

## **Research Paper**

# **The Relationship between Household Debt and Household Consumption in Thailand**

Submitted by

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In partial fulfillment of requirements for the degree  
Master of Public Policy/ International Program

The University of Tokyo

Tokyo, Japan

August 3, 2018

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## **Abstract**

This paper examines the relationship between household debt and household consumption in Thailand. The household-level data from Townsend Thai Monthly Survey's Household Financial Accounting for the period August 1989 to December 2012 is employed. The samples are relatively low-income households, compared to the whole nation. The empirical results by using fixed effect estimation found that income has a significant positive effect on consumption. Since the squared of debt to asset ratio, and the interaction of changes in income to asset ratio and the squared of debt to asset ratio are not significant, the effect of debt overhang is not confirmed. Overall, household debt shows a negative significant impact on household consumption. Constrained households with high debt burdens might decrease their consumption to strengthen balance sheets and correct for past excessive debt.

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## **I. Introduction**

Household debt is an important part of the financial system, and the understanding of household debt is crucial for policymaking. On the one hand, debt helps household consumption and economic expansion. On the other hand, high and rising household debt has raised concerns about the stability of the financial system. In general, household debt is expected to support economic growth if it is at appropriate levels and in line with economic fundamentals. However, if household debt is high and not consistent with income level for a prolonged time, it may affect the ability of households to repay their financial obligations. Further, financial institutions may have problems about loan quality.

Since 2011, Thai government tried to stimulate the economy by launching policies to increase consumption. As a side effect, these policies cause households to take more loans. This practice may not be sustainable because it brings demand from the future to be used in the present. The continued increase in debt may contribute to a problem of debt overhang. When debt is already high, more debt may have a negative impact on consumption. As Figure 1 shows, the ratio of household debt to GDP in Thailand has gradually increased until 2015. Thereafter, it has declined slightly because GDP has increased at a faster rate when compared with the increase in household debt. As Figure 1 shows, in 2017, the ratio of household debt to GDP was almost 80 percent, which rose by 50 percent from 2007.

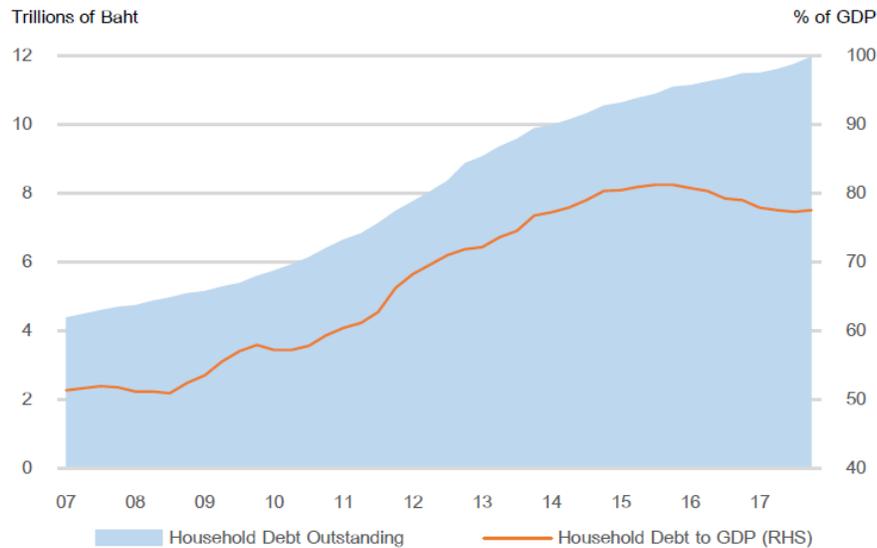


Figure 1: Household Debt Outstanding<sup>1</sup> and Household Debt to GDP in Thailand (%)

Source: Bank of Thailand

Household debt in Thailand has increased constantly because of government policies and low interest rate under the expansionary monetary policy. From 2011 to 2012, the government encouraged citizens to buy their first car by giving the benefit from a tax refund. Therefore, Thai people borrowed money from the bank to buy a car because they wanted to get a tax refund. As Figure 2 shows, car loans had increased from 2011 to 2013. After that, it has declined because of the termination of the first car policy. Moreover, the government guaranteed the rice price in another policy, hence farmers believed that their revenues would remain high. Consequently, they borrowed more money to sustain their consumption level. In 2011, there was massive flooding in Thailand. The commercial banks offered soft loans to people who were affected by the flooding and needed the short-term assistance and finance. In addition, the low interest rate under the expansionary monetary policy has also been one of the factors that increase the amount of household debt. Policy rate had decreased from 3 percent in 2011 to 1.5 percent in 2016. After that, policy interest rate remained at 1.5 percent. Decreasing in debt happened clearly in car loans and personal loans. However, it occurred slower in credit card, housing, and business loans.

<sup>1</sup> Household debt consists of domestic loans to households from financial institutions.

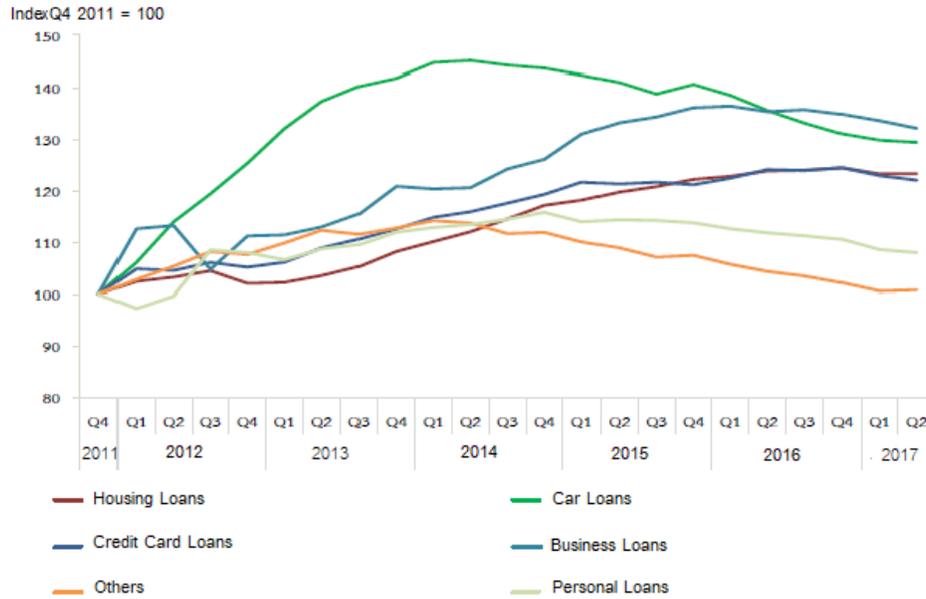


Figure 2: Index of Household Debt in Thailand classified by Type of Loans  
Bank of Thailand

Using GDP to represent income is not correct if the proportion of income to GDP changes. Over the last ten years, the ratio of income to GDP in Thailand has decreased slowly. However, as Figure 3 shows, the actual household income data is available only until 2015. After that, household income is projected by using three hypotheses which are income trend, constant household disposable income to GDP, and projected income to GDP by polynomial trend. The trend of household debt to income was similar to household debt to GDP. Deleveraging<sup>2</sup> occurred in debt to income a bit slower than debt to GDP. In 2017, household debt to disposable income was around 140 to 150 percent, depending on the assumptions.

<sup>2</sup> Deleveraging refers to the constant declines in the debt-to-income ratio.

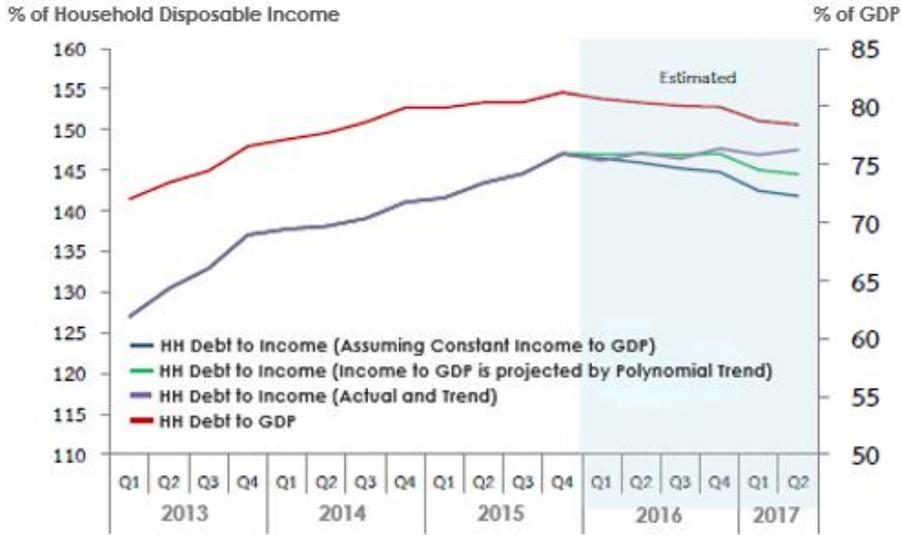


Figure 3: Household Debt to GDP and Household Debt to Disposable Income in three Hypotheses

Source: Office of the National Economic and Social Development Board and Bank of Thailand

Since 2015, deleveraging has been on a national level. However, from Figures 4 and 5, deleveraging occurred in some high-income group in Bangkok and central region. Decreasing in debt might have come from the ending of the first car policy. Nonetheless, since 2015, debt to income has increased among low and middle-income group, especially in Northern and Northeastern regions which was from an increasing debt but almost the same income level.

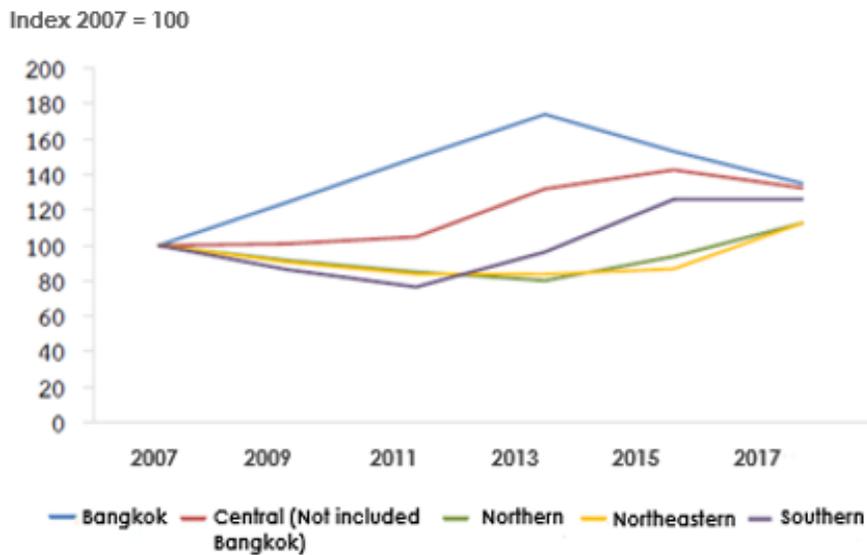


Figure 4: Index of Household debt to Annual Income classified by Region (Median)

Source: The Socio-Economic Survey conducted by the National Statistical Office in Thailand

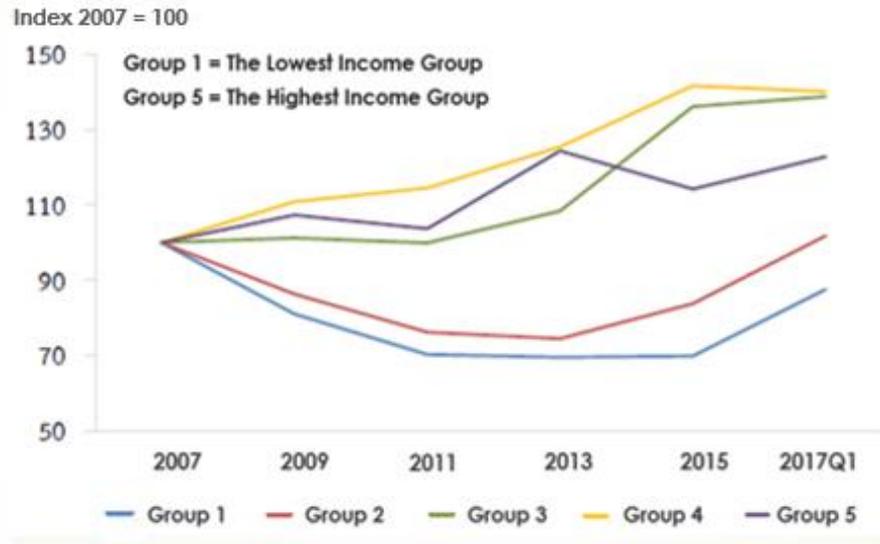


Figure 5: Index of Household Debt to Annual Income classified by Income Group (Median)

Source: The Socio-Economic Survey conducted by the National Statistical Office in Thailand

From Figure 6, the ability to repay debt in Thailand deteriorated by a small margin. The ratio of NPL to consumer loans has increased slightly, especially non-performing housing loans which is a major source of NPL for households. At quarter 3, 2017 Consumer NPL was 2.74 percent which increased from 2.66 percent in the previous quarter.

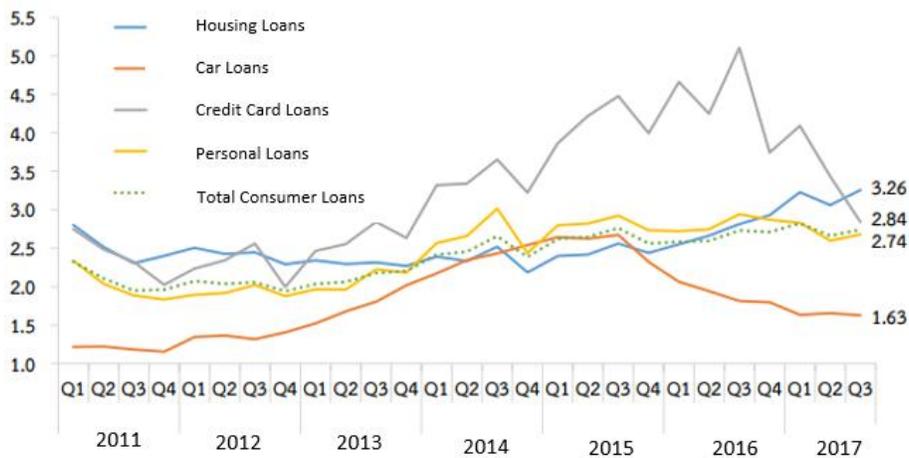


Figure 6: The Ratio of Consumer NPL in Thailand (%)

Source: Bank of Thailand

Glick and Lansing (2009) explained about the relationship among consumption, debt, and saving in the U.S. The increase in debt co-moved with the decrease in the personal saving rate.

The composition of higher debt and lower saving let personal consumption expenditures grow faster than disposable income. However, in the long-run, consumption cannot grow faster than income since there is a maximum limit in terms of how much debt households can service, based on their income. When households are not able to borrow more and realize that they need to pay back, they will try to save money. This will lead to deleveraging. Consumption will grow slower than income. Households will adjust their balance sheet to have stronger financial health and prepare for consumption in the future.

From Figure 7, the ratio of saving to income is available until 2015. It had decreased which is according to leveraging of household debt. In 2015, the ratio of household saving to household income was only 8.7 percent. Furthermore, from 2008 to 2015, the average growth in household consumption was 5 percent which was a little higher than the average growth in household income which was 4.7 percent. Nevertheless, in 2018, it is expected that the savings rate will increase, and consumption will be less than income due to deleveraging of household debt.

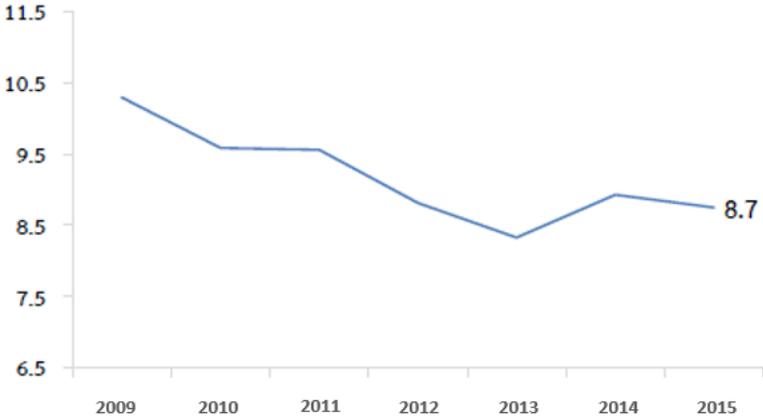


Figure 7: The ratio of household saving to household income (%)

Source: Office of the National Economic and Social Development Board

This research paper, using household-level survey data, examines the relationship between household debt and household consumption. Household finance is crucially important for the financial system in Thailand. Household debt accounted for the majority of total loans in Thailand. With respect to the figure from the first quarter of the year 2017, loans for households accounted

for 61.8 percent of total loans provided by the financial institutions.<sup>3</sup> Studying about household finance is most likely to be beneficial to launch various policies aimed for stimulating the economy in the long-term.

This paper is divided into six sections. Following the introduction, the next section, we provide a review of literature about the relationship between household debt and household consumption. The details of data and variables are discussed in Section 3. In Section 4, the methodology is provided. The empirical results are separately reported in Section 5. Conclusion and policy implications are presented in Section 6.

## II. Literature Review

In the life-cycle hypothesis, individuals plan their consumption behavior over their life cycle. They choose to maintain stable lifestyles. This implies that they usually do not save money a lot in one period to spend extremely in the next period, but they keep their consumption in the same levels in every period. Consumption is a linear function of permanent income and wealth.

$$Consumption = \alpha Income + \beta Wealth$$

Where  $\alpha$  and  $\beta$  are the proportion of income and wealth to consumption. In this model, debt has no particular role in explaining consumption dynamics.

Overtime, several literatures found that other factors beyond the traditional variables affect consumption. Using data from Sweden(1965-83), USA(1961-84), U.K.(1961-83), Japan(1971-83), Italy(1961-85), Spain(1961-84), and Greece(1965-82), Jappelli and Pagano (1989) found that a link between consumption and debt occurred in liquidity-constraint households. In addition, Hall (2011) found that liquidity-constrained households<sup>4</sup> always borrow the upper limit that are allowed by lenders. Their consumption function is income plus changes in borrowing, less interest payments on debt in the previous period.

$$Consumption_t = Income_t + \Delta Debt_t - Interest_t * Debt_{t-1}$$

McCarthy (1997) explained about the effect of household debt on consumption into two hypotheses which are the positive and negative views. On the one hand is the positive view on debt. According to this view, increases in household debts are driven by an expectation of higher income.

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<sup>3</sup> Data is obtained from Bank of Thailand.

<sup>4</sup> Liquidity-constrained households are those who have net liquid assets less than two months of income. (Hall 2011)

They spend more because they anticipate getting more earnings and finance higher spending through debt. Even if their incomes begin to fall, households may continue to increase their debt to maintain their spending on the assumption that income decline only in short period. Only if income declines for a long time, households will cut expenditures and begin to pay down their debt. On the other hand is the negative view on debt. As stated by this view, constrained households with high debt burdens will reduce their consumption. If households have accumulated too much debt, they will suffer from the poor financial position. Their indebtedness makes them more susceptible, especially when there are unexpected events, such as a serious illness, job loss, or other misfortunes. Thus, they will reduce their vulnerability by paying down debt and decreasing their expenditures.

There are some empirical studies supporting the positive hypothesis, for example, using data for the United States (1970Q1-1995Q3), Canada (1973Q1-1995Q3), the United Kingdom (1977Q2-1995Q3), Japan (1977Q2-1995Q1), and France (1980Q1-1995Q3), Bacchetta and Gerlach (1997) found that there is a considerable positive effect of credit aggregates on consumption in five countries. Maki (2000) reported that in the U.S., increase in growth of household debt is positively significant with consumer spending growth when households are optimistic about their future income growth. Moreover, using micro-level data from the Socio-Economic Survey by the National Statistical Office in 1998, 2002, and 2004, Chucherd (2006) found that debt positively affects all type of consumption in Thailand.

Some empirical studies seem to support the negative views on debt. Using household-level data in 1989, 1994, and 1999, Ogawa and Wan (2007) reported that the excessive burden of debt has an extremely negative effect on consumption after the financial bubble in Japan. Using micro-level data from the 2007-2009 Surveys of Consumer Finances, Dynan and Edelberg (2013) reported that high leverage has led to the decrease in consumer spending growth. After controlling changes in income and wealth, highly leverage households are more likely to decrease their spending.

Later, there are some empirical results to support the mixed view on debt. Households can facilitate consumption smoothing through borrowing. Initially, the rise in household debt makes household consumption increase. When debt continues increasing, the excessive debt or the effect of debt overhang will have a negative effect on household consumption.

Using the US state-level data from 1999Q1 to 2012Q4, Albuquerque and Krustev (2015) reported that the growth of debt to income ratio has a positive relationship with consumption growth; however, the excessive indebtedness<sup>5</sup> of U.S. households has a negative impact on consumption growth beyond the effects from income and wealth in the Great Recession and the early years of the recovery. Moreover, using household-level data from 2000 to 2014 in Korea, Choi and Son (2016) believed in the mixed effect of household debt on consumption. They reported that when the debt-to-disposable income ratio exceeds 210 % of their disposable income or when the debt service ratio exceeds 27 percent of their disposable income, households begin to reduce consumption spending. The estimation in a sub-income group show that the estimated threshold of the ratio for a lower-income group is smaller than higher-income households.

### III. Data

Townsend Thai Monthly Survey's Household Financial Accounting data<sup>6</sup> from August 1998 to December 2012 is used in this empirical study. The household-level panel data set covers 800 households from 16 villages in 4 provinces which are Chachoengsao, Lopburi, Buriram, and Sisaket over 172 months. Chachoengsao and Lopburi are located in the Central part. Buriram and Sisaket are located in the Northeastern region. The data does not show financial behaviors of the household nationwide. These samples are relatively low-income households, compared to country level. Nonetheless, the data covers long period and high frequency. As a result, long-term consumption behavior at the household level in response to changes in household debt can be observed across business cycles and macroeconomic shocks.

There are some missing observations across the time span. Therefore, 193 out of 800 households and 3 out of 16 villages were removed from the data. Moreover, outliers in the consumption to asset ratio, Return on Assets (ROA)<sup>7</sup>, and the debt to asset ratio were removed by determining an interval spanning over the mean plus/minus three standard deviations.

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<sup>5</sup> The excessive indebtedness or the debt overhang refers to the stock of debt exceeds of an estimated equilibrium level. (Albuquerque and Krustev 2015)

<sup>6</sup> Data is obtained from the Townsend Thai Project which is conducted by Robert M. Townsend.

<sup>7</sup>  $ROA = (\text{Net Income}/\text{Assets}) * 100$

## **Variable Definition**

- **Consumption:** Consumption consist of household production consumption<sup>8</sup>, food consumption, and non-food consumption.
- **Income:** Income is the residual amount left from netting all expenses off all revenues. The positive number of income implies that revenues are higher than expenses. Increase in income lead to higher spending on services and goods.
- **Asset:** Assets include both current assets and non-current assets. Current assets consist of cash in hand, account receivables, deposits at financial institutions, ROSCA<sup>9</sup>, other lending, inventories, and livestock. Non-current assets comprise household assets, agricultural assets, business assets and land. It is also main variable in a traditional consumption function together with income. Higher asset leads to higher consumption.
- **Debt:** Debt includes accounts payable, other borrowing, and ROSCA.

The household-level nominal variables are deflated with the national consumer price index<sup>10</sup> to obtain household consumption, income, asset, and debt in real terms. The descriptive statistic is shown in Appendix.

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<sup>8</sup> Agriculture households commonly consume crops grown on their field or animal raised on their farms. In addition, households usually grow vegetables in the backyard and consume them. In the household financial statements, the consumption of household-produced outputs is recorded under income and consumption as if the households produce and sell the product to the market, then repurchase and consume them. (Townsend and Samphantharak 2010)

<sup>9</sup> ROSCA is a group of individuals who agree to meet for a defined period in order to save and borrow together. It is categorized as informal lending and borrowing. This account is a position which is netted from both savings and borrowings. Thus, positive position means that households lend more money than they borrow. On the other hand, negative position means that households borrow more money than they lend. (Townsend and Suwanik 2016)

<sup>10</sup> The national consumer price index is gained from Trade Policy and Strategy Office, Ministry of Commerce.

## IV. Methodology

The panel regressions are regressed with the fixed effects over the period from August 1998 to December 2012 to investigate the effect of household debt on household consumption. In the model, consumption function includes not only the main determinants as income, but it also has debt. First difference is used for the consumption to asset ratio and ROA. Additionally, the interaction term between changes in ROA and the debt to asset ratio are included to see the effect of debt, whatever happens to income. Furthermore, the squared of debt to asset ratio and the interaction term between changes in ROA and the squared of debt to asset ratio are added to see the mixed view of debt on consumption. The following equations are estimated:

$$\begin{aligned}
 (1) \quad \left( \Delta \frac{Cons_{ivt}}{Asset_{iv,t-1}} \right) * 100 &= \alpha_{vt} + \beta_1 \left( \Delta \frac{Income_{ivt}}{Asset_{iv,t-1}} \right) * 100 + \varepsilon_{ivt} \\
 (2) \quad \left( \Delta \frac{Cons_{ivt}}{Asset_{iv,t-1}} \right) * 100 &= \alpha_{vt} + \beta_1 \left( \Delta \frac{Income_{ivt}}{Asset_{iv,t-1}} \right) * 100 + \beta_2 \left( \frac{Debt_{iv,t-1}}{Asset_{iv,t-1}} \right) * 100 + \varepsilon_{ivt} \\
 (3) \quad \left( \Delta \frac{Cons_{ivt}}{Asset_{iv,t-1}} \right) * 100 &= \alpha_{vt} + \beta_1 \left( \Delta \frac{Income_{ivt}}{Asset_{iv,t-1}} \right) * 100 + \beta_2 \left( \frac{Debt_{iv,t-1}}{Asset_{iv,t-1}} \right) * 100 \\
 &\quad + \beta_3 \left( \Delta \frac{Income_{ivt}}{Asset_{iv,t-1}} * 100 \right) \left( \frac{Debt_{iv,t-1}}{Asset_{iv,t-1}} * 100 \right) + \varepsilon_{ivt} \\
 (4) \quad \left( \Delta \frac{Cons_{ivt}}{Asset_{iv,t-1}} \right) * 100 &= \alpha_{vt} + \beta_1 \left( \Delta \frac{Income_{ivt}}{Asset_{iv,t-1}} \right) * 100 + \beta_2 \left( \frac{Debt_{iv,t-1}}{Asset_{iv,t-1}} \right) * 100 \\
 &\quad + \beta_3 \left( \frac{Debt_{iv,t-1}}{Asset_{iv,t-1}} * 100 \right)^2 + \varepsilon_{ivt} \\
 (5) \quad \left( \Delta \frac{Cons_{ivt}}{Asset_{iv,t-1}} \right) * 100 &= \alpha_{vt} + \beta_1 \left( \Delta \frac{Income_{ivt}}{Asset_{iv,t-1}} \right) * 100 + \beta_2 \left( \frac{Debt_{iv,t-1}}{Asset_{iv,t-1}} \right) * 100 \\
 &\quad + \beta_3 \left( \frac{Debt_{iv,t-1}}{Asset_{iv,t-1}} * 100 \right)^2 + \beta_4 \left( \Delta \frac{Income_{ivt}}{Asset_{iv,t-1}} * 100 \right) \left( \frac{Debt_{iv,t-1}}{Asset_{iv,t-1}} * 100 \right) \\
 &\quad + \beta_5 \left( \Delta \frac{Income_{ivt}}{Asset_{iv,t-1}} * 100 \right) \left( \frac{Debt_{iv,t-1}}{Asset_{iv,t-1}} * 100 \right)^2 * 100 + \varepsilon_{ivt}
 \end{aligned}$$

Where *Cons* is real household consumption, *Income* is real household income, *Asset* is real household asset, *Debt* is real household debt,  $\alpha$  captures village-time fixed effects to control aggregate macroeconomic shocks in a monthly panel structure or seasonally adjusted in each village,  $\varepsilon$  is the error term,  $\Delta$  represents the first-difference operator. The subscripts *i*, *v* and *t* denote households, villages in the panel, and the time dimension (months).

In the model, variables on both sides of equation are divided by total asset to normalize the variables. Furthermore, to minimize the reverse causality issues, asset and debt are lagged by one period.

## **V. Empirical Results**

From Table A1 in appendix, the average consumption to asset ratio is 0.94 percent which is higher than the average ROA 0.2 percent. About 37.88 percent of samplings have negative net income. It indicates that on average, people consume more than their income. Some people may borrow money to support their consumption. Moreover, the average household debt to asset ratio is 10.26 percent. Top ten percent of household debt to asset ratio is higher than 26.62 percent.

From table 1, income has a significant positive effect on consumption. With respect to the effect of income, one more percent of the income to asset ratio leads to 0.01 percent higher the consumption to asset ratio. Moreover, debt shows a negative significant impact on consumption. The estimates show that one more percent of the debt to asset ratio is associated with 0.001 percent lower of the consumption to asset ratio. The samples from Townsend Thai Monthly Survey Household Financial Accounting are relatively low-income households, compared to the whole nation. When households have accumulated too much debt, they will suffer from the poor financial position. Their indebtedness makes them more susceptible, especially when there are unexpected shocks. Constrained households with high debt burdens will reduce their vulnerability by paying down debt and decreasing their consumption.

In addition, the interaction of changes in ROA and the debt to income ratio is not significant. The squared of debt to asset ratio, and the interaction of changes in ROA and the squared of debt to asset do not show significance. As a result, the effect of nonlinear debt on consumption is not confirmed.

Table 1: Regression Results<sup>1,2)</sup>

	(1)	(2)	(3)	(4)	(5)
$\Delta \frac{Income_{ivt}}{Asset_{iv,t-1}} * 100$	0.0113*** (0.0027)	0.0115*** (0.0027)	0.0103*** (0.0033)	0.0115*** (0.0027)	0.0138** (0.0054)
$\frac{Debt_{iv,t-1}}{Asset_{iv,t-1}} * 100$		-0.0008*** (0.0001)	-0.0008*** (0.0001)	-0.0008** (0.0004)	-0.0007* (0.0004)
$\left(\frac{Debt_{iv,t-1}}{Asset_{iv,t-1}} * 100\right)^2$				1.83e-06 (7.39e-06)	-9.96e-07 (7.99e-06)
$\left(\Delta \frac{Income_{ivt}}{Asset_{iv,t-1}} * 100\right) \left(\frac{Debt_{iv,t-1}}{Asset_{iv,t-1}} * 100\right)$			0.0001 (0.0001)		-0.0005 (0.0004)
$\left(\Delta \frac{Income_{ivt}}{Asset_{iv,t-1}} * 100\right) \left(\frac{Debt_{iv,t-1}}{Asset_{iv,t-1}} * 100\right)^2$					0.00001 (7.70e-06)
Village-Time fixed effects	Yes	Yes	Yes	Yes	Yes
Number of observations	100,948	100,948	100,948	100,948	100,948
Number of households	605	605	605	605	605
Within R-squared	0.0110	0.0110	0.0110	0.0110	0.0112

Notes: 1) Figures in parentheses are the village cluster standard errors

2) \*, \*\*, \*\*\* donate statistical significance at the 10, 5 and 1 %, respectively.

## **VI. Conclusion and Policy Implication**

Household income has a significant positive impact on household consumption. Since the squared of debt to asset ratio, and the interaction between changes in ROA and the squared of debt to asset ratio are not significant, the mixed view of debt on consumption is not confirmed. Overall, household debt shows a negative significant impact on household consumption. In this paper, the samples are relatively low-income households, compared to the whole nation. Constrained households with high debt burdens might decrease their consumption to strengthen balance sheets and correct for past excessive debt.

In term of monetary policy, setting low interest rates for a long period may lead to the excessive household debt accumulation. High debt burden may increase vulnerability, especially when adverse shocks arise. Households can easily borrow more and end up with entering into a vicious cycle of debt. Having measures to cover from upstream to downstream will be a completed solution. To support financial literacy, the Financial Consumer Protection Center was established to provide financial knowledge and understanding of their rights and responsibilities to households which help them to make financial planning and maintain financial discipline, especially encouraging them to balance their revenue and spending. Moreover, the macro-prudential policies and regulations can support responsible lending, for example, setting a cap on the credit line for credit card and personal loans according to income level instead of setting the same limit in all income level. Finally, a pilot consumer debt relief program was launched to solve a problem by restructuring debt. The cooperation among debtor, financial institutions, and central agency are important to solve the problem.

## Appendix

Table A1: Descriptive Statistic

Variable	Mean	Std. Dev.	Min	Max	Observations
$\frac{Cons_{ivt}}{Asset_{iv,t-1}} * 100$	0.9372	1.0674	0	9.1108	101,553
$\frac{Income_{ivt}}{Asset_{iv,t-1}} * 100$	0.7326	1.800	-12.3694	14.4673	101,553
$\frac{Debt_{iv,t-1}}{Asset_{iv,t-1}} * 100$	10.2642	12.7179	0	77.1394	101,553
$\left(\frac{Debt_{iv,t-1}}{Asset_{iv,t-1}} * 100\right)^2$	267.0964	646.0775	0	5,950.482	101,553
$\Delta \frac{Cons_{ivt}}{Asset_{iv,t-1}} * 100$	-0.0032	0.6216	-8.9452	8.6905	100,948
$\Delta \frac{Income_{ivt}}{Asset_{iv,t-1}} * 100$	0.0034	2.0199	-19.6979	18.6814	100,948
$\left(\Delta \frac{Income_{ivt}}{Asset_{iv,t-1}} * 100\right) \left(\frac{Debt_{iv,t-1}}{Asset_{iv,t-1}} * 100\right)$	0.3819	42.2731	-929.0485	1,198.514	100,948
$\left(\Delta \frac{Income_{ivt}}{Asset_{iv,t-1}} * 100\right) \left(\frac{Debt_{iv,t-1}}{Asset_{iv,t-1}} * 100\right)^2$	19.2376	1,951.17	-63,761.48	87,836.31	100,948
Real Consumption	9,700.39	12,790.8	0	638,225.4	101,553
Real Income	10,057.87	44,952.44	-1,293,042	2,214,403	101,553
Real Asset, Lagged	2,819,253	8,685,413	2,140.89	2.07e+08	101,553
Real Debt, Lagged	158,420.4	367,659.3	0	1.11e+07	101,553

Table A2: The Consumption to Asset Ratio, The Income to Asset Ratio, and The Debt to Asset Ratio

Ratio (Percent)	1 <sup>st</sup> Quartile	Median	3 <sup>rd</sup> Quartile	4 <sup>th</sup> Quartile
$\frac{Cons_{ivt}}{Asset_{iv,t-1}} * 100$	0.3034	0.5790	1.1464	9.1108
$\frac{Income_{ivt}}{Asset_{iv,t-1}} * 100$	-0.0400	0.0884	0.8501	14.4673
$\frac{Debt_{iv,t-1}}{Asset_{iv,t-1}} * 100$	1.1262	5.6857	14.7379	77.1394

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