SENIOR RESEARCH

THE HOUSEHOLD AT RISK IN THAILAND: THE QUANTILE REGRESSION ANALYSIS OVER AVERAGE PROPENSITY TO CONSUME AND DEBT SERVICING BURDEN

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The Household At-Risk In Thailand: The Quantile Regression Analysis over Average Propensity to Consume and Debt Servicing Burden

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Abstract

This paper seeks to measure and characterize the extent of household at risk in Thailand with two main indicators; Average Propensity to Consume (APC) and Debt servicing burden. The study evaluates indicators of household at risk on the basis of the Life Cycle and Permanent Income Hypotheses of consumption behavior and adopts a quantitative approach by using household survey data in Thailand year 2009. It then analyses the characteristics, types of expenditure and purpose of borrowing of at risk household by quantile regression. Based on the past studies, household expenditure higher than income by 1.5 times and/or debt repayment greater than 40% of monthly income is considered to be risky. The at risk households can lead to the possibility that they will default and make the overall system unstable. The empirical study reveals that household average consumption declines overtime when he/she gets older. This supports the life cycle hypothesis until retirement; after retirement the *lifestyle hypothesis* can give better explanation. The *lifestyle hypothesis* is the spending style of household such that older household is introverted. On the other hand, the effect of age on debt servicing burden follows the life cycle hypothesis precisely. In addition, asset and debt positively influence household consumption and debt level. By contrast, income shows negative effect on average consumption and debt servicing burden; low income household is at risk. Also, as indicating by APC ratio, household with less educated, bigger family, single and stay in Bangkok and town is at risk; whereas, based on the debt servicing burden indicator, married household and those who stay in Bangkok and town are less risky household. In terms of consumption, at risk household spend heavily on necessity, investment and non-optional expenses; housing, furniture and utensils, medical care, education, clothing and footwear and transportation. Nevertheless, in terms of debt, household borrows for farm operating the highest and education and housing the least accordingly. Although the study found that at risk households are not harmful to the economy at present, it is crucial to protect them from bankruptcy and economy from instability especially when there's uncertainty; for example, when there's a change in interest rate or income. This paper proposes a set of policy recommendations to protect the at risk household better as well as the systematic risk arising from at risk households through household insurance, the demand control by policymakers' tools and the role of social institutions.

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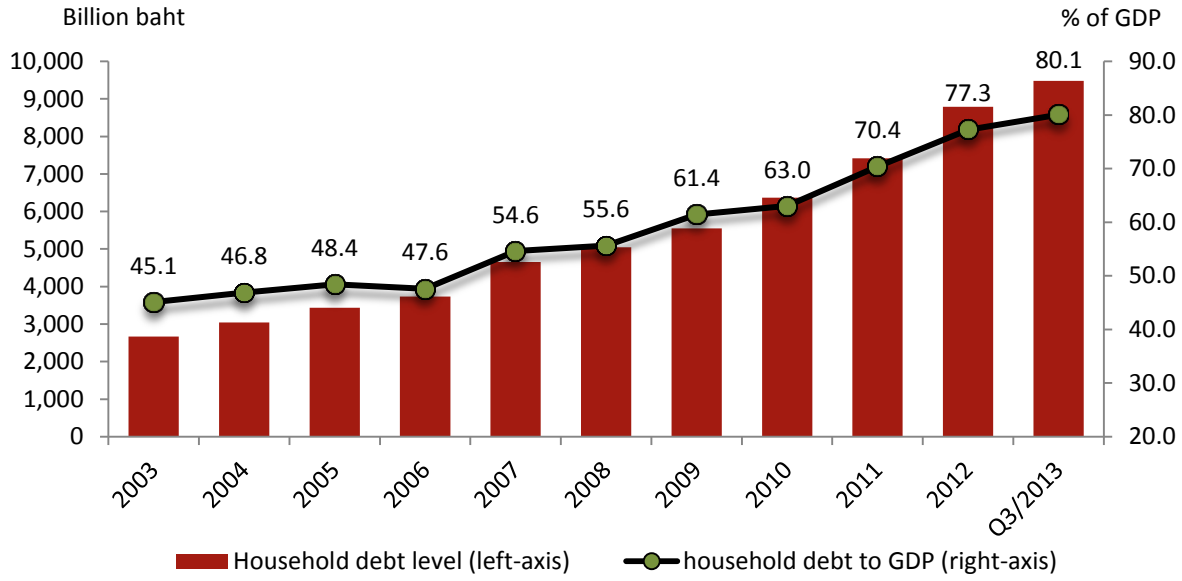
CHAPTER 1
INTRODUCTION

Over the past decade, household debt in Thailand has grown considerably both in absolute terms and relative to household incomes. The amount of debt outstanding in 2009 stood at 5.5 billion baht or 61.4% of gross domestic product (GDP) and now exceeds 9 billion baht, equivalent to around 80% of GDP in the third quarter of 2013 (see figure1), comparing with around 45% of GDP ten years earlier. This rapid rise of debt is widespread phenomenon where it has increased across all age and income groups covered all regions in Thailand. This rise partly comes from the supply side such as the financial institutions (FIs) that have shifted their strategies to focus on personal lending, expanding consumer credit by many lending institutions, the government stimulus policies via tax deductible such as the first time car buyer scheme, Village funds and microfinance via the state-owned FIs. According to the National Statistical Office's socio-economic survey in 2009, the amount of debt was at 134,699 baht while the average income per household stood at 20,903 baht. This gives the debt-to-income ratio equaling 6.4 times in 2009 which dramatically increased from 4.8 times in 1994.

Figure 1
Household debt level and debt ratio



Source: Bank of Thailand (BOT)

As households try to smooth their consumption over their lifetime with intertemporal tradeoff, increasing level of household debt may not cause a problem in itself. Despite the sharp rise in debt, many macroeconomic indicators do not point out that households are at the dangerous situation or are going to deteriorate household credit-worthiness. Nevertheless, risks are still there; households with greater indebtedness cause their consumption and debt servicing burden more sensitive to changes in interest rates particularly if they are unexpected, and to changes in income which arising from unemployment and asset prices (Debelle, 2004). Moreover, the study over assessing risk associated with rising household debt in Thailand showed that the overall debt level is not cause a concern to financial stability or macroeconomy; however, some of the households have higher debt and are more vulnerable to unexpected circumstances (Thaicharoen, Ariyapruchya, & Chucherd, 2004). Also, it causes a concern of financial stability if households default loans. Therefore, this issue should be taken seriously by economic analysts and policymakers of unprecedented level of debt in household sector, particularly, the over-indebtedness households.

This paper aims to examine the households that are at risk which is represented by higher than 40% of income repay on the debt and the expenditure greater than 1.5 times of income and to propose the actionable practice that is both conceptually sound and practically feasible to protect those at risk and society as a whole from unexpected events. Given the current state of the theoretical framework and available empirical data, this paper is a subjective approach (Quantitative analysis). This study poses the main questions as follows:

- What are the characteristics of households at risk?
- What kind of expenditures at risk households spend heavily on?
- What are the borrowing purposes at risk households borrow and cause them a greater burden to service the debt?
- What actions policymakers could take to help protect the at risk households and society as a whole from instability?

To answer these questions, it requires the data on household level. The National Statistical Office in Thailand conducted a survey on household expenditure, income and debt of year 2009 is used. Although the dataset used for our analysis is somewhat dated, the empirical results have some general implications for future studies on the nature, extent and possible determinants of household at risk, and the model specification can be used for other years of the dataset as well.

This paper is organized as follows: Section2 provides the theoretical framework and the empirical studies. Our proposed method is introduced in Section3 including the data collection and model specification. In this light, Section 4 discusses the empirical findings and the policy implications and recommendations to address the at risk household are laid out in Section5. Section6 concludes the paper.

CHAPTER 2
Theoretical Framework and Empirical Studies

2.1 Theoretical framework between consumption, asset and debt

The rising level of household debt in Thailand causes a concern. Many households increasingly run into the risk of insolvency either because of higher debt or higher expenditure. However, before we begin to understand what make household indebtedness increases to historical level and analyses its effect on those at risk households, we must understand the fundamental reason behind the household consumption so that it will enrich the comprehension over our study. To understand household consumption at the microeconomic level, there are theoretical frameworks related namely 'Intertemporal choices of consumption' by Irving Fisher, 'Life-Cycle Hypothesis' by Franco Modigliani and 'Permanent Income Hypothesis' by Milton Friedman. These are the fundamental theories that are often referred to household consumption in most papers. The Life-cycle hypothesis states that households decide the consumption path that maximizes utility over their lifetime subject to intertemporal budget constraint. Following the study at household level in Thailand by Chucherd (2006) and Japanese study by Ogawa and Wan (2005), under the assumption that there are two periods, current and future periods, subscripted by 0 and 1, respectively, we derive

Maximize Utility function: $U(C_0) + \beta U(C_1)$

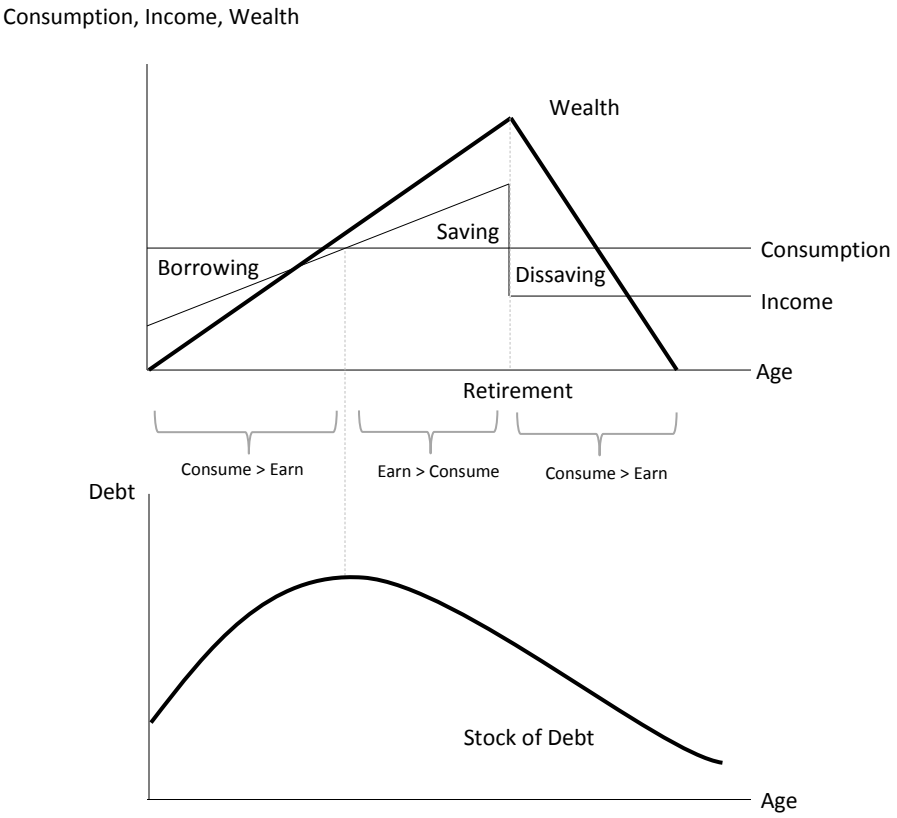
Subject to Budget constraint: $A_1 = (1+r)(A_0+Y_0+D_0-C_0)$

Where U is utility function, C is consumption, Y is labor income, A is net asset, D is the amount of debt, β is the discount factor and r is the interest rate. Households maximize utility over time which is constrained by their intertemporal budget. The asset for the second period is the interest earned on the amount left during first period together with the amount of debt households borrow during the current period. For households whom borrowed from the first period, the amount of debt repayment will be deducted in the second period. Since we assume only two periods, household will spend all for consumption in the second period. Therefore, we derived the budget constraint shown above.

However, not every household can borrow full amount they want, some may face credit constraint in which they could not borrow as much as they desire to. According to the life-cycle and Permanent income model, those whom are not credit constrained, the household consumption reflects the anticipation of future lifetime income and not depends on the stock of household debt. That is, the current consumption depends on current income and asset of the household and the maximum amount of debt the household can borrow against the future income which based on the calculation of the present value of future lifetime income; on the other hand, for those whom are credit constrained, the current consumption depends on the current asset, income and the amount of debt household has.

Figure 2

Life-Cycle Hypothesis Framework (Stripped down)



Source: Chucherd (2006) and Thaicharoen, Ariyapruchya, & Chucherd (2004)

Graphical illustration in figure 2 shows the life cycle hypothesis framework. It is the stripped down life-cycle model incorporating the intertemporal choice theory and depict the relationship between consumption, income, debt, wealth (asset accumulation) and saving of the household. According to the life-cycle model, it assumes that the household income increases steadily until retirement and then it starts to fall. At the younger age, households borrow against their future income to maintain the consumption level so they dissave; when they get older and earn higher income, the amount of borrowing declines and able to pay back the debt, once it is fully paid, households can now save and start accumulating assets. At the retirement, households dissave again by gradually using up their assets and their earning on assets in order to smooth their consumption (Chucherd, April 2006). In addition, if there's unexpected shock affecting the consumption level, households will try to serve their current consumption needs by various ways; for example, they will borrow more or consume their asset holdings faster. However, some households might not follow the life cycle model such as they incur much higher expenditure over their income than the typical households do and accumulate the debt at higher rate, if there's unexpected circumstance such as declining income, higher interest rates on loan, these households would face difficulty and run a risk or default.

2.2 Theoretical Considerations: Influence of Socio-economic Factors

Based on the variables available from the NSO survey on household income, expenditure and debt, we examine the following factors that influence APC and debt servicing burden[1]: age of the household head, household size, number of earners, marital status of the household head, education of household head, occupation of the household head, region where the households live, and type of community (town/rural).As the starting point, our hypothesis is following the life-cycle hypothesis.

As the household size gets bigger, consumption spending increases as well as debt servicing burden such that more members incur higher expense so they need to borrow more.

When the household gets older, average propensity to consume is low at the middle age and high during the younger and after retirement age. This is because household earns less during younger age and earns nothing after retirement, so the denominator of APC is small pushing the ratio to be high. Moreover, the debt servicing burden increases until midlife is expected since at the younger age household has relatively low income couple with the development of expenditures associated with establishing a household. It is declining over time since household has higher income.

Number of earners affects the debt servicing burden in a way that there is more source of income to the household; therefore, household will have lower demand of debt and lower burden to service the debt. Moreover, it should effect negatively to the APC ratio since the extra earner contributes income to the overall household income but this is true as long as household income increases greater than the household expenses.

The marital status, the married couples are expected to have higher demand for lending and thus higher burden. For average consumption, married household expenditure could either increase or decrease.

With regard to the level of education, the higher level of education tends to increase the future income and reduce the nonfinancial cost of borrowing; for example, the cost associated with informational collection. Therefore, more educated household is expected to have less burden on servicing the debt and lower APC ratio.

Occupation of the household is associated with income. Higher income households are more likely to enable self-financing their needs without incurring to borrowing. Put simply, high income households have lower demand for borrowing. Thus, they are expected to have less debt servicing burden. Also, APC ratio of high salary occupation is anticipated to be lower than low salary occupation. However, in terms of consumer credit, the expected change in income comes more relevant than the level of income. It becomes difficult to identify when assets are being concerned; in contrast, there could be less demand for borrowing for wealthier households while wealthier ones may increase the need for borrowing, for example, if they purchase the house and the lender requires the borrowers to contribute their own funds (Beer & Schurz, 2007).

[1] We use the categorical loop technique to see the relationship between those variables which influence our estimation on APC and debt servicing burden ratio.

As household lives in the town, he/she may increase the borrowing because of more financial institutions so that they can access easily than those who live far from the town. Moreover, the higher demand for debt is expected especially at the capital city where financial competition is high and concentrated. However, household living in town earns higher income which can lower the debt servicing burden. Also, household who lives in town is expected to have higher expenditure since there're more choices of goods and services while earning higher income. Therefore, the effect of those who lives in town could increase or decrease the APC ratio.

As the study of Beer and Schurz (2007) indicates that there's influence from the supply side over these socio-economic factors. Since for most banks to grant the loans, they significantly weigh on the security of repayment; the households with high income and wealth in comparison with the commitment size are more likely to be granted with the loans. While the security of income is secondary relevant factor, the information on the occupational status of the household head is used. Also, when the household becomes larger, banks tend to grant loan to them since they can access to many household member incomes.

2.3 Empirical studies

Many studies work on findings the household characteristics that have contributed to rising debt levels which most of them get the results that are consistent with the life-cycle hypothesis. According to Thaicharoen, Ariyapruchya and Chucherd (2004), they analyzed the SES data on year 2004 with ordinary least squares regression by using the log forms of household debt on various socio-economic characteristics and found out that age has a hump-shaped relationship with debt., both low and high incomes have high debt levels. This is consistent with the life-cycle model; as younger households having less income tend to accumulate higher debt than older households whom have higher level of income. However, for those with high income having higher debt level can be explained as they expect their future income to increase so it is rational to borrow more. Moreover, household size, education positively effect on household debt. In Austria, high income households tend to have more debt than low income households while the latter one is more debt burdened (Beer & Schurz, 2007). The result that is derived by Beer and Schurz (2007) better explains the household vulnerable situation. They work on the characteristics of household by using the quantile regression and find out that, in the overall, high household debt does not constitute a threat but the lower income households are more vulnerable than others.

Nevertheless, there are many studies investigating on the over-indebtedness of the household, the vulnerability of the household with high debt and sustainability of household debt in Thailand, where most are the Bank of Thailand (BOT) papers; very little works on the at risk household. And even though there're, they derive the estimation result by applying the least squares regression which gives the distribution of dependent variable at the mean. However, at household level, they might expose to the risk differently. Therefore, quantile regression is of our interest and more suitable. Also, the cross-sectional data available from NSO is more complete in terms of asset measurement as it is the limitation to the study of Chucherd (2006).

2.4 The objective measures

There are many indicators to construct objective measures of at risk households. The existing 'objective' indicators are based on the notion of unsustainable spending behavior (consumption/income ratio) or unsustainable level of debt (debt/asset ratio) or inability to service debt (debt payment/income ratio) (Betti, Dourmashkin, Rossi, & Yin, 2007). These ratios are widely used both macro and micro data; there is no unified approach to determine the benchmark level that is considered to be at risk.

As the consumption/income ratio or APC can be used to indicate the household at risk, according to the life-cycle model and Permanent Income hypothesis, APC is higher for the young age households as they have low income and the retired (Ogawa & Wan, 2005). Plus, the more related APC to the estimation is the *ex post* not the *ex-ante*.

The debt/asset ratio is the fraction of the stock of debt relative to the stock of assets held by the household. It is difficult to say that the household is at risk by looking at this ratio since it is not imply the debt repayment given all available resources. On the other hand, debt payment/income ratio or debt-servicing burden or debt coverage, represents the flow of repayment and income in each period (Beer & Schurz, 2007). This gives more information about the at risk household but it is also limited our estimation because the household's capacity to pay back the debt depends only on the current income while it is possible that households at risk as we misinterpret behaves rationally according to their riskiness.

The better measurement is to replace the consumer's current sources of household lifetime resource as his or her capacity to pay; there's still a problem because the future income stream is uncertain while the consumption is at its smoothing level, debt/resource ratio varies over the household's life cycle implying that the critical level of at risk household also changes over the life cycle (Betti, Dourmashkin, Rossi, & Yin, 2007).

Generally, financial institutions calculate the threshold level of at risk people by taking age and other measurable personal characteristics together to determine the credit-worthiness as a whole; meanwhile, different household ages have different characteristics that imply the different levels and compositions of asset and debt. Also, each household has his or her own time preference and the propensity to consume out of current income and wealth; therefore, they are varying in the optimal consumption, wealth and debt plans (Betti, Dourmashkin, Rossi, & Yin, 2007). Thus, there is no generalized measurement for the at risk household as a whole. As Modigliani (1996) showed that his study is fallacy because he used the simple aggregate consumption function to every consumer and did not convey rich details over the number of consumers as a whole are indebted.

In addition, debt-to-income ratio can be estimated but there are several limitations; it excludes asset holdings which could affect the ability of household to service debt, plus, it provides no indication of debt repayment performance (Canner, Kennickell, & Luckett, April 1995). They proposed that debt-servicing burden is the aggregate measure that is better explaining the household sector's financial situation because the stock of debt relative to income fluctuates over time while the debt servicing burden is the flow which can be used to explain in richer detail. Their paper pointed out that the share of debt owed by households can be classified as follows: having no debt, a low debt payments-to-income ratio is less than 10%, a moderate ratio or a high ratio is more than 40% of income.

CHAPTER 3
Data and Methodology

3.1 Why Quantile regressions not the Ordinary Least Square (OLS)?

The standard linear regression or least squares regression expresses the average relationship between a set of regressors (x) and the dependent variable (y). These sometimes are not informative enough since it is possible to over or under estimate the relationship, especially, if we are interested in the different points. The sizes of the effect at lower or higher quantiles might different from the OLS mean coefficients; quantile regression offers a more complete analysis. It is the conditional function of $Q_q(y|x)$ where q stands for quantile and takes values between 0 and 1: median, q=0.5. While OLS regression aims to minimize the sum of squared errors, quantile regression minimizes the sum of absolute value of errors by weighting asymmetrically other than the median; $(1-q)|e_i|$ is for over prediction and $q|e_i|$ is for under prediction. The quantile regression captures extreme values and outliers better than OLS regression; as least squares regression tries to give the best line that match all variables but it is very sensitive to outliers that even one extreme value can pivot the line pretty much. Although the median quantile estimation is similar to the OLS estimation, the quantile regression is more robust to non-normal errors and outliers while it is highly inefficient using OLS method; moreover, it provides greater data characteristics not only its conditional mean to estimate the impact of regressors on the entire distribution of y (F Baum, 2013). It gives the weight differently to the distribution and better robust heteroskedasticity by bootstrapping the standard errors; in addition, it is equivariant to monotonic transformation such as log function (Wei & He, 2005). This quantile regression is widely used in medical sciences such that to study mainly on the atypical case rather than the typical one; for example, how does HIV person responses to the drug. Therefore, to our study, since we are interested in those at risk or extreme households whom spend dramatically higher than their income and/or those who have to pay back the debt at high ratio relative to their income, the quantile regression technique would appropriate.

3.2 Data Collection

The study employs the data from the 2009 household socio-economic survey from January to December 2009 in Thailand by the National Statistical Office (NSO). The survey contains data on 42,038 households covered every provinces. The report gives the information over income, expenditure and household characteristics. We prepare the given data in a way that the outliers cannot influence our estimation and make our study more reliable and reasonable. First of all, we only look at the monetary terms or cash since it's possible that the in-kind cash happens by chance and is hard to measurable in terms of cash. For income, we cut those households with less than 500 baht per month since they represent very small proportion in our sample. To our study, we focus on households those at risk which can be viewed as those whom spending by more than 1.5 times of their income on expenditures, namely average propensity to consume (APC) and those whom have to service the debt by greater than 40% of monthly income, namely debt servicing burden. As most of the past studies, we assume the same way that households whose APC is greater than 1.5 are at risk; in other words, households spend more than

1.5 times of their monthly income to buy goods and services are considered to be risky household. This critical level of APC has been used widely to measure the consumer over-indebtedness. Since expenditure can't go below zero and people can spend by using their income and saving plus if they are not credit constraint so they can borrow and then able to spend more than their monthly income, but to the level of more than 4 times of their monthly income represents very small number of households in our sample. Therefore, we consider only the range of 0-4 for APC ratio; outside this range are the outliers. For debt servicing burden ratio, debt repayment relative to monthly income, many studies show that households are more vulnerable to macroeconomics if they have to pay principal and interest of debt per month over 40% of their monthly income. Vulnerability to the macroeconomics implies that households are more likely to default on their debt; for example, when the borrowing interest rate increases so that they have to pay higher interest or when income declines so that they face difficulty of paying back the debt. Therefore, household with more than 40% of their income paid back the debt is considered to be at risk (risk of default and go bankruptcy).

When these ratios adapt to the SES survey year 2009, after cutting off the outliers, the distribution of APC histogram is below in figure3. From table1, the median is 0.86 and the mean is 0.95. From the histogram, we can tell that most households in our sample spend their income on expenditure around 65 -100%. Notice that households whom ratios are greater than 1.5 are roughly at 90th percentile in our sample.

Figure 3
The Distribution of APC

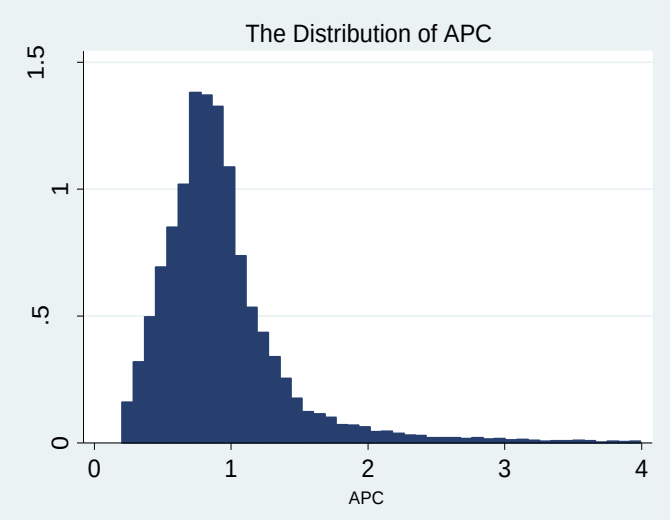


Table 1
Summary of APC (Expenditure/income)

	Percentiles	Smallest
1%	0.2721481	0.2018801
5%	0.3904372	0.2039763
10%	0.477402	0.2060436
25%	0.6594892	0.2069033
50%	0.862142	
		Largest
75%	1.096	3.981045
90%	1.468037	3.984467
95%	1.871491	3.984473
99%	2.98395	3.996222

Base on the sample, approximately 57% have debt with the mean equals to 222,251 baht and the median is 60,000 per household. The total amount of debt is the sum of formal loan and informal loan. Roughly 91% of those who have debt borrow from the formal sector such as financial institutions and 17% borrow from the informal sector such as loan sharks; the rest is mixed between formal and informal sectors. The mean of formal loan is 229,053 baht and the median is 62,000 baht while the mean and median of informal loan are 64,765 and 20,000 baht, respectively. The amount of debt

repayment depends on many factors; type and duration of the loan, credit-worthiness of borrowers and others. For the debt servicing burden, when all the household samples are included, we can see that those at risk (debt servicing burden > 40% of monthly income) are above 86.453th percentile summarized in table 2. Put simply, roughly around 13.5% of our sample is at risk.

Table 2

Summary of Debt servicing burden (Debt repayment/income)

	Percentiles	Smallest
1%	0	0
5%	0	0
10%	0	0
25%	0	0
50%	0.0341743	
		Largest
75%	0.2357206	6.79666
90%	0.4842824	7.297753
95%	0.7092606	7.541
99%	1.599231	8.205371

3.3 Model specification

According to the paper by Chucherd (2006), the consumption function is represented by average propensity to consume and household characteristics, asset-to-income and debt-to-income as the regressors to find the effect of debt on consumption by purpose. We modify her model to capture households at risk by looking at APC and debt servicing burden ratio. One technique that we employ here is the categorical loop which Stata will find independent variables that are related to the dependent variable at the level of correlation that we set which ranges from zero to one. The advantage of the categorical loop is that it makes sure that we include all explanatory variables that significantly affect our estimation indicators. Put simply, it enables us to find the correlation between variables of more than 2. As a result, we include the variables according to the loop result into our model. This process ensures that we include variables that are important and give more complete view to our estimation. Therefore, our quantitative studying over at risk household can be represented as

$$APC = \frac{EXP_i}{Inc_i} = \alpha_0 + \sum_{j=1}^{M} \alpha_i \, X_{j.i} + \beta \frac{Asset_i}{Inc_i} + \gamma \frac{Debt\ repayment_i}{Inc_i} + \propto \frac{C_i}{Exp_i} + \delta \frac{1}{Inc_i} + u_i$$

$$Debt\ servicing\ burden = \frac{Debt\ repayment_i}{Inc_i} = \mu_0 + \sum_{j=1}^{M} \alpha_i \, X_{j.i} + \theta \frac{Asset_i}{Inc_i} + \rho \frac{Debt_i}{Inc_i} + \sigma \frac{1}{Inc_i} + e_i$$

Where
C_i = average monthly household cash expenditure by purpose
EXP_i = average monthly household cash expenditure in total
Inc_i = average monthly household cash income
$X_{i,j}$ = the j^{th} Socio-economic variable of household I where j = 1, 2,…, M
$Asset_i$ = household total assets
$Debt_i$ = household debt categorized by purpose
Debt $repayment_i$ = average monthly household debt repayment in cash
u_i , e_i = error term

Since households with high income tend to be more affordable for higher expenditures while households with low income are less with consumption choice; the variance of expenditures increases with the level of income. Therefore, the first equation both sides are divided by cash income in order to correct for heteroskedasticity. Therefore, we can interpret it as the average propensity to consume which could be described by each household socio-economic variables, asset-to-income and debt-to-income. For the purpose of consumption, we divide by total expenditure to see how the share of each expenditure effects average consumption.

Another equation is the debt servicing burden ratio as express by debt repayment to income based on monthly basis. The debt servicing burden is calculated by the total amount of debt multiplies by the interest rates which depend on the type, the duration of the loan and the creditability of each household divided by household income. By looking at the debt servicing burden ratio, we are trying to identify the characteristics of households and the borrowing purposes that make households at risk. It is also corrected for heteroskedasticity by dividing both sides of the equation by household cash income. Also, the amount of debt by purpose is divided by total cash income since we want to see the share of each debt by purpose that effects more on the debt servicing burden.

3.4 Variable Definition

C_i or household consumption includes only in monetary meaning or cash. We are classified the consumption into by purpose following Chucherd (2006). The purpose of consumption (EXP_i) is grouped into 12 categories: food and beverages, clothing and footwear, housing, fuel and light, furniture and utensils, medical care, transportation, communication, personal care, education, recreation, and others[2]

Inc_i or household income is calculated by the sum of current income and other income in cash on monthly basis.

Socio-economic variables are included to better explain our estimation since different households have different characteristics. The household characteristics help indicating the behaviors of at risk household. We incorporate age of the household head, household size, number of earners,

[2] See appendix A for more detail

marital status of the household head, education of household head, occupation[3] of the household head, region where the households live, and type of community or town/rural.

$Asset_i$ or household assets are the summation of all household assets including financial assets.

$Debt_i$ or household debt is the accumulation amount of household debt which is the summation of both formal and informal loan for various purposes such as buying house/land, education, household consumption, farm and non-farm business and other purposes.

Debt $repayment_i$ is the amount of cash money pay for principal and interest on loan for each month by a household. There are two types of debt that household has to repay according to the sources of loan; formal and informal sector.

Table3 represents the summary of mean and median of factors we include in the models

Table 3
Summary of Factors mean and median

Variables	Sample	
	Mean	**Median**
Age of household head:		
30s	0.1549	0
40s	0.2523	0
50s	0.2453	0
60s	0.1558	0
70 and above	0.1294	0
Household size	3.2065	3
No. of Earners	1.8311	2
Marital status	0.6894	1
Education level:		
Below Secondary	0.2738	0
Bachelor or higher	0.1128	0
Occupation:		
Farm operator	0.1565	0
Business	0.2350	0
Professional	0.1251	0
Officer	0.1817	0
Factory worker	0.0987	0
Retired	0.1639	0
Bangkok	0.0618	0
Type of community (Town)	0.6215	1
Asset-to-income ratio	6.5257	3.7500
Debt servicing ratio	0.1775	0.0342
Inverse income	0.1357	0.0822

[3] See appendix B for more detail

Variables	Sample	
	Mean	Median
Consumption by purpose:		
Food and Beverages	43.9409	44.0899
Clothing and Footwear	2.6814	0.9586
Housing	4.6290	2.0676
Fuel and light	4.4061	3.6081
Furniture and utensils	0.7554	0
Medical care	1.6617	0.1718
Transportation	16.1536	12.1737
Communication	3.9350	3.4454
Personal care	3.8691	3.3383
Education	1.6470	0
Recreation	2.5249	1.4746
Formal debt by purpose:		
Housing	1.8750	0
Education	0.2394	0
Consumption	2.0621	0
Business	0.8254	0
Farm Operating	1.3258	0
Others	0.1266	0
Informal debt by purpose:		
Housing	0.0654	0
Education	0.0123	0
Consumption	0.1826	0
Business	0.1008	0
Farm Operating	0.0473	0
Others	0.0205	0

CHAPTER 4
Empirical Findings

The first step, we will investigate what household characteristics explain the at risk households by regressing the APC equation with quantile regression which is corrected for standard errors via bootstrapping method. As we noted earlier, households with APC > 1.5 considered to be at risk is those above the 90^{th} percentile or quantile (0.9). The next step, the at risk households estimated from debt servicing burden ratio greater than 40% of their monthly cash income are those above 85^{th} percentile or quantile (0.85) of overall samples. We want to identify the household characteristics, what type of consumption they spend heavily on and the amount of loan categorized by the purpose they borrow dramatically that bring them to the concerned group or at risk. Since this group is highly risker and more vulnerable to macroeconomics such as interest rate and income change which make them more difficult to maintain the consumption and to pay back the debt. For more in-depth analysis, consumption classified by purpose will be estimated. It is important to note that heteroskedasticity is likely to occur; thus, we cope with this problem by using the quantile regression instead of least squares to see different effects for each quantile plus we divided our model by income as suggested by Chucherd (2006). However, under OLS estimation, White's heteroskedasticity-corrected standard errors are applied according to Gujarati (2003) but this is not suitable to the quantile regression estimation, instead bootstrap standard errors are often used in place of analytic standard errors (F Baum, 2013).

4.1 Average Propensity to Consume (APC)

Table 4

Quantile Regression of APC and Consumption by purpose

Variables	Coefficients					
	q(0.1)	**q(0.5)**	**q(0.7)**	**q(0.8)**	**q(0.9)**	**OLS**
Constant	0.626***	0.902***	0.963***	1.041***	1.139***	0.964***
Age of household head:	*less than 30 years old as a base*					
30s	-0.0561***	-0.0616***	-0.0517***	-0.0661***	-0.0686***	-0.0425***
40s	-0.0818***	-0.0841***	-0.0747***	-0.0913***	-0.0895***	-0.0726***
50s	-0.116***	-0.130***	-0.125***	-0.151***	-0.167***	-0.110***
60s	-0.128***	-0.157***	-0.162***	-0.189***	-0.216***	-0.136***
70 and above	-0.166***	-0.193***	-0.201***	-0.230***	-0.256***	-0.182***
Household size	0.0251***	0.0402***	0.0513***	0.0624***	0.0737***	0.0500***
No. of Earners	-0.0348***	-0.0443***	-0.0447***	-0.0464***	-0.0479***	-0.0590***
Marital status (Married)	-0.0125*	-0.00936**	-0.0145***	-0.0193***	-0.0240**	0.000793
Education level:	*secondary education as a base*					
Below Secondary	-0.00317	-0.000193	0.00085	0.00122	0.00908	-0.00922
Bachelor or higher	-0.0809***	-0.0906***	-0.0755***	-0.0675***	-0.0604***	-0.114***
Occupation:	*blue collar worker as a base*					
Farm operator	-0.179***	-0.153***	-0.139***	-0.141***	-0.122***	-0.118***
Business	-0.0963***	-0.0664***	-0.0578***	-0.0540***	-0.0405*	-0.102***
Professional	-0.0977***	-0.112***	-0.114***	-0.118***	-0.112***	-0.155***
Officer	-0.0138	-0.0291***	-0.0250*	-0.0239	-0.0212	-0.0450**
Factory worker	0.00133	-0.0273**	-0.0375***	-0.0447***	-0.0452*	-0.0422**
Retired	-0.115***	-0.130***	-0.126***	-0.137***	-0.141***	-0.150***
Consumption by purpose:	*other consumption as a base*					
Food and Beverages	-0.000227	-0.00210***	-0.00290***	-0.00403***	-0.00557***	-0.00198***
Clothing and Footwear	0.00196***	0.00394***	0.00448***	0.00469***	0.00467***	0.00496***
Housing	0.00384***	0.00458***	0.00551***	0.00657***	0.00916***	0.00739***
Fuel and light	-0.00287***	-0.00415***	-0.00579***	-0.00664***	-0.00965***	-0.00689***
Furniture and utensils	0.00248**	0.00342***	0.00440***	0.00599***	0.00660***	0.00569***
Medical care	0.00204***	0.00345***	0.00528***	0.00577***	0.00818***	0.00551***
Transportation	0.00189***	0.00190***	0.00188***	0.00190***	0.00236***	0.00212***
Communication	-0.00797***	-0.00763***	-0.00712***	-0.00797***	-0.00972***	-0.00761***
Personal care	-0.00700***	-0.0100***	-0.0116***	-0.0125***	-0.0148***	-0.0163***
Education	0.00372***	0.00381***	0.00381***	0.00413***	0.00519***	0.00410***
Recreation	-0.00103	-0.00266***	-0.00238***	-0.00205**	-0.00207*	-0.00359**
Bangkok	-0.0188*	0.0443***	0.0878***	0.135***	0.210***	0.0703***
Type of community (Town)	0.0176***	0.0163***	0.0203***	0.0225***	0.0236***	0.0187**
Asset-to-income ratio	0.00353***	0.00726***	0.0101***	0.0120***	0.0162***	0.00949***
Debt servicing ratio	0.0915***	0.166***	0.225***	0.251***	0.323***	0.228***
Inverse income	0.521***	1.209***	1.696***	2.138***	2.825***	0.892***
Observations	42,038					
Pseudo-R^2	0.1144	0.1493	0.1981	0.2416	0.3068	0.3050

Note: ***, ** and * denote 0.1, 1, 5 percent significance levels, with heteroskedasticity-robust standard errors

The estimation results of the APC or consumption-to-income ratio with consumption by purpose using quantile regression are reported in Table4. Note that the at risk household who spends higher than 1.5 times of his or her income on consumption that we are interested in is ranging from the 90^{th} quantile.

The effect of socio-economic variables

1. The age of the household head was found significantly negatively effect on consumption; this means that household consumption will decline steadily when the household head grows older and indicates that he or she is more awareness on spending. According to the life-cycle hypothesis, household has high APC during the younger and older age while lower at the middle age because household member earns little when he's young and earns nothing when he's retired. The result shows that it follows the hypothesis for the first half or less than 60 years old where household has lower APC while it contrasts to the hypothesis after retirement period when APC is even lower. This is because when household head gets older, he tends to stay at home rather than going outside and spending. He is more awareness about the spending behavior or we may call *the lifestyle hypothesis*. Note that the effect gets bigger when we move to higher quantiles for every age. From table4, it shows that when the household head gets a decade older, for example, from 40 to 50 years old, he or she will spend less by 7.75% for those at risk or at 90^{th} quantile.
2. Household size shows the positive effect on household consumption spending. This finding proves the fact that when the household size gets bigger, the average consumption also increases. The effect is stronger for the household spending high amount of his or her income on consumption. It is about 7.37% increasing in average consumption for the at risk household when there is an extra member.
3. The number of earners was found to be negatively effect on consumption. This is because when the extra earner contributes income to the family making the overall income of the household increases, the share of the expenditure out of income declines as long as the total household income rises greater than the total household consumption. The effect is getting larger once we move to higher quantiles; about 4.79% decline in average consumption when there is an extra earner for the at risk household.
4. Marital status coefficients show negative effect on household consumption. The couples tend to have less average consumption over income than the single one. This can be explained that the couples are more carefully about spending. The effect is moderating and 2.4% lower in average consumption compare to the single one for at risk household.
5. The level of education can tell a story of consumption behavior. When the household head is more educated, he or she is more awareness and responsible of his or her spending style. The result shows that when the head of the household has bachelor degree or higher, he is more controllable over spending. Interestingly, the effect is bigger for lower quantile once the household head is more educated. It is 6.04% less on average consumption (APC) for household with bachelor degree or higher than the one who has secondary education level.

6. Occupation of the household head shows significantly influence over the household consumption spending except for officer. It is tied to earning of the household member. Household head who is farm operator spends less on consumption than blue collar worker by 12.2% for at risk household. Part of this result can be explained that he or she is more self-sufficient. Household head as a business owner and professional spends less at the moderating effect. Meanwhile, if the household head is a factory worker, he or she also spends less which could partly explain by the reason that they work more hours than the blue collar worker. Therefore, by working more hour increases income and then lowers the APC ratio when comparing to the blue collar worker by 4.52% for at risk household. Also, the retired household head spends less out of their income on consumption because old household tends to stay home rather than going outside and spending money.
7. Household living in Bangkok spends their money more than other regions in Thailand. Social influence has moderating effect on the countryside while much stronger for those who lives in Bangkok. In general, capital city provides more consumption choices, higher cost of living and higher income one could earn. This is true for Bangkok where facilities are provided in variety which induces people to spend more. The result is interesting since it turns dramatically larger for at risk household; 21% higher on consumption spending for household who lives in Bangkok.
8. Type of community tells the similar story as when the household lives in Bangkok. Because in the town, household is offered by more choices of goods and services; he or she spends more than those who lives in the rural areas. It can be viewed that household gets more utility from what he or she buys. The figure indicates that household who lives in town spends higher by 2.36% than those who lives in suburb.

The effect of asset represented by asset-to-income ratio shows the positive effect on consumption. The magnitude of wealth effect is getting larger for higher quantiles or who already spent higher share of income on consumption. It is 1.62% spending higher on consumption for at risk household once he or she has asset relative to income increasing by 1%. This is because when he or she has more assets, it makes him or her more confident about spending.

The effect of debt on consumption reflects in debt servicing burden ratio or the amount that the household has to pay back on loan, principal and interest, every month. Note that the amount of debt servicing every month derives from the amount of loan household borrows; they reflect the same thing but different units. As a result, household with more debt has higher debt servicing. This effect takes bigger for at risk household. It is 32.3% increase in household average consumption when the debt servicing burden increases by 1%.

The effect of income on average consumption shown in the inverse income ratio points out that income of the household head is negatively related to household consumption spending. This ratio reflects the fact that it is higher for household with lower income and it is lower for household with higher income. As a result, poorer household has higher APC. The result shows that 2.825% greater in average consumption for the poor household whom at risk once he or she gets 1% income higher. Meanwhile, household with higher income tends to have lower average consumption since APC represents as a ratio, so with higher income, denominator is higher making APC lower.

The effect of consumption by purpose on APC

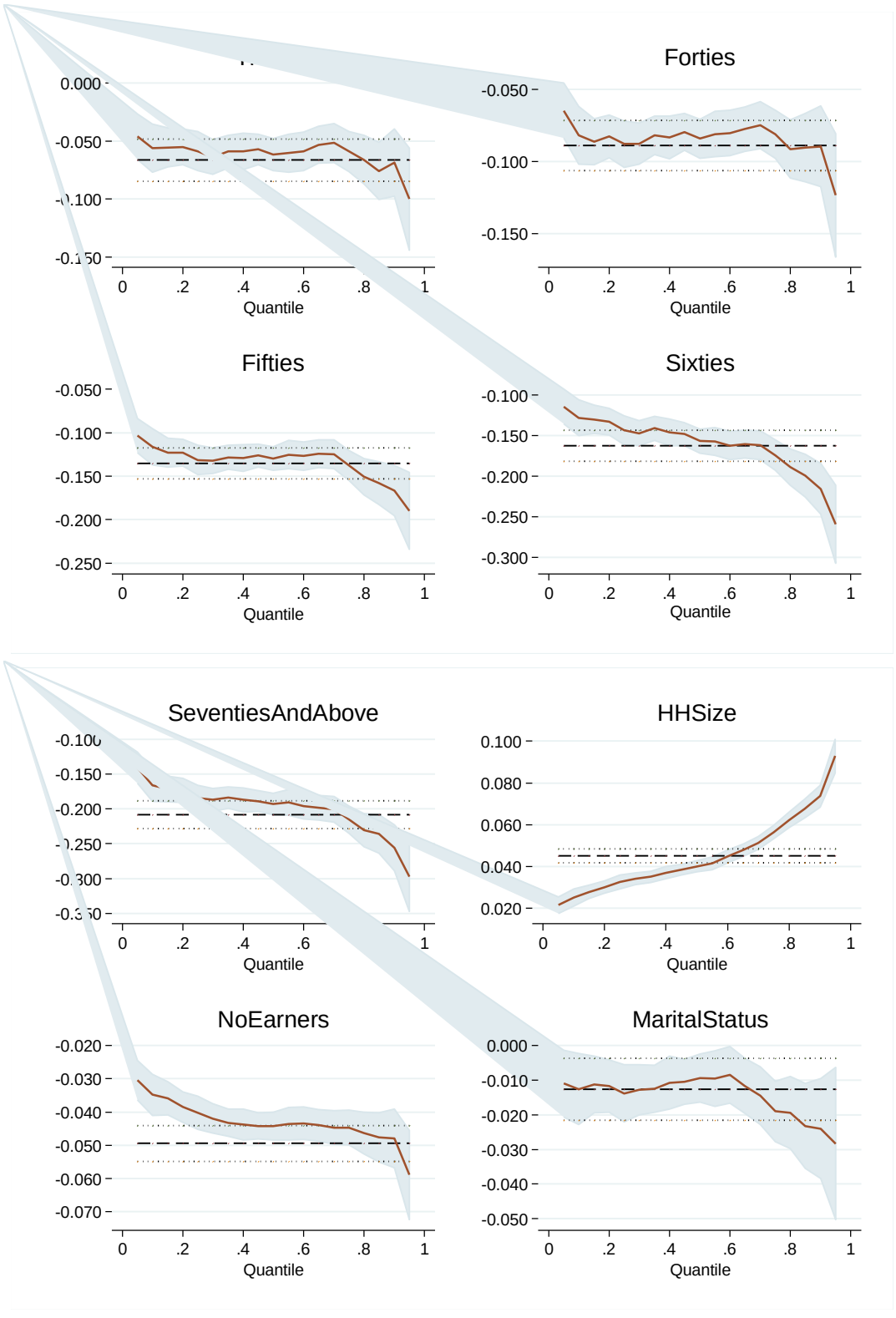
The magnitudes are positively related to the consumption for housing, medical care, furniture and utensils, education, clothing and footwear and transportation, these are the ranking of expenditures from the highest to the lowest effect towards APC. When these expenditures increase, average consumption or APC also increases and the effects are getting larger for higher quantiles. Numerical illustration, for household at risk, 0.916%, 0.818%, 0.66%, 0.519%, 0.467% and 0.236% increase in APC if housing, medical care, furniture and utensils, education, clothing and footwear and transportation increase by 1% accordingly. All except medical care and clothing and footwear are investment expenditures; furniture and utensils is counted because it is considered as a complementary to housing. Medical care is the non-optional expenditure which household has to spend whereas clothing and footwear is luxury goods. As a result, it seems that household at risk is rational on what he or she is overspending but there's still a risk of getting into trouble.

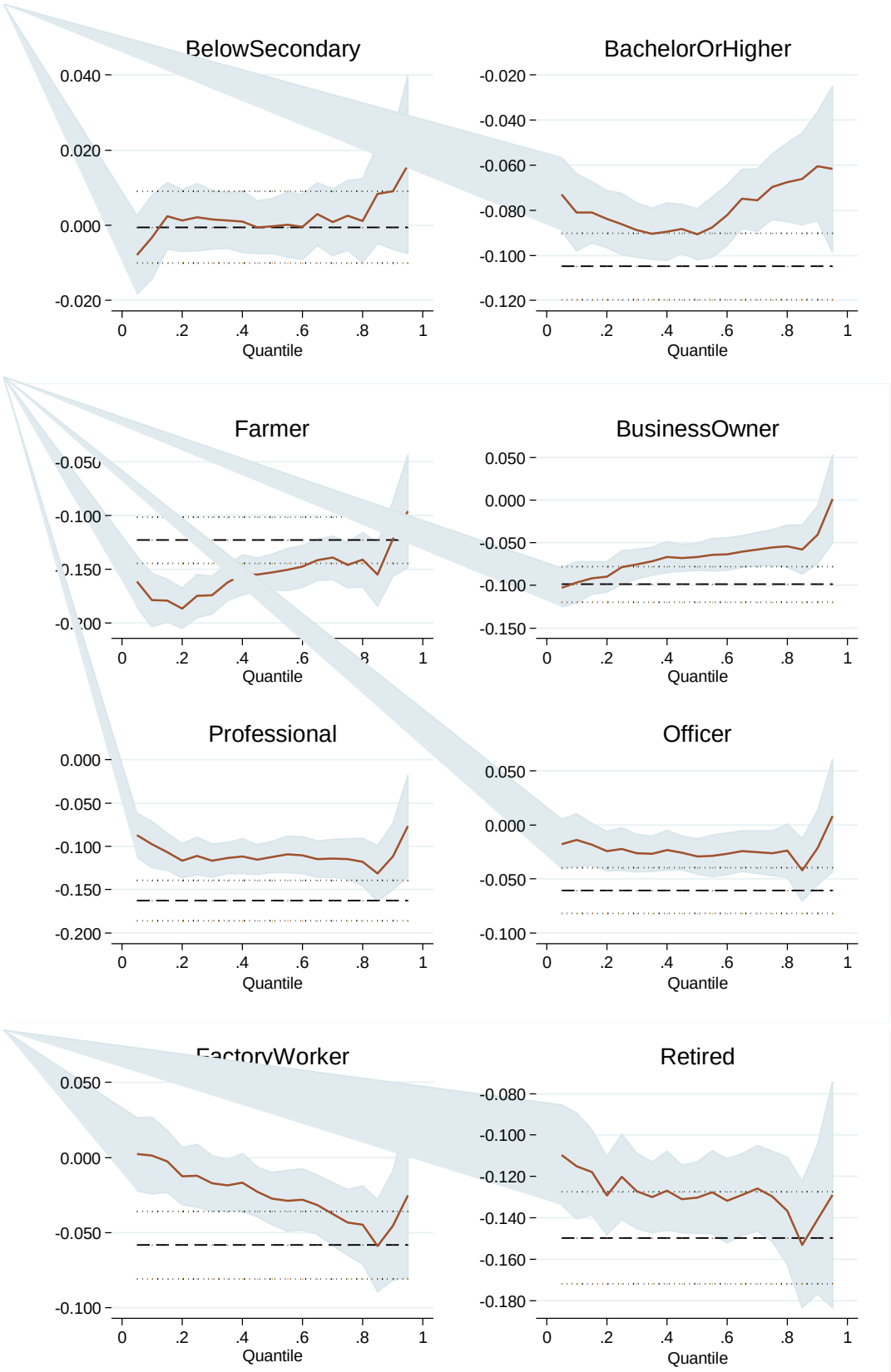
On the other hand, expenditure on food and beverage, fuel and light, communication, personal care and recreation show the negative sign. When the household spends more on these consumption, the average consumption declines. This is partly because with the purpose of consumption listed above tends to be richer or wealthier household who spends on. In other words, because higher income household spending on these types of consumption shows only small part of his or her income and that even goes negative when comparing to those expenditures which show the positive effects on APC. From table4, -1.48%, -0.972%, -0.965%, -0.557% and -0.207% decline in APC once the household at risk spends on personal care, communication, fuel and light, food and beverages and recreation activities by 1% more accordingly. Also, it shows the bigger effect on those on the edge except for recreation expenditure.

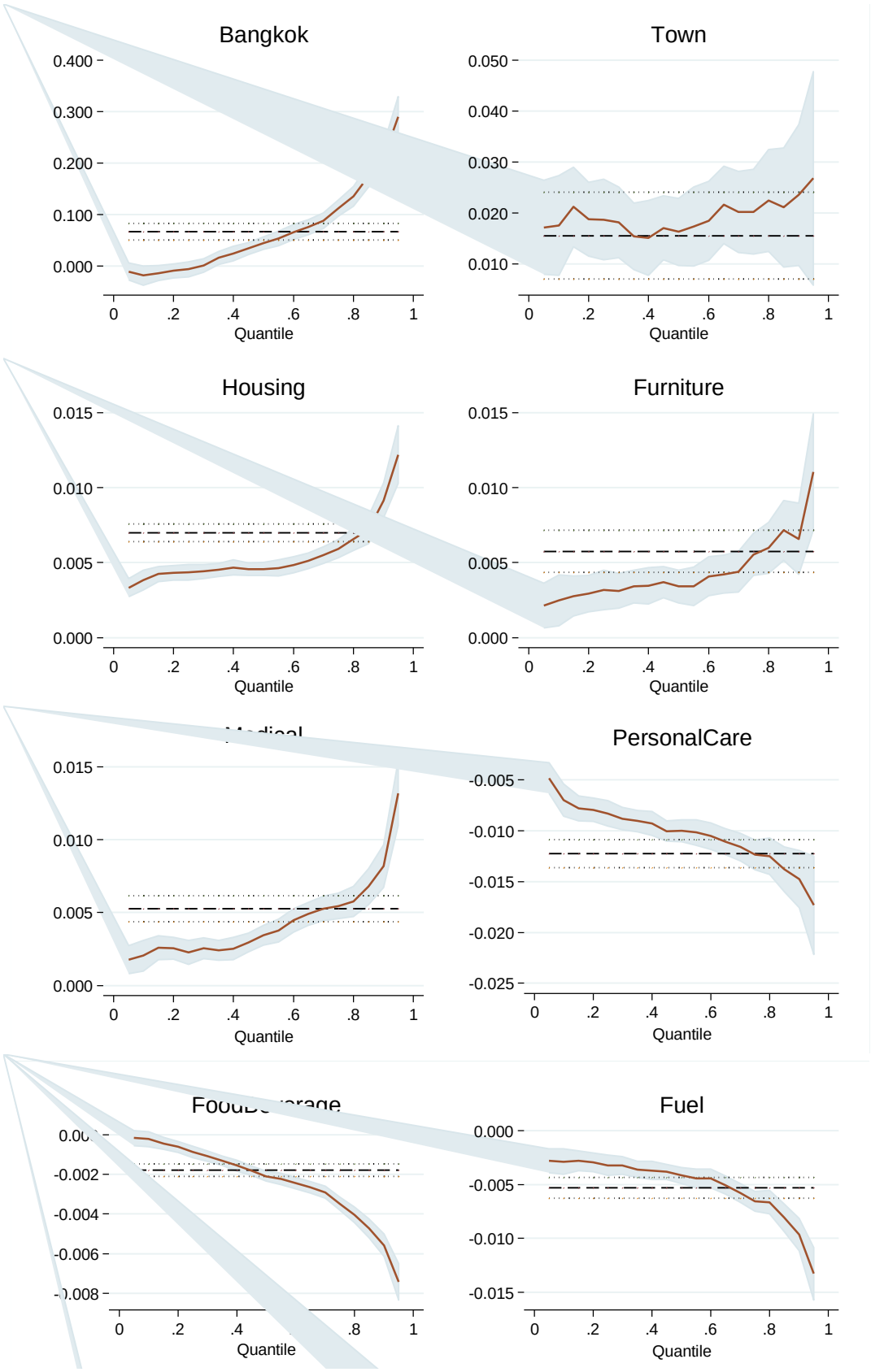
Figure 4 shows all the relationship between APC and variables we include in APC equation. The brown solid line shows the coefficients for quantile regression with the range of 95% confidential interval represented by the blue area. Result from OLS regression shows the mean effect illustrated in the black dashed line with 95% confidential interval represented by the dot line area.

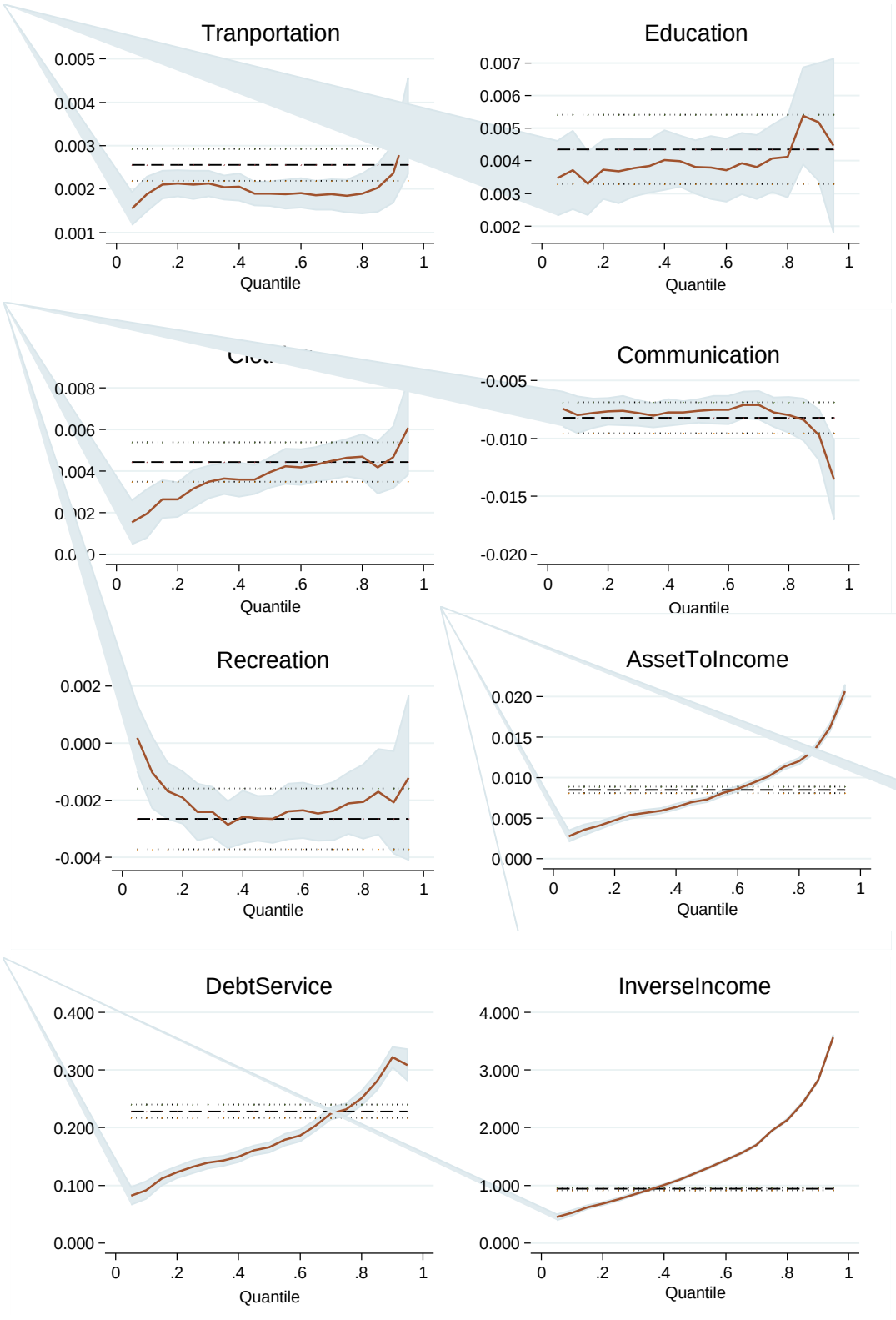
Figure 4

Factors effecting Average Propensity to Consume (APC)




BelowSecondary
0.040
0.020
0.000
-0.020
0 .2 .4 .6 .8 1
Quantile
BachelorOrHigher
-0.020
-0.040
-0.060
-0.080
-0.100
-0.120
0 .2 .4 .6 .8 1
Quantile
Farmer
-0.050
-0.100
-0.150
0 .2 .4 .6 .8 1
Quantile
BusinessOwner
0.050
0.000
-0.050
-0.100
-0.150
0 .2 .4 .6 .8 1
Quantile
Professional
0.000
-0.050
-0.100
-0.150
-0.200
0 .2 .4 .6 .8 1
Quantile
Officer
0.050
0.000
-0.050
-0.100
0 .2 .4 .6 .8 1
Quantile
FactoryWorker
0.050
0.000
-0.050
-0.100
0 .2 .4 .6 .8 1
Quantile
Retired
-0.080
-0.100
-0.120
-0.140
-0.160
-0.180
0 .2 .4 .6 .8 1
Quantile


Bangkok
0.400
0.300
0.200
0.100
0.000
0
.2
.4
.6
.8
1
Quantile
Town
0.050
0.040
0.030
0.020
0.010
Housing
0.015
0.010
0.005
0.000
Furniture
PersonalCare
-0.005
-0.010
-0.015
-0.020
-0.025
-0.002
-0.004
-0.006
Fuel


Tranportation
0.005
0.004
0.003
0.002
0.001
0
.2
.4
.6
.8
1
Quantile
Education
0.007
0.006
0.005
0.004
0.003
0.002
Quantile
0.008
0.006
Quantile
Communication
-0.005
-0.010
-0.015
-0.020
Quantile
Recreation
0.002
0.000
-0.002
-0.004
Quantile
AssetToIncome
0.020
0.015
0.010
0.005
0.000
Quantile
DebtService
0.400
0.300
0.200
0.100
0.000
Quantile
InverseIncome
4.000
3.000
2.000
1.000
0.000
Quantile

4.2 Debt servicing burden

Table 5

Quantile Regression of Debt servicing burden and Debt by purpose

Variables	Coefficients					
	q(0.1)	q(0.5)	q(0.7)	q(0.85)	q(0.9)	OLS
Constant	1.66E-11	-6.38E-11	-0.0108***	0.0196***	0.0399***	-0.023
Age of household head:			*less than 30 years old as a base*			
30s	2.54E-11	7.12E-11	0.0147***	0.0276***	0.0252***	0.0459***
40s	9.82E-12	1.20E-10	0.0256***	0.0429***	0.0373***	0.0594***
50s	2.18E-11	1.16E-11	0.0176***	0.0321***	0.0282***	0.0353***
60s	6.86E-12	1.06E-10	-2.46E-10	0.0125**	0.00928	0.0133
70 and above	1.15E-11	-2.91E-11	-0.00302***	-0.0112**	-0.0170*	-0.0108
Household size	-1.14E-11	-4.54E-12	0.00151***	0.00284***	0.00142	0.000928
No. of Earners	4.78E-12	7.89E-11	0.0108***	0.00648***	0.00711***	0.0175***
Marital status (Married)	1.94E-12	-8.63E-12	0.00574***	0.0116***	0.0110**	0.0189***
Education level:			*secondary education as a base*			
Below Secondary	6.37E-12	1.93E-12	0.00302***	0.00536*	0.00279	0.00197
Bachelor or higher	2.71E-11	3.06E-10	-0.00423***	-0.0133***	-0.0150**	-0.014
Occupation:			*blue collar worker as a base*			
Farm operator	2.12E-11	0.0188***	0.0445***	0.0298***	0.0303***	0.101***
Business	5.53E-12	2.54E-11	0.00947***	0.0243***	0.0237**	0.0575***
Professional	-2.78E-11	-1.27E-10	0.00520***	0.00735	0.00404	0.0434***
Officer	8.17E-12	-2.41E-10	0.00369***	0.00337	-0.00236	0.0167
Factory worker	-4.10E-12	-1.05E-10	0.00520***	0.00364	-0.00552	0.00664
Retired	-1.59E-11	-8.20E-11	0.0144***	0.00623	-0.000838	0.0448***
Formal debt by purpose:						
Housing	0.00298***	0.00860***	0.0106***	0.0133***	0.0156***	0.00607***
Education	6.30E-13	0.00461***	0.00796***	0.0166***	0.0215***	0.00640***
Consumption	0.00534***	0.0208***	0.0278***	0.0406***	0.0538***	0.0139***
Business	-1.29E-12	0.0127***	0.0192***	0.0305***	0.0393***	0.00498*
Farm Operating	0.000960***	0.0254***	0.0530***	0.0782***	0.0812***	0.0175***
Others	4.03E-13	0.0145***	0.0211***	0.0380***	0.0556***	0.00876*
Informal debt by purpose:						
Housing	-7.56E-13	0.00445***	0.0131***	0.0208***	0.0312***	0.00381**
Education	-0.00130***	5.56E-11	-0.000406***	0.0222***	0.0210***	-0.0053
Consumption	-1.39E-12	0.0169***	0.0271***	0.0399***	0.0489***	0.00887**
Business	6.20E-13	0.00875***	0.0226***	0.0336***	0.0519***	0.00839
Farm Operating	-4.68E-12	0.0149***	0.0323***	0.0644***	0.0732***	0.0278**
Others	-0.00126***	0.0106***	0.0195***	0.0298***	0.0426***	0.0150**
Bangkok	1.17E-11	8.98E-11	-0.00663***	-0.0126***	-0.0187**	-0.0195***
Type of community (Town)	-1.96E-12	8.65E-11	-0.00520***	-0.0175***	-0.0173***	-0.0354***
Asset-to-income ratio	9.03E-13	3.55E-12	1.14E-11	0.000187*	0.000633***	0.00240***
Inverse income	1.12E-11	1.41E-10	-1.23E-10	-0.000539	0.0539***	0.0659**
Observations	42,038					
Pseudo-R^2	0.0351	0.2955	0.354	0.4204	0.4531	0.3064

Note: ***, ** and * denote 0.1, 1, 5 percent significance levels, with heteroskedasticity-robust standard errors

The estimation results of the Debt servicing burden or debt repayment-to-income ratio with debt by purpose using quantile regression are reported in Table5. Note that the at risk household who has debt servicing burden more than 40% of his or her income that we are interested in in is ranging from the 85th quantile. Since quantile regression captures the level of debt servicing at different levels, those with zero debt at the lower quantiles has no debt servicing burden. Therefore, at the lower quantiles, we derive zero coefficients for debt servicing burden.

The effect of socio-economic variables

1. The age of the household head proves the life cycle hypothesis that at the younger age, household borrows more and when he or she gets older and earns higher income, the amount of borrowing declines and able to pay back the debt. The amount of debt repayment reflects the amount of debt but in different units; they move together as when the total debt increases, the debt repayment calculating as the interest rate charges on loan also increases. Therefore, following the life cycle hypothesis, debt servicing burden should be higher at the younger age and lower at the older age. As the table5 shown, the debt servicing burden increases until 40s and then it starts to decline steadily overtime. Numerical illustration, it is 2.76% at the age of 30s, 4.29% at the age of 40s and then declining to -1.12% at the age of 70 and above. This indicates that older household head borrows less and therefore less debt servicing burden. The effects are getting smaller at the 90th quantile.
2. Household size coefficients show the positive effect on debt servicing burden. This is because the extra member causes household to borrow more in order to send his or her kids to school, for example. From the table5, it reveals that one extra member increases the debt servicing burden by 0.284% for at risk household. Therefore, the bigger the family, the more debt servicing incurs.
3. The number of earners shows the positive effect on debt servicing burden. It can be explained that because the household is able to borrow more since the lenders like financial institution or the bank can access to more sources of income to secure the loans. In order for banks to grant the loans, the security of payment is the most important and in case of extra earner in the family, result is more likely for lenders to grant them more (Beer & Schurz, 2007). The extra earner enabling the family to borrow more increases the debt servicing burden by 0.648% for the at risk household.
4. Marital status was found to be positively effect on debt servicing burden. The couples tend to have more debt than the single one. For at risk household who married has 1.16% debt servicing burden higher than the single household head.
5. The level of education turns out to be positive for those with lower education than secondary level and negative related for those with higher education than secondary level. This means that when the household head is more educated, he or she has less debt servicing burden since higher educated household head tends to earn more income. In contrast, low educated household head earns less income and thus incurs more debt and debt servicing burden. The effects are larger for higher quantiles. For at risk household, 85th quantile, has 1.33% less debt servicing burden if the household head has bachelor degree or above comparing to the one with secondary education level.

6. Occupation of the household head shows significantly related to debt servicing burden only if the household head is a farm operator or business owner. Household head as a farm operator incurs more debt and thus more debt servicing burden because farming is risky such that his crops depend on the weather so that he can possibly get into cash flow trouble; therefore, debt provides liquidity to him. Farm operator has 2.98% more debt servicing burden than the blue collar worker for at risk household. Moreover, household head as a business owner has more debt because the firm relies on leverage to expand; thus, more debt servicing burden he or she has to pay. Note that the borrowing amount is collateralized against the value of business or the business plan. It is indicated that 2.43% higher debt servicing burden for entrepreneur than the blue collar worker.
7. Household living in Bangkok has fewer burdens on debt servicing than other regions in Thailand by 1.26% for household at risk. The reason why lower debt servicing burden is that household earns higher income in Bangkok than other parts of Thailand. Moreover, table 6 shows that the debt servicing burden is greater for those who live in North and Northeast of Thailand.

Table 6
Debt servicing burden by region

Region	Debt servicing burden mean
Bangkok	0.0960
Central	0.1434
North	0.2451
Northeast	0.2897
South	0.1224
Total	0.2023

8. Type of community shows the same thing as region. In the town, household tends to get higher income and therefore has less debt servicing burden. It is 1.75% less burden for debt servicing than those who live in the rural areas for at risk household.

The effect of asset represented by asset-to-income ratio shows the positive effect on debt servicing burden. This is because household has more collateral against the loans and feels safer to borrow. Also, the size of the effect is getting larger for higher quantiles. The household at risk has more burdens by 0.0187% once he or she has more assets relative to income by 1%.

The effect of income on debt servicing burden points out that richer household has less debt servicing burden since he or she has higher income to cover the principal and interest on loans than the poorer ones. From the table5, it shows that poorer household has debt servicing burden 5.39% higher if he or she has 1% increase in income for at risk household at 90^{th} quantile.

The effect of debt by purpose on debt servicing burden

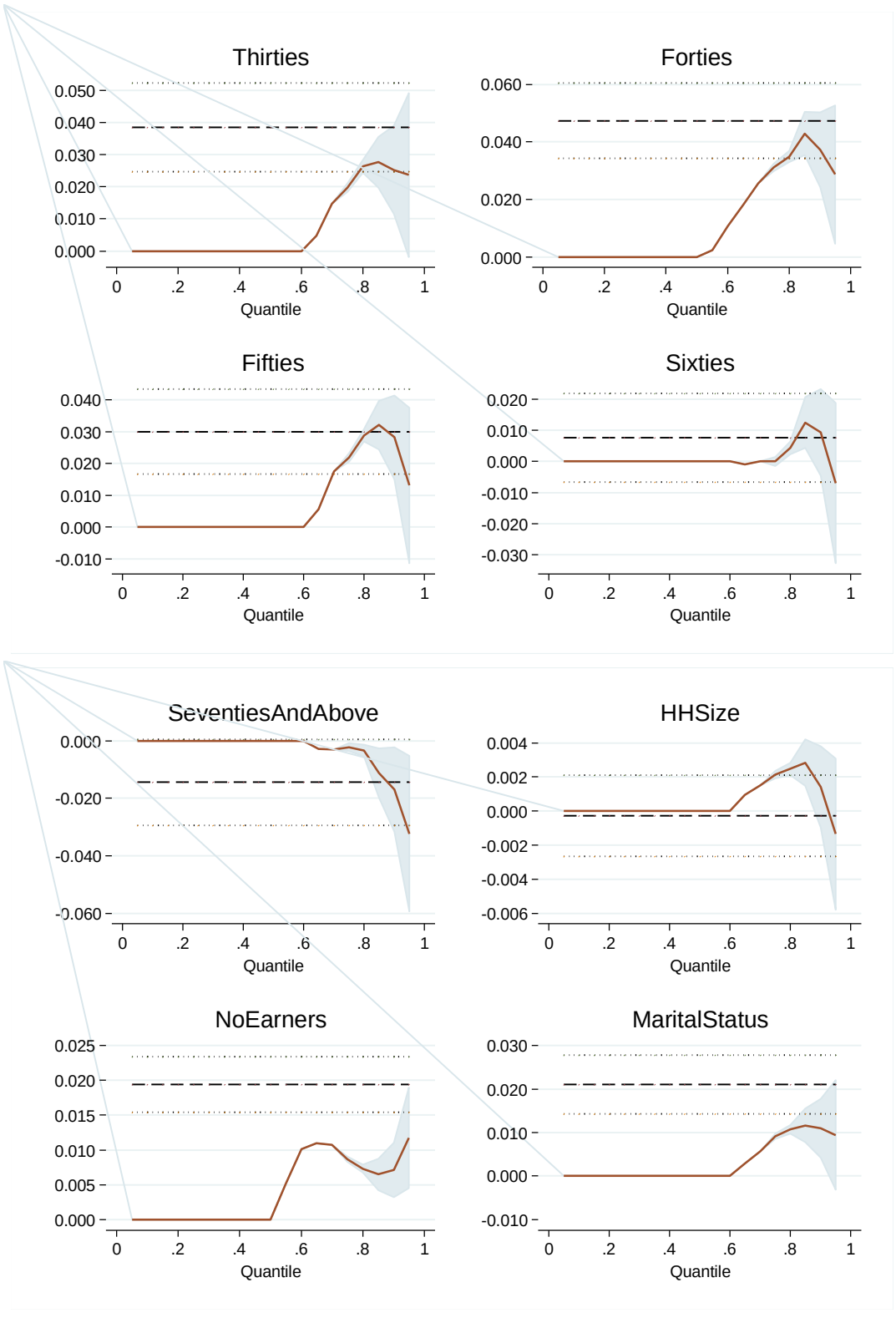
The amount of loan comes from two sources; formal and informal sector. The formal sector is financial institutions like banks where the informal sector is to borrow from someone or loan sharks which charges higher interest rates than the bank. Moreover, for in depth analysis, we categorize the loan by purpose; housing, education, consumption, business, farm operating and other. For formal sector, the result in table 5 shows that household who borrows for farm operating has more debt servicing burden. It is farm operator who borrows for this kind of loan and because he or she has uncertain income; therefore, burden to pay debt is high. For at risk household, borrowing 1 more percent for farm operating relative to income increases debt servicing burden by 7.82%. Borrowing for consumption (4.06%), other purposes (3.8%), business (3.05%), education (1.66%) and housing (1.33%) show the less effect on debt servicing burden for household at risk accordingly. The effects are getting bigger when we move to higher quantiles.

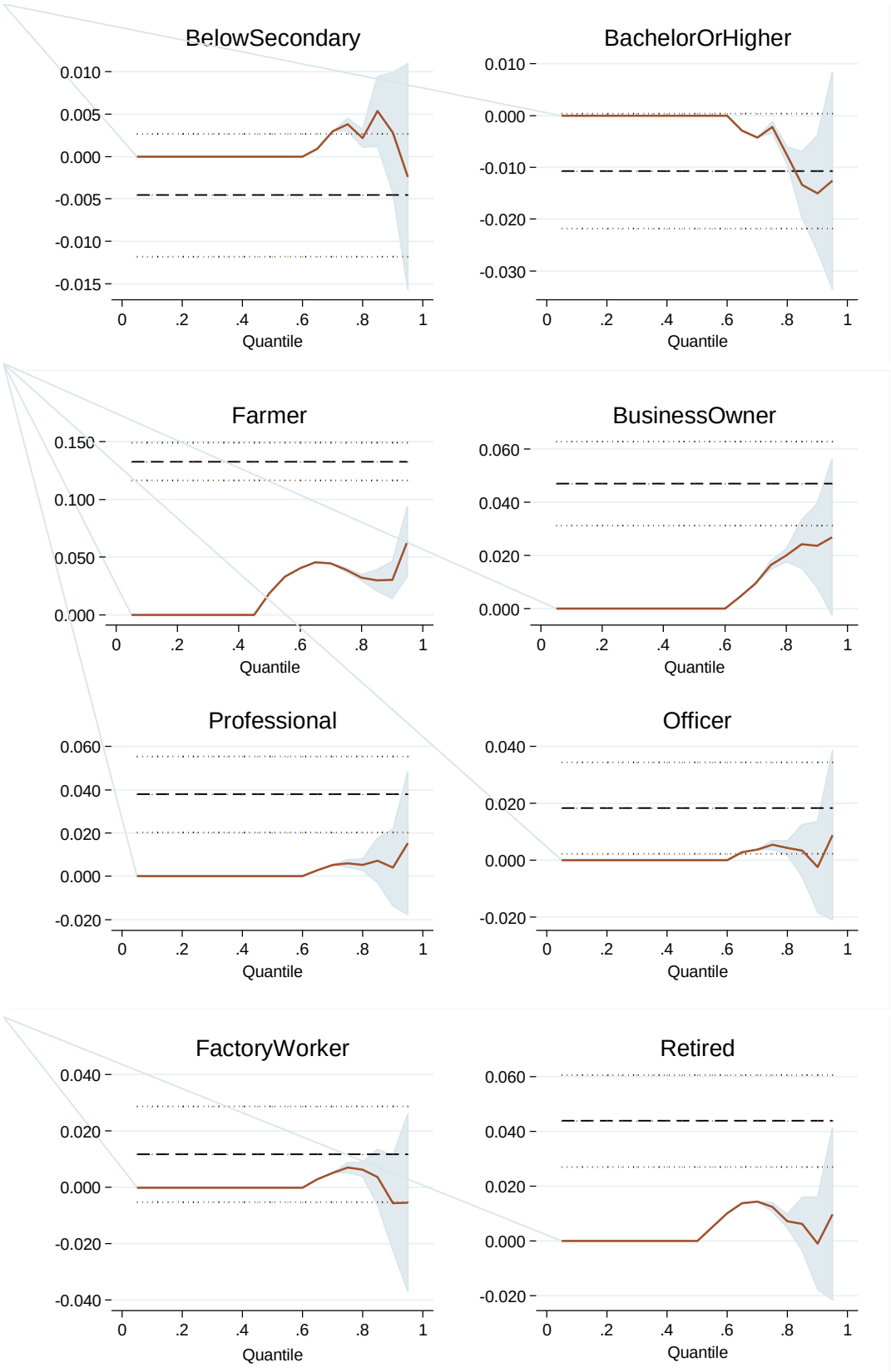
On the other hand, informal loan made by the household for farm operating creates the highest debt servicing burden among other purposes; it is 6.44% increases in burden once the household borrows more for farm business but it affects less than the loan made from the formal sector. However, consumption (3.99%), business (3.36%), other purposes (2.98%), education (2.22%) and housing (2.08%) affect less on debt servicing burden accordingly for the at risk household. The coefficients were found to be bigger for higher quantiles for every loan purposes made from informal sector except for education which increases until 85^{th} quantile and then declines afterwards.

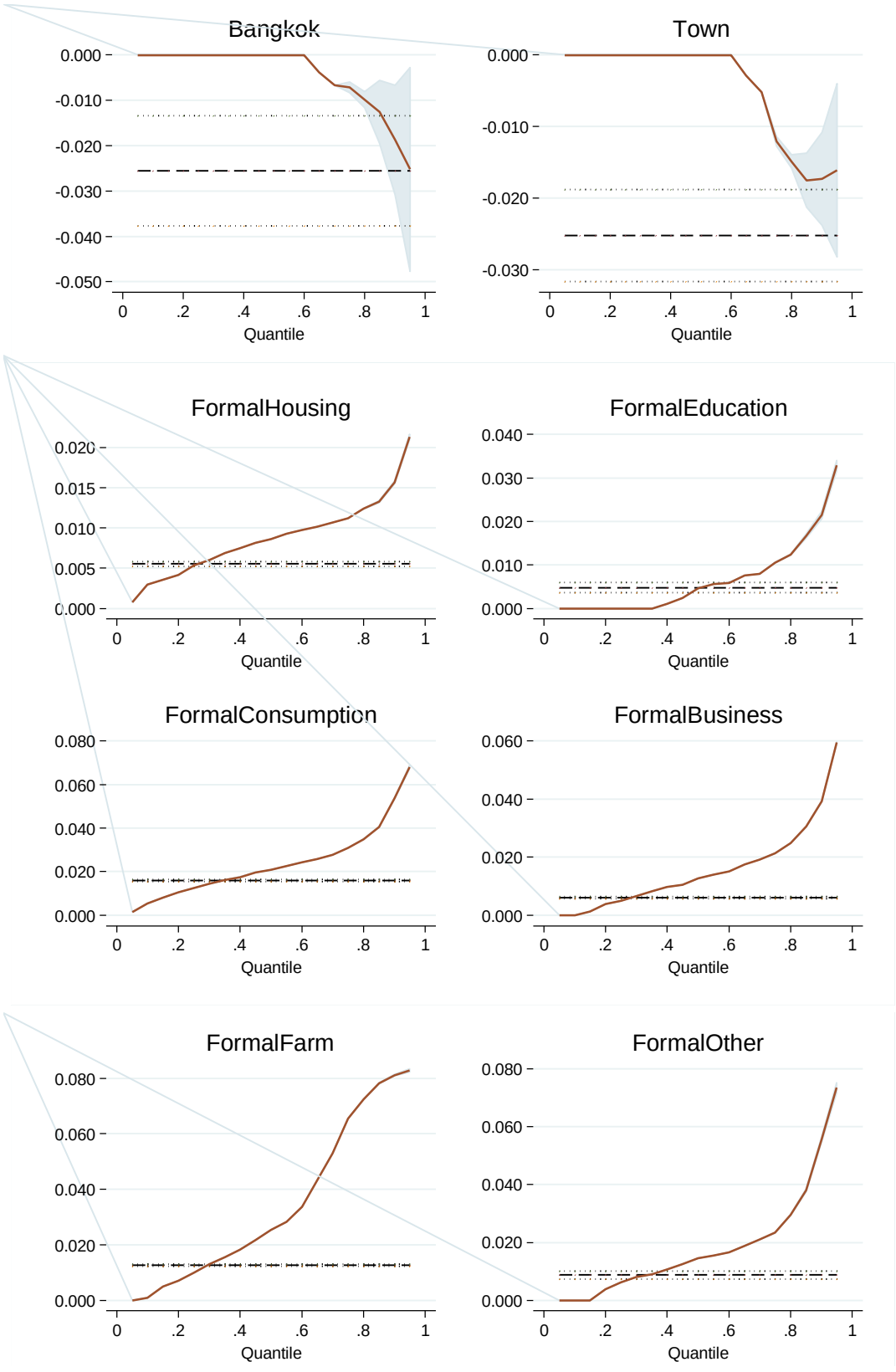
Figure 5 shows all the relationship between debt servicing burden ratio and variables we include in debt servicing burden equation. The brown solid line shows the coefficients for quantile regression with the range of 95% confidential interval represented by the blue area. Result from OLS regression shows the mean effect illustrated in the black dashed line with 95% confidential interval represented by the dot line area.

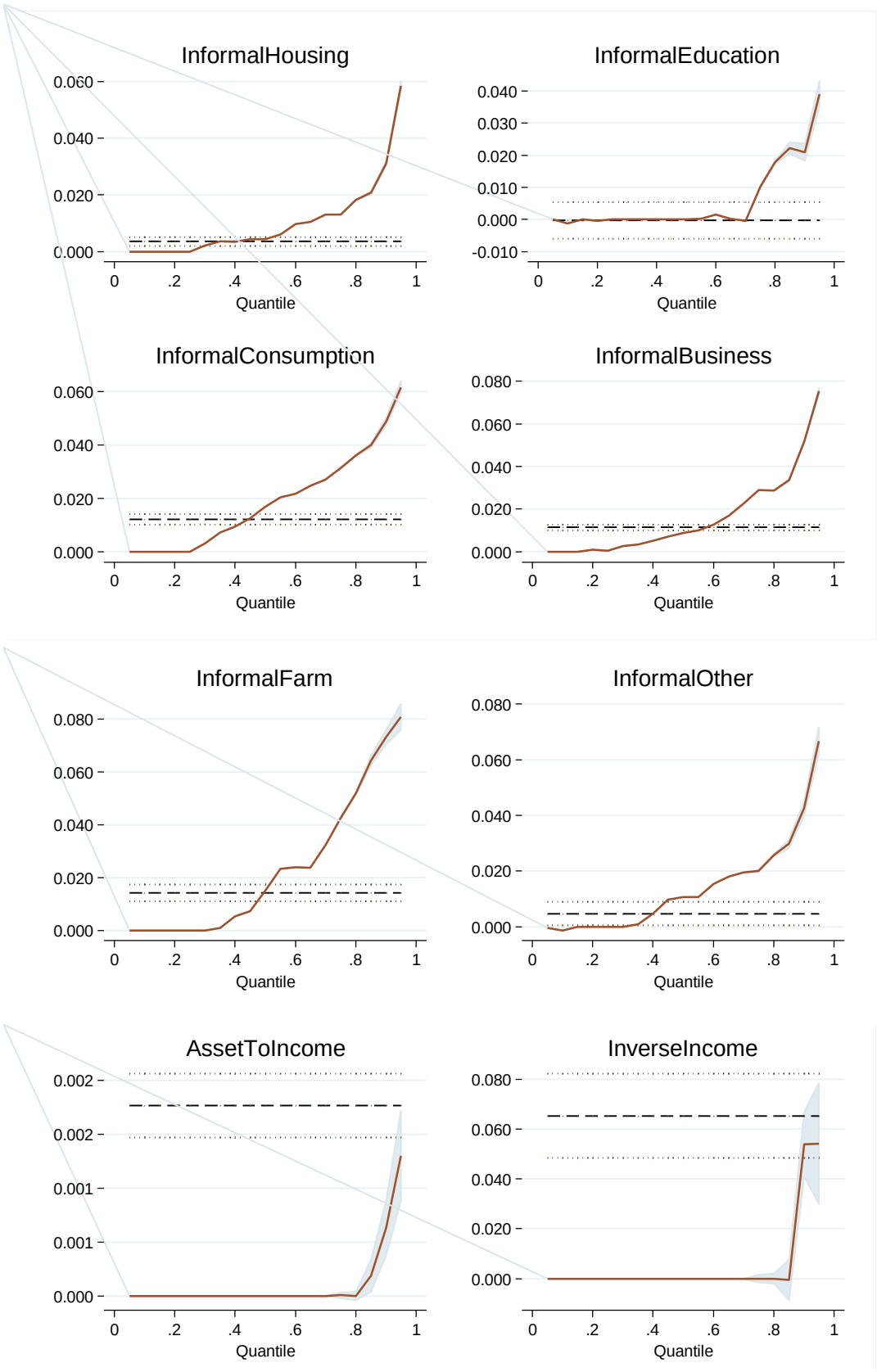
Figure 5

Factors effecting Debt servicing burden




BelowSecondary
0.010
0.005
0.000
-0.005
-0.010
-0.015
0 .2 .4 .6 .8 1
Quantile
BachelorOrHigher
0.010
0.000
-0.010
-0.020
-0.030
0 .2 .4 .6 .8 1
Quantile
Farmer
0.150
0.100
0.050
0.000
0 .2 .4 .6 .8 1
Quantile
BusinessOwner
0.060
0.040
0.020
0.000
0 .2 .4 .6 .8 1
Quantile
Professional
0.060
0.040
0.020
0.000
-0.020
0 .2 .4 .6 .8 1
Quantile
Officer
0.040
0.020
0.000
-0.020
0 .2 .4 .6 .8 1
Quantile
FactoryWorker
0.040
0.020
0.000
-0.020
-0.040
0 .2 .4 .6 .8 1
Quantile
Retired
0.060
0.040
0.020
0.000
-0.020
0 .2 .4 .6 .8 1
Quantile


Bangkok
0.000
-0.010
-0.020
-0.030
-0.040
-0.050
0
.2
.4
.6
.8
1
Quantile
Town
0.000
-0.010
-0.020
-0.030
0
.2
.4
.6
.8
1
Quantile
FormalHousing
0.020
0.015
0.010
0.005
0.000
0
.2
.4
.6
.8
1
Quantile
FormalEducation
0.040
0.030
0.020
0.010
0.000
0
.2
.4
.6
.8
1
Quantile
FormalConsumption
0.080
0.060
0.040
0.020
0.000
0
.2
.4
.6
.8
1
Quantile
FormalBusiness
0.060
0.040
0.020
0.000
0
.2
.4
.6
.8
1
Quantile
FormalFarm
0.080
0.060
0.040
0.020
0.000
0
.2
.4
.6
.8
1
Quantile
FormalOther
0.080
0.060
0.040
0.020
0.000
0
.2
.4
.6
.8
1
Quantile


InformalHousing
0.060
0.040
0.020
0.000
0 .2 .4 .6 .8 1
Quantile
InformalEducation
0.040
0.030
0.020
0.010
0.000
-0.010
0 .2 .4 .6 .8 1
Quantile
InformalConsumption
0.060
0.040
0.020
0.000
0 .2 .4 .6 .8 1
Quantile
InformalBusiness
0.080
0.060
0.040
0.020
0.000
0 .2 .4 .6 .8 1
Quantile
InformalFarm
0.080
0.060
0.040
0.020
0.000
0 .2 .4 .6 .8 1
Quantile
InformalOther
0.080
0.060
0.040
0.020
0.000
0 .2 .4 .6 .8 1
Quantile
AssetToIncome
0.002
0.002
0.001
0.001
0.000
0 .2 .4 .6 .8 1
Quantile
InverseIncome
0.080
0.060
0.040
0.020
0.000
0 .2 .4 .6 .8 1
Quantile

CHAPTER 5
Policy Implications and Recommendations

In this section, the results showing the characteristics, expenditure types, borrowing purposes of at risk households based on Average Propensity to Consume (APC) and debt servicing burden will be discussed in terms of policy implications and relate the result particularly to macroeconomic policy to protect them from defaulting and the overall system from instability when there's unexpected event occur. The events that are not anticipated can affect household in several ways; for example, when interest rates increase, household has higher burden on paying the interest on loans. Moreover, when there's change in income, household faces difficulty to maintain the previous consumption level or become more difficult for them to pay back the loans. There are policies addressing these problems at present such as unemployment insurance and 30 baht health plan. From the last section, household at risk whose expenditure is more than 1.5 times of his or her income spends much on necessity, investment and luxury goods; in addition, those who has to pay more than 40% of his or her income on paying back the principal and interest of loans considering to be household at risk mostly borrows for farm operating, consumption, business and education. These points out the implications of the findings in three different ways

1. Non-optional expenditures are the expenditures that household has to spend such as medical expenses.
2. Investment expenditures are housing, furniture and utensils (as a complementary to housing), education and transportation.
3. Overspending expenditures are the type of expenditures that are out of control; for example, when household member buys a smartphone when it's not necessary, alcohol expenditures and consuming behavior like eating outside. These are the lifestyle spending as well as for spending on clothing and footwear. Moreover, gambling and lottery are in this type.

To elaborate on the implications stated above, there should be a set of policies that are better protect households at risk so that the system or the nation remains stable when there's shock occurring. We propose the policies concerning the at risk household as follows.

1. The non-optional expenditures including emergency expenditures are diversifiable since it is the individual problem and will not affect system as a whole. Therefore, the insurance policies can help diversify the risk for households. For example, the health plan insurance offered by the government should be promoted to cope with the medical expenditure.

2. The investment expenditures are non-diversifiable since the risk can affect overall society. The households spend and borrow money for investment expenditures like housing and education are not a bad thing but they are more vulnerable once they spend and borrow heavily out of their income. This risk can be spread out and effect everyone in the economy; thus, the policymakers should consider the policies to help protect the economy or serve as a cushion against economic uncertainties. The policy should relate to the control of demand of household expenditures to be at the certain level which is not too high and not too low. When the demand of the product is too low, policymakers should stimulate it via many feasible tools such as lower interest rates. In contrast, when the burden of debt servicing by the households is greater than 40% for the loan under investment expenditures like housing or education and/or households spend much higher on that type of product, the policymakers should consider the demand for that product and manage it to be at the appropriate level. There are many tools that the policymakers can use to cool the demand down such as interest rates and taxes. This is crucial because the booming or bubble of the product demand can make the overall economy more vulnerable. The action to protect is, for example, when there's higher demand for housing and households borrow and spend dramatic amount of money on housing, policymakers could raise the mortgage interest rate or mortgage tax to reduce the demand. However, those households who previously holding mortgage loans also will be affected and add more burdens to them in order to pay higher debt repayment. Therefore, policymakers should set the rates at the appropriate level; otherwise, those with higher amount of loan can go bankrupt and possibly could affect the economy as a whole as well. In addition, if the investment expenditure like education is considered to be important such that it is better to have people being more educated, then the government should subsidize the education expenditure.

3. The overspending expenditures are considered to be irrational behavior. This is the individual risk and not spread out to the overall society. This kind of expenditures can be managed through the social institutions such as schools and religions. It is about the spending behavior or the lifestyle of households; the social institutions can somehow give the knowledge about appropriate and adequate spending habits. For example, the teachers could emphasize that gambling is not a good thing and show the consequences of those who go bankrupt because of gambling.

CHAPTER 6
CONCLUSION

Since there is no macroeconomic indicators posing the alarming sign of overspending and over-borrowing of Thai households to financial stability and macroeconomy; however, several pockets of population are somewhat at risk when there's a change in future income or interest rate as a result of higher debt and expenditure loads (Thaicharoen, Ariyapruchya, & Chucherd, 2004).With the evaluation of two indicators for household at risk analysis, Average Propensity to Consume (APC) and debt servicing burden, we have adopted a quantitative approach using the quantile regression and information from the NSO household surveys in 2009. Our empirical results do support the Life Cycle hypothesis predictions and we explain as *lifestyle hypothesis* for the contrasting result.

Following the previous studies, the at risk household is the one who spends more than 1.5 times of his or her income on expenditure and/or pays more than 40% of monthly income on debt repayment, composing of principal and interest. The APC ratio as an indicator is calculated by expenditures divided by income. The findings for household at risk show negative effect of age on average consumption or APC for all age groups. The life cycle hypothesis supports the findings until the retirement period where the effect continues to be negative which can be explained by the *lifestyle hypothesis* that older household tends to stay home rather than going out and spending money. Meanwhile, the debt servicing burden, debt repayment divided by income, supports the life cycle hypothesis. Household has higher debt at the lower age and lower debt at the higher age. Because household earns less when he or she is younger and earns nothing when he or she gets older, this is the reason why household has greater burden on debt servicing. In addition, asset and debt affect expenditure in a positive way since they support consumption precisely. Also, asset accumulation reflects more collateral against borrowing which pushes household to incur more debt and thus higher debt servicing burden. In terms of income, richer household spends less proportionately to his or her income as well as having fewer burdens on debt servicing compare to the poorer ones. By analyzing two indicators, the at risk household considering from expenditures is those at the younger age, less educated, bigger family, single household, living in Bangkok and in town and higher amount of debt; the debt servicing burden indicator points out that younger, bigger family, married, less educated, low income household head and those who stay in urban areas are risky household.

The expenditures at risk household spends and borrows on can be categorized as the non-optional expense, investment expenditure and overspending expenditure. Medical expense is non-optional expenditure that the household has to spend while housing, furniture and utensils as a complementary to housing, education and transportation are investment expenditure. Clothing and footwear, gambling and lottery are overspending type of expenditure. In terms of debt, household has debt servicing burden the highest from farm operation borrowing while education and housing give the lowest burden accordingly. With the findings, policies concerning the at risk household should be taken in order to protect the economy from instability especially when there's uncertainty. Insurance policy should be promoted in order to help household with the non-optional expenditure such as medical health plan which help diversify the risk. Moreover, the non-diversifiable investment expenditure can be managed by the policymakers' tools such as interest rates or taxes to control the demand of booming product. However, the risk of irrational overspending behavior can be slowed down through social institutions such as school and religion that somehow can give knowledge about appropriate and adequate spending behavior.

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Appendix A

The Classification of Household Consumption

(Grouping codes of household expenditure from SES survey)

Code	Household expenditure	Consumption by purpose
ef011	Grains and cereal product	Food and beverages
ef021	Meat and poultry	
ef031	Fish and seafood	
ef041	Milk, cheese and eggs	
ef051	Oils and fats	
ef061	Fruits and nuts Vegetables	
ef071	Sugar and sweets	
ef081	Spices and condiments and other food	
ef091	Prepared meals taken at home	
ef111, ef121	Non-alcoholic beverages at home	
ef101	Alcoholic beverages at home	
ef141	Alcoholic beverages drunk away from home	
ef151	Food eaten away from home	
ef131	Student's lunch	
ef161-171	Tobacco products	Food and beverages
eg301-351	Cloth and clothing	Clothing and footwear
eg361-381	Footwear	Clothing and footwear
eg011-051	Shelter	Housing
eg181-241	Fuel and light	Fuel and light
eg131-151	Textile house furnishings	Furniture and household utensils
eg161-171	Minor equipment	Furniture and household utensils
eg061-121	Major equipment	Furniture and household utensils
eg251-271	Cleaning supplies	Housing
eg281-291	Domestic servant	Housing
eg471-511	Medical supplies	Medical care
eg521-571	Medical services (outpatient)	Medical care
eg581-601	Medical Services (inpatient)	Medical care
eg391-441	Personal supplies	Personal care
eg451-461	Personal services	Personal care
eg711-791,7911-7921	Local transportation	Transportation
eg801-841	Travel out of area	Transportation
eg641-701	Vehicle operation	Transportation
eg611-631	Vehicle purchase	Transportation
eg861-881	Communication services	Communication
eg851	Communication equipment	Communication
eg1051-1081	Admissions	Recreation
eg941-991	Recreation and sport equipment	Recreation
eg1001-1041	Musical equipment	Recreation
eg1091-1101	Reading materials	Recreation
eg1111	Religious activities	Recreation
eg891-931	Education	Education
eg1121	Ceremonies	Other services
eg1131-1211	Miscellaneous services	Other services

Source: Chucherd (April 2006)

Appendix B

The Classification of Socio-Economic class

(Grouping codes of household socio-economic class from SES survey)

Code	Household Socio-Economic Class	Occupation
H01 – H19	Farm Operator who mainly owning land (including marine culture) Farm Operator who mainly renting land/occupied free (including marine culture) Fishing, Forestry, Hunting, Agricultural services	Farm Operator
H21-H22	Entrepreneurs, Trade, Industry and Service - With paid workers - Without paid workers	Business owner
H31-H32	Professional, Technical and Managerial - Working on own account - Employed by others	Professional
H41 – H42	Laborers - Farm workers - General workers	Worker
H50	Clerical, Sales and Service workers	Office worker
H60	Production and Construction workers	Factory worker
H71 – H72	Economically Inactive - Earning from current transfers, social assistance, pensions and annuities - Earning from property income	Retired