

The Impact of Exchange Rate Risk on The Market Value of Malaysian Listed Commercial Banks

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Abstract: The aim of this study is to determine the impact of exchange rate risk on market value of commercial banks, through an econometric model based on daily market value data of listed commercial banks in Bursa Malaysia during a period of nine years from 2013 to 2022. First, we used Generalized Autoregressive Conditional Heteroscedasticity model to estimate exchange rate volatility of Malaysian Ringgit's daily price against the United States Dollar (MYR/USD). Then, we estimated a Panel Data model of the market value using the previous values of exchange rate volatility and the change in market value as explanatory variable. The results showed a significant negative relationship between the market value of Malaysian listed commercial banks and the previous values of exchange rate volatility, furthermore, the change in the market value have a significant positive impact on the present value.

Keywords: Exchange rate risk, Market value, volatility, commercial banks, Panel data

JEL Classification: G21, G32.

ملخص : تهدف هذه الدراسة إلى تحديد تأثير مخاطر سعر الصرف على القيمة السوقية للبنوك التجارية، ذلك من خلال نموذج قياسي يعتمد على بيانات القيمة السوقية اليومية للبنوك التجارية المدرجة في بورصة ماليزيا خلال فترة عشر سنوات من 2013 إلى 2022. أولاً، تم استخدام نموذج الانحدار الذاتي الشرطي المتباين لتقدير تقلب سعر الصرف لسعر الرينجت الماليزي اليومي مقابل الدولار الأمريكي (MYR / USD). بعد ذلك، قمنا بتقدير نموذج بيانات بانل للقيمة السوقية باستخدام القيم السابقة لتقلب سعر الصرف والتغير في القيمة السوقية كمتغير مساعد. أظهرت النتائج وجود علاقة سلبية كبيرة بين القيمة السوقية للبنوك التجارية الماليزية المدرجة والقيم السابقة لتقلبات أسعار الصرف، علاوة على ذلك، فإن التغير في القيمة السوقية له تأثير إيجابي كبير على القيمة الحالية.

الكلمات المفتاحية : مخاطر سعر الصرف، القيمة السوقية، التقلبات، البنوك التجارية، بيانات بانل.
تصنيف جال: G32, G21.

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1.Introduction

Malaysia's economy is closely tied to global demand. In order for it to run smoothly, global factors that influence it must stay in equilibrium. That includes the exchange markets, where currencies are traded every day. Exchange rates are determined by demand and supply, for example, if there is a strong demand for a country currency from other nations in the world, there will be a higher exchange rate. Thus, all these factors affect the supply and demand of a particular country's currency which will have an impact on that country's economy and ultimately the stock price of its listed companies. A change in the exchange rate will have a direct impact on the value of companies operating in the domestic market, this is because their revenues and profits will be affected. Companies that are based overseas will also be impacted; they will have to change their accounting standards to reflect the changes in exchange rates (Chan and Low, 2017).

Currencies are likely to fluctuate for a variety of reasons including interest rate movements, political events, inflation or deflation and a host of other factors. In many businesses, while fluctuations in exchange rates can be accounted for to some extent, significant variations can have a significant impact on the overall profitability of a company. (Smith and Landon, 2009)

Exchange rate risk refers to the financial risk faced by a business entity that owns assets in one country and uses its local currency in a different country to exchange these assets for cash. This often occurs when the exchange rate of the local currency for the foreign currency changes unfavorably for a company. (Moore and wang, 2014)

Exchange rate volatility is considered as the main source of exchange rate risk, volatility is defined as all movements and changes deprecating or appreciating the value of the currency. Exchange rate volatility is associated with price stability, economic growth and achieving macroeconomic and monetary policies. (Ajao, 2015; Hook and Boon, 2000)

The exchange rate volatility has a significant impact on the overall profits of any firm whose business is conducted internationally. Both short-term and long-term exchange rate volatility affects the profitability of the firm as it reduces its margins and hurts the company's ability to execute its strategies and sustain its competitive position in the market. (Srinivasan and Kalaivani, 2012)

Increasing the level of exposure to exchange rate volatility through increased foreign operations leads to an increase in the variability of profit for the company. Higher levels of variability result in a higher level of risk to shareholders because the success of their business depends on unpredictable market movements.

The exchange rate volatility affects the market value of firms, as the firm valuation is based on the expected future cash flows that are discounted back to the present value using appropriate interest rates. An increase in exchange rate volatility hurts the expected cash flows and therefore results in a lower value for the company. (Chamberlain et al, 1997)

Thus, how the exchange rate risk effects the market value of Malaysian listed commercial banks?

To answer the previous question, this paper is organized as follows: Section 2 devoted to literature review, the third section presents the Research Design and the

estimation of exchange rate volatility using ARCH model, the fourth section provides the interpretation of the model results and the final section is the Conclusion.

2.Literature Review

There were many studies about the exchange rate risk and its volatility such as:

Hooper and Kohlhagen (1978) paper is considered as one of the first researches that studied the exchange rate risk after the collapse of Bretton Woods system. The researchers analyzed the exchange rate risk impact of the prices and volume of U.S. and German international trade, they found that the exchange rate risk had a significant effect on prices unlike the volume of trade.

The study of Thavikulwat (2004) that determined the value of firms through five different criterions: book value, market value, capitalized value, deductive judgment and adjusted net worth.

Setiawanta et al (2020) researches on the effect of the Indonesian public companies' financial performance and exchange rate risk on the firm value, they found that the financial performance affects firm value, but not profitability, while the exchange rate risk occurs from the relation between capital structure and firm value.

The study of Pavone (2019) examine the relationship between the market capitalization (the market value) and some financial variables using evidence from Italian Listed Companies, the results shown positive impact of Price/Earnings Ratio, Operating income/Turnover per share and Working Capital per Share on market value, while they are affected negatively by ROE, ROA and Earnings Yield.

Ur Rahman et al (2017) studied random sample of nonfinancial Malaysian listed companies to examine the effect of profitability ratios: EPS, ROE, and ROA, on firm market value. They concluded that the investors prefer to deal with the firms that maximize return on their equity.

Kilicarslan (2018) research focused on determinants of factors related to exchange rate volatility in Turkey, the study found that the exchange rate volatility increases by rising the domestic investment, money supply and trade openness, meanwhile any rising in foreign direct investment, output and government expenditures will reduce the exchange rate volatility.

The exchange rate volatility has a positive effect on increasing the ratio of lending to total bank deposits and loan-to-deposit ratio, while it has a negative effect on banks return on capital and banks profitability, also the exchange rate instability encourages speculators to enter into foreign exchange market in Iranian commercial banks (Keshtgar et al, 2020)

The study of Nnenna (2012) shown a significant negative impact of exchange rate risk on stock market returns meanwhile the interest rate has negative impact but insignificant at the chosen 5% level according to econometric model of listed firms in Nigeria.

Flota (2014) studied the impact of exchange rate movements on the equity value of individual firms and identified the determinants of exposure, and he suggested that firms that engage in international activities and hold debt in foreign currency are significantly less sensitive to exchange rate movements than firms that rely primarily on domestic sales.

Muigai and Cherono (2019) examine the effect of fluctuations in exchange rates on share prices of the listed companies in Kenya and they found that the exchange rates volatility has a significant adverse effect on the share prices which mean significant adverse effect on market value.

And most recently Eita and Djemo (2022) research reveals a strong codependency between the stock from the financial industry and foreign exchange rates by attempted to apply an EVT-based pairwise copula method for modeling risk interaction between foreign exchange rates and equity indices of the Johannesburg Stock Exchange.

The purpose of this study is to determine how the exchange rate risk impacts the market value of Malaysian commercial banks, using an econometric model depending on daily data about listed commercial banks in bursa Malaysia and the volatility of Malaysian Ringgit.

3. Empirical Study

In this study we selected all listed commercial banks in bursa Malaysia (10 Banks: AFFIN BANK, ALLIANCE BANK MALAYSIA, AMMB HOLDINGS, BIMB HOLDINGS, CIMB GROUP, HONG LEONG BANK, Malaysia Building Society BANK, MALAYAN BANKING, PUBLIC BANK and RHB BANK). The study employed pooled Least Squares for panel data model using collected data from investing.com during the period (2013 - 2023) with total of 2422 observations, this model contains market values of the Malaysian listed commercial banks related to the exchange rate volatility of (MYR/USD) estimated by a GARCH model.

Our proposed panel econometric model of the study is formulated as follows:

$$MV_{it} = a_1 \Delta MV_{it} + a_2 ERV_{(t-1)} + c$$

Where;

MV_{it} : Market Value of the bank i at the period t = Share market price $\times$ total number of outstanding shares

ERV_t : Exchange rate volatility at t ($\hat{\sigma}_t^2$ of the GARCH model).

ΔMV_t : Change in Market Value at t .

c : constant.

3.1. Estimating exchange rate volatility

We used time series of Malaysian Ringgit's daily price against the United States dollar (MYR/USD) during the period 2005 - 2023 collected from investing.com website, then, following Box-Jenkins method (Box and Jenkins, 1976) and using EViews software, we estimated the ARIMA model and the optimum Malaysian Ringgit volatility model represented by a Generalized Autoregressive Conditional Heteroscedasticity model (GARCH).

3.1.1. ARIMA model estimation

First we studied the time series stationarity by using Unit Root tests: Augmented Dickey-Fuller (1981), after testing the three Dickey-Fuller models as shown in Table (1), we found that the trend coefficient is not significant ($0.7028 > 5\%$), the intercept coefficient is not significant ($0.3321 > 5\%$), the Unit Root coefficient is significant ($0.0256 < 5\%$), which means the existence of Deference Stationary process without intercept.

Afterward, we tried several orders of Auto Regression and Moving Average to obtain the optimum ARIMA(p;1;q) model according to Akaike criterion AIC (1973) as follows (Table (2)):

$$\text{ARIMA}(2;1;2): \Delta \hat{x}_t = 0.884\Delta x_{t-1} - 0.969\Delta x_{t-2} - 0.875\varepsilon_{t-1} + 0.974\varepsilon_{t-2}$$

Where :

t : the observation order.

$\Delta \hat{x}_t$: the estimated value of exchange rate deference at t .

Δx_{t-p} : the value of exchange rate deference at $t-p$ (AR(p): autoregression).

ε_{t-q} : the estimation residual at $t-q$ (MA(q): moving average).

Table (1): Stationarity test for the time series of exchange rate in the level

Test equation	T-Statistic	Probability	Test equation
Trend & intercept	-1.803904	0.7028	Trend & intercept
Intercept	-1.901107	0.3321	Intercept
None	-2.218997	0.0256	None

Source: Research Findings depending on Eviews outputs

Table (2): Estimated ARIMA Model for exchange rate difference

Variable	coefficients	Std. Error	T statistic	Probability
AR(1)	0.884988	0.014958	59.16395	0.0000
AR(2)	-0.969892	0.014652	-66.19299	0.0000
MA(1)	-0.875429	0.013693	-63.93355	0.0000
MA(2)	0.974813	0.013355	72.99435	0.0000
R²	0.003208			
AIC	-10.82493			

Source: Research Findings depending on Eviews outputs

3.1.2. The GARCH model estimation

After estimating the ARIMA model, we used ARCH-LM test to test the ARCH variance heterogeneity as depicted in Table (3):

Table (3): ARCH-LM test: Results of variance homogeneity test

Statistic	statistic value	Probability
F	51.02732	0.0000
LM	50.47163	0.0000

Source: Research Findings depending on Eviews outputs

Both probabilities of F and LM statistics are less than 5%, this indicates a significant variance heterogeneity effect at the 5% confidence level on the first order difference of

exchange rate, which means the possibility of fixing heteroscedasticity using one of Autoregressive Conditional Heteroscedasticity models represented generally as follow:

- ARCH models: (Engle, 1982)

$$\text{ARCH}(p) : \hat{\sigma}_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \alpha_2 \varepsilon_{t-2}^2 + \dots + \alpha_p \varepsilon_{t-p}^2$$

In condition of:

$$a_0 > 0 ; (a_i = a_1; a_2; \dots; a_p) \geq 0$$

- GARCH models: (Bollerslev, 1986)

$$\text{GARCH}(p,q) : \hat{\sigma}_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \alpha_2 \varepsilon_{t-2}^2 + \dots + \alpha_p \varepsilon_{t-p}^2 + \beta_1 \hat{\sigma}_{t-1}^2 + \beta_2 \hat{\sigma}_{t-2}^2 + \dots + \beta_q \hat{\sigma}_{t-q}^2$$

In condition of:

$$\alpha_0 > 0 ; (\alpha_i = \alpha_1; \alpha_2; \dots; \alpha_p) \geq 0$$

$$(\beta_j = \beta_1; \beta_2; \dots; \beta_q) \geq 0$$

$$(\sum_{i=1}^p \alpha_i + \sum_{j=1}^q \beta_j) > 1$$

Where:

$\hat{\sigma}_t^2$: the conditional variance at t .

α_0 : the constant value of the model.

α_i : residual coefficient of i order.

β_j : variance coefficient of j order.

p and q are the model orders.

After testing several orders of p and q of ARIMA and GARCH models, the optimum model obtained according to Akaike criterion is as follows: (Table (4))

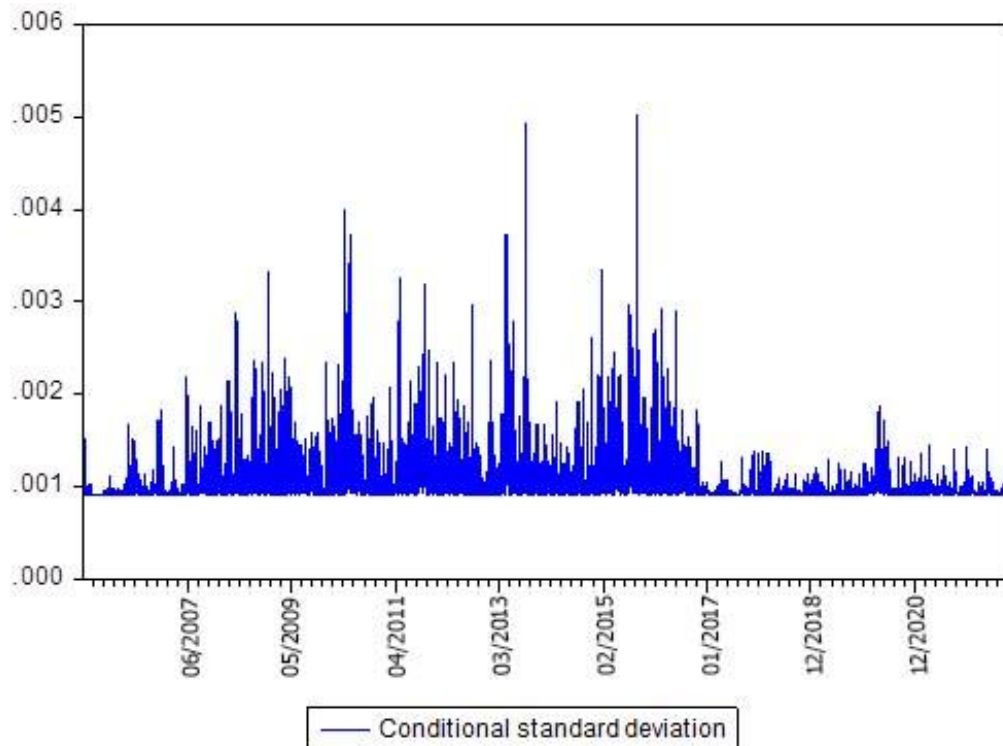
Table (4): GARCH Model Estimation

Variable	Coefficient	Std. Error	t statistic	Probability
AR(1)	1.145937	0.045736	25.05558	0.0000
AR(2)	-0.822323	0.043889	-18.73655	0.0000
MA(1)	-1.097446	0.048875	-22.45401	0.0000
MA(2)	0.782825	0.046845	16.71101	0.0000
The variance equation				
C	8.37E-07	1.25E-08	67.16309	0.0000
RESID ²	0.346660	0.021353	16.23509	0.0000

Source: Research Finding depending on Eviews outputs

$$\text{ARIMA}(2;1;2) : \Delta \hat{x}_t = 1.145 \Delta x_{t-1} - 0.822 \Delta x_{t-2} - 1.097 \varepsilon_{t-1} + 0.782 \varepsilon_{t-2}$$

$$\text{GARCH}(1;0) : \hat{\sigma}_t^2 = 8.37 \times 10^{-7} + 0.346 \varepsilon_{t-1}^2$$



Source: Research Findings depending on Eviews outputs

Figure (1): Exchange rate volatility Values derived from GARCH model

According to the results of the previous GARCH Model, we can estimate exchange rate volatility as shown in Figure (1), where we can see the exchange rate volatility values of Malaysian Ringgit's against the United States dollar during the period (2005 - 2022).

Before June 2007 the exchange rate volatility was relatively stable, then, the chart begin to rise and take a ups and downs pattern until the end of year 2016, which means a high level of exchange rate risk especially during the period of 2014 – 2016 (oil prices falling) where it reached its maximum value.

During the rest of the period, the exchange rate volatility take a stable pattern (low level of exchange rate risk) except the year 2020 and the COVID-19 pandemic, according to Feng et al (2021) the various policies adopted by governments in response to the pandemic, increase the exchange rate volatility.

3.2. Panel Data model results and discussion:

3.2.1. Descriptive Statistics

Table (5): Descriptive Statistics

Variable	Obs	Max	Min	Mean	St. Dev
MV	2422	1.29E+11	3370597	3.34E+10	3.48E+10
ERV	2422	0.005024	0.000915	0.001050	0.000287
D(MV)	2422	9.12E+09	8.00E+09	-706347.7	5.25E+08

Source: Research Findings depending on Eviews outputs

Table (5) shows descriptive statistics of bank market value (MV_t), exchange rate volatility (ERV_t), change in Market Value (ΔMV_t).

The log of bank market value shows a mean of 3.34×10^{10} with a minimum 3370597 and maximum 1.29×10^{11} . Similarly, exchange rate volatility has an average value of 0.001 with a minimum 0.0009 and maximum 0.005. The mean for ΔMV is -706347.7 in the range from 8.00×10^{09} to 9.12×10^{09} .

3.2.2. Estimation Results

Table (6): Panel unit root test results (Levin, Lin & Chu, 2002)

Variable	T-statistic	Probability	Result
MV	-5.217	0.0349	Stationary

Source: Research Findings depending on Eviews outputs

Table (7): Hausman test for fixed vs. random effects

Chi-Sq Statistic	0.000000
Prob	1.0000

Source: Research Findings depending on Eviews outputs

By rejecting the null hypothesis of unit root as shown in Table (6), all variables time series are stationary and all the accumulated variables are zero. According to Hausman test (1978) shown in Table (7) as the null hypothesis is accepted, the chosen panel data model must be with Random Effects. Finally, the estimated panel data model of MV_{it} is as follows:

Table (8): Model Estimation Results for MV

Variable	Coefficient	Std. Error	t-Statistic	Probability
c	3.40E+10	1.20E+10	2.830231	0.0047
ERV(-1)	-5.30E+11	1.47E+11	3.609688	0.0003
D(MV)	0.436737	0.080214	5.444622	0.0000

Source: Research Findings depending on Eviews outputs

Table (8) shows the regression results of the relationship between the Market Value of the commercial banks and the previous values of exchange rate volatility besides the change in the Market Value, the panel data model is formulated as follows:

$$\widehat{MV}_{it} = 0,4367\Delta MV_{it} - 5,3 \times 10^{11}ERV_{t-1} + 3,4 \times 10^{10}$$

Market Value of commercial banks model has a constant value of (3.4×10^{10} MYR) which represent the maximum market value of listed commercial banks could be achieved.

The change in the market value affects positively the market value of commercial banks at an estimated rate of (43%), which means that the market value has a positive relationship with its previous period value. Moreover, the previous period value of exchange rate volatility has a significant negative impact on market value at an estimated value of (-5.3×10^{11} MYR).

The estimated model and the results of the study indicate that any change in exchange rate volatility will affect directly the future investment decisions of Malaysian listed commercial bank's investors, who make their expectations according to the previous market value. Therefore, any value of shares below the investor's expectations will decrease their investing confidence, and they will lose their confidence in those commercial banks whose value are undervalued and will continue to sell their shares, leading to a decrease in the value of the stock.

On the other hand, if the value of their shares is higher than their expectations, they will increase their investment and increase the value of shares in the short term, because according to them the market value of the listed commercial banks will continue to rise in the future. Thus, Malaysian listed commercial banks investors will have a positive perception of their shares in the short-term if the appreciation rate of the shares is above the average expected appreciation rate estimated by the model.

This will keep them motivated to hold on to their shares and also will lead to an increase in the market price of shares in the long run since more and more investors will start to hold on the shares of the listed commercial banks, which eventually will push its market value above the estimation.

5. Conclusion

There is a significant relationship between the market value of commercial banks and their exchange rate risk. In other words, banks with a higher amount of exposure to currency fluctuations are typically worth more than those with less risk. This is because the value of these banks is affected by movements in the foreign exchange market, which in turn impacts their profitability and ability to generate revenues. In general, the market value of a company's share is a reflection of the expectations related to future earnings. Therefore, companies that are exposed to fluctuations in exchange rates tend to have a lower market value than those that are not. On the other hand, companies that manage to reduce the risk of exchange rate fluctuations can generate higher profits and are therefore more valuable to shareholders. This means that identifying and managing exchange rate risk is critical for banks and financial institutions alike.

In this paper, we discussed how this relationship works and explained its implications for investors and Malaysian listed commercial banks. The study results and the model estimation showed that the market value of Malaysian listed commercial banks is negatively affected by the previous exchange rate volatility; on the other hand, it is positively affected by the change compared to the last period.

Moreover, the study showed that investors decide about the stock prices of the listed commercial banks taking into account the confidence level in their future returns. On the other hand, the results showed the impact of the market volatility on the future investment decision of the investors of listed commercial banks in Malaysia. Changes in exchange rates of Malaysia will affect the market prices of the listed commercial banks result in changes in the value of the shares of all listed commercial banks.

In the future, it is important for the Malaysian financial system to continue monitoring this relationship so it can respond appropriately by changing market conditions in the future. However, it is imperative that the Malaysian government also play an active role in ensuring that banks are financially healthy and profitable so they can contribute in the country's economic development and well-being in the long term. As

Malaysia continues to transform itself into a fully developed economy that is capable of facing the challenges of globalization and the digital age, it is important that it learns from the mistakes of other emerging markets that have struggled with financial stability in recent years. In particular, it should closely examine the policies and regulations adopted by other economies and implement those that are best suited to its situation.

Moreover, policymakers should also increase transparency about the operations of the banking sector and ensure that regulatory measures are in places that encourage responsible lending practices and protect the interests of depositors and investors. This will allow the banking system in Malaysia to grow from strong to stronger in the coming years and help it to become a regional and global leader in the financial sector.

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