

# Non-Performing Loan and Economic Determinants in Asia-Pacific Countries: Evidence from Credit Card Debt

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**Abstract:** Credit card loans are one of the NPL classified as doubtful requiring 50% provisioning and those which are more than 6 months in arrears should be classified as bad requiring 100% provisioning which has the high potential loss for banks when the users unable to pay back the amount. Country macroeconomics indicator leads to a rise in delinquency rates after controlling for credit supply and shocks like divorce and health coverage we investigate whether consumer propensity for delinquency and bankruptcy. The study sample consisted of 4 countries with 2 types of market classification which are developed countries by Singapore and Hong Kong, and emerging countries, Malaysia and Korea. A balanced panel regression shows unemployment rate play a significant variable to explain the NPL due to the credit card debt outstanding. The country development status helps in enhancing the reliability of the study.

**Index Terms:** Keywords: Credit Card Debt, Non-Performing Loan, Macroeconomic, Gross Domestic Product.

## I. INTRODUCTION

Non-performing loan (NPL) is the aggregate sum of acquired cash where the borrower did not made installment for at least in 3 months. Brownbridge (1) stated that most of the bank failures were caused by non-performing loans. This is because non-performing loan have a great impact towards banking system as it is one of their sources of fund to and from users. It is important to control non-performing loan to gain a good indicator of banking performance and environment of economics' financial. Credit card loans is one of the NPL classified as doubtful requiring 50% provisioning and those which are more than 6 months in arrears should be classified as bad requiring 100% provisioning which have high potential loss for banks when the users unable to pay back the amount. This is because credit card is one of the cashless payment transactions that can be done by consumers at ease of use in this whole world. Most of the bank institution allowed credit card users to pay back the amounts used at later date in installment plan Brito and Hartley (2) indicated from this flexibility, credit card users had clearly significant to increase their ability in spending. Higher spending will increase the delinquency as well when they did not manage to payback the amounts due to the non-performing loan rate and the duration of the time. Credit card delinquencies should be managed by banks

effectively as it will affect economic and financial stability of the country.

Nowadays, cost of living are increasing from days to days which affect household to consume on borrowing other loans like credit card in order to reduce their commitment on housing or car expenses. Ahmad K) said consumer will apply credit card loan to meet their living expenses. Decreasing trend for NPL due to credit card shows to Malaysia with RM 743.7 million in 2006 to RM 510.8 million in 2016 based on Bank Negara statistics and Indonesia with Rp 6410 million in 2008 and decreased to Rp 3671 million I 2015, Central Bank Republic Indonesia. Meanwhile, increasing trend for NPL due to credit card shows to Singapore with SGD 3,794 million in 2005 to SGD 10,795 million in 2016 by Monetary Authority of Singapore, and Thailand from Bath 448084 million of in 2007 to Bath 1,095,809 million of in 2016.

Most researchers have studied that a high NPL ratio requires greater loan provisions, which reduces capital resources available for lending to other people, and negative change in bank profitability. There is evidence that high NPL stock is a significant predictor of bank failure, and distorts bank's cost structure and efficiency. An example of such distortions is the case of 'zombie lending' by Japanese banks to save corporations plagued by bad debt, which led to misallocation of capital and slowdown of economic growth during the early 1990s

This research would like to study on the impact of credit cards outstanding debt on the economic growth for selected Asia-pacific countries which including Singapore, Hong Kong, Malaysia and South Korea. Some reasons on the selectivity of 4 countries among others due to the availability of credit card data and rising delinquent issues.

Emerging countries by MSCI Market Classification show decreasing trend for credit card's NPLs which Malaysia with RM 743.7 million in 2006 to RM510.8 million in 2016 based on Bank Negara statistics, and Korea decreased from 7.59 trillion won in 2009 to 4.37 trillion won in 2016, meanwhile, developed countries show increasing trend for credit card's NPLs shows to Singapore with SGD3,794 million in 2005 to SGD10,795 million in 2016 by Monetary Authority of Singapore, and Hong Kong with 253 million Hong Kong dollar in 2005 to 313 million Hong Kong dollar in 2016, based on Hong Kong Monetary Authority. Therefore, there would be a relationship and impact of credit card's NPL from these 2 groups of countries toward economic.

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As example for developed countries, a survey has conducted on Hong Kong market in 2015 showed that aged 18 to 35 who have at least one credit card spend an average of 36 % of their monthly income on purchases made with a card and take 19 months to pay back their loans. According to Singapore news, total number of delinquent debtor was more than \$73,000 in 2011 and increased to \$101,490 in 2015. Recent news in 2017, another study pointed out that the high interest debt like credit cards and personal loans have been the fastest growing debt category, now comprising 21% of total household liabilities among Singaporeans.

Even though Malaysia and Korea experienced in decreasing credit card's NPL, but it still create a serious impact on citizens' financial especially among young generations. As for emerging countries which are Malaysia and South Korea, Malaysia shows that 70% of debt problems was due to credit card debts Mr. Azaddin, CEO of AKPK and 47% of young Malaysians are currently in facing debt payments amount to 30% or more of their gross income Based on New Strait Times News, total outstanding balance on credit card for Malaysia as at June 2017 was RM36.9 billion and RM2.7 billions was overdue balance owed by creditors. Total outstanding balance that less than three months was of RM2.3 billion, while the balance RM0.4 billions more than 3 months. According to latest statistic in November, 2017, the Financial Services Commission surveyed 1,700 young Koreans adults and 16% of Koreans between the ages of 19 and 31 borrowed money, and 11.1% of them can't repay them in time. College students are spending more than they earn from allowances and part-time jobs, and most already have a large loan due on tuition fees. So they turn to extra bank loans, while some even turn to finance companies and credit cards that have ridiculously high interest rates.

The problem with credit card happen when they unable to pay back the amount that they used at the end of the month. Thus, interest rate becomes higher when people need more time to settle the debt and cause bankruptcy when the debt amount over RM30, 000. According to the Insolvency Department, 41 Malaysians are declared bankrupt every day, with the majority of them being under the age of 44 due to inability to pay off car loans, poor control of credit card usage and a failure to pay off personal loans. Therefore, NPL rate will increase and other people could not applying loans in the future as the money was allocated to people who does not pay back their debt.

## II. LITERATURE REVIEW

There are many researchers examined on NPLs, household and also credit card delinquency which can be attributed to macroeconomic conditions. First of all, Balgovam et al investigate NPLs' problem and the burden NPLs impose on the economy in Europe which has an unambiguously positive medium-term impact on the economy. Economies that actively seek to resolve NPLs do comparably well when the countries experience an influx of fresh credit grow the fastest, the. On the other hand, economic performance becomes worse when the NPL problem is ignored. Moreover, Klein et al. (3) shows that level of NPLs tends to increase when

unemployment and inflation rises, exchange rate and real GDP growth depreciates. Besides, GDP growth and the global risk aversion, have a direct impact on banks' asset quality and sensitive to bank-level factors where higher quality of the bank's management, in term of their profitability, leads to lower NPLs, while moral hazard incentives, such as low equity, tend to worsen NPLs. In term of household delinquency, Abid et al (4) investigate the potential effect of both macro economic which are GDP, inflation, interest rates and bank-specific variables on the Household NPLs. Their results indicate that real GDP growth rate, inflation rate and the real lending rate (RLR) have significant effect on NPLs.

Moreover, Abd Rahaman & examine the increase in household debts and its relation to GDP, interest rate and house price via time series techniques in Malaysia. Result shows that there is a positive significant relationship between house price and household debts, in the long run. Dikko & Madi (5) show NPLs insignificant toward macroeconomic effect when in Singapore and Thailand household are in a strong financial position and have the ability to withstand adverse shocks of higher interest rates and other financial shocks, regardless of whether households have "over borrowed", but, recent international experience shows that excessive indebtedness and looser lending standards can also make households more vulnerable to adverse shocks and increase risks to the financial system. Thus there was some gap to investigate the household debt factor as increase in household debt has important macroeconomic implications according to the researchers.

In term of credit card delinquency, credit data that have been collected by researchers shows there is a relationship to the macroeconomic effects. This is shown by Akcelik et al. (6) that examine the feasibility of using credit data in explaining the variability in Turkish GDP growth as well as now casting it using credit impulse and new borrowing. Result shows that the pattern of the Turkish GDP growth is significant between the credit flows. Besides, credit data significantly improves the forecast performance of the models using in nowcasting quarter on quarter Turkish GDP growth.

According to Agarwal & Liu (7) examine consumers' delinquency and bankruptcy behavior affect country unemployment rates by focusing on the credit card market. It is significantly shows country unemployment rates influence delinquency as higher unemployment rates lead to a rise in delinquency rates after controlling for credit supply and shocks like divorce and health coverage we investigate whether consumer propensity for delinquency and bankruptcy changes with respect to the macroeconomic fluctuations across countries. Besides, supply of consumer credit is positively related to delinquency, our results indicate credit limit (credit supply) is negatively related to delinquency.

In recent research of Astous & Shore (8), study the impact of increasing minimum payments on delinquency, payments, spending, and write-offs. Result shows that most affected borrowers tend to reduce their spending and lowering their revolving balance when they affected by minimum payments in the future respond to the policy change by increasing their payments. Thus, higher delinquency will happen when increasing the minimum payment that lead to increase write-offs. Write-off will increase and interest rate decreases when the payment increases by delinquent borrowers whose are insufficient to match increasing minimums payment. Finally, interest earned by the bank decreasing as affected borrowers migrate away from these accounts by decreasing charges and increasing payments.

In a nutshell, determinant of non-performing loan on macroeconomic factors has widely researched by all the researchers in explaining their country's economic growth. From empirical literature, household delinquency has significant effect towards economic growth. Household delinquency proportions include the credit card loan, house loan, car loan and personal purpose. There are some limitations in previous researchers study as they analyzed major percentage of NPLs and further in household debt. Thus, this study tends to narrow down the scope of household delinquency which is credit card to analyse their relationship towards economic suggested by Abid et al. (4). This is because, some researchers have examined that credit card have a significant relationship towards economic.

### III. RESEARCH DESIGN AND METHODOLOGY

The sample consisted of 4 countries with 2 types of market classification which are developed countries by Singapore and Hong Kong, and emerging countries, Malaysia and Korea. Research acquires the data of borrowers who have at least 3 month credit card outstanding balance in arrears with country licensed banking institutions. This study use balanced panel dataset, which comprising the time series data from all banks in the 4 countries which are Malaysia, Singapore, South Korea and Hong Kong to avoid the sampling bias problem covering the annual period from 2010 to 2016.

Table I: Measurement Table

No	Variable	Formula	Sources	Expected sign
1.	Credit card's NPLs	Total outstanding balance overdue more than 3 months / Total loans	Central Bank of the country	Significant at 5% level of significance
2.	Interest rate	Interest = Prt (Principal amount x rate of interest x time)	World bank database	Positive / Negative relationship between interest rate and NPLs at 5% level of significance

3.	Inflation rate	Annual inflation current year = (Consumer Price Index current year - previous year) x 100	World bank database	Positive / Negative relationship between inflation rate and NPLs at 5% level of significance
4.	Real GDP Growth	$\left\{ \frac{\text{Annual rate current period}}{\text{annual rate previous period}} - 1 \right\} \times 100$	World bank database	Negative relationship between GDP and NPLs at 5% level of significance
5.	Unemployment rate	Number of unemployed person / labor force	World bank database	Positive relationship between unemployment rate and NPLs at 5% level of significance

To investigate this study more accurately, data is collected on quarterly basis. As a result, a total of 112 data points for 4 countries observations are to be examined in this study. This makes this data rich and valuable in addressing the study objective. The data obtained was from two main sources, country central bank and World Bank database. After sorting, filter (outlier and missing data) and arranging the raw data into a spreadsheet, the data is ready to use for further investigation. The dataset has tested for correlation analysis and econometric diagnostic checking such as heteroskedacity test, autocorrelation test and collinearity test. The model been tested using the latest version of STATA 13. Since the dataset has heteroskedacity and autocorrelation problem, command "xtscc" has been applied to mitigate the error and secure the reliability of the outcome. The table below illustrated the data sources of each variable, formula and expected sign.

#### A. Regression Model

In linear regression model, there would be 2 categories of regression which is Multiple Linear Regression. Multiple linear regressions will be applied and used in this study as it has more than 1 independent variable and 1 dependent variable. The regression equation includes regression coefficient ( $\beta_1$ ) and additive constant ( $\beta_0$ ). Therefore,

$$(Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \epsilon)$$

Where,

Y = Credit card's NPLs

X1 = Interest rate

X2 = Inflation rate

X3 = Real GDP growth rate

X4 = Unemployment rate



$\beta_0$  = Constant  
 $e$  = Term error  
 $\beta_1, \beta_2, \beta_3, \beta_4$  = Slope

IV. RESULTS AND DISCUSSION

A. Descriptive Statistic and Results

The descriptive statistics of all the variables of the model are reported in table 2 below which are mainly consist of the mean, minimum and the maximum values of the respective variables, the mean values. The measures of dispersion of the model variables are measured by variance and standard deviation values.

The total numbers of observations are 208 observations given data collected from 2005 to 2017 period with quarterly data frequency for 4 countries which are Singapore, Malaysia, Hong Kong and South Korea. Looking at the mean value, unemployment rate deficit has the highest mean value of 3.2126 percent with the NPL having a mean value of 0.6693 percent for the sampled time period. Gross domestic product, interest rate and inflation rate have a mean value of 2.5269, 2.1601 and 2.83 percent. On the measures of dispersion as measured by standard deviation, gross domestic product has the highest dispersion from its mean value standing at 4.06 percent while the credit card debt outstanding have the least deviation from its mean value of 0.71 percent.

Table II. Descriptive Statistics of Dependent and Independent Variables

Variable	Mean	Std. Dev.	Min	Max
Credit Card debt Outstanding	0.6693	0.7104	0.10	4.30
Gross Domestic Product	2.5269	4.0647	-13.50	19
Interest Rate	2.1601	1.6616	0.01	6.75
Unemployment Rate	3.2126	0.7807	1.70	6
Inflation Rate	2.8304	3.4726	-13.50	19

B. Discussion of Research Findings

Firstly, gross domestic product has significantly negative relationship on the credit card’s non-performing loan at 5% significance level. This implies that an increase in GDP growth results in a decrease in the levels of non-performing loan and vice versa. Our result supports those of Ghosh (9), Abid et al. (4); Jameel (10), (3); Akcelik et al. (6) that research on macroeconomic effect towards NPL. This is because a growing economy increases borrowers’ income and ability to repay credit card debts and subsequently, increases overall financial stability. Thus all subjects in one economy when getting higher incomes will ideally be more capable of repaying their debts and this will be translated into lower non-performing loan

In model 2, when country level between developed and developing being added in the regression gross domestic product shows insignificant positive relationship with credit cards non-performing loan. As for GDP, the relationship is suggested to be inverted, but past research from Vatansver & Hepsen have been done on determining impact on non-performing loan ratio at Turkey also shows the same

result on gross domestic product. As time goes, the NPLs will deteriorate when GDP increase. During the period, more economic activities are taken place and thus, more revenue is obtained by businesses, institutions and individuals which lead to rising on the debt payment, thus reducing bad loan significantly.

Both result shows unemployment rate is significant with credit card’s non-performing loan. Besides, the p-value becomes more significant at 0.000, 1% significance level instead of 0.068 at 10% significance level when country level is being added in the regression.

Table III: Results for the impact of economic determinants on the non-performing loan due to credit card debt outstanding

Independent variables	Dependent Variable: Credit card debt outstanding (NPL)	
	Model 1	Model 2
Constant	0.20515 (0.3360)	0.64809 (0.0000)***
Gross Domestic Product	-0.0351 (0.0330)**	0.00727 (0.4790)
Interest rate	0.06193 (0.1250)	-0.0296 (0.2800)
Unemployment Rate	0.12294 (0.0680)*	0.15711 (0.000)***
Inflation Rate	0.00852 (0.5360)	-0.0113 (0.3780)
Dummy		-0.8118 (0.000)***
Ad-j R square	0.1144	0.3448
F stat	14.55	56.67
Chi Test	(0.000)***	(0.0000)***
Significant at 0.01(*), 0.05(**), 0.001(***)		
P-values are in parentheses		

The table shows the two of results economic determinants on the credit card debt outstanding from year 2005-2017. The equation in model 1 regresses the credit card debt’s NPL with economic determinants, the country development status dummy is added in model 2.

According to the coefficient obtained from the test earlier, the result matches the theories published, unemployment and NPLs have positive relationship. Vatansver & Hepsen Klein et al. (3), published their research on the same topic but a different country perspective. Their conclusion is parallel to the initial findings. Unemployment will result in loss of income of an individual which he or she may need it to support their daily needs and monthly commitments. When an individual could not contribute to their commitments for a specific range of time, it is where banks will take action and decision whether the loan is considered default.

Besides, individuals who anticipate a new job in the near future while maintaining a good credit standing with their

creditors are more likely to declare bankruptcy once they do not find the job that cause higher rate delinquency. Consumers that are unemployed 90 days prior to missing their first payment (or 180 days delinquent) may have depleted more of their liquid reserves and be forced to default not only on their credit card debt but all other debt as well (7). However, the results suggest that consumers who lost their job days prior to missing their first payment (or 90 days delinquent) might exhibit "selective default behavior" by acting strategically and becoming delinquent on their credit card payments to conserve the liquid reserves for other debt payments.

Moreover, country level of the 4 countries which are developed country from Singapore and Hong Kong and developing country; South Korea and Malaysia also shows highly significant with credit card's non-performing loan. From the result, country level has negative correlation with credit card's non-performing loan. This implies that the highest country level which is developed results in a decrease in the levels of non-performing loan and vice versa. This result also supported by past researcher, stated that developed countries such as Australia and Canada expectedly, have the lowest levels of NPL compared to comparison to emerging economies at that time such as China, Thailand, Malaysia, Korea and Turkey.

On the other hand, both results show insignificant relationship between inflation rate and interest rate on the credit card's non-performing loan. During inflation, the central bank will increase interest rate in order to reduce money circulation in the market, hence reducing inflation. However, in doing so the central bank uses monetary tools with extra care in order to maintain a balance between economic growth and inflation. Thus, the negative estimated result obtained is only for the short run analysis. We argue that inflation in the long run will capture the effect of a less volatile price regime and therefore will be less risky. Therefore, in the long-run, we estimate a positive coefficient, indicating lower inflation volatility that can contribute to the better performance of the ratio of bad loan.

Interest rate shows insignificantly relationship with credit card's non-performing loan supported by Vatansever & Hepsen. Therefore, null hypothesis of no relations between interest rate towards credit card's non-performing loan is successfully rejected. The reason being when interest rates increase, the cost of borrowing and paying loan is getting more expensive, thus unable for the customers to furnish the existing loan, resulting in rising bad loan. The result supports the findings of Nkusu (who shows that an increase in interest rates make borrower's repayment capacity become worsen since it is becoming more expansive and hence, cause of NPLs to rise).

On the overall, The model 1 in table 3 presents the value of R-squared of 0.1144, meaning that 11.44% of the total variations in the level of NPL for four countries which are Malaysia, Singapore, Hong Kong and South Korea occur because of the variation in interest rate, inflation rate, unemployment rate and gross domestic product. The remaining 88.56% might be due to randomness and other variables which are not included in the model. When country level is being added in the regression model (model 2), the

explanatory power of the model stands at R squared increase to 0.3448 which about 34.48% of the total variation in the NPL can be explained by the total variation in the independent variables. This shows that the model is considered a good fit model.

## V. CONCLUSION

In a nutshell, all the hypothesis testing and diagnostic checking has been run through completely in this chapter. Based on the result generated from Stata program, the regression model has included all important and significant independent variables including gross domestic product, unemployment rate, inflation rate and interest rate, to explain credit card's NPLs. Moreover, the results also show that all of the independent variables have consistent econometric points of view with the other researchers. Several tests were run to examine the problems in the regression model formed for diagnostic checking. As a result, the problems of autocorrelation and heteroskedacity are being detected. The unemployment rate play an important role to explain the NPL due to the credit card debt outstanding. Country unemployment rate leads to a rise in delinquency rates after controlling for credit supply and shocks like divorce and health coverage we investigate whether consumer propensity for delinquency and bankruptcy. The country development status helps in enhance the reliability of the study.

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