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IS THE FINANCIAL ENGINEERING WELL AFFECTED BY COVID19 AND US TRADE WAR? PREDICTING THE DERIVATIVES USAGE AMONG BANKS IN MALAYSIA

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ABSTRACT

Derivative instruments are a contract for the purchase or selling of a given asset, quantity, price, and time which has been set for later delivery today. The former financial derivatives are linked to futures and options, while the latter is forwards and swaps This paper investigates the different reasons commercial and Islamic banks use derivatives and how these changes in derivatives usage impact their efficiency. Additionally, it discusses the impact that US-China trade war and Covid-19 has on the economic performance of Malaysia compared to other Asian countries and how these systematic risks are expected to impact derivative usage of banks. This paper analyses banks use of derivatives towards banking efficiency, through the use of 2 panel studies of 3 commercial banks and Islamic banks in

Malaysia for a period of 5 years. To examine this relationship, variables in terms profitability, probability of financial distress, reduced exposure to risk, liabilities and macroeconomic environment are used to perform a multivariate analysis through the use of the E Views software. Based on the result, it can be concluded that to some extent Malaysian Banks use derivatives to improve their efficiency in terms of profitability, risk exposure and macro environment.

INTRODUCTION

Derivative instruments are financial engineering based and are used for risk mitigation and part of risk management strategy. Derivative markets derive their value from the underlying markets to include tools for price discovery and hedging leading to hedging and speculation of activities. Nevertheless, the collapse of major investment banks that advise large multi-national companies has turned derivative trading into corporate nightmares. In the case of the collapse of Baring Bank of the United Kingdom in 1995 and Lehman Brothers of the United States in 2008 after more than 200 years of global banking companies, significant losses of derivative markets. The action of derivative trading has accelerated in the world especially towards the financial and economic markets around the globe (Alwi et al., 2020).

The events are correlated with the former due to defaults in index futures on the Singapore International Monetary Exchange (regulated trading), while the latter due to defaults in credit default swaps on the mortgage market in the United States (over-counter trading). However, high losses in financial markets are therefore seen to be correlated with their abuse of risky strategies. Financial engineering helps hedgers define, quantify, and analyse the financial risks expected to prevail in the financial and commodity markets by predetermining their future prices today. Therefore, companies have prompted to use derivatives as a protective strategy to manage their portfolio risk according to their risk appetite (Sinha & Sharma, 2016). Previous studies have explored the role of derivatives in industrial firms that use these financial instruments mainly for hedging purposes (Chang et al., 2018). Scare literatures investigate the use of this financial instrument in the banking industry that uses derivatives to hedge against unexpected movements in economic variables or for broker-dealer activities (Infante et al., 2018). In contrast to Industrial firms, banks have stronger incentive to use derivatives as risk hedging tools, due to the importance of its stability towards the financial markets and its direct and indirect contribution to economic growth (Chang et al., 2018). These instruments act as alternative solution for banks to manage risk without influencing their balance sheet (Figure 1).

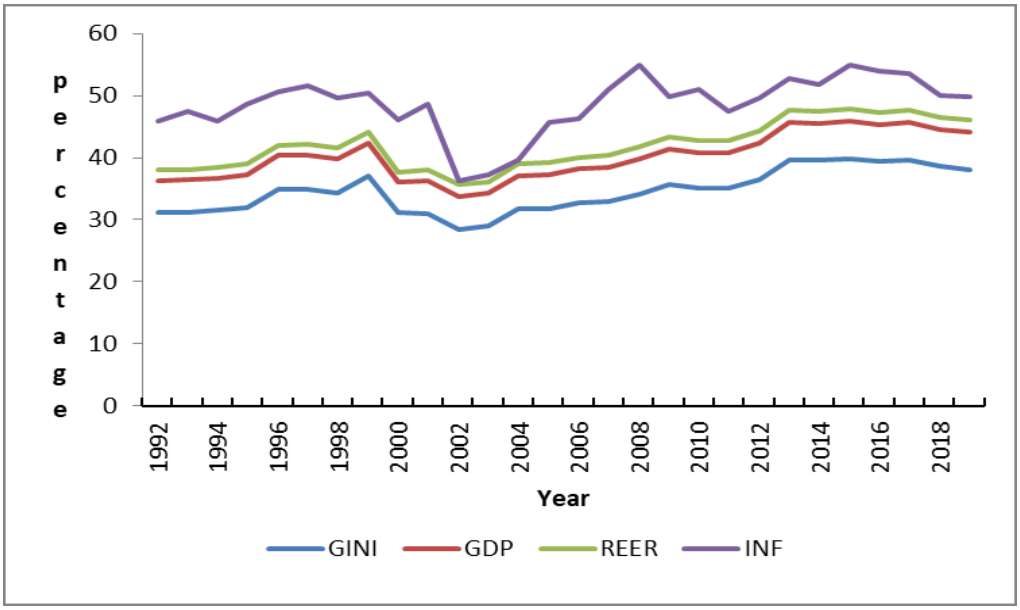

Figure 1: Relationship between GDP, Exchange Rate, Inflation and Gini Ratio Inflation and Gini Ratio

LITERATURE REVIEW

In contrast to Industrial firms, banks have stronger incentive to use derivatives as risk hedging tools, due to the importance of its stability towards the financial markets and its direct and indirect contribution to economic growth (Chang et al., 2018). These instruments act as alternative solution for banks to manage risk without influencing their balance sheet.

The concept of risk in the banking industry refers to uncertainty in the financial market that impacts liquidity. The most common type of risk faced by banks while acting as financial intermediaries is interest rate volatility, which arises due to mismatched duration while borrowing short and lending long. The larger the duration gap, the more costly unexpected changes in interest rates are, as much of their profit is attributed to the difference between interest rate receives and interest paid on deposits (Ozgur & Gorus, 2016).

Interest paid on deposits are subject to changes when the market interest rates fluctuates. This implies that although changes in interest rate does not directly impact Islamic banks, the interbank rates change (Gorton & Rosen, 1995). This is inevitable as the absence of corresponding changes will raise arbitrage opportunities (Bacha, 2004). In theory, banks' exposure to interest rate risk directly impacts derivative usage. Hence, derivatives are used as risk management tools as it allows banks to adjust their exposure without changing the composition of their financial statement (Chang et al., 2018).

With interest rate swap used as a function of interest rate, the sensitivity of banks' balance sheet position towards this risk, to determine whether swap can neutralize it. Results show that large banks are more exposed to this risk from

their swap position, as it enables them to efficiently minimise the cost of debt (Gorton & Rosen, 1995; Goswami & Shrikhande, 1997).
On the contrary, firms with low capital are unlikely to hold swap as it increases their exposure to systemic risk (Kim & Koppenhaver, 1993). These firms are risk neutral and would prefer to use swap in conjunction with debt financing activities. Hence risk has no bearing on banks motivation to use derivatives (Sinha & Sharma, 2016; Goswami & Shrikhande, 1997).

Previous literature showed evidence that banks' use of derivatives is motivated by their desire to improve profitability and reduced the possibility of bankruptcy without altering their capital structure (Chang et al., 2018). This implies that the cash inflows from hedging and speculation, motivates banks into using derivatives to improve efficiency. Furthermore, literatures suggest that banks with riskier capital structures and less liquid assets are more likely to use derivatives to reduce their exposure to unexpected movements in the market, contrary to those with greater profitability and lower probability of financial distress2,10. Nonetheless, the increasing use of derivatives corresponds to banks that are more profitable, using derivatives to strengthen their finances against adverse shocks (Sinha & Sharma, 2016; Chang et al., 2018). In addition, companies paying highest dividend levels are more profitable than that paying lesser dividends (Alwi et al., 2020).

Risk management through financial derivatives are less costly, acting as a substitute for less expensive capital, giving banks the flexibility to reach desired risk exposures without changing their original business objectives (Sinha & Sharma, 2016). Additionally, more derivatives are used to hedge cost and improve efficiency if the probability of financial distress or distress induced cost are high (Rivas & Policastro, 2006).

Low-quality loan applicants have led banks to move into the derivatives market in order to reduce their exposure to credit risk. This describes the likelihood that a borrower fails to make its required payment. The larger the mismatch in loan repayment and deposit interest rate, signals higher cash outflows. Banks are therefore motivated to employ derivatives to compensate for regulatory capital that compels banks to hold a portion of its capital to sustain operational losses and honour unexpected high rates of withdrawals (Chang et al., 2018). In addition, banks with more customer deposits are more likely to engage in derivative usage to transfer some or all of its credit risk to another party, as the amount of loans granted impact regulatory capital and profitability (Rivas & Policastro, 2006; Infante et al., 2018).

The financial soundness of banks has a significant impact on the financial stability of an economy. Therefore, banks' derivative usage changes in accordance to the business cycle, taking into account the systematic risk associated with each stage. Economic expansion is associated with high inflation rate and improved solvency of borrowers as higher income results in higher streams of loan payment that reduces banks’ exposure to credit risk (Athanasoglou, et al., 2008). The pro-cyclical nature of bank profitability is

derived from the effects economic cycle exerts on its net income from lending activities and loan loss provisions (Albertazzi & Gambacorta, 2009). A positive relationship is expected between economic expansion and bank profitability, with derivative usage of banks contingent to its desire to improve efficiency. While a negative relation between economic trough and profitability as default risk exposures of banks are higher and deposit withdrawals increases was expected (Bolt et al., 2012).

MATERIALS AND METHODS

To reach the study objectives, this paper analyses banks use of derivatives towards banking efficiency, through the use of 2 panel studies of 3 commercial banks and Islamic banks in Malaysia for a period of 5 years. To examine this relationship, variables in terms profitability, probability of financial distress, reduced exposure to risk, liabilities and macroeconomic environment are used to perform a multivariate analysis through the use of the EViews software. This quantitative research collects data from secondary sources such as the financial statement of Commercial banks; Maybank, RHB and CIMB and Islamic banks; Maybank, RHB and OCBC for a period of 5 years starting from 2015.

Furthermore, macro variables such as GDP and inflation are also used to analyse banks' use of derivatives to improve efficiency, along with interest rate swaps and interbank rates. The data collected is analysed separately depending on the banking system, as the two types of banks differ in terms of concept although offering similar products. The key difference lies in the way commercial banks earn their revenue which is by charging interest and fees for their services. While Islamic banks earn revenue through trading, leasing, sharing profits and losses, excluding any transactions that relates to interest rates as per the Islamic principles (Fayed, 2013). Therefore, in analysing banks motivation to use derivatives due to interest rate risk the 2 types of bank will have different IV's. Furthermore, due to varying units of measurements, natural logarithms (log) are used to standardize the units and provide a clear description of the relationship between variables. The IV's total income, total non-interest expense, total deposit and the dependent variable total asset derivatives undergo log transformation before the data is inserted in EViews for the regression analysis. Correspondingly, the responsiveness of the dependent variable to these IV's will be expressed in percentage terms, in order to ease the interpretation of results.

Model specification

LNTDASSET = f(SWAP INTERBANLK LNINCOME LNEXPENSE LNTDEPOSIT GDP INDEX)

Log Model 1: commercial banks

LNTDASSET = B+BLNINCOME +B LNEXPENSE + LN TDEPOSIT + B GDP + BINDEX + Ɛit

Log Model 2: Islamic banks

LNTDASSET = B+INTERBANK +B LNINCOME+ B LN TDEPOSIT + B LNTDEPOSIT + B GDP + Ɛit

Table 1: Research hypothesis

VARIABLES	HYPOTHESES
Total Income (INCOME)	H_0: There is no significant or negative relationship between Total Derivative Asset and Total Income H_1: There is a significant positive relationship between Total Derivative Asset and Total Income
Total Non-Interest rate Expense (EXPENSE)	H_0: There is no significant or negative relationship between Total Derivative Asset and Total Non-Interest rate Expense H_1: There is a significant positive relationship between Total Derivative Asset and Total Non-Interest rate Expense
Total Deposit (TDEPOSIT)	H_0: There is no significant or negative relationship between Total Derivative Asset and Total Deposit H_1: There is a significant positive relationship between Total Derivative Asset and Total Deposit
Gross domestic product (GDP)	H_0: There is no significant relationship between Total Derivative Asset and Gross domestic product. H_1: There is a significant relationship between Total Derivative Asset and Gross domestic product.
Interest Rate Swap (SWAP)	H_0: There is no significant relationship between Total Derivative Asset and Interest Rate Swap. H_1: There is a significant relationship between Total Derivative Asset and Interest Rate Swap.
Islamic Interbank Rates (IRTERBANK)	H_0: There is no significant or negative relationship between Total Derivative Asset and Islamic Interbank Rates. H_1: There is a significant positive relationship between Total Derivative Asset and Islamic Interbank Rates.
Inflation (INDEX)	H_0: There is no significant relationship between Total Derivative Asset and Inflation. H_1: There is a significant relationship between Total Derivative Asset and Inflation.

Table 2. Description of variables and data collection

Variables	Proxy	Data Source	Expected Sign
Total derivatives Asset	Total derivatives Asset (RM)	Banks annual report	N/A
Total Income	Profit for the year (RM)	Banks annual report	+
Total Non-Interest Expenses	Personal expenses & overheads (RM)	Banks annual report	+
Total Deposits	Deposit of customers & deposit of other financial institutions (RM)	Banks annual report	+
Interest rates swap	Average of 1 week overnight interest rate (%)	Bank Negara	+/-
Islamic Interbank Rates	Interest rates (%)	Bank Negara	+
GDP	Gross Domestic Product, constant prices (National Income)	Imf.com	+/-
Inflation	Average consumer prices (%)	Imf.com	+/-

RESULTS AND DISCUSSION

Table 3 reports the model 1's correlation analysis. Based on Table 3, correlation value of more than 0.80 between two variables, signals the existence of multicollinearity. The correlation matrix of both models observed severe collinearity between LNTDASSET & LNINCOME along with LNINCOME & LNEXPENSE. Furthermore, Model 2 recorded collinearity of

0.84572 between LNTDASSET & EXPENSE and 0.859575 between LNTDEPOSIT & LNEXPENSE.

High multicollinearity between 2 variables, suggest that the IV's are multiples of each other, rendering the OLS estimation incapable of distinguishing between the two. As a result, the regression output has high p-value and incorrect hypothesis (Ho & Liau, 2019). This is evident in the case of total income and expenses as the derivation income is calculated by deducting expenses of the banks. Therefore, it is important to be mindful while interpreting the data. As per the result of the correlation analysis of Model 1, LNINCOME was dropped due to its severe multicollinearity to LNTDASSET, improving the significant of the other IV's in the model. In Table 4, Model 2 LNEXPENSE is dropped; resulting in 3/5 IV's significant in the model.

Table 3: Model 1

	LNTDASSET	LNTDEPOSIT	SWAP	INDEX	LNINCOME	GDP	LNEXPENSE
LNTDASSET	1.0000						
LNTDEPOSIT	0.055120	1.0000					
SWAP	-0.21755	-0.01690	1.0000				
INDEX	0.07981	-0.11358	-0.20262	1.0000			
LNINCOME	0.81919	-0.23057	0.09836	-0.02322	1.0000		
GDP	-0.07465	-0.00324	-0.17292	0.75544	-0.00050	1.0000	
LNEXPENSE	0.77075	0.23954	0.11932	-0.01973	0.84881	0.04778	1.0000

Table 4: Model 2

	LNTDASSET	LNTDEPOSIT	INTERBANK	LNINDEX	LNINCOME	GDP	LNEXPENSE
LNTDASSET	1.0000						
LNT	0.67356	1.0000					

DEPOSIT	2						
INTERBANK	-0.04720	-0.03985	1.0000				
LNINDEX	117164	-0.00236	-0.72129	1.0000			
LNINCOME	0.845721	-0.77311	-0.01690	0.03160	1.0000		
GDP	0.024551	0.100617	-0.21919	0.75544	0.05914	1.0000	
LNEXPENSE	0.914967		0.020143	-0.00737	0.9548 4	0.01796	1.0000

It can be concluded that to some extent Malaysian Banks use derivatives to improve their efficiency in terms of profitability, risk exposure and macro environment. In accordance to the assumption as to why banks are motivated to use derivatives, a regression is run to show empirical evidence of the relationship previously stated in this report.

The macroeconomic environment of Malaysia significantly influences banks' motivation towards using derivatives. As per the findings of the study by Perry (1992), a positive significant relationship exists between inflation rate and banks derivative usage in both models. This implies that the inflation was fully anticipated by banks, allowing them to adjust their interest rates and investment activities in order to mitigate its impacts.

Therefore, as the Malaysian economy experienced rising price level that exposed banks to inflationary risk, Malaysian banks use of derivatives rose for the 5-year period, as the effects of this risk was fully anticipated and using derivatives reduces its impacts (Athanasoglou, 2008). LNINCOME was dropped due to its severe multicollinearity to LNTDASSET, improving the significant of the other IV's in the model. In Model 2 LNEXPENSE is dropped, resulting in 3/5 IV's significant in the model. A correlation value of more than 0.80 between two variables, signals the existence of multicollinearity.

The correlation matrix of both models observed severe collinearity between LNTDASSET & LNINCOME along with LNINCOME & LNEXPENSE. Furthermore, Model 2 recorded collinearity of 0.84572 between LNTDASSET & EXPENSE and 0.859575 between LNTDEPOSIT & LNEXPENSE.

Table 5: Regression Analysis

Variables	Commercial Banks				Islamic Banks			
	Model 1 (A)		Model 1(B)		Model 2 (A)		Model 2 (B)	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
C	1.905317		-4.907202		-0.215173		-18.46804	
LNTDEPOSIT	0.135591	0.4825	-0.136035	0.1800	-0.147006	0.0992 *	0.186597	0.3443
SWAP/ IRTERBANK	-0.000722	0.0498 **	-0.000767	0.0511 *	2.255585	0.4413	7.526767	0.1165
INDEX	0.218743	0.2927	0.370308	0.0811 *	0.660048	0.1317	1.298107	0.0651 *
LNINCOME	0.852065	0.1343	N/A		-0.740075	0.9457	0.616996	0.0196 **
GDP	-0.441965	0.1947	-0.690341	0.0471 **	0.837533	0.1453	-1.414314	0.0767 *
LNEXPENSE	0.058856	0.9570	1.763330	0.0002 ***	-0.023352	0.0043 ***	N/A	
R-Squared Prob(F-statistics)	0.867060 0.003744		0.820936 0.003551		0.942935 0.000145		0.811062 0.004457	

The results of both Model(A) was specious, due to the apparent severe multicollinearity in the models, it is imperative to be mindful of the interpretation, hence Model(B) are generated.

Model 1 (B)

LNTDASSET = - 4.907202 – 0.136035 LNTDEPOSIT – 0.000767 SWAP + 0.370308 INDEX – 0.690341 GDP + 1.763330 LNEXPENSE

Model 2 (B)

LNTDASSET = - 18.46804 + 0.186597 LNTDEPOSIT + 7.526767 IRTERBANK + 1.298107 INDEX + 0.616996 LNINCOME -1.414314 GDP

The regression output presented in the Table 5, shows that INDEX & GDP in both models are significant at 5% and 10% significance level, signifying that these IV's are meaningful in explaining variations in total derivatives asset. Model 1(A) recorded an R-square value of 0.867060, indicating that 86.71% of the variation in LNTDASSET can be exclusively explained by interest rate swaps. The lack of significant variables raised suspicion that multicollinearity exists in the model, leading to the generation of Model 1(B) corresponding to the result of the correlation matrix. Consequently, LNINCOME was dropped rendering 3 other IV's significant. 82.09% of the variation in total derivatives assets can now be explained by SWAP, INDEX, GDP & LNEXPENSE at 10%, 5% and 1% significance level, respectively.

The R-square value in Model 2(A) is recorded at 0.942935, implying that 94.29% of the variations in total derivatives asset in this model can be explained by LNTEPOSIT and LNEXPENSE. Multicollinearity was suspected due to high P-value of LNINCOME. In accordance with the correlation matrix output, severe multicollinearity between LNTDASSET & LNEXPENSE was present, which led to its removal. Therefore, the R-square value of Model 2(B) reduced to 81.11%. The Prob(F-statistic) of both models shows that the overall models are statistically significant at 0.05 significance level, implying that all the explanatory variables in these individual models can jointly explain variations in total derivatives asset.

The smallest significant impact on LNTDASSET in Model 1, emanated from interest rate swap where a 1% increase led to a 0.000767% fall in total derivatives, holding other variables constant. The largest significant impact was a direct result of total non-interest expense that increased LNTDASSET by 1.763330% for every 1% increase in LNEXPENSE, ceteris paribus. In Model 2, the smallest significant impact on LNTDASSET came from GDP, which caused total derivatives to fall by 0.616996% for every 1% increase, ceteris paribus. The largest significant impact resulted from INDEX with a 1.298107% rise in usage for every 1% increase, holding other variables constant.

CONCLUSION

In view of these circumstances, it is expected that banks' derivative usage changes in accordance to the extent business cycle events influence their efficiency during these uncertain times. The apparent economic slowdown in 2018 and the expected one in 2020, suggest that banks derivative usage will rise. The low interest rates brought about due to trade war and low trade in 2020 is expected to increase derivative usage of commercial banks which indirectly impact the operations of Islamic banks. The unprecedented impact of Covid-19 increases uncertainty in the market especially in regards to inflation, since its impacts cannot be fully predicted. Furthermore, as numerous businesses are at a standstill and unemployment rates are high, banks earnings are expected to fall while expenses rise. Henceforth, the combined situation increases banks derivative usage in order to improve its profitability and efficiency.

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