BANK NEGARA MALAYSIA
CENTRAL BANK OF MALAYSIA

Bank Negara Malaysia Working Papers
WP7/2015

# Implications of Evolving Household Balance Sheets for Private Consumption in Malaysia

By Dhruva Murugasu, Chang Wen Huei, Tng Boon Hwa

July 2015

# Implications of Evolving Household Balance Sheets for Private Consumption in Malaysia

**Dhruva Murugasu**
**Chang Wen Huei**
**Tng Boon Hwa**[1]

## Abstract

Understanding the household balance sheet, and its interlinkages with private consumption and the real economy, is important, especially given developments in the advanced economies over the past decade. This paper presents estimates of the size and composition of the household balance sheet in Malaysia, and attempts to quantify its effect on private consumption through an estimated error-correction model of the aggregate consumption function. We find that disposable income is the most important driver of consumption, but financial and housing wealth also play significant supportive roles. In the long run, a RM1 increase in income, financial wealth and housing wealth increases private consumption, respectively, by 58 cents, 5.4 cents and 3.0 cents. Consumption credit disbursements and repayments are found to have a role in redistributing consumption in the short-run. These findings illustrate the importance of ensuring the sustainability of the household balance sheet and highlight the relevance of pre-emptive macroprudential measures undertaken by Bank Negara Malaysia (BNM) and the Government in recent years.

[1] The authors are grateful to Fraziali Ismail, Shasha Kartini Mohd Ridzam Deva, Dr. Mohamad Hasni Sha'ari, Dr. Loke Yiing Jia, Rubin Sivabalan, Sabrina Bashir Ahmad and Ang Jian Wei for their invaluable comments. All views expressed and errors made are those of the authors and do not necessarily reflect that of the Economics Department and Bank Negara Malaysia.
Correspondence: wenhuei@bnm.gov.my, boonhwa@bnm.gov.my

## 1. Introduction

The periods prior to, during and after the recent global financial crisis demonstrated the close interlinkages between the financial system, economic agents' balance sheets and the real economy. One area that has received greater attention is the relationship between household balance sheets and private consumption. The United States, for example, experienced strong credit expansion, a build-up in house prices and robust household consumption before 2007. This changed abruptly following the global financial crisis to an extended phase of balance sheet deleveraging, depressed house prices and weak consumption.

Over the past few years, private consumption in selected Asian economies, such as Singapore and Hong Kong SAR, has been resilient and accompanied by high growth in asset prices and credit. While it is tempting to draw similar comparisons with the US experience, there are likely considerable differences in the transmission of wealth and credit to private consumption across countries (Slacalek, 2009). For instance, differences in financial market development, regulatory frameworks and financial literacy can influence how households utilise their assets and credit for consumption purposes. The link between household balance sheets and their consumption should therefore be studied in-depth and on a country-specific basis.

This paper seeks to probe deeper into this link in the case of Malaysia. We first present estimates of the size and composition of household debt and assets, and study its evolution over time. We then estimate an aggregate consumption function that captures the short- and long-run dynamics of private consumption, especially in response to changes in disposable income, financial wealth, housing wealth and credit. Our methodology follows from a number of papers in the literature[2], mainly in advanced economies and selected developing countries. To our knowledge, this paper represents a first attempt to capture the interactions between specific components of household balance sheets and private consumption in Malaysia. The results thus contribute towards providing a more holistic understanding and improved surveillance of private consumption behaviour in Malaysia.

[2] Our methodology is guided by Mehra (2001), Case, Quigley and Shiller (2001, 2011, 2013) and Dynan (2012), as discussed in Section 4.0.

We find that the long-run marginal propensities to consume out of disposable income, financial wealth and housing wealth are 0.58, 0.054 and 0.030, respectively. This implies that in the long run[3], a RM1 increase in financial wealth will result in a 5.4 cents rise in private consumption, while a similar increase in housing wealth will result in a 3.0 cents increase. Despite the numerically smaller marginal propensities to consume out of wealth, the large absolute size of the stock of financial and housing wealth on household balance sheets result in wealth playing a significant supportive role for private consumption. In particular, financial and housing wealth contributed to 17% and 16% of private consumption growth, respectively, since 2005. Income, meanwhile, remains the key driver of private consumption, contributing an average of 65% of its growth since 2005. Consumption credit disbursements and repayments have positive and negative impacts on the short-run variations in private consumption, suggesting their role in redistributing consumption over time. Overall, our findings show that household balance sheet positions play a significant supportive role for private consumption in Malaysia. It also highlights the economic importance of Bank Negara Malaysia's (BNM) and the Government's recent pre-emptive macroprudential measures aimed at ensuring that developments on the household balance sheet are sustainable.

The remaining paper is organised as follows. Section 2 provides an overview of key themes in the theoretical and empirical literature that have motivated our work. Section 3 details how the household balance sheet is constructed and highlights some key trends. Section 4 explains the estimation approach and model specification, while Section 5 presents the results and policy implications. The final section concludes.

## 2. Literature Review

### 2.1 Theoretical Foundations

The important role of the household balance sheet, in particular wealth, in determining private consumption can be explored through standard consumption theories such as the permanent income hypothesis (Friedman, 1957) and the life-cycle hypothesis (Ando & Modigliani, 1963). Broadly, these theories posit that households aim to maintain a stable standard of living by avoiding excessive fluctuations in consumption[4]. Households thus

[3] The immediate impact is significantly smaller, as consumption behaviour tends to exhibit habit persistence.
[4] These results arise if households' utility functions depend on both current and future consumption, and have diminishing marginal utility of consumption in any given period.

estimate the expected value of their lifetime resources and consume an appropriate fraction of it every period (Hall, 1978). Wealth, both real (property) and financial wealth, forms a key part of households' lifetime resources. Any increase in the value of household wealth raises a household's lifetime resources and, hence, private consumption. However, the increase in private consumption in any given period will likely be modest relative to the rise in wealth, as households smooth the increase in wealth over time to maintain a stable consumption pattern.

In practice, there are three main channels through which an increase in wealth can affect household spending of homeowners (Skudelny, 2009 and Ludwig & Sløk, 2002).

1) **Realised wealth effect:** This effect occurs when consumers sell their assets at a higher price to realise a capital gain
2) **Unrealised wealth effect:** This effect works through expectations, as the asset is expected to be sold and a capital gain realised in the future
3) **Liquidity constraint effect:** Consumers borrow against the value of their assets (as collateral) to finance spending

For housing wealth, the transmission is potentially dampened by two effects that mainly affect non-homeowners (Skudelny, 2009 and Ludwig & Sløk, 2002):

4) **Budget constraint effect:** Rental cost may increase, reducing available income for other spending
5) **Substitution effect:** Households who need to purchase a house in the future may lower consumption to save for a higher down payment and to service a larger loan

The strength of channels (1), (2) and (3) likely differ for different forms of wealth, given differing levels of liquidity (ability to realise capital gains) and collateral rules by lenders. Meanwhile, channels (4) and (5) apply primarily to housing wealth. Therefore, understanding the overall level of household wealth, its composition and its impact on household spending is critical for a deeper understanding of private consumption.

On the liability side of the household balance sheet, the role of credit as a determinant of private consumption was given less emphasis prior to the global financial crisis (Dynan, 2012a). This is likely because standard life-cycle savings models implicitly assume that household spending depend only on underlying preferences and expected lifetime resources

(wealth and income). This changed after the crisis, as more recent studies such as Dynan (2012) and Mian, Rao and Sufi (2013) point out that high levels of debt could matter for household spending, especially during episodes of financial stress, for a number of reasons:

1) **Leverage or debt service target:** Indebted households who face a slump in asset prices or falling income may cut back on spending to reduce their debt in order to meet their target for leverage or the debt service ratio.

2) **Credit constraints:** Financial institutions are often less willing to lend to more-leveraged households, particularly during episodes of uncertainty.

3) **Debt burden:** The burden of debt repayments, especially when not in line with income or the underlying value of the asset, could affect households' willingness and ability to borrow further and spend.

Nonetheless, empirically identifying the role of credit is challenging, because it is difficult to disentangle the effect of over-indebtedness from the use of credit to smooth consumption in anticipation of higher future income. Thus, most studies on the credit channel focus on micro-level analysis of households affected by episodes of financial stress, rather than during normal times. Given that such micro-level data on household balance sheets is unavailable in Malaysia, our study focuses primarily on the effect of household assets[5].

## 2.2 Empirical Findings

Skudelny (2009) and De Bonis & Silvestrini (2012) provide a detailed summary of the recent cross-country empirical literature on the effects of household balance sheets, particularly wealth, on private consumption. Here we highlight the key findings in the literature that are relevant to our study. A number of studies in the literature find a modest positive effect of household wealth on private consumption (Table 2.1). An increase in wealth of $1 can be expected to increase household spending from 0 to 10 cents, depending on the type of wealth, time period and country studied, and country-specific structural factors[6] (Slacalek, 2009). Table 2.1 summaries the results of several key papers, which

[5] The potential effects of household debt in Malaysia are discussed in greater detail as an extension to our analysis in Section 5.4.

[6] This includes the composition of household balance sheets, levels of financial sophistication and ease with which households are able to liquidate or borrow against wealth (e.g. through mortgage equity withdrawals).

estimate the marginal propensities or elasticities to consume out of financial and housing wealth using different methodologies and time-period.

**Table 2.1: Marginal propensities and elasticity to consume out of wealth**

| Study | Economies covered | MPC | | | |
|---|---|---|---|---|---|
| | | Financial wealth | | Housing wealth | |
| | | Short-run | Long-run | Short-run | Long-run |
| **Studies based on micro-level data** | | | | | |
| Attanasio et al (2009) | UK | - | - | 0.04-0.21* | |
| Bostic et al. (2009) | US | - | 0.02* | - | 0.06* |
| Campbell & Cocco (2007) | UK | - | - | 1.22* | - |
| Dynan & Maki (2001) | US | 0.05-0.15 | - | - | - |
| Juster et al. (2006) | US | 0.0019 | | 0.0003 | |
| Rungcharoenkitkul (2011) | Thailand | - | 0.01* | - | 0.05* |
| **Studies using macro-level data** | | | | | |
| Carroll et al (2011) | US | 0.008-0.016 | 0.041-0.064 | 0.018-0.039 | 0.087-0.16 |
| Case, Quigley and Shiller (2013) | US states | 0.025* | 0.028-0.075* | 0.07* | 0.044-0.18* |
| Catte et al.( 2004) | 10 OECD countries | 0.01-0.03 | 0.01-0.07 | 0.01-0.08 | 0.01-0.08 |
| De Bonis & Silvestrini (2011) | 11 OECD countries | - | 0.036-0.04 | - | ~0.005 |
| Ludwig & Sløk (2002) | 16 OECD countries | -0.002* | 0.08* | 0.063* | 0.036* |
| Mehra (2001) | US | 0.01* | 0.03-0.04 | 0.1-0.15* | 0.03-0.05 |
| Peltonen et al (2012) | Asia EM | 0.027-0.03* | 0.097-0.098* | 0.012-0.042* | 0.04-0.154* |
| Skudelny (2009) | Euro area | - | 0.024-0.036 | - | 0.011 |
| Slacalek (2009) | 16 industrial countries | - | 0.05 | - | 0.05 |

* Refers to elasticity (rather than marginal propensity) to consume out of housing and financial wealth

Three key themes emerge from this literature (based on De Bonis & Silvestrini, 2012 and Slacalek, 2009). First, the marginal propensities to consume out of real (housing) wealth and financial wealth vary significantly (Case, Quigley & Shiller (2001, 2011, 2013), Aron & Muellbauer (2013) and Rungcharoenkitkul (2011) among others). For several economies, the marginal propensity to consume out of financial wealth tends to be higher, most likely because financial wealth is more liquid, making capital gains easier to realise. Second, the size of the marginal propensities to consume from wealth varies dramatically across

economies. As an example, Slacalek (2009) finds that consumers in Anglo–Saxon and market-based economies, and in countries with more developed mortgage markets tend to react more strongly to changes in wealth than in continental Europe. Finally, the relative strength of housing and financial wealth effects also varies across economies. While the effect of financial wealth tends to be larger than housing wealth in most economies, the opposite is true for the US and the UK (Slacalek, 2009). This is attributable, in part, to financial innovation in these economies that allows for mortgage equity withdrawals. Catte, Girouard, Price, & André (2004) also find that the effect of housing wealth compared to financial wealth is larger in Australia, Canada, the Netherlands, the UK and the US, as all of these economies provide opportunities for mortgage equity withdrawals.

These themes in the literature have two broad implications that motivate our study. First, the literature highlights the importance of distinguishing the effects of housing and financial wealth for private consumption. Hence, in the next section, we construct various components of Malaysia's household balance sheet to understand its size and composition. Second, given that the estimates of the marginal propensities to consume out of wealth vary widely across studies and countries, it is likely that the empirical results in the literature based on other economies are not directly applicable for Malaysia. Thus, in Section 5, we estimate the aggregate consumption function of the Malaysian economy, to understand the responsiveness of private consumption to changes in household wealth and credit. To our knowledge, this is the first such study for Malaysia.

## 3. The Balance Sheet Position of the Household Sector in Malaysia

### 3.1 Constructing the Household Balance Sheet

This section identifies and estimates the major components of household balance sheets. This data was compiled from a wide range of sources, as shown in Table 3.1. On the asset side of the balance sheet, the major components comprise deposits, the public provident fund, unit trust funds, direct investments in the stock market, insurance and housing wealth. Total household deposits comprise deposits at commercial banks, development financial institutions (DFIs) and non-bank financial institutions (NBFIs). The public provident fund refers to households' savings in the Employee Provident Fund (EPF)[7]. Households' holdings of securities are captured through investments in unit trust funds and estimates of direct

[7] The Employee Provident Fund (EPF) is a pension fund where all private sector employees are mandated to contribute a fixed portion of their wages every month, mainly for retirement purposes.

holdings of equities listed on the FTSE Bursa Malaysia (FBM) KLCI market. The latter is proxied by a 30% share of the FBM KLCI market capitalisation[8].

**Table 3.1: Source of Balance Sheet Components**

| Component | Source |
|---|---|
| **Household assets** | |
| Deposits | |
| Banking system | Bank Negara Malaysia (BNM) |
| Development financial institutions | DFIs |
| Non-bank financial institutions | Lembaga Tabung Haji |
| Pension funds | Employee Provident Fund |
| Unit trust funds | Securities Commission (SC) |
| Direct investment in stock market | FTSE Bursa Malaysia KLCI (FBM KLCI) |
| Insurance | BNM |
| Housing wealth | National Property Information Centre (NAPIC) |
| **Household Liabilities** | |
| Loans | |
| Banking system | BNM |
| Development financial institutions | BNM |
| Non-bank financial institutions | BNM |

Finally, housing wealth is not directly measured and is estimated from the following expression:

$$H_t = P_t \times (S_t - E_t) \qquad (1)$$

Where,

$H_t$ = Value of house wealth

$P_t$ = Average home price

$S_t$ = Number of existing units (housing stock)

$E_t$ = Number of unsold units (excess supply)

*t* denotes the time period. The value of housing wealth is estimated to be the average national house price multiplied by the number of residential properties with owners $(S_t - E_t)$. Thus, movements in housing wealth reflect changes in prices, home ownership or both.

The aforementioned assets vary in their degree of liquidity and hence likely affect consumption differently. For instance, deposits, unit trust funds and direct investments in the

[8] The average monthly retail holdings (from Jan 2012 to July 2013) of FBM KLCI, based on the top 30 stocks in terms of market capitalisation, was approximately 30% of market capitalisation.

stock market are generally more liquid compared to housing wealth and mandatory contributions to the Employees Provident Fund. Thus, understanding not just the size but also the composition of household assets is critical for assessing its impact on private consumption.

On the liabilities side, we categorize household loans into three functional purposes – for consumption (consumption credit), to purchase property and to purchase securities[9]. Loans for consumption purposes refer to vehicle loans, personal loans and credit card facilities.

### 3.2 Evolving Household Balance Sheet in Malaysia

Table 3.2 presents estimates of the household balance sheet at the aggregate level in terms of value, share and growth. The figures show that the household balance sheet in Malaysia has evolved significantly over the recent decade. Broadly, household assets are estimated at about RM3,204 billion whereas household debt is approximately RM854 billion at end-2013.

Three key aspects of Malaysia's household balance sheet can be observed: First, the size of the balance sheet has grown since 2002. Total household assets grew at an average annual rate of 10.5% from 2003-2013 to 325.5% of GDP at end-2013, while household debt grew annually by 12.7% to 86.8% of GDP at end-2013 (Table 3.2). In level terms, household assets continue to exceed debt by 3.8 times. This trend is mainly attributable to rising household income, which facilitates asset accumulation through an increase in savings and borrowings. Second, property-related assets and liabilities are the largest component on both sides of the balance sheet.[10] As at end-2013, property assets accounted for 40.6% of total assets, while property loans accounted for largest share of total liabilities at 51.8% (Table 3.2).

[9] For Malaysia, this comprises mainly loans to purchase unit trust funds.

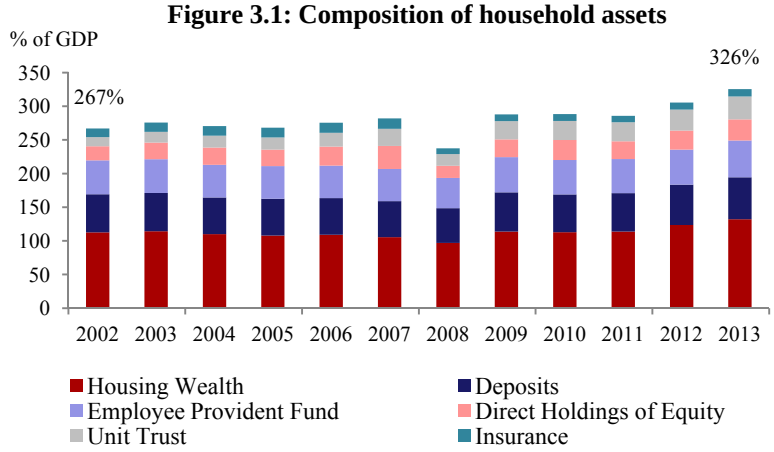
[10] This is also observed in the Euro Area, US and UK.

**Table 3.2: Major Components of Assets and Liabilities of the Household Sector**

| | Value (RM mn.) | | Share (%) | | CAGR (%) |
|---|---|---|---|---|---|
| | 2003 | 2013 | 2003 | 2013 | 2003-2013 |
| **Assets** | | | | | |
| Housing Wealth | 498,138 | 1,299,999 | 41.5 | 40.6 | 10.2 |
| Deposits | 246,661 | 612,938 | 20.5 | 19.1 | 9.5 |
| Employee Provident Fund | 218,725 | 538,204 | 18.2 | 16.8 | 9.4 |
| Unit trust funds | 70,080 | 335,510 | 5.8 | 10.5 | 18.1 |
| Direct holdings of equities | 107,176 | 309,646 | 8.9 | 9.7 | 12.6 |
| Insurance | 60,107 | 108,039 | 5.0 | 3.4 | 7.0 |
| **Liabilities** | | | | | |
| Property loans | 158,776 | 442,358 | 56.8 | 51.8 | 11.5 |
| Motor vehicle loans | 65,473 | 150,128 | 23.4 | 17.6 | 9.0 |
| Personal loans | 22,110 | 141,532 | 7.9 | 16.6 | 23.2 |
| Securities loans | 11,374 | 54,878 | 4.1 | 6.4 | 15.5 |
| Credit cards | 12,227 | 35,487 | 4.4 | 4.2 | 11.7 |
| Others | 9,630 | 29,912 | 3.4 | 3.5 | 47.8 |

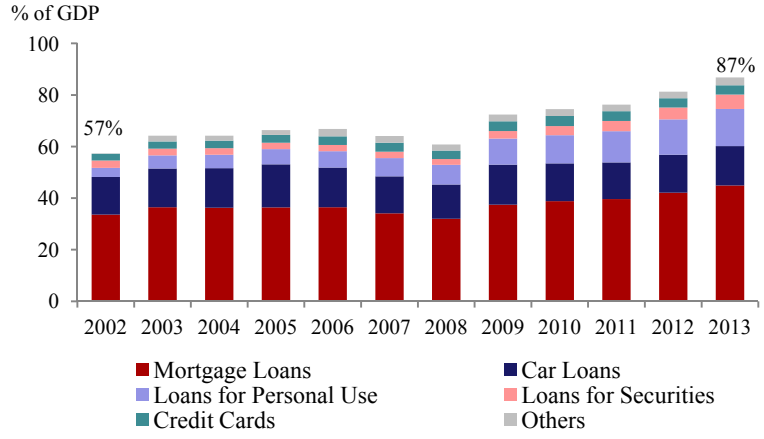
Source: Bank Negara Malaysia

**Figure 3.1: Composition of household assets**




Source: Bank Negara Malaysia

**Figure 3.2: Composition of household debt**

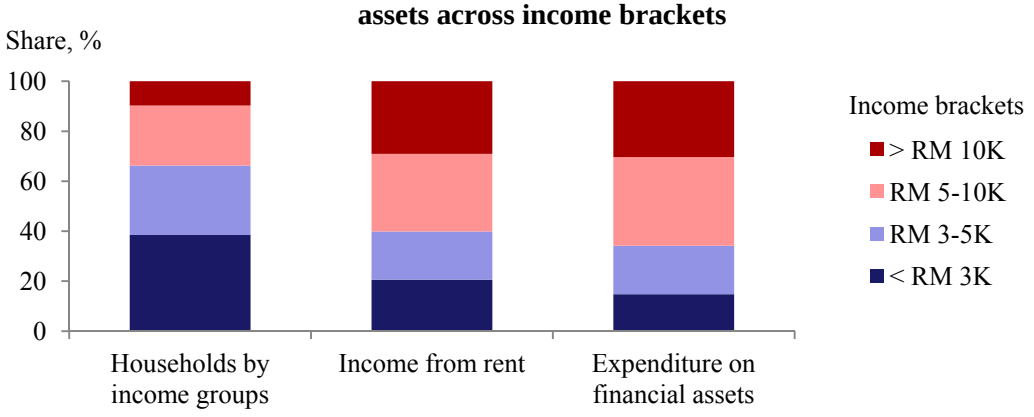



Source: Bank Negara Malaysia

Finally, the composition of household assets has become more diversified, which is also reflected in the developments on the liabilities side (Figures 3.1 and 3.2). While the level of deposits continues to grow, its share of total assets has been on a moderating trend. Meanwhile, the accumulation of assets in unit trust funds and equities has been rising (from 14.8% to 20.1% of household assets between 2003 and 2013). On the liability side, the corresponding trend is the increasing share of loans to purchase securities from 5.4% in 2001 to 6.4% in 2013. This trend not only reflects a wider range of products and services on offer, which is a sign of growing maturity of the domestic financial institutions, but also the households' growing financial sophistication and increasing awareness of alternative savings instruments.

From a distributional perspective, much of the wealth accumulation can be accounted for by higher-income households who are able to save a larger proportion of their income. Figure 3.3 illustrates the distribution of households by income groups and proxies of asset ownership based on flow data across income brackets[11]. Relative to lower-income households, those with monthly incomes above RM5,000 (accounting for a share of 33.7% of total households) assume a larger share of spending that is channelled to the accumulation of financial assets (65.8%) and of income earned from rent (60.1%)[12].

**Figure 3.3: Income from rent and expenditure on the accumulation of financial assets across income brackets**



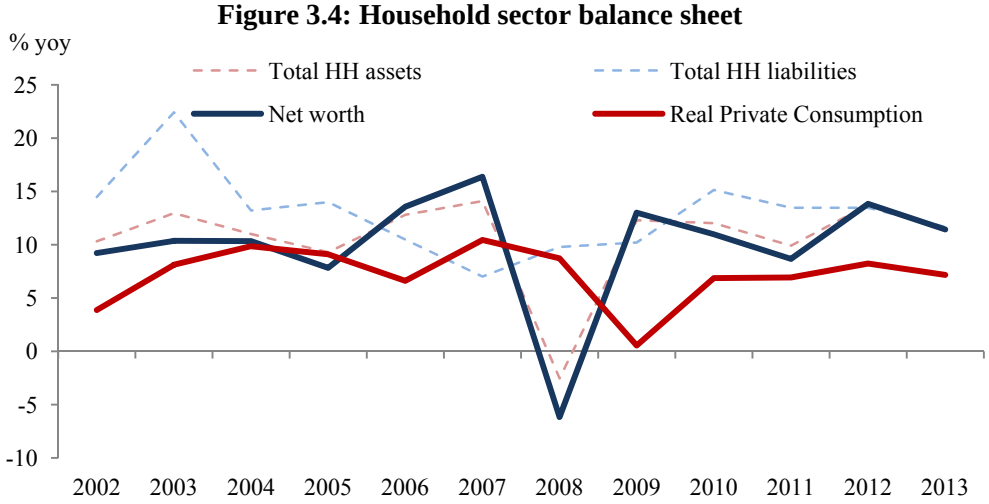

Source: Household Expenditure Survey 2009/10 and Household Income Survey 2012, Department of Statistics Malaysia

As a whole, households' accumulation of net worth (value of total assets minus total liabilities) has increased by 2.6 times from RM921 billion in 2003 to RM2,350 billion as at end-2013. Notably, the correlation between net worth and private consumption growth in

[11] Statistics on stocks of household assets by income groups are not available.
[12] Rental income, however, constitutes only a small fraction of total income for all income brackets.

Malaysia is more evident post- global financial crisis (from 2010 onwards). This is indicative of a relationship between household balance sheets and private consumption (Figure 3.4). The remaining paper seeks to better understand and quantify the link between developments in the household balance sheet and private consumption.

**Figure 3.4: Household sector balance sheet**




## 4. Methodology

We now describe our methodology, using Mehra (2001), Case, Quigley and Shiller (2001, 2011, 2013) and Dynan (2012) as guides. Our main goal is for the empirical framework to capture the transmission of both wealth and credit channels on private consumption at the aggregate level.

### 4.1 Estimation Approach

The life-cycle hypothesis posits that an individual's utility depends on consumption at present and in the future. The individual thus allocates lifetime resources, wealth and expected future income streams, over several time periods. Hence, we model consumption as a function of income and wealth. It is assumed that current income partially captures the variation in expected lifetime income since current income tends to be a good indicator of future income.

If individuals behave as described above and constantly adjust their consumption behaviour in response to changes in their expected lifetime resources, then only income and

net worth should enter our empirical model. However, there are reasons to believe otherwise, for the following reasons.

First, different types of wealth may affect consumption differently, as discussed in the literature review. Given this, our baseline model specifies housing and financial wealth separately in our estimations to capture the differing ability to spend out of the different types of wealth.

Second, consumers may not immediately adjust to their 'optimal' level of consumption after unanticipated shocks and only do so in the long run. Mehra (2001) points out that consumption may exhibit persistence due to adjustment costs or habit persistence in consumption behaviour. During this period of adjustment, consumption credit (or a drawdown of savings) may play a role in supporting private consumption. Therefore, we specify our consumption function as an error correction model, which allows consumption to adjust to changes in long-run fundamentals over time. Disbursements and repayments of credit for consumption purposes are included in the short-run specification to capture consumption smoothing behaviour.

Finally, credit and capital markets are not perfect. Some individuals do not have access to desired borrowing especially if they already have high debt obligations. This necessitates us to consider the consumption effects of debt repayments on current resources and access to credit markets due to high leverage. We test this hypothesis in Section 5.4 as an extension of our baseline model.

### 4.2 Data Description

The variables used in the estimations are private consumption, disposable income, housing wealth, financial wealth as well as disbursements and repayments of consumption credit. They are defined as below (Table 4.1).

**Table 4.1: Description of variables**

| Variable | Definition |
|---|---|
| Private consumption | Total spending by resident households domestically and abroad |
| Disposable income | Household income net income taxes |
| Net housing wealth | Value of housing wealth minus loans for property purchases |
| Net financial wealth | Value of holdings of unit trust funds minus loans for the purchase of securities |
| Consumption credit disbursements | Disbursements of loans for motor vehicles, personal use and the purchase of consumer durables, plus net disbursements of credit card loans |
| Consumption credit repayments | Repayment of loans for motor vehicles, personal use and the purchase of consumer durables |

Quarterly data of private consumption and disposable income from the Department of Statistics Malaysia Quarterly National Accounts and Oxford Economics, respectively, are extracted from Haver Analytics. The gross value of housing wealth is as described in Section 3.1, while the gross value of financial wealth is proxied by the value of holdings of unit trust funds. We exclude direct holdings of equities in our estimation, as reliable quarterly data is unavailable. The relevant figures for outstanding loans in the estimation of net housing and financial wealth, consumption credit disbursements and repayments are obtained from Bank Negara Malaysia, DFIs and NBFIs. All variables are deflated with the private consumption deflator, seasonally adjusted and span from the first quarter of 2002 to the fourth quarter of 2013.

### 4.3 Model Specification

We specify our baseline model as follows. The long-run equation takes the form:

$$C_t = \alpha + \beta Y_t + \gamma NHW_t + \theta NFW_t + \varepsilon_t \quad (2)$$

$C_t$ is private consumption, $Y_t$ is disposable income, $NHW_t$ is aggregate net housing wealth and $NFW_t$ is aggregate net financial wealth. Both housing and financial wealth are estimated as the value of wealth net of the outstanding loans used to purchase them. $NHW_t$ and $NFW_t$ are taken as at the end of the preceding period (time *t-1*,) to capture the net wealth position at the beginning of the current period (time *t*). This is as consumption and income decisions in period *t* influence net wealth at the end of period *t* via savings, leading to endogeneity issues

if current period wealth is included. $\varepsilon_t$ captures the difference between actual consumption and the estimated long-run level of consumption. We postulate that this difference is eliminated over time via an adjustment process.

Thus, we model the short-run dynamics of private consumption with the following error correction model:

$$\Delta C_t = \alpha' + \beta' \Delta Y_t + \gamma' \Delta NHW_t + \theta' \Delta NFW_t + \rho \Delta CC_t^{disb} + \lambda \Delta CC_t^{repay} - \Phi(C_{t-1} - \alpha - \beta Y_{t-1} - \gamma NHW_{t-1} - \theta NFW_{t-1}) + \mu_t \quad (3)$$

$\Delta$ represents the first-difference of the variables. $CC_t^{disb}$ is disbursements of consumption credit, while $CC_t^{repay}$ is repayments of consumption credit. These variables capture individuals that utilise credit markets to directly finance their consumption. We postulate that direct financing of consumption by credit has only short-run and not long-run effects, since consumption credit does not influence lifetime resources but only involves a redistribution of it over time periods.

$\Phi$ captures the speed of adjustment to the long-run equilibrium. The expression in the parentheses models the deviation of consumption from its long-run equilibrium in the previous period. A higher $\Phi$ indicates that consumers are able to adjust quicker from deviations back to their long-run consumption level.

### 4.4 Estimation Technique

The long-run equation (2) is estimated using the dynamic OLS (DOLS) methodology based on Saikkonen (1991) and Stock and Watson (1993). This DOLS estimator has three key benefits: The test statistics (*t* and Wald-statistics) have conventional asymptotic distributions, they are efficient and can account for possible endogeneity between the regressors. The lead-lag structure in the DOLS estimation is chosen to minimize the Schwarz Information Criterion. Meanwhile, the short-run equation is estimated using OLS with heteroskedasticity and autocorrelation consistent (HAC) standard errors based on Newey and West (1987)[13].

[13] All estimations are conducted with EViews software.

### 4.5 Diagnostic Tests

Prior to estimating equations (2) and (3), we first verify the time-series properties of the variables. Unit root tests indicate that private consumption, disposable income, net housing wealth, net financial wealth, consumption credit disbursements and repayments are all I(1) in levels and I(0) in first difference. In general, regressions involving I(1) series such as equation (2) will produce spurious regressions, appearing to show a statistically significant relationship even when one may not exist (Granger & Newbold, 1977). However, Engle and Granger (1987) find that a linear combination of two or more I(1) series may be stationary. If so, the variables are cointegrated and OLS estimates of the coefficients will be super-consistent. Hence, we test equation (2) to assess if the variables are cointegrated. The results from four cointegration tests are presented below.

**Table 4.2 Regression Results across Income Brackets**

| Cointegration Test | Null Hypothesis | p-value | Conclusion |
|---|---|---|---|
| Hansen Instability | Series are cointegrated | >0.2 | No significant evidence that the series are not cointegrated |
| Park Added Variables | Series are cointegrated | 0.84 | No significant evidence that the series are not cointegrated |
| Engle-Granger | Series are not cointegrated | 0.10* | Evidence of cointegration at the 10% significance level |
| Phillips-Ouliaris | Series are not cointegrated | 0.08* | Evidence of cointegration at the 10% significance level |

Note: ***, ** and * denote statistical significance at the 1, 5 and 10 per cent level.

Based on all four tests, there are signs of cointegration[14], implying the likely existence of a long-run relationship between private consumption, income and wealth as postulated by the permanent income hypothesis. We present further evidence for cointegration with our short-run consumption function results in Section 5.2.

[14] We conjecture that the relatively short sample of our data is the reason why the Engle-Granger and Phillips-Oularis test were unable to reject the null hypothesis of no cointegration at the 5% and 1% level.

## 5. Results

### 5.1 The Long-run Consumption Function

The estimated long-run consumption function using DOLS is shown in Table 5.1, showing the aggregate marginal propensities to consume (MPC) out of income, housing wealth and financial wealth.

**Table 5.1: DOLS estimates of the long-run aggregate consumption function**

**Dependent Variable: Private consumption (RM mn)**

| | Coefficient | Standard error | p-value |
|---|---|---|---|
| **Disposable Income** | **0.58*** ** | 0.049 | 0.0000 |
| **Net housing wealth** | **0.030*** ** | 0.0094 | 0.0027 |
| **Net financial wealth** | **0.054*** ** | 0.019 | 0.0077 |
| Constant/Intercept | 2,628 | 2,610 | 0.3202 |
| Adjusted R-squared | 0.998 | | |
| Sample size | 48 | | |

**Note:** ***, ** and * denote statistical significance at the 1, 5 and 10 per cent level. Heteroscedasticity robust standard errors are reported.

The marginal propensity to consume out of disposable income is 0.58 and statistically significant. This estimate is broadly in line with Murugasu, Ang and Tng (2013), who find that the MPCs of various income groups in Malaysia vary between 0.25 and 0.81[15].

The marginal propensity to consume out of housing and financial wealth is 0.030 and 0.054, respectively, and significant at the 1% level. This implies that for every RM1 increase in each, household spending will rise by 3.0 cents and 5.4 cents respectively[16]. Three broad observations emerge. First, the small size of both coefficients relative to income is in line with the permanent income hypothesis, which postulates that increases in wealth will be distributed to finance both present and future consumption. Second, the marginal propensity to consume out of financial wealth is higher than out of housing wealth. This is likely as

[15] The MPC out of disposable income for lower income households is higher than that for higher income households. The MPC of 0.81 is for households earning below RM1,000, while the MPC of 0.25 corresponds to those earning above RM10,000.

[16] The size of the coefficients on financial and housing wealth are numerically small as they refer to the propensity to consume out of the stock of wealth, as opposed to a flow variable such as income. Nonetheless, given the absolute size of this stock of wealth, its contribution to private consumption growth is significant.

financial wealth is more liquid, and there is often greater certainty as to its value. Finally, the large share of housing wealth in household balance sheets makes it a significant determinant of private consumption despite the relatively small coefficient. We explore this further in Section 5.3 on the implications of the findings.

### 5.2 Short-run Adjustments to Private Consumption

The estimated short-run dynamics of private consumption is shown in Table 5.2. The marginal propensities to consume out of disposable income, housing wealth and financial wealth are 0.149, -0.003 and 0.028, respectively, which are lower compared to the long-run coefficients.

**Table 5.2: OLS estimates of the short-run aggregate consumption function**

**Dependent Variable: Change in private consumption (RM mn)**

| | Coefficient | Standard error | p-value |
|---|---|---|---|
| **Δ Disposable Income** | **0.149** | 0.130 | 0.26 |
| **Δ Net housing wealth** | **-0.003** | 0.015 | 0.86 |
| **Δ Net financial wealth** | **0.028*** | 0.014 | 0.05 |
| **Δ Consumption credit disbursements** | **0.105** | 0.098 | 0.29 |
| **Δ Consumption credit repayments** | **-0.030** | 0.116 | 0.80 |
| Constant/Intercept | 173.9 | 271.2 | 0.53 |
| Disequilibrium error | -0.488 | 0.104 | 0.00 |
| Adjusted R-squared | 0.486 | | |
| Sample size | 47 (after adjustments) | | |

**Note:** ***, ** and * denote statistical significance at the 1, 5 and 10 per cent level. Heteroscedasticity robust standard errors are reported.

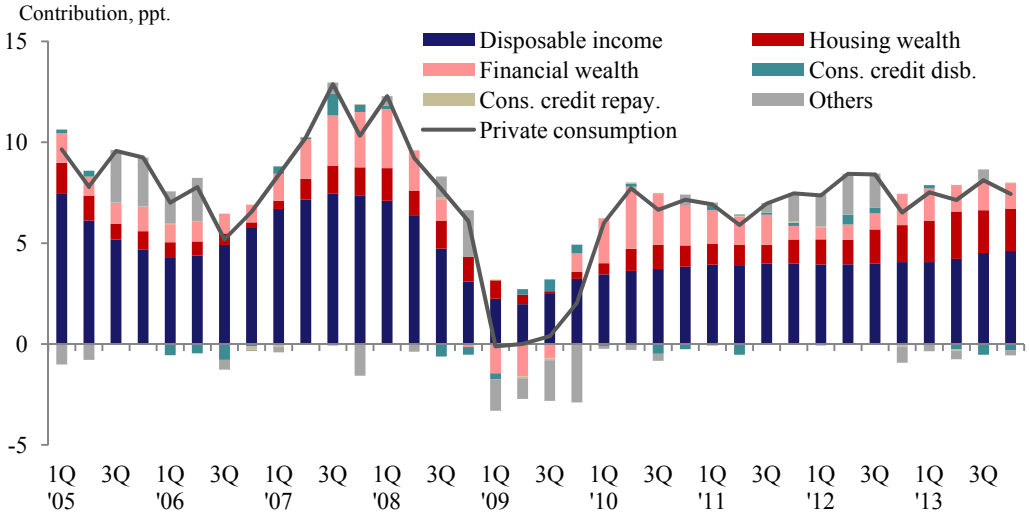
These findings are consistent with short-run persistence in consumption behaviour, due to adjustment costs or habit persistence. As expected, consumption credit disbursements and repayments have positive and negative impacts on household spending, respectively. This suggests that consumption credit may play a role in influencing private consumption in the short-run. While most of the coefficients have a low statistical significance, we postulate that this is due to the relatively short sample of data available to us.

In addition, the coefficient on the error-correction term (adjustment speed) is 0.488 and is statistically significant at the 1% level, which provides further support for the existence of a cointegrating relationship (Kremers, Ericsson, & Dolado, 1992).

### 5.3 Implication of the Results

We now break down the factors driving private consumption growth to better understand the implications of our results. As the variables in both the short- and long-run equations are additively separable, we use our estimated consumption function to obtain a historical decomposition of private consumption growth over time. Table 5.3 and Figure 5.1 highlight these findings.

**Figure 5.1: Drivers of private consumption growth**




Source: Bank Negara Malaysia estimates

**Table 5.3: Average contribution of the determinants of private consumption growth (1Q 2005 - 4Q 2013)**

| Determinant | Contribution (%) |
|---|---|
| Disposable income | 65 |
| Housing wealth | 16 |
| Financial wealth | 17 |
| Consumption credit disbursements | 0 |
| Consumption credit repayments | 0 |
| Others | 3 |

Source: Bank Negara Malaysia estimates

As expected, disposable income is the most important driver of private consumption, accounting for an average of 65% of private consumption growth between 2005 and 2013. Since 2005, housing and financial wealth have supported private consumption, accounting for 16% and 17% of private consumption growth, respectively. Their contributions have increased in the post-global financial crisis period, which is consistent with the expansion in household balance sheets. Consumption credit disbursements, while on average playing a small role[17], contributed significantly to private consumption during certain periods. For example, between 2Q and 4Q 2009, consumption credit disbursements contributed an average of 0.4 percentage points to overall private consumption growth of 0.8%[18]. This reflects the fact that consumption credit cannot permanently increase spending, but rather helps households redistribute consumption over time.

Our findings on household balance sheets and its impact on private consumption suggest that balance sheet developments have significant policy implications for two key reasons. First, asset price movements have an important effect on household spending. This warrants a policy awareness of the sustainability of asset price developments and their spillovers to economic activity.

Second, changes in household income may now pose significant implications for growth and financial stability. It not only affects households' ability to consume in a given period, but also to service their higher debt obligations[19]. However, this risk is partially alleviated by households' holdings of assets at the macro level[20]. Liquid financial assets of households are 1.6 times of outstanding debt, which is sufficient to cover their liabilities in the event of income shocks. In addition, 52% of the household debt is utilised for property purchases and, hence, is backed by physical assets. From a distributional perspective, however, households earning below RM3,000 a month have higher average leverage positions than those in other income groups and hence are more susceptible to income shocks.

[17]Consumption credit disbursements and repayments have a very small contribution on average as the model specification assumes they have only a short-run and not a long-run impact.
[18]This coincided with the reductions in the Overnight Policy Rate by BNM to support the economic recovery during this period.
[19] For example, if an income earner of an indebted household becomes unemployed, the household may be forced to further cut back on spending to manage debt repayments or face default.
[20] The sale of liquid assets could support the repayment of debt obligations in the event of income shocks.

The findings indicate that the policy imperative is thus to continue to ensure that households only borrow within their capacity. In this vein, the Government and BNM have undertaken pre-emptive policies to prevent household balance sheets from becoming a source of systemic risk. In the 2014 Budget, the Government raised the real property gains tax (RPGT) and the minimum price of properties that can be purchased by foreigners. These measures were aimed at curbing speculation and ensuring that property prices grow in line with fundamentals. BNM also introduced macroprudential measures in several stages since 2010, to prevent excessive household indebtedness and to ensure responsible lending practices[21]. These measures were gradual and targeted by design, to avoid over-adjustments that could have adverse effects on household spending and hence, overall growth.

### 5.4 Limitations and Scope for Further Research

This section presents several areas for improvement going forward. First, it would be useful to explicitly model the impact of total household debt on private consumption. We attempt to do so in this study by estimating a long-run consumption function of disposable income, gross housing wealth, gross financial wealth[22] and total household debt. The methodology is similar to that in Section 4 and the results are presented in Table 5.4.

These results show that the responsiveness of aggregate private consumption to changes in household debt is negative, as expected, but is relatively small and statistically insignificant. We believe that this is likely an under-estimate of the impact of higher household debt, as our sample period does not include any episodes of widespread household deleveraging and is therefore unable to empirically capture the behavioural response of excessive leverage on household spending. In contrast, using household level data for the United States, Dynan (2012) finds that households with higher leverage positions experienced larger declines in consumption after the global financial crisis. Her regression results across a range of specifications find strong evidence that household leverage positions exert a negative effect on consumption after controlling for the drop in income, wealth and a range of

[21] These measures are part of a broader trend of more active use of macroprudential policies to manage risks related to financial imbalances and excessive leverage. PR China, Chinese Taipei, Hong Kong SAR, Singapore and Indonesia have also introduced macroprudential measures to either manage property prices or mitigate unsustainable increases in household indebtedness.

[22] Gross housing and financial wealth are used as it is assumed that the impact of higher debt used to purchase property or financial assets is captured by the total household debt term.

household characteristics. Mian, Rao and Sufi (2013) find similar results with aggregate data across geographical locations in the US.

**Table 5.4: Alternative long-run aggregate consumption function**

**Dependent Variable: Private consumption (RM mn)**

| | Coefficient | Standard error | p-value |
|---|---|---|---|
| **Disposable Income** | **0.60*** ** | 0.050 | 0.0000 |
| **Gross housing wealth** | **0.023** ** | 0.011 | 0.0364 |
| **Gross financial wealth** | **0.050*** ** | 0.014 | 0.0018 |
| **Total household debt** | **-0.009** | 0.015 | 0.5495 |
| Constant/Intercept | 2,658 | 2,934 | 0.3713 |
| Adjusted R-squared | 0.999 | | |
| Sample size | 48 | | |

**Note:** ***, ** and * denote statistical significance at the 1, 5 and 10 per cent level. Heteroscedasticity robust standard errors are reported.

More generally, the consumption functions in this paper are estimated over a relatively stable period for the household balance sheet. The applicability of our results during periods of balance sheet distress should thus be treated with caution. Going forward, further efforts should be undertaken to extend our dataset to the period covering the Asian Financial Crisis, or undertake analysis in countries at similar stages of development that have experienced episodes of household deleveraging. However, data availability is a significant challenge.

Another area for improvement is to replicate our analysis over a longer sample period. Our consumption functions are currently estimated on quarterly data for a period of 12 years. As a result, a number of our coefficients are statistically insignificant. Of importance, with the relatively short sample, we were also unable to meaningfully identify the potential presence of structural breaks in our coefficients. Going forward, we intend to update our findings and undertake structural break analysis as we obtain an increasing number of data points.

## 6. Concluding Remarks

This paper addresses a gap in the knowledge of private consumption in Malaysia – how household balance sheet developments, in particular asset prices and credit conditions, affect private consumption. After presenting estimates of the size and composition of the household balance sheet in Malaysia, this paper quantifies its effect on private consumption through an aggregate consumption function.

We find that the long-run[23] marginal propensities to consume out of disposable income, financial wealth and housing wealth are 0.58, 0.054 and 0.030[24], respectively. This result, coupled with the large absolute size of the stock of financial and housing wealth in the household balance sheet, suggests that wealth plays a significant supportive role for private consumption. In particular, financial and housing wealth have contributed 17% and 16% of private consumption growth, respectively, since 2005. Nonetheless, income remains the key driver of private consumption, contributing 65% of its growth since 2005. Consumption credit disbursements and repayments, meanwhile, have positive and negative impacts on the short-run variations in private consumption. This suggests their role in redistributing consumption over time.

Overall, our findings imply that household balance sheet positions play a key supportive role for private consumption in Malaysia. They highlight the longer-term macroeconomic importance of ensuring that asset prices grow in a sustainable manner and that all households only borrow within their means. Our paper thus sheds some light on the potential long-term benefits of the Government's and BNM's pre-emptive macroprudential measures in recent years to ensure the sustainability of asset prices and household credit growth. It also illustrates the importance of continued vigilance against the potential build-up of imbalances in the household balance sheet.

[23] The immediate impact is significantly smaller, as consumption behaviour tends to exhibit persistence

[24] The size of the coefficients on financial and housing wealth are numerically small as they refer to the propensity to consume out of the stock of wealth, as opposed to a flow variable such as income. Nonetheless, given the absolute size of this stock of wealth, its contribution to private consumption growth is significant.

**Bibliography**


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

Aron, J., & Muellbauer, J. (2013). Wealth, Credit Conditions, and Consumption: Evidence from South Africa. *Review of Income and Wealth 59*, s161–s196.

Attanasio, O. P., Blow, L., Hamilton, R., & Leicester, A. (2009). Booms and busts: Consumption, house prices and expectations. *Economica, 76(301)*, 20-50.

Bostic, R., Gabriel, S., & Painter, G. (2009). Housing wealth, financial wealth, and consumption: New evidence from micro data. *Regional Science and Urban Economics, 39(1)*, 79-89.

Calomiris, C., Longhofer, S. D., & Miles, W. (2009). The (Mythical?) Housing Wealth Effect. *NBER Working Paper 15075*.

Campbell, J. Y., & Cocco, J. F. (2007). How do house prices affect consumption? Evidence from micro data. *Journal of Monetary Economics, 54(3)*, 591–621.

Carroll, C. D., Otsuka, M., & Slacalek, J. (2011). How large are housing and financial wealth effects? A new approach. *Journal of Money, Credit and Banking, 43(1)*, 55-79.

Case, K. E., Quigley, J. M., & Shiller, R. J. (2001). Comparing Wealth Effects: The Stock Market Versus the Housing Market. *NBER Working Paper No. 8606*.

Case, K. E., Quigley, J. M., & Shiller, R. J. (2005). Comparing wealth effects: the stock market versus the housing market. *Advances in macroeconomics, 5(1)*.

Case, K. E., Quigley, J. M., & Shiller, R. J. (2011). Wealth Effects Revisited 1978-2009. *NBER Working Paper No. 16848*.

Case, K. E., Quigley, J. M., & Shiller, R. J. (2013). Wealth Effects Revisited: 1975-2012. *NBER Working Paper No. 18667*.

Catte, P., Girouard, N., Price, R. W., & André, C. (2004). Housing Markets, Wealth and the Business Cycle. *OECD Economics Department Working Papers 394*.

Catte, P., Girouard, N., Price, R., & André, C. (2004). The contribution of housing markets to cyclical resilience. *OECD Economic Studies, 38*.

De Bonis, R., & Silvestrini, A. (2012). The effects of financial and real wealth on consumption: new evidence from OECD countries. *Applied Financial Economics, 22(5)*, 409-425.

Dynan, K. (2012). Is a Household Debt Overhang Holding Back Consumption? *Brookings Papers on Economic Activity*, pp. 299-362 Spring 2012.

Dynan, K. E., & Maki, D. M. (2001). Does Stock Market Wealth Matter for Consumption? *FEDS Discussion Paper No. 2001-23*.

Engle, R. F., & Granger, C. W. (1987). Co-Integration and Error Correction: Representation, Estimation, and Testing. *Econometrica, 55(2)*, 251-276.

Friedman, M. (1957). *A Theory of the Consumption Function.* Princeton University Press.

Granger, C. W., & Newbold, P. (1977). Forecasting Economic Time Series. New York: Academic Press.

Hall, R. E. (1978). Stochastic Implications of the Life Cycle-Permanent Income Hypothesis: Theory and Evidence. *Journal of Political Economy, 86*(6), 971-987.

Juster, F. T., Lupton, J. P., Smith, J. P., & Stafford, F. (2006). The decline in household saving and the wealth effect. *Review of Economics and Statistics, 88(1)*.

Klyuev, V., & Mills, P. S. (2006). Is Housing Wealth an 'ATM'?: The Relationship Between Household Wealth, Home Equity Withdrawal, and Saving Rates. *IMF Working Paper No. 06/162*.

Knotek, E., & Khan, S. (2011). How do households respond to uncertainty shocks? *Kansas City Federal Reserve Board Economic Revivew*.

Kremers, J. J., Ericsson, N. R., & Dolado, J. J. (1992). The power of cointegration tests. *Oxford Bulletin of Economics and Statistics, 54(3)*, 325-348.

Lee, J., Rabanal, P., & Sandri, D. (2010). US Consumption After the 2008 Crisis. *IMF Staff Position Note SPN/10/01*.

Ludwig, A., & Sløk, T. (2002). The Impact of Changes in Stock Prices and House Prices on Consumption in OECD Countries. *IMF Working Paper No. 02/1*.

MacKinnon, J. G. (1996). Numerical Distribution Functions for Unit Root and Cointegration Tests. *Journal of Applied Econometrics, 11(6)*, 601-618.

Mehra, Y. P. (2001). The wealth effect in empirical life-cycle aggregate consumption equations. *Economic Quarterly-Federal Reserve Bank of Richmond 87(2)*, 45-68.

Mian, A., Rao, K., & Sufi, A. (2013). Household Balance Sheets, Consumption, and the Economic Slump. *The Quarterly Journal of Economics, 128(4)*, 1687-1726.

Murugasu, D., Ang, J. W., & Tng, B. H. (2013). The Marginal Propensity to Consume across Household Income Groups. *Bank Negara Malaysia Working Paper Series WP2/2013*.

Peltonen, T. A., Sousa, R. M., & Vansteenkiste, I. S. (2012). Wealth effects in emerging market economies. *International Review of Economics & Finance, 24*, 155-166.

Phillips, P. C., & Hansen, B. E. (1990). Statistical Inference in Instrumental Variables Regression with I(1) Processes. *The Review of Economic Studies, 57(1)*, 99-125.

Rungcharoenkitkul, P. (2011). Wealth Effects and Consumption in Thailand. *Bank of Thailand Working Papers*.

Saikkonen, P. (1991). Asymptotically Efficient Estimation of Cointegration Regressions. *Econometric Theory 7(1)*, 1-21.

Skudelny, F. (2009). Euro Area Private Consumption: Is There a Role for Housing Wealth Effects? *ECB Working Paper No. 1057*.

Slacalek, J. (2009). What drives personal consumption? The role of housing and financial wealth. *The BE Journal of Macroeconomics*.

Stock, J. H., & Watson, M. W. (1993). A Simple Estimator of Cointegrating Vectors in Higher Order Integrated Systems. *Econometrica, Econometric Society, 61(4)*, 783-820.