threshold is applied to all households regardless of their income levels. For example, for high-income households, the risk of not completing their debt service on time might be lower despite their high DTI.

3.2 "Financial Margin" Approach

In this approach, each household is assigned with a financial margin, which is calculated as a difference between income and estimated household expense (summation of debt service and consumption). The approach assumes that consumption can be lowered to a minimum living expense.[3] In other words, a household is considered to have credit risk if the residual of their income after paying their debt service can not meet the minimum living expense. The weight of loans outstanding for households with negative financial margins in total loans outstanding (WPD) is used to estimate the credit risk for households. High WPD implies a risk for the loan becoming overdue and non-performing.

3. Financial margin-type approaches are also known as the household budget constraint method, financial surplus method or the residual income approach. For some examples of these approaches, see Johansson and Persson (2007) and Sveriges Riksbank (2009) for Sweden; Holló and Papp (2007) for Hungary; Herrala and Kauko (2007) for Austria; and, Sugawara and Zaluendo (2011) for Croatia.

$$FM_i = Y_i - (P_i + r_i) - MC_i \quad (2)$$

where, FM_i -financial margin (difference between income and expenditure) for household i, MC_i – estimated minimum living expense for household i.

$$PD_i = \begin{cases} 1 \ \ if, FM_i < 0 \\ 0 \ \ if, FM_i \geq 0 \end{cases} \quad (3)$$

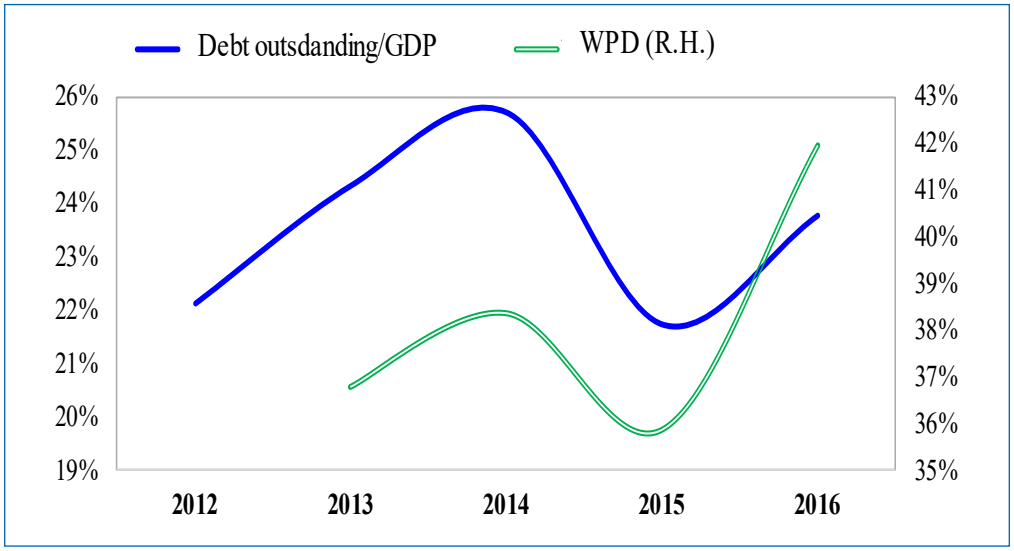
where, PD_i – is the probability of default for household i and it takes value of "0" if financial margin, FM_i, is positive and "1" if financial margin, FM_i, is negative.

$$WPD = \frac{\sum_i^N PD_i(P_i+r_i)}{\sum_i^N (P_i+r_i)} \quad (4)$$

WPD – is the weighed-average probability of default for N number of households, N- is the number of households that were included in the survey for a given year.

Based on the results estimated with the financial margin approach, the share of risky credit or WPD decreased in 2015 and has been increasing since 2016 (Figure 7). Furthermore, the share of risky credit is 5 unit percent lower than that estimated by using the previous or threshold approach and the trend for the share is different.

Figure 6:
Results for "Financial Margin" Approach:
Weighted Probability of Default (WPD) and Household Debt Outstanding/GDP



Sources: BOM, NSO, and authors' calculations.

Several research studies have been completed using the financial margin approach. Johansson, and Persson (2007), Sveriges Riskbank (2009), Hollo and Papp (2007), Herrala and Kauko нар (2007) assessed the impact of unemployment and household income on risky credit level, while Andersen (2008), Albacete and Fessler (2010), Sugawara and Zaluendo (2011) introduced the additional macroeconomic shocks into the model and assessed the impact of those shocks.

Some studies categorize households based on their income level and investigate on which category the macroeconomic shocks are affecting the most adversely. For example, Johansson and Persson (2007) concluded that 20% of high income households account for the 57% of total household debt. Sveriges Riskbank (2009), Hollo and Papp (2007) showed that the most financially vulnerable households tend not to have debt in most cases.

Despite several advantages, this approach has a shortcoming which omits the fact that households have their assets they can draw on to repay their loans if they face a risk of defaulting (a negative financial margin).

3.3 "Extended" Approach

Herrala (2007) and Karasulu (2008) modified the model used in the previous approach by introducing households' assets that can be sold. This modification enabled them to estimate credit risk accurately for households that have low income, but otherwise have substantial values of assets that can be sold. In this approach, the following assumptions are made: (i) households can sell their assets to repay their loans when they face financial adverse shocks such as decreased income; or, (ii) households can repay their loans outstanding with their collaterals. The share of loans outstanding that can not be repaid with collaterals in total loans outstanding is defined as debt at risk (DAR) and used to determine the credit risk level.

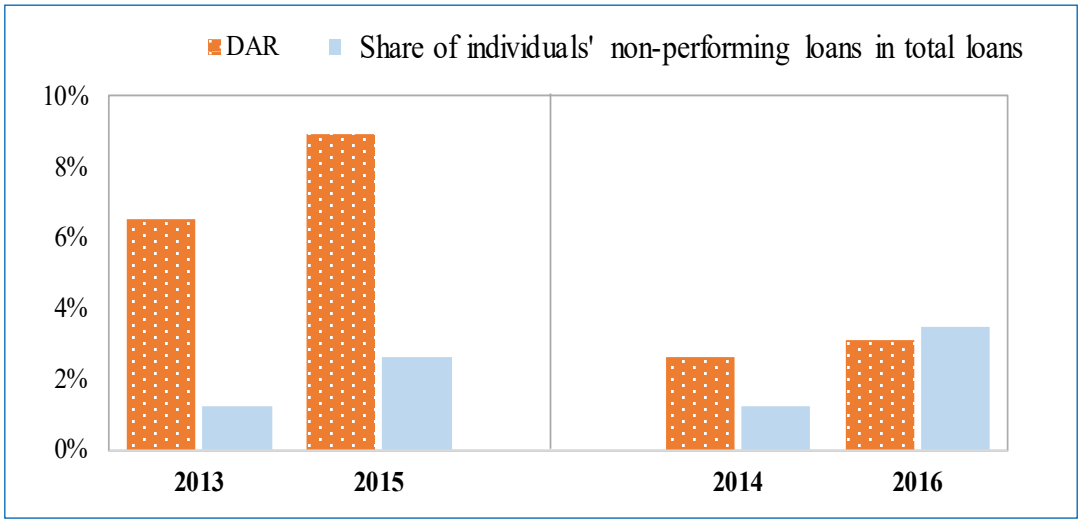
$$DAR = \frac{\sum_i^N PD_i M_i}{\sum_i^N PD_i D_i}; \qquad M_i = \max(D_i - A_i, 0) \tag{5}$$

where, M_i – is the difference between loans outstanding and collaterals' value for household i, D_i – is total loans outstanding or total debt for household i, A_i – value of total assets that can be used as collaterals for household i, DAR - share of loans outstanding that cannot be repaid with collaterals in total loans outstanding for i households.

In this paper, collateral assets include real estate, land, livestock, savings, patents, and any type of ownership license.[4]

4. We were able to estimate valuations for real estate, livestock and savings for each household based on extensively conducted HSES for 2014 and 2016, while we calculated valuations for livestock and savings based on HSES 2013 and 2015 which are conducted in brief modules. We used data from HSES 2014 and 2016 to estimate the valuations on real estate for 2013 and 2015 for which the years did not reflect the data on real estate on their briefly conducted HSES. Therefore, there may be limitations in comparing the tests results for 2014 and 2016 with those of 2013 and 2015.

Figure 7:
Result of "Extended" Approach (DAR) and Share of Overdue and Non-performing Loans in Total Loans for Individuals



Sources: BOM, NSO, and authors' calculations.

According to the "Extended" approach, prior to applying shocks, the DAR was 3.0% in 2014 and 3.1% in 2016. These estimates compare reasonably with shares of non-performing loans in total loans for those years. On the contrary, the DAR was 6.2% in 2013 and 8.5% in 2015, which is approximately 6% higher than shares of non-performing loans in total loans for those years (Figure 8). These deviations illustrate that there exists potential error in evaluating the valuations for real estate properties for 2013 and 2015.

Furthermore, it should be emphasized that the results obtained in this model stand the closest to the level of non-performing loans compared with the results obtained in other models. This shows that household assets have increased more than the household loans, as there is a common tendency for households to draw on their assets including livestock to repay their loans when they become unable to meet their debt servicing obligations with their permanent income. Also, banks evaluate collaterals for lower than the market values, which can be the reason that households are still able to repay their loans even when the assets prices decline.

4. Data and Caliberation

4.1 Data

In this paper, we used data from the "Household Socio Economic Survey" (HSES), which is a nationally representative household-based longitudinal study collected annually by the NSO. In estimating the necessary indicators and additional calculations, we referred to statistics and methodologies released by the BOM and NSO.

The HSES comprises the data from 11-16 thousand households that can well represent the nation. It is conducted in the detailed module for the even numbered years, while it is conducted in brief module for the odd numbered years. Also it should be noted that some questions were not covered in HSES for the years prior to 2013. Therefore, we completed the calculations based on data covering 2013-2016.[5]

Limitations: Since all the necessary information for the paper is not reflected in HSES and some information available through HSES can not be utilized directly, we faced several limitations in completing the stress testing for the paper. To overcome these limitations, we carried out additional calculations for odd numbered years as HSES in those years lack information on valuations for household debt, savings and assets. For example, we used the average price of livestock sold for the specific year to estimate the valuations for total livestock for households, while we divided the savings income by the average savings interest rate to derive the total savings outstanding for households.

HSES covers data on household loan outstanding only for the loans taken in the last 12 months and does not reflect any information regarding any other loan type in terms of loan length. Consequently, we calculated the outstanding amount for loans taken more than 12 months ago by referring to data on monthly debt service, loan average term, and interest for those loans.

Moreover, there arose other limitations - such as the data quality of HSES was not sufficient to calculate some indicators, survey results were not aligned with real observations in the economy and datasets were incorrect in some cases. These limitations illustrate that focus should be directed at the content and quality of the data in order to complete the study based on similar data source.

4.2 Macroeconomic Shocks Affecting the Household Loans

This paper aims to assess the effects of external and domestic macroeconomic shocks on household loans after estimating risky loans based on household-level data using 3 main approaches introduced in the previous section. In similar research studies completed in other countries, they mainly investigate the effects of unemployment rate, interest rate, prices of consumer goods and real estate prices.

Conversely for Mongolia, we chose the following policy decisions, external economic stance, domestic price change as shocks which have impacts on household income and collateral valuations:

- Effects of monetary policy (rise in policy rate),
- Changes in fiscal policy (rise in tax, cut on wage and pension),
- Effects of external sector (depreciation in exchange rate for national currency, tugrug, against USD),
- Effects of real estate market (fall in real estate prices).

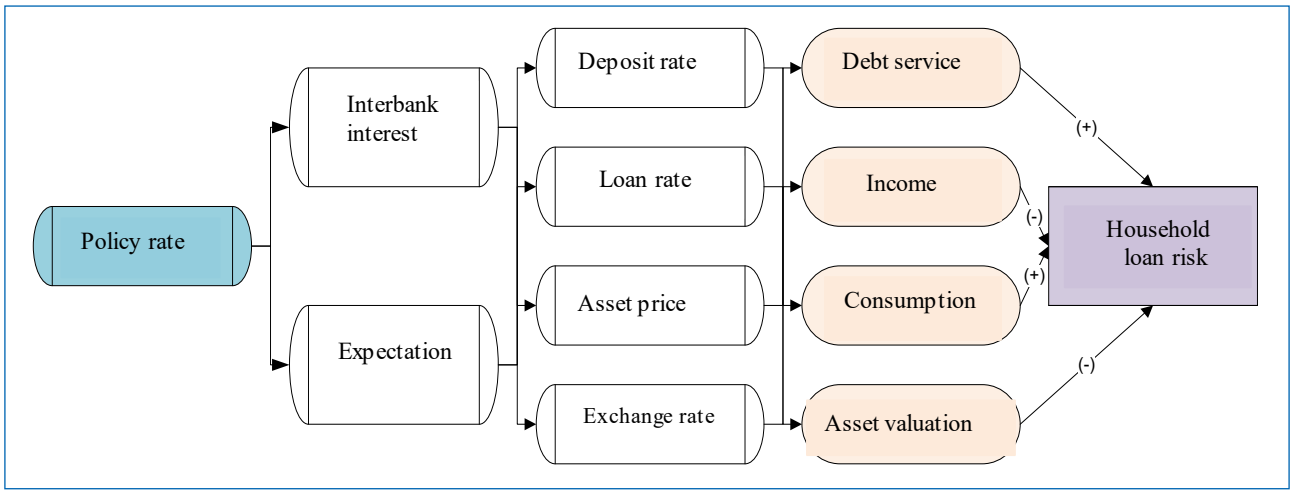
The abovementioned macroeconomic shocks can affect household credit risk both directly and indirectly, passing through multiple channels. For instance, as illustrated in Picture 1, policy rate change affects the deposit rate, loan rate, asset prices, and exchange rate through the channel of

5. The data and indicators used in this research paper are shown in the appendix.

interbank rate and market expectation. Eventually it affects the household credit risk through the following transmission channels:

- These changes have impacts on household consumption by changing the inflation,
- Loan rate affects debt service for the new loans or floating rate loans,
- Exchange rate affects the income and debt services measured in domestic currency for households who are earning or borrowing in foreign currency,
- Deposit rate increases interest income for the household…etc.

Picture 1:
Macroeconomic Aggregates' Channels Affecting Credit risk



Source: "Monetary Policy Transmission in Mongolia", BOM.

It becomes challenging to assess the impacts of all channels in a similar manner mentioned above and the effects of some macroeconomic shocks are not unequivocal, eventually requiring the conduct of another research study. Therefore, we used the results obtained in the research papers by Doojav and Kalirajan (2016), Tserendejid and Byambasuren, Bayarsaikhan et al. (2015), and Bazarsad (2014). The next section explains the effect of each macroeconomic shock in detail.

We used the annual change or average of the first 12 periods for response impulses to the macroeconomic and policy shocks analyzed in those research papers.

5. Stress Testing Results

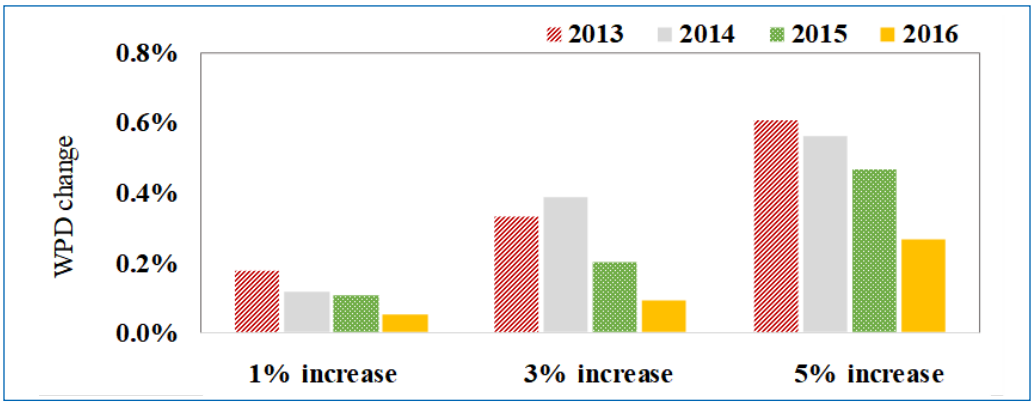
As it was impossible to conduct stress testing for each approach in studying effects of macroeconomic shocks on credit risk due to inadequate data quality and coverage, we employed the "Financial Margin" approach to study effects of monetary policy, fiscal policy, and exchange rate and "Extended" approach for effects of fall in asset prices.

5.1 Effects of Monetary Policy

We asssume that an increase in the policy rate has effects on: (i) decreasing DAR by increasing the deposit interest income; (ii) increasing DAR by increasing the interest repayments for new loans;

and, (iii) affecting household's financial wellbeing positively by decreasing inflation, eventually leading to a decline in the minimum living cost.

Figure 8:
Effects of Change in Policy Rate (Financial Margin Approach)



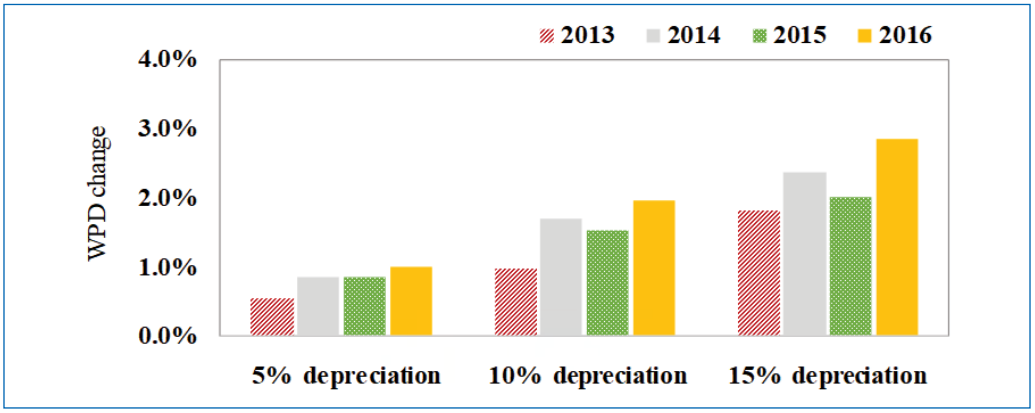
Sources: Authors' calculations.

Results show that the effects of the policy rate on credit risk has the tendency to deteriorate over time. For instance, when the policy rate was increased by 5 unit percent, the DAR calculated using the financial margin approach increased by 0.6% in 2013, while it increased by 0.3% in 2016, seeing a deceleration in the increase. This can be due to the decrease in new loans issued and inflation in recent years.

5.2 Effects of External Sector

The effects of the external sector is represented by the exchange rate of tugrug, MNT, against USD. Depreciation of MNT has effects on: (i) increasing debt service for individuals who have borrowings in foreign currency[6]; (ii) affecting the household balance sheet negatively by raising imported goods prices eventually leading to a hike in household consumption expenditure; and, (iii) affecting the household balance sheet favorably by raising household income that have earnings in foreign currency.

Figure 9:
Effects of Exchange Rate Depreciation (Financial Margin Approach)



Sources: Authors' calculations.

6. The share of outstanding loan in foreign currency in total loan is 4% as of 2017 December.

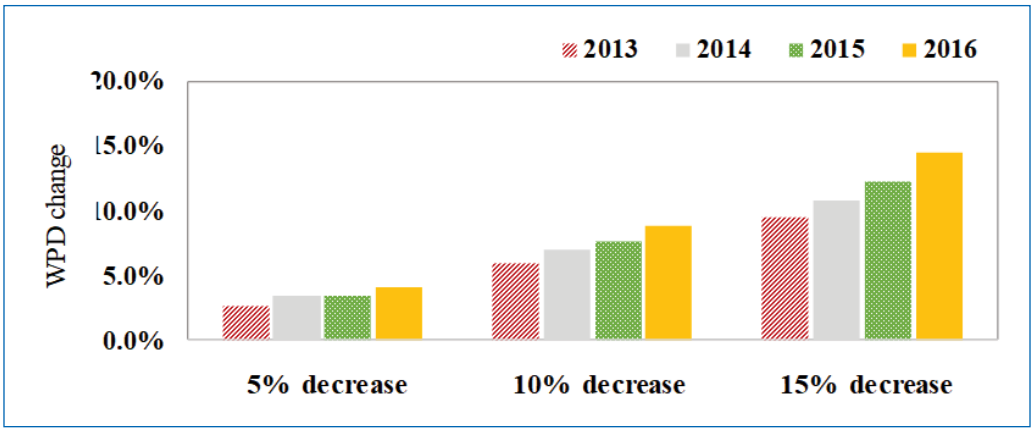
In this section, we consider the effects of exchange rate only on inflation as approximately 97% of individuals' bank loans is in MNT and the number of individuals who have earnings in foreign currency is meager. The results suggest that the effects of the exchange rate weakened in 2015 but have strengthened since 2016.

This can be explained by the fact that the effects of the exchange rate on inflation decreased in 2015 due to the slowdown in the economy.

5.3 Effects of Fiscal Policy

Effects of fiscal policy: Decrease in wage and pension cost has effect on: (i) increasing DAR by decreasing household income; and, (ii) decreasing DAR by decreasing inflation. In this section, direct effects that decrease income are discussed while the inflation effect is not covered.

Figure 10:
Effects of Change in Household Income (Financial Margin Approach)



Sources: Authors' calculations.

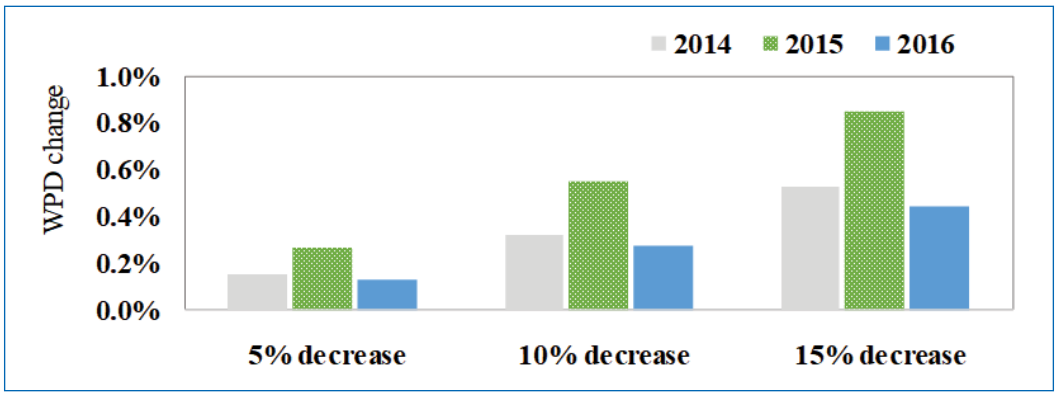
Results indicate that the effects of income decrease on DAR has been rising continuously since 2013. This shows that wage, pension and social welfare expenditure which are mainly dependent on fiscal policy have substantial effects on credit risk.

This also reflects the fact that in the last several years, social welfare expenditure has increased and it has become the main source of household income. Based on the abovementioned results, it is concluded that imposing a cut on social welfare expenditure or increase on tax is highly likely to entail non-performing loans to increase and to bring about vulnerabilities in the financial sector.

5.4 Effects of Housing Prices

Effects of stock market: In this section, we investigate the effects of real estate assets on DAR by employing the extended approach. We assume that a fall in asset prices increase DAR by reducing the valuations for collaterals.

Figure 11:
Effects of fall in assets prices (Financial Margin Approach)



Sources: Authors' calculations.

Results illusrate that although the effects of a fall in assets prices on DAR increased in 2015, it has decreased since 2016. This can be interrelated with the fact that real estate price have stablilized relatively since 2016, after observing an unceasing drop since the last half of 2014. On the contrary, it could also be due to incomplete data on real estate valuations for 2015.

6. Conclusion and Possible Policy Recommendations

In recent years, it is observed that the impact of macroeconomic changes on household credit risk is widening as household debt rises. Therefore, it becomes crucial and necessary to study the effects of macroeconomic variables on credit risk on regular basis.

In this paper, we used data from HSES covering 54 thousand households for the last 4 years to assess risky loans or DAR using several different approaches. Moreover, we conducted micro stress testing to investigate the effects of policy decisions and macroeconomic shocks on credit quality and this can be considered as a novel aspect of this research paper.

In conclusion, our results suggest that: (i) the effects of policy rate change on credit quality have weakened in the last several years; (ii) the effects of wage, pension, and social welfare benefit on credit quality have strenghtened continuously; and, (iii) the effect of the exchange rate decreased in 2015 while it increased in 2016.

Continuing this study with some further extensions should enable authorities, researchers and policy makers to utilize its results for policy decisions and estimating the stance for the economy.

But it should be noted that before conducting future similar research studies, several areas of work should be completed including: (i) re-estimating macroeconomic channels that affect household finance and enhancing the estimation methodologies; (ii) studying the sample errors in-depth and correcting the errors; and, (iii) introducing some new questions on the HSES to capture additional information necessary for future research studies.

References

Bayarjargal, Ariun-Erdene and Gan-Ochir Doojav, (2017), "A Model For Stress Testing Household Sector In Mongolia," *Asia Pacific Development Journal,* Vol. 24, No. 2, pp. 23-52.

Bayarsaikhan, Bayardavaa; Undral Batmunkh and Altan-Ulzii Chuluun, (2015), "Monetary Policy Transmission in Mongolia," *Bank of Mongolia Research Bulletin*, No. 10. pp. 92-133.

Bazarsad, Munkhzul (2014), "The Impact of Nominal Exchange Rate of MNT Against USD on Inflation," *Bank of Mongolia Research Bulletin*, No. 9, pp. 346-369.

Bilston, Tom; Robert Johnson and Mathew Read, (2015), "Stress Testing the Australian Household Sector Using the HILDA Survey," *Reserve Bank of Australia Research Discussion Paper,* 2015-01.

Djoudad, Ramdane, (2012), "A Framework to Assess Vulnerabilities Arising from Household Indebtedness Using Microdata., *Bank of Canada Discussion Paper,* pp. 2012-3.

Doojav, Gan-Ochir and Kaliappa Kalirajan, (2016), "Interest Rate Pass-through in Mongolia," *The Developing Economies,* 54, No. 4, pp. 271-291.

Karasulu, Meral, (2008), "Stress Testing Household Debt in Korea," *IMF Working Paper,* No. 08/255.

Muellbauer, John. 1994. "The Assessment: Consumer Expenditure," *Oxford Review of Economic Policy* (Oxford University Press), 10(2), pp. 1-41.

National Statistical Office of Mongolia, (2013), The Methodology to Estimate Household's Living Standards.

Risto, Herrala and Karlo Kauko, (2007), "Household Loan Loss Risk in Finland - Estimations and Simulations With Micro Data," *Bank of Finland Research Discussion Paper,* No. 5/2007.

Tserendejid, Byambatsogt and Byambasuren, Tsenguunjav, (2016), "The Impact of Exchange Rate on the Economy," *Bank of Mongolia Research Bulletin*, No. 11.

APPENDIX

Explanations for data used in the paper

Variable *(for household "i")*		***Explanation (resource)***
P_i	Loan principal repayment	It includes principal repayments of wage, pension, mortgage, consumption, herder, small and medium enterprise, leasing, and car loans for household members.
rm_i	Interest repayment for 5-8% mortgage loan	We assumed that it will remain constant as it is the interest rate for subsidized "mortgage program" by the Government of Mongolia.
ro_i	interest repayment for non-mortgage loans taken prior to the last 12 months for household i	We assumed that no macroeoconomic shock will affect interest repayment for this type of loan as the loan contract is signed before any shock occurs (prior to the last 12 months.)
rn_i	interest repayment for non-mortgage loans taken in the last 12 months for household i,	It is the interest repayment for non-mortgage loans taken within a year and can fluctuate depending on effect of any shock occuring during the year.
Y_i	total both monetary and non-monetary disposable income for household i	It is a difference between summation of wage, bonus, pension, social welfare benefits, interest income, household output, household service income, rent income, sales income, grants given by others, and food goods received from own enterprises and costs related to own enterprise and services. For Mongolia, considerable share of total population has private business in husbandry and agricultue. Moreover, many households receive food and other household goods from their relatives and friends. So we have made additional estimations by adding gifts and grants households received and raw materials and goods they consumed from their enterprises for households' non-monetary income.
MC_i	Estimated minimum consumption for household i	We used the living minimum cost for an adult calculated for Ulaanbaataar city, and 5 regions of the country by NSO annually. While estimating the living mimimum cost for household, we assigned weights of 1.0, 0.7, and 0.5 for the first adult member, the second adult member, and a child in the household, respectively.
D_i	Debt outstanding for household i	HSES contains information on loans outstanding only for the loans taken in the last 12 months and debt service for the loans taken prior to the last 12 months. So we used data for debt service, loan average term, and interest rate to calculate loan outstanding for the loans taken more than 1 year earlier.

A_i	Amount of assets that are considered as eligible collaterals household i	We considered real estate properties, vehicles, livestock, and savings to be eligible collaterals for bank loans in Mongolia. We did not include land, stock, bonds, ownership license and patent for the eligible collaterals as there is no available information for them. Since there is no valuation information on household's real estate prices for 2013 and 2015, we used information for prices of similar properties from 2014 and 2016. For valuation of household's total livestock, we used average price for livestocks sold in that year, while for savings outstanding we divided saving interest income by average deposit rate.

Sources: Authors' calculations, The Household Socio-Economic Survey (NSO, 2013-2016), Guideline of calculating household's living standards (NSO, 2013), Monthly statistical bulletin by BOM (2017), and Individual and SME loan report (BOM, 2013-2016).

Chapter 5

HOUSEHOLD SECTOR DYNAMICS AND MONETARY POLICY IN THE PHILIPPINES

By

Tatum Blaise Pua Tan[1]

1. Background

The growing importance of household sector financial dynamics and its implication on financial and economic stability, as witnessed in the recent global financial crisis, has spurred substantial interest among policymakers, regulators, and economists. The same is true for the Philippines. In the recent decade, an expanding suite of statistics has been compiled and generated on the household sector, especially for the Central Bank.[2] Most of these statistics offer insights on household indebtedness and financial behavior. Rightfully so, it is estimated that the household sector comprises about a quarter of the banking system's total loans in 2016.[3] The sector's borrowings surged in the past seven years from Php746.2 billion in 2010 to reach Php1,829.6 billion by end-2016.[4],[5] Moreover, credit activity in the household sector is closely tied to real asset prices, particularly those of residential real estate properties, which serve as collateral in borrowing from formal lending intuitions. As such, credit not only affects household consumption directly as a supplementary source of funds but also indirectly, via housing prices.

---

1. Ms. Tatum Blaise Pua Tan is a Bank Officer V in the Department of Economic Statistics of the Bangko Sentral ng Pilipinas (BSP). E-mail: ttan@bsp.gov.ph. The views expressed in this paper are those of the author and do not necessarily reflect those of the BSP. Any errors and omissions are the responsibility of the author. The researcher is grateful to the data support provided by the staff from the Banking and Flow-of-Funds sub-groups of the Department of Economic Statistics (DES). The author would also like to acknowledge the technical assistance of Dr. Maria Teresa Punzi, Mr. Jade Eric Redoblado, Ms. Cristeta Bagsic, Mr. Jeremy de Jesus, Mr. Jan Christopher Ocampo, and Mr. Ray Angelo Justin Fernandez.

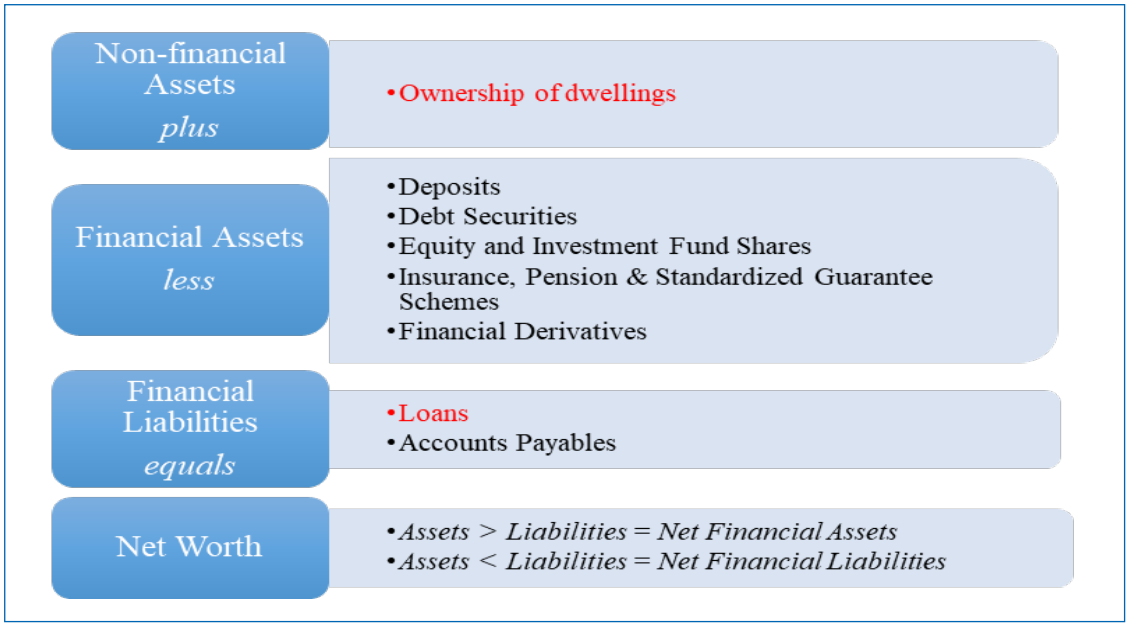
2. The BSP compiles the following household sector statistics: HH Consumer loans (started in 2009), the Consumer Finance Survey (CFS, maiden issue released in 2012- reference year is 2009 and 2014), the Flow of Funds (2008 SNA, starting 2000), Consumer Expectations Survey (started in 2004), the National Baseline Survey on Financial Inclusion (2014), and Year-end Reports of BSP Financial Inclusion Initiatives (starting 2011).

3. End-2017 data are still unavailable as of the time of the study. Source: Standardized Report Forms and author's calculation.

4. Except in 2013.

5. Includes household loans from other depository corporations (ODCs) (i.e., Universal/Commercial Banks (UKBs), Thrift Banks (TBs), Rural and Cooperative Banks (RBs), Non-stock Savings and Loan Associations (NSSLAs), and Non-bank with Quasi-Banking functions (NBQBs)). Household indebtedness in this study adopts the definition in the 2008 System of National Accounts (SNA). Household debt is used interchangeably with household credit. Source: Standardized Report Forms and author's calculation.

Figure 1:
Composition of Household Sector Balance Sheet in the Philippines



Note: Based on the 2008 System of National Accounts and the Philippine Flow of Funds.

In the Philippines, the households' ownership of residence is considered their biggest asset, posing significant implications on its net worth (Figure 1).[6],[7] As a form of collateral, an increase in housing prices augments the value of the households' real assets and its net worth, leading to improved prospects in terms of loan availment and terms of credit. Similarly, the upturn in housing prices encourages more housing construction and real estate investments in anticipation of further increase in house prices. On the demand side, this translates to a significant boost in the net worth of 75.5% of Filipino households who are homeowners.[8] The subsequent wealth effect stimulates more consumption and investment activities. On the supply side, this induces more residential building constructions by the real estate and construction industries.[9] As housing prices increase, exceeding construction costs, new housing constructions will continue to generate profits, fueling more residential construction (Goodhart and Hofmann, 2008).

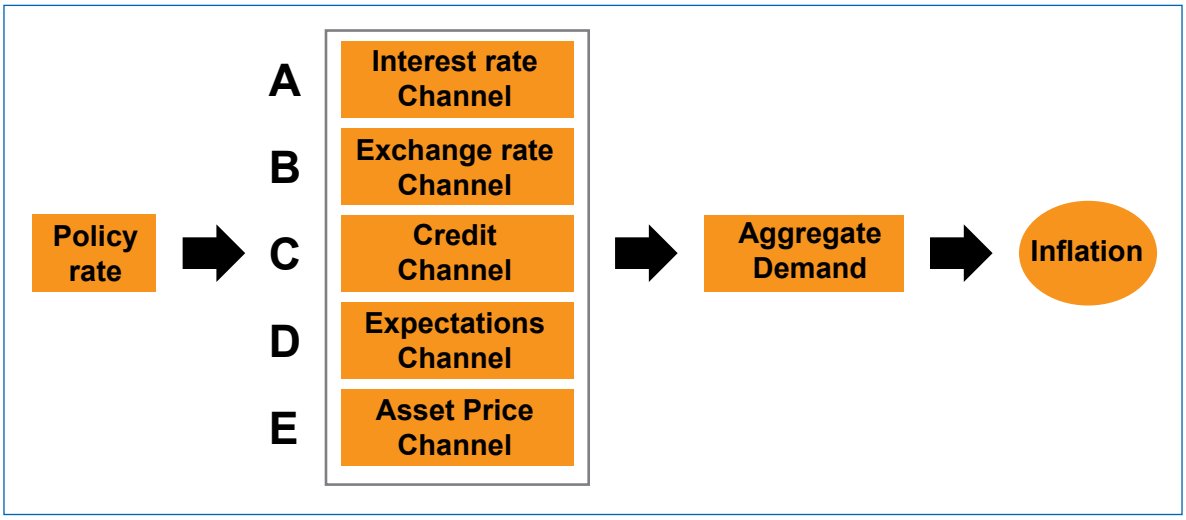
In view of the foregoing, the motivation for this research is twofold. First, the study aims to analyze the multi-directional relationship between household sector credit, house prices, and monetary policy transmission mechanism in the Philippines (Figure 2). Specifically, the paper attempts to shed light on the multidimensional link between house prices and the household sector's debt dynamics to the country's monetary policy settings, as potential sources of shock. A theoretical assessment of these variables suggests a reciprocal causation between house prices, credit, and policy rates. Second, while there have been significant developments in the compilation of household sector statistics, the body of research employing contemporary macroeconomic

6. BSP (2014a), CFS. www.bsp.gov.ph
7. Net worth is measured as non-financial and financial assets less financial liabilities.
8. Based on the 2014 CFS (BSP, 2014a), which has a sample size of 18,000 households encompassing all regions in the country, except Leyte province and Autonomous Region in Muslim Mindanao (ARMM).
9. See Bjørnland and Jacobsen (2010), Robstad (2014), Iacoviello (2005), and Musso, A., Stefano, N., & Stracca, L. (2011).

empirical models which integrate household sector aggregates (e.g., house prices and household indebtedness) remains limited. Thus, this study hopes to set the groundwork for future research works that would take into account said household sector variables using more sophisticated empirical economic models (i.e., Dynamic Stochastic General Equilibrium (DSGE) model, multi-equation model).

As a small open economy that has adopted an inflation targeting framework, Bjørnland and Jacobsen's (2010) research on Sweden, Norway, and United Kingdom offers a sound starting point for this research on the effect of house prices on the monetary transmission mechanism in the Philippines. Bjørnland and Jacobsen (2010) use a structural vector autoregressive (SVAR) model to analyze the effects of monetary policy and housing price shocks to inflation and interest rates. Extending their model, Robstad (2014) incorporates household credit in Norway in the specification to analyze the impact of monetary policy shocks using Bayesian structural VAR (BVAR) models. Robstad (2014) broadens the analysis of a monetary policy shock to household-related variables by employing three different specifications: a Cholesky identification, a SVAR as in Bjørnland and Jacobsen (2010), and a SVAR sign restrictions following Uhlig (2005).

Figure 2:
Monetary Policy Transmission Mechanism in the Philippines



* Aggregate Demand consists consumption, investment and net external demand. Consumption and investment include those of both the private and the public sectors.

Source: Tuaño-Amador, Claveria, and Glindro, (2009), "Some Perspectives on the Monetary Policy Transmission Mechanisms in the Philippines," *Bangko Sentral Review*, p.18.

Building on the aforementioned literature, this study employs a SVAR model with sign restrictions to examine the multidimensional impact of an expansionary monetary policy shock (A in Figure 2), a housing price boom (E in Figure 2), and a positive credit supply shock (C in Figure 2). Using monthly data from 2010:M1 to 2017:M5, the study finds three key conclusions. First, the muted link between household credit and policy rates in the country, with household credit from banks responding variably to changes in policy rates over time. In the expansionary monetary policy shock, household debt's positive reaction is transitory despite the sustained decline in policy rates, while borrowing activity continues to expand amid rising policy rates in the credit supply shock. This

is attributed in part to the alternative funding sources available to the sector not captured in the study.[10] Second, the research finds a reciprocal connection between household debt and housing prices. In both the credit supply and housing price shocks, the impulse response functions (IRFs) of the two variables show broadly parallel and coinciding trends. Third, monetary variables can influence real aggregates. A negative monetary policy shock spurs consumption in the short-run, while a rise in housing prices boosts household consumption through the price-induced wealth effect and better access to credit. Furthermore, household consumption moves in tandem with credit in all the simulations.

The household credit's robust expansion and its significance to housing prices and household consumption in the country merit an assessment of the households' current state of indebtedness. As of 2017:Q2, the Philippines' household debt to GDP ratio stood at 12.8%. This is comfortably below the 60% threshold specified by Lombardi, Mohanty, and Shim (2017), at which household debt becomes a drag to consumption. This is also much lower than the 80% threshold set by Cecchetti, Mohanty, and Zampolli (2011), wherein household debt becomes a strain on economic growth.[11] Moreover, with financial assets amounting to more than thrice of its financial liabilities as of end-2016, the sector is well-cushioned against potential adverse changes in macroeconomic conditions.[12] Notwithstanding the sector's resilient position, regular assessment is crucial to avert overleveraging and becoming counterproductive to the economy in the long-run. Hence, current efforts towards financial inclusiveness should be combined with closer and wider monitoring of household borrowings to include non-bank institutions, particularly shadow banking activities. In addition, the roll out of the first package of the Tax Reform for Acceleration and Inclusion (TRAIN) will have significant ramifications—considering the Filipino households' marginal propensity to consume (discussed in the next section)—on the households' income, expenditure, and indebtedness.[13]

The paper is organized as follows: Section 2 provides a comprehensive discussion on the household sector in the Philippines; Section 3 discusses the relevant literature; Section 4 tackles the research design of the paper; Section 5 presents and analyzes the results; and Section 6 concludes and offers recommendations.

2. Stylized Facts on the Philippine Household Sector

2.1 Economic Behavior

As a consumption-driven economy, the household final consumption expenditure (HFCE) accounts for more than 60% and 70% of the country's Gross National Income (GNI) and Gross

10. It may be noted that some of these financial providers do not necessarily track the movement of the policy rates (e.g., socialized housing facilities, money lenders). According to the CFS (BSP, 2014a), a significant percentage of households borrow from government financial institutions, especially for housing loans—predominantly through the National Housing Authority (NHA) and Pag-ibig, which offer socialized housing. Households with no access to formal lending channels resort to money lenders who adopt a "5/6" loan arrangement, which translates to a daily interest rate of 20 percent (Mitra, 2009).
11. Includes household loans from ODCs. Source: Standardized Report Forms and author's calculation.
12. Based on household sector's asset holdings and debt incurrence with the ODCs.
13. TRAIN encompasses lower personal income taxes but higher excise taxes on petroleum and petroleum products, automobiles, and sugar-sweetened beverages, among others. However, the authorities expect the potential impact of said tax reforms on inflation to be transitory.

Domestic Product (GDP) on average over the years 2000-2016, respectively.[14] Growth in consumption is robust, averaging 9.3% in the same period. While this could be a boon for the economy, an article in the 2016 BSP Annual Report found that the Filipino household's marginal propensity to consume (MPC) was 0.99 on average between the years 2010-2015, an almost one-to-one ratio between income and spending.[15] This implies that every additional peso income is spent almost entirely on consumption.

Delving deeper, an analysis of the Filipino households' MPC across income class shows that households in the higher income brackets have higher marginal propensity to save (MPS).[16] This is expected as households from these income classes have more financial flexibility. Meanwhile, households belonging in the middle to the lower income classes exhibit a lower marginal propensity to save. The households from these brackets tend to spend more for every additional income, suggesting little savings to even dissaving. This is expected, as their modest income is likely spent entirely on basic necessities. This raises the question on how they source additional funds to finance their consumption in light of their net worth and access to credit.

Table 1:
MPC Across Income Class

Income Class in thousands	Total Annual Income		Total Annual Expenditure		MPC (2015)
	in millions				
	2012	2015	2012	2015	
all	5,026,798	6,068,162	4,125,312	4,882,860	0.73
under 40	20,303	11,086	22,540	12,376	1.10
40 - 59	71,530	46,104	75,188	47,947	1.07
60-99	325,936	266,410	320,853	262,096	0.99
100-249	1,443,751	1,671,854	1,307,091	1,500,018	0.85
250 above	3,165,277	4,072,708	2,399,641	3,060,424	0.73

Source: Family Income and Expenditure Survey 2012 and 2015. www.psa.gov.ph

2.2 Access to Credit

Household nominal credit has been expanding at a double-digit rate since 2010, with an average year-on-year growth rate of 15.4% from 2011 to 2017 (Figure 3).[17] As of 2017:Q2, total household debt reached P1,937.6 billion from only P662.4 billion in 2010:Q1. From 2010:Q1 to 2017:Q2,

14. Based on the Philippine Statistics Authority's (PSA) System of National Accounts.
15. Based on the box article titled "Analyzing the Trends and Developments in the Household Sector's Economic Behavior" in the 2016 BSP Annual Report.
16. MPS = 1 - MPC
17. Includes household loans from ODCs only.

consumption loans account for about 70% of the households' total loans, on average.[18] Auto loans, on average, constitute a third of the total loans for consumption purposes and a fifth of the households' total loans from the bank proper. [19] Meanwhile, loans for production purposes largely consist of housing loans, which comprise, on average, 28.1% of the households' total loans (Figure 4).

The size of the country's household indebtedness as a ratio to GDP and GNI is relatively low compared to its peers in the region. On average, the ratio stood at 10.1% and 8.3% from 2010:Q1 – 2017:Q2, respectively (Figure 5).[20] While both ratios moved parallel to each other, the GNI steadily registered a lower value, the GNI being larger since compensation of residents working abroad or more commonly known as Overseas Filipino Workers (OFWs) accounts for the bulk of the net primary income from abroad. In the same vein, it is equally important to calculate the ratio of household debt to household disposable income (HDI), which includes personal transfers—an important source of income for Filipino households.[21],[22] The household sector's debt to HDI ratio recorded an average of 13.9% in the past seven years. While these ratios offer favorable indications of the sector's ability to service their debt, and at the same time, suggest that the sector's debt accumulation remains in check and manageable (Armas, 2016), these modest ratios also signify the households' limited access to credit in the country, especially for production purposes.[23]

A commonly cited challenge encountered by households borrowing from the formal channels is the collateral requirement. According to the BSP's National Baseline Survey on Financial Inclusion (2014b), apart from not having the need for credit, the second most common reason for Filipinos not borrowing money is the lack of collateral. Similarly, the collateral concerns along with insufficient documentary requirements were cited as the most common reasons for denied loan applications. It may be noted that physical assets (land and real estate) continues to be the preferred form of collateral among the financial institutions in the country.[24] The lack of real assets and the ineligibility of some households have led them to tap other sources of credit which are less cumbersome compared to banks, particularly money lenders and in-house financing. According to the survey, 10.8% and 7.7% of households reported to have availed of loans from money lenders and in-house financing facilities, respectively.

18. Consumption loans include the following: credit card, motor vehicle loans, salary loans, loans for consumption purposes – others, other purposes, while agrarian reform and other agricultural loans, and microfinance loans. Accrued interest payable is also lodged under loans for consumption purposes.
19. Excludes loans from NSSLAs and NBQBs due to the limited information on the breakdown of the type of loans. Thus, total household loans used in the calculation is lower than the total used in the other ratios mentioned.
20. Includes households' loans (as defined in the with 2008 System of National Accounts Manual) to ODCs only (i.e., U/KBs, TBs, RBs, NSSLAs, and NBQBs). Estimates started in 2008 since there was a break in the series following a shift in the compilation framework. Quarterly household debt ratios are computed using annualized GDP and GNI.
21. HDI is computed as household sector's total income less property expense, taxes on income and wealth, compulsory fees, social security contributions, and current transfers paid. The HDI is calculated as household final consumption expenditure plus net savings as in the box article titled "Analyzing the Trends and Developments in the Household Sector's Economic Behavior." Sources: 2016 BSP Annual Report and PSA's System of National Accounts.
22. Personal transfers are defined as "current transfers in cash or in kind by OF workers with work contracts of one year or more as well as other household-to-household transfers between Filipinos who have migrated abroad and their families in the Philippines." Source: www.bsp.gov.ph
23. Includes housing loans, agricultural loans, and loans for microfinance.
24. BSP, Financial Inclusion in the Philippines, Issue No. 3, 2013:Q3

Figure 3:
Outstanding Loans, by Type Of Purpose

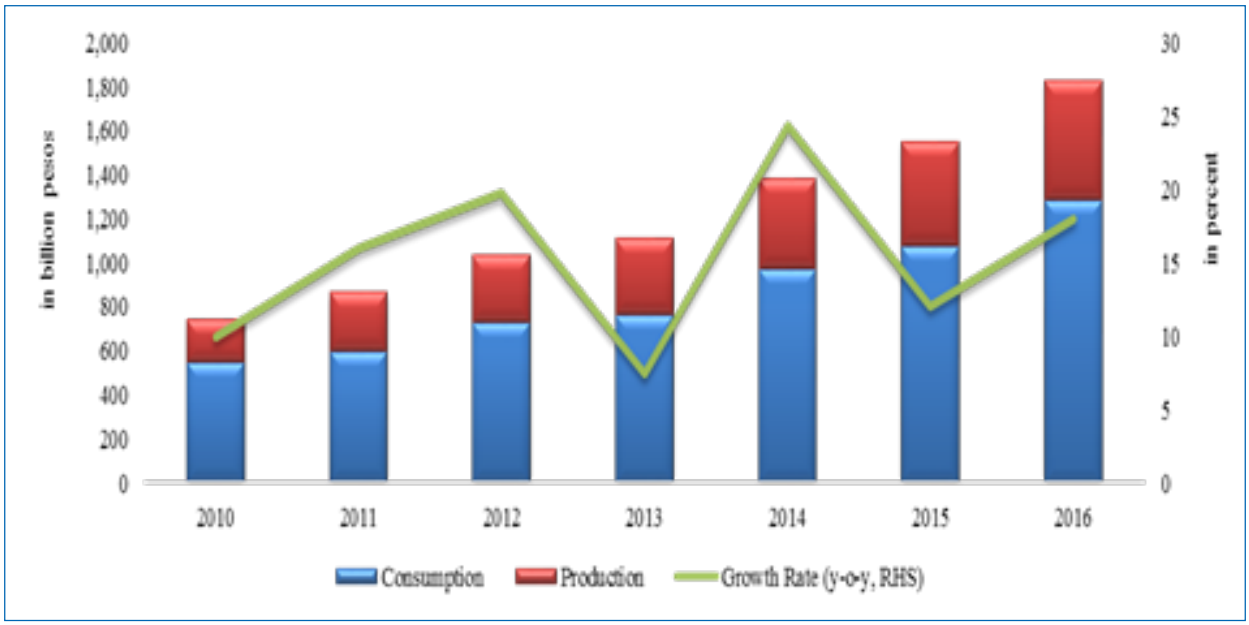


Figure 4:
Outstanding Loans, by Type of Loan
Average share from 2010Q1 to 2017:Q2

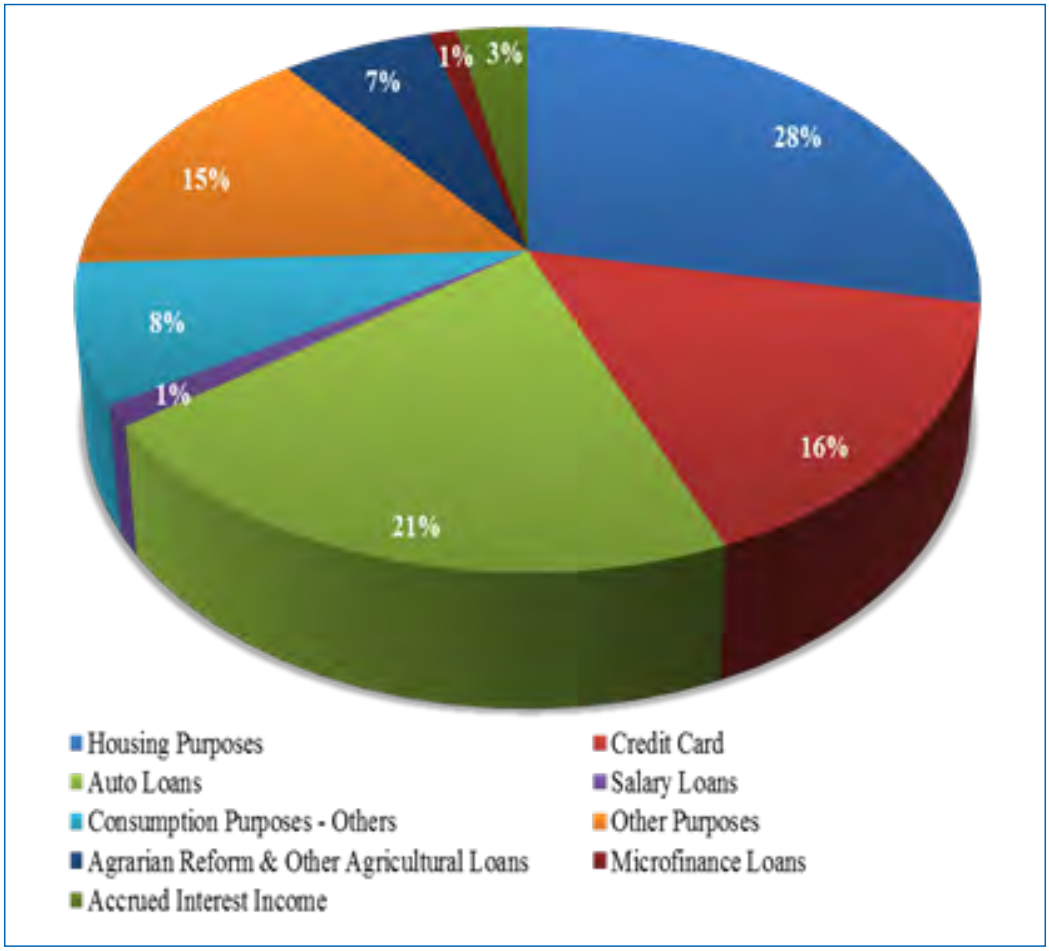
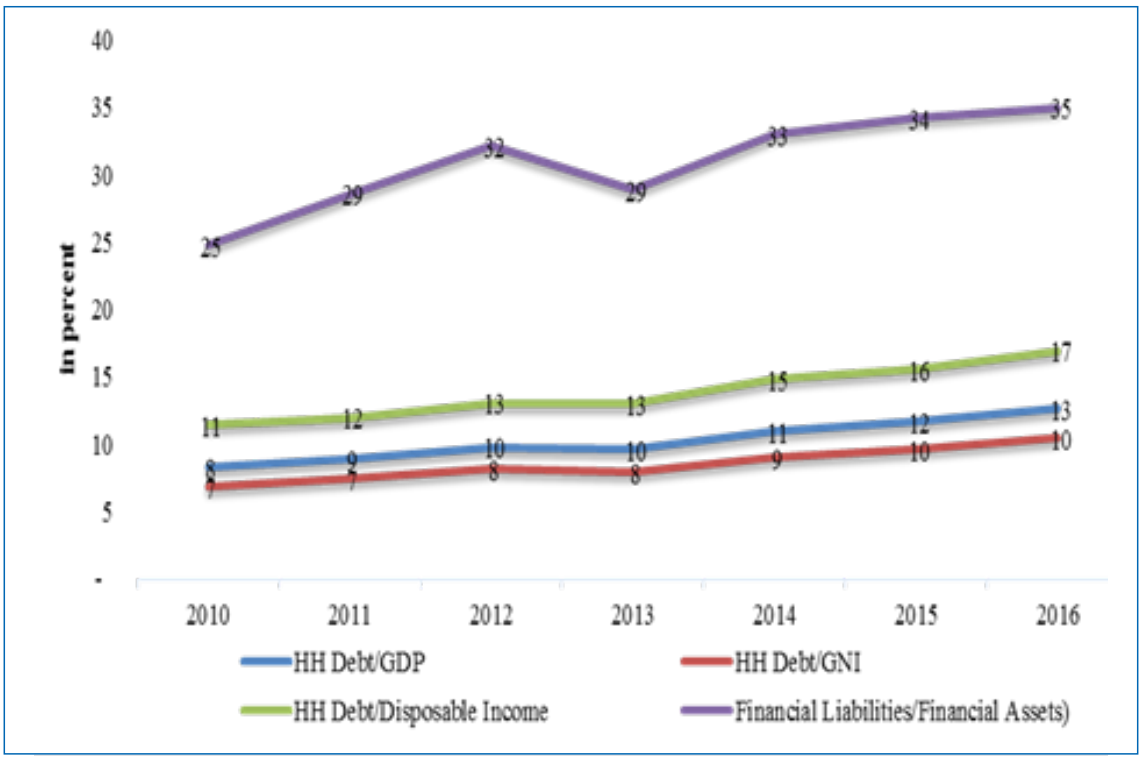


Figure 5:
Household Indebtedness Indicators



Source: Standardized Report Forms- Department of Economic Statistics, Philippine Statistics Authority (PSA), and Author's calculations.

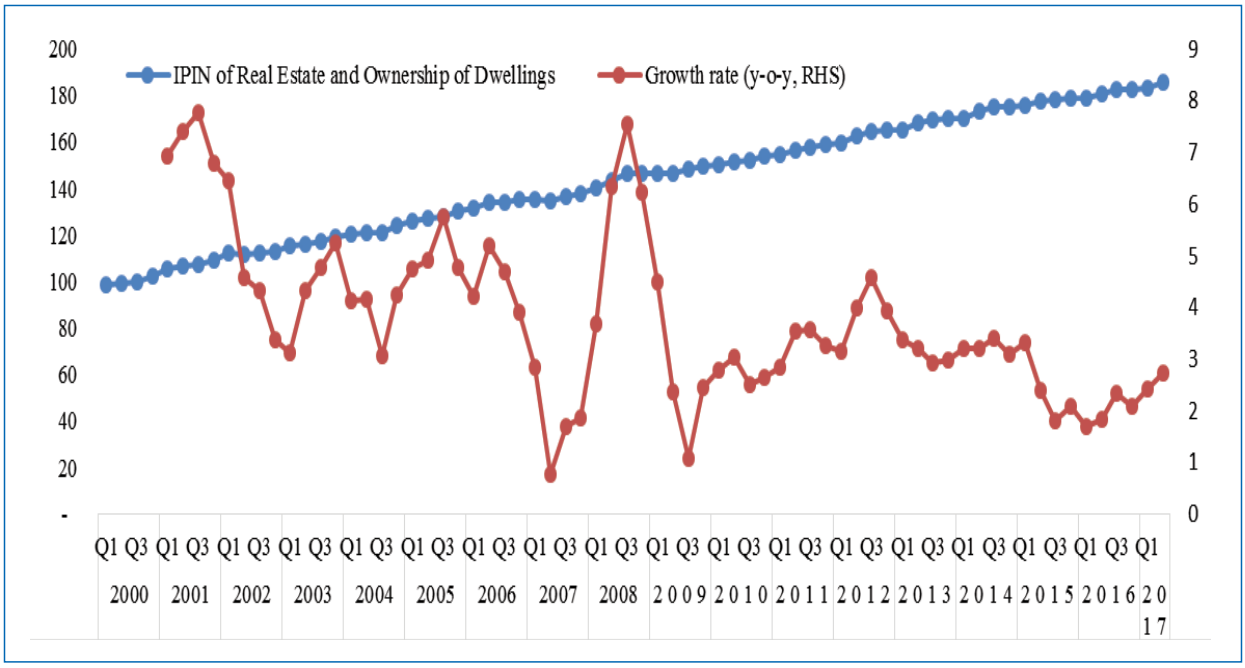
2.3 Residential House Prices

The households' ownership of dwellings and land has become more important following the advent of financial liberalization, which has enhanced the market for *de-cumulated* real assets.[25] To provide a better picture of the housing market in the country, this study presents three alternative measures of housing prices in the country. The first one is the housing price index calculated as the implicit price index (IPIN) of the Nominal/Real Gross Value Added of Real Estate and Ownership of Dwellings (Figure 6).[26] Hence, the index is based on both actual (real estate, both residential and non-residential) and imputed (ownership of dwellings) rents. It can be observed that the housing prices are on the uptrend as the indicator reached 181 in 2016.

25. Davis, P., (2010), "New International Evidence on Asset-Price Effects on Investment, and a Survey for Consumption," *OECD Journal: Economic Studies*, Volume 2010.

26. The derivation of the index follows the paper by Glindro, E. and Delloro, V. (June 2010) titled "Identifying and Measuring Asset Price Bubbles in the Philippines," BSP Working Paper Series No. 2010-02. It may be noted that IPIN on real estate also covers real estate developers and brokers. Source: Philippine National Accounts.

Figure 6:
House Price Index
For the periods indicated



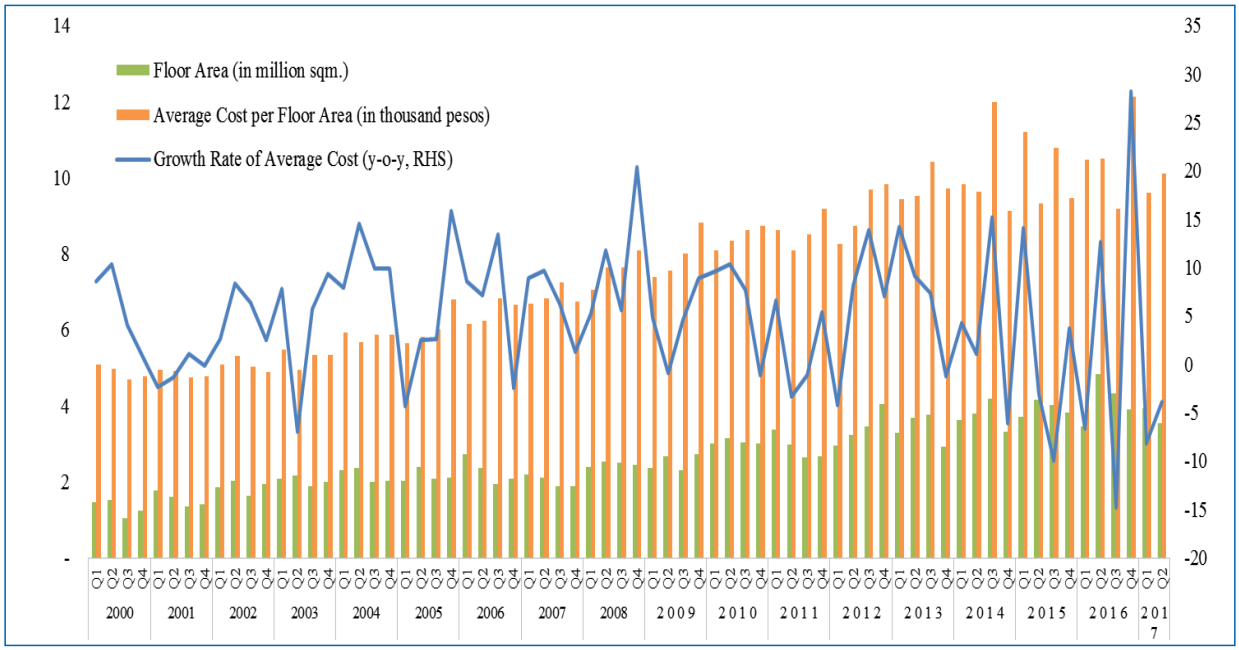
Source: Gross Value Added in Real Estate, Renting & Business Activities by Industry Group, PSA, and Author's calculations.

The second measure is based on the average cost per floor area of residential property construction.[27] Consistent with the rise of housing rents, the value of residential properties has also risen as evidenced in the more than double increase in the average annual cost per floor area of residential property construction since the early 2000s to 2016 (Figure 7). A simple correlation test conducted between the average cost per square meter of residential construction and an estimated house price index based on the imputed rents of housing services covering the periods 2000:Q1 to 2017:Q2 indicate a high positive correlation at 0.95. The study employs this indicator as it captures the actual value of the residential real property asset, which is more relevant to our variable of interest—real property as collateral for credit availment.

The third measure is the Residential Real Estate Price Index (RREPI), which was introduced by the BSP in 2015 as part of its financial soundness indicators and asset price monitoring for monetary policy consideration. The weighted chain-linked index measures the prices of residential real estate in the country based on new housing units across time, regions, and types of units. The index is derived from the banking system's data on housing loans granted, the appraised value per square meter, and share of floor area of new housing units.[28] While this would have been a promising alternative measure of house prices, this study is unable to utilize the index due to its short time series.

27. Source: Philippine Statistics Authority's Construction Statistics based on Building Permits
28. Lifted from the Technical Notes of the RREPI

Figure 7:
Residential Construction
For the periods indicated



Source: Construction Statistics based on Residential Building Permits, PSA, Authors' calculations.

3. Review of Related Literature

Bjørnland and Jacobsen (2010) use the structural vector autoregression (SVAR) model estimated for U.K., Norway, and Sweden to study the role of house prices in the monetary transmission mechanism in small open economies. The research identifies six (6) endogenous variables: foreign interest rate, inflation, 3-month domestic interest rate, real exchange rate, and real house prices and centers on two shocks to monetary policy and house prices.[29] The model employs both long-run and short-run restrictions to enable the interest rates and house prices to respond simultaneously. This allows house prices and the REER to respond immediately to shocks, and at the same time, enables monetary policy to incorporate fluctuations in asset prices. Using the data covering 1983:Q1 to 2006:Q4, Bjørnland and Jacobsen (2010) find that monetary policy shocks have an immediate and pronounced effect on house prices. The research also observes that a shock in house prices affects interest rates, albeit with varying lags and magnitude.

Robstad (2014) extends the work of Bjørnland and Jacobsen's (2010) research by incorporating household credit in the model. While the shock in the study is limited to a contractionary monetary policy shock, Robstad (2014) identifies three (3) different Bayesian structural VAR models to analyze the impact of the said shock on household prices and credit in Norway for the periods 1994:Q1 to 2013:Q4. To wit, the study simulates (1) two Cholesky identification VAR models—one with the interest rate ordered last and the other with credit; (2) a model as in Bjørnland and Jacobsen (2010) which allows for multidimensional contemporaneous effects between interest rates, house prices, and credit; and lastly, (3) an identification which employs sign restrictions akin to Uhlig (2005). The study consistently finds that a rise in the interest rates has significant negative effect on house prices across all models, as in Bjørnland and Jacobsen (2010). However, the research also concludes

29. All variables are in real terms and in log form except for the interest rates.

that a contractionary monetary policy shock affects household credit only modestly in all three VAR identifications.

On a broader context, Musso, Neri, and Stracca (2010) employ a SVAR framework using a Bayesian approach with short-run restrictions to compare the multidirectional impact of three (3) structural shocks between the United States (U.S.) and the Euro Area (includes Germany, France, Italy, Spain, and the Netherlands) between the years 1986:Q1 to 2008:Q4. The model's vector of endogenous variables includes: consumer price index, private consumption, residential investment, real house price, 3-month interbank interest rate, mortgage lending rate, and nominal mortgage debt.[30] These variables were used to simulate the following shocks: 1) contractionary monetary policy; 2) negative credit supply shock (increase in mortgage lending rate); and 3) housing demand shock (an increase in real house price). The study infers that a monetary policy shock results in a decline in residential investments, real house price, mortgage debt, and private consumption in both economies, albeit the effect is larger in the U.S. Meanwhile, credit supply shocks have significant negative effect on both residential investment and real house price, but with limited transmission on consumption. Lastly, house price shocks were observed to positively impact on all variables, with a more pronounced effect on consumption in the U.S. Musso, Neri, and Stracca (2010) conclude that housing variables play a key role in the transmission of monetary policy shocks, especially in the U.S.

A similar cross-country study by Singh and Nadkarni (2017) analyzes the interlinkages between asset prices, bank credit, and monetary policy by employing a panel VAR model across 22 emerging markets and developing economies (including the Philippines) for the periods 1995:Q1 to 2014:Q4. The research employs the Cholesky decomposition with the following ordering of first differenced variables: real GDP growth, inflation, interest rate, credit growth, changes in house and equity prices. The research simulates a string of shocks: positive aggregate demand shock, contractionary monetary policy, bank credit boom, and positive asset price shock for both house and equity prices. Singh and Nadkarni (2017) find that a positive monetary policy shock leads to a decrease in bank credit—following a momentary increase—and a decline in asset prices, especially for equity prices. Meanwhile, a credit boom results in an increase in GDP and in asset prices, albeit with insignificant effect for equity prices. Similarly, the study observes that an expansionary aggregate demand shock leads to rise in asset prices and credit growth. Lastly, an equity price shock results in an expansion of credit demand and output, albeit, house price shocks offer mixed results. In sum, Singh and Nadkarni (2017) conclude that monetary policy shocks have more impact on stock prices, while credit shocks have bigger and more persistent effect on house prices.

4. Methodology

4.1 Dataset and Specification

This study uses monthly data on housing prices, household credit, weighted monetary operations rate (WMOR), household final consumption expenditure (HFCE), inflation, and exchange rate (ER) covering the periods 2010:M1 to 2017:M5. The data were sourced from the Bangko Sentral ng Pilipinas and the Philippine Statistics Authority. The said variables were adopted based on the studies by Bjørnland and Jacobsen (2010) and Robstad (2014). However, since the study centers on the household sector dynamics, HFCE is used instead of output as in Musso, Neri, and Stracca (2011). Since the Philippine National Accounts is only available on a quarterly basis, the research applied

30. All variables are in log form except for interest rates.

cubit spline interpolation to the quarterly data on output and housing prices to generate the monthly data on said variables. The variables were transformed to log forms, except for the inflation and WMOR, and were all detrended using the Hodrick-Prescott filter.

The research first identifies the vector of macroeconomic variables as follows:

$$y_t = [HFCE, housing\ prices, ER, household\ credit, inflation, WMOR\ ]_t'$$

A Structural Vector Autoregressive (SVAR) model is then specified with sign restrictions following Robstad (2014), Uhlig (2005) and Musso, Neri, and Stracca (2011) and defined accordingly as:[31]

$$Ay_t = c + B(L)y_{(t-1)} + \varepsilon_t$$

where A is the matrix of contemporaneous interactions where the sign restrictions are applied, y is the vector of endogenous variables, c is a constant, $B(L)$ is a matrix of polynomial in the lag operator in which its order of four (4) lags and ε is the vector of structural shocks. The lag was determined by the Hannan-Quinn information criterion (HQ) along with reasonable judgment given the model's limitations.[32] The shocks are identified as: (1) expansionary monetary policy shock; (2) housing price boom; and (3) positive credit supply shock.

The identification of the sign restrictions and its corresponding durations are drawn from relevant literatures and to some extent, determined arbitrarily utilizing fundamental economic theories as well as recognizing the limitations of the model/sample size. The shocks are characterized as one standard deviation away from the mean and the sign restrictions are applied to the impulse response functions (IRFs) for several months after the impact or the set lag, i.e., 1 or 3 to 12 months (Uhlig, 2005). The shocks are all assumed to affect economic activity (i.e., household consumption) with a quarter lag (Robstad, 2014, and Musso, Neri, and Stracca, 2011). For the expansionary monetary policy shock, the variables were left unrestricted, except for consumption, so as to let the data to determine the effect on household credit and housing prices. The housing demand represented by household credit is allowed to respond contemporaneously (Jarociński and Smets, 2008) to the housing price shock, while the rest of the variables are unrestricted.

As discussed in the previous section, borrowing conditions in the Philippines is tightly linked to the value of their real properties which serve as the collateral. Meanwhile, housing prices are set to respond with a quarter lag in an expansionary credit supply shock. This takes into consideration the transmission mechanism of the shock adversely affecting the sector's investment activity/demand before eventually driving down housing prices. Moreover, it may be noted that while household credit is predominantly housing loans, it also includes other types of loans. Table 2 summarizes the sign restrictions employed in the study.

31. Simulations were carried out using Matlab (50,000 replications).

32. The Schwarz Information Criterion recommends a lag order of three (3). However, at that lag order the variables are auto correlated, especially at the lower lag levels. Meanwhile, sequential modified LR test statistic, final prediction error, and Akaike information criterion suggest a lag order of six (6), however, considering the short series of the study this may not be plausible.

Table 2:
Sign Restrictions of the Different Shocks

Shocks / Variables	Expansionary Monetary Policy Shock (EMP)		Housing Price Boom (HPB)		Positive Credit Supply Shock (PCS)	
	Sign	Period	Sign	Period	Sign	Period
HFCE	+	3-12	+	3-12	+	3-12
Housing Prices	0	0	+	1-12	+	3-12
REER	0	0	0	0	0	0
Household Credit	0	0	+	1-12	+	1-12
Inflation	0	0	0	0	0	0
WMOR	-	1-12	0	0	0	0

Note: 1 -12 months implies that the sign restriction is imposed for a year following the variables' contemporaneous reaction to the shock, while 3 – 12 months indicates that the variable is restricted to react to the shock, according to the imposed sign, only after a quarter lag and lasting until the next three quarters.

4.2 Endogenous Variables [33]

A. Real Housing Prices (RHP) = average price of residential construction per square meter based on construction statistics from building permits and deflated using the consumer price index (CPI, 2006=100). The data were seasonally adjusted.

B. Real Credit to Households (RHDEBT) = households' loan availment from Universal/Commercial and Thrift banks and deflated using the CPI. The coverage is limited to UKBs and TBS only since monthly data is unavailable for rural and cooperative banks as well as NSSLAs and NBQBs. The data were seasonally adjusted.

C. Exchange Rate (ER) = the price of a unit of foreign currency in terms of the domestic currency. The exchange rate is conventionally expressed as the value of one US dollar in peso equivalent (i.e., US$1 = P50.00). The data were seasonally adjusted.

D. Inflation (INF) = the rate of change in the average prices of goods and services typically purchased by consumers or the consumer price index (CPI). Measured as the month-on-month growth rate of the CPI.

E. Weighted Monetary Operations Rate (WMOR) = the monetary policy rate. For the periods 2010:M1 to 2016:M5, the variable is calculated as the average between the weighted average rates of the reverse repurchase (RRP, overnight) and the Special Deposit Accounts rates. Following the implementation of the interest rate corridor in June 2016, data from said month and onwards include the weighted average rates of the RRP, overnight deposit facility (ODF),

33. Definition lifted from the relevant technical notes/metadata published by the Bangko Sentral ng Pilipinas and Philippine Statistics Authority

and term deposit facility (TDF).[34] This variable represents the monetary policy setting in the model.

F. Household Final Consumption Expenditure (HFCE) = accounts for the various expenditures of the households and non-profit institutions serving households (NPISH). The data are at constant prices (2000=100) and were seasonally adjusted.

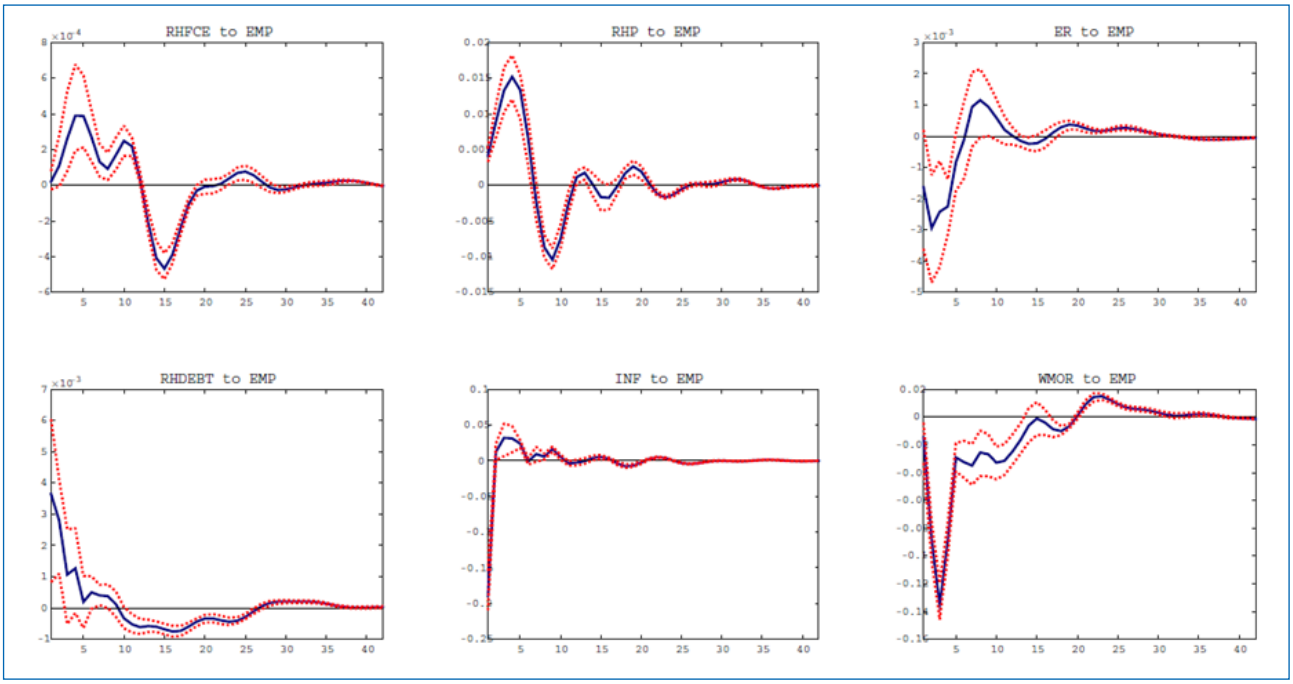
5. Presentation and Analysis of Results

5.1 Expansionary Monetary Policy Shock

Expansionary monetary policy action has significant impact on real property assets as the lower market interest rates, brought about by a reduction in policy rates, shore up the value of existing residential real property assets and enhance wealth accumulation (Glindro and Delloro, 2002). Similarly, the decrease in interest rates lowers the cost of borrowing thereby encouraging credit availment. The strengthened household credit activity and higher wealth holding jointly promote household consumption.

Simulating a one standard deviation negative monetary policy shock, this study finds consistent results (Figure 8) with the existing literature. Housing prices and household credit both exhibit increasing trends at the onset. Tuaño-Amador, Claveria, and Glindro's (2009) inference on both the negative relationship between real policy rates and credit lends support to the households' credit reaction on impact. However, the positive response of household sector's bank borrowing is transitory lasting only for about a quarter despite sustained reduction in policy rates. Guinigundo

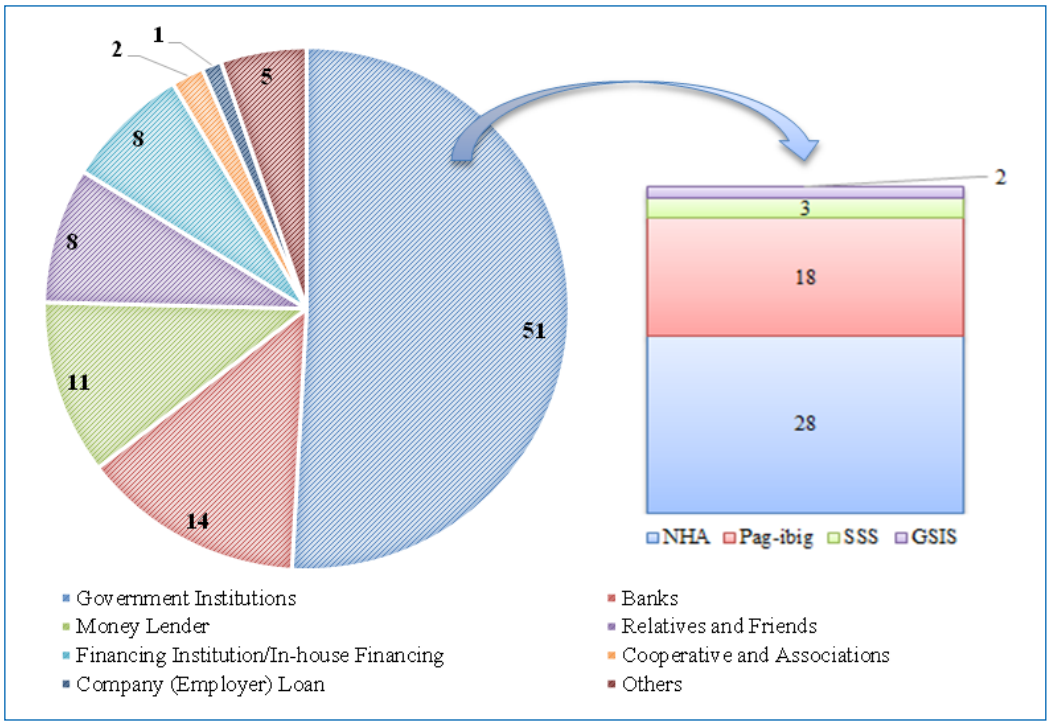
Figure 8:
Impulse Response Functions to an Expansionary Monetary Policy Shock



34. The repurchase (RP) and Special Deposit Account (SDA) windows were replaced by standing overnight lending and overnight deposit facilities, respectively. The reverse repurchase (RRP) facility was changed to a purely overnight RRP. Lastly, the term deposit facility (TDF) is the main policy tool in absorbing liquidity. Source: http://www.bsp.gov.ph/publications/media.asp?id=4063

(2008) attributes the abated bank lending channel of monetary policy transmission mechanism to financial liberalization and the availability of other sources of financing, particularly for the private non-financial corporate sector (i.e., securities and equity). Correspondingly, the CFS (2014) results indicate that most of the households tapped non-bank government institutions, in-house financing, and money lenders for real property, vehicle, and other loans (Figure 9), which are not captured in the study.[35] Hence, households have found alternative sources of financing outside the banking system that are beyond the purview of the central bank. In the medium-term, both housing prices and credit gradually descend to the negative territory.

Figure 9:
Loan Providers to the Households 2014, in percent



Source: Consumer Finance Survey (BSP, 2014a).

Household consumption expands in the short-run benefitting from the low interest rate environment and heightened credit activity. However, the decline in house prices and credit in the latter part of the year induces household consumption to gradually contract after the first year. The inflation's instantaneous reaction to the shock suggest evidence of a price puzzle.[36],[37] Goodhart and Hofmann (2008) reckon that this could be attributed to the forward-looking monetary policy setting, i.e., the IRF is able to partially incorporate the policy's response to the expected direction of inflation in the future. In addition, the appreciation of the ER may have initially dampened the

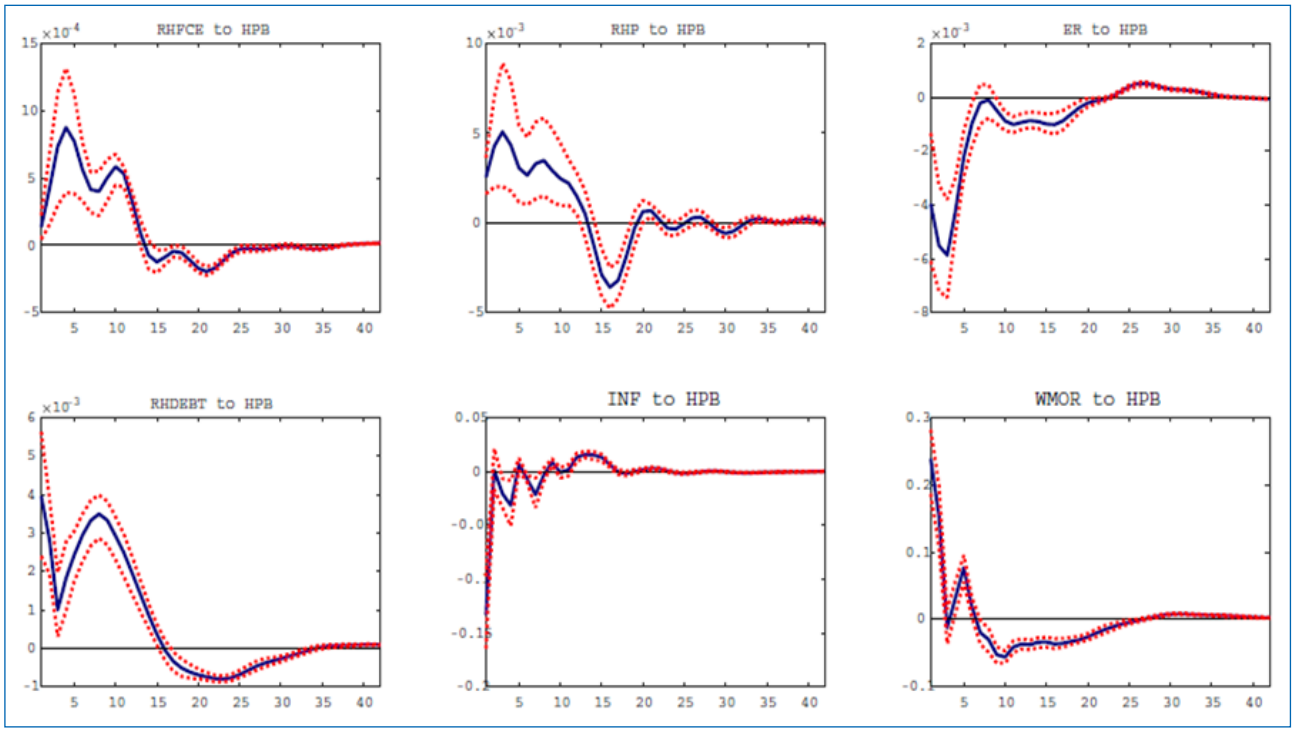
35. The CFS (2014) defines moneylenders as "those who provide informal loans to people who have n.o access to formal sources like banks and other non-bank lending institutions. These lenders are not regulated, nor registered."
36. According to Balke and Emery (1994), price puzzle is "an unexpected tightening in monetary policy leads to an increase rather than a decrease in the price level."
37. The model implies symmetric shocks, hence, an expansionary shock is the opposite of a contractionary shock. Consistent with related literature, e.g., Bjørnland and Jacobsen (2010), Robstad (2014), and Singh and Nadkarni (2017).

shock's impact on inflation (Guinigundo, 2008).[38] Nonetheless, inflation swiftly picks up after about the first month reflecting the rise in rents—via housing prices— bank lending, and expansion in the real economy. Meanwhile, the ER momentarily appreciates following the reduction in the interest rate, which dissipates about halfway through the first year. Aligning with the a priori expectations, the ER depreciates in the second half of the year but is statistically insignificant. The ER's atypical initial reaction to the monetary shock could be partly traced to the model's specification (i.e., absence of capital flows, remittances, and the gamut of other factors that determine the exchange rate).

5.2 House Price Boom

This sub-section investigates the presence of reverse causation between housing prices and monetary policy as well as household credit. The model allows household credit to contemporaneously react to the shock, since the value of residential real estate properties is closely linked to the bank lending channel in the Philippines. These properties serve as collateral for the loans and help determine the approval and terms of credit. The increase in the value of said properties are accounted for at the time of the loan application wherein the relevant property is appraised. Figure 10 illustrates the impact of a one standard deviation increase in housing prices to the other variables.

Figure 10:
Impulse Response Functions to a Housing Price Boom

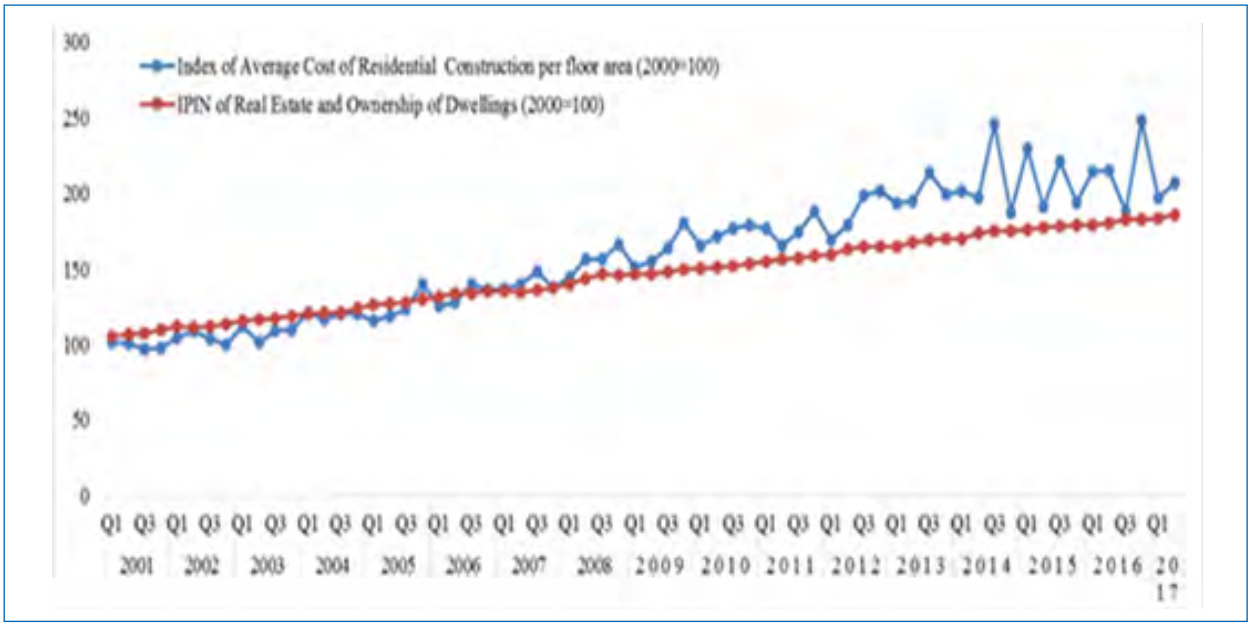


The shock in housing prices leads to a peak impact on the policy rates. Halfway through the year, policy rates start to tread the negative territory. On the contrary, inflation dips on impact and dissipates unevenly through the year. Inflation starts to pick up in the medium-term shortly after the

38. According to Guinigundo (2008), a peso appreciation translates to a 0.01 percentage point decrease in inflation, and dampens the average annual inflation rate by 0.043 percentage point based on the sensitivity analyses conducted using the BSP's inflation forecasting models. Employing the 2000 input-output table, a one percent appreciation of the peso would diminish the inflation rate by 0.14 percentage point.

reduction in policy rates. The rise in housing prices feeds into the inflation with a considerable lag. This is potentially due to the sluggish adjustment of rental fees following the increase in housing prices.[39] Figure 11 shows the different price indices for residential real estate. While residential prices (based on cost per square meter of residential construction) exhibit significant volatility, IPIN (based mainly on imputed rents) treads a smooth increasing path. This is likely because of the rent controls on residential units in place in the country.[40] Meanwhile, the rise in policy rates drives the exchange rate to appreciate, which persists for almost two years. The higher domestic interest rates partly strengthen the peso through the surge of capital flows in the domestic market by profit-taking investors.

Figure 11:
Measures of Housing Prices
For the periods indicated



Moving forward, the house price boom has a strong positive impact on household credit, lasting for about 15 months. This highlights the considerable influence of house prices on the bank lending conditions to the household sector in the country. Guinigundo (2008) explains that since the banks dominate the financial system, the asset price channel is tightly hinged to the banking lending channel. As such, an improvement in the asset quality stimulates more credit activity, among others (i.e., declining policy rates). Singh and Nadkarni (2017) explain that developments in the housing prices help ease credit conditions, which in turn, generates more investments, thus, creating a reciprocal relationship between credit and house prices. Lastly, the improvement in house prices boosts consumption. The effect of enhanced credit access along with price-induced housing wealth following the improvement in the housing prices is evident in the increase of household consumption well throughout the first year. Correspondingly, the decline in housing prices is followed by a slowdown in credit and a fall in consumption. Hence, real asset price fluctuations are able to affect real aggregates (i.e., consumption and output indirectly).

39. The former is the one included in the calculation of the CPI.
40. See Ballesteros, Ramos, and Magtibay (December 2016).

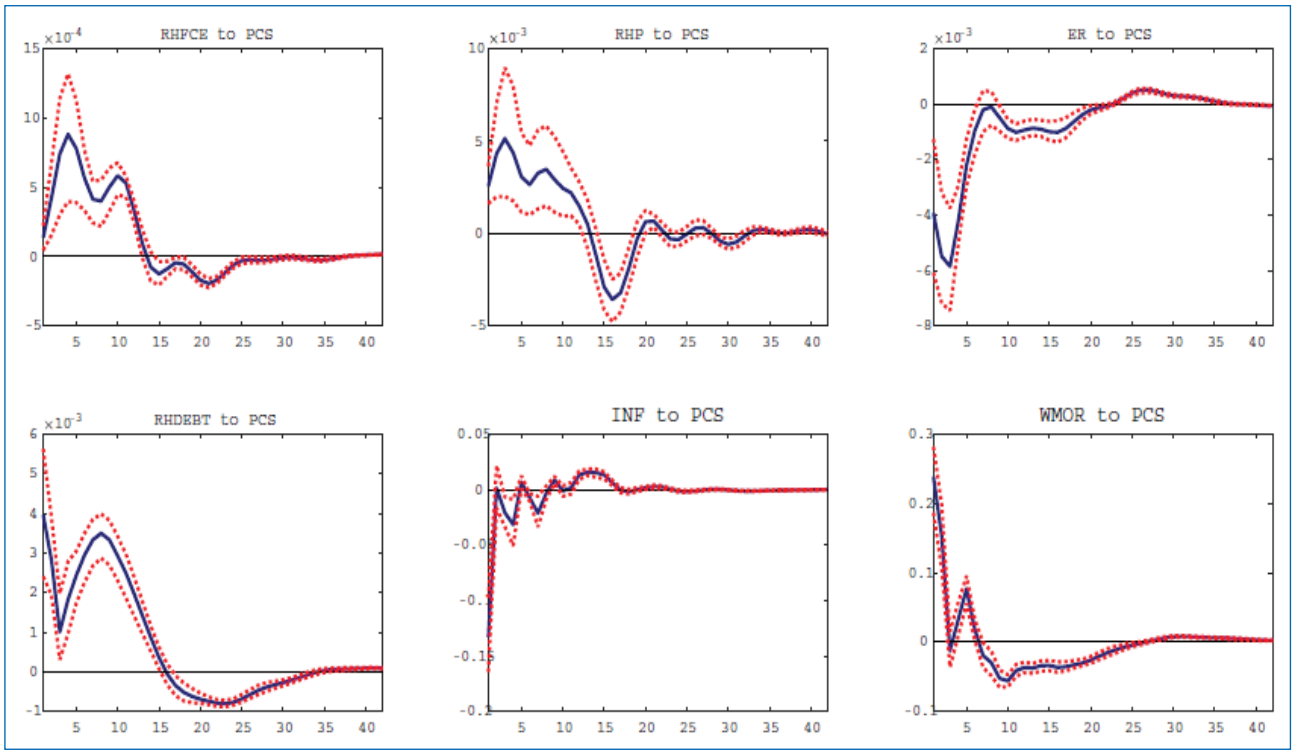
5.3 Positive Credit Supply Shock

The bank lending activities' diminishing ability to manifest the monetary policy stance is evident in the results of the expansionary monetary policy shock. Moreover, the previous sub-section's discussion reckons that house price booms are found to positively impact household debt. This sub-section examines the feedback loop between credit, housing prices, and monetary policy. In order to distinguish the positive credit supply shock, the model is identified such that the response of housing prices is set with a quarter lag. Unlike the previous simulation wherein a contemporaneous response for both variables is allowed, a lag was imposed under the assumption that financial variables take time to feed into the real sector, particularly the housing market. Explicitly, a decline in credit will still be reflected as a slowdown in demand to drive house prices down, and thus, a lag is plausible. Notwithstanding the relative congruity of the last two shocks, a positive credit shock is simulated to close the loop. As anticipated and given the close link between credit and residential real property prices in the Philippines, the IRFs of the two shocks chart similar trends.

As in the literature, the results of a one standard deviation expansionary shock to household credit finds a bi-directional effect between credit and house prices, as shown in the trend and timing of the household debt's IRF (Figure 12).[41] As for the policy rates, while the initial reaction is consistent with the expectations, the increase is relatively short-lived. The policy rates' response moves to negative section midway through the first year, implying an expansionary monetary policy stance. Following the household credit's knee-jerk reaction around the second month to the rise in interest rate on impact, it is unable to sustain its expected response to the changes in policy rates. Specifically, bank lending to households continues to expand in the short-run despite the policy rate hikes during the first half of the year. This is consistent with the earlier findings on the abating link between credit and monetary policy. Meanwhile, household consumption moves broadly in tandem with household credit and house prices as in the previous simulation outcomes. Consumption expands in the short-run following an improvement in the credit conditions and the housing market, but tightens accordingly in the medium-term. Meanwhile, the decline in inflation on impact and the appreciation of the exchange rate are attune with the rise in policy rates, as shown in the previous section.

41. See Musso, Neri, and Stracca (2010), Goodhart and Hofmann (2008), and Singh and Nadkarni (2017)

Figure 12:
Impulse Response Functions to a Positive Credit Supply Shock



6. Conclusion and Recommendations

In the past seven years, household debt has more than doubled and has not shown any signs of slowing down. As of 2017:Q2, household debt to GDP ratio stood at 12.8%, well below the 85% threshold specified in Lombardi, Mohanty, and Shim's (2017) cross-country research household debt and Cecchetti, Mohanty, and Zampolli's (2011) earlier study on sectoral debt sustainability, respectively.[42],[43] In terms of loan quality, non-performing consumer loans (NPCL) to total consumer loans ratio registered at 4.1% only, while non-performing residential real estate loans (RREL) to total RREL ratio is recorded at 3%.[44] Nonetheless, continued vigilance is warranted. The recent implementation of the first package of the TRAIN will have significant effects on the Filipino households' income and spending, given the sector's noted economic behavior. Moreover, the risks of an interest rate hike arising from potential inflationary pressures following said developments could cause debts to bourgeon. Lastly, the households' considerable borrowing activity with non-bank institutions/companies (i.e., shadow banking) as well as with informal lending channels also pose significant credit risks. Thus, while the outlook on the households' credit availment with the banking system is benign, there is a need to remain prudent, and adopt a broader approach on monitoring and assessing households' indebtedness.

42. The household debt includes loans from ODCs. Source: Standardized Report Forms and author's calculation.
43. According to Cecchetti, Mohanty, and Zampolli (2011), the households' debt level becomes a strain to the economy whilst making the households vulnerable to shocks at more than 85% of GDP.
44. Since this indicator is unavailable for the dataset used in the study, the ratio was taken from the BSP's Consumer Loans statistics. Consumer loans include motor vehicle, residential real estate, salary-based general-purpose consumption, and other consumer loans and credit card receivables from UKBs and TBs. The ratio of total non-performing loans to total loan portfolio (net of interbank loans) stood at a mere 1.98%, with NPCL comprising 39.12% of the total.

Employing a SVAR model with sign restrictions, this study looks into the feedback loop between household credit, housing prices, and monetary policy in the Philippines. An expansionary monetary policy shock, a boom in housing prices, and a positive credit supply shock are carried out to examine the said multidimensional interlinkages and their effect on the macroeconomy. The study offers three key findings. First, there is a muted link between household credit and policy rates in the country. In particular, the household credit from banks does not seem to consistently react to the changes in policy rates. This is partly on account of the alternative funding sources tapped by the sector which are not captured in the study. Second, the research finds a bi-directional connection between household debt and housing prices. In the credit supply shock and housing price boom, the IRFs of two variables move in parallel to each other. Third, monetary variables (i.e., policy rates, housing prices, and credit) are able to influence real aggregates (i.e., household consumption). A negative monetary policy shock results in a growth in consumption in the short-run, while an increase in housing prices enhances household consumption through the price-induced wealth effect and improved access to credit. Moreover, household consumption generally moves in tandem with credit in all simulations. Overall, the findings on the key variables are consistent with the existing literature.

The results have also identified some drawbacks of this precursor study on the subject. First, the six-variable model has been significantly constrained by the short time series, spanning from 2010 to 2017 only.[45] The availability of a longer series will improve the model specification and determination of restrictions. Second, a more comprehensive indicator could be used for the household credit—to include non-bank sources—and real estate prices. Finally, the study highlights the need for more empirical literature on household-related variables in the country. Nevertheless, the present model allows us to advance our understanding of the household sector, the housing market, and their role in the conduct of monetary policy in the Philippines. It paves the way for more advanced research in the future, which could further integrate the country's household sector dynamics in policy analysis.

45. While increasing the lag level addresses the autocorrelation, it reduces the degrees of freedom.

References

Armas, J. C., (2008), "Household Credit in the Philippines: Development, Cross-Country Comparison, and Implication to Financial Stability," Available at: https://www.dosm.gov.my/v1/uploads/files/4.../2.../08__Abstract_JeanArmas.pdf

Balke, N. S. and K. S. Emery, (1994), "Understanding the Price Puzzle," *Economic Review,* Fourth Quarter, Federal Reserve Bank of Dallas, Available at: https://ideas.repec.org/a/fip/fedder/y1994iqivp15-26.html

Ballesteros, M. M.; T. P. Ramos and J. E. Magtibay, (2016), "Rent Control in the Philippines: An Update", Discussion Paper, No. 2016-40, December, Philippine Institute for Development Studies, Available at: https://dirp3.pids.gov.ph/websitecms/CDN/PUBLICATIONS/pidsdps1640.pdf

Bangko Sentral ng Pilipinas, (2014), Consumer Finance Survey, Available at: Bangko Sentral ng Pilipinas: www.bsp.gov.ph

Bangko Sentral ng PIlipinas, (2014), National Baseline Survey on Financial Inclusion, Available at: www.bsp.gpv.ph

Bangko Sentral ng Pilipinas, (2016), Analyzing the Trends and Developments in the Household Sector's Economic Behavior, Annual Report, Available at: www.bsp.gov.ph

Bangko Sentral ng Pilipinas, (2016), "BSP Implements Interest Rate Corridor (IRC) System in Q2 2016," Media Releases, May 16, Available at: http://www.bsp.gov.ph/publications/media.asp?id=4063

Bjørnland, H. C. and D. Jacobsen, (2010), "The Role of House Prices in the Monetary Policy Transmission Mechanism in Small Open Economies," *Journal of Financial Stability*, pp. 218-229, Available at: static.norges-bank.no/contentassets/.../workin_paper_2014_05.pdf

Cecchetti, S. G.; M. S. Mohanty and F. Zampolli, (2011), "The Real Effects of Debt," *BIS Working Papers,* No. 352, September, Available at: http://www.bis.org/publ/work352.htm

Cesa-Bianchi, A., (2014 and 2015), VAR Toolbox, Available at: sites.google.com/site/ambropo/

Davis, P., (2010), "New International Evidence on Asset-Price Effects on Investment, and a Survey for Consumption," *OECD Journal: Economic Studies,* 10(1), Available at: https://www.oecd.org/eco/monetary/49848860.pdf

Glindro, E. and V. Delloro, (2002), "Identifying and Measuring Asset Price Bubbles in the Philippines, (2010-02), (B. W. 2010-02, Trans.)," *BSP Working Paper Series*, Available at: www.bsp.gov.ph/downloads/Publications/2010/WPS201002.pdf

Goodhart, C. and B. Hofmann, (2008), "House Prices, Money, Credit and the Macroeconomy," *Working Paper Series,* No. 888, April, The European Central Bank, Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1120162

Guinigundo, D. C., (2008), "Transmission Mechanism of Monetary Policy in the Philippines," Bank for International Settlements Papers, No 35.

Iacoviello, M., (2005), "House Prices, Borrowing Constraints, and Monetary Policy in the Business Cycle," *The American Economic Review*, 95, June, Available at: https://www.aeaweb.org/articles?id=10.1257/0002828054201477

Jarociński, M. and F. Smets, (2008), House Prices and the Stance of Monetary Policy, E. C. 891, Ed., Available at: https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp891.pdf?ebb33813f3e5610a5a39285e5c31923d

Lombardi, M.; M. Mohanty and I. Shim, (2017), "The Real Effects of Household Debt in the Short And Long Run," *BIS Working Paper,* No. 607, January, Available at: https://www.bis.org/publ/work607.htm

Mitra, S. K., (2009), "Exploitative Microfinance Interest Rates," *Asian Social Science*, Vol. 5, No. 5, May, Available at: www.ccsenet.org/journal.html

Musso, A.; N. Stefano and L. Stracca, (2011), "Housing, Consumption, and Monetary Policy: How Different are the US and the Euro Area," *Journal of Banking & Finance,* 35(11), pp. 3019-3041, Available at: https://econpapers.repec.org/RePEc:eee:jbfina:v:35:y:2011:i:11:p:3019-3041

Robstad, Ø., (2014,), "House Prices, Credit, and the Effect of Monetary Policy in Norway: Evidence from Structural VAR Models," *Norges Bank Research*, pp. 1-25, May, Available at: static.norges-bank.no/contentassets/.../workin_paper_2014_05.pdf

Rummel, O. and H. Mumtaz, (2015), "Economic Modelling and Forecasting: Recent Developments in Structural VAR Modelling," February, Centre for Central Banking Studies, Bank of England, Available at: https://www.google.com/search?ei=kO48Wt2xCoS_0gS13ovIDw&q=ole+rummel+and+haroon+structural+VAR+modelling&oq=ole+rummel+and+haroon+structural+VAR+modelling&gs_l=psy-ab.3...15486.15486.0.15696.1.1.0.0.0.0.125.125.0j1.1.0....0...1.1.64.psy-ab..0.0.0....0.6GN

Sims, C. A., (1982), "Policy Analysis with Econometric Models," *Brookings Paper on Economic Activity,* 1, pp. 107-164, Available at: https://econpapers.repec.org/RePEc:bin:bpeajo:v:13:y:1982:i:1982-1:p:107-164

Singh, B. and A. R. Nadkarni, (2017), "How Asset Prices Interact with Bank Credit and Monetary Ploicy? Evidence from Emerging Market and Developing Economies," *RBI Working Series*, Reserve Bank of India, Department of Economic and Policy Research, Available at: https://www.rbi.org.in/Scripts/BS_PressReleaseDisplay.aspx?prid=39221

Tuaño-Amador, M. C.; E. Glindro and R. Claveria, (2009), "Some Perspectives on the Monetary Policy Transmission Mechanisms in the Philippines," *Bangko Sentral Review*, Available at: www.bsp.gov.ph/downloads/publications/2009/bs09_a2.pdf

Uhlig, H., (2005), "What are the Effects of Monetary Policy on Output? Results from an Agnostic Identification Procedure," *Journal of Monetary Economics,* (52), pp. 381-419, Available at: home.uchicago.edu/~huhlig/papers/uhlig.jme.2005.pdf

Chapter 6

HOUSEHOLD INDEBTEDNESS AND ITS IMPLICATIONS TO FINANCIAL STABILITY IN CHINESE TAIPEI

By
Hung-Wei Tseng[1]

1. Introduction

The U.S. subprime mortgage crisis and the following European debt crisis left many advanced economies mired in a low growth morass. The Federal Reserve (Fed), the European Central Bank (ECB), the Bank of Japan (BoJ), and the Bank of England (BoE) all kept their policy rates at low levels and implemented quantitative easing policies in attempts to revive their economies. As ample liquidity flowed in the global economy, Asian economies became eye-catching targets of hungry international investors owing to their relatively robust economic performance. Asian economies were tempted to borrow more money because of the cheap foreign funds that was readily available. In view of this, Asia's debt has soared rapidly and the household debt sustainability has drawn a lot of attention.[2]

Although accumulating household debt may promote economic growth and improve social welfare, extremely high levels of leverage may revert the benefits of economic growth and affect financial stability.[3] When an economy faces unexpected extreme negative shocks, the household sector may be unable to pay its debt owing to a decrease in its income or wealth. Once a large number of defaults has occurred, it may affect banks' operations, thereby affecting financial stability and economic growth.

Bank loans account for a major share of household debt in Chinese Taipei. The domestic literature related to household debt mostly discuss the factors that affect non-performing loan (NPL) ratio of household loans in order to examine the cause affecting the financial stability. The sample

---

1. Specialist, Section of Flow of Funds, Department of Economic Research, Central Bank, Chinese Taipei (CBCT). The views and opinions expressed in this paper are those of the author and do not necessarily reflect those of the Central Bank, Chinese Taipei.
2. According to the IMF (2017), the median of debt-to-GDP ratio of emerging market economies has risen from 15% in 2008 to 21% in 2016. The IMF warned that under the low salary growth conditions, the household indebtedness may affect stability.
3. According to the CBCT's Financial Stability Report, there is as yet no universally accepted definition of "financial stability". Defined positively, "financial stability" can be thought of in terms of the financial system's ability to: (i) facilitate an efficient allocation of economic resources both spatially and intertemporally; (ii) assess and manage financial risks; and, (iii) withstand adverse shocks. From a negative view, "financial stability" refers to the occurrence of currency, banking, or foreign debt crises, or inability of the financial system to absorb adverse endogenous or exogenous shocks and allocate resources efficiently, with the result that it cannot facilitate real economic performance in a sustained manner.

period of the latest empirical literature[4] is from 1998 to 2012. Furthermore, the household debt overhang problem in Chinese Taipei[5] has attracted attention in recent years. Therefore, it is necessary to re-examine the factors that affect the NPL ratio of household loans.

In this paper, a model of NPL ratio of household loans is built to examine the factors that affect the NPL ratio of household loans. The paper also aims to highlight the importance for the government to adopt appropriate policies. Empirical results show that the loan rate and the interest rate spread are positively correlated with the NPL ratio of household loans. The interest rate spread is found to be the most important factor in the long-run while the loan rate is the most important factor in the short-term. On the contrary, the housing price to disposable income ratio is negatively, but not significantly, correlated with the NPL ratio of household loans. With regard to policy recommendations, given that Chinese Taipei's household debt is mostly bank mortgage loans, if the Central Bank, Chinese Taipei (hereafter referred to as "the CBCT") increases the policy rates to curb household debt, this could undermine financial stability and jeopardize economic growth and housing market developments. These empirical results, in line with the literature, demonstrate that interest rates are not a good policy instrument for dealing with a housing bubble because of its profound impact.

The paper consists of six sections. Section 1 is the introduction. Section 2 presents the theoretical framework and literature review that describe how the ascending household debt may affect financial stability and economic growth. Section 3 illustrates the economic conditions and household debt in Chinese Taipei. Section 4 analyzes the empirical model of the NPL ratio of household loans in Chinese Taipei. The long-term relationship between the macroeconomic variables and the NPL ratio could be examined by conducting a cointegration analysis, while the short-term interaction between the variables could be examined by building a vector error correction model to simulate the impulse responses and estimate the variance. Section 5 provides conclusion and policy recommendations.

2. Theoretical Framework, Literature Review and Policy Responses

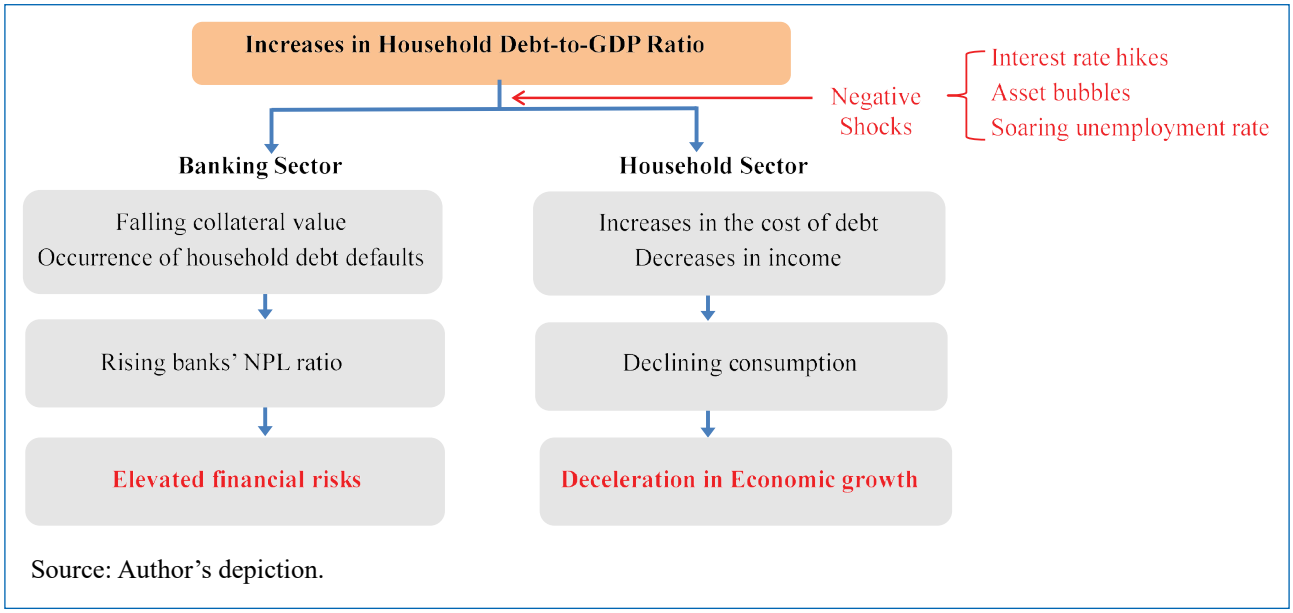
2.1 Theoretical Framework

Based on the Permanent Income Hypothesis,[6] if the household sector anticipates an increase in future income, they may increase their debt to smooth their consumption or make large investments in nonfinancial assets or education, which in turn, would help improve household welfare and promote economic and financial stability. Nevertheless, this theory does not consider that the household sector might be over-optimistic and cause household indebtedness. Recent theories and empirical studies[7] find that when private sector debt reaches a certain level, the positive effects on GDP per capita growth start to decline, which is related to the diversion of resources from productive sectors and to rising financial stability risks when the economy becomes highly leveraged.

4. Hsu, P. C. and Y. M. Yu, (2014), "Mortgage Finance and Consumer Credit: Implications on Financial Stability in SEACEN Economies," SEACEN Research Paper, No. 94, October.
5. The household debt-to-GDP ratio of Chinese Taipei is around 70%-80% for the past 20 years, however, compared to that of South Korea, Malaysia, Thailand, Hong Kong, Singapore and China, the household debt-to-GDP ratio in Chinese Taipei has grown steadily.
6. Friedman, Milton (1957).
7. IMF (2017).

The rising household debt could amplify the macroeconomic consequences of negative shocks. For example, if household income decreases or the cost of debt increases, the household sector may be unable to pay their debts, and then consumption and economic growth may decrease (Figure 1). Besides, defaults on household debt accompanied by an increase in banks' NPL ratio may impact the operation of the financial system and endanger financial stability. Furthermore, when the household sector starts deleveraging, they may sell houses to repay the debts, causing the collateral values to decline further. The experience of the global financial crisis suggests that high household debt can be a source of financial vulnerability and lead to prolonged recessions. For example, the 2008 U.S. subprime mortgage crisis was caused by the housing bubble and the continuous expansion of household debt. The US economic growth was severely affected by a fairly long household deleveraging process.

Figure 1: Effects of the Increases in Household Debt-to-GDP Ratio on Financial Stability and Economic Growth



Source: Author's depiction.

2.2 The Literature Related to Household Debt

2.2.1 Foreign Literature

Most literature identifies that there is a trade-off between the short-term benefits of rising household debt to economic growth and its medium-term costs to macroeconomic and financial stability. IMF (2017) found that, in the short-term, an increase in the household debt-to-GDP ratio is associated with higher economic growth and lower employment, but the effects are reversed in three to five years. Moreover, higher growth in household debt is associated with a greater probability of banking crises. Lombardi et al. (2017) showed that, while the household debt boosts consumption and GDP growth in the short-run, negative effects appear over the long-run on consumption and GDP growth when the household debt-to-GDP ratio exceeds 60% and 80%, respectively.

However, the above-mentioned literature does not take into account different conditions in each country, such as the housing market and mortgage market characteristics, the composition of borrowers, and government policies. Debelle (2004) highlighted that increased indebtedness has

heightened the sensitivity of the household sector to changes in interest rates, income and asset prices. On the other hand, the macroeconomic effects of greater indebtedness depend crucially on the distribution of the debt across the household sector and the types of mortgage loans (e.g., floating-rate or fixed-rate mortgage). IMF (2017) said that the growth-stability trade-off can be significantly mitigated through a combination of sound institutions, regulation and policies. For example, better financial regulation and supervision, less dependence on external financing, flexible exchange rates, and lower income inequality would attenuate the impact of rising household debt on risks to growth.

With regard to the literature suggesting that household debt overhang may influence financial stability, most of the studies examined the factors that affect the NPL ratio of household loans. According to the ability-to-pay hypothesis, the factors that affect the NPL ratio include macroeconomic conditions and costs of repayment. For example, an increase in income and a decrease in unemployment rate help to reduce the NPL ratio. By contrast, raising interest rates leads both the borrowing costs and the NPL ratio to rise. Laura et al. (2006) derived the equation of the probability of default. They found that the chance of falling into arrears depends on the amount of the loan taken, current income, and investment. Arrears depend also on the bank lending rate, the (uncertain) future income and wealth, which globally depend on the possibility of unemployment and on the development of asset prices. Finally, arrears depend on the time preference, which we associate with individuals' expectations about inflation.

2.2.2 Domestic Literature

The household debts in Chinese Taipei are largely bank loans while most literature related to domestic household debt focuses on exploring the factors that affect the NPL ratio of household loans. The empirical literature is, therefore, relatively limited.

Hsu and Yu (2013) built a vector error correction model based on the ability-to-pay hypothesis in order to investigate the NPL ratios of mortgages and consumer credit and their interaction with macroeconomic conditions. They found that the increases in real GDP and housing prices significantly reduce the NPL ratios of mortgages and consumer loans. Moreover, the rises of real interest rate and the unemployment rate are both related to increases in the NPL ratios of mortgages and consumer credit.

Fang (2010) constructed an error correction model for the NPL ratio of household loans with a default option developed by Lawrence (1995). This model is linked to relevant macroeconomic variables. She noted that the debt-to-GDP ratio, the unemployment rate, and the loan rate are positively correlated with the NPL ratio. By contrast, the real housing prices are negatively correlated with the NPL ratio.

Yang, Lin and Chen (2008) explored three factors affecting mortgage default behavior, including characteristics of borrowers, loan contracts and macroeconomic indices. Results showed that "macroeconomic indices" could serve as an excellent predictor for default behavior. The macroeconomic variables used in the model include economic growth rate, the unemployment rate, and the loan rate.

The Financial Stability Report published every year by the CBCT analyzes how the interest rates, unemployment rate, housing prices, regular earnings, and debt burden (e.g., debt to disposable

income) affect debt-servicing capacity. According to the 2016 Financial Stability Report, the decreasing domestic unemployment rate, low interest rates on loans, and steady growth of real regular earnings should help improve the debt servicing capacity of households.

2.3 Policy Responses

After 2008, the ample liquidity created by the central banks in major advanced economies pushed up financial asset prices and housing prices, raising concerns for financial stability. When dealing with the problem of housing bubbles, international organizations recognize that monetary policy is not a suitable tool because of its profound impact. Macroprudential policies, which became popular after the 2008 global financial crisis, are relatively more appropriate for addressing housing bubbles (or other asset price bubbles). This is because some of the macroprudential policy instruments can be more targeted at specific financial sector distortions and would not have a severe impact on the economy.

André (2016) stated that rapid increases in household debt, often associated with housing booms, are more suggestive of upcoming adverse economic and financial developments. The policy instruments can be broadly sorted into three categories: microprudential, macroprudential, and monetary policy. Sound microprudential regulation and supervision are essential to ensure effective risk management and consumer protection. Nevertheless, they may be insufficient to contain systemic and macroeconomic risks. Monetary policy is a crude tool for containing household debt because this objective may conflict with core objectives of stabilizing consumer price and output levels. For examples, if the central bank chooses to raise policy rates to curb housing prices, it may have negative effects on output, employment, and inflation. Therefore, macroprudential policies are an appealing alternative. They are meant to address systemic fragilities, and the most widely used instrument targeting household debt directly is a cap on LTV ratios.

With respect to choosing the appropriate policy to control the housing market and household debt, the former Fed Chair Janet Yellen said that monetary policy faces significant limitations as a tool to promote financial stability. The former Fed Chair Ben Bernanke indicated that raising interest rates may not be the best way to pop or prevent asset bubbles. Crowe et al. (2011) showed that the increases in interest rates are unlikely to tame a real estate boom and even may slow the economic recovery. Zhang, L. and E. Zoli (2014) and Kuttner and Shim (2013) stated that targeted macroprudential policy instruments (such as real estate taxes and loan-to-value ratio caps) have proved to be effective in curbing housing price growth, and among all instruments considered in the studies, housing tax measures seemed to have a bigger impact on housing prices.

3. Economic Conditions and Household Debt in Chinese Taipei

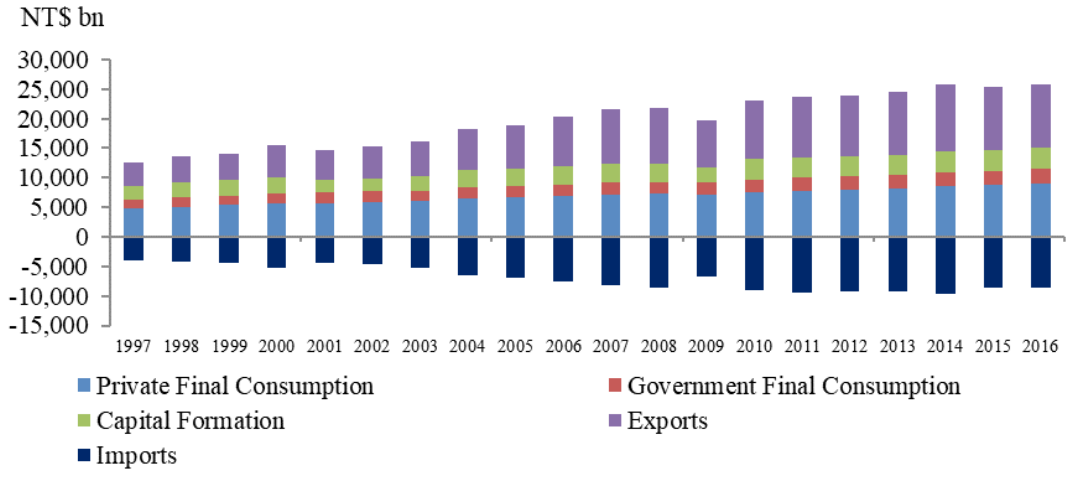
3.1 Developments in the Domestic Economy

3.1.1 Economic Growth Has Slowed in Recent Years

Chinese Taipei is an open and export-oriented[8] economy. It represents an indispensable partner in the global value chains, especially in the electronics, information technology and communications (ICT) industries (Figure 2).

8. Exports and imports accounted for 113% of GDP in 2016.

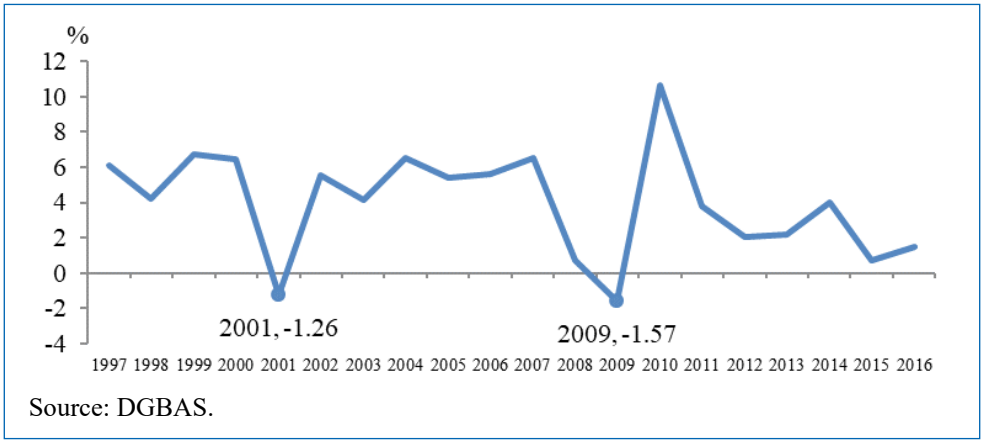
Figure 2: Nominal Gross Domestic Product by Expenditures



Source: Directorate-General of Budget, Accounting and Statistics, Executive Yuan, Chinese Taipei (DGBAS).

In the past twenty years, the economy had suffered from 1997 Asian financial crisis, 2000 dotcom bubble, the 2008 U.S. subprime mortgage crisis, and the 2010 European sovereign debt crisis. As Chinese Taipei mainly exports ICT products and the U.S. is its major trade partner, the economy had been hurt severely by the US recessions which occurred in 2001 and 2008. For the rest of the period, the economy mostly grew with the global economic expansion. Before 2008, the economic growth rate was around 6%, but slowed down after the 2008 crisis (Figure 3).

Figure 3: Economic Growth Rate



Source: DGBAS.

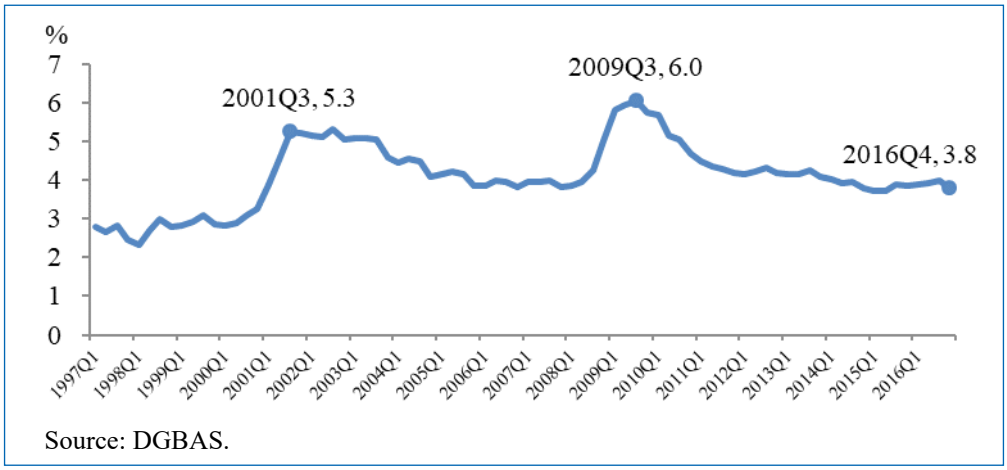
3.1.2 Employment Situation Has Been Stable yet Wage Growth Remained Sluggish

The economy has not only faced several economic cyclical problems but was also confronted with long-term structural challenges over the past few decades. From 1980s, the labor-intensive industries had shifted overseas owing to NT dollar appreciation and surging wages. After the year 2000, the capital-intensive and technology-intensive manufacturers had moved abroad[9] to cut costs

9. Chinese Taipei and China joined WTO in 2001, and the companies of Chinese Taipei expanded their investments in China.

and be close to potential markets, but there were not enough new industries to make up these gaps. In recent years, investments have declined further because the domestic investment environment has deteriorated and the government has not signed many free trade agreements so far. All these factors influence the domestic employment situation. However, the unemployment rate has almost always broadly fluctuated around 4% except for the periods of the 2000 dotcom bubble and the 2008 U.S. subprime mortgage crisis (Figure 4).

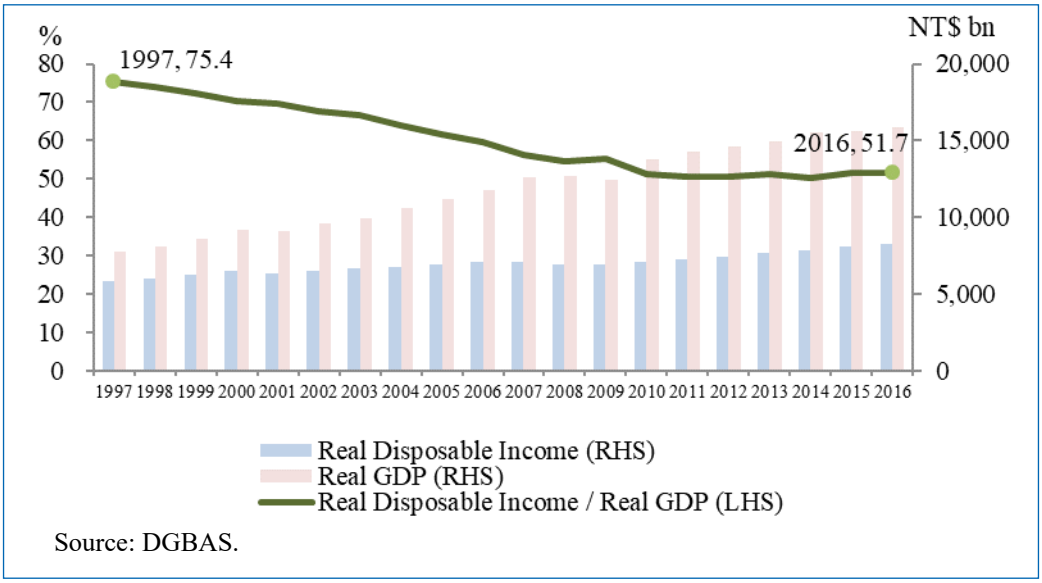
Figure 4: Unemployment Rate



Source: DGBAS.

Although the employment situation has been stable, the nominal wage growth remained stagnant. Employers became less willing to hike wages for the following reasons: i) a lack of investment growth momentum; ii) slow industrial upgrading; iii) talent mismatch and the rise of automation; iv) weak labor union; and, v) increases in non-wage compensation for employees in response to institutional changes by the government such as cutting legal working hours, launching the New Labor Pension System, and raising labor and health insurance costs. The real disposable income-to- real GDP ratio displayed a downward trend in the past twenty years (Figure 5).

Figure 5: Real Disposable Income to Real GDP



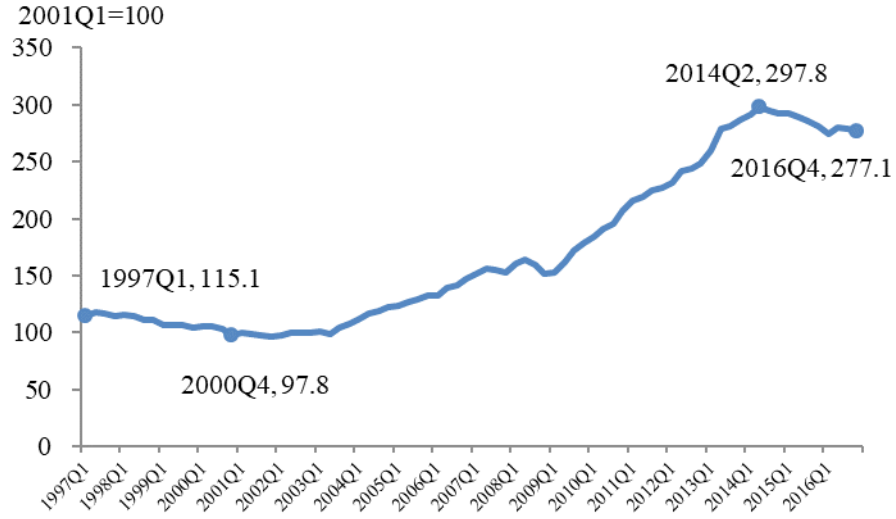
Source: DGBAS.

3.1.3 Housing Prices Surged and Then Slowed Down

In the early 1990s, the housing market grew as the new banks were opened and developers rushed to build houses before the government imposed building bulk controls, yet the housing market became oversupplied after 1994. Later, cross-strait tensions in 1996, the Asian financial crisis in 1997, domestic financial crisis in 1998, and the dotcom bubble in 2000 resulted in a sluggish housing market. From 2002 onwards, the domestic economy has been on its path to growth amid the global economic recovery. In addition, the government expanded the credit line of preferential loans, cut the land value increment tax by half, and allowed foreign investors to invest in domestic real estate property. Housing transactions thus recovered gradually and housing prices increased.

Housing prices slightly decreased after the 2008 U.S. subprime mortgage crisis, but bounced back quickly afterwards. The government cut the domestic estate and gift taxes substantially from 50% to 10%, and markets investors were also optimistic about the cross-strait developments (e.g., the effects of signing the Economic Cooperation Framework Agreement (ECFA)), resulting in a surge of capital flows into Chinese Taipei. Furthermore, low real estate tax, speculation in pre-sale housing and the extension of subway routes in the Taipei metropolitan area, all helped push up the demand for houses. Consequently, transactions soared and home prices rose. Owing to continual real estate market enhancement measures implemented by the government since 2010, speculative demand has tapered off and housing prices grew at a moderate pace. As the transaction volume in the housing market contracted, housing prices have trended slightly downwards since the third quarter of 2014 (Figure 6).

Figure 6: Housing Price Index



* The housing price index is based on the secondary market price.

Source: Sinyi Realty Inc.

3.2 Healthy Banking System

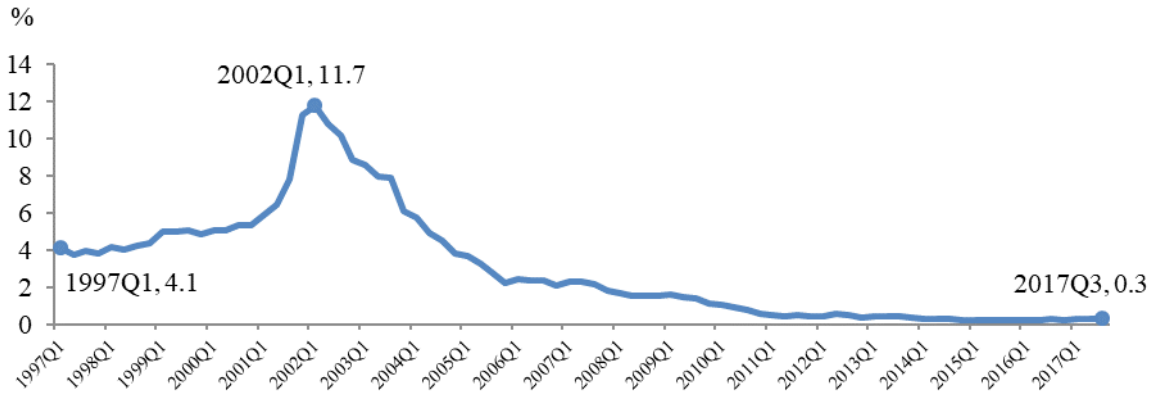
The Asian financial crisis in 1997 and the dotcom bubble in 2000 caused a large increase in the non-performing loan (NPL) ratios of banks. In order to help banks improve their loan quality, the government lowered the required reserve ratios of banks in February 1999 and raised the remuneration rates on banks' B reserves accounts three times. In July of the same year, the government reduced the business tax rate of banks substantially from 5% to 2%, and required that banks use their surplus to write off bad loans. Since 2002, the government has continued to promote financial reform to strengthen the solvency of financial institutions. The key measures are as follows:

- The fund base of the Executive Yuan's Financial Restructuring Fund (RTC)[10] is enlarged, and the RTC's functions are expanded to cover the purchase of NPLs of troubled financial institution and provide capital injections into banks in the form of preferred shares.
- Different supervisory measures are provided to address non-performing loan situations at domestic banks of various levels of severity; incentive measures are provided for those with low non-performing loan ratios, employing simplified application procedures for financially sound banks; various dispositive measures are provided for those with excessively high non-performing loan ratios.
- Banks are required to classify credit assets and allocate sufficient loan loss provisions based on the elevation of asset quality.
- Banks failing to achieve the minimum capital adequacy ratio are required to increase capital or reduce risk-weighted assets.
- The Taiwan Asset Management Corporation was established in 2001 to help financial institutions reduce their NPLs.
- The Financial Supervisory Commission (FSC) implemented BaselIIfrom 2007 and amended existing regulations as well as introduced new ones based on the three pillars (minimum capital requirements, supervisory review process, and the effective use of market discipline) required in the BaselIIframework.
- In light of the 2008 U.S. subprime mortgage crisis, domestic banks have been required to raise capital and liquidity reserve in compliance with Basel III standards since 2013.

Through the reform measures above, the NPL ratio of banks has continued to decrease since the second quarter of 2002 and remained at a historically low level in recent years (Figure 7). This suggests that banks have taken prudent actions on loans, and the credit quality of loans remained sound. Besides, in order to prevent domestic banks from overly concentrating on real estate lending, the FSC raised banks' capital requirements and also asked banks to increase their loss provisions for housing loans.[11] As shown in Figure 8 and Figure 9, the capital adequacy ratio and the provision coverage ratio of domestic banks are on the uptrend, indicating that domestic banks have some buffers to absorb negative economic and financial shocks.

10. The Executive Yuan's Financial Restructuring Fund is Chinese Taipei's version of Resolution Trust Corporation (RTC) set up to expedite the cleanup of poorly managed deposit-taking institutions.
11. The FSC lowered capital requirements in 2017.

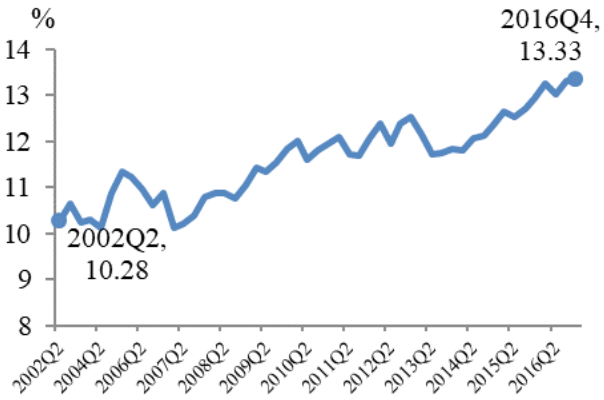
Figure 7: NPL Ratios of Domestic Banks



Note: Beginning Dec. 2001, the figures represent the broadly defined NPL ratios released by the Financial Supervisory Commission, which include loans under surveillance.

Source: CBCT.

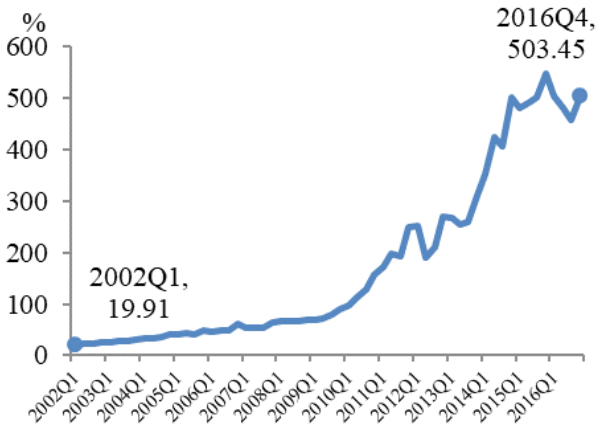
Figure 8
Capital Adequacy Ratio of Domestic Banks



Notes:
(1) Capital adequacy ratio is regulatory capital/risk-weighted assets.
(2) Regulatory capital: the aggregate amount of net Tier 1 Capital and net Tier 2 Capital.
(3) Risk-weighted assets: the aggregate amount of the risk-weighted assets for credit risk together with the capital requirements for market risk and operational risk multiplied by 12.5.

Source: CBCT.

Figure 9
Provision Coverage Ratio of Domestic Banks



Note:
Provision coverage ratio is loan loss provisions/non-performing loans. This indicator is to analyze the provision policy for loan losses.

Source: CBCT.

The FSC required domestic banks to conduct stress tests on bank-specific market risk and credit risk since 2010, according to the requirement of pillar 2 of Basel II. The results of latest stress test of 37 domestic banks conducted in April 2016 revealed that in both mild and relatively serious scenarios, capital adequacy related ratios of domestic banks were all higher than the minimum capital requirement, showing that banks have the capability to bear risks (Table 1).

Table 1: Stress Test Outcome

	Mild scenario	Serious scenario	Minimum requirement
Average common equity ratio	9.55%	8.50%	5.125%
Tier 1 capital ratio	9.83%	8.78%	6.625%
Capital adequacy ratio	11.68%	10.58%	8.625%
Leverage ratio	5.63%	5.03%	3%

Notes:

(1) Mild scenario: economic growth rate is -1%, housing prices decrease by 12%, interest rate spreads decrease to 1.2%, local share prices decrease by 15% and the unemployment rate increases to 6%.

(2) Serious scenario: economic growth rate is -2.5%, housing prices decrease by 21%, interest rate spreads decrease to 1%, local share prices decrease by 30%, and the unemployment rate increase to 7.5%.

(3) All data used in the stress test are as of the end of 2015.

Source: FSC.

3.3 Household Debt in Chinese Taipei

3.3.1 Real Estate Lending Made up Largest Share of Household Debt

As shown in Chinese Taipei's household sector balance sheet (Table 2), most households held real estate properties as their main assets which accounted for nearly 40% of total assets. It reflects the conventional concept that "land (real estate) breeds fortune".[12] As for liabilities, household loans were main components, but it only accounted for 11% of total assets.[13] If we further analyze household loans by purpose (Figure 10), we can see that household sector borrowing was mainly used for real estate purchases (65.0%). Therefore, it is reasonable to pay more attention on the housing market when we discuss the household debts in Chinese Taipei.

12. According to the Survey of Family Income and Expenditure (2016) compiled by the DGBAS, the rate of self-owned house 2016 is 85.36%.

13. Households owning real estate mostly purchased the properties in the early years and have already paid off loans. Therefore, household loans only accounted for 11% of total assets.

Table 2: Chinese Taipei's Household Sector Balance Sheet in 2015 (End of 2015)

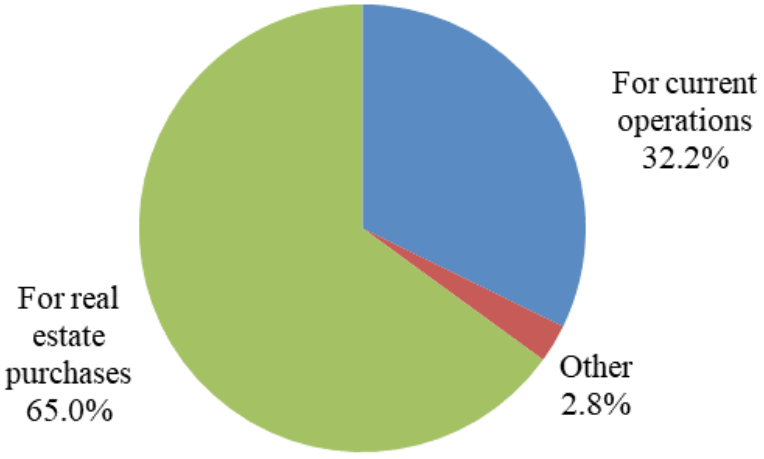
NT$ bn, %

ASSETS	Amount	%	LIABILITIES	Amount	%
Real estate and households' equipment	50,929	39%	Loans	13,922	11%
Domestic cash and deposits	28,811	22%	Other domestic financial liabilities	464	0%
Domestic life insurance and pension funds	19,966	15%	**EQUITY**	**Amount**	**%**
Domestic portfolio	16,859	13%	Net worth	115,073	89%
Other domestic financial assets	6,522	5%			
Foreign financial assets	6,372	5%			

Note:
(1) Domestic deposits include NT Dollar deposits and foreign currency deposits.
(2) Portfolio consists of government securities, domestic corporate bonds, bank debentures, mutual funds, shares and other equities.
(3) Other domestic financial assets include repurchase agreements, loans by nonfinancial institutions, short-term securities, accounts receivable/payable and net other assets & liabilities.
(4) Land in residential, industrial & commercial areas is re-evaluated based on current market price.

Source: DGBAS.

Figure 10: Household Loans by Purpose in 2016 Q4 (End of 2016)



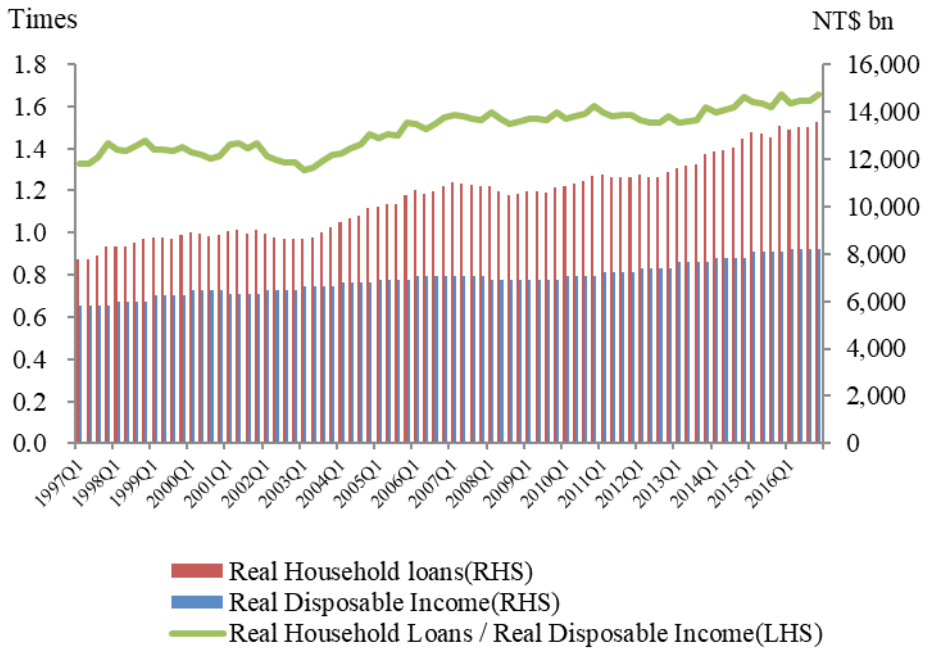
Note: Others include loans for movable properties (1.6%), revolving credit for credit cards (0.8%), business investment (0.4%).

Source: CBCT.

3.3.2 Sluggish Income Growth Accompanied by Surging Housing Prices Put a Heavy Burden on Households

Housing prices had increased since 2003, together with rising mortgage loans and household debt.[14] However, income growth remained sluggish. As shown in Figure 11, real household loans to real disposable income rose from 1.33 times in the first quarter of 1997 to 1.65 times in the fourth quarter of 2016. Housing price to disposable income rose from 4.47 times in the first quarter of 2002 to 9.46 times in the second quarter of 2017 (Figure 12). The debt servicing ratio for housing loans rose from 23.93% in the first quarter of 2002 to 38.9% in the second quarter of 2017 (Figure 13). Since the second quarter of 2011, the debt servicing ratio for housing loans has exceeded the reasonable burden level of 30%.[15]

Figure 11: Real Household Loans to Real Disposable Income



Source: DGBAS.

14. Chinese Taipei's household debt has climbed since 2003, partly owing to the expansion of credit card debt. Besides, the credit and cash card debt crisis erupted in 2005~2006.

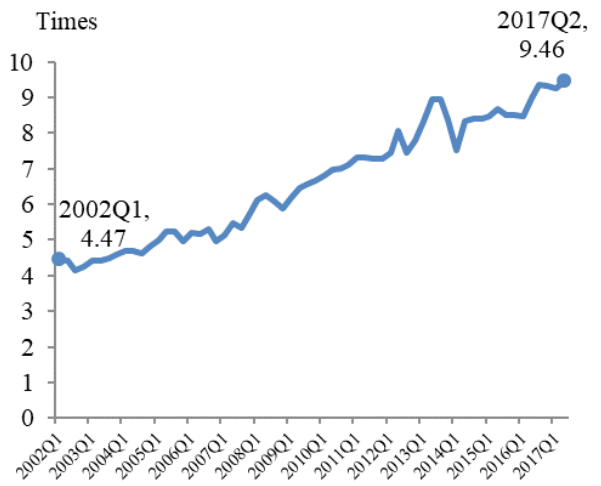
15. Debt servicing ratio for housing loans < 30%: means reasonable affordability.

    30% ≤ Debt servicing ratio for housing loans < 40%: means slightly low affordability.

    40% ≤ Debt servicing ratio for housing loans < 50%: means low affordability.

    Debt servicing ratio for housing loans ≥ 50%: means overly low affordability.

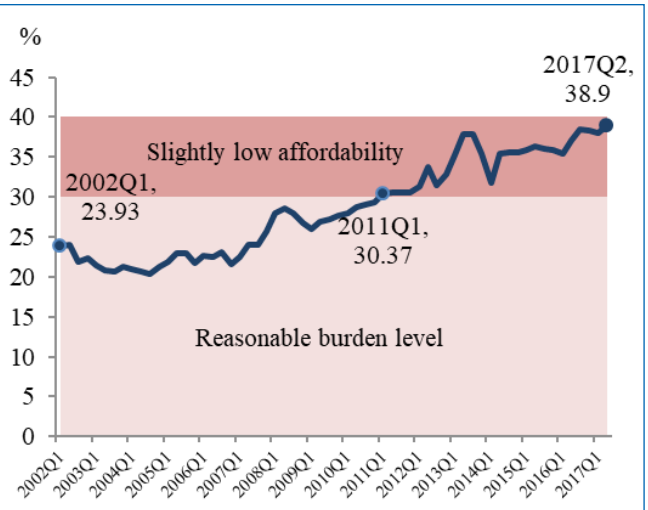
Figure 12
Housing Price to Income



Housing Prices to Income = housing price (median) / Yearly Disposable Income (Median)

Source: Construction and Planning Agency Ministry of the Interior (CPAMI).Source: CBCT.

Figure 13
Debt Servicing Ratio for Housing Loans

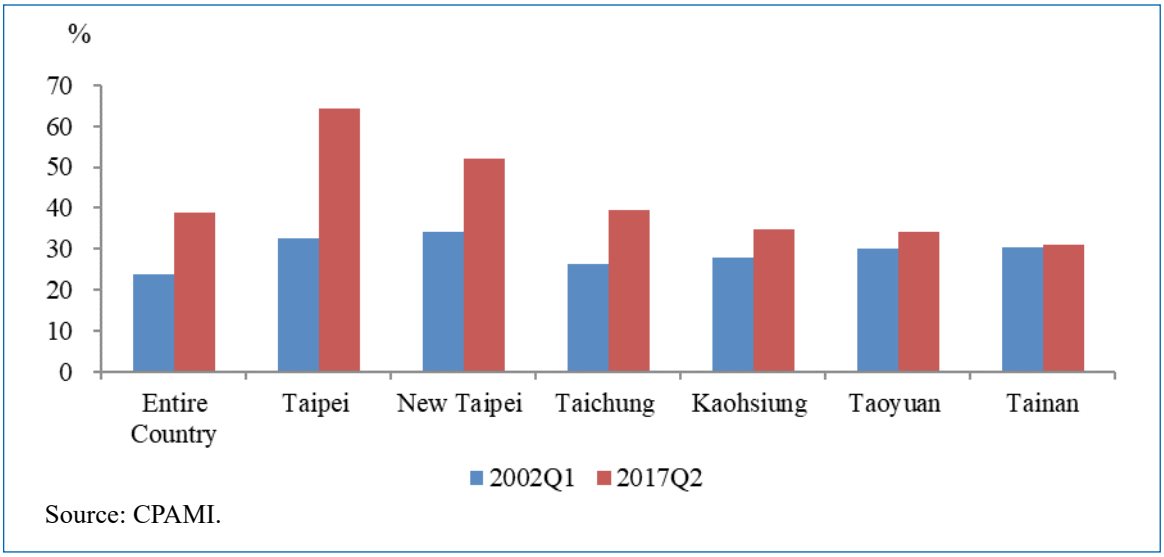


Debt Servicing Ratio for Housing Loan = Monthly Amortization of Loans (Median) / Monthly Disposable Income (Median)

Source: CPAMI.

However, housing prices in different regions vary greatly. The housing price-to-income ratios and the mortgage burden ratios are also significantly different in different regions. The debt burden was heavy particularly in Taipei City and New Taipei City (Figure 14). Therefore, the CBCT enacted regulations governing housing loans in Specific Areas, and the Taipei City government increased the property tax on high-priced house owners.

Figure 14: Mortgage burden for Chinese Taipei and Six Metropolitan



Source: CPAMI.

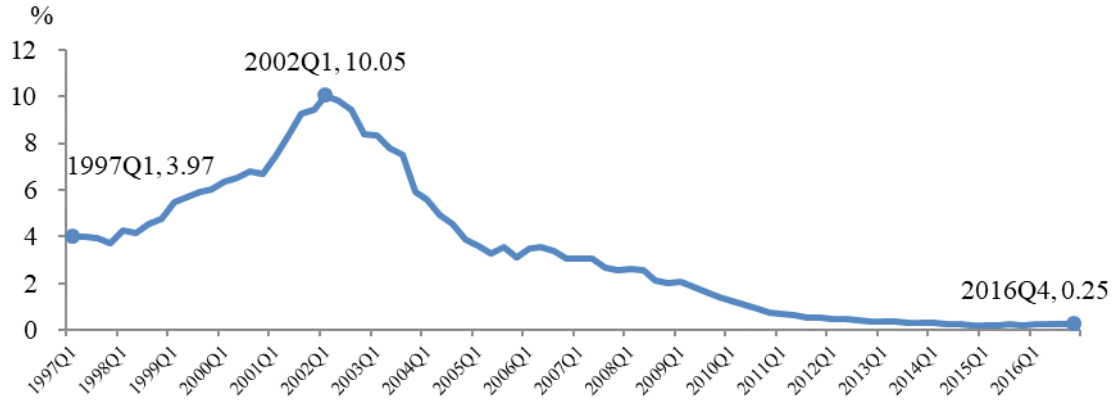
3.3.3 Heavy Household Burden but Sound Credit Quality of Loans

The NPL ratio of household loans has continued to decrease after the dotcom bubble and remained at around 0.25% in recent years (Figure 15). The credit quality of household loans continued to be satisfactory. The reasons are as follows.

- **Financial Reforms**

As mentioned above, the NPL ratio of banks increased quickly during 1997 to 2002. The government helped banks to clean up their bad debt through a lowering of required reserve ratios, cutting the business tax and adopting financial reforms. In addition, banks took more prudent actions when extending loans after the financial crises and strictly complied with Basel III standards.

Figure 15: NPL Ratio of Household Loans



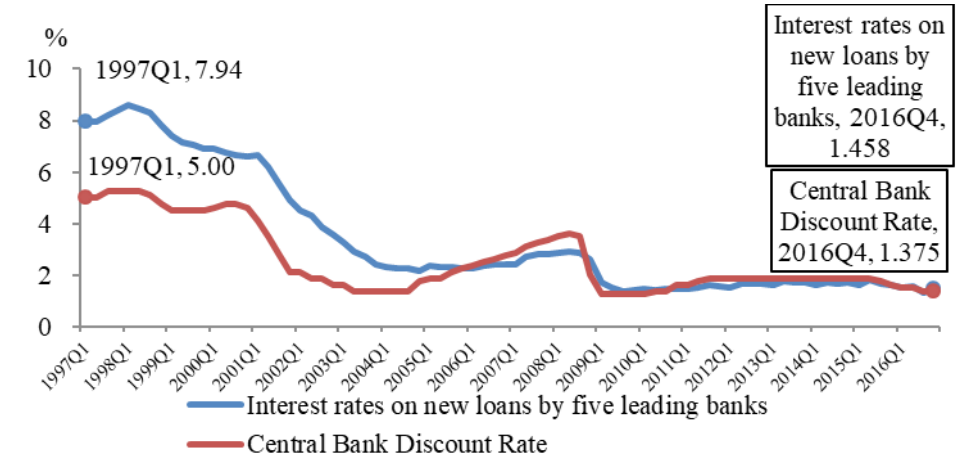
Note: Beginning Dec. 2001, the figures represent the broadly defined NPL ratios released by Financial Supervisory Commission, which include loans under surveillance.

Source: CBCT.

- **Decline in Bank Interest Rates**

Housing price surges and stable economic growth generated positive wealth and income effects which could enhance borrowers' willingness and ability to repay loans. Besides, the CBCT has maintained an accommodative monetary policy stance and a low interest rate environment considering the moderate economic growth and stable inflation outlook (Figure 16). Therefore, banks also decreased their lending rates, and the interest burden on the households was alleviated.

Figure 16: Central Bank Discount Rate and Interest Rate on New Loans

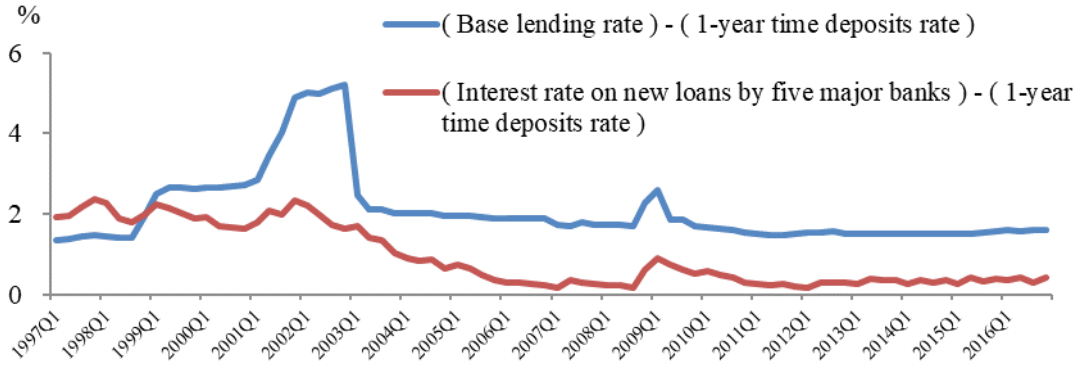


Source: CBCT.

- **Stable Market Conditions**

The interest rate spread could be used to measure banks' risk appetite for lending and cash outflow pressure of household sector.[16] The difference between "the base lending rate"[17] and "1-year time deposit rate" and the difference between "the interest rates on new loans by five leading banks" and "1-year time deposit rate" were only higher during 1997-2002 and the 2008 financial crises, and remained stable in other periods (Figure 17), implying that people could borrow money from banks easily and their cash outflow pressure was stable.

Figure 17: Spread Between Loan Rate and Deposit Rate



Notes: Prior to Jan. 2003, the base lending rate represents prime lending rates.
Source: CBCT.

16. The interest rate spread could measure banks' risk appetite for lending. The interest rate spread was higher during the Asian financial crisis (1997), the dotcom bubble (2000-2002) and the U.S. subprime mortgage crisis (2008-2009). This is because when banks faced higher risks of lending, they would raise risk premiums. When banks became more conservative, people would not be able to get refinancing easily. Besides, the interest rate spread also reflects the gap between interest income and interest expense. The higher the indicator is, the more pressure of cash outflow on households.
17. Prior to Jan. 2003, the figures represent prime lending rates.

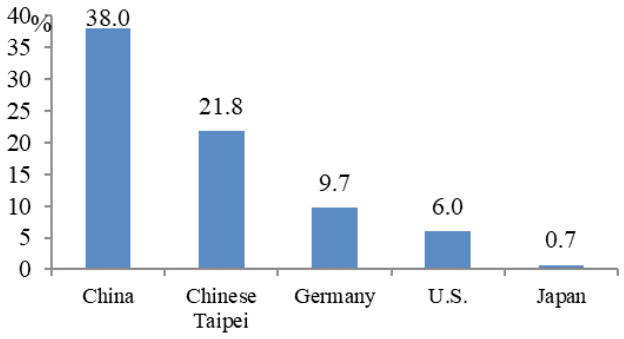
- **Mortgage Rate Reforms**

Due to the downward rigidity of prime rates in the local banking system,[18] the CBCT urged banks to adopt the adjustable rate mortgages and the new market interest rate-linked prime lending rate regime in 2002. As pricing transparency was improved, banks' mortgage rates and prime rates were substantially lowered to the benefit of borrowers. Furthermore, with the diversification of mortgage loans[19] (such as a longer grace period and different types of interest rates), people had more mortgage loan options. Consequently, the debt burden of the household sector was relieved.

- **Strong Solvency of the Household Sector**

The prosperous domestic economy has helped boost national income. For a long time, the savings rate has remained at over 20%, higher than other major economies (Figure 18), and has been an important source of debt repayment. Besides, the net assets of the household sector to GDP of Chinese Taipei is 8.6 times higher than the ratio of the UK, the US, South Korea and Singapore (Figure 19). Finally, according to the household sector balance sheet (Table 2), securities accounted for 13% of total assets. In recent years, global financial asset prices have increased, helping to bring more wealth to the household sector.[20]

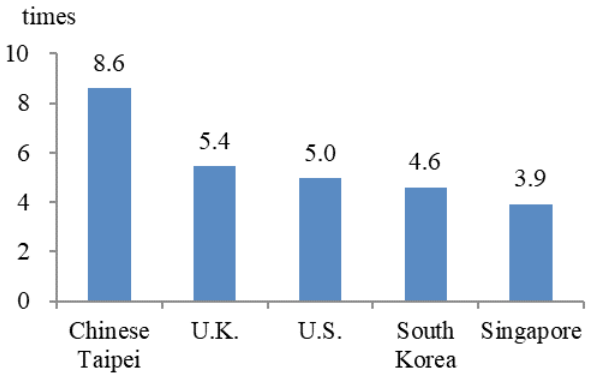
Figure 18
Household Savings Rate



Note: Chinese Taipei and German (2016);US and Japan (2015); China (2014).

Sources: DGBAS, OECD

Figure 19
Net Assets of Household Sector to GDP



Note: Chinese Taipei and the UK (2015).

Sources: official websites

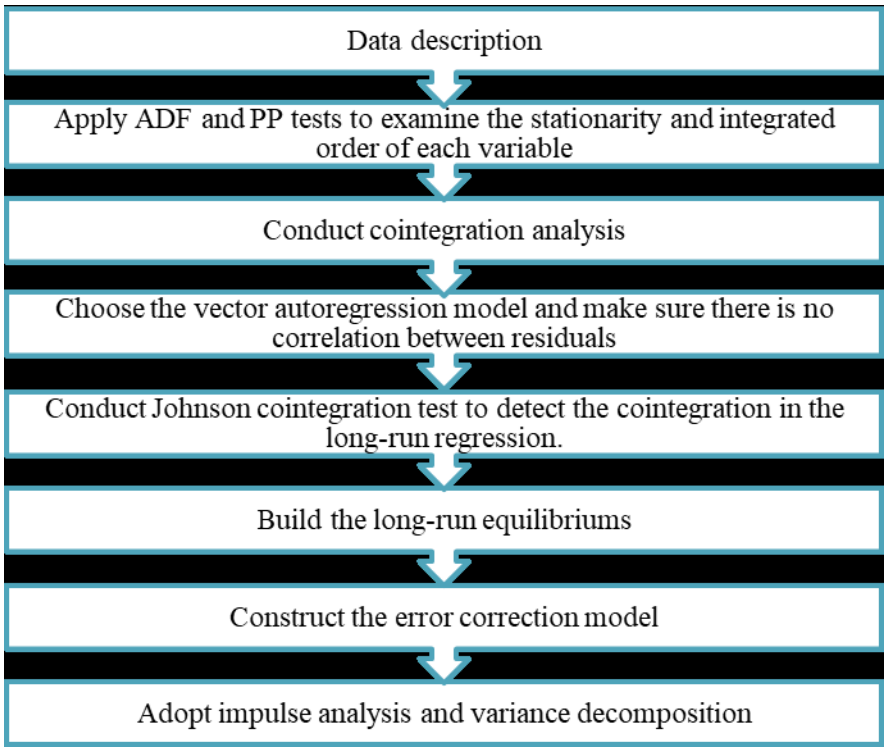
18. Because the prime lending rate has not decreased with the falling market interest rates, affecting the interest rate channel of monetary policies and consumers' rights, the CBCT announced the basic lending rate pricing reform in 2002.
19. The CBCT undertook the mortgage rate reforms to urge banks to adopt the adjustable rate mortgages. Besides, the credit and cash card crisis happening in Chinese Taipei during 2005-2006 also impelled banks to promote the mortgage finance instead of the consumer finance.
20. Given that financial asset prices are really high, many central banks including the U.S. Fed expressed their concerns about a possible risk of price fluctuations in the future.

4. An Empirical Model of the NPL Ratio of Household Loans

4.1 Research Framework

This paper focuses on the linkage between Chinese Taipei's household debt and financial stability and emphasizes the importance that the government chooses appropriate policy responses. With respect to empirical study, our model takes the household NPL ratio as explained variable and the loan rate, the interest rate spread and the housing price-to-disposable income ratio as explanatory variables.[21] Then, the Johansen cointegration tests are used to determine the existence of long-run relationships. Finally, we use error correction model and its impulse analysis and variance decomposition to examine the short-run interaction among variables in the model. The research procedure is as Figure 20.

Figure 20: Research Procedure



4.2 The Data

Quarterly data from 1997Q1 to 2016Q4 (consisting of 75 observations) of the following variables (Table 3) are used in the analysis.

As shown in Figure 21, most data have trends and interceptions. Meanwhile, the results of first difference show that data move within a limited range and are therefore stationary.

21. This paper explored the possibility of using other items as explanatory variables, such as the stock index, outstanding loans, GDP, disposable income, unemployment rate, business cycle indicators (leading, coincident and lagged) and interest rate spread (interest rates on new loans by five leading banks minus 1-year time deposit rate), but could not derive from them one single cointegrating vector.

Table 3
Description of Variables

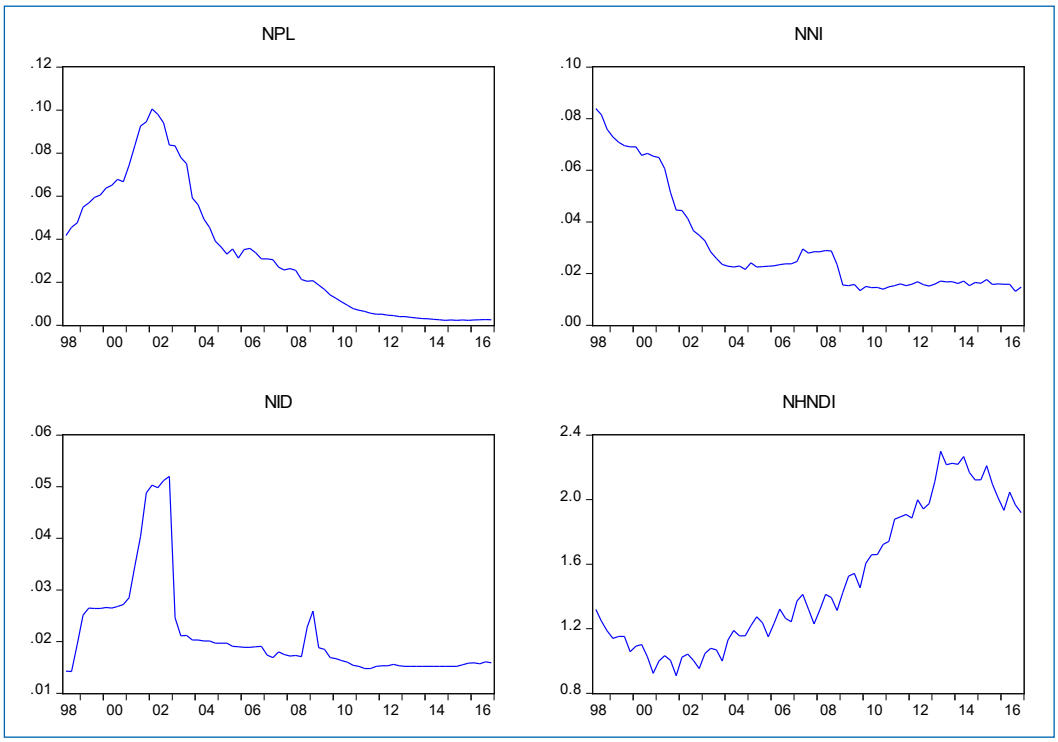
Variables	Calculation	Meaning of the variables and expected effects on NPL ratios	Source
Explained Variable			
● Household NPL ratio	● Total household NPL/ Total household loans ● Including Loans provided by all financial institutions	● To measure the loan credit quality and financial stability	● CBCT
Explanatory Variables			
● Loan rate	● Interest rates on new loans by five leading banks	● To measure borrowing cost ● According to the ability-to-pay hypothesis, an interest rate increase leads to higher borrowing costs and in turn higher the NPL ratios.	● Interest rates: CBCT
● Interest rate spread	● Base lending rate minus 1-year time deposit rate	● To measure banks' risk appetite for lending. The higher the reading is, the more conservative the lending policy is. If banks become more conservative, people would not get refinancing easily then the pressure of repayment increases. ● It also reflects the gap between the households' interest revenue and interest expense. The higher the reading is, the greater pressure of net cash outflows. ● It could have a positive effect on NPL ratio.	● Interest rates: CBCT
● Housing price-to-disposable income ratio	● The housing price is the Sinyi realty housing price index, which represents the secondary housing price (2001Q1=100). ● The disposable income is gross disposable income (2001Q1=100)	● To measure collateral value and wealth effect ● A housing price increase will enhance the willingness of repayment. People could also choose to sell the property to repay their debt. ● It could have a negative effect on NPL ratio.	● Housing price: Sinyi Inc. ● Disposable income ratio: CBCT

Notes: (1) This paper use base lending rate minus 1-year time deposit rate as the interest rate spread variable. This is because the base lending rate is able to reflect the rigidity of the mortgage rate before 2002 that the household debt burden was not relieved by market rate falls. Although the base lending rate is not used as the mortgage rate for household lending, its movement is highly correlated with interest rates on new loans by five leading banks. Therefore, the interest rate spread is chosen to represent the conditions during our sample period.

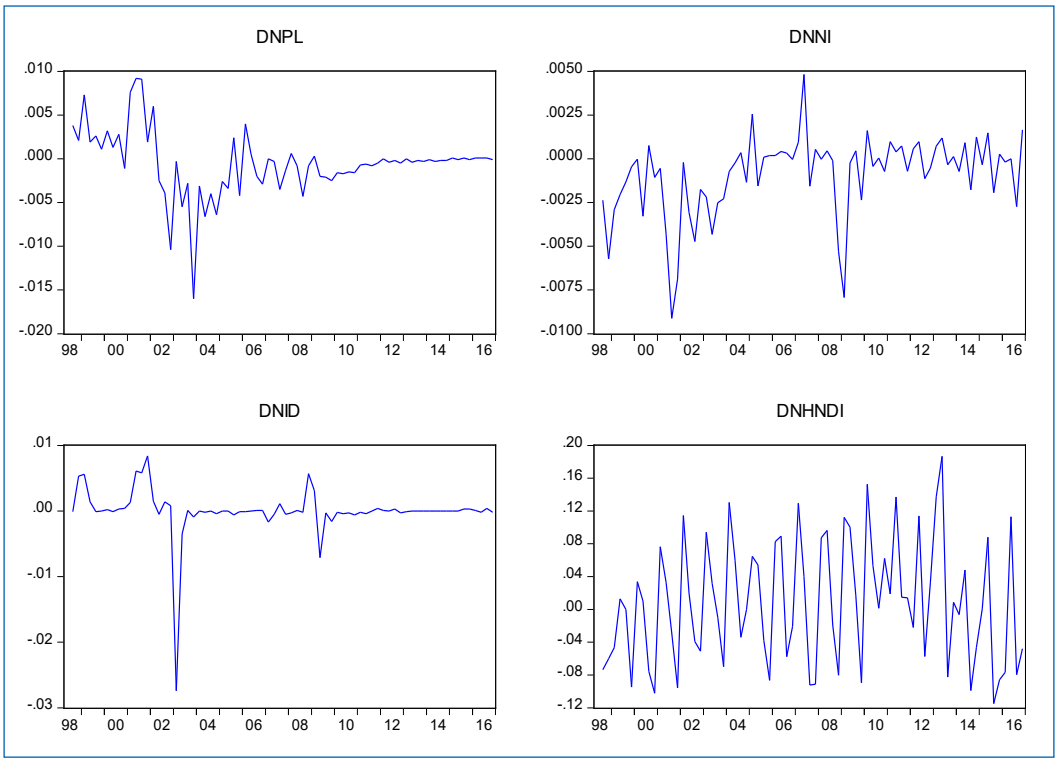
(2) Generally, the housing price-to-disposable income can serve as an indicator for mortgage burden. However, in this model, it is used as a substitute indicator for the housing price, for the purpose of measuring the wealth effect.

Figure 21: Data

Level



First Difference



Notes: (1) NPL: Household NPL ratio; NNI: Loan rate; NID-Interest rate spread; NH_NDI: Housing price-to-disposable income ratio.

(2) D means the first difference value of variables.

4.3 Unit Root Test

In order to test the stationarity of each stochastic variable, the Augmented Dickey-Fuller (ADF) test and Phillips-Perron (PP) test are applied to examine the null hypothesis of the unit root in each variable. Table 4 and Table 5 report the ADF and PP test results of level data and the first differenced data. Table 4 shows that nearly all variables cannot reject the nonstationary null hypothesis. Table 5 shows that nearly all variables can reject the nonstationary null hypothesis. Because all variables are I(1), it is appropriate to conduct the Johansen Cointegration test.

Table 4: Unit Root Test (Level)

Variables	ADF		PP	
		τ_τ	τ_μ	τ_τ
Household NPL ratio	-1.12	-2.80	-0.67	-2.55
Loan rate	-3.28**	-2.04	-3.61***	-1.98
Interest rate spread	-2.27	-3.38*	-2.15	-3.02
Housing price-to-disposable income ratio	-2.38	-2.24	-0.63	-2.86

Notes: 1. τ_μ, Exogenous: constant; τ_τ, Exogenous: constant and trend.
2. *** indicates significant at 1%, ** indicates significant at 5%, and * indicates significant at 10%.
3. The lag length of ADF test is selected based on Akaike information criterion (AIC).
4. The lag length of PP test is selected based on Newey-West Bandwidth.

Table 5: Unit Root Test (First Difference)

Variables	ADF		PP	
	τ_μ	τ_τ	τ_μ	τ_τ
Household NPL ratio	-2.67*	-2.59	-5.01***	-5.23***
Loan rate	-5.59***	-6.31***	-5.54***	-6.31***
Interest rate spread	-6.89***	-6.88***	-6.90***	-6.89***
Housing price-to-disposable income ratio	-1.99	-0.75	-8.57***	-8.52***

Notes: 1. τ_μ, Exogenous: constant; τ_τ, Exogenous: constant and trend.
2. *** indicates significant at 1%, ** indicates significant at 5%, and * indicates significant at 10%.
3. The lag length of ADF test is selected based on Akaike information criterion (AIC).
4. The lag length of PP test is selected based on Newey-West Bandwidth.

4.4 Cointegration Analysis

The Johansen cointegration analysis examines the long-term relationships between household NPL ratio and other macroeconomic variables.

Before conducting the cointegration test, we should select a vector autoregressive (VAR) model as the base model,[22] then conduct the LM test to make sure that the residuals do not show autocorrelation. Furthermore, the paper uses the trace test and the maximum eigenvalue test to examine if there exists only one cointegrating vector. The long-run regression could be set as the following (3.4.1):

$$NPL_t = \beta_1 \times NNI_t + \beta_2 \times NID_t + \beta_3 \times NH\_NDI_t + c + \varepsilon_t \qquad (3.4.1)$$

NPL: NPL ratio of household loans; *NNI*: loan rate; *NID*: interest rate spread; *NH_NDI*: housing price-to-disposable income ratio; ε_t is stationary error term.

Based on the trace test and the maximum eigenvalue test, the NPL ratio of household loans forms a cointegrating relationship with other variables in the long-run regression (Table 6).

Table 6: Johansen Cointegration Test

	NPL ratio of household loans	
	Trace test	Maximum Eigenvalue test
r = 0	76.66**	49.77**
r <=1	26.89	17.40
r <=2	9.49	6.53
r <=3	2.97	2.97

Notes: (1) r denotes the maximum number of cointegrating vectors.
(2) The symbol of ** indicates significance at 5% level.

Since there is only one cointegrating relationship in the long-run regression, the error-correction model of household debt can be set as the following (3.4.2):

$$\Delta(NPL_t) = \alpha_0 + \sum_{i=1}^{5} \beta_{1i} \times \Delta(NNI_{t-i}) + \sum_{i=1}^{5} \beta_{2i} \times \Delta(NID_{t-i}) + \sum_{i=1}^{5} \beta_{3i} \times \Delta(NH\_NDI_{t-i}) + \beta_4 \times ecm_{t-1} + \varepsilon_t$$

$$ecm_t = NPL_t - (\beta_1 \times NNI_t + \beta_2 \times NID_t + \beta_3 \times NH\_NDI_t + c) \qquad (3.4.2)$$

22. The lag-length of vector autoregressive (VAR) model is selected based on Akaike information criterion(AIC) and this paper chooses VAR(5).

The results of long-run estimation and short-run dynamic equation are shown in Box 1.

Box 1: Long-run Estimation and Short-run Dynamic Equation

Long-run estimation:

$$NPL_t = -0.054 + \underset{(6.95)***}{0.672} \times NNI_t + \underset{(15.39)***}{3.544} \times NID_t - \underset{(-1.30)}{0.005} \times NH\_NDI_t \quad (3.4.3)$$

Short-run dynamic equation:

$$\begin{aligned}\Delta(NPL_t) = \alpha_0 &+ \underset{(4.45)***}{0.633} \times \Delta(NPL_{t-1}) + \underset{(1.98)*}{0.339} \times \Delta(NPL_{t-2}) - \underset{(-1.55)}{0.219} \times \Delta(NPL_{t-3}) + \underset{(0.64)}{0.090} \times \Delta(NPL_{t-4}) \\ &- \underset{(-2.57)**}{0.347} \times \Delta(NPL_{t-5}) + \underset{(1.14)}{0.191} \times \Delta(NNI_{t-1}) + \underset{(2.80)***}{0.437} \times \Delta(NNI_{t-2}) + \underset{(0.13)}{0.022} \times \Delta(NNI_{t-3}) \\ &+ \underset{(0.70)}{0.115} \times \Delta(NNI_{t-4}) + \underset{(0.40)}{0.065} \times \Delta(NNI_{t-5}) - \underset{(-1.60)**}{0.232} \times \Delta(NID_{t-1}) - \underset{(-2.26)**}{0.242} \times \Delta(NID_{t-2}) \\ &+ \underset{(1.14)}{0.126} \times \Delta(NID_{t-3}) - \underset{(-3.22)***}{0.336} \times \Delta(NID_{t-4}) - \underset{(-1.32)}{0.160} \times \Delta(NID_{t-5}) - \underset{(-0.66)}{0.003} \times \Delta(NH\_NDI_{t-1}) \\ &- \underset{(-1.84)*}{0.008} \times \Delta(NH\_NDI_{t-2}) - \underset{(-0.20)}{0.001} \times \Delta(NH\_NDI_{t-3}) + \underset{(0.82)}{0.003} \times \Delta(NH\_NDI_{t-4}) \\ &- \underset{(-1.05)}{0.006} \times \Delta(NH\_NDI_{t-5}) + \underset{(1.36)}{0.000} - \underset{(-2.66)***}{0.140} \times ecm_{t-1} + \varepsilon_t\end{aligned}$$

$$ecm_t = NPL_{t-1} - (0.672 \times NNI_{t-1} + 3.544 \times NID_{t-1} - 0.005 \times NH\_NDI_{t-1} - 0.054) \quad (3.4.4)$$

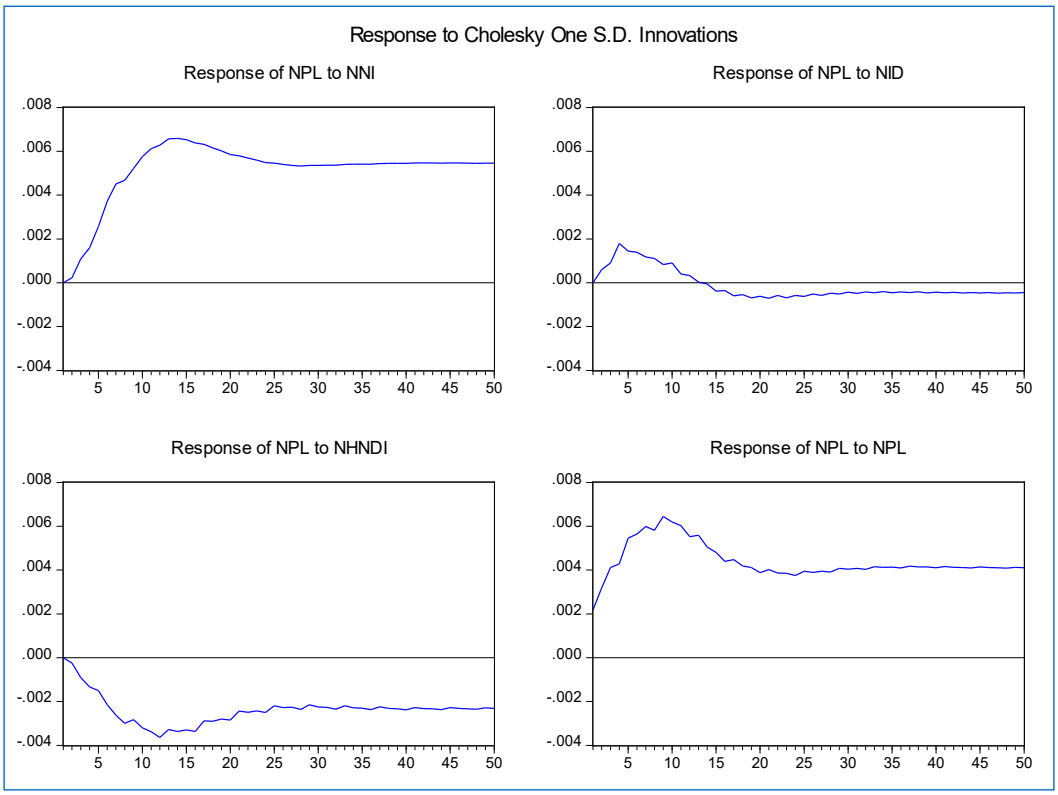
Note: Number of observation = 69 after adjustment (Q4:1999 - Q4:2016)
t-statistics are in parentheses; ***, **, * denote 1%, 5%, and 10% significance, respectively.

In the long-run (3.4.3), the loan rate and the interest rate spread have a significantly positive effect on the NPL ratio of household loans, while the housing price-to-disposable income ratio has a negative effect but is not significant. Among them, the interest rate spread has the most effect on NPL ratio of household loans. One unit increase in the interest rate spread will lead to a 3.544 unit increase in the NPL ratio of household loans. That means that when banks become more conservative about lending, the household sector may not get refinance easily or may face greater pressure for cash outflows, leading to defaults. Moreover, one unit increase in loan rate will lead to a 0.672 unit increase in the NPL ratio of household loans. It means that the household sector may fall into arrears when their borrowing costs increase. Finally, one unit increase in the housing price-to-disposable income ratio will lead to a 0.005 unit decrease in the NPL ratio of household loans but it is not significant. The possible reason may be that the mortgage loans are usually fully guaranteed, a sharp increase in the NPL ratio of household loans only happens when the housing market crashes. In the short-run dynamic equation (3.4.3), the estimated error correction is significantly negative, indicating that the NPL ratio may automatically go back to the equilibrium when the system deviates from long-run equilibrium.

4.5 Impulse Analysis and Variance Decomposition

If we look at the response of the impulse analysis of the NPL ratio on other variables in Figure 22, we can see that a loan rate increase would lead to a rapid and continuous increase in the NPL ratio. This means that the loan rate increase has a significant and long-lasting effect on the NPL ratio. An increase in the interest rate spread would cause the NPL ratio to rise immediately but then decrease gradually over time. In other words, if the interest spread could be reduced effectively, the NPL ratio would not increase further. Finally, an increase in the housing price-to-disposable income ratio leads to a decrease in NPL ratio. It might suggest that rising housing prices generate a positive wealth effect.

Figure 22: Impulse Analysis of NPL Ratio of Household Loans (VECM Model)

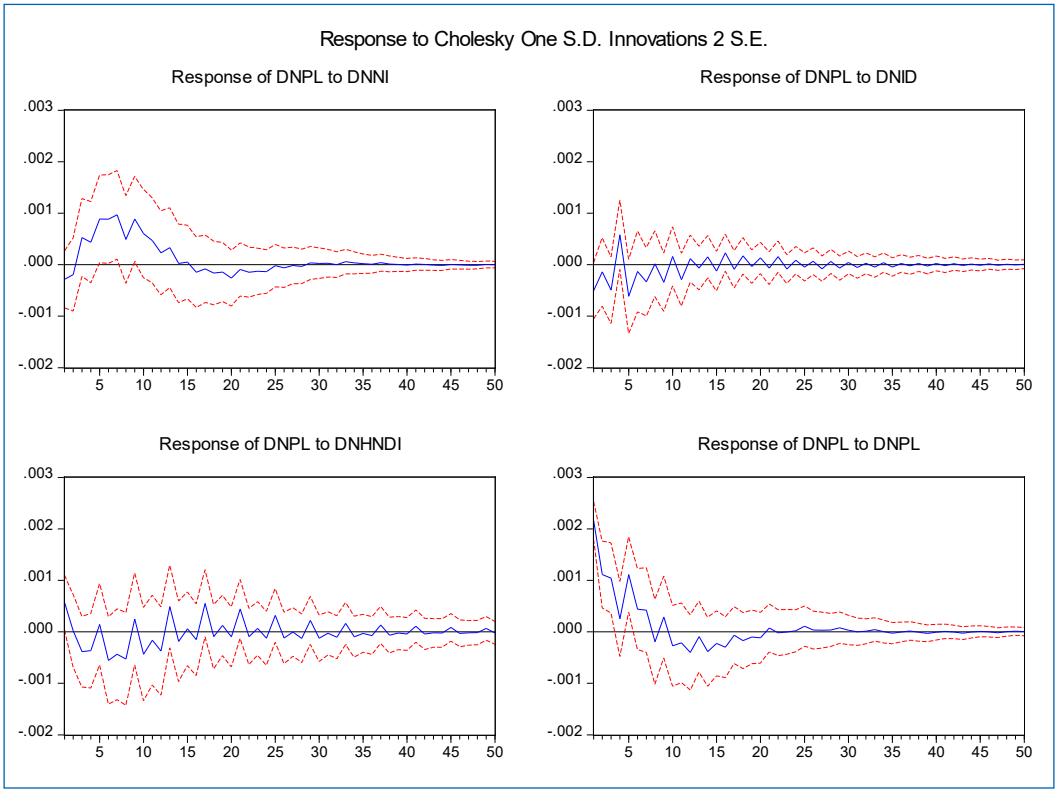


Notes: (1) NPL: Household NPL ratio; NNI: Loan rate; NID: Interest rate spread; NH_NDI: Housing price-to-disposable income ratio.

(2) Decomposed using Cholesky method; the order of variables is NNI, NID, NH_NDI and NPL.

However, the confidence interval of the impulse analysis of the VECM model does not get revealed in Eviews. In order to test whether the empirical result is robust enough and the coefficients are significantly different from zero, this paper uses the first difference value of variables to build VAR models.[23] Furthermore, to prevent order of variables from affecting the empirical results, Cholesky decomposition (Figure 23) and generalized impulse response analysis (Figure 24) are applied. Both of the results show that the loan rate has a significant impact[24] on the NPL ratio of household loans, while the coefficients of other variables are not significant from zero.

Figure 23: Impulse Analysis of NPL Ratio of Household Loans (VAR model - Cholesky)



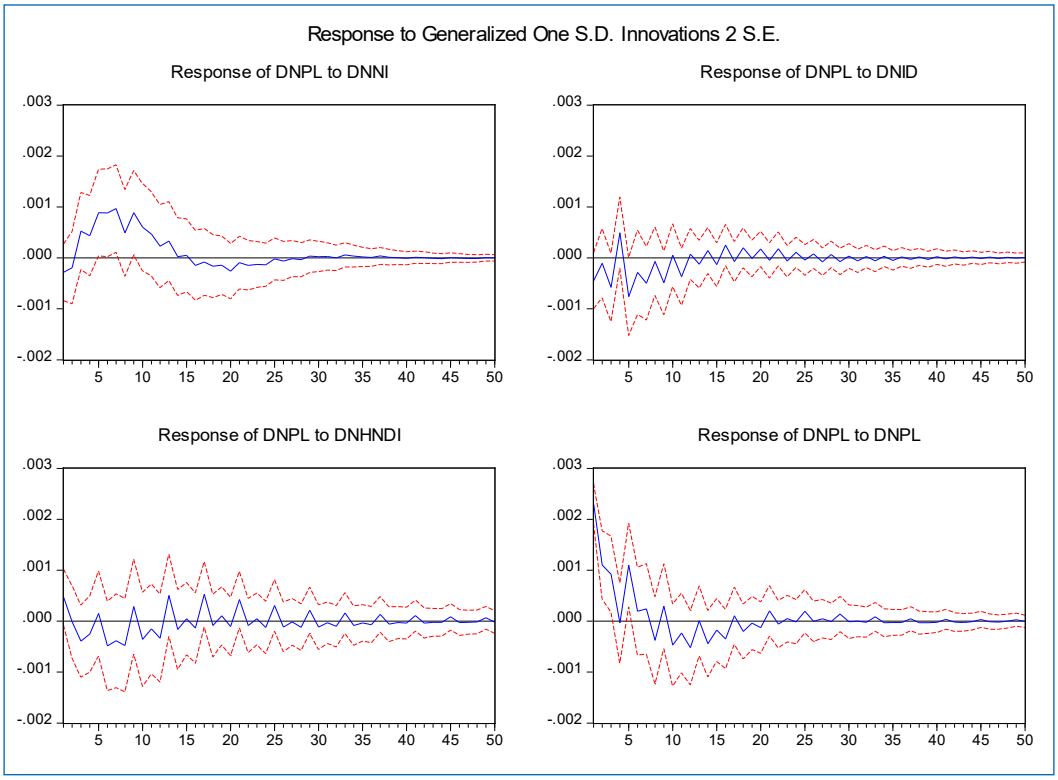
Notes: (1) DNPL: Household NPL ratio changes; DNNI: Loan rate changes; DNID: Interest rate spread changes; DNH_NDI: Housing price-to-disposable income ratio changes.

(2) Using Cholesky decomposition; the order of variables is DNNI, DNID, DNH_NDI and D NPL.

23. The lag-length of vector autoregressive (VAR) model is selected based on Akaike information criterion (AIC) and this paper chooses VAR (5).

24. It becomes more significant from period 5 till period 9.

Figure 24: Impulse Analysis of NPL Ratio of Household Loans (VAR model - Generalized)

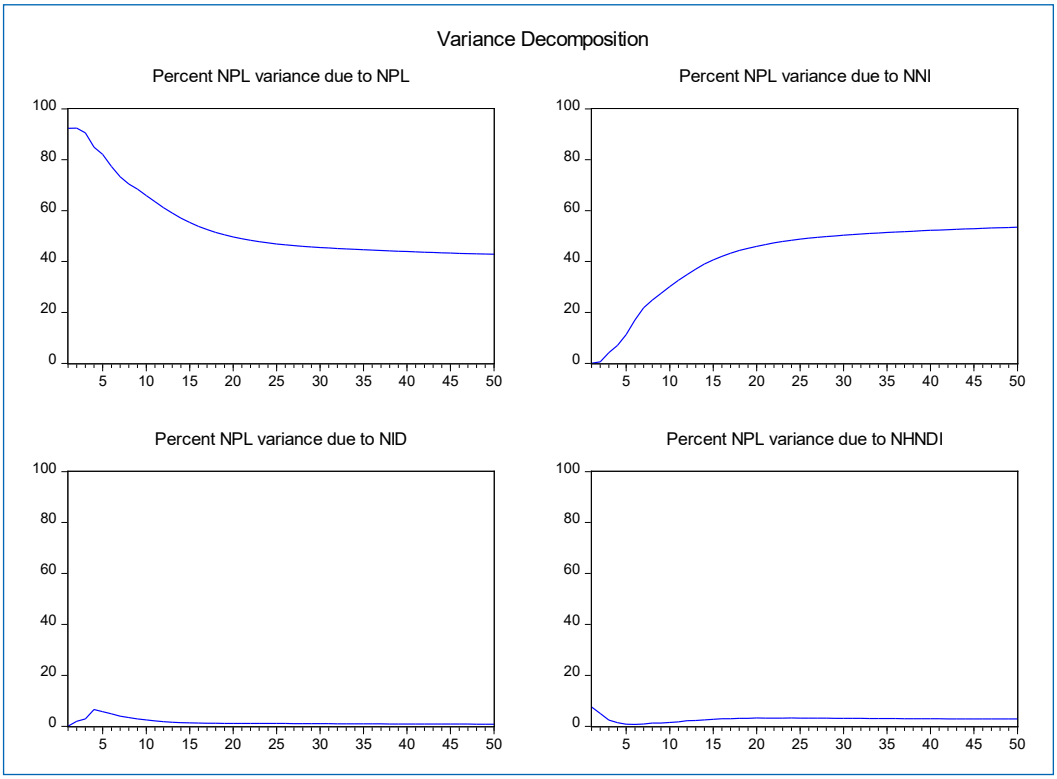


Note: DNPL: Household NPL ratio changes; DNNI: Loan rate changes; DNID: Interest rate spread changes; DNH_NDI: Housing price-to-disposable income ratio changes.

We can observe the results of the variance decomposition of the NPL ratio in Figure 25. It seems that the loan rate's explanatory power increases rapidly and reaches around 53% after period 40. We could then conclude that the loan rate is the most important factor to affect the NPL ratio. With regard to the housing price-to-disposable income ratio and the interest rate spread, they only could explain the variation of the NPL ratio for around 3% and 1% respectively.

This is a very important result. In the short-run, the loan rate is the key driver of NPL changes. It has a significant and long-lasting effect on the NPL ratio of household loans. Rising housing prices generate a positive wealth effect and enhance the willingness of borrowers to meet their debt service obligation. However, housing price increases do not have a significant effect on the NPL ratio of household loans.

Figure 25: Variance Decomposition of NPL Ratio of Household Loans



Notes: (1) NPL: Household NPL ratio; NNI: Loan rate; NID: Interest rate spread; NH_NDI: Housing price-to-disposable income ratio.

(2) Using Cholesky decomposition; the order of variables is NNI, NID, NH_NDI and NPL.

5. Conclusion and Policy Implications

Household debt increases and greater access to credit can help boost demand and build personal wealth. However, high household indebtedness may reduce the ability to respond to sudden negative shocks and undermine financial stability and economic growth. As a result, household indebtedness in Chinese Taipei has received increased attention recently.

The increase in household debt in Chinese Taipei mainly results from increased loans for house purchases amidst housing price rises. In the past few years, the government has adopted relevant measures to enhance the soundness of the housing market and financial stability, while the market loan rates have been relatively low. As result, the NPL ratio of household loans has stayed at historically low levels in recent years, reflecting sound credit quality for household loans. Furthermore, ample household wealth and a healthy financial system constitute important buffers for financial stability. However, as household debt burdens remain heavy, it is still necessary to study the factors that affect the NPL ratio of household loans and explore the applicable policies to maintain financial stability.

This paper builds a model to examine the factors that affect the NPL ratio of household loans, with an emphasis on the importance for the government to adopt the appropriate policies. The empirical results show that the loan rate and the interest rate spread are positively correlated with the NPL ratio of household loans. Furthermore, the interest rate spread is the most important factor in the long-run while the loan rate is the most important factor in the short-term. On the other hand, the housing price-to-disposable income ratio is negatively, but not significantly, correlated with the household

NPL ratio. The possible reason may be that since mortgage loans are usually fully guaranteed, a sharp increase in the NPL ratio of household loans only happens when the housing market crashes.

In terms of policy implications, the government should continue to pay attention to the changes in the interest rate spread to monitor market appetite. In the event of any risk, the default situation will not significantly deteriorate as long as the interest spread does not rise sharply. Besides, interest rate rises not only have negative effects on consumer price and output levels, but also could weigh on financial stability. Since mortgage loans make up a major share of domestic household debt, if the central bank uses interest rate hikes to curb housing speculation, the household NPL ratio may rise substantially. This view is in line with what we found in the relevant literature, which suggests that interest rates are not a good policy instrument for dealing with housing bubbles because it has an impact on other aspects too.

With respect to the domestic household debt overhang problem, this paper proposes the following suggestions.

5.1 Mind the Interest Rate Normalization Effects on NPL Ratio

Based on our empirical model, the loan rate is the key factor behind the NPL ratio of household loans. Given that interest rate changes may influence borrowers' mortgage interest payments and that the household sector cannot hedge their interest rate risk the way companies and financial institutions do, the CBCT had urged banks since 2010 to remind mortgage borrowers of the risks from interest rate changes. From 2017 onwards, in view of greater possibility of interest rate normalization by central banks in advanced countries, the government needs to monitor closely the changes in international economic and financial environment. Apart from continuing to remind borrowers to pay attention to the impact of future interest rate changes on their debt, and it is also important for appropriate measures to be adopted when necessary to maintain economic and financial stability.

5.2 Collect Microdata from Joint Credit Information Center for Analysis

This paper uses macro data to analyze the NPL ratio of household loans. However, it does not take into account borrower composition across the household sector and the terms of loans. For example, if most borrowers are generally creditworthy, the impact of debt overhang on financial stability and economic growth could be limited. Currently, information disclosure for mortgage data collected by the Joint Credit Information Center includes such information as the age, income and education level of borrowers. Future studies could use such microdata for analysis. Furthermore, the Joint Credit Information Center could begin to collect information regarding loan terms (to reflect the differences in grace periods and interest rate calculation methods). This could help better capture debt repayment information, and, in turn, provide a more accurate picture of the debt burden of the household sector.

5.3 Implement Macroprudential Measures to Maintain Financial Stability

Monetary policy is a blunt tool that affects all aspects of the economy. Therefore, macroprudential policy should also be adopted as its effect can be targeted. When the government considers measures to address housing market concerns, several elements can be taken into account, including demand and supply, homebuyer's motivation (for personal use or investment) and regional difference of the real estate market. From the housing supply side, the government needs to ensure that demand is sufficiently met. From the housing demand side, relevant authorities can use targeted measures aimed

at bank lending or banks' operating costs to guide excessive funds away from the housing market. The government can also levy taxes to curb speculative demand if needed. Moreover, since market participants tend to change their behavior in response to the implementation of specific policies, the authorities have to continue tracking policy effectiveness and monitoring for any illegal or circumventing behavior and make necessary adjustment accordingly.

References

André, C., (2016), "Household Debt in OECD Countries Stylised Facts and Policy Issues," *OECD Economics Department Working Papers*, No.1277, February.

CBCT, (2016), "The CBCT Adjusted Targeted Prudential Measures on Real Estate Lending," Financial Stability Report, May.

CBCT, (2015), "The Effectiveness of the CBCT's Macro-Prudential Measures on Real Estate Loans," Financial Stability Report, May.

CBCT, (2014), Press Conference Supplement Materials, July.

CBCT, (2013), "Effectiveness of Plan to Enhance the Soundness of the Housing Market," *Financial Stability Report*, May.

CBCT, (2012), "Effectiveness of the CBCT's Measures to Strengthen Risk Management on Real Estate-Related Loans of Banks," *Financial Stability Report*, May.

CBCT, (2011), "The CBCT's Targeted Prudential Measures to Stabilize the Property Market," Financial Stability Report, May.

Cheng, P. W., (2015), "Prudent Policy: Implementation and Practice," CBCT, December.

Crowe, C.; G. Dell'Ariccia; D. Igan andP. Rabanal, (2011), "Dealing with Real Estate Booms," BOK-IMF Workshop, April 11-12.

Debelle, G., (2004), "Macroeconomic Implications of Rising Household Debt," *BIS Working Papers*, No. 153, June.

Fang, H. J., (2010), "Household Indebtedness and Its Implications to Financial Stability in Chinese Taipei," *SEACEN Research Paper*, No. 80, August.

Hsu, P. C. and Y. M. Yu, (2014), "Mortgage Finance and Consumer Credit: Implications on Financial Stability in SEACEN Economies," *SEACEN Research Paper*, No. 94, October.

IMF (2017), "Household Debt and Financial Stability," Global Financial Stability Report, October.

Kuttner, K. N. and I. Shim, (2013), "Can Non-interest Rate Policies Stabilise Housing Markets? Evidence from a Panel of 57 Economies," *BIS Working Papers*, No 433, November.

Lombardi, M. J.; M. Mohanty and I. Shim, (2017), "The Real Effects of Household Debt in the Short and Long Run," *BIS Working Papers*, No. 607, January.

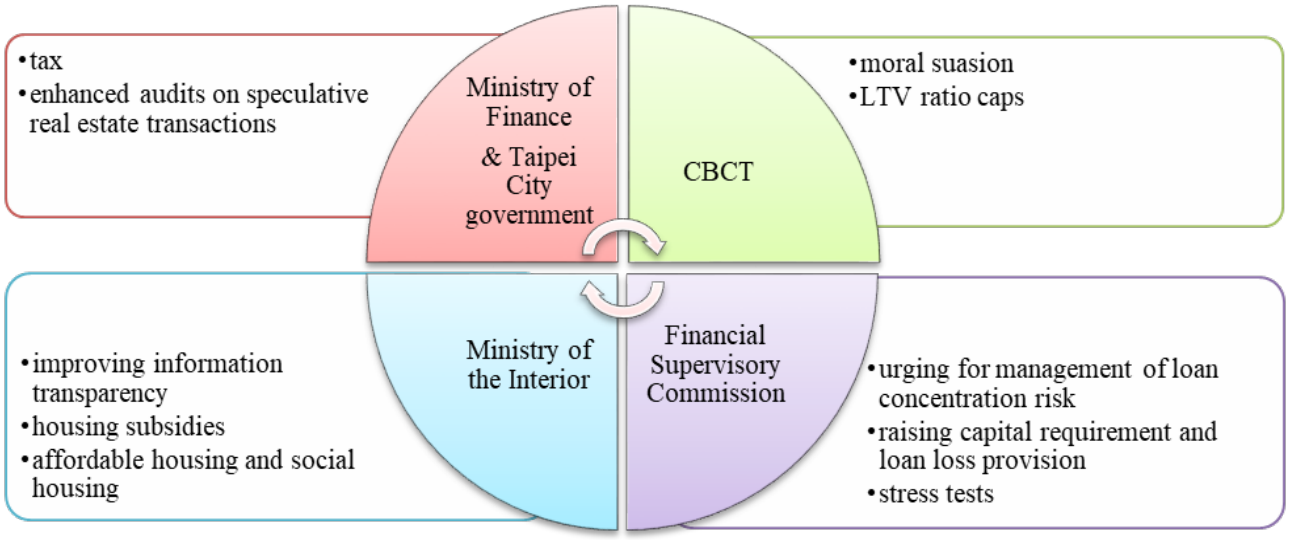
Yang, H. C.; T. C. Lin and T. H. Cheng, (2008), "A Study on the Significant Factors for Default in Residential Mortgages," *Journal of Taiwan Land Research*, Vol. 11, No. 2 pp. 1-36, November.

Zhang, L. and E. Zoli, (2014), "Leaning Against the Wind: Macroprudential Policy in Asia," *IMF Working Paper*, WP/14/22, February 6.

Appendix: Policy Measures to Address Housing Price Surges

The CBCT, the Ministry of Finance, the Financial Supervisory Commission (FSC) and the Ministry of the Interior have adopted the following measures to enhance the soundness of the housing market and ensure financial stability. (Figure 1)

Figure 1: Policy Measures



Sources: CBCT; MOI.

1. Central Bank Measures

To prevent financial institutions' funds from being used for real estate speculation and undermining financial stability, the CBCT has, since October 2009, employed moral suasion to urge financial institutions to enhance credit risk management from October 2009. Since June 2010, the CBCT has introduced several rounds of targeted macroprudential measures (i.e., selective credit controls aimed at housing loans in specific areas, high-value housing loans and loans taken out by natural persons with third (or more) mortgage house(s)) (Table 1). As speculative demand abated, the CBCT lifted relevant restrictions in 2015 and in 2016, repealing the regulations governing real estate loans except for high value housing loans.

Table 1: Key Prudential Measures by CBCT

Items		Effective Date					
		2010/6/25	2010/12/31	2012/6/22	2014/6/27	2015/8/14	2016/3/25
Mortgage loans for house purchases in Specific Areas	Specific Areas	Taipei City and 10 districts in New Taipei City	Taipei City and 13 districts in New Taipei City		Taipei City ,17 districts in New Taipei City and 4 in Taoyuan City	Removed 2 districts in New Taipei City and all 4 districts in Taoyuan City	Repealed
	LTV ratio cap on loans for a natural person's second(or more) mortgaged house(s)	LTV ratio capped at 70%	LTV ratio capped at 60%		Capping the LTV ratio at 50% for third or more house-purchase loans by a single borrower across the country	Raising the LTV ratio ceiling to 60% for third or more house-purchase loans by a single borrower across the country	Repealed
	LTV ratio cap on loans for corporate legal entities' second (or more) mortgaged house(s)		LTV ratio capped at 60%		Lowering the LTV ratio ceiling of house-purchase loans granted to corporate legal entities to 50% across the country	Raising the LTV ratio ceiling of house-purchase loans granted to corporate legal entities from 50% to 60% across the country	Repealed
Land col-lateralized loans			LTV ratio capped at 65%				Repealed
Mortgage loans for high-value housing				Capping LTV ratios of those loans at 60% and removing their grace period	Revising the definition of high-value housing and lowering their LTV ratio ceiling to 50%	Raising their LTV ratio ceiling to 60%	

Sources: CBCT.

2. Financial Supervisory Commission

The FSC strengthened risk management for bank real estate lending (such as requesting banks to strengthen concentration risk management of real estate lending, verify the purpose of loans and cautiously determine real estate valuation), raised the capital requirement and loss provision related to real estate lending, and conducted stress tests. Similar to the CBCT, the FSC also relaxed the relevant regulations when the housing market showed more signs of cooling (Table 2).

Table 2: Key Measures by FSC

Date	Measure	Description
2011	Strengthen risk management for bank real estate lending	Monitor banks with excessive concentration in real estate lending. The FSC focused on two key ratios - ratio of the outstanding balance of construction loans to total outstanding loans and ratio of home purchase loans and home improvement loans to total outstanding loans.
April 2011	Raise the capital requirement	Allow the use of either a 45% risk weight or 35%/75% risk weight under the LTV method for new self-use residence loans granted by banks, while non-self-use residence loans would be assigned a risk weight of 100%. Self-use residence loans refer to loans applied for by nationals without domestic residence for the purpose of purchasing residences for self-use.
2013	Restrict further real estate funding using false loan purposes	Require that banks should not increase the lending amount for the real estate projects using false loan purposes, such as in the name of working capital financing or other types of loans by way of pledge or transfer of the beneficiary rights of real estate asset trusts.
May 2014	Conduct stress tests	Conduct stress tests to evaluate banks' ability to withstand losses in case of sharp house price declines. The tests focused on credit exposures associated with housing loans and loans to the construction industry, based on three risk factors including a fall in house prices, a rise in the interest rate, and a decrease in borrowers' income verification under adverse scenarios in varying degrees.
December 2014	Strengthen the verification of self-use residential loans	Strengthen the verification of self-use residential loans according to the one-person-one-house principle
December 2014	Require banks to raise loss provision	Require banks to raise loss provision ratios of housing loans and construction loans to 1.5% or more before the end of 2016
July 2015	Require insurance companies to raise their allowance for bad debt	Require insurance companies to raise their allowance for bad debt at a ratio of at least 1.5% against loans for home purchases, refurbishment, or construction by the end of 2016.
December 2015	Relax relevant regulations	Banks have to control their own concentration risk in real estate lending.
October 2017	Lower the capital requirement	Lower the risk weight of non-self-use residence loans from 100% to 75% and that of self-use residence loans from 45% to 35% from the end of 2017.

Sources: CBCT; FSC.

3. Ministry of Finance (MoF) and Taipei City Government

The MoF successively introduced the "specifically selected goods and services tax", raised the house tax and levied consolidated housing and land income tax. They also reinforced tax audits on speculative real estate transactions. Because the debt burden is the heaviest in Taipei City, the Taipei City government increased the house tax on high-value housing. (Table 3)

Table 3: Key Tax measures conducted by MoF and Taipei City Government

Date	Government	Item	Description
June 2011	Ministry of Finance	Specifically, selected goods and services tax ("luxury tax")	Imposing a tax of 10% - 15% on the sale price of non-self-use residences and city land with building permits (land for construction in urban planning areas) that were bought less than two years ago, while not applicable to reasonable, ordinary or involuntary transfers of properties
1 July 2011	Taipei City Government	House tax on high-value housing	Because the prices of high-value housing is much higher than those of other housing in the same area, to promote fair taxation, the Taipei City government imposed a higher house tax on high-value housing.
4 June 2014	Ministry of Finance	House tax	Raising the house tax for non-self-use property from 1.2% - 2% to 1.5% - 3.6%.
1 January 2016	Ministry of Finance	Consolidated housing and land income tax	Levying consolidated housing and land income tax and repealing the specifically selected goods and services tax.

Sources: Cheng (2015); Taipei City Government.

4. Ministry of the Interior (MoI)

The MoI promotes affordable housing and social housing to meet the public housing demand, completing a house rental system to improve rental market development, launching the mechanism of real estate transaction price registration to promote information transparency.

Chapter 7

HOUSEHOLD DEBT IN SEACEN ECONOMIES: THAILAND

By

Suparit Suwanik and Kanin Peerawattanachart[1]

1. Introduction

Thai household debt[2] has drawn considerable attention since it has continued to grow over the past decade, reaching its highest record at 81.2% out of the nation's GDP in Q4/2015[3] (Figure 1.1). Previously, the household debt growth peaked at 18.5% year-on-year in Q4/2012. According to the BIS data[4], the Thai household debt to GDP ratio ranked among the top and the fastest rising in Asia (Figure 1.2).

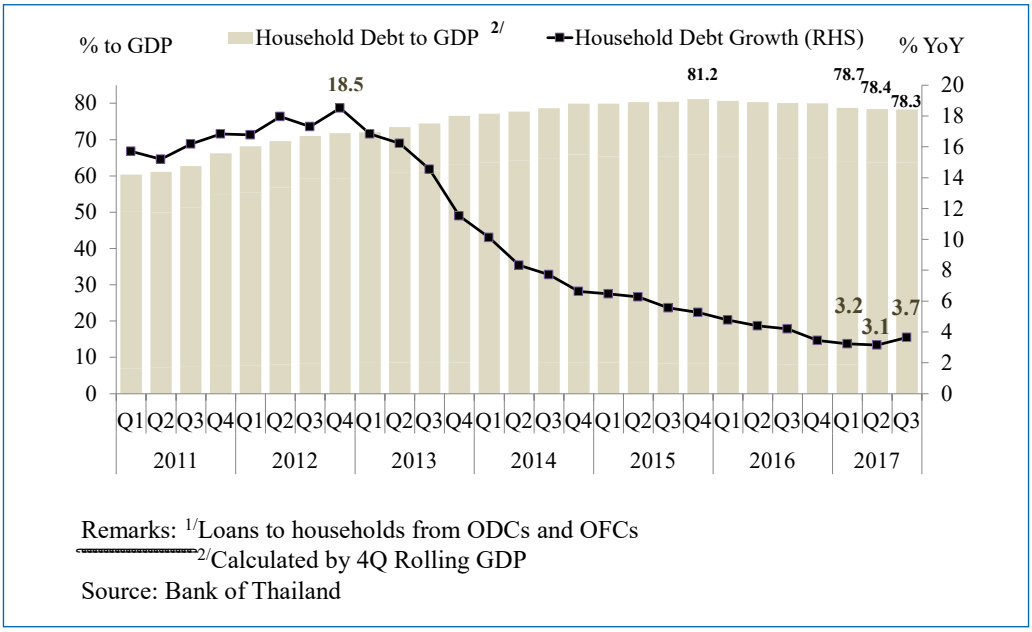
---

1. Monetary Policy Group. E-Mail Address: SuparitS@bot.or.th; KaninP@bot.or.th

We would like to thank Jaturong Jantarangs, Don Nakornthab, Yunyong Thaijaroen, Cheerapan Olanthanasate and Sra Chuenchoksan for helpful comments and suggestions. Comments from participants at the International Conference on Household Debt in SEACEN Economies are also appreciated. We are also thankful to National Statistical Office and Data and Statistics Division, Bank of Thailand for their data support. We have also benefited from email correspondence with Maria Teresa Punzi. All remaining errors are ours. The views expressed in this paper are those of the author (s) and do not necessarily represent those of the Bank of Thailand or its policy.

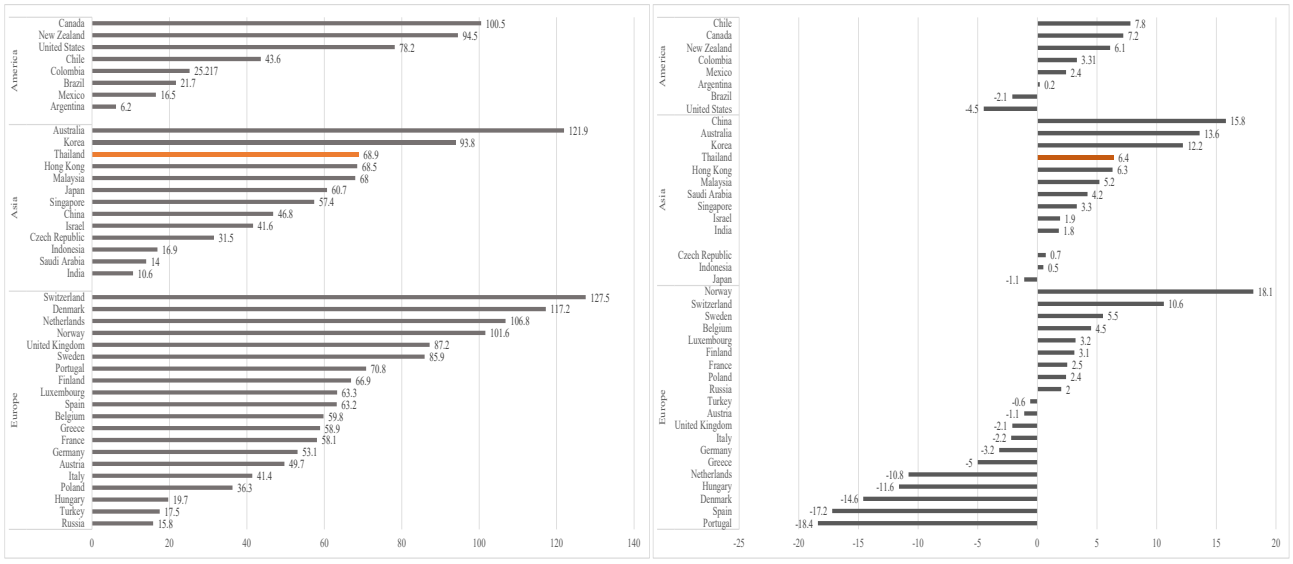
2. Household debt is calculated from the individuals' or households' loans outstanding (overdrafts, general loans, non-negotiable bills and investments in account receivable) with financial institutions. The financial institutions include ODCs (Other Depository Corporations) and OFCs (Other Financial Corporations):
   1) ODCS include commercial banks (both domestically registered commercial banks, branches of foreign banks and international banking facilities), Special Financial Institutions (SFIs), saving cooperatives and other deposit-taking corporations (finance companies and credit foncier companies)
   2) OFCs include credit card, leasing and personal loan companies, insurance companies, securities companies, asset management corporations, pawnshops and others (Financial Institutions Development Fund, Government Pension Fund, Secondary Mortgage Corporation and Thai Credit Guarantee Corporation).
3. Household debt to GDP ratio is calculated from household debt divided by rolling 4-quarter sum of GDP (the method of calculating GDP by accumulating the sum of gross domestic product at current prices of the past 4 quarters, starting from the reference quarter backwards).
4. Note that the BIS household debt data is different from the Bank of Thailand (BOT) household debt data in three aspects: 1) Borrowers: the BIS data includes households and non-profit institutions serving households (NPISHs), while the BOT data includes only households 2) Creditors: the BIS data includes only domestic ODCs and cross-border banks, while the BOT data includes ODCs and OFCs 3) Instruments: the former includes loans and debt securities, while the latter includes only loans.

Figure 1.1: Thai Household Debt[1]



Remarks: 1/Loans to households from ODCs and OFCs
2/Calculated by 4Q Rolling GDP
Source: Bank of Thailand

Figure 1.2: Household Debt Across Region



Household debt to GDP (%): 2017Q2 | **Change in Household Debt to GDP (%): 2017Q2 – 2012Q4**

Source: BIS

Although Thai household debt has already been seen deleveraging[5] for 7 consecutive quarters since Q4/2015, the debt level remains high and the debt overhang looms large on economic growth. This raises much concern to Thai policy makers on its effect to macroeconomic and financial stability.

5. Deleveraging is defined as a decline in the ratio of household debt to GDP, which is calculated by rolling 4-quarter sum of GDP.

The objective of the paper is to review recent developments and to investigate the household debt problem systematically by understanding its background and characteristics from both macro and granular perspectives. Specifically, the paper attempts to address three main questions. First, how is the situation of household debt literally? Second, how is the relationship between rising household debt and private consumption? And last but not least, what policies/measures have been implemented to address the problem?

To answer these questions, the paper analyses both macro (administrative) and micro (household surveys) data. At the macro perspective, the paper mainly uses the data collected from financial institutions reporting to the Bank of Thailand (BOT). The aggregate analysis shows the development and types of loans behind the rising household debt. This also includes the household debt serviceability from the non-performing loans (NPLs).

The aggregate analysis, however, lacks the details on characteristics of each household/borrower. There is a potential danger of basing the conclusion solely on macro findings. To fill in the gap left out by the aggregate analysis, the household surveys step in to address the heterogeneity of households, i.e., each household has its own characteristics and cannot be treated or looked upon uniformly. The household surveys also include the informal sector, which plays an important part in financial system.

The rest of the paper is organized as follow. Section 2 takes a comprehensive look at the household debt situation in Thailand from both macro- and micro-level analyses. Section 3 presents the relationship of household debt and private consumption. Section 4 investigates what Thai policy makers have done to mitigate the problem. Section 5 concludes.

2. Overview on Thailand's Household Debt

The household has been an important actor in the Thai economy and financial system. This can be seen by household credit which is a larger proportion out of total private credit, than business credit[6]. Similarly, on the asset side (deposits), the proportion of household deposits is also larger than that of businesses'[7]. If household finance, especially on household debt, becomes problematic, e.g., through the debt-default channel, it could pose risks to the economy and trigger financial turmoil. Therefore, it is essential to understand the household debt situation clearly.

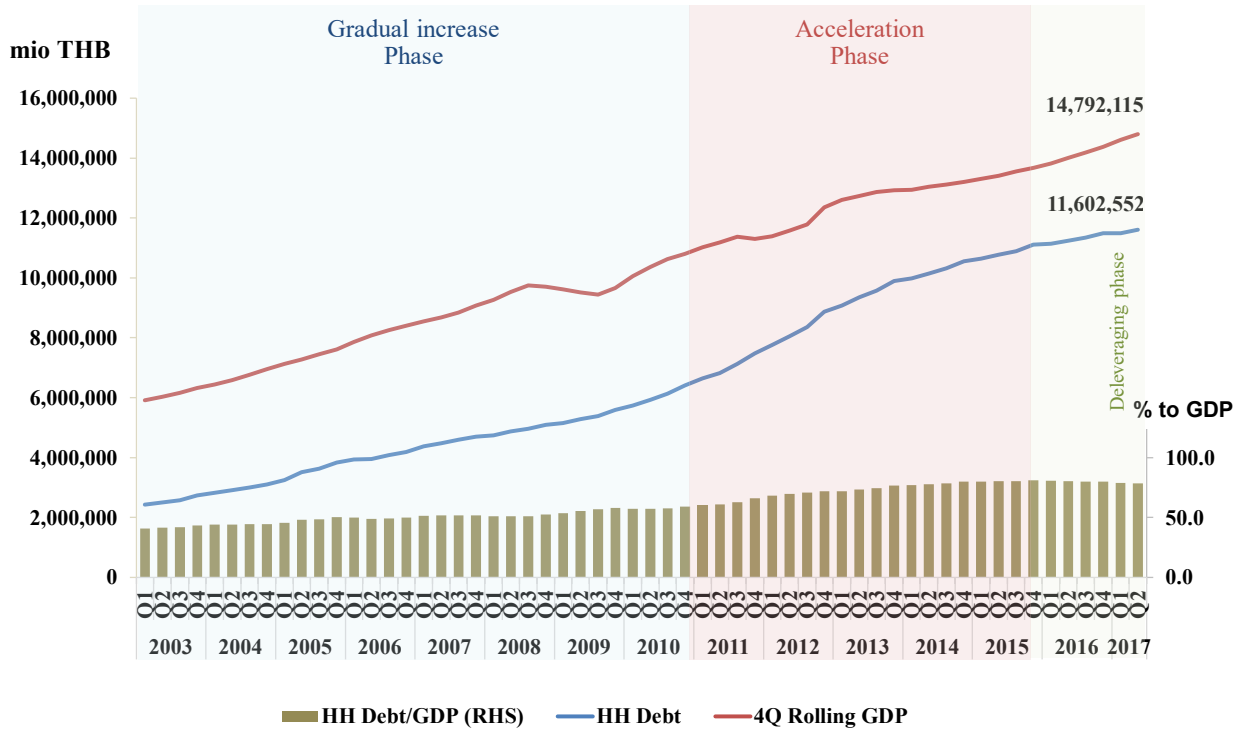
2.1 Macro Perspective

It is common to see a circumstance where household loans grow in parallel with the economy[8]. According to the data collected from financial institutions reporting to the BOT, from the earliest available data (Q1/2003) to Q3/2011, Thai household loans have been slowly growing alongside GDP, which resulted in a gradual increase in the ratio of household debt to GDP (Figure 2.1, gradual increase phase)[9].

6. Private credits consist of two sectors: household/consumer (61.8% as of Q2/2017) and business/non-financial corporations (NFC) loans (38.2% as of Q2/2017).
7. Calculated from the sum of deposits in Other Depository Corporations (ODCs) from the BOT data.
8. The household loan can be used interchangeably with consumer loan which is a part of private credit.
9. Many analysts use the debt-to-GDP ratio in place of the debt-to-income ratio because GDP data are comparable across countries and available in advance of household disposable income data. However, the use of GDP instead of household disposable income might not reflect households' financial adjustments, especially when the ratio of household disposable income to GDP changes significantly.

However, since Q3/2011, the household debt began to accelerate significantly due to several reasons, ranging from the first-time car buyer scheme[10], the great flood during 2011–2012, to a surge in agricultural prices due to both global price cycles and government subsidies which raised farmers' income expectations. The debt surge was also spurred by the low interest rate environment following the global financial crisis. This growth in household debt had far exceeded the growth of income which resulted in the rapid increase of household debt to GDP, reaching a peak of 81.2% in Q4/2015 (Figure 2.1, acceleration phase). However, household debt leveled off and has slowed down since Q1/2016, when the household debt to GDP ratio decreased from the peak to 78.3% in Q3/2017 (Figure 2.1, deleveraging phase).

Figure 2.1: Household Debt and Economic Growth



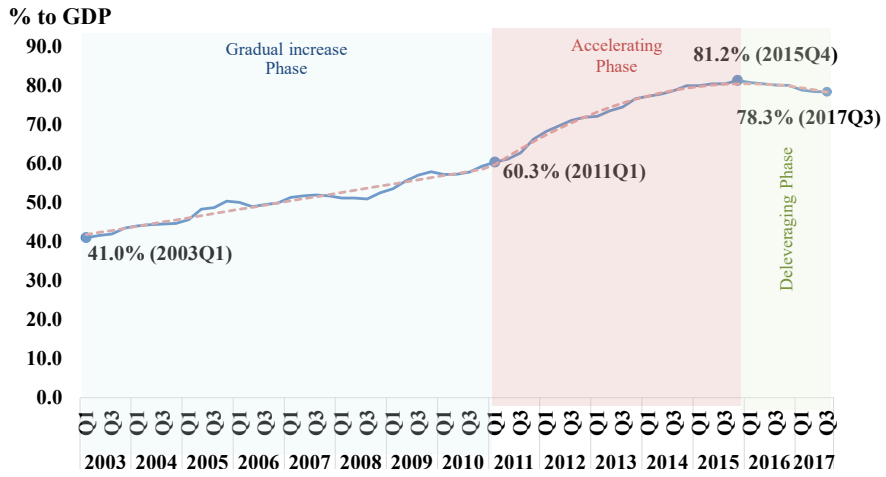
Source: Bank of Thailand

The debt deleveraging, a reduction in debt relative to GDP, slowly took place (Figure 2.2, orange line) with economic growth outpacing loan growth.[11] This is reflected in a higher contribution of nominal GDP relative to contribution of debt creation (Figure 2.3, blue line above black line). This deleveraging phenomenon occurs when household debt accumulation relative to income accelerates to certain levels, at which the households are constrained by ability to service debt. Households, therefore, have to adjust their financial positions which marks the beginning of debt deleveraging.

10. An excise tax rebate, 50,000 – 100,000 Thai baht, for first-time car buyers. This policy was enacted from September 2011 to December 2012.

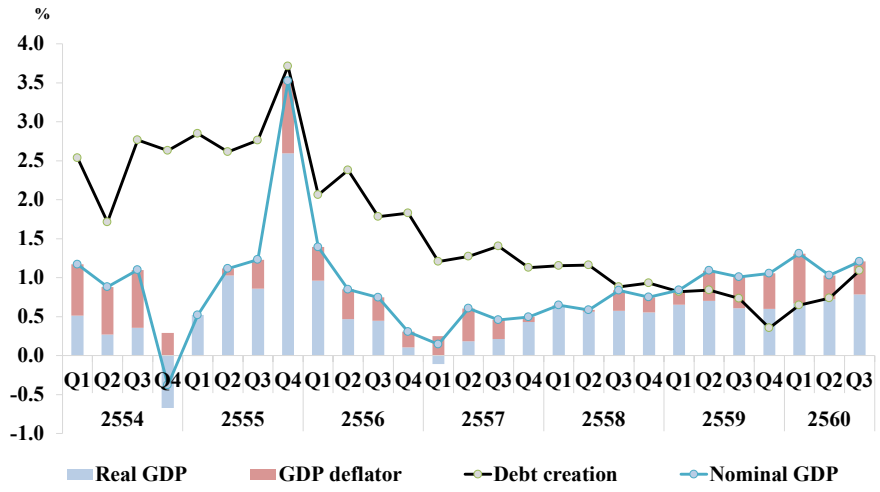
11. Deleveraging occurs whenever loan growth is outpaced by income growth—regardless of whether loan growth is faster, stable, or slower than in the past.

Figure 2.2: Household Debt to GDP



Source: Bank of Thailand

Figure 2.3: Contribution to Change in Household Debt to GDP



Remarks: For comparison purpose, contribution of nominal GDP (blue Line) has been changed from negative to positive territory (normally, contribution to growth of nominal GDP is negative to the ration).

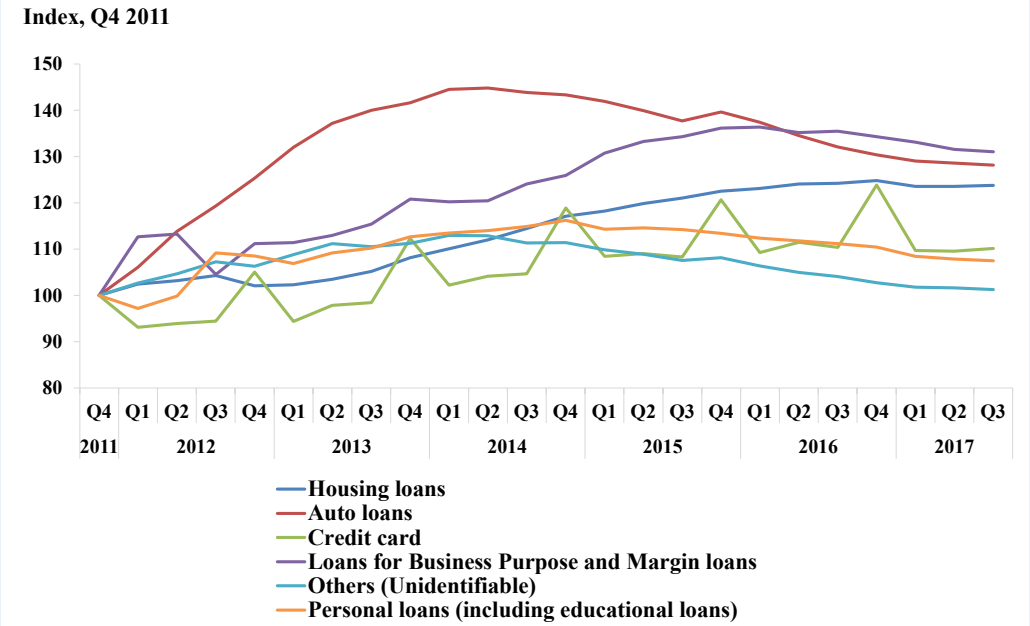
* Contribution is calculated from seasonally adjusted data

Source: Bank of Thailand

It is worth noting that debt deleveraging can take various forms. One way is through debt reduction, which usually occurs following an economic crisis originating from asset price bubbles in the real estate sector or other financial stability issues. As such, this leads to a pronounced decline in credit extension and an extreme debt deleveraging. This is not the case for Thailand, which saw a gradual deleveraging process following a debt acceleration. This gradual process would yield benefits in the long-run because households' adjustment would alleviate financial vulnerabilities and strengthen their balance sheets. As a result, risks to financial stability would be reduced and consumption would once again become an important economic growth driver.

Considering the types of loans, this deleveraging process was particularly apparent in auto loans (approximately 10% share of household loans) given the end of loan contract terms under the first-time car buyer scheme. Housing loans (the largest share of household loans) and loans for business purpose (approximately 20% share of household loans) exhibited a relatively slow deleveraging pace because such loans still continued to expand (Figure 2.4).

Figure 2.4: Index of Household Debt to GDP (by types of loan)

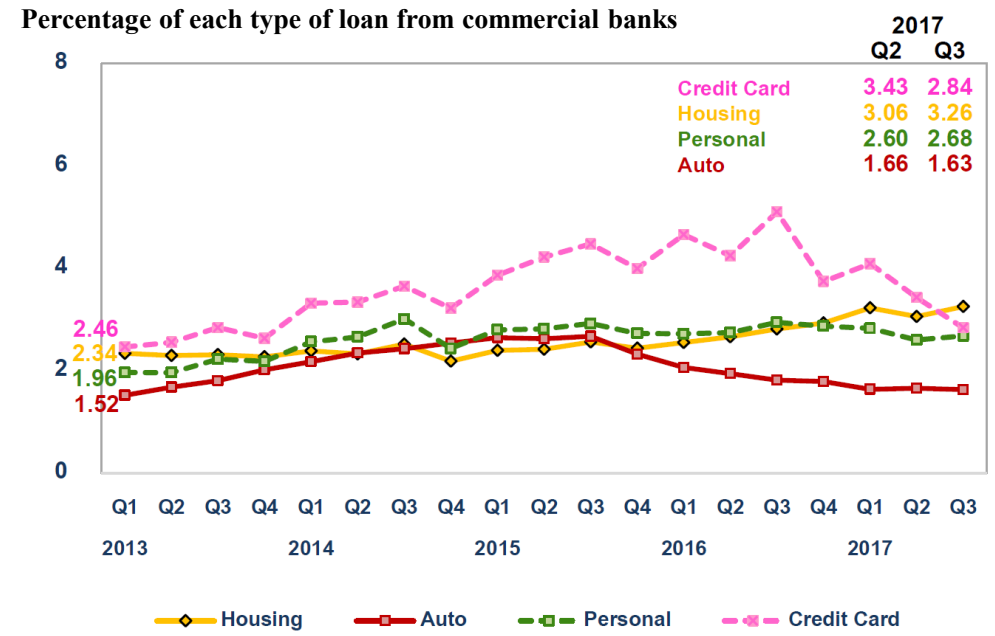


Source: Bank of Thailand

The debt level itself may not clearly explain how the household debt situation is without considering household's ability to service its debt. As reflected in the non-performing loans (NPL ratios)[12], the aggregate data shows that the household debt serviceability deteriorated mainly from the housing loans (Figure 2.5).[13] The NPL ratio for total consumer loans rose to 2.74% in Q3/2017 from 2.66% in the previous quarter. This signifies the vulnerability of Thai households, though the household debt to GDP ratio has leveled off.

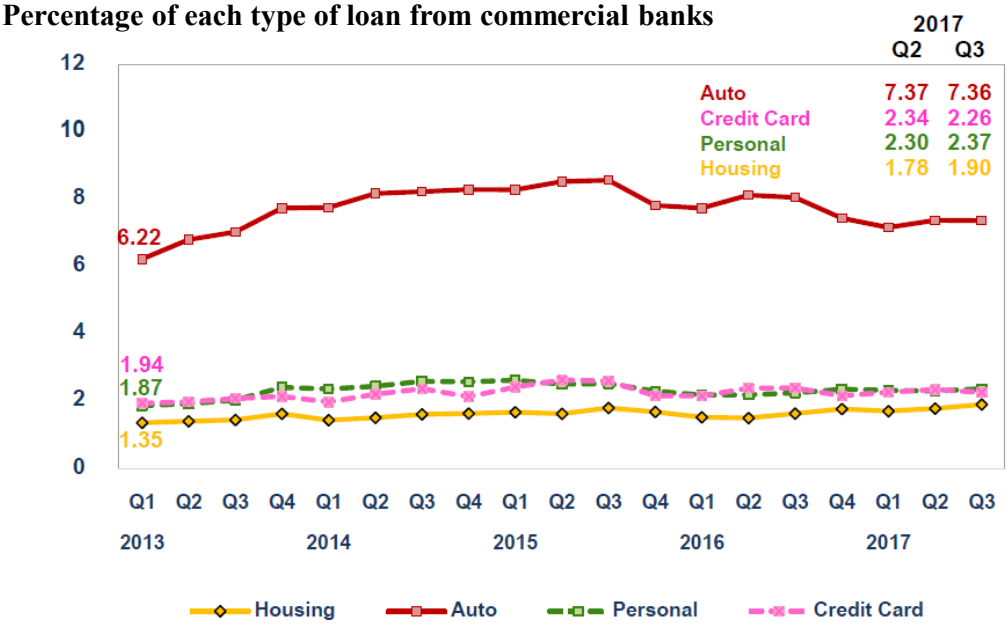
12. The NPL ratios are collected and calculated from the Thai banking system (latest data as of Q3/2017). Thai banking system includes commercial banks, foreign branches of Thai commercial banks, full branches (foreign branches of Thai banks), subsidiaries (foreign banks registered in Thailand), retail bank. Unlike the household debt data, the Other Financial Corporations (OFCs) are excluded from NPL ratios' calculation.
13. Though the special mentioned loans (SM) ratio is relatively constant (Figure 2.6)

Figure 2.5: Household Non-performing Loans



Source: Bank of Thailand

Figure 2.6: Household Special Mentioned Loans

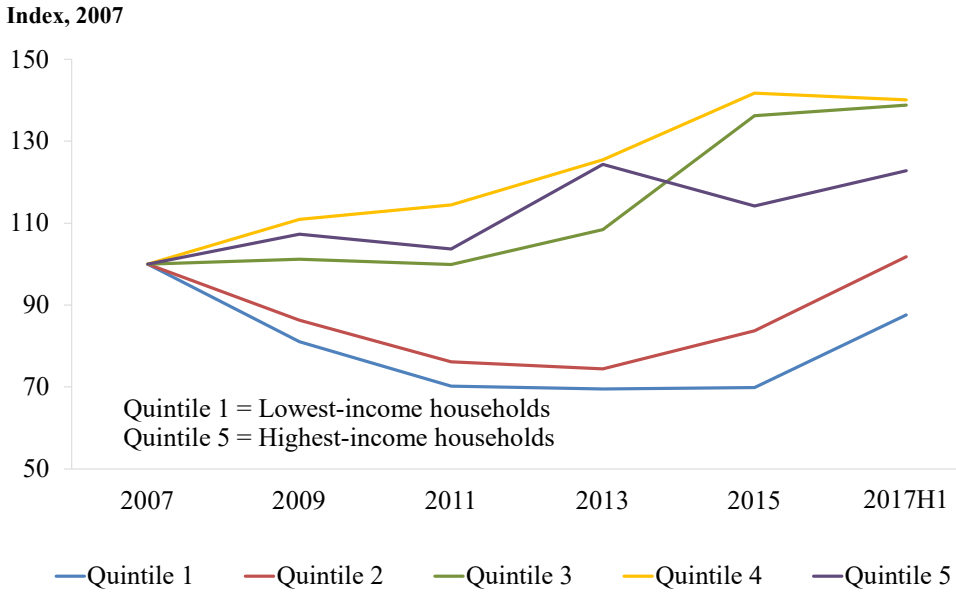


Source: Bank of Thailand

2.2. Micro Perspective

As mentioned previously, the Thai household debt to GDP ratio has been gradually decreasing for 7 consecutive quarters. The macro picture, however, might be misleading in the context of the current situation. Looking closely at a more granular level, the deleveraging process is not seen to be broad-based. According to the Household Socio-Economic Survey (SES)[14], deleveraging was evident among some high-income households (4th quintile in Figure 2.7) and some households in Bangkok and Central Region (Figure 2.8). This was primarily due to a decrease in debt while income was broadly unchanged. Meanwhile, low-income households and households in other regions continued to leverage further since 2015, owing to debt acceleration while income was largely unchanged or increased slightly.

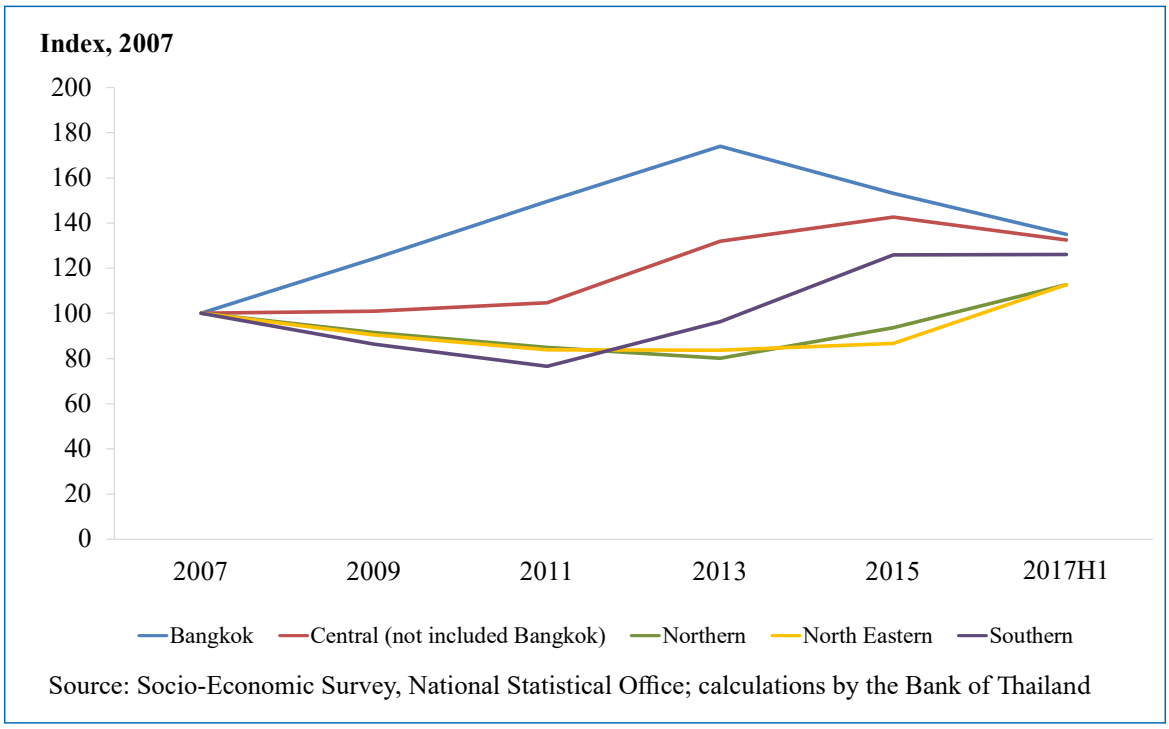
Figure 2.7: Index of Household Debt to Annual Income Ratio Across Income Groups (Median)



Source: Socio-Economic Survey, National Statistical Office; calculations by the Bank of Thailand

14. This annual data (with the exception of 2017 which is semi-annual data) were collected by the National Statistical Office based on a sample size of approximately 52,000 households. In Figure 2.6 and 2.7, data were from 2007 to 2017H1. Income data were available every other year.

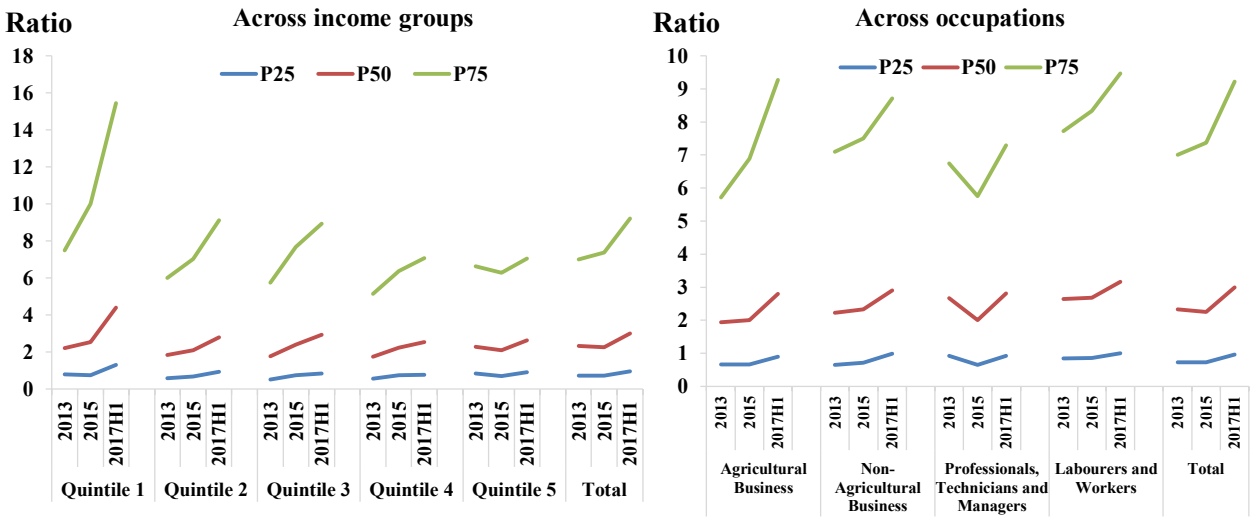
Figure 2.8: Index of Household Debt to Annual Income Ratio Across Regions (Median)



Source: Socio-Economic Survey, National Statistical Office; calculations by the Bank of Thailand

In addition, the worsening debt serviceability of Thai household is pronounced by the granular data. The SES shows that Thai households are more fragile due to its decrease in financial cushion/ buffer, exhibited by a sharp rise in the ratio of household debt to financial assets (or savings) across both income groups and occupations (Figure 2.9).

Figure 2.9: Debt to Financial Assets Ratio



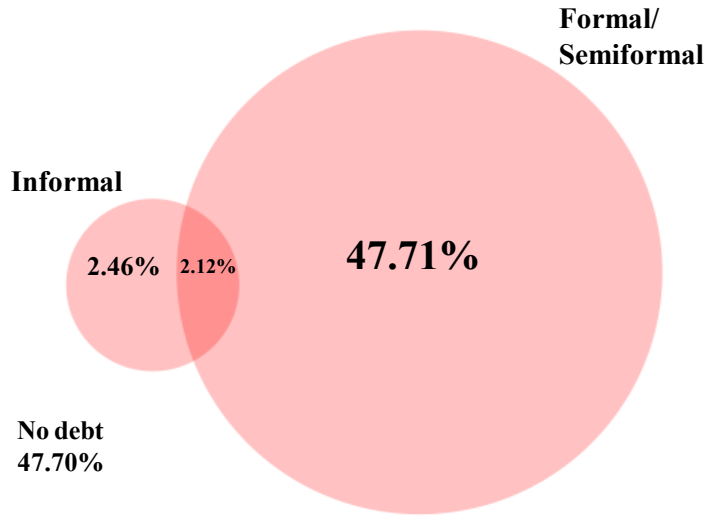
Remarks: Calculated from only indebted households

1/ Income groups are segregated by income per capita; Quintile 1 = lowest monthly income per capita, Quintile 5 = highest monthly income per capita

Source: Socio-Economic Survey, National Statistical Office; calculations by the Bank of Thailand

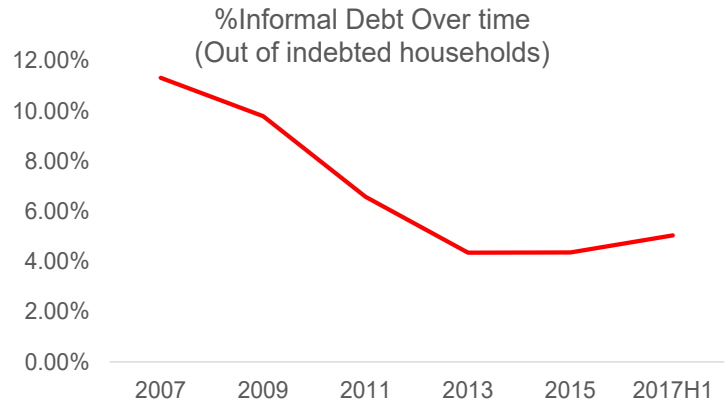
Nevertheless, regarding household debt profile, the micro data found that indebted households are largely concentrated in formal and semiformal sectors[15], while only a small portion is in the informal sector (Figure 2.10). Indebted households also tend to decrease its informal debt overtime (Figure 2.11). This somewhat alleviates policymakers' concerns on the problem of loan sharks/money lenders who might charge interest rates exceeding the level indicated by law[16].

Figure 2.10: Household Debt Profile
(As of Q2/2017)



Source: Socio-Economic Survey, National Statistical Office; calculations by the Bank of Thailand

Figure 2.11: Development of Informal Debt Sector



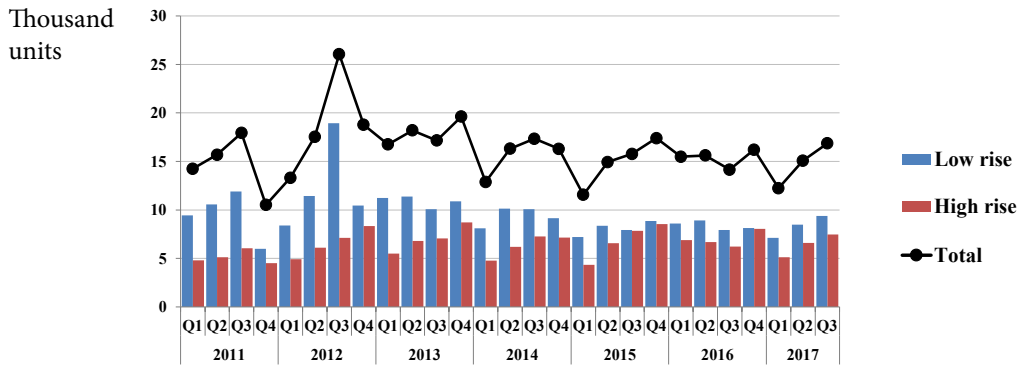
Source: Socio-Economic Survey, National Statistical Office; calculations by the Bank of Thailand

15. This paper segregates debt sectors into 3 groups: 1) formal sector (commercial banks, SFIs, other depository corporations); 2) semi-formal sector (saving cooperatives, village funds); and, 3) informal sector (individuals, loan sharks, ROSCA)
16. The Civil and Commercial Code Section 654 indicates that interest shall not exceed 15% per year; when a higher rate of interest is fixed by the contract, it shall be reduced to 15% per year.

Special Issue: Thai Housing Market

The largest share among Thai household loans is taken by housing loan due to its relatively high value and importance in meeting one of the basic human needs. It is, therefore, necessary to understand the market of its underlying asset, i.e., Thai housing sector, including its current situation and ongoing concerns.

Figure I: Residential Units in Bangkok and its Vicinity with Approved Mortgage by Commercial Banks

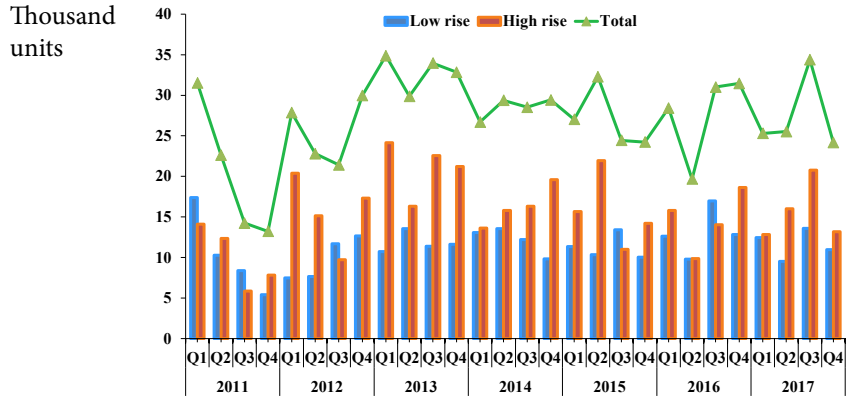


* Average during 2010-2016, excluding periods with government's stimulus measures (Nov 2015-Apr 2016)

Source: Bank of Thailand

As of the end of 2017, the Thai housing market exhibited strong fundamentals. Demand in residential real estate continued to rise in accordance with an overall economic recovery. This is reflected in a continuing increase in the number of residences financed by newly approved housing loans in Bangkok and its vicinity (Figure I). On the supply side, real estate developers attempted to meet the demand by both selling the completed units and launching new projects, as shown by the number of new residential projects in Bangkok and its vicinity (Figure II). The overall financial position of the developers, specifically the SET listed companies[17], also remained solid, evident in the ability to generate profit and service its debt.

Figure II: New Residential Projects Launched in Bangkok and its Vicinity

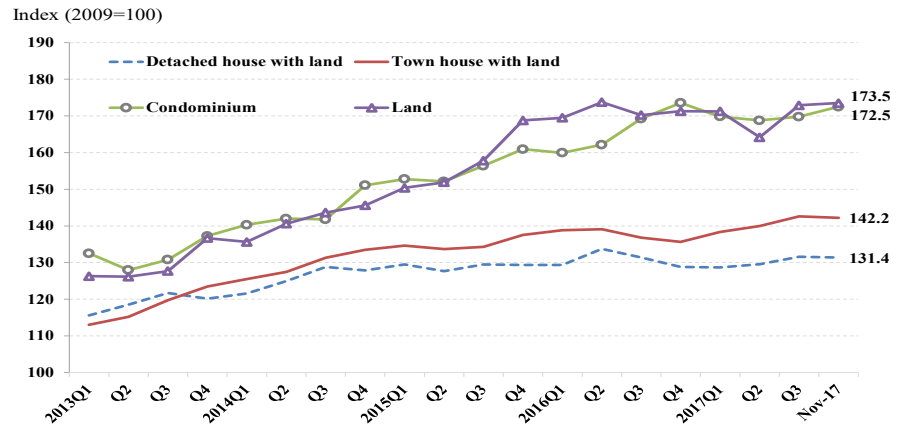


Source: Agency for Real Estate Affairs (AREA), calculated by Bank of Thailand

17. The companies listed in the Stock Exchange of Thailand (SET)

Residential real estate prices gradually rose in tandem with the continuously increasing costs of land prices (Figure III). This partly contributes to the growing value of housing loans over time. Looking forward, the BOT estimated that the risk of having housing price bubbles is limited since: i) there is still the remaining supply of housing units, especially condominiums, and ii) commercial banks continue to maintain its strict lending standard in providing housing loans to both pre-finance (developers) and post-finance (residences).

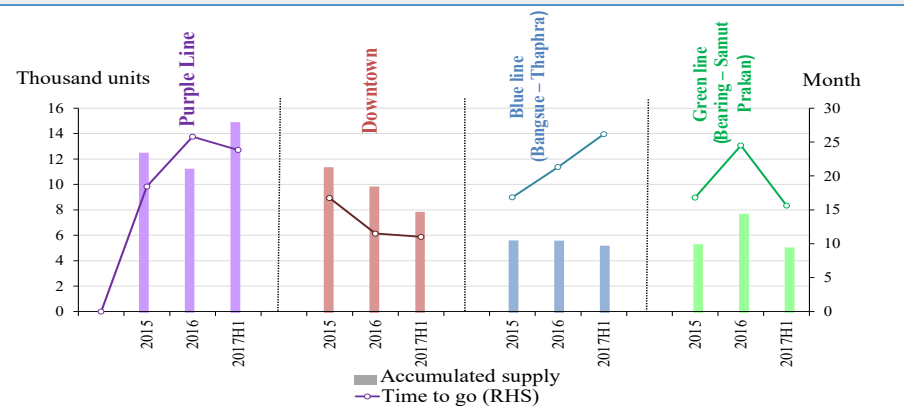
Figure III: Real Estate Price Indices



Source: Bank of Thailand

However, despite the strict lending standard, it would be worth monitoring the declining quality of post-finance housing loans, as reflected in the rising NPL ratio.[18] Also, the potential rise of unsold units in some areas and certain price ranges should be constantly assessed. For instance, condominium units along the Purple Line Train[19] with the price range of one to three million baht and the Blue Line Train with the price range of two to five million baht (Figure IV). If the developers, whose financial position is affected by the unsold units, fail to service or roll over their debt, this would have an impact on investor confidence and financing costs of businesses in the real estate sector as a whole by means of affecting investor confidence in the financial market.

Figure IV: Condominium Inventory in Bangkok and Vicinity by Location



Note: 'Time to go' is the time length that all housing inventory will be sold out, using the average sale rate since projects launched
Source: AREA and calculation by the Bank of Thailand

18. As already mentioned in Figure 2.5
19. The extension of the Sky Train line currently constructed in Bangkok and its vicinity

3. Household Debt Impact on Private Consumption

As discussed earlier, though a gradual deleveraging process has occurred, the household debt level is still high. This has raised a concern for policy makers especially on whether this household indebtedness will become a major constraint for consumption and future economic growth. This section therefore aims to examine how the debt overhang that Thailand has experienced over the past several years affect household spending.

3.1 Literature Review and Theoretical Framework

Recent papers by the International Monetary Fund (IMF) and Bank for International Settlements (BIS) observe that, in the short-run, an increase in borrowing props up economic growth and keep unemployment down. However, after a while, these gains are reversed. The results are consistent with various other studies. Economists such as Mian and Sufi (2013) have noted that areas with high household debt saw relatively poorer economic performance during the global financial crisis. Dynan (2012) also found that US mortgagors with high Loan-to-Value (LTV) ratios pre-crisis, subsequently experienced larger declines in spending. Others have suggested that households became more debt-averse, leading to consumption cutbacks among the most indebted households.

3.2 Nature and Definition of Data

For this study, we mainly use the dataset from the Household Socio-Economic Survey (SES) collected by the National Statistical Office (NSO) of which some of the stylized facts were highlighted in the earlier section. The research captured the data for a 10-year horizon from 2007 to 2017 (the first half of the year)[20], which covers the period before and after the global financial crisis. This should shed light on the role of the household leveraging pattern more explicitly. The necessary variables include monthly income, expenditure, asset, debt, and household characteristics. We then constructed an unbalanced panel data of 76 provinces in Thailand. Thus we are able to observe income and spending across all areas in a high frequency setting. In addition, care had also been taken to eliminate or control abnormal observations and reweigh sample households by demographic characteristics and location to ensure no outlier has influenced our estimation (the Summary Statistics is provided in Table 3.1).

There are several reasons why it is worthwhile to examine the relationship of household debt and consumption by the micro-level data. Firstly, these granular data, which covers around 52,000 households across the country, provide sufficient cross-sectional variation. This allows us to determine the changing consumption behavior between periods which cannot be seen by aggregate data. Secondly, measuring impact across household groups with different characteristics, such as low and high debt-service ratio (DSR)[21], could mitigate the simultaneity issue between consumption and income that plagues macro-level analysis. Last but not least, the micro-level data provides additional identification power by exploiting idiosyncratic income and wealth shocks, both of which are arguably exogenous.

20. This annual data (with the exception of 2017 which is semi-annual data) were collected by the NSO based on a sample size of approximately 52,000 households. Income data were available every other year.

21. The debt-service ratio measures the share of income that is used to repay loan principal and interest payment. This ratio is used to determine the difficulty of repayment.

Table 3.1 Summary Statistics from Household Socio-Economic Survey

Variable	Mean	Std. Dev.	Min	Max
Debt	91,625	60,634	13,000	420,000
Consumption	13,306	4,149	3,640	29,303
Income	15,057	5,027	4,243	32,350
Financial Asset	31,624	19,650	5,000	154,000
Age	53	4	38	61
Size of Household	3.1	0.3	2.1	4.1
Debt-service Ratio	0.2	0.1	-	0.4
Debt-to-Income	5.9	2.6	1.3	17.6
Sample: 2007-2017				
Number of Observations: 456				

3.3 Research Methodology

To clarify the relationship between household debt and consumption, this paper performs four types of investigations: (1) baseline model - proceeds to examine the impact of debt on consumption; (2) debt dynamic effect - explore how long the effect lasts; (3) debt endowment effect - investigate how the effect differ between low and high income group; (4) different time episodes analysis - identify the relationship in different time horizons; and, (5) variation in DSR analysis - seek to understand the income elasticity between households which experienced high DSR growth (quartile 3 and 4) versus one with low DSR growth (quartile 1 and 2).[22]

3.3.1 Baseline Model

Despite the importance of understanding the nature of the relationship between the household balance sheet and consumption behavior, clear analysis is often difficult due to both endogeneity and heterogeneity concerns as well as limited data covering the entirety of household finance (both income and spending). For this study, we employ fixed-effect GMM with instrument variables. Thus, we are able to assess the impact of variables (household debt and consumption) that vary over time and counter both problems (endogeneity and heterogeneity). The fixed-effect model allows us to control for variables which cannot be observed or measured, for example, cultural factors or difference in provincial characteristics. Moreover, it also removes the effect of those time-invariant characteristics so that we can analyze the net effect of the predictors on the outcome variable. For our estimation, we apply GMM using deviation from mean, which minimizes certain norm of simple average of the moment conditions measured by the quadratic form below:

$$\hat{\theta}GMM = arg\min_{\theta}(\frac{1}{N}\sum \tilde{z}_{it}(\tilde{y}_{it} - \tilde{x}_{it}'\theta)'W(\frac{1}{N}\sum \tilde{z}_{it}(\tilde{y}_{it} - \tilde{x}_{it}'\theta))$$

where, $\tilde{x}_{it} = x_{it} - \bar{x}_i$, $\tilde{z}_{it} = z_{it} - \bar{z}_i$, $\tilde{y}_{it} = y_{it} - \bar{y}_i$ and W is a weighting matrix.

22. The DSR growth rate is on annual basis from 2011 to 2015. Households are separated into 4 quartiles by annual DSR growth rate.

The main assumption in the model is that lag terms of debt are correlated with debt in the current period, but are not correlated with consumption. The Sargan test was also performed to validate the overidentification of the specification.

3.3.2 Debt Dynamic Effect Model

Reviewing existing literature and general findings - Lombardi et al. (2017), IMF (2017), and Chudik et al. (2016) - all suggest there is a trade-off between the short-term benefits of rising household debt to growth and its medium-term costs to macroeconomic and financial stability. Hence, to clarify the dynamic relationship, lagged variables of debt are added to the equation.

3.3.3 Debt Endowment Effect Model

We next investigate the role of debt in explaining consumption in different income groups by applying the interaction term of debt and income in the following form. The quantitative analysis, therefore, offers important implications on whether low income group household experienced a larger degree of impact or not.

3.3.4 Different Episodes Analysis

To identify the relationship in different time episodes, we run the regression in two separate horizons of 2007-2011 and 2013-2017. With these simple regression coefficients, one can tell how the stylized relationship has changed before and after the onset of the global financial crisis.

3.3.5 Variation in DSR Analysis

Lastly, we seek to investigate the effect between provinces with high DSR growth and one with low DSR growth. We sub-divide 76 provinces into 4 groups based on their increase in DSR. We hypothesize that districts with a larger leveraging degree experienced a slower consumption growth.

3.4 The Effects of Household Debt on Total Consumption

Our empirical results suggest 5 major findings. Firstly, household leveraging play an important part in explaining consumption (Model I, Table 3.2). The coefficient on debt increase is positive and statistically significant at 0.01 level. It implies that holding income growth and other variables constant, an increase in debt by 10 percentage point lead to an increase in total consumption by 0.3%. The coefficient on contemporary income is also large and statistically significant.

Secondly, lag variables are added to derive the longer-term coefficients of the relationship between household debt and total spending (Model II, Table 3.2). It is also clear that a positive debt effect can be observed in the short-run, but high indebtedness could possibly become a constraint for consumption and economic recovery in the medium- to long-term, which is consistent with other studies. For instance, Mian et al. (2012) found that a weakness in household balance sheet caused a fall in the household savings rate and subsequently, more volatility in private consumption.

Thirdly, the effect varies between households with different income endowment (Model III, Table 3.2). The impact is found to be more prevalent for lower-income households. In other words, debt elasticity of the rich is lower than the poor, whereas, income elasticity is higher, and vice-versa. This is perhaps consistent with Chucherd (2006), which suggests that the positive debt effect can

possibly be due to the fact that Thai households, especially the lower-income groups, face liquidity constraints due to the relatively less-developed financial market. Thus, the rising debt level could help smoothen their desired level of consumption.

Table 3.2: Fixed-effect Regression

	Model I	Model II	Model III
Ln (Debt)	0.03***	0.03**	0.43***
Ln (Income)	0.77***	0.74***	1.19***
Ln (Financial Asset)	0.02**	0.02***	0.02***
Ln (Debt) (-1)		0.03**	
Ln (Debt) (-2)		0.05***	
Ln (Debt) (-3)		-0.01	
Ln (Debt) x Ln(Income)			-0.04**
Observation	456	228	455
R-squared	0.86	0.65	0.86
Sargan Stat	0.99	0.76	0.40

Note: *, **, *** indicate the coefficients are significant at 10, 5, and 1 percent significance levels respectively.

Source: NSO, Staff's estimate.

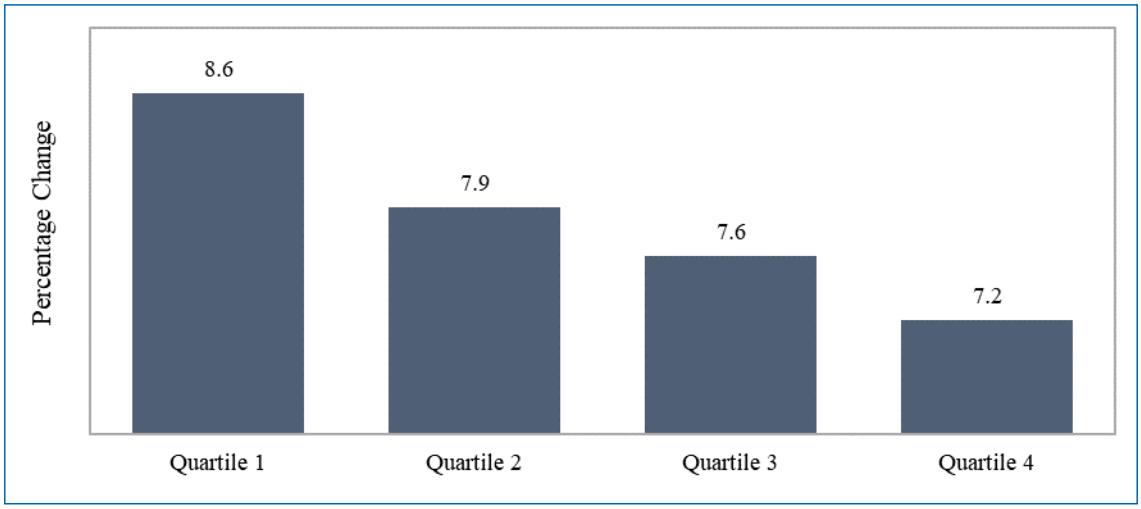
Fourthly, the magnitude of the debt effect in 2007-2011, and 2013-2017 were 0.06 and 0.03 respectively (Table 3.3). The predicted coefficient of debt on consumption has slightly declined in the last 5 years, suggesting the incremental change in the debt level has played little role in determining consumption. In the prior period, household may have ramped up spending beyond the actual movement in income and wealth, and then consumed during the recovery as household debt started to slow.

Table 3.3: Magnitude of Debt Effect Across Horizon, 2007-201

	GMM	Fixed effect	2007-2011	2013-2017
Ln (Debt)	0.03***	0.04***	0.06***	0.03***
Ln (Income)	0.77***	0.76***	0.73***	0.79***
R-squared	0.86	0.83	0.76	0.60

Finally, by subdividing households into 4 quartiles by DSR growth, households in the 4th quartile (with highest DSR growth) experienced a larger decline in spending during 2007 to 2017. For instance, an income growth of 10% yields an average consumption growth of only 7.2%. On the opposite side, for households in the 1st quartile (with lowest DSR growth), a 10% rise in income yields an average consumption growth of 8.6%. The results are pretty much the same as Muthitacharoen et al. (2014), which suggest that the overstretched balance sheets of households started to cripple consumption as households become more financially constrained.

Figure 3.1: Predicted Mean of Total Consumption Growth



In sum, household debt boosts consumption in the short-run mostly within 2-4 years and an increase in debt by 10% leads to an average consumption growth of 0.3%. On the contrary, the trend seems to reverse in the medium- to longer-run. We also find that the impact to consumption varies across income groups, and different time episodes.

4. Policy Implementation

The BOT has been aware of the household debt situation which might create a problem of debt overhang, the major obstacle to the household consumption and economic growth. Although Thai households have started to adjust their financial positions, which results in the deleveraging of household debt to GDP ratio for seven consecutive quarters, assuring smooth deleveraging process is crucial. The policies that have been implemented can be divided into 2 groups: comprehensive measures on household debt cycle and macroprudential policies.

4.1 Comprehensive Measures on Household Debt Cycle

The household debt cycle can be segregated into 3 phases: pre-debt, at-debt-issue, and in-debt. The BOT aims to tackle the debt problem at every phase by taking both holistic and granular approaches in formulating appropriate policies.

With respect to the pre-debt phase, financial literacy is vital. Financial literacy is an abstract concept which reflects financial knowledge, the behavior and attitudes necessary for making sound financial decisions and promoting good financial health. Households need to understand how to manage their personal finance effectively in order to have a sustainable financial position, ranging from the knowledge on types of loans to balance sheet management. The BOT has set up the so-called Financial Consumer Protection Center (FCC) since January 2012 with aims to systemically enhance its financial consumer protection mandate, particularly for promoting financial literacy for the Thai people. This would prevent the risk of household over-indebtedness and loan default by strengthening the very foundation –household financial literacy.

In the at-debt-issue phase, responsible lending is an important principle for financial institutions that the BOT has been promoting via its microprudential supervision. The financial institutions need to clearly explain details on any financial product they are proposing to customers, including the

risks customers need to face. Moreover, the financial institutions need to assess customers' financial position thoroughly. In so doing, the customer will be granted a credit limit suitable for his financial health and which would enable him to repay his debt in the future.[23]

Lastly, during the in-debt phase, if any eligible household enters into a situation of financial distress and could not repay a debt after more than 90 days, i.e., having obtained the NPL status, they may seek assistance from the "Debt Clinic", which is a collaboration between the BOT, Association of International Bank (AIB), Thai Bankers' Association, as well as Sukhumvit Asset Management (SAM). The Debt Clinic, established since June 2017, provides a debt relief program[24] with the principle of sustainable resolution. For the participants in the Debt Clinic, financial literacy is an important part to ensure the success and sustainability of the debt restructuring program and to prevent moral hazards which may occur in the eligible households.

4.2 Macroprudential Policies

The use of macroprudential policies has long been used in the Thai financial sector. Over the past decade, the BOT, as the country's financial stability safeguard, has implemented various macroprudential measures. It uses the measures to mainly tackle the household debt problem and to contain risk build-ups in specific sectors, e.g., housing market and consumer credit, by using the Loan-to-value (LTV) and Loan-to-income (LTI) measures, respectively.

Since 2003, a variety of LTV measures targeted at the housing market have been implemented with different degree of constraints (Table 4.2.1). From a strict ceiling on the LTV ratio to greater risk weights on high LTV mortgages with variation on the types of property and the property value, the measures were found to be effective in moderating housing credit growth as mentioned by Pongsaparn et al.(2017).

Table 4.2.1: Loan-to-value Measures

Year	Details
2003	Imposing a 70% LTV limit on high-value residential properties (≥ 10 million THB)
2009	**High-value mortgages (≥ 10 million THB):** Increasing LTV limit for high-value mortgage from 70 to 80% and imposing higher risk-weighted capital charge of 75% for loans with LTV greater than 80%, otherwise risk-weighted capital charge of 35%
2011	**High-rise property (< 10 million THB):** Imposing risk-weighted capital charge of 75% for loans with LTV greater than 90%, otherwise risk-weighted capital charge of 35%
2013	**Low-rise property (< 10 million THB):** Imposing risk-weighted capital charge of 75% for loans with LTV greater than 95%, otherwise risk-weighted capital charge of 35%

Source: Bank of Thailand.

23. This is in line with the macroprudential measures on credit card and personal loan discussed in Section 4.2
24. The debt relief program is eligible for any individual who 1) has permanent income 2) is not exceeded 65 years old at the time of entering the program 3) has the NPL status of credit card or personal loans (before 1 May 2017) with more than 2 banks participating in the program 4) has the outstanding amount of all loans not exceeding 2 million THB and 5) is not sued or under litigation.

In addition, Thailand also has macroprudential measures on credit cards and personal loans in the form of LTI (the value of loans is capped at certain level) and the minimum monthly payment (Table 4.2.2). With its characteristics of easy-to-access, such loans may weaken the financial well-being of people which may lead to over-indebtedness and loan default, especially of low-income earners. The BOT, therefore, revised regulations on credit cards and personal loans such as granting a credit line based on the level of income to ensure that the amount of debt does not to exceed their ability to repay, especially in the segment that is vulnerable to over-indebtedness. Regarding the latest measures in 2017, it is to target the lower-income segment and the credit line will apply only to new consumers applying for credit cards and personal loans from the effective date of the notification onwards.[25]

Table 4.2.2: Credit Card and Personal Loan Measures

Year	Details
2004	**Credit card measure:** Increasing the minimum monthly payment from 5% to 10%; setting a minimum income for credit card holders to at least 15,000 THB per month; setting a combined credit line limit for every credit card provider to no greater than five times the average monthly income; and requiring the cancellation of a credit card after three months of nonpayment on an outstanding balance
2005	**Personal loan measure:** Setting overall credit limits to no greater than five times the average monthly income
2017	**Credit card measure:** Lowering a credit line limit for credit card holders with monthly income lower than 50,000 THB per month – from 5 to 1.5 times the average monthly income times (if card holders' monthly income is less than 30,000 THB per month) and to 3 times (if card holders' monthly income is between 30,000 – 50,000 THB per month)
2017	**Personal loan measure:** Lowering a credit line limit for personal loan borrowers with monthly income lower than 30,000 THB per month – to 1.5 times the average monthly income with restrictions on the number of personal loan providers not to exceed three companies

Source: Bank of Thailand.

25. In this case, the effective date is from 1 September 2017 onwards.

5. Conclusion

Thai household debt has been in the spotlight since it was ranked among the top and fastest rising in the region. The situation, however, has somewhat alleviated, as a gradual deleveraging has taken place for seven consecutive quarters. Nonetheless, Thai households remain vulnerable due to the high level of household debt and weakening prospect of debt serviceability.

The relationship between household debt and private consumption also confirms that a rise in the household debt-to-GDP ratio is associated with an increase in private consumption, in the short-term, although the relationship is reversed in the medium- to long-term.

Therefore, the current deleveraging process which is taking place in a gradual and measured manner would mitigate the risk of economic recession and yield long-run benefits. The resultant adjustments of households would alleviate financial vulnerabilities and strengthen their balance sheets. In order to support the smooth deleveraging process, Thai policy makers have implemented comprehensive measures for household debt management, including macroprudential policy in complement with microprudential supervision.

References

Bank of Thailand, (2017), Financial Stability Report 2017.

Chucherd, T., (2006), "The Effect of Household Debt on Consumption in Thailand," *Bank of Thailand Discussion Paper*, No. 1/2006.

Dynan, K., (2012), "Is a Household Debt Overhang Holding Back Consumption?" *Brookings Paper on Economic Activity*, Spring, pp. 299-362.

Dynan, K. and W. Edelberg, (2013), "The Relationship between Leverage and Household Spending Behavior: Evidence from the 2007-2009 Survey of Consumer Finance," *Federal Reserve Bank of St. Louise Review*, September/October, pp. 425-448.

IMF, (2017), "Household Debt and Financial Stability," Financial Stability Report, Chapter III, October, pp. 46-73.

Lombardi, M.; M Mohanty and I. Shim, (2017), "The Real Effects of Household Debt in the Short and Long Run," *BIS Working Papers*, No. 607.

Mian, A.; K. Rao and A. Sufi, (2013), "Household Balance Sheets, Consumption and the Economic Slum," *Quarterly Journal of Economics*, Vol. 128, No. 4, pp. 1687-1726.

Muthitacharoen, A.; P. Nuntramas and P. Chotewattanakul, (2014), "Rising Household Debt: Implications for Economic Stability," Bank of Thailand Research Symposium 2014.

Ogawa, K. and J. Wan, (2005), "How Does Household Debt Affect Consumption? Evidence from Micro Data," Osaka University, Institute of Social Economic Research.

Pongsaparn, R.; W. Wongwachara and R. Nudam, (2017), "Macroprudential Policy: Its Role, Effectiveness and Interaction with Monetary Policy," *Focused and Quick (FAQ)*, Issue 121.

Thaicharoen, Y.; K. Ariyapruchya and T. Chucherd, (2004), "Rising Thai Household Debt: Assessing Risks and Policy Implications, Bank of Thailand Research Symposium 2004.

Chapter 8

HOUSEHOLD DEBT IN VIETNAM: AN OVERVIEW

By

Le Phu Loc, Ngo Thi Huyen Linh, Tran Le Hoang An,
Truong Hoang Diep Huong, Can Thi Thu Huong,
Vu Thi Kim Chi and Nguyen Thanh Huyen

Introduction

Over the past two decades, household borrowings worldwide has increased significantly, both in absolute terms and relative to household income, reaching record levels. Such sudden growths in household debts have received much attention on account of its important macroeconomic and financial implications. In developing market economies, the delivery of financial services has advanced, albeit with large differences in access. Some programs may also have led to an oversupply of credit and may be responsible for unproductive investments which may have resulted in levels of indebtedness exceeding the repayment capacity of households. This, in turn, could weaken the social and economic well-being of households and result in financial distress. Therefore, we analyze empirically the behavior of household loans and how they react to changes in macroeconomic conditions and housing prices to shed some light on the nature of the recent debt increase and its implications for measures to reduce financial vulnerability.

The outline of the paper is as follows. First, we discuss the relevance of household financial conditions for macroeconomic stability by explaining the links between household debts and a number of determinants in view of some stylized facts and on the basis of the theoretical literature. The second section provides an overview of macroeconomic and monetary policy in Vietnam over the period from 2000 to 2016. Then, in the third and fourth section, we conduct event analysis and discuss some data related to household debt in terms of its performance and linkage with macroeconomic factors in Vietnam. A close examination into the housing market in Vietnam and its relationship with household debt is depicted in the fifth part and finally, a few tentative conclusions are offered.

1. Literature Review

Since the 1990s, a number of studies have been conducted with a focus on the topic of household debt analysis. Former studies assumed and established models for measuring the impact of interest on household loans. Later studies with more data revealed deeper analyses of household debt structures in relation to macroeconomic factors such as monetary policy, gross domestic product (GDP) or consumer price index (CPI). The most remarkable ones are the following researches.

Mian and Sufi (2011) studied the way in which home borrowers respond to house price increases and then investigated the debt channels based on the equity of the owner using a set of data including personal credit information from the U. S. national consumer credit bureau. The real impact of home loans depended on what the householders did with their loans. There is no evidence that there is a link between the increase of house prices and new home purchases or real estate investment volume. In fact, equity-based debt is not used to pay for a credit card balance even for households that rely

heavily on credit card debt. Gathering information about defaults, borrowing against the rise in equity caused a relative decline in default rates between 2002 and 2006, especially for homeowners with low credit scores and use high credit card. However, the fall in default rates began in 2006. By the end of 2008, the homeowner default rate jumped with the rise in home prices during 2002-2006.

Goodhart and Hofmann (2008) examined the relationship between money, credit, housing prices and economic activity in industrial countries over the past three decades. The three main findings were: (i) significant multi-dimensional correlations between home prices, monetary variables and macroeconomic variables; (ii) a stronger relationship between house prices and monetary variables than former studies with the sample ranging from 1985 to 2006; (iii) a stronger impact of currency and credit when home prices are booming. However, the two final results were not statistically significant due to their high reliability. They proved the multidimensional relationship between house prices, money supply, private credit, and macroeconomics. Currency growth had a significant impact on both home prices and credit, which in return affected the currency. They showed that shocks in house prices, credit and currency have had significant effects on economic performance and price inflation. Shocks to GDP, CPI and interest rates are found to have a significant effect on home prices, currencies and credit. The effects of a currency shock and credit on house prices might be stronger when home prices were booming. The study suggested that monetary growth might make the central bank respond indirectly to imbalances.

Kiyotaki and Moore (1997) aimed to answer a research question on whether, theoretically, the interaction between credit limits and asset values becomes a powerful transmission mechanism in which the impact of real estate price shocks is exaggerated and diffused. They discovered small and temporary shocks from technology and income distribution can create large and continuous fluctuations in asset and output values. Specifically, they showed interest rates interacting with asset and output values. A temporary increase in productivity causes a reduction in interest rates, which increases the price of land and output rather than inputs in an open economy where interest rates are constant.

Iacoviello (2004) showed that if the borrowing capacity of indebted households is tied to the value of their home, house prices should enter a correctly specified aggregate Euler equation for consumption. The author developed a simple two-agent, dynamic general equilibrium model in which home (collateral) values affect debt capacity and consumption possibilities for a fraction of the households before deriving and estimating an aggregate consumption Euler equation, and estimating its structural parameters. The results provided robust support for housing prices as a driving force of consumption fluctuations.

After the Great Recession started in 2007, Lyons and Muellbauer (2013) realized the importance of understanding housing market dynamics as contributors to macroeconomic fluctuations, instead of a typically omitted variable in the analyses of housing prices in credit conditions. The authors examined Ireland, where an extreme housing market cycle saw prices increase four-fold in the decade to 2007, before falling by more than 50% by 2012. Using a quarterly dataset from 1980 to 2012, the study estimates an error-correction model that reveals the long-run relationship between house prices and fundamentals. Those fundamentals include the ratio of income to the stock of housing, the ratio of persons to households, user and transaction costs, and credit conditions, as measured by the ratio of mortgage credit to deposits. While the earlier phase of Ireland's house price boom was a result of a number of factors, growth between 2001 and 2007 was almost due to the easing of credit conditions. This study indicated that credit conditions were, along with the real rate of interest, key to determining equilibrium in the housing market. Normalization of expectations in relation to

housing can be expected to generate some upward pressure on prices in coming years, but may be counteracted by a normalization of credit conditions.

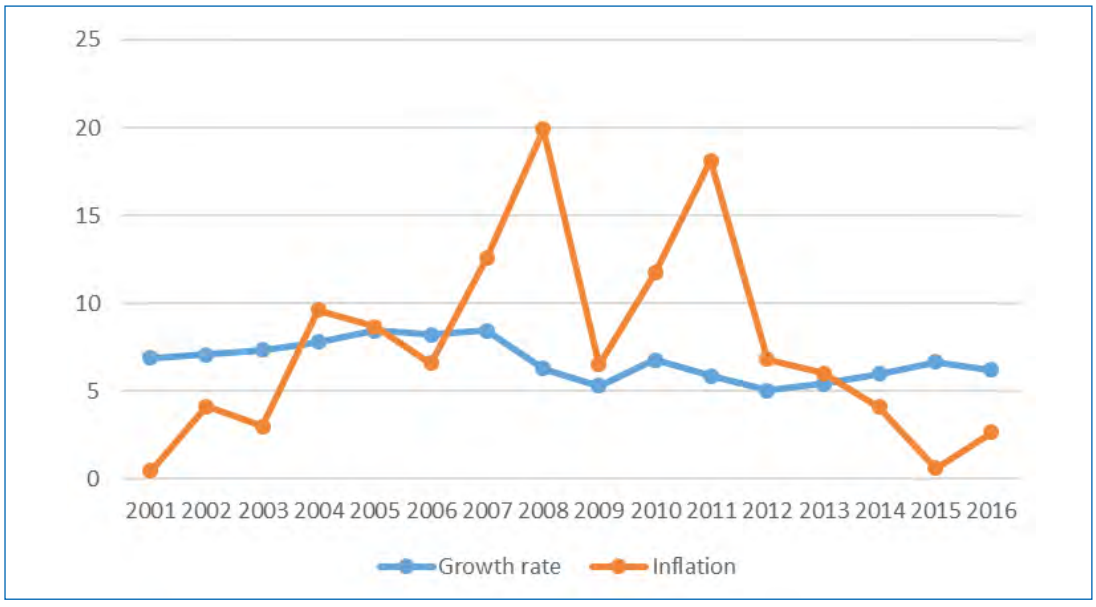
2. Vietnam Macroeconomic and Monetary Review from 2000 to 2016

2.1 Vietnam Macroeconomic Review from 2000 to 2016

Over the period from 2000 to 2016, Vietnam's macroeconomic situation has become increasingly complicated. Prior to 2007, rising world oil prices and the recovery of the world economy coupled with loosening monetary, fiscal and economic growth policies have had a positive impact on the growth of the world economy. Vietnam, with an average GDP growth rate of around 7% in the period 2000 – 2007, became one of the countries with thte highest growth rate in the world. However, due to the global financial crisis, GDP growth dropped from 7.13% in 2007 to marginally above 5% in 2014. As a result of the government's policy management and lifting of barriers for national economic development to reap the positive dynamics derived from the recovery of the world economy, Vietnam's economic outlook began to improve, recording a phenomenal growth in 2015 (6.68%) and 2016 (6.21%).

2.1.1 Inflation

Figure 1: Growth Rate and Inflation in Vietnam 2000-2016



Source: General Statistics office of Vietnam.

Starting the period at a really low inflation of 0.5% in 2001, the figure increased significantly to 9.5% in 2004, marking the first return of high inflation after a long period of stability. Inflation continued to fluctuate afterwards. Subsequently, with the huge capital inflows in 2007 and the boom in the banking sector after Vietnam officially joined the World Trade Organization (WTO), inflation rose to 12.7% in 2007 and reached a peak of 19.9% in 2008. Under the influence of the global financial crisis 2008-09, the inflation and growth rate decreased sharply in 2009. Hence, in 2009, the Vietnamese government announced an economic stimulus package of US$6 billion (6.8% of GDP) in order to boost the economy. However, it had a considerable impact on the inflation in the following years, with the figure rising significantly to 18.13% in 2011. Although inflation has been kept to a

level of single digit since 2012, deemed as a low inflation rate based on the State Bank of Vietnam's (SBV) commitment to price stability, the expectations of price increases are always hidden and can, in turn, possibly affect the sustainable development of Vietnam's economy.

2.1.2 Sustainable exports growth rates

On average, the annual export growth rates in recent years have been observed at around 18%, which has become an important driving force for economic growth in the country. Up to now, Vietnam has over 25 items with an export turnover of over US$1 billion, of which eight products have reached over US$5 billion. In terms of the export structure, the proportion of raw and semi-processed goods decreased sharply, while the proportion of refined products increased significantly. The export and import market has expanded with increasing turnovers, strengthening the traditional market and opening up many other potential markets. The trade balance has improved markedly since 2012 and has shifted to a surplus after years of continuous deficits.

2.1.3 Guaranteed National Financial Security

Public debt, government debt and foreign debt of the country are guaranteed to the extent permitted by the government. In recent periods, the system of mechanisms and policies on public finance management in Vietnam has been gradually enhanced in line with the market economy regime, more closely approaching the international practices in terms of tax reform, budget management and public debt management. As of December 31, 2014, public debt stood at 59.6% of GDP, of which government debt stood at 47.4% of GDP; Government guaranteed debt at 11.34% of GDP while local government debt was 0.8% of GDP. Additionally, the government's borrowing structure has changed in the direction of increasing the proportion of domestic borrowing with longer maturities.

2.2 Vietnam Monetary Policy Review from 2000 to 2016

In the context of an increasingly integrated economy with the world economy leading to faster trade and international capital flows, the construction and operation of monetary policy has become more sophisticated and demanding. Vietnam has long been known to pursue multi-objective monetary policies. Monetary policy has been made flexible via the adjustment of financial tools. The expectation is for the country to accelerate the growth rate, control price-inflation level, stabilize monetary policies as well as use monetary policies as a supplementary instrument in an attempt to stabilize the national budget, ameliorate poverty and ensure national security (UNDP, 2012).

According to the Law on the State Bank of Vietnam (SBV) 2010, in addition to the duty of stabilizing the value of the Vietnamese currency, the SBV also has an essential part to play in accelerating socio-economic development. Therefore, to some extent, the monetary policy framework in Vietnam is obscure and conflicts may sometimes arise among monetary policy objectives. In general, the main objectives of monetary policy are dependent on the macroeconomic conditions; therefore, the SBV is not independent of the government in implementing the national monetary policy.

The SBV has also taken a number of steps to gradually use its monetary policy instruments independently, such as exchange rates and open market operations (OMO). An inflation targeting monetary policy regime is being seriously considered by the government and the SBV and Vietnam is on the way to deploy such a regime in the future.

Due to the negative effects that the 1998 Asian crisis imposed on the economic growth rate over the period from 2000 to 2005, the SBV increased money supply markedly to support economic growth. Additionally, from the year 2000, confronted with a large capital inflow, while having to maintain a stable exchange rate, the SBV decided to purchase foreign currency, leading to a drastic increase in the money supply. As a consequence, inflation rates increased sharply in 2004 to 9.5% from a low of 3% in 2003, much higher than the 5% target set by the National Assembly. Inflation rates continued to increase on an annual basis, peaking at 20% in 2007, the highest level since 1990, as a result of high money supply. In this scenario, the government had to turn its attention to inflation and monetary policy was switched from loose to tight.

With its accession to the WTO, Vietnam has been exposed to a higher level of and wider scope of integration with the global economy. As a result, since 2006, Vietnam has been on the receiving end of huge capital inflows from foreign direct investments, foreign indirect investments, and remittances. These huge capital inflows have had significant effects on the money supply over the recent decade. From 2006 to 2009, money supply experienced a substantial increase, reaching a peak in 2007 (at 50%). The fluctuation of the money supply has had negative impacts on the exchange rate. Before 2006, the average quarterly depreciation rate was 0.9%. However, during periods of crisis from 1997 to 1998, the depreciation rate was 7.6% and from 2007 to 2008, the depreciation rate was up to 16.3%. It can well be seen that the impact of macroeconomic conditions on monetary policy targets has been noticeable from 2000 to 2016.

2.2.1 Interest rate

The interest rate mechanism has made fundamental changes. Since August 2000, the SBV has stepped up the easing of interest rate regulations, gradually moving from operating, by imposing "hard" ceiling interest rates. The difference between the average lending rate and the average mobilizing rate is that credit institutions agree with the borrower on the lending interest rate to a certain extent and the full liberalization of interest rates on VND deposits.

As for the interest rate tool, after the interest rate of the economy was liberalized, the SBV used some market-oriented interest rates to control the economy's interest rates: (i) a copy published monthly by the SBV; (ii) the refinancing interest rate and the discount interest rate were used as a corridor for interbank interest rates; and, (iii) open market interest rates. Depending on the situation of economic growth and inflation, the SBV has adjusted the interest rates accordingly.

From the beginning of 2007 to June 2008, with the goal of absorbing excess liquidity caused by foreign capital inflows, the SBV also continuously adjusted the interest rates. In late 2008 and early 2009, with the downward pressure on inflation, the SBV reduced its benchmark interest rates to support economic growth.

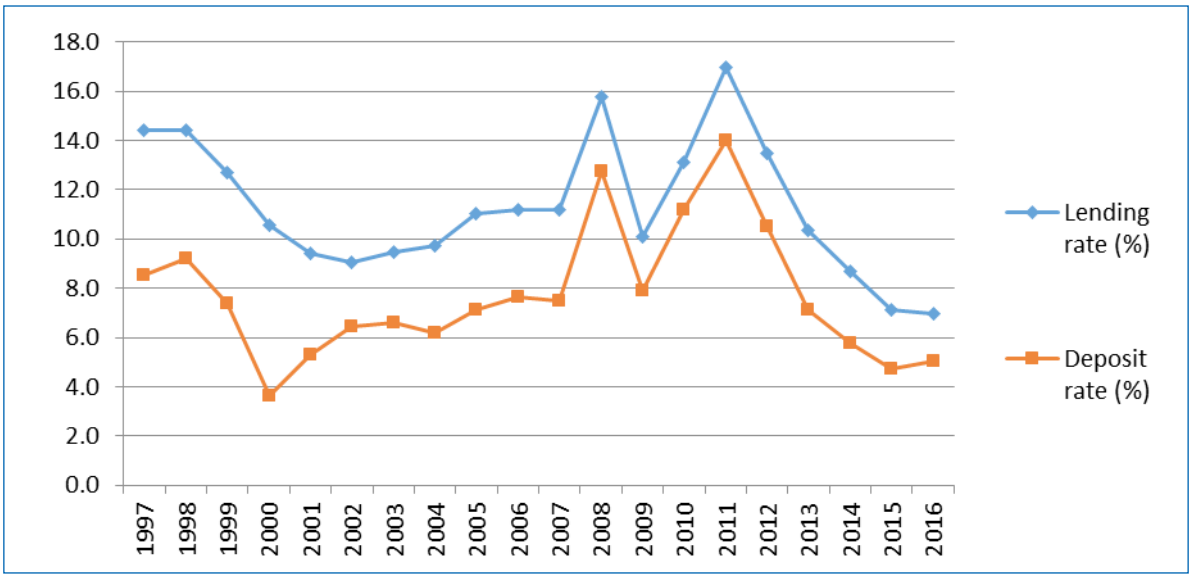
In 2009 and the first quarter of 2010, the SBV implemented the basic interest rate mechanism for which credit institutions set mobilizing and lending interest rates in VND not exceeding 150% of the basic interest rate. In 2011, the SBV gradually adjusted working interest rates to implement strict and prudent monetary policy in order to fight inflation.

In 2012, as the inflation forecast tended to decrease, the interest rate tool has been actively managed in a downward direction in line with the reduction of inflation and expected inflation, all the while ensuring that the management of the real interest rate continue to be cautious, with the risk of inflation rising again. Recently, refinancing demand is less likely due to the excess of liquidity in the

credit institutions. From March 18, 2014, the refinancing rate was 6.5%, much lower than the 15% at the end of 2011 and the discount rate was 4.5%.

With regard to interest rate instruments, the SBV has used different instruments since 1990s. Figure 1 features the interest rate in domestic currency.

Figure 2: Vietnam Interest Rate in Domestic Currency



Source: IFS.

Interest rates have gradually been liberalized since the mid-1990s. Previously, the SBV set deposit as well as lending rates and, since October 1992, ceilings for lending rates and floors for deposit rates. Major steps towards market-determined interest rates were taken with the lifting of floors for deposit rates with the exception of foreign currency deposits in 1996 and for ceilings on lending rates in August 2000. The ceilings for lending rates were replaced first by a basic interest rate, which was announced by the SBV every month and which commercial banks could only exceed within a set margin. Interest rates for foreign currency loans were liberalized in July 2001 and lending rates for loans in domestic currency in June 2002. Since 2002, commercial banks in Vietnam have been able to legally set lending rates as well as deposit rates according to market conditions (BIS, 2006).

However, in 2008, the ceiling for lending rate seemed to return. SBV announced a basic rate on a monthly basis, for which the commercial banks could base the lending rate and deposit rate on, albeit within a scope of 150% of that rate.

After that, in April 2010, commercial banks were free to set the lending rate for all areas but from 2012, the ceilings for the lending rate were set for five priority areas, including Agriculture, Export Products, Small Medium Enterprises, Supporting Industry, and High-tech Enterprises (12% per year from 2012 to 2014 and 8% from 2014 up to now). Since 2011, SBV has resorted to some interventions to control short-term deposit rates, especially ceiling deposit rate measures for both domestic and foreign currency.

2.2.2 Reserve Requirement

The reserve requirement ratio has been adjusted to be more flexible in line with the objective of monetary policy and monetary evolution in each period. In 2007, to neutralize the excess liquidity in the banking system due to the influx of foreign currency and also to tighten monetary policy to curb inflation, alongside open market instruments and issuance of bills. In the meantime, SBV increased the reserve requirement for credit institutions (CI) in mid-2007 and early 2008 and increased the interest rate on CRR. By the end of 2008, the State Bank of Vietnam reduced the reserve requirement to decrease the liquidity pressure for credit institutions and reduce the cost of capital mobilization, thereby encouraging the CI to increase mobilization and lending to the economy. In particular, the bank reserve ratio declined sharply from 11% in mid-2008 to 3% in the first quarter of 2009 and remained at that level until now. The ratio of foreign currency deposits decreased more slowly, from 11% in 2008 to 4% in 2010. From September 2011 to now, it has been maintained at 6%.

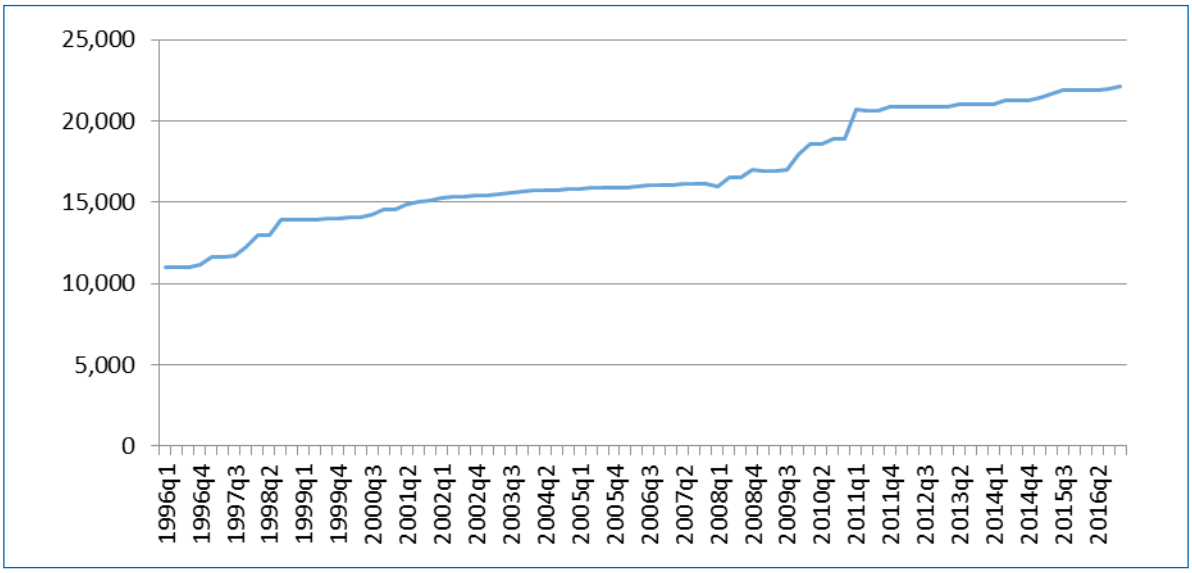
2.2.3 Open Market Operations

Beginning in July 2000, open market operations have been constantly improving and becoming the main monetary regulator of the SBV. Since 2007, with the trend of foreign currency flowing into Vietnam, the pressure on the VND has caused the SBV to step up its buying of foreign currencies to increase foreign exchange reserves and stabilize exchange rates. In the second half of 2009, the bid volume which was boosted by the stimulus program of the government, started to take effect, increasing the demand for capital for production and business. In 2008-2009, the term of tender offer was 7 and 14 days respectively. In the first 3 quarters of 2010, due to the 4% interest rate subsidy package for short-term loans, the SBV's additional 28-day tender offer to support liquidity for credit institutions, facilitated credit institutions to reduce market interest rates and continue to support economic growth.

2.2.4 Foreign Exchange Rate Policy

Figure 3 depicts the evolution of the VND/USD rate since 1996. As illustrated, there was a significant depreciation of the Vietnam Dong from 1996 to 2016. The exchange rate policy has become increasingly flexible since 1990s. In early 1999, the SBV switched to a type of exchange rate system called the crawling peg exchange rate system, which the IMF has classified as a "de facto managed floating regime (managed floating with no pre-announced path for exchange rate)". The SBV announces a daily official rate which is the weighted average of the exchange rates quoted in the interbank market on the previous day. Since the interbank rate can fluctuate around the official rate within a range of +/- 0.25% (since July 2002; the band was + 0.1% between February 1999 and July 2002), the interbank rate can gradually impact the official exchange rate. While fluctuations of +/- 0.25% are, in principle permitted, the actual daily fluctuations have, in general, been much smaller, staying within a range of 0.1% around the interbank exchange rates of the previous day. While Vietnam has an officially managed floating exchange rate system, the exchange rate system actually functions more like a fixed exchange rate system (BIS 2006) but is now a crawling peg regime.

Figure 3: VND/USD Exchange Rate 1996-2016



Source: IFS.

In terms of exchange rates, in the period 2000-2007, corresponding to the period of the stable economic development and associated with it, a relatively stable dollar exchange rate mechanism, prices in the free market were stable and anchored to the official rate. Since 2007, due to the massive influx of indirect investments into Vietnam, US$ supply has increased sharply causing the exchange rate to stabilize. Starting from 2008, the exchange rate fluctuated sharply. Along with the economic downturn, the flow of indirect investments into Vietnam has started to reverse. The general trend during 2009 - 2011 is a nominal depreciation of the VND against US$.

In the period before 2011, the exchange rate was under constant pressure with the foreign exchange market being unstable. Therefore, in February 2011, the State Bank adjusted the exchange rate by 9.3% and narrowed the trading band from + 3% down to + 1%. After that, SBV implemented flexible intervention in the market to stabilize the exchange rate, thus reducing dollarization.

In 2012 and 2013, the SBV aimed to control exchange rate variation by no more than 2-3% per year to influence the depreciation expectations of the dong, thereby enabling enterprises to take the initiative to set and take up real estate and business deveopment. The SBV's operating guidelines for 2013 show that the exchange rate was only adjusted 1% on June 28, 2013.

By 2014, the SBV adjusted the exchange rate by only 1% on 19 September and remained unchanged until the end of the year. In 2015, due to the global economic turmoil, the adjustment of the exchange rate of the Chinese yuan and the Federal Reserve's (Fed) raising of interest rates caused the exchange rate to be unstable by the end of 2015. The exchange rate in Vietnam was quite high, which caused the SBV to cut prices three times in FY2015 (January, May and August) by 1%. With the devaluation of the domestic currency, in August 2015, the SBV adjusted the exchange rate band from + -1% to + -2% on August 12, finally + -3% on August 19.

Since January 2016, a central exchange rate regime is applied where the central rate is announced daily by the SBV. Commercial banks will fix their own exchange rate within a set margin (currently +/- 3%). The daily central exchange rate is based on: (i) the previous day's dong/US$ exchange rate;

(ii) exchange rates of countries that have substantial trade and financial links with Vietnam; and, (iii) domestic macroeconomic conditions.

2.2.5 Restructuring the Banking Sector and Non- performing Loans

Rapid growth of the banking system in the period of 2007-2008 resulted in a high rate of non-performing loans (NPL) of the system. Culminating in 2012, NPL of the system was 4.12% for which commercial banks were 4.67%. After implementing the project of restructuring the banking system with the focus on the NPL of the entire system, the NPL ratio has tended to decrease since 2012, from 4.12% in 2012, down to 3.61% in 2013 and 3.25% in fiscal year (FY) 2014 and less than 3% at the end of FY2015, reflecting the results of NPL management to limit the occurrence of new NPLs.

The legal documents on finance in the field of credit banking continue to be reviewed and finalized. Implementing the scheme on restructuring of the system of credit institutions in the period of 2011 - 2015, the SBV has approved the restructuring plan for the weak joint stock commercial banks, thereby improving the financial capacity and solvency of credit institutions; minimizing the risk of breakdowns and ensuring a safe system. In addition, many solutions have been developed to detect, treat and prevent cross-ownership.

However, the level of accumulation and segmentation is still relatively high; State-owned commercial banks currently account for 55- 57% of the deposit market share and credit market share of the whole system. People's credit funds, although large in numbers, have a small share of deposit mobilization (less than 1%) and their operation is not effective. Despite a downward trend in the last few years, market segmentation is relatively clear in customer groups by industry and by ownership. Meanwhile, the segments of micro credit market, credit for small and medium enterprises have not been properly examined.

Credit risk is high, particularly in relation to bad loans. The NPL of Vietnamese commercial banks are mainly due to the lack of /not strictly appraised loans related to: (i) policy lending (under official government mandate and tacit approval); (ii) lending to projects/ businesses of members of the board of directors/leaders of commercial banks or borrowing from relatives; (iii) real estate/securities loans. The loan risk also relates to valuable mortgages that may fall sharply if the asset bubble is "pricked" and/or overvalued (deliberately) (for example, real estate), or by policy risk. In addition, the failure to fully apply international debt classification standards can create a psychological illusion of bad debt and the accompanying risks.

Credit risk is linked to excessive "double deviation" (in term structure and the demand for money in the balance sheet of commercial banks). The excessive deviation of term structure can be seen in the fact that short-term loans and short-term deposits still account for a large proportion, about 75%, but commercial banks use an excessive proportion to lend medium- and long-term. This situation poses a major risk, especially when capital is lent to projects with low efficiency, lacking the necessary expertise. The deviation of the currency structure is very sensitive to exchange rate fluctuations, especially in the context of high dollarization and gradually liberalized capital account in Vietnam.

Operational risk also relates to cross equity (between commercial banks, corporations/ corporations that engage in financial activities, real estate). This creates interest groups that can dominate the market, which makes it difficult to separate ownership, thus hindering the process of banking supervision and restructuring; causing strong price fluctuations in the stock market.

Operational risk, especially liquidity risk, high interest rate, especially when many banks have limited financial capacity, weak risk management capacity (CAMEL indicators have not met the requirements Basel I), whose main source of income is based on credit activity.

International practices and standards on banking management and administration such as risk management, asset management, debt, customers, products, internal auditing, etc., have not been fully implemented. In general, banks' internal governance has yet to meet international standards such as CAMELS and Basel.

In addition to formal credit markets, informal credit markets remain relatively large in Vietnam, mainly in rural areas. The black credit crunch from 2011 to now clearly shows the scale and great damage that be inflicted from the credit crunch. From 2011 up to now, in the context of the State Bank tightening monetary policy, the lending interest rate is very high and selective with the real estate market plummeting. Many (about 12%) enterprises encountered difficulties and were forced to suspend operations or faced dissolution, coupled with the negative impact from domestic and international economic difficulties and abovementioned weaknesses and risks.

3. Household Debts in Vietnam

3.1 Database about Household Debts

OECD defines household debt as "all liabilities that require payment or payments of interest or principal by the household to the creditor at a date or dates in the future. Consequently, all debt instruments are liabilities, but some liabilities such as shares, equity and financial derivatives are not considered as debt. According to the 1993 System of National Accounts, debt is thus the sum of the following liability categories, whenever available/applicable in the financial balance sheet of the households and non-profit institutions serving households sector, such as: currency and deposits; securities other than shares, except financial derivatives; loans; insurance technical reserves; and, other accounts payable. For households, liabilities predominantly consist of loans, in particular mortgage loans for the purchase of houses. This indicator is measured as a percentage of NDI."

Vietnam does not currently have official household debt statistics as defined by OECD. In this report, we use data provided by the SBV to illustrate household debt data in Vietnam. These can be found in the table on outstanding credit by type of organization and individual for credit institutions operating in Vietnam. However, this statistical method has changed from time to time as the SBV's reporting regime has changed over time.

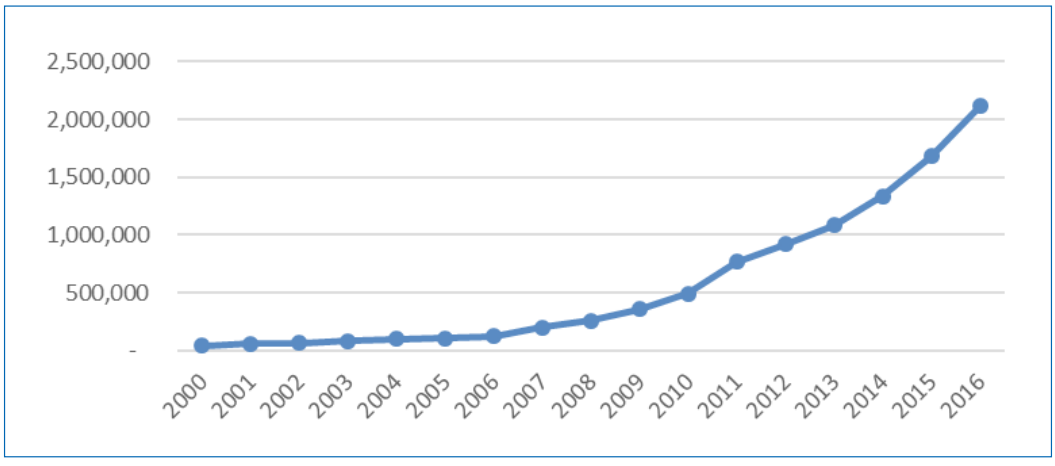
- 2000-2004 period: The data used are personal outstanding debts - outstanding loans of individuals.
- 2005-2010 period: The data used are individual economic data. Such data consists of the outstanding debt of production and business households in the agricultural, forestry, fishery, industry-construction sectors, non-cooperative services, which were established under the Cooperative Law and have not yet been registered to establish a business. In addition, credit granted to officials, students, and those who work abroad is allocated to the credit granted to the individual sector.
- From 2011 up to now: The data used comprise of business households and individuals (including individuals, households producing and trading in agriculture, forestry, fishery, industry, construction, non-cooperative services established under the Cooperative Law and not yet registered for the establishment of enterprises).

Thus, household debt figures for the 2000-2004 period are the lowest , followed by the addition of business households in the period of 2005-2010 and business households and individuals in general, making banking credit the largest in the period from 2011 till now. Based on the available data, albeit with no basis for unifying the input of the data, these data series are used tentatively to illustrate the outstanding household debt of Vietnam's credit institutions.

It should be acknowledged, however, that these data only reflect the household debt figures in the banking system, and does not include household debt data in the non-banking system. Traditionally, people would first borrow money from their friends and relatives to meet their financial needs before resorting to other formal debt instruments. With the high number of people living in rural areas, knowledge about and access to official credit from credit institutions is still limited. Thus, many have opted to borrow money from informal agents with high interest rates - known as black credit. Black credit is the form of mobilization credit outside the banking system. They are not registered businesses and unlicensed as well as also outside official management of the government. A common form of black credit is usury in which one organization mobilizes and lends with high interest rates. The procedure for such activities is usually a lot less complicated than the credit operations of formal banks. The size of this market is not quantitatively known but at the end of 2011, this figure was estimated to reach 22% of the total credit of the banking system. According to some researchers, the total black credit of Vietnam accounts for 30% of total credit provided by commercial banks, or about US$50 billion, which is considered extremely high by international standards (Van Ha Nguyen, 2016).

3.2 Trend of Household Debts in Vietnam

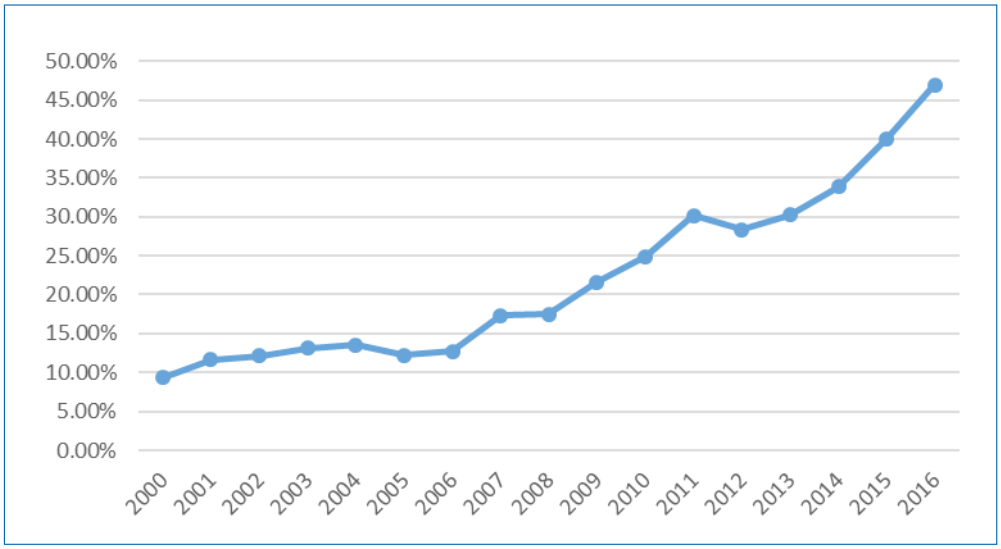
Figure 4: Household Debts Level in Vietnam from 2000 to 2016 (million VND)



Source: SBV.

Household debts in Vietnam have grown rapidly over the years from 2000 to 2016 with an average growth rate of 28.58% per year. Between 2000 and 2016, household debt increased from VND 41.3 trillion to VND 2116.2 trillion (by 51 times). From 2005 up to now, household debt in Vietnam has tended to increase but the rate of increase is not uniform. Household debt rose sharply in the period 2007-2011, sustaining an increase of around 20% in the following years.

Figure 5: Household Debt/GDP in Vietnam from 2000 to 2016

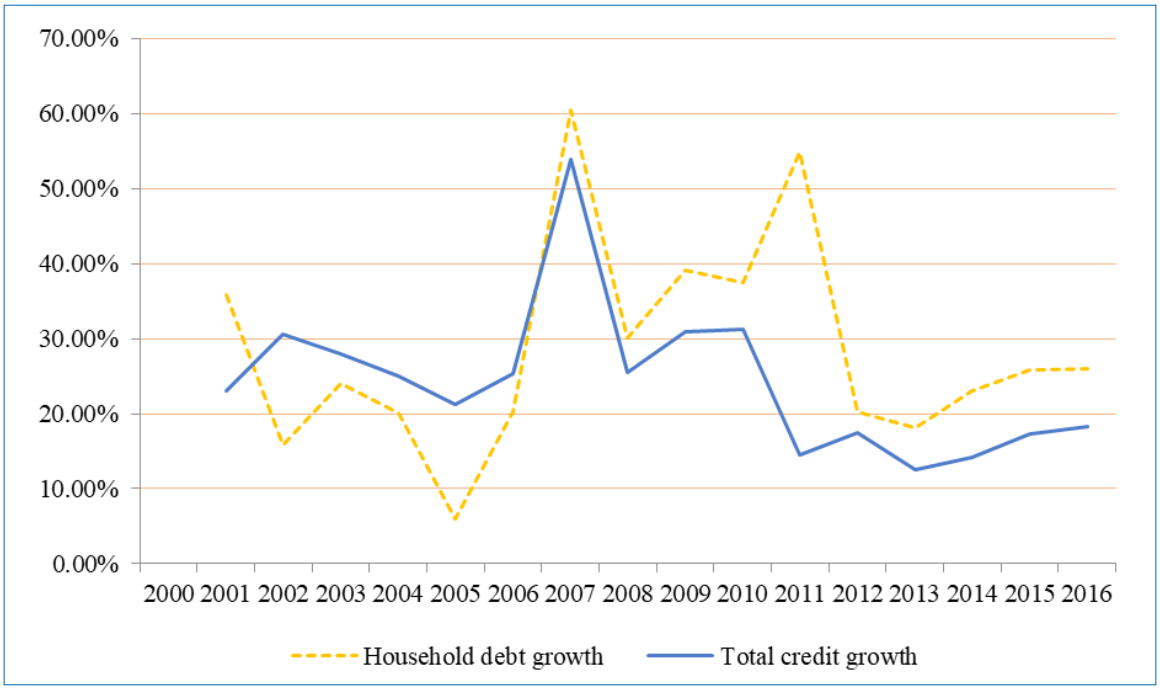


Source: Calculation by authors.

The household debt/GDP ratio has growth significantly from 2000 to 2016. During the period 2000-2006, the figure stayed at around 12% but it increased gradually from 2006 to 2011 from 12.7% to 30.2%. It decreased slightly in 2012 and rose significantly again to reach 47.0% in 2016. The increase in household debt in Vietnam supported economic growth and enabled more people to become home owners. However, recent studies have showed that the beneficial effects of economic growth have declined as the leveraging became increasingly high. Cecchetti et al. (2011) estimate that when household debt to GDP exceeds a threshold value of 85%, then increases in household debt have a negative medium-term relationship to macroeconomic aggregates such as GDP growth, consumption, and employment. The relationship between increasing household debt and financial crises is more pronounced when household debt to GDP exceeds a threshold value of 65%.

As Vietnam's household debt/GDP ratio was 47% in 2016, still relatively far from the threshold level of 65%, a potential crisis is unlikely. The increase in household debts has in fact supported the country's economic growth. However, with the high increase in household debt/GDP ratio in recent years, it is worth monitoring this indicator carefully. If it keeps rising significantly in the coming years, SBV should implement measures to control it and minimize vulnerabilities to financial stability.

Figure 6: The Growth Rate of Household Debt and Total Credit of the Economy from 2000 to 2016

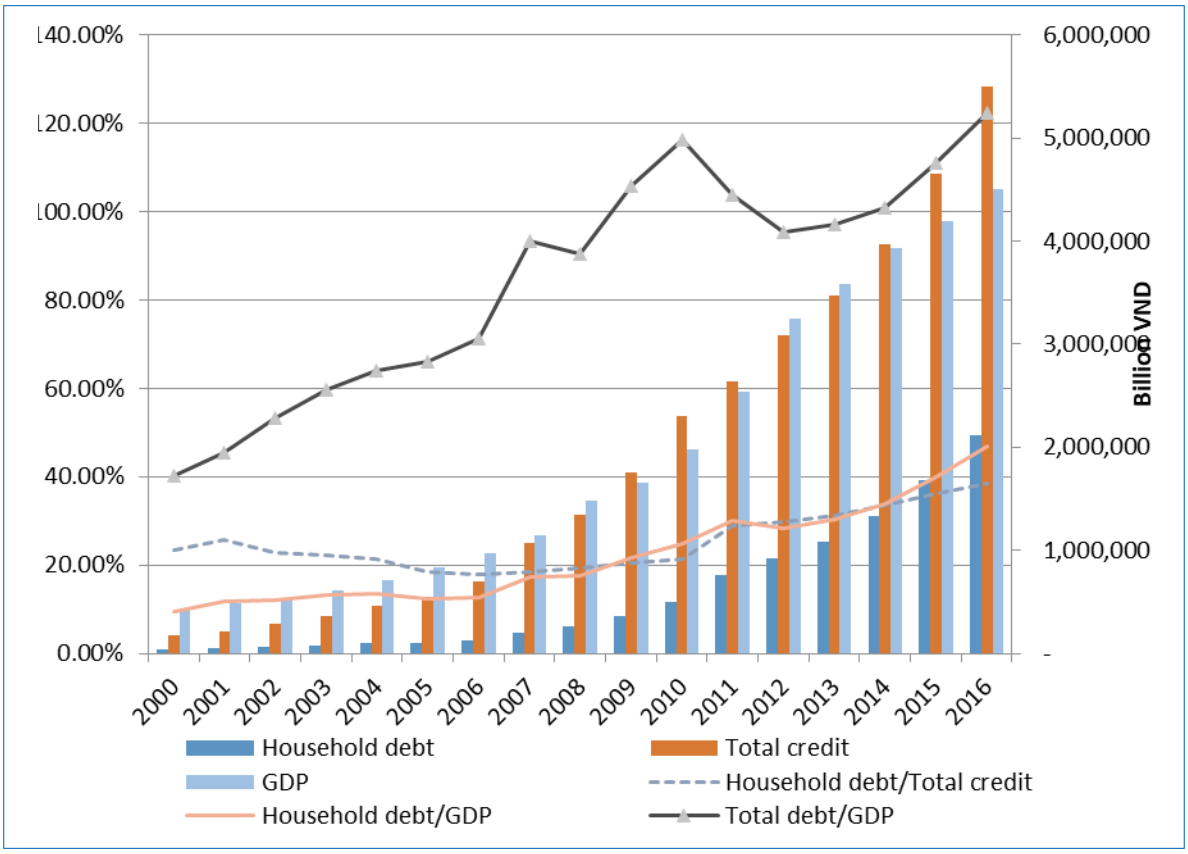


Source: SBV.

The growth rate of household debt follows the same trend as the growth of total outstanding loans in the economy. In 2011, the growth rate of total outstanding loans was only 14.5%, down from 31.2% in 2010, while the growth rate of household debt increased dramatically from 37.5% in 2010 to 54.9% in 2011. This may be due to a change in the statistical methodology of the SBV as discussed above.

Moreover, the proportion of household debt out of the total outstanding loans of the economy has been increasing recently, remaining at around 25-21% during 2000-2004, decreasing to around 18.55% in 2005 and gradually increasing over the years to around 21% in 2010, subsequently rising to 29% in 2011 (the sudden increase in 2011 as against 2010 can be explained by the adoption of an alternative statistical method). This upward trend continued to 38.44% in 2016.

Figure 7: Household Debt, GDP and Total Credit in Vietnam from 2000 to 2016



Source: SBV.

The increasing share of household debt out of total outstanding loans is in line with the fact that households have a tendency to borrow more for consumption (a more open view of borrowing for consumption, which is different from the traditional view where people purely spend their income rather than the borrow to spend). The share of household debt to GDP also tended to increase and the rate of increase is faster than the proportion of household debt to total debt. However, in the fourth quarter of 2016, this ratio was only 47%, which was quite low compared to other countries in the region.

4. Household Debts and Macroeconomic Factors in Vietnam

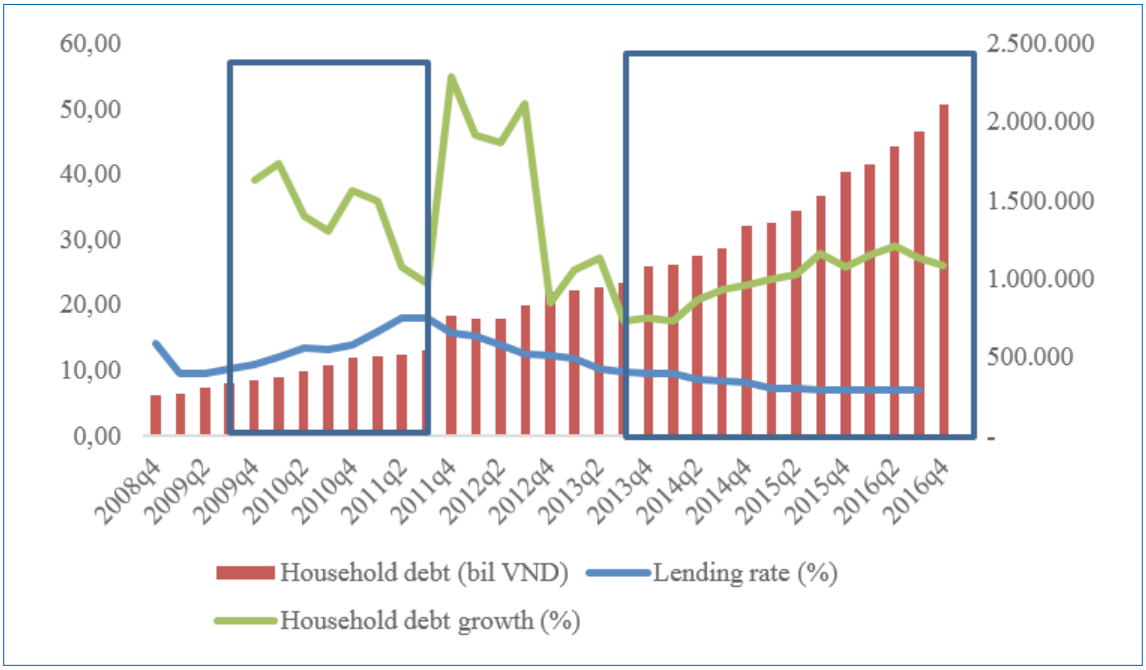
4.1 Interest Rate, Lending Condition and Household Debts

One of the strongest determinants of household debts is interest rates and lending conditions. With low interest rates and favorable lending conditions, household debts will increase. In contrast, high interest rates and the tightening of lending conditions are factors that slow down the household debt growth (Debelle, 2004).

In Vietnam, due to the high inflation, the SBV has had to tighten monetary policy during the period 2009-2011. This led to a widespread lack of liquidity throughout the system, prompting banks to enter an interest rate race. This was despite the SBV implementing several policies to curb interest rates. In addition, the State Bank implemented credit control measures such as setting the credit

growth limits for commercial banks, and limiting lending to non-manufacturing sectors (like real estate, securities, etc.) These measures subsequently led to the reduction of household debt growth in the period.

Figure 8: Lending Rate and Household Debt Growth[1]



Source: SBV and IMF.

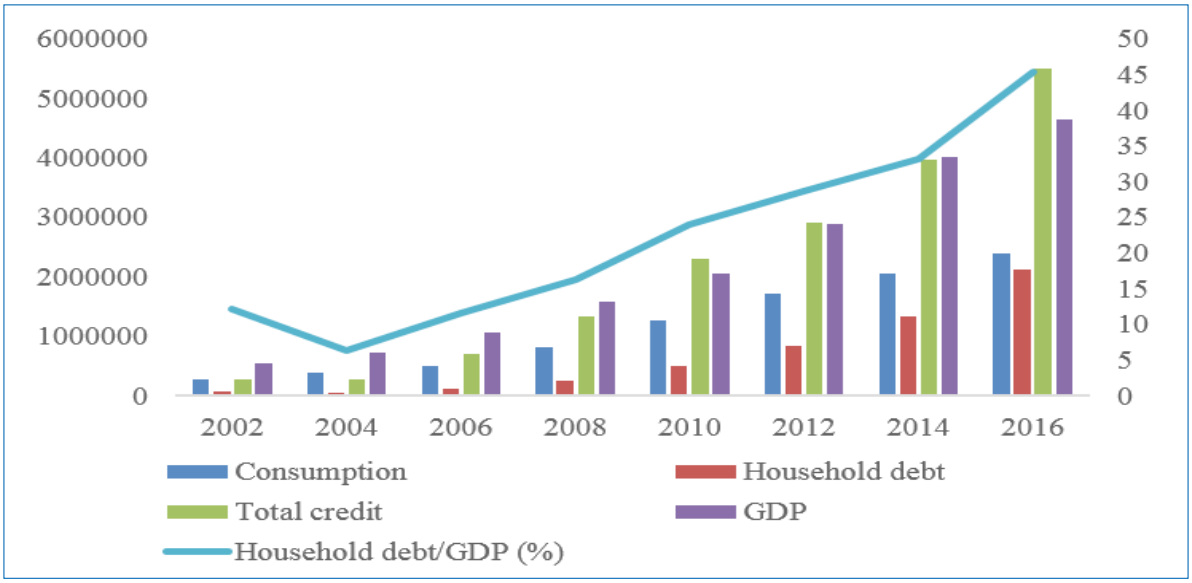
In the next period, interest rate gradually decreased in line with SBV's direction. Along with that, the macroeconomic indicators such as GDP and inflation have improved, creating momentum for banks to continue reducing interest rates to support businesses, thereby promoting growth. Restrictions on lending to non-manufacturing sectors set by government in the last period have also been loosened and removed. The SBV has coordinated with the Ministry of Construction to implement some solutions to restore the real estate market, culminating in a package of 30 trillion dong through refinancing with reasonable interest rates for credit institutions to lend to low income groups; those who have difficulties to purchase houses; and, the supply chain (four-party link) credit policy in the construction sector. The lower interest rate and easing of credit constraints have led to a substantial rise in household debt.

4.2 GDP Growth, Consumption and Household Debt

A rise in household debt initially increased consumption and hence promoted economic growth in Vietnam in the period 2000 – 2016. The GDP growth was in line with credit growth and household debt growth, albeit at a slower pace, leading up to a sustainable increase in household debt/GDP ratio, from 9.36% in 2000 to 45.46% in 2016. This rate showed that the Vietnamese people has increased borrowing. However, in comparison with other countries in the same region such as Thailand, Malaysia, Korea and Chinese Taipei (economies with household debt/GDP ratio exceeding 80%), this ratio in Vietnam is still relatively low.

1. Year-over-year growth, compares the quarter of one year to the same quarter of the previous year.

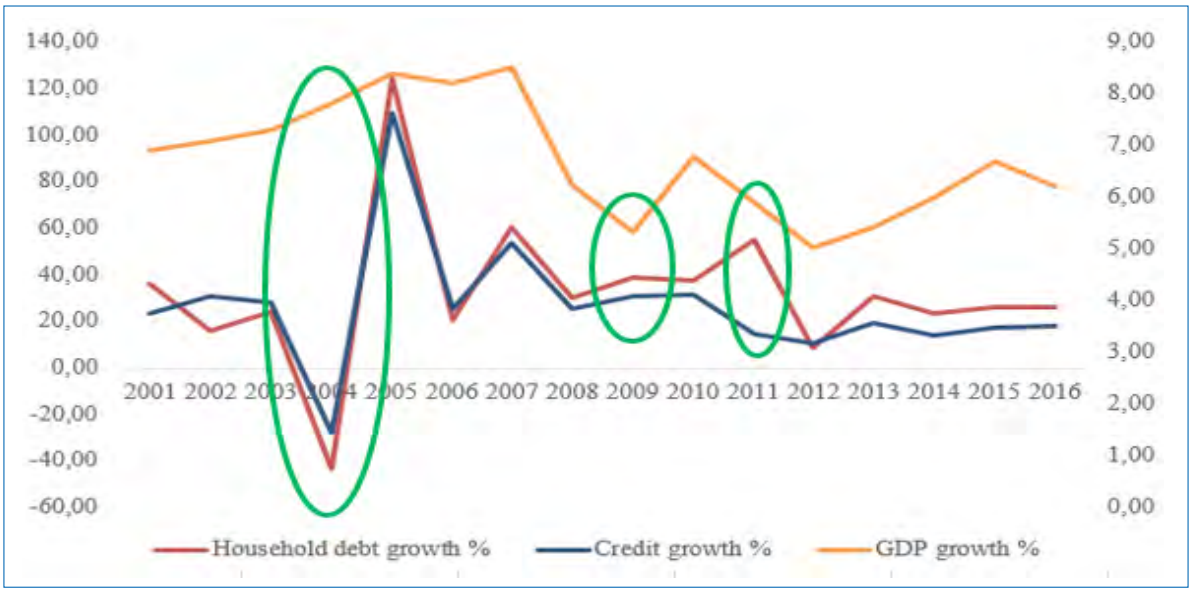
Figure 9: GDP, Consumption and Household Debt (billion VND)



Sources: GSO and SBV.

Generally, GDP growth is in line with credit growth and household debt growth. However, the chart for bank debt, credit and GDP growth, shows that at some point, these indicators do not move in the same direction, particularly in 2004, when the economic growth rate continued to increase over the previous year while the credit and household debt growth rate fell sharply to below 0% (see Figure 10). In 2009, both credit and household debt rose, but the pace of GDP growth continued to on a decreasing trend from the previous year. In 2011, household debt growth surged sharply against GDP growth and credit growth, leading to a sharp increase in the household debt/GDP ratio from 24.04% in 2010 to 28.39% in 2011. The main reason for this difference were the changes in the SBV's monetary policy and the effect of external factors. The table below gives more details about these differences.

Figure 10: GDP Growth, Credit Growth and Household Debt Growth



Source: GSO and SBV.

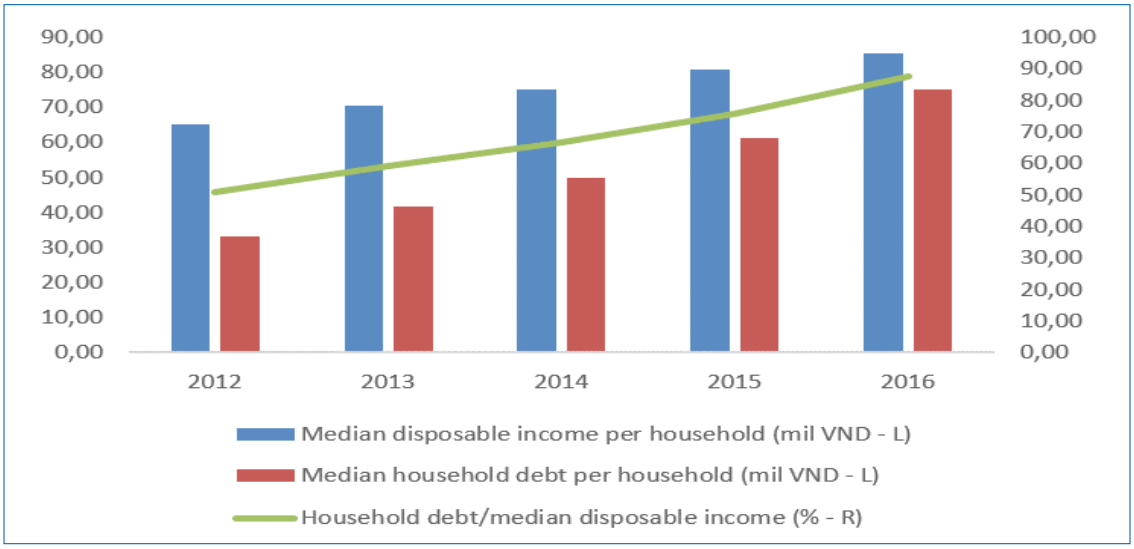
Table 1: Differences Between Movement of GDP, Credit and Household Debt

Time	Context	Differences	Reasons
2004	CPI increases sharply, causing the negative impact on economy	GDP growth ↑ Credit growth ↓ Household debt growth ↓	The SBV announced a decision to increase the required reserve ratio to closely control credit growth. Adjusting the required reserve ratio will lead banks to take a closer look, with stricter lending conditions to limit projects which require large capital but have low efficiency.
2009	Global Financial Crisis and the internal instability of economy	GDP growth ↓ Credit growth ↑ Household debt growth ↑	As an open economy, the global economic crisis has affected the Vietnamese economy, especially exports, investment and tourism. At the same time, high credit growth in the previous period, especially in 2007 when the credit growth increased to 52%, leading to high-inflation from the end of 2007 and late in 2008. To help economic recovery, in 2009 and 2010, SBV loosened monetary policy.
2011	Non-performing debt ↑, economic downturn	GDP growth ↓ Credit growth ↓ Household debt growth ↑	The State Bank of Vietnam controls credit growth at a low level. The economy is in a state of recession, leading to reduced investment opportunities for businesses. Thus, commercial banks turned their credit to households, and priority sectors.

4.3 Population, Income and Household Debt

In the period 2012 – 2016, the disposable income per household increased, from 65 million VND to 85.48 million VND, one of the causes that boosted household debt per household, from 33.04 million VND to 74.97 million VND. However, household debt has not increased at the same rate as disposable income. In recent years, the household debt/disposable income ratio rose from 50.83% in 2012 to 87.71% in 2016. This trend shows a change in savings and consumption attitude of the Vietnamese. The rise in household debt is a motivation for the development of the household economy. However, the loan repayment burden would be evident if households do not use loans effectively.

Figure 11: Income and Household Debt

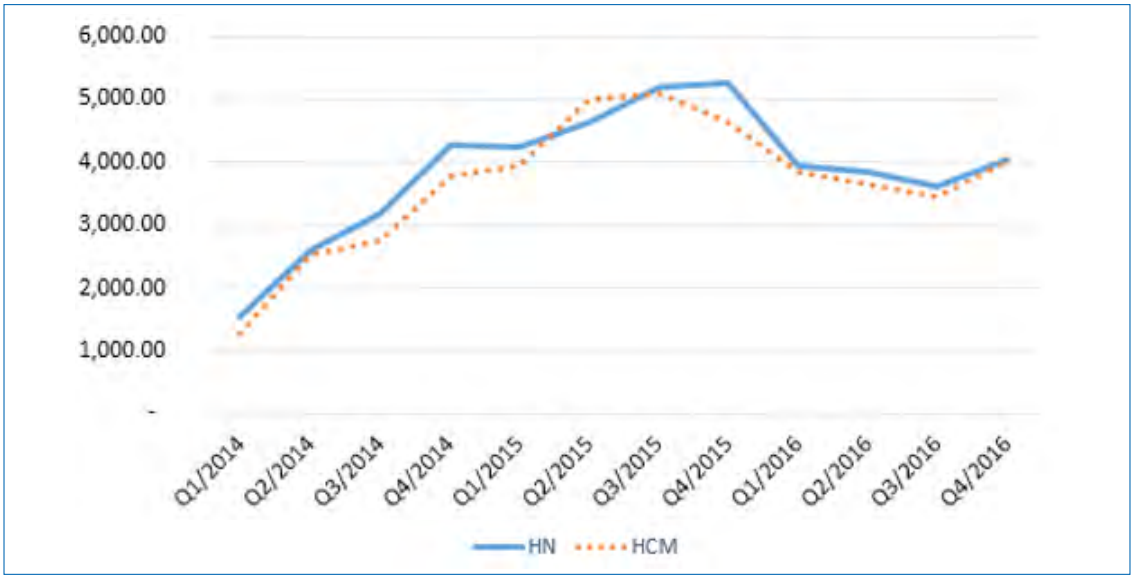


Source: SBV, Euromoniter.

5. Housing Market in Vietnam and its Relationship with Household Debt

Since 1993, Vietnam has experienced three cyclical land developments which included 1-2 years of an overheating market, followed by 5-6 years of a frozen market. The first market boom took place in mid-1993 to 1994, when housing prices surged about tenfold. The second cycle took place from 2000 towards the end of 2003, when housing prices increased rapidly and peaked in Q2 2001 and the average price increased five times, mainly due to speculative activities. Vietnam's real estate prices in comparison with the world average was relatively high and even higher than several mega-cities in developed countries. The third period occurred from 2007 to early 2008. During this period, real estate in Ho Chi Minh (HCM) City underwent rapid growth in price which was different from previous periods when market boom was mainly observed in Hanoi.

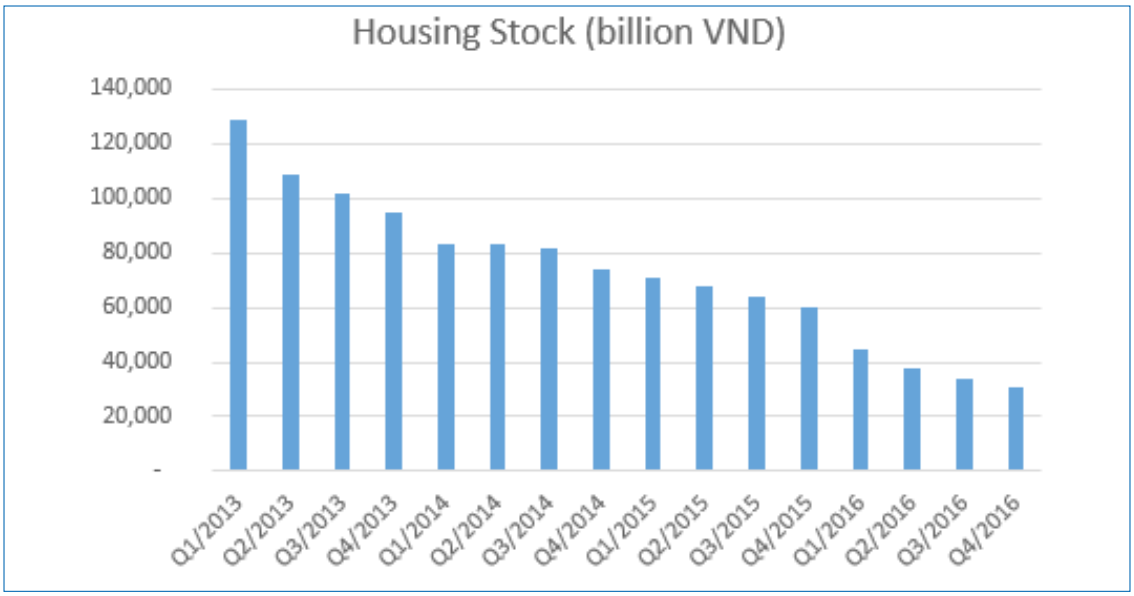
Figure 12: Number of Housing Transactions in Hanoi and Ho Chi Minh City



Source: Savills.

Over 2014 - 2016, the number of transactions in the Hanoi and Ho Chi Minh City markets correlated to each other and were quite inactive in the first few months of 2014. Subsequently, these numbers increased significantly towards the end of 2015 and showed signs of decline in 2016 (See Figure 12). The most active period was at the end of 2015, when the number of transactions in Q4 2015 in Hanoi recorded 5,270 thousand transactions and that of HCM City market amounted to 5,100 thousand transactions in 2015 Q3.

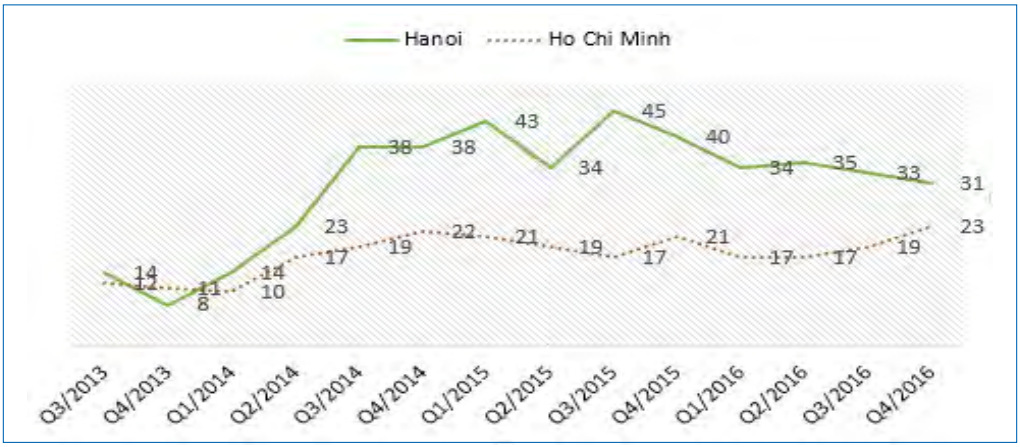
Figure 13: Housing Stock in Vietnam



Source: Savills.

Meanwhile, real estate inventory fell sharply, from 128.548 billion dong in 2013 to 31.032 billion dong by the end of 2016 (See Figure 13). The economy has gradually recovered and the real estate market has seen positive changes from 2013 to 2016. The main reason was that since 2013, public investments have been supplemented to stimulate economic recovery. In addition, a series of legal documents related to real estate market was issued to resolve some difficulties in this area, specifically the issue of real estate inventory. The new regulations of the Law on Housing 2014, the Law on Real Estate Trading 2014 and the guiding documents have created more favorable conditions to attract domestic and foreign investments in developing real estate markets. In particular, the improvement of policies on social housing development and management is one of the breakthroughs, contributing to the restructuring of the real estate market, creating favorable conditions for policy beneficiaries. The poor and low-income earners have been able to improve their housing conditions, contributing to improved social security and promoting socio-economic development. Another reason is that the composition of real estate was adjusted more reasonably towards real demand and real payment capacity of the market. The commodity structure is increasingly diversified in both types and product segments to meet the various needs of the people and society. Material and technical foundations have been set up to promote economic development. Credit also has an impact on the reduction of real estate inventory; in particular, credit in the real estate sector continues to grow, even at higher rates than the overall credit growth of the system. By the end of 2016, outstanding loans of real estate trading were 436.144 billion dong, up 11.03% compared to 2015.

Figure 14: Rate of Absorption in Hanoi and Ho Chi Minh City



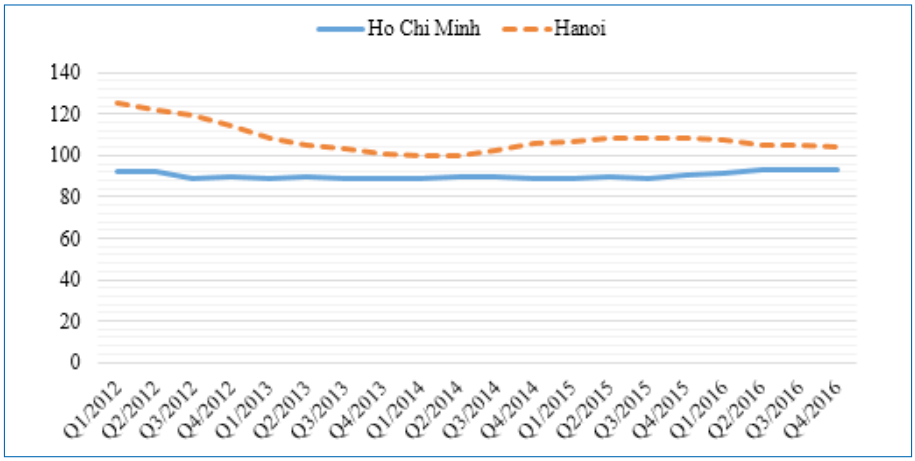
Source: Savills.

Absorption rates[2] in 2013 in Hanoi and Ho Chi Minh City tend to be comparatively similar, with the figures being recorded at 14% and 12% respectively before the gap between two areas gradually widened. Absorption rates in HCMC fluctuated between 17% and 21% during the 2014 – 2016 period, with its overall highest point of 23% in Q4 2016. The Hanoi market witnessed more fluctuations in the absorption rate, hitting a trough of 8% in Q3 2013, followed by a significant rebound and peaked at 45% in Q3 2015. The real estate market froze from the end of 2013 as a result of the global financial crisis. The real estate market started to show some signs of recovery in early 2014, particularly in the number of transactions, along with a series of positive supporting policies (HN had 11,450 successful transactions, an increase of 200% compared to 2013. In HCMC, 10,350 transactions were successful, up 30% over 2013). On top of that, stable real estate prices were recorded, real estate inventories continued to fall, and real estate composition shifted in a rational way (projects shifted from commercial housing to social housing and adjustable apartment design) to meet market demand. Specially, real estate credit (14%) was even higher than total credit growth (13%). In 2015, the growth in real estate continued to recover. However, from 2016, the rate of absorption in Hanoi had gradually decreased, and the gap between the absorption rate between Hanoi and Ho Chi Minh City had narrowed. On horizon, if the real estate market does not fluctuate too much by policy or economic impact, the absorption rate between Hanoi and Ho Chi Minh City will move in the same trend.

House price indices reflect the level of price movement of real estate through successful transactions over time. These indices are announced by mainly market research companies and several real estate exchanges for a specific location and a number of market segments. House price index data is limited in scope, available mainly through the development of real estate price indices in "standardized" market segments such as apartments for sale and for rent and offices for lease. As for the individual housing market and land prices, no state management agencies or real estate companies have calculated this price index. The main reason is due to limited sources of information and data pertaining to housing prices. Another reason is that there have been very few transactions. Besides, there is no functional agency that collects and stores statistical data on real estate transaction prices as well as their characteristics in a complete and accurate manner, leading to some limitations in constructing the house price index.

2. The absorption rate is the rate at which available homes are sold in a specific real estate market during a given time period. It is calculated by dividing the average number of sales per month by the total number of available homes.

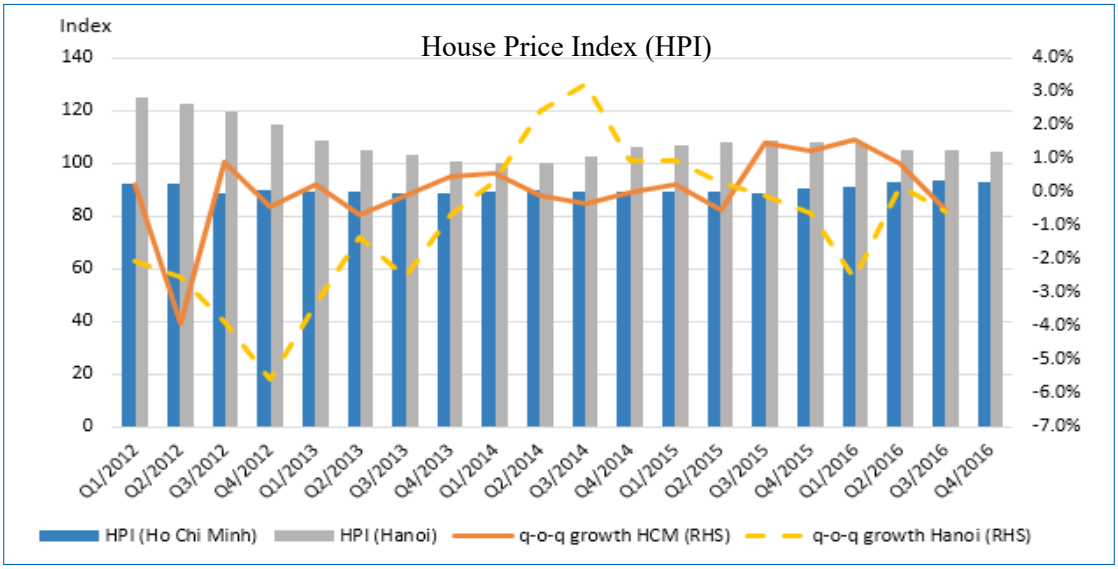
Figure 15: House Price Index in Hanoi and Ho Chi Minh City



Source: Savills.

As is illustrated from the house price indices both in Hanoi and HCM city, house prices in HCMC tend to be higher and more volatile than house prices in Hanoi. However, the fluctuation of the house price index is not too volatile. In HCM, the price index reached its peak of 125 points in Q1 2012, and then gradually declined to 100 points in Q1 2014. From that time onwards, the index has gone through a slight rather than wild fluctuations. In the Hanoi market, the house price index only hovered around 89 to 93 points and witnessed no significant changes. This can be accounted for by the fact that the economic situation during the 2014-2016 period was quite stable, which, in turn, had no strong effect on the real estate market.

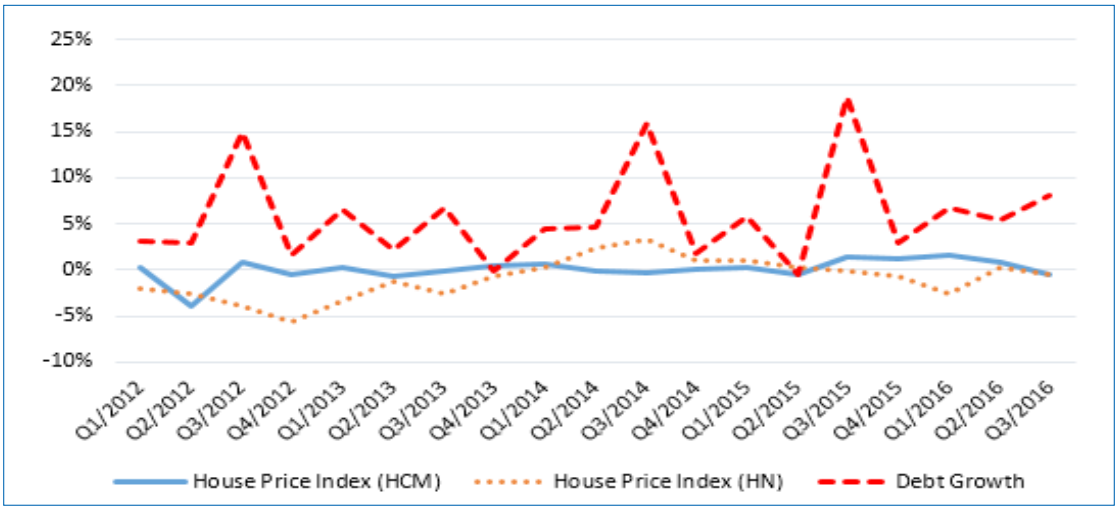
Figure 16: House Price Index and its Growth Rate in Hanoi and Ho Chi Minh City



Source: Savills.

House price indices in both Hanoi and Ho Chi Minh City were volatile on a quarter by quarter basis, fluctuating between -3.9% and 1.5% for HCMC and -5.6% to 3.2% for Hanoi. The charts indicate that price fluctuations in Hanoi was more volatile than in HCM. House price fluctuations have a direct impact on the value of the homeowners' properties. Increased home prices mean that the value of material possessions of homeowners have increased. The majority of the wealthiest in Vietnam are from the real estate industry.

Figure 17: Growth of House Price Index and Debt Growth



Source: SBV, Savills.

In Vietnam, household loans are mostly mortgaged. Therefore, house prices play a significant role in changes in the volume of debt. As housing prices increase, households are inclined to consume more and borrow more. The chart shows that the relationship between changes in the housing price index and household credit growth are interrelated, especially during financial crisis period when house prices went down.

Figure 18: Growth Rate of Household Debt, Household's Housing Loans and Housing Price Index from Q2/2014 to Q4/2016

Source: SBV, Savills.

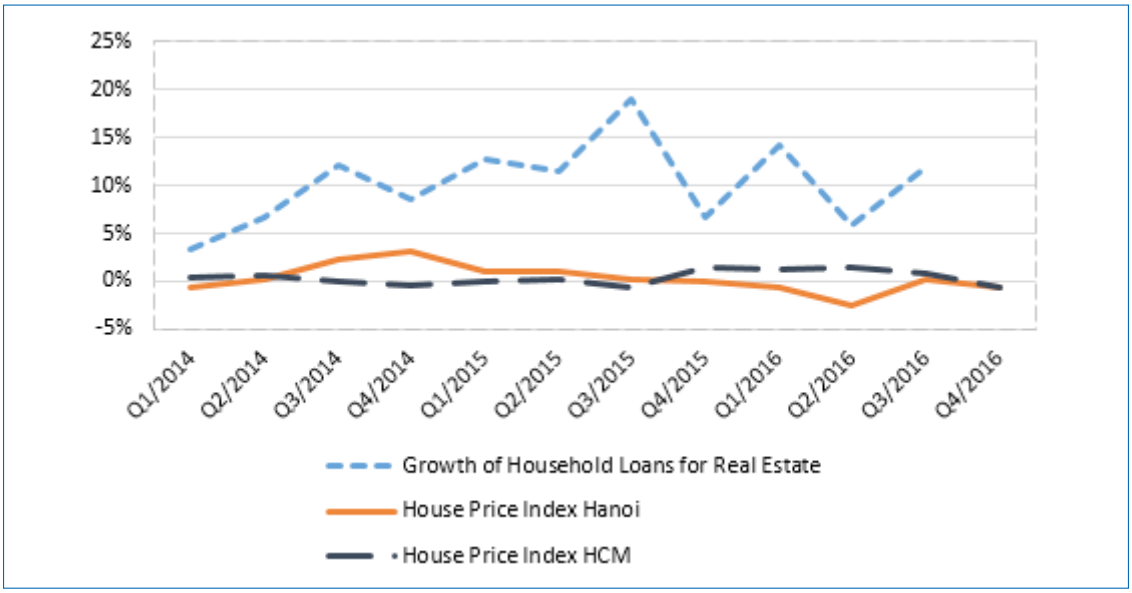
In addition, we have also added outstanding debt related to cost of repair and purchase of houses for living, for sale and for rent (quarterly figure from Q2/2014), and lending for real estate business. The researchers used this data as the total outstanding household real estate debt to illustrate the relationship between real estate and household debt.

According to the illustrated graph (quarterly data, quarter-on-quarter growth rate), the growth rate of household real estate loan followed a similar pattern with the increasing household debt but at a slower pace (less than 10%), while the growth rate of household debt is usually over 10%. The graph also shows that there is no strong correlation between the increase in household debt, real estate debt and housing price indexes in both Hanoi and Ho Chi Minh city.

The proportion of outstanding real estate loans in total outstanding loans tended to increase rapidly (from 16% in early 2014 to 25% in 4/2016). This increase is also in tandem with the recent trend of households who tend to buy houses for living (due to actual demand, especially in big cities). This increase also reflects the government's policy to encourage housing loans in recent years to revive the real estate market after a period of freeze, thereby stimulating other production areas, such as construction, production of building materials and so on to promote economic growth.

As shown in the chart below, while the proportion of outstanding real estate loans has been on the rise, real estate loans/total outstanding loans declined from 8.6% in Q1/2014 to under 1% in Q4/2016. This also represents the success of government management and SBV in the issuance of regulations and policies to limit real estate market to prevent the formation of a real estate asset bubble.

Figure 19: Growth of Household Loans for Real Estate and House Price Index



Source: State Bank of Vietnam, Savills.

The chart also confirms a positive correlation between the growth of household debt for real estate purposes and the housing price index over the majority of the period shown. However, the growth of outstanding loans reached its highest rate in Q3 2015 with an increase of 19% compared to the previous quarter, while the index of housing prices remained almost unchanged at this time. The absorption rate for 2015 Q3 in Hanoi also reached the highest rate of 45% while the figure for HCMC was less significant, at 19%.

6. Conclusion

Although household debt levels in Vietnam remain under control, it is envisaged that they will continue to increase in the coming years and the proportion of household debt/GDP is inclined to increase. However, this percentage is still below 60%, lower than other countries in the region. In addition, the proportion of outstanding real estate business loans/total outstanding loans has tended to decrease, while the proportion of real estate debt balance of households/total debt has increased, indicating that the increase in outstanding loans in the real estate sector was mainly due to the increase in debt by households rather than the real estate business. This also depicts that credit continues to flow into the production sector, contributing to economic growth and there is less worry about the possibility of a real estate bubble in Vietnam.

Due to the impact of the global financial crisis and the loosening of monetary policy in general, more households in Vietnam are turning to consumption patterns through debt financing, and tend to invest in real estate in the context of rising housing prices. The trend towards new consumer products amongst the youth has also accelerated consumer lending. In addition, the lower interest rate and easing of credit constraints have led to a substantial rise in household debt.

In the current period, household debt in Vietnam is on an increase, and this only represents the outstanding portion of loans in credit institutions while it is customary in Vietnam for consumers to borrow from relatives, friends and possibly borrow from the black credit segment. Therefore, in addition to controlling the credit of household debt in credit institutions to ensure the appropriate use of capital, Vietnam needs to have household debt statistics outside the formal credit institutions in order to have a comprehensive and in-depth evaluation of household debt, from which the government can formulate more effective policies.

References

Cecchetti; Mohanty and Zampolli, (2011), "The Real Effect of Debt," *BIS Working Paper*, No. 352.

Debelle, G., (2004), "Household Debt and the Macroeconomy," *BIS Quarterly Review*, March.

Goodhart, C. and B. Hofmann, (2008), "House Prices, Money, Credit, and the Macroeconomy," *Oxford Review of Economic Policy*, 24(1), pp. 180-205.

Iacoviello, M., (2004, "Consumption, House Prices and Collateral Constraints: A Structural Econometric Analysis," *Journal of Housing Economics*, 13, pp. 304–20.

Iacoviello, M., (2005),"House Prices, Borrowing Constraints, and Monetary Policy in the Business Cycle," *American Economic Review*, 95, pp. 739–64.

Kiyotaki, N. and J. Moore, (1997), "Credit Cycles," *Journal of Political Economy,* 105, pp. 211–248.

Lyons, R. and J. Muellbauer, (2013), "Explaining the Bubble: House Prices, User-cost and Credit Conditions in Ireland, 1975-2012," *Trinity Economics Papers*.

Mian, A. and A. Sufi, (2011), "House Prices, Home Equity-based Borrowing, and the US Household Leverage Crisis," *American Economic Review,* 101, pp. 2132–2156.

State Bank of Vietnam (SBV), (2017), Statistic, Available from: https://www.sbv.gov.vn/webcenter/portal/vi/menu/trangchu/tk.

Van Ha Nguyen, (2016), "Classifying the Shadow Banking in Commercial Bank of Vietnam," *International Journal of Humanities and Management Sciences (IJHMS)*, Volume 4, Issue 3 (2016).