

Chapter 6

HOUSEHOLD INDEBTEDNESS AND ITS IMPLICATIONS TO FINANCIAL STABILITY IN CHINESE TAIPEI

By
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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 literature⁴ is from 1998 to 2012. Furthermore, the household debt overhang problem in Chinese Taipei⁵ 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 studies⁷ 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.

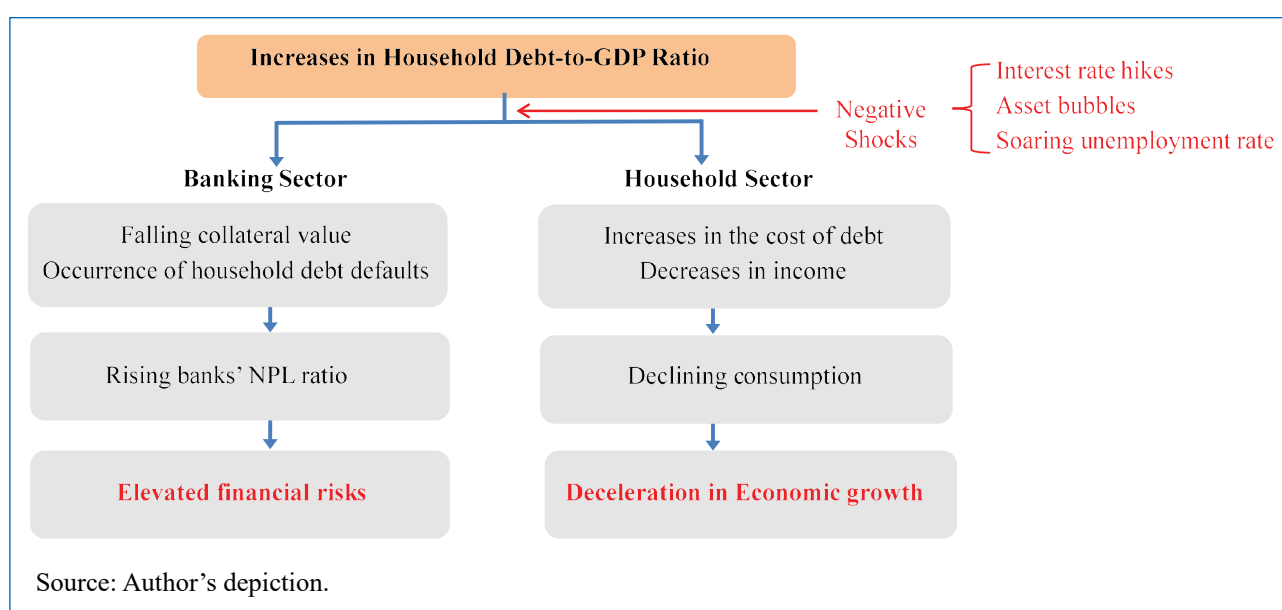
5. The household debt-to-GDP ratio of Chinese Taipei is around 70%-80% for the past 20 years, however, compared to that of South Korea, Malaysia, Thailand, Hong Kong, Singapore and China, the household debt-to-GDP ratio in Chinese Taipei has grown steadily.

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



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.

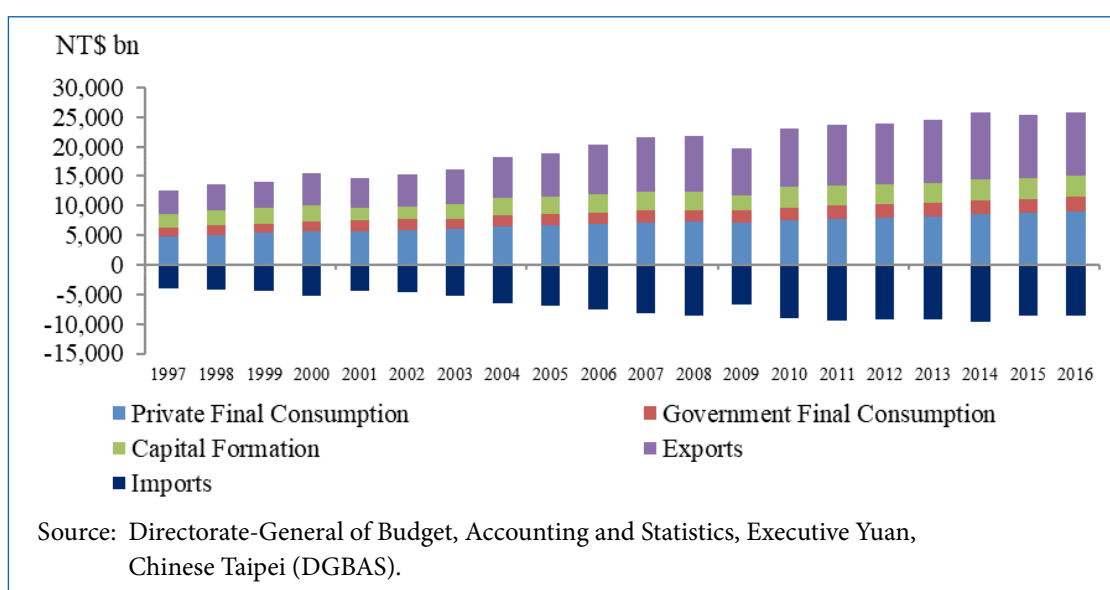
3. Economic Conditions and Household Debt in Chinese Taipei

3.1 Developments in the Domestic Economy

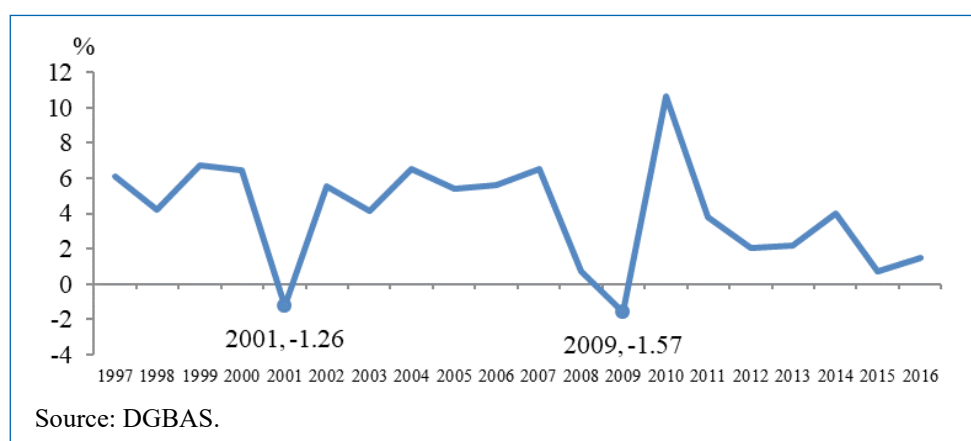
3.1.1 *Economic Growth Has Slowed in Recent Years*

Chinese Taipei is an open and export-oriented⁸ 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

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

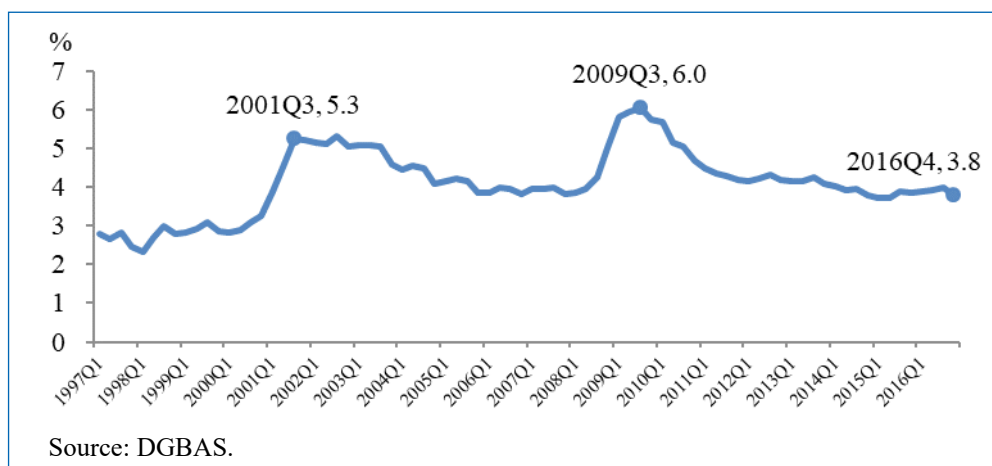
3.1.2 Employment Situation Has Been Stable yet Wage Growth Remained Sluggish

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 abroad⁹ to cut costs

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

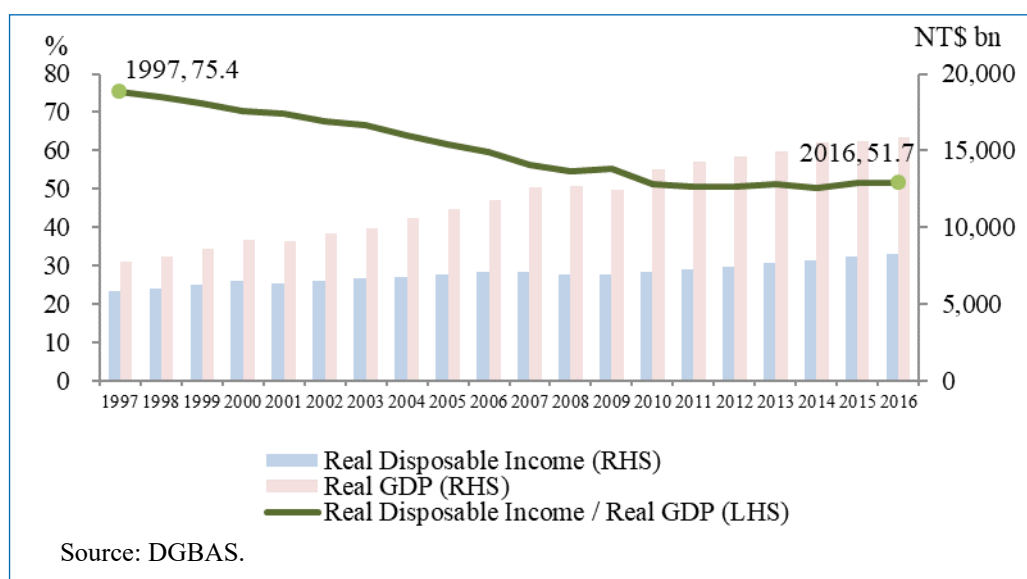
and be close to potential markets, but there were not enough new industries to make up these gaps. In recent years, investments have declined further because the domestic investment environment has deteriorated and the government has not signed many free trade agreements so far. All these factors influence 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



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

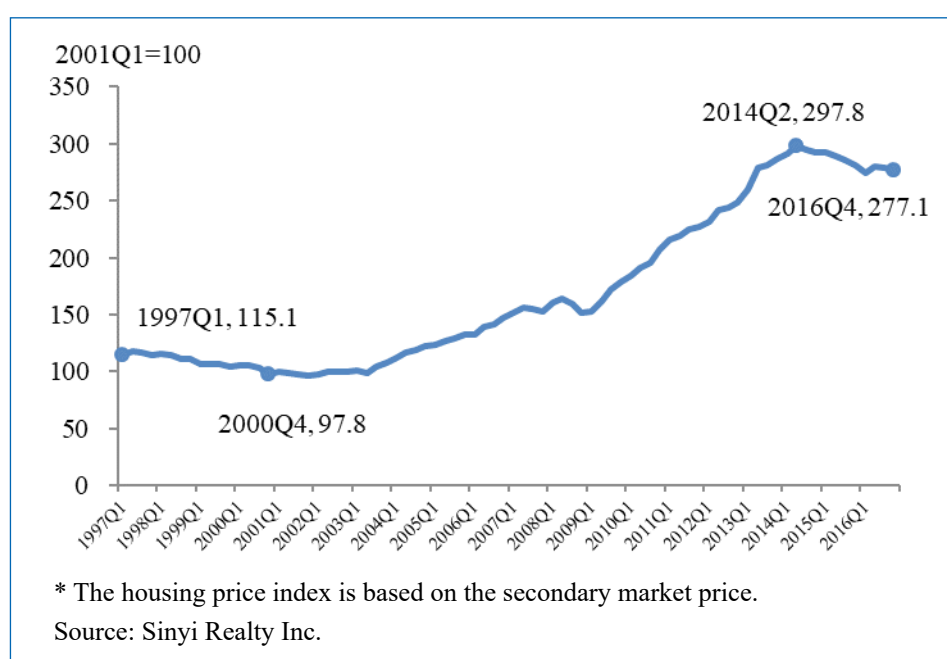


3.1.3 Housing Prices Surged and Then Slowed Down

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



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:

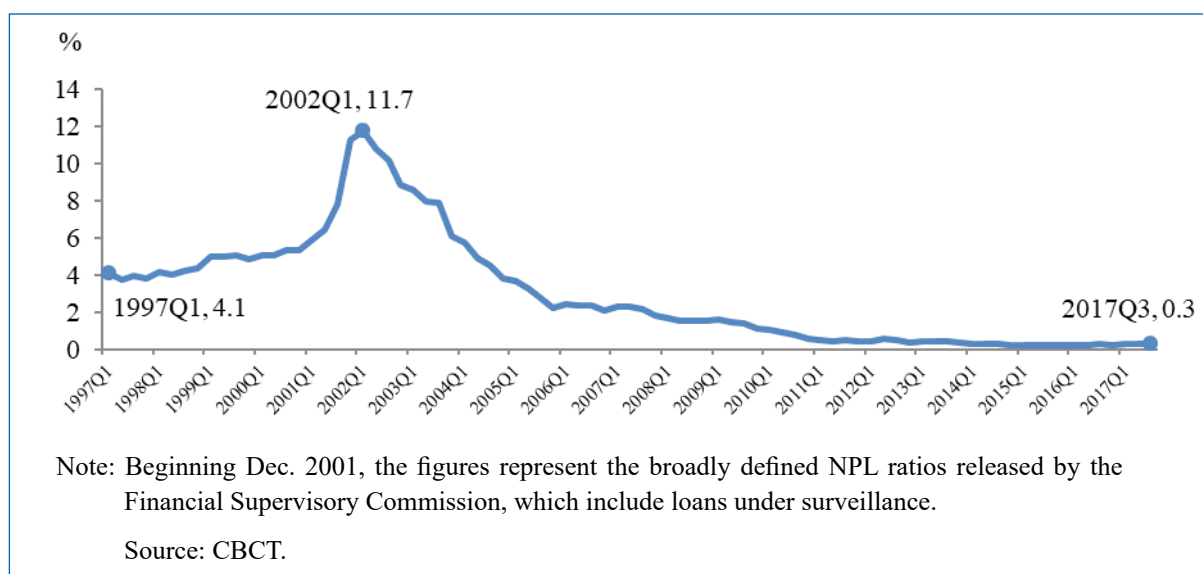
- ◆ The fund base of the Executive Yuan's Financial Restructuring Fund (RTC)¹⁰ is enlarged, and the RTC's functions are expanded to cover the purchase of NPLs of troubled financial institution and provide capital injections into banks in the form of preferred shares.
- ◆ Different supervisory measures 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 Basel III from 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 Basel III framework.
- ◆ 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.

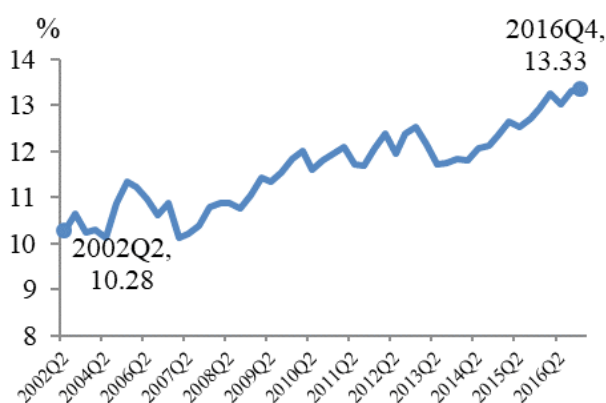
10. The Executive Yuan's Financial Restructuring Fund is Chinese Taipei's version of Resolution Trust Corporation (RTC) set up to expedite the cleanup of poorly managed deposit-taking institutions.

11. The FSC lowered capital requirements in 2017.

Figure 7: NPL Ratios of Domestic Banks



**Figure 8
Capital Adequacy Ratio of
Domestic Banks**

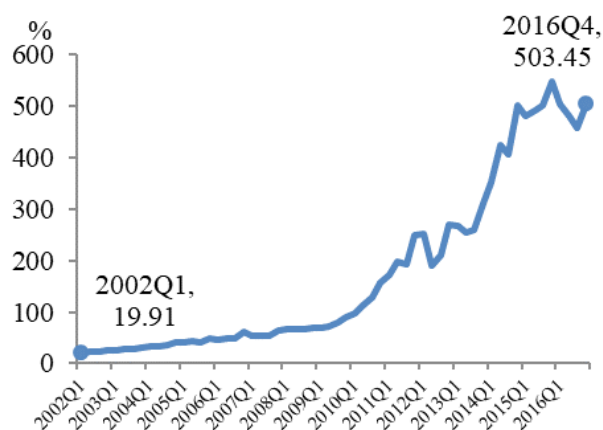


Notes:

- (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.

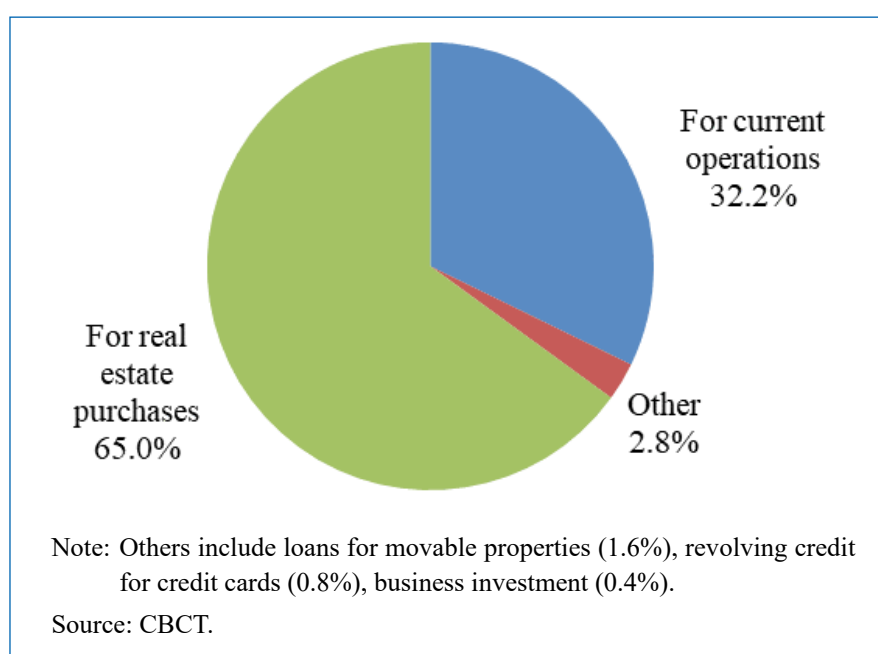
Table 2: Chinese Taipei's Household Sector Balance Sheet in 2015
(End of 2015)

			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.

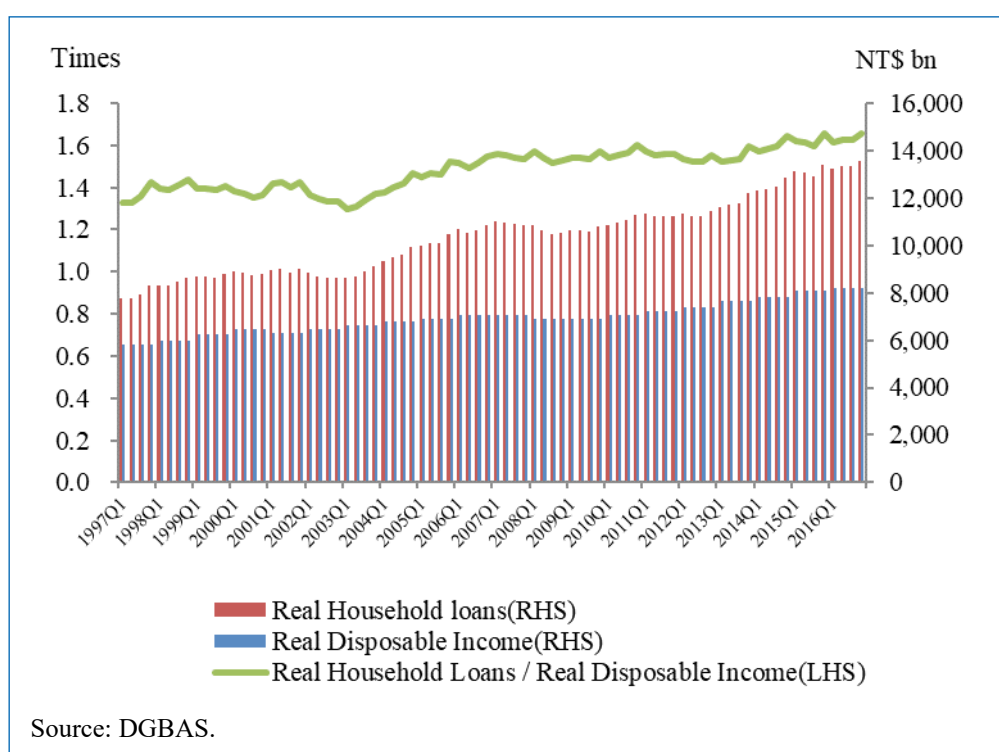
Source: DGBAS.

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

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



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

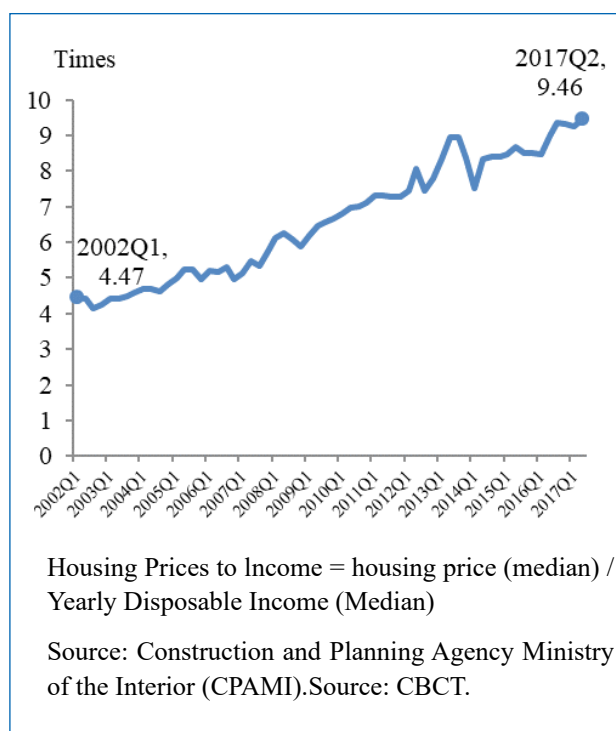
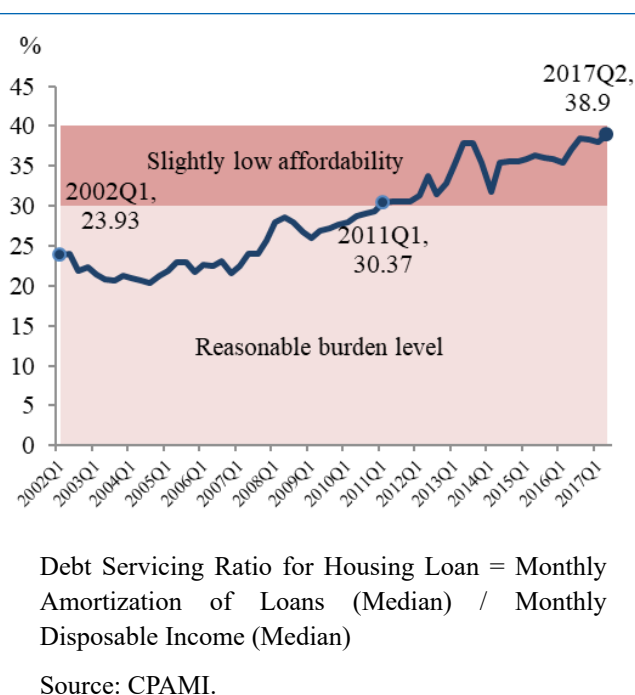
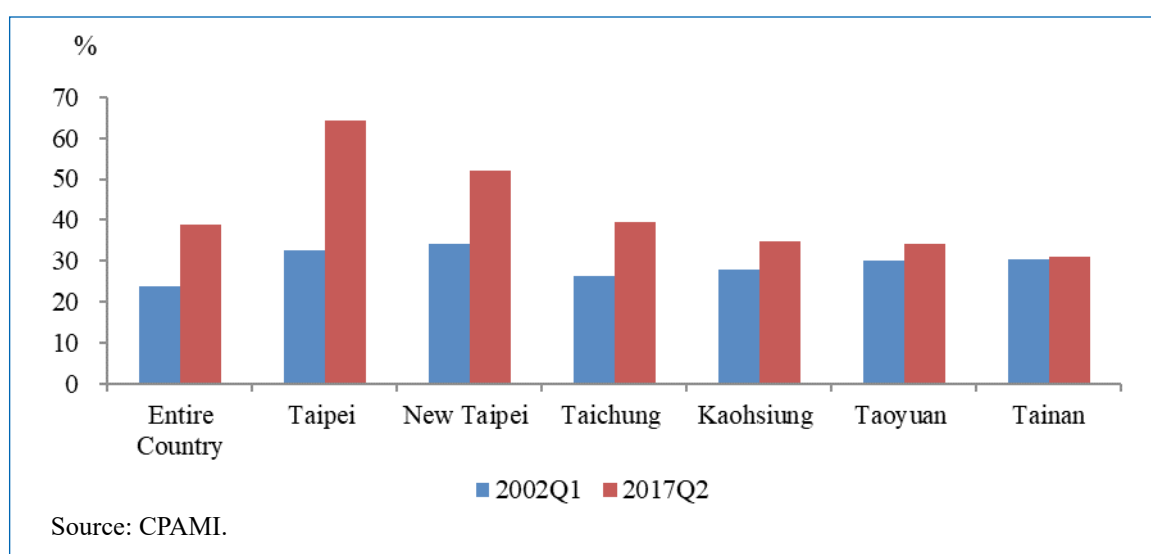


Figure 13
Debt Servicing Ratio for Housing Loans



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



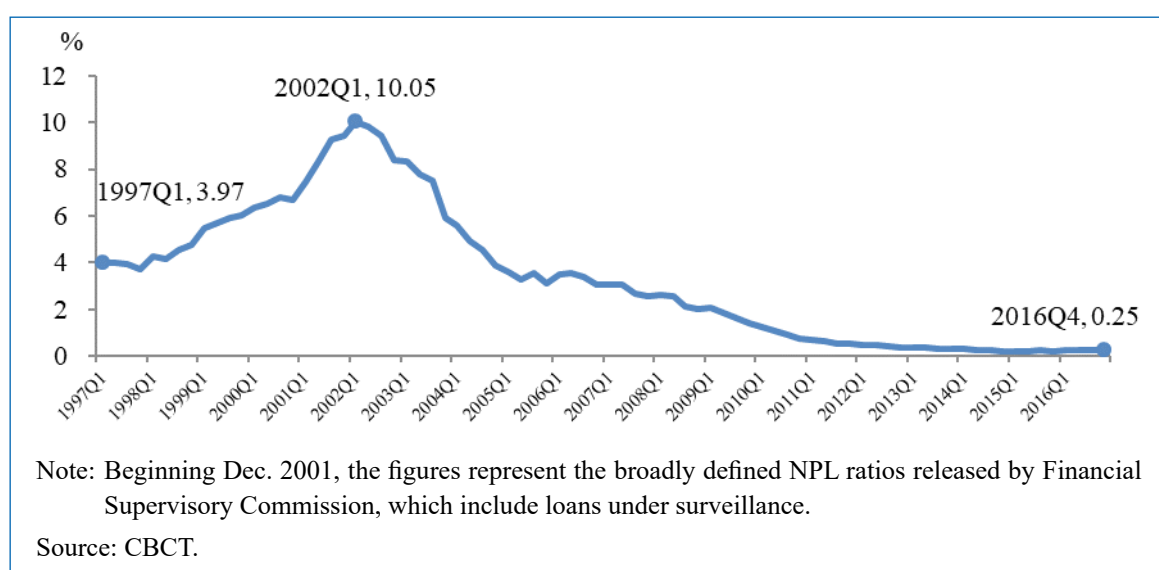
3.3.3 Heavy Household Burden but Sound Credit Quality of Loans

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

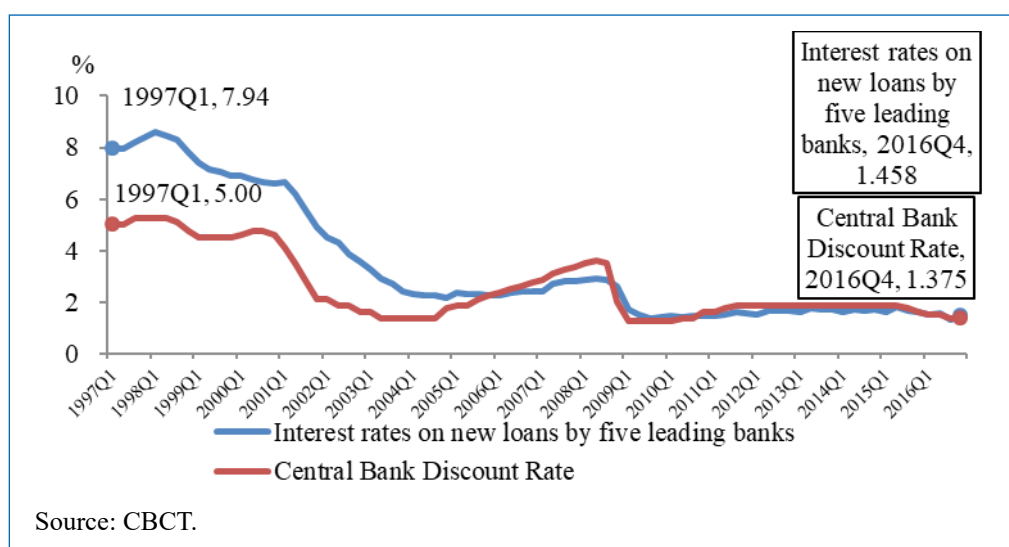
As mentioned above, the NPL ratio of banks increased quickly during 1997 to 2002. The government helped banks to clean up their bad debt through a lowering of required reserve ratios, cutting the business tax and adopting financial reforms. In addition, banks took more prudent actions when extending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

Figure 15: NPL Ratio of Household Loans



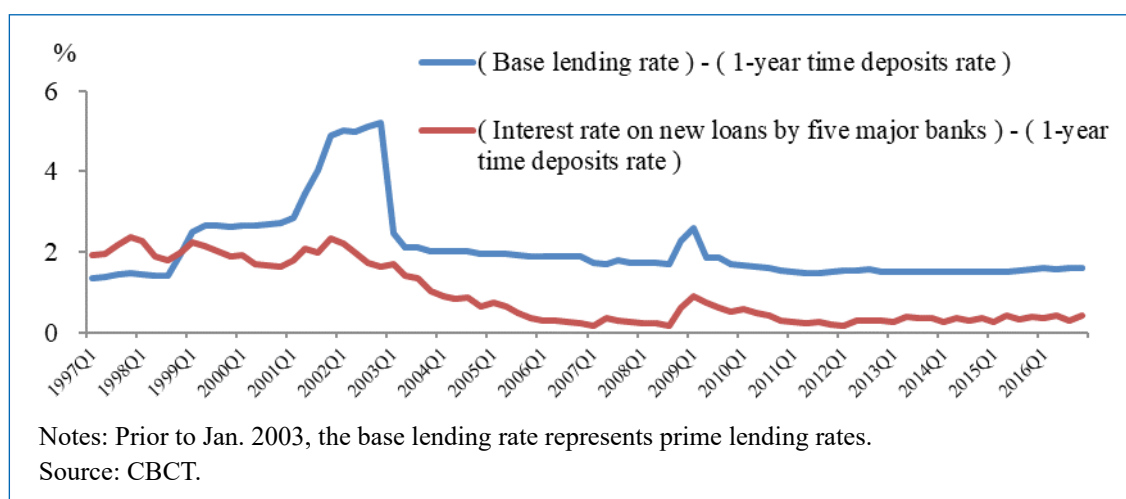
◆ Decline in Bank Interest Rates

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

◆ 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

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 loans¹⁹ (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

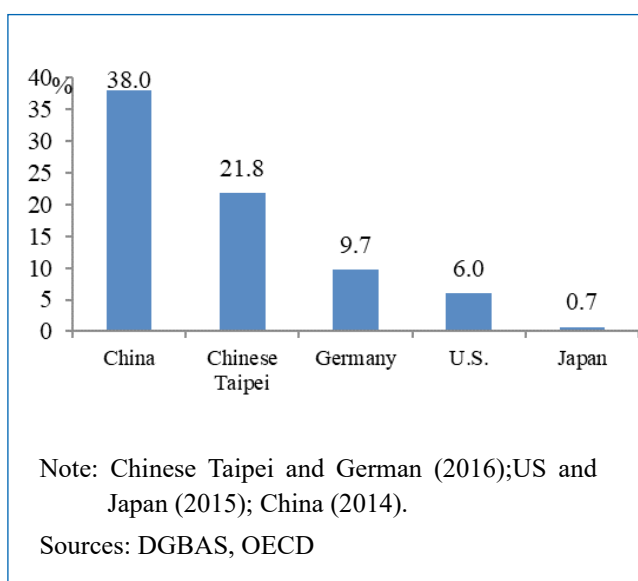
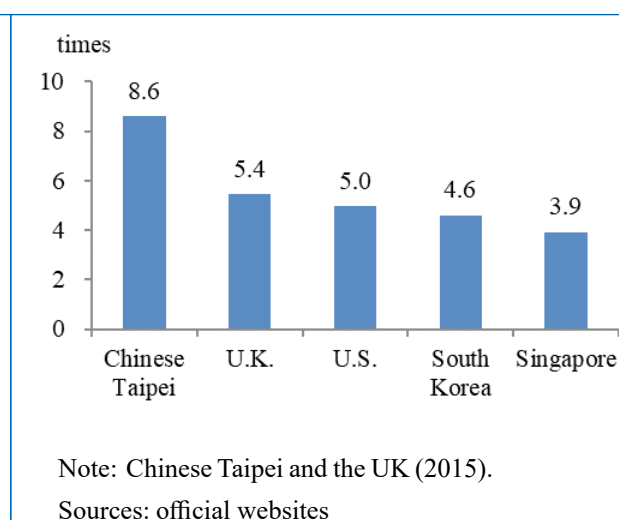


Figure 19
Net Assets of Household Sector to GDP



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.

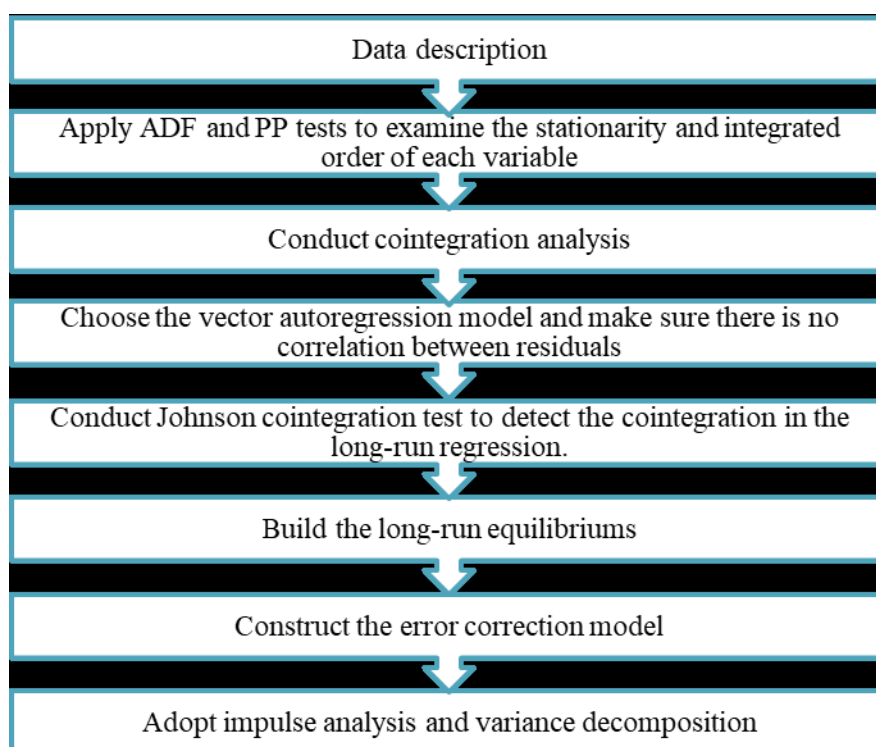
20. Given that financial asset prices are really high, many central banks including the U.S. Fed expressed their concerns about a possible risk of price fluctuations in the future.

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

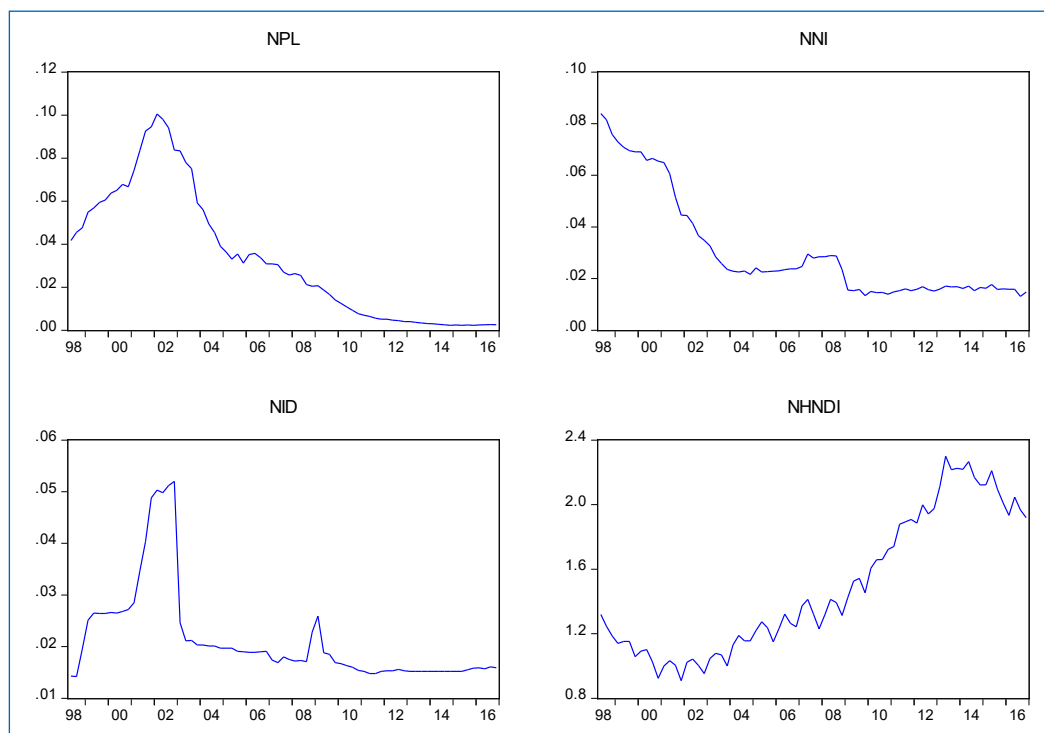
Variables	Calculation	Meaning of the variables and expected effects on NPL ratios	Source
<i>Explained Variable</i>			
● Household NPL ratio	● Total household NPL/ Total household loans ● Including Loans provided by all financial institutions	● To measure the loan credit quality and financial stability	● CBCT
<i>Explanatory Variables</i>			
● 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.

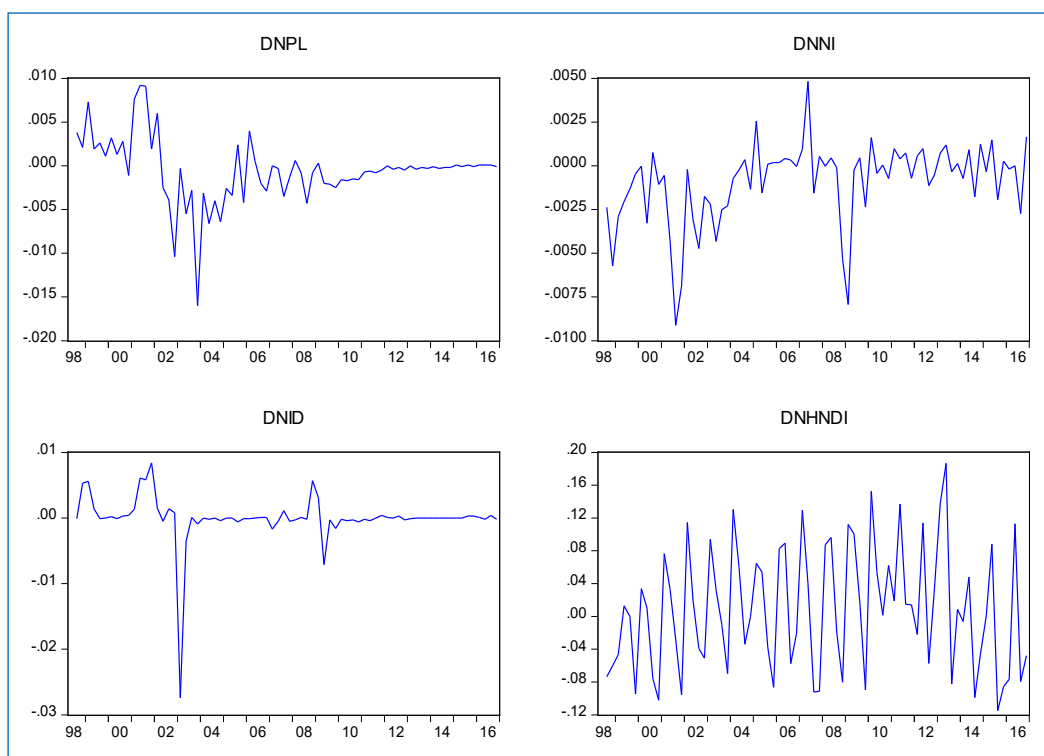
(2) Generally, the housing price-to-disposable income can serve as an indicator for mortgage burden. However, in this model, it is used as a substitute indicator for the housing price, for the purpose of measuring the wealth effect.

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_{μ}	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):

$$NPL_t = \beta_1 \times NNI_t + \beta_2 \times NID_t + \beta_3 \times NH_NDI_t + c + \varepsilon_t \quad (3.4.1)$$

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**
$r \leq 1$	26.89	17.40
$r \leq 2$	9.49	6.53
$r \leq 3$	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):

$$\begin{aligned} \Delta(NPL_t) = & \alpha_0 + \sum_{i=1}^5 \beta_{1i} \times \Delta(NNI_{t-i}) + \sum_{i=1}^5 \beta_{2i} \times \Delta(NID_{t-i}) + \sum_{i=1}^5 \beta_{3i} \times \Delta(NH_NDI_{t-i}) \\ & + \beta_4 \times ecm_{t-1} + \varepsilon_t \end{aligned}$$

$$ecm_t = NPL_t - (\beta_1 \times NNI_t + \beta_2 \times NID_t + \beta_3 \times NH_NDI_t + c) \quad (3.4.2)$$

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:

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

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

Note: Number of observation = 69 after adjustment (Q4:1999 - Q4:2016)

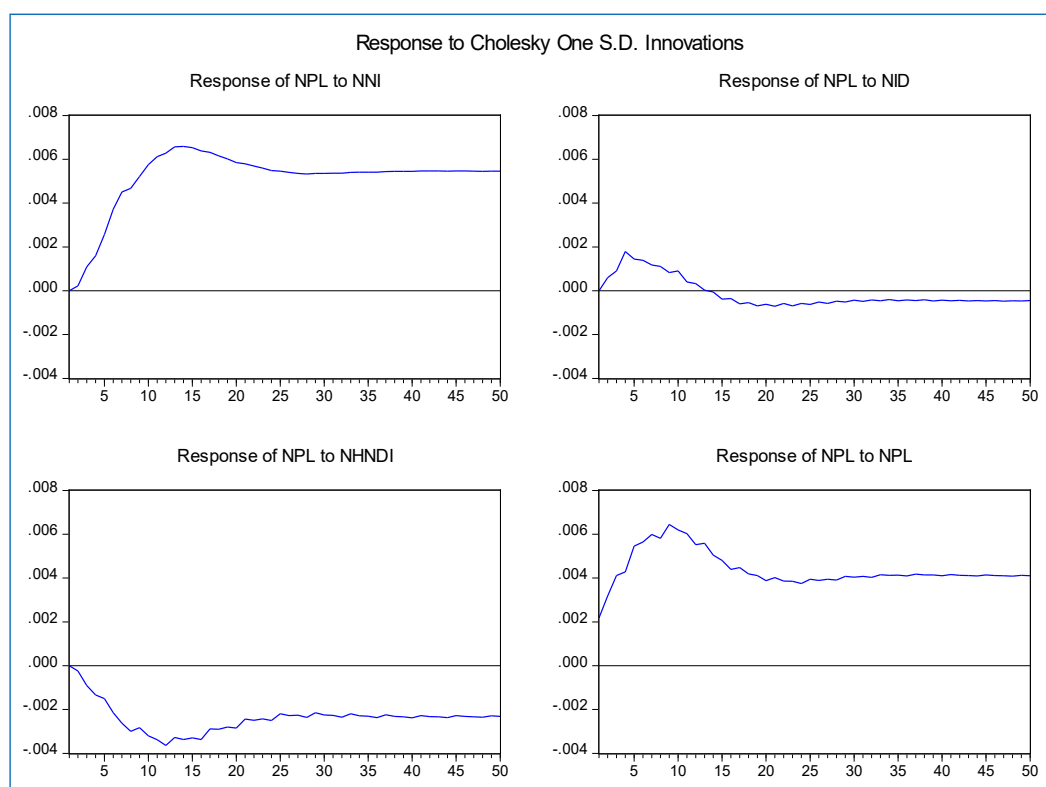
t-statistics are in parentheses; ***, **, * denote 1%, 5%, and 10% significance, respectively.

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)

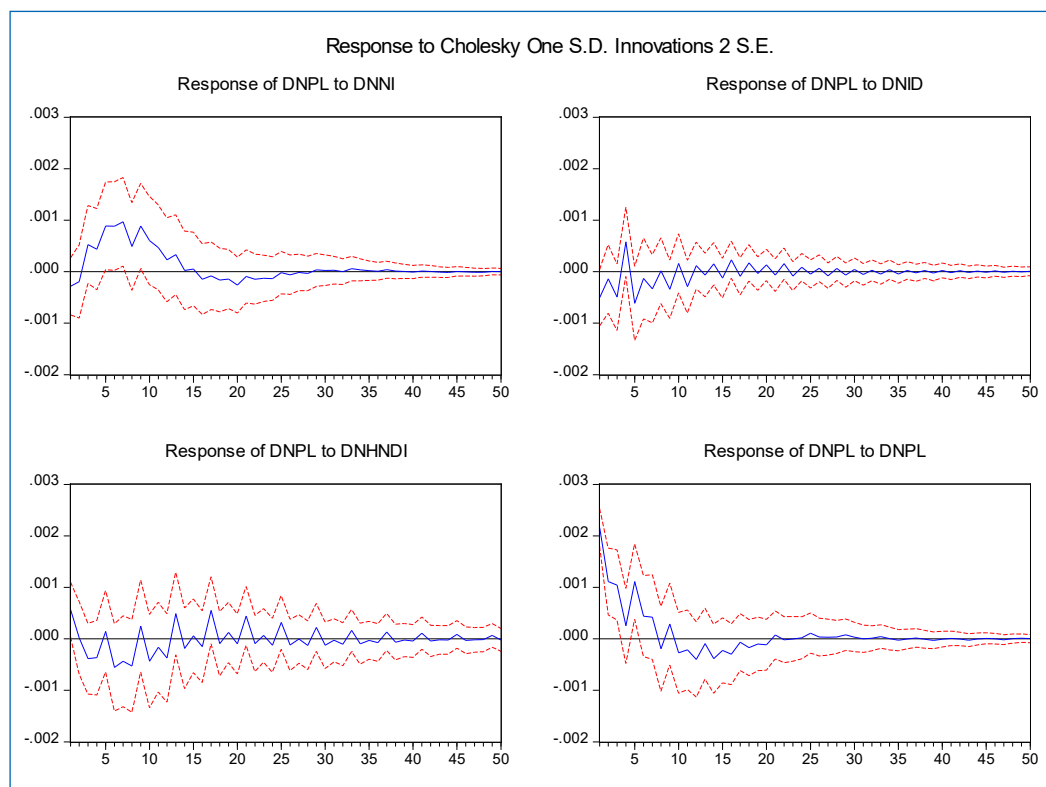


Notes: (1) NPL: Household NPL ratio; NNI: Loan rate; NID: Interest rate spread; NH_NDI: Housing price-to-disposable income ratio.

(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 impact²⁴ 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)



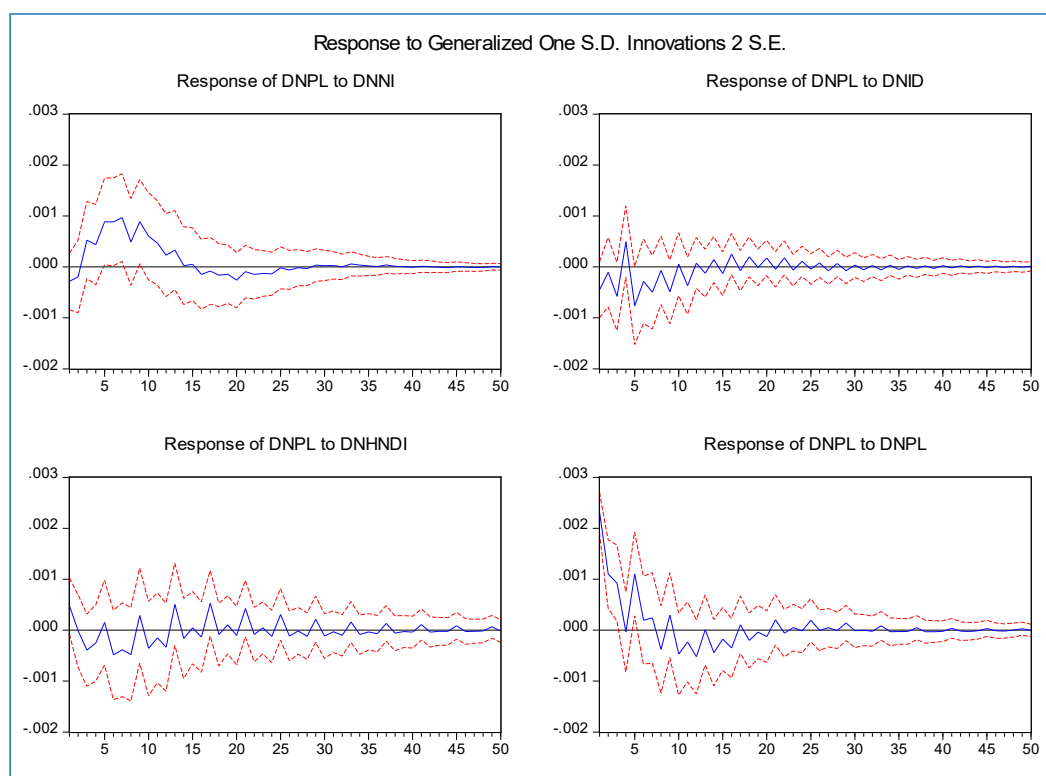
Notes: (1) DNPL: Household NPL ratio changes; DNNI: Loan rate changes; DNID: Interest rate spread changes; DNH_NDI: Housing price-to-disposable income ratio changes.

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

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.

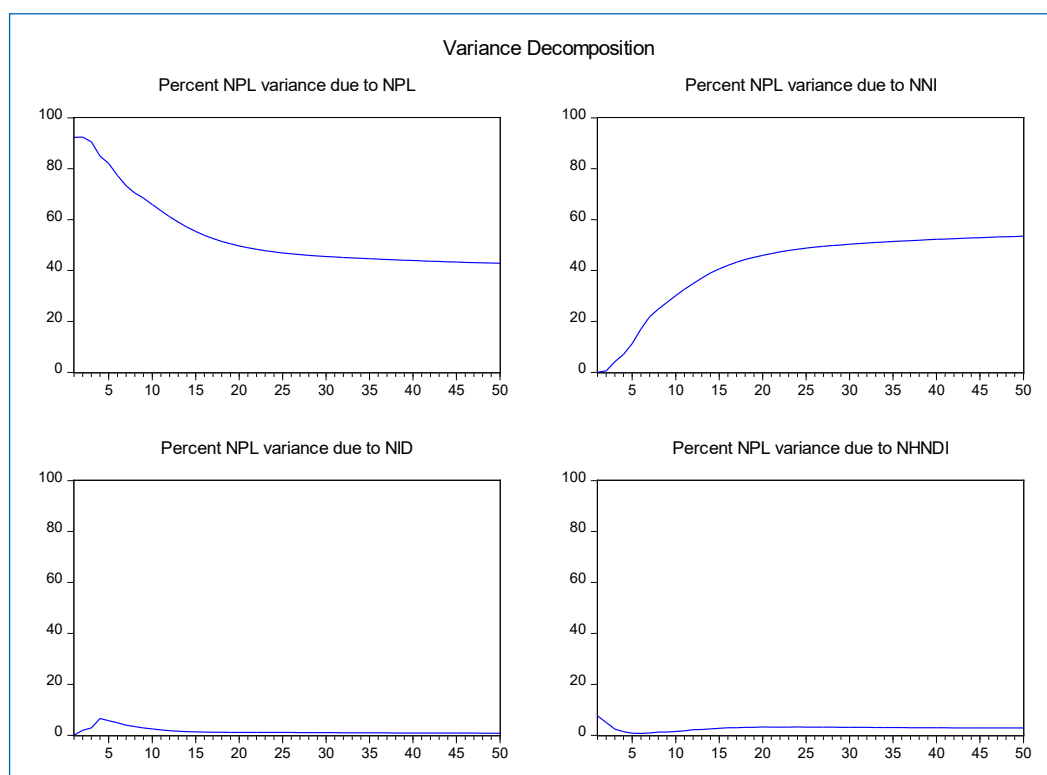
**Figure 24: Impulse Analysis of NPL Ratio of Household Loans
(VAR model - Generalized)**



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.

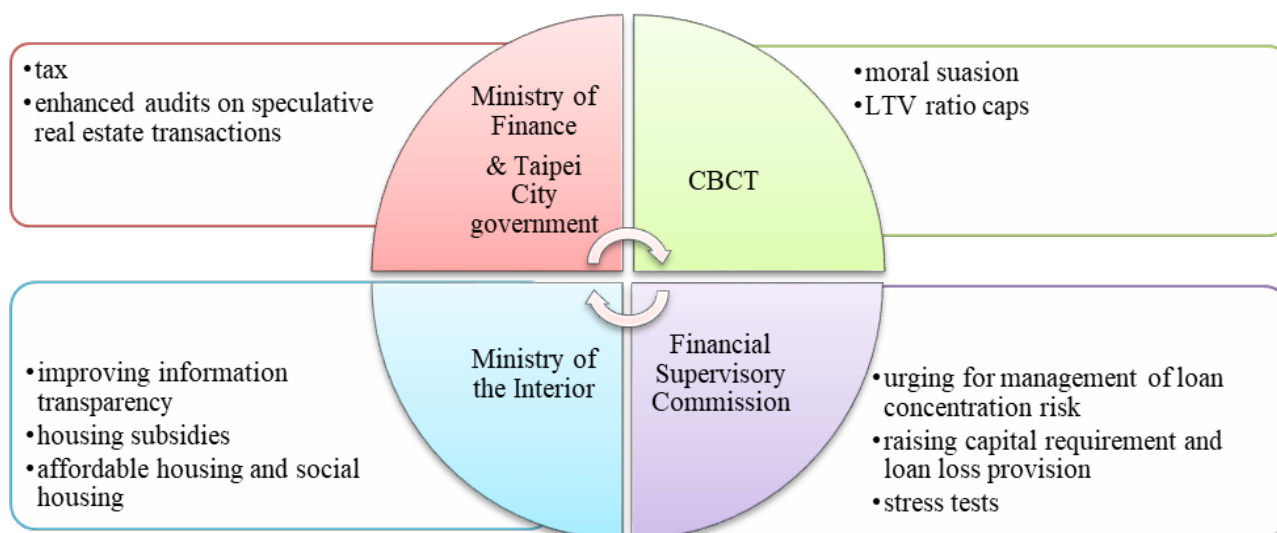
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Appendix: Policy Measures to Address Housing Price Surges

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.