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## CREDIT CARD DELINQUENCY IN MALAYSIA

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### ABSTRACT

The objective of this paper is to investigate the influence of economic conditions and regulatory interventions as potential drivers of credit card delinquency in Malaysia. Using quarterly data from 1999 to 2021 and the autoregressive distributed lag model, we find that national income, wealth, expectations of future economic conditions, and the supply of credit determine credit card delinquency. We also find evidence in favour of regulatory interventions as a solution to curbing the deteriorating credit card debt situation in Malaysia.

*Keywords: Credit card delinquency; Expectation; Non-performing loan; Regulatory interventions; ARDL.*

**JEL Classifications: G01; G51.**

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## I. INTRODUCTION

The financial system plays an important role in the development of an economy. A growing body of literature demonstrates that a well-functioning financial system assists in oiling the cogwheels of an economy and enhances economic growth in the process (see, for example, Levine, 1997; Beck *et al.*, 2000; McCaig and Stengos, 2005; Sehrawat and Giri, 2015; Juhro *et al.*, 2020; Barra and Ruggiero, 2021; Phan *et al.*, 2021). However, during a banking crisis, the functions of commercial banks are disrupted, leaving a disastrous impact on the economy (See for example Bordo *et al.*, 2001; Laeven and Valencia, 2020; Phan *et al.*, 2021). The history of banking crises shows us that these disruptions involve significant losses due to widespread credit defaults by borrowers.

The growth of credit card debt is a mysterious paradox. On the one hand, this unsecured household debt boosts household consumption, which in turn generates higher economic growth (Agarwal and Liu, 2003). On the other hand, it concurrently induces systemic risk within the financial system, which creates vulnerabilities in the financial system. In particular, excessive and unsustainable debt levels increase the potential for delinquent behaviour among borrowers resulting in the deterioration of banks' balance sheet. The credit card boom and bust cycles that occurred in Korea, Taiwan, and Hong Kong between 2002 and 2006 demonstrated the cascading effect of poor asset quality in banks on private consumption (Jung, 2019; Kang and Ma, 2007).

Credit card debt contributed approximately 1.87 percent to the total loans of the Malaysian banking system in 2021 (Bank Negara Malaysia, 2022). However, the significance of this figure should not be underestimated due to its outstanding debt quantum. The cost of borrowing of credit card debt is among the highest among various household financing options (Zinman, 2015). It is also the most costly instrument for retailers (Chakravorti and To, 2007). Hence, its implications on consumer welfare is substantial.

A survey conducted by the Credit Counselling and Debt Management Agency (2018) showed that 39 percent of working adults in Malaysia have outstanding balances on their credit card accounts. Furthermore, 8.58 percent of the total bankruptcy cases in Malaysia from 2018 to 2021 were due to accumulated credit card debt (Malaysia Department of Insolvency, 2022). The susceptibility of the banking system to systemic risk due to the rising levels of credit card debt amidst the current uncertainty in the economy and the cost of living crisis poses a critical dilemma. Given that widespread default on credit card debts will have adverse impact on the Malaysia banking system, it is thus important to understand the factors that contributed to the default of credit card debts in Malaysia.

Hence, in view of its prevalent impact to the overall economy, it is essential to understand the fundamental causes of credit card delinquency by taking into consideration the significant influence of economic conditions and regulatory interventions to resolve this problem.

The importance of macroeconomic factors in empirical testing and forecasting has been recognised and considered by many studies (Jiang and Dunn, 2013; Bellotti and Crook, 2013). However, there is scant research that specify and examine the connections between macroeconomic factors and credit card debt. In particular, the link between macroeconomic factors and credit card delinquency at

the aggregate level has not received sufficient attention in the academic literature (see, for example, Grieb *et al.*, 2001; Theong *et al.*, 2018). In addition, the Malaysian central bank has introduced various policies that influenced the credit card market, as some of the policies were introduced to control the level of credit card debt default. Thus, this study examines the effectiveness of these policies.

This study takes advantage of the interesting contextual and legal framework that exist in the Malaysian financial system to contribute a novel investigation into the effectiveness of regulatory interventions in the credit card market as a deterrent for credit card default. The paper contributes to the existing literature gap in the following ways. Firstly, although various consumption models have incorporated expectations of future income to account for current consumption behaviour, there has yet to be a study that linked credit card delinquency to expectations of future income. Secondly, this study investigates the effect of regulatory interventions in the credit card market on credit card delinquency because previous studies have not done so.

The rest of the paper is organised as follows. Section II presents a brief review of previous studies on credit card delinquency. Section III describes the data and methodology employed. Section IV reports the findings of this study. Section V concludes the paper and discusses some implications from the study.

## II. REVIEW OF LITERATURE

The literature specific to credit card delinquency is rather limited and can be broadly classified into two distinct groups. One group of studies that form the majority of previous studies on the subject used household level or account level data. For example, using the 2013 Survey of Consumer Finance, Donou-Adonsou and Basnet (2019) found that access to the internet increased the likelihood of default on credit card debt. They argued that access to internet promotes compulsive online shopping and overspending that naturally leads to credit card delinquency.

Another key study from the majority group, Gross and Souleles (2002) used account level data from several credit card issuers for their study. They examined the changes in propensity to default over time to unravel the risk composition of card holders. The crucial dominance of this research is the richness of the dataset that included credit risk scores and details of the financial position of credit card holders, such as their assets and liabilities. However, the results appeared to omit vital time varying factors because of short time span of the data examined.

Kim *et al.* (2018) also used credit card account data from an anonymous credit bureau in South Korea. The findings based on a multinomial logit model suggested that loan and borrower characteristics led to higher probability of credit card default. In particular, higher valued debts and loans with shorter periods of maturity have higher probability of default. In addition, male credit card holders, credit card holders under the age of 30 and borrowers living outside Seoul were also found to have higher risk of default on their credit card debt.

Another study that used credit card account data is by Li *et al.* (2019). Using credit card account information provided by a commercial bank in China, their estimated model incorporated both credit card holders' characteristics and

macroeconomic factors. The findings suggested that it is not income that affected credit card debt default but rather the stability of the income stream that impacted credit card delinquency. Similar to the finding of Kim *et al.* (2018), male credit card holders were also found to have a higher risk of default on their credit card debt.

The use of household level data poses some limitations on our ability to capture the impact of changes in government policies and economic conditions on credit card delinquency. To overcome this limitation, the second group of studies used national level or aggregated data. The incorporation of macroeconomic factors is based on the premise that debt delinquency is usually affected by adverse macroeconomic conditions and an income shock. Among the pioneer studies, Agarwal and Liu (2003) investigated the effect of the rate of unemployment on credit card delinquency. Their results showed that the unemployment rate has a significant effect on credit card default even after controlling for credit supply and shocks (e.g. divorce rate and health coverage).

Another related study by Grieb *et al.* (2001) used quarterly data from the American Bankers Association. Their investigation found that consumer debt ratio and the total amount of outstanding revolving debt influences credit card debt default significantly. It is worth noting here that the statistical significance of unemployment rate depended highly on how the dependent variable is defined. Due to the inconsistency in the results of previous studies, we are not able to draw any conclusive evidence to predict the effect of unemployment on credit card default. Another interesting finding from Grieb *et al.* (2001) is the selective default behaviour shown by credit card holders. This rather unexpected result suggested that borrowers chose to default on their bankcard debts first prior to other type of loans.

A more recent study, Dinh *et al.* (2012) examined the impact of macroeconomic factors on bank losses on different types of household loans in UK. To do so, the household debts were classified into secured and unsecured household loans. Their findings showed that the influence of macroeconomic factors varied across different types of household loans. The result that is of particular interest for this paper is the implication that credit card loan losses are significantly correlated to disposable income and unemployment rates but not correlated with interest rates.

Besides domestic macroeconomic conditions, global economic shocks also play a role in explaining credit card delinquency. Theong *et al.* (2018) investigated the impact of global oil price movements and global financial conditions on the volume of credit card default in Malaysia. Based on national level data, their results suggested that lower global oil prices and adverse global financial conditions resulted in higher levels of credit card delinquency. In addition, low inflation and interest rate reduced defaults on credit card debt.

From the literature, to the best of our knowledge, there is no study that investigate the link between regulatory interventions in the credit card market and default on credit card debt. Moreover, expectations of future economic conditions are not considered in earlier studies. Therefore, this study contributes to the literature by examining the effects of a set of macroeconomic variables and government interventions on credit card delinquency.

### III. DATA AND METHODOLOGY

To investigate the determinants of credit card delinquency, the following econometric model was estimated with the following functional form:

$$LNNPL = f(LNGDP, LNNOCARD, LNLEADING, LNWEALTH, LNUNEMPLOY, ServiceTax, HigherIncome, TierPricing, AKPK, Deferment) \quad (1)$$

where  $LNNPL$ ,  $LNGDP$ , etc. denote, respectively, ... The total value of non-performing credit card loans reported by BNM was selected as the dependent variable to proxy credit card delinquency. The key determinants of non-performing credit card loans may be classified into macroeconomic factors and regulatory interventions implemented by the Malaysian government.

Our hypothesis that income is negatively related to credit card delinquency is based on the theoretical assumption that an increase in the disposable income increases the individual's ability to service his/her debt obligation thus the outstanding balances on household debt will decrease and debt delinquency will decline. This expected relationship is also supported by empirical evidence drawn from the literature (see, for example, Fay *et al.*, 2002). Therefore, it is hypothesised that real gross domestic product, representing aggregate national income, will have a negative relationship with non-performing credit card loans. The wealth of households has similar effect on credit card debt default. When households' wealth increases, credit card holders will have more liquid assets to pay off their credit card debts. This will lead to lower credit card delinquency.

The Neo-classical economic theory proposes that households with positive future expectations of income growth are more likely to increase their current level of spending compared with households that have a more pessimistic view of their future income (Campbell and Mankiw, 1990; Deaton, 1991; Hanna *et al.*, 1995; Souleles, 2004). These conclusions are more consistent with precautionary motives of spending (Souleles, 2004). In the event that household expectations do not materialise, the increase in consumption due to expectations of income growth will negatively impact credit card debt repayment. Furthermore, Godwin (1998) and Brown *et al.* (2005) argued that expectations, rather than the accuracy of the forecasted future financial position, drive debt levels. Therefore, expectations of future income growth as proxied by the leading indicator on the future economic condition is expected to be positively correlated to non-performing credit card loans.

Another macroeconomic factor that will cause a shock to household wealth is unemployment. In general, borrowers that are unemployed will have limited liquidity to service their debts. Thus, an increase in the rate of unemployment will have an adverse income shock to the financial system. This study expects that a higher rate of unemployment will increase credit card delinquency.

Our study estimates supply of credit with the number of credit cards in circulation. The intuition behind this decision is the assumption that more credit cards in circulation would mean more credit is being offered to households. If not managed carefully, greater access to financing can easily lead to higher outstanding balances (Canner and Cynrak, 1986; Kinsey, 1981; Lee and Hogarth,



1998; Kim and DeVaney, 2001) and eventually non-performing loans if the debts are not sustainable (Paquin and Weiss, 1998; Grieb *et al.*, 2001). While it would be desirable for the credit limit amount to be incorporated into the model as an alternative measure of credit supply, such data is not available. We anticipate the number of credit cards in circulation will be positively related to non-performing credit card loans.

In 1997, concerned by the rising level of credit card debt and the potential adverse consequences on the economy, the Malaysian government imposed a service tax of between RM25 to RM50 per annum on each credit card issued. The tax is collected annually upon the issuance or renewal of a card. The service tax was intended to discourage individuals from holding too many cards. It was presumed that the reduction in the number of credit cards per person will restrict the supply of credit in the market and consequently induce a decline in non-performing credit card loans. It is important to note that there were two distinct periods during our period of investigation where the service tax on credit cards was abolished, namely quarter two, 2001 to quarter four, 2010 and quarter two, 2015 to quarter two, 2018.

The interest rate is inevitably an essential macroeconomic factor in credit card financing (Canner and Luckett, 1992; Duca and Whitesell, 1995; Kang and Ma, 2007; Lin *et al.*, 2019). A unique feature of credit card debt in Malaysia is the tiered pricing introduced on the 1<sup>st</sup> of July 2008 by BNM to regulate the cost of credit. This initiative ensured that credit card debt was charged a fixed interest rate throughout the market and the interest rate would not be lowered due to competition among credit providers. The inclusion of this tiered pricing policy as a determinant of credit card debt into our empirical model distinguished this study from previous work on this topic. The policy encourages prompt payment from credit card revolvers through a three tier pricing of credit card debt: (1) a ceiling interest of 15 percent per annum if minimum payments are made on time for twelve consecutive months; (2) a ceiling interest of 17 percent per annum if minimum payments are made on time for 10 out of 12 months; and (3) a ceiling interest of 18 percent per annum credit card debtors who do not fulfil the two conditions specified in tier 1 and 2. In other words, the longer the time period of consistent repayment, the lower the interest charged on credit used. It is expected that this policy will have a negative relationship with non-performing credit card loans.

The Credit Counselling and Debt Management Agency (hereafter known as AKPK) was instituted under the BNM's Financial Sector Master Plan for 2000 to 2010 with the long-term goal of promoting financial education to the public while achieving the short-term objectives of providing financial counselling and assistance for debt management through a Debt Management Programme. Increasing financial literacy has been proposed in the literature as a long-term resolution to curtail the issue of credit card over-borrowing (Scott, 2007; Kang and Ma, 2007), which will inevitably reduce debt delinquency. This view is consistent with White's (1998) and Dobbie and Song's (2015) research advocating benefits from bankruptcy shield. Thus, the Debt Management Programme by AKPK was established with the objective of targeting financial distressed households that have not engaged litigation or entered the bankruptcy process. The programme helps clients to restructure their debt through negotiation with the respective

financial institutions. The Debt Management Programme by AKPK represents institutionalised financial education and simultaneously signifies the option for debt restructuring. It is predicted that the establishment of AKPK should lead to a decrease in non-performing household loans in general.

The Malaysian government also increased the minimum income requirement to apply for a new credit card in 2011. This measure raises the probability that new credit card holders will have sufficient income to repay their monthly credit card balance. Thus, we expect the higher income requirement will also reduce non-performing credit card loans.

Finally, due to the spread of COVID-19, the government imposed various restrictions from March 2020 to March 2022 to control the spread of the virus. To lighten the financial burden of households and businesses, the government imposed a moratorium on loan repayments starting from April 2020 for a period for six months. After the end of moratorium, borrowers were able to request the banks to further defer the repayments and restructure the bank loans. The study hypothesised that this deferment and loan restructuring (*Deferment*) will allow borrowers to accumulate liquidity and reduce the credit card delinquency.

This research employed the ARDL model introduced by Pesaran and Pesaran (1997), and Pesaran *et al.* (2001). The ARDL model has numerous noteworthy advantages compared to earlier cointegration techniques, such as the Engle and Granger (1987) two-step residual-based model and the system-based reduced rank regression approach introduced by Johansen (1988) and Johansen and Juselius (1990). The ARDL technique possesses a major advantage in terms of its efficiency in small sample testing compared to Engle and Granger (1987) and Johansen and Juselius cointegration techniques. This view is widely established in the literature on this subject (see, for example, Pattichis, 1999; Gounder, 2002; Worthington and Higgs, 2013; Badeeb and Lean, 2017). With the adoption of ARDL model and small-sample optimised critical values generated by Narayan (2005), any adverse consequences of the limited sample size of this study should be mitigated. In addition, the underlying variables are not restrictive of pure  $I(0)$ , pure  $I(1)$  or mutually cointegrated series (Pesaran and Pesaran, 1997), thus, eradicating the ambiguity related to pre-testing the order of integrations, a process which often causes problems in unit root-cointegration literature (Pesaran and Pesaran, 1997). Furthermore, the ARDL approach adopts the best practice general to specific modelling framework enabling the data generating process to take into consideration the adequate number of lags. Consequently, both long and short-run relationships can be established, and, thus, the Error Correction Model (ECM) can be modelled through simple linear transformation from ARDL model (Banerjee *et al.*, 1993). This approach ensures the retention of the long-run information, improving this research by providing further dynamic analysis of short and long-run relationships, which is especially useful in examining impact of the policy interventions.

The ARDL method estimates  $(p + 1)k$  number of regressions to select the optimal lag length for each variable, where  $p$  is the maximum number of lags and  $k$  is the number of variables in the equation. In this paper, the model is selected based on the Akaike Information Criteria (AIC). Since the policy variables were represented



by dummy variables, *ServiceTax*, *HigherIncome*, *TierPricing*, *AKPK* and *Deferment* were treated as exogenous variables in the ARDL testing.

The data for this paper was collected from published data by the Central Bank of Malaysia and the Malaysian Department of Statistics. The period of investigation begins in the first quarter of 1999 and ends in the last quarter of 2021. A longer period of study was not possible as the data on some of the credit card indicators was first computed and published in 1999. The definitions of all the variables used in this paper are presented in Table 1.

**Table 1.**  
**Definitions and Sources of Data**

This table defines and provide the source of data for all the variables used in the study. In addition, the abbreviations for the variables are also provided.

Variables	Definition	Abbreviation	Source
<b>Panel A: Dependent Variables</b>			
Credit Card Delinquency	Natural logarithm of non-performing loans for credit card	<i>LNNPL</i>	BNM
<b>Panel B: Macroeconomic Factors</b>			
Income	Natural logarithm of Real Gross Domestic Product (2010 = 100)	<i>LNGDP</i>	BNM
Income expectations	Natural logarithm of Leading Index (2010 =100)	<i>LNLEADING</i>	Department of Statistics
Wealth	Natural logarithm of FTSE Bursa Malaysia KLCI Index	<i>LNWEALTH</i>	BNM
Supply of credit	Natural logarithm of number of credit cards in circulation	<i>LNNOCARD</i>	BNM
Unemployment Rate	Natural logarithm of unemployment rate	<i>LNUNEMPLOY</i>	Department of Statistics
<b>Panel C: Regulatory Interventions</b>			
Implementation of service tax	1 during implementation period, 0 otherwise	<i>ServiceTax</i>	Various Sources
Introduction of tiered pricing structure	1 during implementation period, 0 otherwise	<i>TierPricing</i>	Various Sources
Establishment of Credit Counselling and Debt Management Agency (AKPK)	1 after establishment period, 0 otherwise	<i>AKPK</i>	Various Sources
Higher minimum income requirements	1 during the period of higher income, 0 otherwise	<i>HigherIncome</i>	Various Sources
Deferment of loan repayment during Covid-19	1 during the period of deferment, 0 otherwise	<i>Deferment</i>	Various Sources

#### IV. EMPIRICAL RESULTS AND DISCUSSION

Prior to the ARDL testing, the integrating order of each variable other than the dummy variables were investigated. In general, the results presented in Table 2 generated using the ADF unit root test suggested that all the variables are integrated of order one, I(1).

**Table 2.**  
**Results of ADF Unit Root Test**

This table presents the integrating orders of the key variables estimated using the ADF unit root test. \*\*\* and \*\* indicate significant at 1% and 5% level respectively. The values in parentheses represent the optimum lag. The lag selection was based on Akaike information criterion (AIC).

Variables	Test Statistics	
	Levels	1 <sup>st</sup> Differences
LNNPL	-1.84789 (1)	-7.30856 (1) ***
LNGDP	-0.11674 (8)	-3.21065 (7) **
LNNOCARD	-2.35696 (3)	-3.15976 (1) **
LNLEADING	-2.09117 (5)	-6.63742 (3) ***
LIWEALTH	-1.89699 (1)	-5.99523 (1) ***
LNUNEMPLOY	-1.98081 (4)	-6.98322 (1) ***

The bound test was used to test for the existence of a long-run relationship. The results for the bound test are shown in Table 3. The *F*-statistic of the bound test is 9.74673, which is higher than the upper bound for both *I*(0) and *I*(1) at the 1% significance level, an indication that a long-run equilibrium relationship exists. We then proceeded with the underlining ARDL model to develop the long-run slope-estimated coefficients and the short-run dynamic model. The optimum lags of the ARDL(1,2,0,1,2,0) are selected based on the AIC.

**Table 3.**  
**Results of the Bound Test**

This table present the *F*-statistics for Bound test and critical values. The Bound test statics is generated based on the ARDL model of ARDL(1,2,2,1,0,0). The critical values for finite sample (*n* = 80) are generated by Narayan (2005).

Bound Test F-Statistic	Critical value at 1% Level			
	Asymptotic <i>n</i> =1000		Finite sample <i>n</i> =80	
	<i>I</i> (0)	<i>I</i> (1)	<i>I</i> (0)	<i>I</i> (1)
9.74673	3.06	4.15	3.351	4.587

The long and short-run coefficients were estimated using ARDL technique. The long-run estimates in Table 4 indicate that lower income, higher supply of credit, optimism about the future of the economy, and a bearish stock market were the causes of higher credit card debt default in the long run.

**Table 4.**  
**Results of Long-run Estimated Coefficients**

The table presents the long-run coefficients estimated from the ARDL model. \*\*\*, \*\* and \* indicate significant at 1%, 5% and 10% respectively

Variable	Coefficient	t-Statistic
LNGDP	-1.44846	-6.57657***
LNNOCARD	0.52386	4.85685***
LNLEADING	5.53917	3.95244***
LNWEALTH	-0.88220	-3.11599**
LNUNEMPLOY	-0.08460	-0.39263
C	3.90156	1.06278

The estimated ECM is presented in Table 5. The ECM is negative and significant at confidence of 99%, endorsing the existence of a long-run equilibrium relationship between the variables. The error correction term of -0.66168 suggests that the convergence to long-run equilibrium is moderate. In the short run, only income, wealth, and leading indicator of future economic conditions are significant. On the other hand, supply of credit and unemployment rate do not have any impact on credit card delinquency.

**Table 5.**  
**Results of Error Correction Model**

The table presents the short-run coefficients estimated from the error correction model. \*\*\* And, \*\* and \* indicate significant at 1%, 5% and 10%, respectively.

Variable	Estimated Coefficient	t-Statistic
$\Delta$ LNGDP	-0.59328	-2.59990**
$\Delta$ LNGDP <sub>1</sub>	0.31920	1.60479
$\Delta$ LNLEADING	1.06462	1.78895*
$\Delta$ LNWEALTH	-0.06645	-0.56167
$\Delta$ LNWEALTH <sub>1</sub>	0.36756	3.82932***
ServiceTax	-0.03286	-1.76539*
TierPricing	-0.03025	-0.82287
AKPK	-0.10087	-3.83601***
HigherIncome	0.12451	4.00862***
Deferment	-0.40342	-6.78489***
ECT <sub>1</sub>	-0.66168	-8.59272***
R-square	0.55354	

The estimated coefficients for income (LNGDP) in the short and long run are negative and significant. This is because higher income increases the ability of card holders to pay off their credit card balances. Hence, higher income will substantially relieve households of the liquidity constraint that disables credit card holders from paring down their credit card balance (Lin *et al.*, 2019) resulting in less delinquent behaviour.

The effect of wealth, proxied by the performance of the Malaysian stock market, on credit card debt delinquency is similar to income in the long run. In the short run, a bullish stock market offers a general increase in wealth in the economy giving consumers an additional source of income to spend from. Consistent with economic theory, the temporary increase in wealth induces card holders to spend more on their cards leading to a higher default rate in the short run. For example, when wealth increased by one percent in the short run, default on credit card debt increased by 0.36 percent. However, in the long run, the bullish stock market offers card holders more liquidity to repay their debts, causing credit card default to fall. Specifically, a 1 percent increase in wealth caused a 0.88 percent decrease in credit card debt default.

Friedman's consumption model posits that consumption does not only depend on current income but future income, also known as permanent income. In this paper, the leading indicator of the economy was used as a proxy to gauge how consumers view the economy in the future. The estimated coefficients for leading indicator of the economy are positive and significant in the short and long run. When card holders are optimistic about the economy, they will spend more and accumulate more credit card debt both in the short and long run. However, as time goes by, card holders accumulate too much debt. As a result, many card holders are unable to repay their debt and credit card default increases.

It is interesting to note that the number of credit cards in circulation representing credit supply impacts credit card delinquency only in the long run. If households have more credit cards, households should also have greater access to credit. As expected, long-term easy access to credit induces credit card debt accumulation and credit card delinquency increases in the long run. This result is consistent with Lin *et al.*'s (2019) finding that higher credit card limits will increase credit card debt.

Previous studies by Agarwal and Liu (2003) and Dinh *et al.* (2012) have found that unemployment rate impacted credit card debt default. Typically, an unemployed individual has a lower ability to service his/her debt. This will lead to default on their debt. However, the estimated coefficients for unemployment rate (*LNUNEMPLOY*) are not significant in the short and long run. In Malaysia, unemployment rate is generally low and fluctuated around 3.5 percent. Between 2000 to 2019, unemployment rates ranged from 2.7 percent to 4 percent. The low volatility of the unemployment rate may have contributed to this finding.

The introduction of higher income requirements for new credit card applicants was viewed as a measure to ensure that new credit card holders will have sufficient income to repay their credit card balances. However, the estimated coefficient suggests that the higher income of credit card holders only encourages them to spend more, accumulate more debt, and default on their credit card payments.

To discourage each credit card holder to own many credit cards and subsequently lower the aggregate credit limit, the government introduced a service tax on each credit card. Supportive economists believe that these changes in government policy would reduce credit card debt default. The empirical results indicate that this government measure was successful in reducing credit card debt delinquency. We suspect that this is probably due to the policy's effect on restricting credit supply.

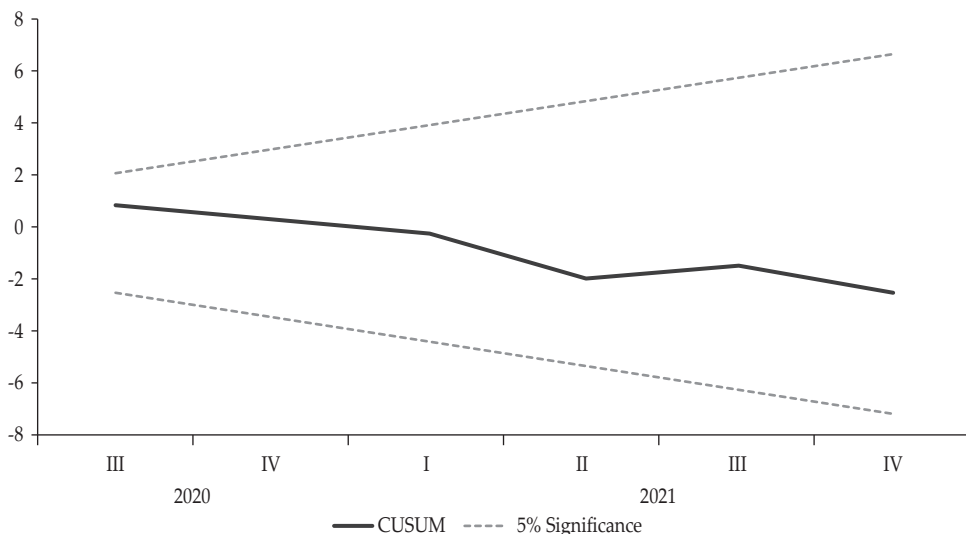
There is strong evidence to show that the establishment of the Credit Counselling and Debt Management Agency (AKPK) was effective in reducing credit card default. The significant negative relationship between this policy variable and non-performing credit card loans points to the effectiveness and efficiency of the Debt Management Programme undertaken by AKPK. Instead of filing for bankruptcy, financial distressed clients undergo a debt restructuring process which enables them to repay their debts. Their credit card debt will be reclassified as non-impaired by the financial institutions once the new terms and conditions have been agreed by both parties. In view of AKPK's targeted intervention of financial distress households, the negative relationship against credit card debt default is inevitable.

In line with the liberalisation of interest rates in Malaysia, the central bank introduced tiered interest rates to encourage prompt payments by cardholders in 2008. A lower interest rate is charged on the credit card balance if the cardholder makes the minimum payment punctually every month. A previous study by (Kim and DeVaney, 2001) found that the introduction of ceiling interest rates relieves the debt burden for credit card revolvers. It appears however, credit card default in Malaysia was not affected by the tiered interest rate policy.

During the period of COVID-19 pandemic, various restrictions were enforced by the government to stop the spread of the virus. In order to lessen the financial burden of borrowers, the government imposed a loan moratorium starting from April 2020. This policy will improve borrowers' liquidity and reduces the probability of loans to be classified as impaired. The finding suggests that the deferment of loan repayments have significantly reduced credit card delinquency in Malaysia.

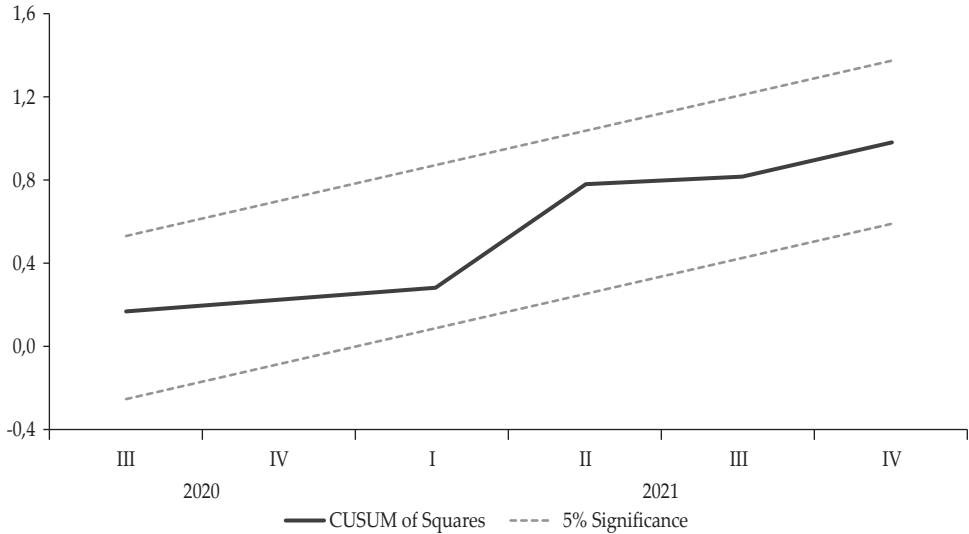
**Figure 1.**  
**Cumulative Sum Test (CUSUM)**

The figure shows the cumulative sum test. The aim of this figure is to examine the stability of the estimated parameters. The test indicates that the parameters are stable over time.



**Figure 2.**  
**Cumulative Sum of Square Test (CUSUMSQ)**

The figure shows the cumulative sum of square test for parameter stability. At 5% significance level, the result suggests that the parameters are stable over time.



As a final note, the stability of the estimated results for the short and long run was investigated using the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMSQ). Figures 1 and 2 clearly show that both plots fall between the two lines with a 5% significance level. This suggests that the estimated model has goodness of fit and is stable.

#### *A. Robustness Test*

From the residuals of the estimated ARDL model, a structural break was identified in Quarter four, 1999. This break point coincided with the initial recovery phase of the Asian financial crisis. In order to derive a more robust conclusion, the model was re-estimated by including a break point. The estimated long run coefficients presented in Table 6 are similar to the estimated coefficients in Table 4. In particular, the signs of the estimated coefficients in Table 4 and Table 6 are the same. Furthermore, all the four regressors that are significant in Table 4 are also significant in the model with structural break.



Table 6.

**Results of Long-run Estimated Coefficients and Bound Test (with Structural Break)**

The table presents the long-run coefficients estimated from the ARDL model with a break point at Quarter 4, 1999. \*\*\*, \*\* and \* indicate significant at 1%, 5% and 10% respectively. The estimated long-run coefficients are based on ARDL(2,2,1,1,2,2) model.

Variable	Coefficient	t-Statistic
LNGDP	-1.48512	-4.86875***
LNNOCARD	0.39133	2.67912***
LNLEADING	7.45541	3.53488***
LNWEALTH	-1.31711	-2.90049**
LNUNEMPLOY	-0.54848	-1.11077
C	-0.48218	-0.09136
F Bound Test	5.98078***	

The results derived from the error correction model with a structural break presented in Table 7 are also similar to the results shown in Table 5. However, there are a few differences. Notably, when a break point was included, the unemployment variable is significant at 10% level. Furthermore, the *ServiceTax* variable that is significant at 10% in Table 5 has no impact on the credit card delinquency when a structural break was introduced into the model. Interestingly, the break point at Quarter four, 1999 has an impact on credit card delinquency. This is not unexpected because as the country recovered from the Asian financial crisis, default on credit card debts also reduced.

Table 7.

**Results of Error Correction Model (with Structural Break)**

The table presents the short-run coefficients estimated from the error correction model. \*\*\* And, \*\* and \* indicate significant at 1%, 5% and 10% respectively.

Variable	Estimated Coefficient	t-Statistic
$\Delta$ LNNPL <sub>1</sub>	-0.14783	-1.92377
$\Delta$ LNGDP	-0.29571	-1.20990
$\Delta$ LNGDP <sub>1</sub>	0.46086	2.14796**
$\Delta$ LNNOCARD	0.16234	0.66906
$\Delta$ LNLEADING	1.00670	1.67097
$\Delta$ LNWEALTH	0.01307	0.10896
$\Delta$ LNWEALTH <sub>1</sub>	0.23841	2.40162**
$\Delta$ LNUNEMPLOY	-0.01713	-0.15713
$\Delta$ LNUNEMPLOY <sub>1</sub>	0.18116	1.85645*
<i>ServiceTax</i>	-0.03069	-1.65283
<i>TierPricing</i>	-0.00210	-0.05742
AKPK	-0.09194	-3.76820***
<i>HigherIncome</i>	0.07108	2.40050**
<i>Deferment</i>	-0.30609	-5.46223***
D1999Q4	-0.35300	-4.20265***
ECT <sub>1</sub>	-0.48298	-6.74978***
R-square	0.64974	

## V. CONCLUSION AND POLICY IMPLICATIONS

This paper examined the effects of economic conditions and regulatory interventions on credit card delinquency in Malaysia. Using the ARDL model, a long-run relationship was established. We found that income, supply of credit, future prospects of the economy, wealth, and government policies influence credit card default.

In particular, higher income means that credit card holders have more money, and this will lead to higher ability to repay their credit card debt. As a result, credit card delinquency decreased. On the other hand, the wealth indicators affected credit card debt default in the short and long run. In the short run, higher wealth induced credit card holders to spend more and accumulate more debt, resulting in higher default on credit card debt. In the long run, as wealth increased, credit card holders have higher ability to service their credit card loans, lowering credit card default. These results suggested that liquidity constraints played an important role in explaining credit card debt default in Malaysia. Therefore, lifting household income by increasing the competitive advantage of the nation through shifts into high value-added economy is essential in alleviating delinquent debt behaviour and pre-empting the adverse consequences of escalating household debt.

Expectations of future economic conditions also affected credit card debt default in the short and long run. Optimistic card holders used their credit card to spend more and accumulated more credit card debt. However, over time, card holders have accumulated unsustainable amounts of debt. Card holders were then unable to repay their debt and credit card debt default increased.

The supply of credit is also an important determinant of credit card default. In the long run, as households owned more credit cards, their access to credit increased. This allowed them to accumulate more debt which subsequently led to debt default. Similarly, a service tax on each card discouraged households from holding many credit cards. As households' access to credit declined, credit card default also declined.

With these findings, banking institutions must consider restricting the number of cards and credit limit offered to each card holder when approving new card applications. While issuing more credit cards and offering more credit may provide opportunities for profit, it also increases the risk of incurring more non-performing credit card loans on their balance sheet. Thus, banks should leverage on the Central Credit Reference Information System to minimise the risk of credit card defaults. Furthermore, regular review of the threshold of income distribution and credit limits in accordance with economic conditions is essential in order to balance the control of credit supply and stimulation of household consumption for economic growth.

The introduction of a higher income requirement for new credit card applications was viewed as a method to ensure that credit card holders have sufficient income to service their debts. However, our findings suggest that the higher income requirement only encourages high income earners to spend more and accumulate more debts leading to higher debt default. The findings support the introduction of intervention policies introduced by the Central Bank. In particular, the Debt Management Programme run by the Credit Counselling and Debt Management Agency was effective in reducing credit card delinquency. In

view of this, we recommend that more financial literacy programmes targeting new entrants to the work force should be conducted by the Credit Counselling and Debt Management Agency. Furthermore, credit card debt restructuring should be offered by banks to lower the incidence of credit card debt default. This is in line with the finding of the study as loan moratorium has reduced credit card delinquency. Finally, the tiered pricing structure on interest rate charged had no impact on the credit card default.

The advancement of technology has accelerated the adoption of credit cards as an important payment channel for ecommerce. With this increasing use of credit cards, future studies should incorporate technological advancement to better understand the reasons behind credit card default.

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