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Do Thai Credit Card Consumers Have Self-Control?

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ABSTRACT

The use of credit cards has been popular in Thailand for several decades. As its popularity increases, policymakers and the public have expressed concerns over the credit card debt. With the panel dataset from the National Credit Bureau, this study is able to explore whether Thai credit card consumers, on average, have self-control in terms of credit card utilization rate. Under the theoretical framework of Life Cycle Hypothesis and the theory of self-control in behavioral economics, the effects of demographic variables, life stages, time of the year and the economic outlook are investigated in this study. From the Panel Random-Effects Tobit regression, the main results indicate that Thai credit card consumers statistically have partial self-control. However, they begin to lose self-control when they (i) have too many credit cards, (ii) fall into the 'illusion of income', (iii) have any additional type(s) of debt, (iv) spend in December and (v) become optimistic towards the economy in the future. To alleviate the loss of self-control in the short run, policymakers are advised to 'build income walls' and lock 'one credit limit per one card issuer' for all card holders. In the long run, self-control can be achieved through an appropriate financial habit formation with the aid of financial technology.

Keywords: Credit Card, Self-Control, Utilization Rate, Panel Random-Effects Tobit

JEL Classification: D14, E21, G4

1. Introduction

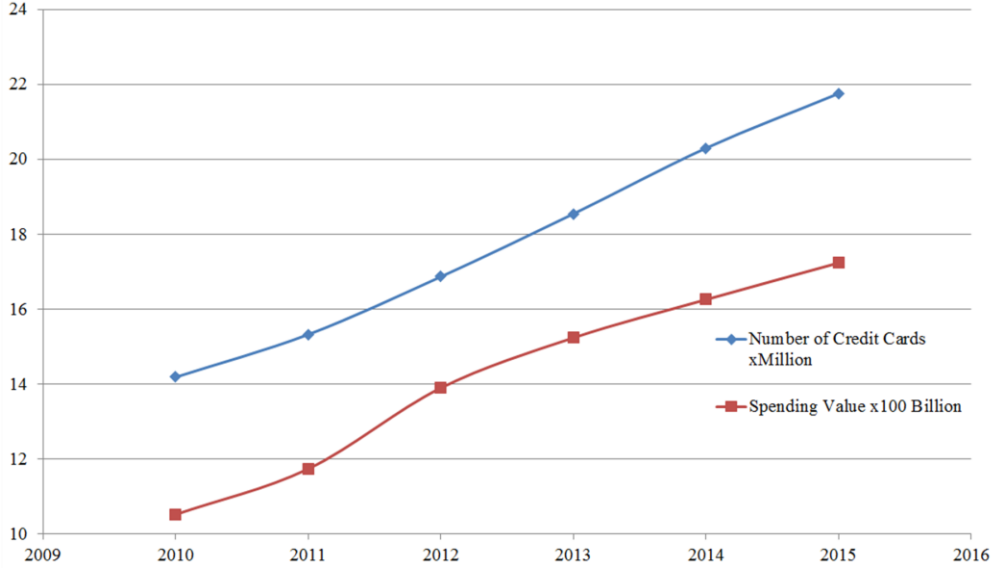
Credit cards are a popular method of payment and a prominent way to get loans legally without any collateral in Thailand. It was first introduced in 1969, and has gradually gained popularity since then. From Figure 1, the total number of credit card in 2010 was around 14.19 million cards, which increased to 21.76 million cards four years later. The value of credit card spending also sharply increased from 1.05 trillion THB in 2010 to 1.72 trillion THB in 2015.

With its increasing popularity, policymakers and the public have expressed concerns regarding the credit card debt – as a part of Thai household debt – and its effects toward the Thai economy. This is of concern as the issue will eventually harm private consumption and Thai economic stability if left uncontrolled.

As the Thai economy has been weak (See Figure 2) for many years, middle-income credit card holders have started controlling their card spending receipt by receipt according to Kitticharoonwit (2016). From the side of Thai commercial banks, they have taken extra caution in reviewing their card holders' credit history and tightening credit card application processes.

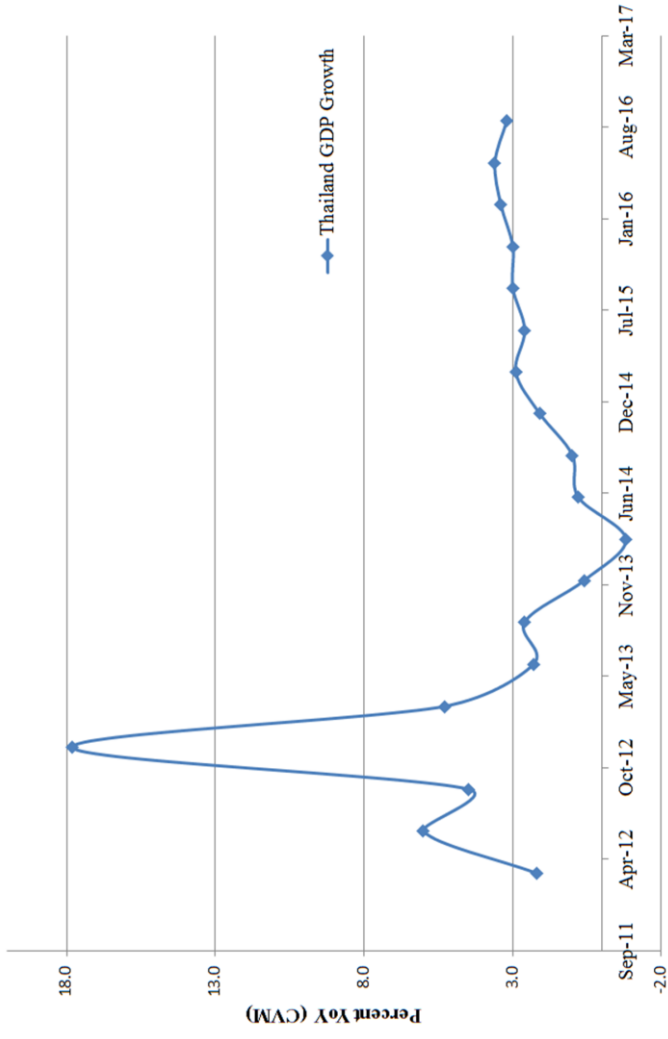
Despite the concerns, and controlling measures on the side of consumers and card-issuer, the credit card problem has become evident in the last two years. The problem is reflected in both the absolute number of card holders (Figure 3) and the growth in number of card holders (Figure 4) who are classified as 'Special Mention' (SM) or 'Non-Performing Loan' (NPL) status in the 40,512-card-holders panel dataset provided by the National Credit Bureau (NCB).

Figure 1. Number of Credit Cards and Total Spending Value in THB



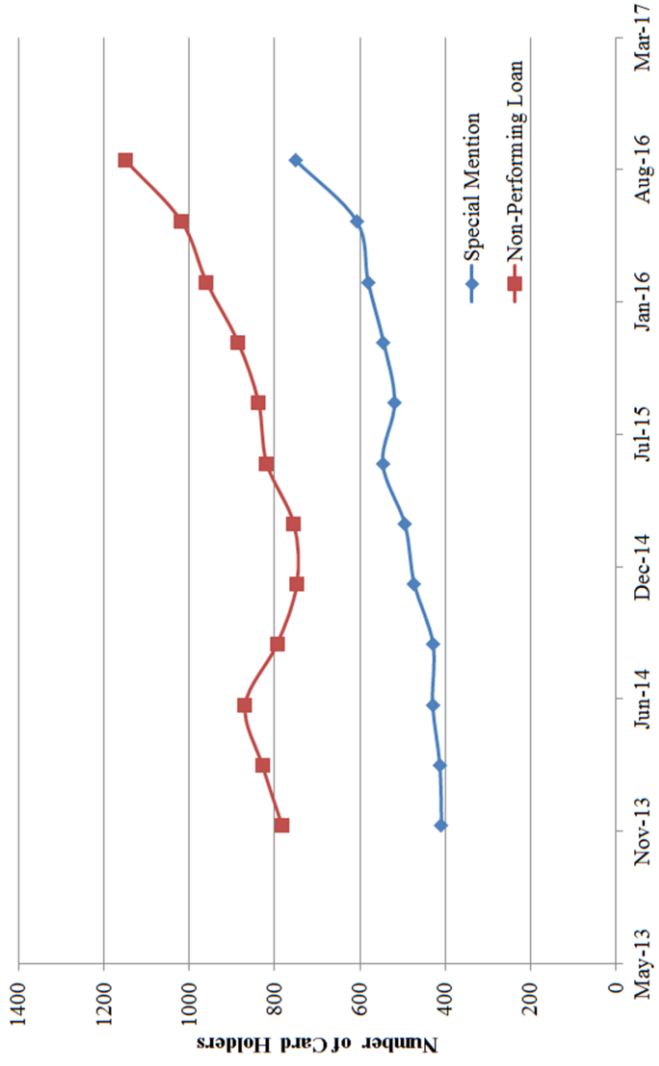
Source: Bank of Thailand Statistics (2015)

Figure 2. Thailand GDP growth YoY (CVM)



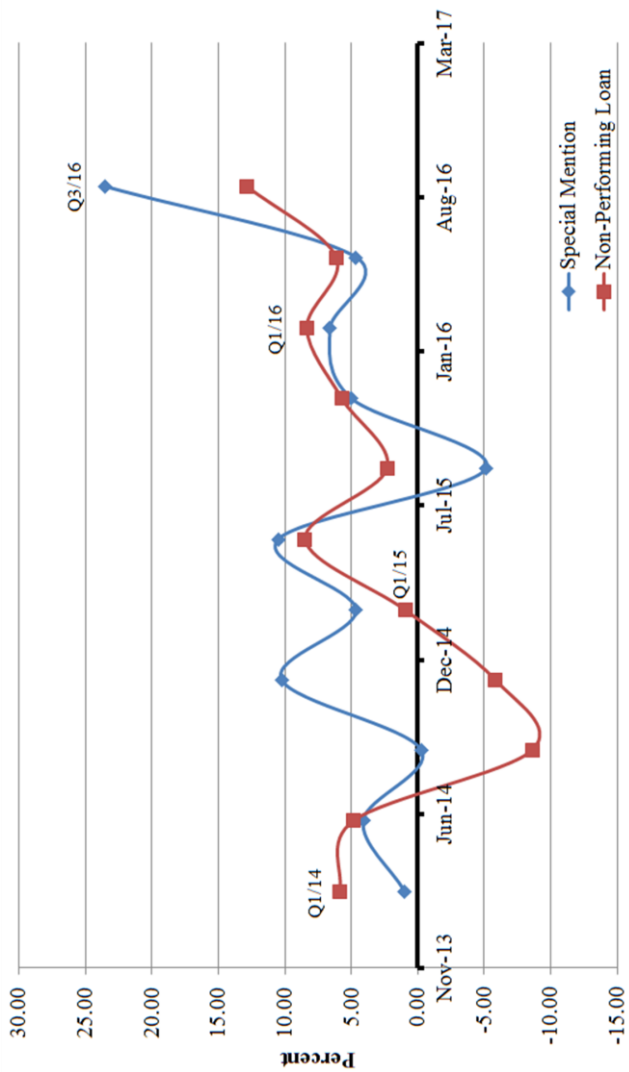
Source: NESDB (2016)

Figure 3. Number of Card Holders by Delinquency



Source: Authors' calculation

Figure 4. Percent Increase of Delinquency QoQ



Source: Authors' calculation

Surprisingly, there is no empirical research regarding self-control of Thai credit card holders in Thailand, even though the problem is real and the need for economic research in credit card debt controlling is significant. Therefore, this study is conducted to explore whether Thai credit card holders have self-control in the aspect of credit card utilization rate using the panel dataset from the NCB, under the theoretical framework of Life Cycle Hypothesis proposed by Ando and Modigliani (1963) and the Economics of Self-Control proposed by Thaler and Shefrin (1981). The study will analyze the effect of life cycle and demographics on the self-control of Thai credit card consumers using the provided dataset.

As for the scope of methodology, this study uses only credit card panel data and its relevant statistics from the NCB database including variables derived or obtained from the database during the fourth quarter of 2013 to the third quarter of 2016. For the scope of theoretical framework, this study mainly uses the Life Cycle Hypothesis and the Economics of Self-Control in behavioral economics.

2. Literature Review

2.1.Literature in Thailand

The very first study related to credit cards in Thailand was Aramcharoen (1996) who studied the effect of credit card usage on the demand for money (M1) in Thailand during Q3/1986 to Q4/1994. He found that credit card usage significantly led to a reduction in the level of M1 demand especially demand deposits. However, Aphaiwongse (1997) found that credit cards could only marginally replace cash while the card holders still used cheques along with credit cards as the payment methods.

Some studies explored the issues of adverse selection in credit card usage. Chinaprayoon (2003) explored the stickiness of credit card interest rate in Thailand using Cointegration and Error Correction Method. He found that the credit card adverse selection problem arises from search costs and switching costs using 380-sample questionnaire and Tobit regression. He found that the interest rate of credit cards is sticky with the interest-adjustment rate of 7.2% per month. His survey also found that the credit card holders with high level of credit card balance per credit limit did not face search costs in finding the right card promotion. However, they faced a high switching cost from higher rejection rate and lower credit limit when applying for a new credit card. It is then concluded that adverse selection induced by switching cost partly explained the stickiness of credit card interest rate in Thailand. In another study, Seneerattanaprayul (2007) tried to design credit card contracts which reveal types of agents (high probability of following contract and low probability of following contract type) under asymmetric information (adverse selection) in a static game in which the agent chooses whether to accept or reject the contract. It was found that those who with high probability of following contract will get more utility than those with low probability since they benefited from being good people.

Keawthong (2008) explored the factors contributing to credit card delinquency in Thailand using an in-house dataset from a commercial bank with 19,626 card holders. The Logistic regression results indicated that being male, entrepreneur, self-employed, living in Bangkok, number of credit cards, outstanding balance, minimum payment and minimum-payment-to-income ratio all have positive correlations with the probability of credit card delinquency. It was thus suggested that the Bank of Thailand should control the maximum number of credit cards for an individual, raise

the minimum required income criteria and reduce the minimum-payment percentage to 5% during an economic downturn in order to limit credit card default.

No domestic literature has incorporated the aspect of self-control in analyzing credit card usage. The next section reviews related literatures to fulfill this gap.

2.2.Credit Card Literature

Although there are numerous strands of credit card literature, this study will describe only literature in the strand of 1) credit card balance, 2) credit card & college students, and 3) other related credit card literature.

2.2.1. Credit card balance

Most of the literature in this strand relied on the assumption of Life Cycle Hypothesis (LCH) which implies that young card holders would have higher a credit card balance compared to the middle-age card holder because of the mismatch between his income and his consumption at that time. Kim and DeVaney (2001) explored the factors determining the credit card balance of US card holders using 1998 Survey of Consumer Finance (SCF) under the framework of LCH and the exposition of consumption and savings by Bryant (1990). To isolate credit card revolvers from the credit card holders, they used Heckman selection model in the study. In one of their findings, they found that number of credit card and the credit limit have positive correlations with the credit card balance. These relationships violated agent rationality in the mainstream economics. They also found no evidence supporting the assumption of LCH. In the other study, Gross and Souleles (2002) used a special dataset collected from several card issuers to investigate the

effect between credit limit increase and the rise of credit card balance. With traditional regression, they found that increasing credit limit would significantly increase the credit card balance. They also observed a peculiar phenomenon that card holders held both credit card balance and the liquid assets instead of paying all the debt and using only the cards. This phenomenon, which is known as 'credit card puzzle' has become another strand of research related to credit cards.

In additional to using the LCH, Baek and Hong (2004) also incorporated the concept of Life-Cycle Stages from Bojanic (1992) in their study. They argued that each stage of the card holder's life has different financial goals and challenges, analyzing life cycle stage-by-stage would give better explanation in each life stage than using the LCH. With the double-hurdle model, they found that number of credit cards or the credit limit significantly increased the amount of credit card debt.

Since these mentioned studies violated the rationality of agents in the relationship between credit card balance and the credit limit or number of credit cards, some studies employed the concepts of behavioral economics in their studies instead. For instance, Wang et al. (2011) studied the effect of demographics, attitude, personality and credit card towards the credit card debt in China using mail-in questionnaires with cooperation from a Chinese commercial bank. In one of their findings, they found that the credit limit has a positive relationship with the credit card debt.

2.2.2. Credit card and college students

Unlike Thailand where college students mostly do not have their own income, college students in the US with either part-time or full-time job can have credit cards. Therefore, it is useful to study this strand of literature in case of college students in Thailand who are able to hold credit cards in the near future.

Norvilitis et al. (2003) explored the factors influencing the credit card debt of 227 college students using on-campus questionnaires. They found that students who applied for a credit card on the campus had higher debt-to-income ratio than those who applied elsewhere. They also suggested that college students intended to get out of debt but they did not know how. In another study, Norvilitis et al. (2006) investigated whether financial literacy including personality factors and money attitudes affects the credit card debt in college students using 448 on-campus questionnaires. They found that having low financial literacy, age and number of credit cards have positive correlations with the credit card debt. However, Robb and Sharpe (2009) found a contradicting result that those college students who have higher financial literacy significantly have higher credit card balance although the direction of causality was unwarranted.

2.2.3. Other related credit card literature

Min and Kim (2003) compared between the result of Tobit type I regression and the result of Tobit type II regression using the 1998 SCF. They found that Tobit type II could give more realistic results than the Tobit type I. Basnet and Donou-Adonsou (2016) also used Tobit type I regression with the 2013 SCF dataset in order to investigate whether internet access had any effect toward the credit card spending. They found that internet access was a venue to more credit card debt.

3. Research Methodology

3.1.Dataset

The multi-dimensional panel dataset provided by the National Credit Bureau (NCB) is a quarterly panel data of 40,512 credit card holders after data cleaning and panel balancing. The dataset spans three years; starting from the fourth quarter of 2013 to the third quarter of 2016. For each card holder, the dataset contains quarterly details accounting level of his/her credit cards including his/her other type(s) of debt such as auto loan, mortgage loan and personal loan. The details include the card holder's outstanding balance, credit limit, number of credit cards, minimum percentage payment, delinquency status, age, marital status, sex and postal code. If the card holder has other type(s) of debt, the details also indicate his/her monthly term payment in account level.

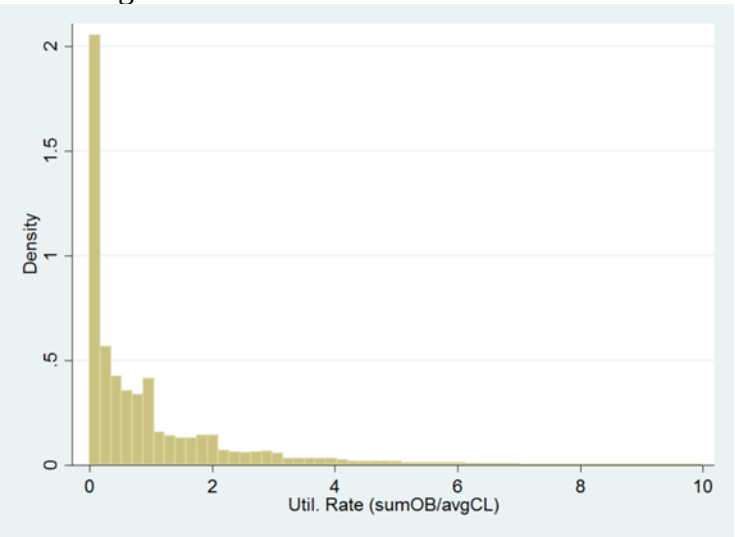
Data organizing process begins with the summing of all term payments for each type of loan to generate total payment variables. Therefore, for each card holder, all monthly term payments of auto loan, mortgage loan and personal loan are summed into 'AUTOPAY', 'MORTPAY' and 'PLPAY' respectively. These variables indicate the total monthly payment that card holders pay to their loans, which are not credit card debt. Then other necessary demographical and delinquency variables are generated. Generational dummy variables are created from the age variable. There are three generations in this study, as categorized by the year of birth – generation Y (1977 - 1995), generation X (1965 - 1976) and Baby Boomers (1946 - 1964). The age criteria for each generation were taken from the Center for Generational Kinetics (accessed on June 16, 2017). Some card holders change their generation during a three-year period of this dataset, and thus the information of these card holders is not a complete three-year period. To deal with this problem,

dummy variables are created to screen out those who change generation. For the delinquency status, 'SM' dummy variable is created for any 'Special Mention' loan which has been overdue for more than 30 days but less than 90 days; and 'NPL' dummy variable is created for any 'Non-Performing Loan' which has been overdue for more than 90 days. This study also creates two dummy variables – 'IDSM' and 'IDNPL' – to capture those card holders who had one of their credit cards marked as SM or NPL during the past three years. Since the NCB keeps credit history of every loan consumer only for three years, these IDSM and IDNPL variables are useful in screening for card holders who have clean credit history. After data organizing process, the next step is panel transformation.

Panel transformation is the process which sums all loan accounts into a card holder. Because the provided dataset is multi-dimensional, it is vital to transform the dataset into a conventional panel data before running any regression. The transformation starts with creating a variable of total credit card balance or 'sumOB'. This variable represents the total balance that a card holder holds in each quarter. A variable for credit limit (i.e. 'sumCL') is also generated in the same fashion. This 'sumCL' will be the variable which detects whether average card holders in Thailand fall into the illusion of income as proposed by Wang et al. (2011). After that, all credit limits will be averaged as 'avgCL'. The average credit limit is very important in this study since the NCB does not collect debtors' income. To reflect the card holders' income level, the average credit limit is used as the proxy for income instead. The final step for transformation is to generate credit-limit-weighted variables out of all financial variables. To do so, the variable 'sumOB' was divided by 'avgCL' to

form the card holders' utilization rate ('UR')[1]. Then, the 'AUTOPAY', 'MORTPAY' and 'PLPAY' are weighted by 'avgCL' to yield 'AUCL', 'MOCL' and 'PLCL' variables respectively. Finally, all data are transformed into a conventional two-dimensional panel dataset.

Figure 5. Distribution of the Utilization Rate



Source: Authors' calculation

After data transformation, any weighted variable will be augmented by one unit and then log-transformed. The reason for adding one before log transformation is to avoid sample omission from having zero value. These variables are log-

[1]Please note that this UR is different from the UR in credit card industry that UR in the industry is in a card basis but UR in this study is in the individual basis.

transformed because the distributions of these variables are highly right-skewed as seen from Figure 5.

Finally, control variables for the 'December' effect and the economic outlook effect are added in this dataset. According to Figure 6, all spikes in aggregate credit card spending occur in the December. This study suspects that spending in December might have some effect toward the credit card utilization rate. Therefore, 'December' dummy variable is created to detect this time effect. For the effect of economic outlook, this study uses lagged YoY GDP growth (CVM) from the National Statistical Office as the macroeconomic control variable. The reason for using lagged variable is because the previous quarter growth is normally announced in the current quarter and the card holders will judge the economic outlook from this information.

3.2.Estimation Method

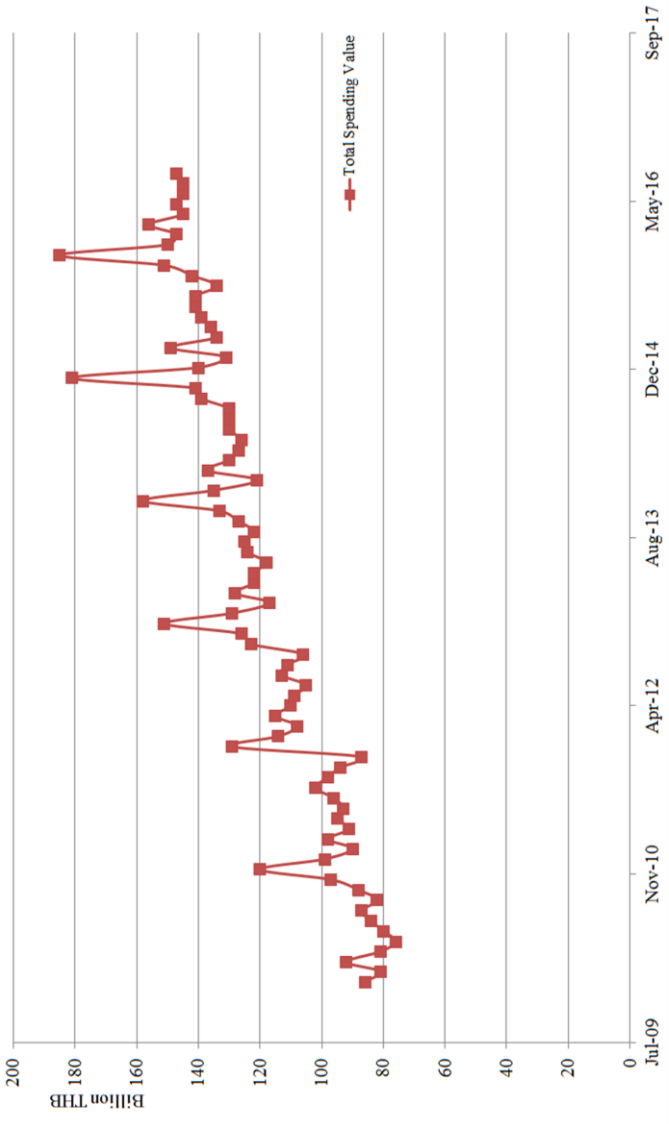
According to Figure 5, financial variables in the dataset are censored data where zeroes are the largest portion of the data. This suggests that the use of Panel Random-Effects Tobit regression is appropriate for this study. Some previous studies on credit card that employed the panel Tobit regression are Min and Kim (2003), and Basnet and Donou-Adonsou (2016).

3.3.Research Model

According to the regression, there are 2 stages of decision which can be described into 2 equations as follows:

$$y_{it} = \begin{cases} y_{it}^{*} & if\ y_{it}^{*} > 0 \\ 0 & if\ y_{it}^{*} = 0 \end{cases} \quad (1)$$

Figure 6. Monthly Total Credit-Card-Spending Value



Source: Bank of Thailand Statistics (2016)

The first equation is called the 'decision equation' because it represents whether the card holder decides to hold his/her credit card balance or not. If he/she decides to hold a balance, the second equation, which is the main equation, will be used to determine his/her utilization rate.

$$\log(UR_{it}+1) = \alpha_{it} + \beta_{1it}\log(sumCL_{it}+1) + \beta_{2it}NUMCC_{it} + \beta_{3it}\log(AUCL_{it}+1) + \beta_{4it}\log(MOCL_{it}+1) + \beta_{5it}\log(PLCL_{it}+1) + \beta_{6it}AGE_{it} + \beta_{7it}AGE_{it}^{2} + \gamma_{1i}SEX_i + \gamma_{2i}MARRIED_i + \gamma_{3it}DEC_{it} + \gamma_{4t-1}Growth_{t-1} + \varepsilon_{it}$$

Dependent variable $\log(UR_{it}+1)$ is the card holder's utilization rate in each quarter. The details of independent variables are follows; (i) $\log(sumCL_{it}+1)$ is the card holder's total credit limit in that quarter, (ii) $NUMCC_{it}$ is the number of credit cards for each card holder, (iii) $\log(AUCL_{it}+1)$, (iv) $\log(MOCL_{it}+1)$, and (iv) $\log(PLCL_{it}+1)$ are the card holder's total monthly auto-loan payment, mortgage-loan payment and personal-loan payment weighted by his/her average credit limit respectively, (v) AGE, and (vi) AGE^2 stand for the card holder's age and the squared term of his/her age respectively, (vii) SEX is the dummy for card holder's gender where 1 means male and 0 means female, (viii) MARRIED is the marital-status dummy of the card holder where 0 means single and 1 means married, divorced or widowed, (ix) DEC is the seasonal dummy which is used to detect the spending-in-December effect where 1 indicates that the data is in December or the fourth quarter, and 0 indicates that the data is in the other quarters, and (x) 'Growth' is the Thailand's GDP growth (CVM) YoY calculated by the National Statistical Office.

3.4.Meaning of Variables

UR stands for the 'utilization rate'. It is a measure of the card holder's outstanding balance compared to his/her credit limit. Normally, UR is calculated on each card. However, this study defines the utilization rate as the card holder's total credit card balance divided by his/her average credit limit. The UR is done in this fashion because averaging the UR of each card will result in underestimation. For example, Mr. D has a 'Bank A' credit card with 10,000 THB credit limit and 2,000 THB balance. He also has a 'Bank B' card with 10,000 THB credit limit and no balance. The UR of 'Bank A' card will be 20%, while that of 'Bank B' card will be 0%. Averaging both URs will give the card holder's average UR of 10%, which implies that he has credit card debt only 1,000 THB – which is 50% lower than his actual balance. The UR in this study can be over 100% since the balance from each of his/her cards can be summed beyond his average credit limit.

'sumCL' stands for the card holder's summation of credit limit. Normally, a card holder in Thailand can have a credit limit around 2-3 times of his/her regular monthly income with the maximum legal limit of 5 times. Suppose the credit limit multiplier is 2 (i.e. two times of one's income) and Mr. D's income is 5,000 THB per month, then if he has 2 credit cards, the total credit limit would be 20,000 THB. This total limit represents his purchasing power of 20,000 THB or 4 times of his income. If he applies for a credit card at 'Bank C' with the same credit limit as 'Bank A', his purchasing power will be 30,000 THB. Therefore, the more cards he applies, the more total credit limit he has which literally translates into higher purchasing power in his hand. The phenomenon where one has an inflated purchasing power while income remaining constant is called the 'illusion of income' by Wang et al. (2011). Kim and Devaney (2001)

together with Baek and Hong (2004) found the positive correlation between the credit card balance and the total credit limit. Therefore, this study expects the 'sumCL' to have a positive correlation with the UR if Thai credit card holders on average fall into this illusion.

Number of credit cards (NUMCC) is similar with the 'sumCL'. Unless the card issuer locks all credit cards of a card holder to one credit limit, having more cards leads to higher purchasing power while income remains the same. So, NUMCC is expected to have a positive correlation with the UR.

Auto-loan payment (AUCL), mortgage-loan payment (MOCL) and personal-loan payment (PLCL) are usually in monthly basis for the Thailand case. These types of loan are very common for the Thai households. Capturing these aspects is essential since a card holder may have more than one type of debt and these other types of debt may affect the credit card spending which is reflected through the utilization rate. Muthitacharoen et al. (2015) proposed the maximum debt-to-income ratio of 40% that households can have before they face a difficulty in paying back. If the card holders do not want to have a problem in repaying all of their debts, they should control themselves by lowering the credit card balance when they have any additional type of debt such as auto loan, mortgage loan or personal loan. Hence, this study hypothesizes negative correlations among these variables and the utilization rate if the card holders do have some self-control. On the other hand, if the correlations are positive then the average card holders do not have self-control when they have any additional type of debt.

Age and the squared age are vital variables to check whether Thai credit card holders follow the LCH or not. The example for using these variables can be seen from Kim and DeVaney (2001) or Baek and Hong (2004). If the card

holders follow the LCH assumption, the relationship of age and squared age towards the UR should be negative and positive respectively. However, if the card holder follows life-stage behavior in which he has more financial responsibilities (i.e. having family and children), then the positive significant and negative significant relationships toward the UR should be expected from the AGE and AGE2 respectively.

Lagged growth is used in this study to investigate whether the economic optimism do have effects towards the utilization rate of the average card holders. If the optimism is real, there should be a positive correlation with the UR for this variable.

4. Results and Discussions

4.1.Summary Statistics

According to Table 1, the summary statistics reveal a worrying picture of the credit card debt situation. Since most of the credit card issuers in Thailand provides credit limit to the card holders around 2 to 3 times of card holders' monthly income, this study assumes that the credit limit multiplier is around two times of card holders' monthly income. Under this assumption, card holder's debt service ratio (DSR) will be around two times of the credit card utilization rate (UR). In the UR row, it can be interpreted that most (median) of the card holders in generation Y have DSR around 104% while most of the generation-X card holders have DSR around 87%. These DSR figures signal that credit card debt problem is mostly concentrated in the younger generation. Furthermore, considering the UR of those who have had one of their cards marked as SM or NPL within the past 3 years, most of them have literally explosive DSR ratio of almost

360% for SM card holders and almost 400% for the NPL card holders. Comparing these clean-record card holders to the SM or NPL card holders, this indicates that these individuals are sitting on ticking time bombs – ready to explode from around one hundred percent to almost four hundred percent DSR.

In term of the income proxy, the average credit limit shows an interesting finding that most of the SM and NPL card holders have their income less than 20,000 THB per month. These income levels are similar to the income level of generation-Y card holders. This asserts that the problem of credit card debt does not only pertain to the young card holders but also to low-income card holders.

Although most of the card holders in this study have extremely high DSR levels, they mostly do not have any other type of debt beside from the credit card debt. However, when they have another type of debt, the severity of their debt problem is exacerbated.

Lastly, the median of number of credit cards might give some clue regarding to the relationship between number of credit cards and the utilization rate. Most of card holders own around 2 cards. However, most of the SM and NPL card holders own around 3 cards. Therefore, the number of credit cards should have a certain relationship with the credit card utilization rate.

Table 1. Summary Statistics of clean-record and bad-record card holders

		Summary Statistics					
		THAILAND	Clean-Record Card Holders†			IDSM	IDNPL
			Generation Y	Generation X	Baby Boomer		
UR	Mean	94.56%	91.89%	89.06%	63.12%	224.67%	238.52%
	Median	44.42%	52.16%	43.36%	19.30%	178.80%	198.80%
		(138.87%)	(122.8%)	(132.52%)	(110.86%)	(207.22%)	(212.92%)
sumOB	Mean	56,170.59	41,921.71	57,727.78	53,239.20	119,841.70	112,271.30
	Median	21,868.00	19,621.00	23,241.50	15,554.50	60,377.00	58,828.50
		(126,361.3)	(85,215.89)	(123,062.4)	(135,642.6)	(211,409.3)	(175,807.7)
sumCL	Mean	315,046.20	168,973.50	362,418.30	441,294.50	225,713.70	175,058.20
	Median	117,000.00	89,000.00	125,000.00	160,000.00	120,000.00	95,000.00
		(8,006,989)	(255,597.7)	(9,446,416)	(10,100,000)	(359,034.3)	(286,345.2)

Table 1. (Continued)

		Summary Statistics					
		THAILAND	Clean-Record Card Holders†			IDSM	IDNPL
			Generation Y	Generation X	Baby Boomer		
avgCL	Mean	85,371.11	52,650.67	83,722.47	114,088.60	54,389.03	45,033.19
	Median	50,000.00	38,000.00	51,000.00	74,333.34	39,006.25	34,000.00
		(1,638,622)	(59,991.22)	(787,358.6)	(911,037.9)	(60,699.2)	(50,176)
AUCL	Mean	9.21%	12.22%	8.90%	4.45%	15.50%	15.56%
	Median	0%	0%	0%	0%	0%	0%
		(37.61%)	(37.14%)	(28.72%)	(18.99%)	(40.23%)	(110.15%)
MOCL	Mean	5.99%	6.86%	6.91%	3.49%	7.81%	5.61%
	Median	0%	0%	0%	0%	0%	0%
		(20.54%)	(20.32%)	(23.37%)	(16.91%)	(24.26%)	(21.32%)
PLCL	Mean	17.91%	12.62%	19.47%	16.30%	31.31%	35.91%
	Median	0%	0%	0%	0%	7.1%	7.5%
		(175.53%)	(105.37%)	(195.71%)	(232.34%)	(145.32%)	(158.68%)

Table 1. (Continued)

		Summary Statistics					
		THAILAND	Clean-Record Card Holders†			IDSM	IDNPL
			Generation Y	Generation X	Baby Boomer		
NUMCC	Mean	3.2	3.1	3.3	3.1	3.8	3.5
	Median	2	2	2	2	3	3
		(2.7)	(2.5)	(2.9)	(2.7)	(2.7)	(2.3)
AGE	Mean	45.2	32.9	45.6	59.2	42.4	42.5
	Median	44	33	45	59	41	41.5
		(11.4)	(3.67)	(2.73)	(4.30)	(10.1)	(10.1)
MARRIED		71.81%	56.15%	75.90%	87.64%	67.47%	64.19%
		(44.99%)	(49.62%)	(42.77%)	(32.91%)	(46.85%)	(47.95%)
SEX		44.85%	39.64%	44.75%	50.76%	44.96%	46.36%
		(49.73%)	(48.91%)	(49.72%)	(50.00%)	(49.75%)	(49.87%)

Source: Authors' calculation

Note: (i) IDSM/IDNPL = Credit card holders who had history of 'Special Mention/Non-Performing Loan' within the past 3 years, (ii) The values in the parentheses are standard deviations, (iii) † Only card holders who stay in the same generation for 3 years.

4.2.Discussion of the results

From the Panel Random-Effects Tobit regression, the main results, as shown in Table 2, suggest that the average Thai credit card consumers have partial self-control. The negative correlations between percentage change in utilization rate and the percentage change in total credit limit indicate certain behavior of card balance targeting among clean-record card holders. This behavior illustrates that the average card holders have certain levels of card spending in their mind regardless of any increment in credit limits. This behavior, however, does not apply to the SM and NPL card holders. These delinquent card holders do indeed fall into the illusion of income as proposed by Wang et al. (2011). When their credit limit or purchasing power increases, they simply increase their credit card balance despite having the same income level. The mismatch between available purchasing power and the actual income is the essence of illusion of income.

Although the average card holders do not fall into the illusion, they are still vulnerable to the loss of self-control. The first factor that causes the loss of self-control is the number of credit cards. Unless there is a regulation that locks all cards into one credit limit within the same issuer, having more cards implies having more purchasing power which loops back to the illusion of income again. This loop is warranted by the positive correlation between number of credit cards (NUMCC) and the percentage change in UR

across generations and delinquencies. These mentioned results support the findings of Kim and DeVaney (2001), Baek and Hong (2004), and Wang et al. (2011). Having other type(s) of debt is the second factor that causes the loss of self-control. The regression results show positive correlations among percentage change in utilization rate and the percentage change in weighted monthly term payment of three types of debt: auto loan, mortgage loan and personal loan. These positive correlations are consistent throughout all sub-sample groups.

Contrary to the assumption of Life Cycle Hypothesis that the card balance should be lower as card holders get older, most of the clean-record card holders follow the life-stage behavior. The positive correlation in AGE and the negative correlation in SQAGE illustrate that card holders on the average hold higher balance as they get older. Only NPL card holders follow the LCH assumption. This reflects that the problem of credit card debt is more pronounced in the young generation.

Controlling for macroeconomic factors, this study finds that the average card holders including SM card holders have economic optimism. They predict that the next quarter will be as good as this quarter. If they have a precaution about the economy, they should lower their balance of the current quarter to cushion an incoming shock. However, they spend more when the economy is good. Therefore, economic optimism is the third factor contributing to the loss of self-control in average Thai card holders especially those in the generation Y who have the highest optimistic magnitude. Unlike other groups, NPL card holders have lower balance even if the economy works fine. This is possible because these NPL card holders already have their card cancelled automatically according to the Bank of Thailand's regulation.

They can only pay off their existing debts even if they wish to spend like the others.

The last factor of causing the average card holders to lose self-control is the tendency to spend in December. According to the results in Table 2, card holders in every generation including SM card holders spend more in December. The average card holders in generation X have the highest magnitude of spending in December. These card holders might take their families to the Christmas and New Year vacation, or they might spend for the New Year gifts. Only NPL card holders have lower balance in the December since they can only pay off their debts.

Table 2. Regression results of clean-record card holders and bad-record card holders

	log(UR+1)					
	THAILAND	Clean-Record Card Holders†			IDSM	IDNPL
		Generation Y	Generation X	Baby Boomer		
log(sumCL+1)	0.0045** (0.0019)	-0.0106*** (0.0033)	-0.0133*** (0.0038)	-0.0140*** (0.0043)	0.0663*** (0.0064)	0.183*** (0.0076)
NUMCC	0.0862*** (0.0007)	0.0785*** (0.0012)	0.0762*** (0.0013)	0.0733*** (0.0015)	0.129*** (0.0021)	0.171*** (0.0030)
log(AUCL+1)	0.1360*** (0.0058)	0.1050*** (0.0095)	0.0975*** (0.0119)	0.1360*** (0.0181)	0.1430*** (0.0162)	0.1660*** (0.0205)
log(MOCL+1)	0.1190*** (0.0078)	0.1560*** (0.0133)	0.1390*** (0.0149)	0.0880*** (0.0223)	0.0660*** (0.0218)	0.0175 (0.0332)
log(PLCL+1)	0.0667*** (0.0029)	0.0782*** (0.0070)	0.0305*** (0.0053)	0.0242*** (0.0059)	0.0724*** (0.0081)	0.2030*** (0.0103)
AGE	0.0106*** (0.0014)	0.0592*** (0.0083)	0.0294* (0.0170)	0.0584*** (0.0146)	0.0072 (0.0047)	-0.0195*** (0.0058)

Table 2. (Continued)

	log(UR+1)					
	THAILAND	Clean-Record Card Holders†			IDSM	IDNPL
		Generation Y	Generation X	Baby Boomer		
SQAGE	-0.0002*** (0.00001)	-0.0009*** (0.00013)	-0.0003* (0.00018)	-0.0006*** (0.00012)	-0.0001** (0.00005)	0.0002** (0.00006)
SEX	-0.0147*** (0.0051)	-0.0200** (0.0088)	-0.0215** (0.0100)	-0.0207* (0.0109)	-0.0272* (0.0162)	0.00170 (0.0194)
MARRIED	-0.0338*** (0.00574)	-0.0403*** (0.00872)	-0.0174 (0.0115)	-0.00794 (0.0162)	-0.0472*** (0.0180)	-0.0497** (0.0214)
DEC	0.0241*** (0.0010)	0.0293*** (0.0020)	0.0320*** (0.0021)	0.0292*** (0.0023)	0.0097*** (0.0033)	-0.0219*** (0.0046)
lagGrowth	0.0116*** (0.0003)	0.0184*** (0.0009)	0.0122*** (0.0010)	0.0109*** (0.0009)	0.0111*** (0.0011)	-0.0124*** (0.0016)
Constant	0.0367 (0.0354)	-0.6260*** (0.1380)	-0.3590 (0.3950)	-1.3000*** (0.4410)	-0.3450*** (0.1180)	-1.1360*** (0.1460)
Card Holder	40,512	11,622	9,792	7,957	3,388	2,235

Source: Author's calculation

Notes: (i) IDSM/IDNPL = Credit card holders who had history of 'Special Mention/Non-Performing Loan' within the past 3 years, (ii) * p<0.1 ** p<0.05 *** p<0.01, (iii) The values in the parentheses are standard errors, and (iv) † Only card holders who stay in the same generation for 3 years.

5. Conclusion and Recommendations

5.1. Conclusion

Credit card debt, as a part of household debt, has been discussed widely in the circle of policymakers and the Thai public for many years. It is a worrying issue among policymakers that if the problem about credit card debt remains unsolved, its consequence would lead to a drastic cutback of private consumption since people will prioritize their income to paying their debt first instead of consuming, and this weakened consumption would eventually affect Thai economic growth and stability. Since there is no empirical study in Thailand regarding to the self-control of Thai credit card consumers, this study was conducted to explore whether Thai credit card consumers have self-control in the aspect of credit card utilization rate or not. The credit card utilization rate is defined as the card holder's total credit card balance divided by the card holder's average credit limit. This study employs 12-quarter multi-dimensional panel data from the National Credit Bureau with the total number of credit card holders after panel balancing and data cleaning procedure of 40,512 people. The main theoretical frameworks are mainly based on the Life Cycle Hypothesis and the economics of self-control in the behavioral economics. Since the distributions in this dataset are censored, using traditional regression would give a biased result. Hence, the Panel Random-Effects Tobit regression is used in this study to give consistent estimates. The main results show that Thai credit card consumers statistically have partial self-control. They begin to lose self-control when they fall into the illusion of income like the delinquent card holders and if they have too many cards. The results from these two factors support the findings of Kim and DeVaney (2001), Baek and Hong (2004) and Wang et al. (2011). The third factor that makes people

lose self-control is having other type(s) of debt. The more types of debt they have, the more self-control they lose. The fourth factor of losing self-control goes pertains to spending in December. This is possible since the card holders might take their families to the Christmas and New Year vacation. The last factor is having an economic optimism. Card holders spend more if they believe that the next quarter will be as good as the current quarter.

5.2.Recommendations

This section discusses recommendations for policymakers under the theme of 'Take Back Control' which emphasizes the need to take back self-control from card holders before the credit card problem goes down the spiral.

5.2.1. Build the wall[2]

The notion of 'wall', as used in this context, should not be confused with the border wall. Here we refer to income walls. In order to take back control from the illusion of income, the total credit limit of a card holder must be limited in some manner that does not deter competition in the credit card industry. Income wall is a possible way to stop the illusion. The Bank of Thailand initially set the legal limit for each credit card to 5 times of monthly regular income. However, the Bank does not set a limit on how much total credit limit a card holder can get or how many cards an individual card holder can have. If the Bank sets any limit on total credit limit in THB or number of credit cards, the second-and-above card issuers will sue for the unfairness

[2] The authors came up with this idea in April 2017 – three months before the Bank of Thailand coincidentally announced a credit card measure which resembles the proposed wall.

they experience given advantages the first card issuer gains from such regulations. Thus, instead of applying the maximum credit limit for each card equals to 5 times of monthly regular income for all card holders, the maximum credit limit multiplier should be set according to the card holders' income levels. For instance, if an income wall is set at 40,000 THB and 2 times of regular income, a card holder with regular income of 25,000 THB will have a maximum credit limit for each of his card equal to 50,000 THB. He can have his credit limit less than 50,000 THB depending on the card issuers' decisions but the limit must not exceed 2 times of his income. If he wants to expand his credit limit beyond this, he must find a way to increase his monthly income above 40,000 THB in order to overcome the wall. Table 3 shows the average credit limit for card holders in the dataset with average utilization rate (UR) for each interval of the credit limit. This table reveals that the lower average credit limit a card holder gets, the higher will one's average UR be. Income walls are set by the jumps in average UR and its standard deviations (SD). For an example, at the average credit limit of 100,000 THB and 100,001 THB, the average UR decreased from near 90% to around 70% while the SD decreased from around 140% to around 130 percent. In case the decrease in average UR is unclear, the decrease in its SD will be considered instead. For an example, at the average credit limit of 400,000 THB and 400,001 THB, the average UR differs only by one percent but the SD decreases from more than one hundred percent to below one hundred percent. Suppose the card issuers originally used the credit limit multiplier of 2.5, the average credit limit of 100,000 THB would mean the monthly regular income of 40,000 THB. So, the first income wall would be 40,000 THB with the maximum allowable credit limit multiplier of 2.

Table 3. Brief Guideline for the Income Wall

Average Credit Limit (THB)	Utilization Rate (%)	Standard Deviation (%)	Max. Credit Limit Multiplier
less than 50,000	108.33	141.34	2X
50,001 - 100,000	89.8	141.02	
100,001 - 150,000	71.1	129.53	3X
150,001 - 200,000	62.4	122.68	
200,001 - 250,000	56.14	111.58	4X
250,001 - 300,000	52.34	112.15	
300,001 - 350,000	58.12	114.36	
350,001 - 400,000	48.03	107.72	
400,001 - 450,000	49.63	96.66	4.5X
450,001 - 500,000	37.63	85.12	
500,001 - 550,000	59.32	114.95	
550,001 - 600,000	42.61	93.03	

Table 3. (Continued)

Average Credit Limit (THB)	Utilization Rate (%)	Standard Deviation (%)	Max. Credit Limit Multiplier
600,001 - 650,000	30.85	64.05	4.75X
650,001 - 700,000	24.73	50.15	
700,001 - 750,000	35.96	67.79	
750,001 - 800,000	18.91	32.82	5X
800,001 - 850,000	18	35.82	
850,001 - 900,000	25.02	48.24	
900,001 - 950,000	47.48	91.52	
950,001 - 1,000,000	17.11	56.58	
above 1,000,000	15.34	42.67	

Source: Author's calculation
Note: Horizontal lines represent income walls.

Using decreases in the average UR to define income walls, the approximated regular income for each wall can be calculated as Table 4, where MCL represents card issuer's approved credit limit multiplier. If policymakers are hawkish, they should use the MCL equal to 2. But if the policymakers are dovish, they should use the MCL equal to 3.

Table 4. Income Wall Derived from Different Credit Limit Multiplier

	Income Wall (THB)		
avgCL (THB)	MCL = 2	MCL = 2.5	MCL = 3
100,000	50,000.00	40,000.00	33,333.33
200,000	100,000.00	80,000.00	66,666.67
400,000	200,000.00	160,000.00	133,333.33
600,000	300,000.00	240,000.00	200,000.00
750,000	375,000.00	300,000.00	250,000.00

Source: Author's calculation
Note: MCL = Card issuer's approved credit limit multiplier

5.2.2. Drain the Debt

Policymakers are advised to require all credit card issuers to increase minimum-repayment percentage from 10% to 15% or 20% so to (i) force the minimum payers to drain down the debt faster, (ii) signal all card holders to have more self-control whenever they swipe their cards, and (iii) help reduce interest incurred from paying minimally. There are many studies supporting the negative effect of low minimum percentage payment. For examples, Stewart (2009) and Navarro-Martinez et al. (2011) confirmed that typical card holders tend to anchor their payment to the number of minimum percentage payment which is presented for them.

This implies that if a bank shows the minimum percentage payment of 10% to the card holders, they will stick to paying at 10% even though they are able to pay more. Another example is from Crack and Roberts (2015) who mathematically proved that raising the minimum percentage repayment can substantially influence the accumulated debt and the time to pay off credit card balance. They also mentioned that low minimum percentage payment is so dangerous for all credit card holders that the debt itself becomes unserviceable if they keep paying minimally.

5.2.3. Brace Yourself

Mian and Sufi (2015) proved that the elevated household debt and the housing collapse were central to the severity of recession and the weak recovery. In other words, it can be implied that household debt is the heart of all economic recessions. Since the effects of December and economic optimism are so strong across all regions and demographics, policymakers are required to monitor households' DSR ratios during the economic boom and right after December because these periods are the most financially vulnerable for any average credit card holders. Their DSRs might become too high that they go underwater when the economic storms come. A sharp drop in private consumption, which is what policymakers are afraid of, might be fulfilled if they do not take action in time.

5.2.4. Education is the key

All policy recommendations mentioned earlier are either active short-run (i.e. the income wall) or passive short-run (i.e. the DSR monitoring). Nevertheless, the heart of the problem of self-control comes from the behaviors of card holders themselves. Thus, it is vital to introduce financial

literacy to every single student at tertiary level of education. This is because these undergraduate students are in the early generation Y which is the most worrying generation suggested by the results in this study. Furthermore, the undergraduate students will face real life financial challenges right after their graduation whether it is getting a loan, getting credit cards, saving their hard-earned money or investing in mutual funds. Nonetheless, as the fact is apparent, no university inculcates such a literacy. Moreover, one Thai commercial bank has recently allowed undergraduate students to apply for credit cards with their saving accounts as collaterals. If these generation-Y students do not have enough financial literacy, having credit cards might be the road to bad financial habit formation.

There are studies supporting the need to introduce financial literacy to the undergraduate students. Norvilitis et al. (2003) found that college students intended to get out of the credit card debt but they did not know exactly how. Norvilitis et al. (2006) also found that lacking financial literacy was related to the credit card debt for college students. However, Robb and Sharpe (2009) showed that high financial literacy was related to the high credit card balance. Therefore, country-specific context should be considered when referring to these literatures.

To introduce such literacy, any university which has its own economic faculty and business school may start a pilot project that requires passing financial literacy course(s) as one of the graduation requirements. The reason to begin in a university is because the financial literacy covers (i) the personal savings and consumptions which are widely studied in Economics and (ii) the personal investment, which is under expertise of the Finance department in the business school.

Equipping undergraduate students with financial literacy will make their education useful again because they can

apply the literacy in their life right after their graduation regardless of the career paths they take. These students may enjoy better credential in their resumes and loan applications since they will send signals to the employers and loan issuers that they have better financial decision than those who did not take the course(s). These signals could imply less SM or NPL loans which include less debt collection costs for loan issuers, and they might also imply better financial responsibility of the job applicants for the employers.

5.2.5. Financial Literacy for Young Students

Educating personal finance to undergraduate students, who are in the most worrying generation as mentioned earlier, inevitably involves overcoming financial inertia. In the Thai general financial education, undergraduate students are taught to do personal accounting – recording their income, savings and expenses daily. However, recording every single transaction requires much time and efforts. Students including ordinary people do have a status quo bias. They might think why they would waste their time and effort with the accounting especially when they have no financial problem at the moment and there is no immediate reward from doing such a thing. Some students would even ask their lecturer whether one actually does what one preaches.

In the USA, there is a nationwide concept of making debit card a "feedback card" to help people deal with their daily budgeting. With feedback card, card holders can check their total spending by simply pressing a button on the card. The total spending figure can be updated by tapping the card with the smartphone which installed the feedback application. In the application which is linked with the bank account, card

holders can check their historical transaction, total spending and safe-to-spend balance[3].

To overcome such inertia, appropriate financial habit formation incentives are needed. Everyone cannot brush their teeth right after their birth but they would pick up this simple skill through daily practice. With the aid of current financial technology, secondary-school students can do personal accounting without the need to record by themselves. All of them are just required to use top-up E-cards at the school canteen. Every time they buy food and drinks at the canteen, their transactions will be recorded in their cards. By simply tapping the cards with their NFC-supported smartphones, they can check their balance and canteen transactions anytime and wherever they want. Since no central server is needed for this E-card system, there should have no privacy concern. At the end of the week or month, the application will digitally deliver students weekly or monthly consolidated statements of their cards. In case of some students who are poor and do not have smartphones, they can tap their cards with the provided printing machine near the canteen to get the statements for free as well. If they want to re-print or print historical statement, 3 THB (less than 0.1 USD) per page will be deducted through the card. These statements can be used as financial self-review and real-life teaching materials in the financial literacy courses. In other words, let the application tell their finances. By using such E-cards five days a week, the habit of personal accounting is indirectly formed within these students. Once the habit is formed, it is much easier to teach them about financial literacy when they enter tertiary education because they already know how to monitor their finances.

[3] For further discussion about the feedback card, please refer to Chang and Tucker-Ray (2017)

6. Future Research

As this study might be in the first generation of studies regarding self-control problem of Thai credit card holders and there are very few credit card research papers in Thailand, an enormous research gap in credit card is to be explored in the future. We provide below some potential areas for future research related to the credit card study in Thailand.

Future studies can explore the self-control problem among salarymen and those who do not have regular income like freelancers and entrepreneurs. However, the present NCB statistical database does not provide information about the occupation of the borrowers. If such information is made available, the results of research can assist policymakers in tailoring credit card policies for different types of borrower based on their occupations.

In addition, information about card holders' income directly indicates the card holders' credit card DSR (C-DSR), auto loan DSR (A-DSR), home loan DSR (H-DSR) and personal loan DSR (P-DSR). With more details about DSRs, future research can suggest the optimal DSR and the critical DSR for each type of loan. Information about the critical and optimal DSRs is useful for policymakers in moderating loan creation of financial institutions and improving lending standards so that the loan itself can help generate growth and prosperity in a sustainable manner as it intends to.

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