

CAUSAL NEXUS BETWEEN CURRENCY EXPOSURE AND STOCK RETURNS OF NON-FINANCIAL MNCs UNDER TWO FINANCIAL CRISES IN MALAYSIA

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Abstract: Malaysia practises high level economic openness which makes it an interesting avenue to study currency exposure. Based on this, this paper comparatively examines the relationship between currency exposure and stock returns among non-financial multinationals corporations in Malaysia by utilising the OLS and Granger causality tests. These tests were run using data from 207 non-financial Malaysian under two financial crises namely the Asian financial crisis (AFC) and global financial crisis (GFC) in 1997 and 2008, respectively. The distinct foundations of these crises are believed to induce varying levels of currency exposure and different nexus between currency exposure and stock returns of the selected multinationals. The firm-level OLS estimation found that higher number of firms' stock returns were affected by currency exposure compared to the composition of significantly affected firm in Granger causality estimation (regardless of the causal directions). Still, the significant relationship and bilateral causality under both estimations were comparatively higher during the AFC. With this, the findings answer the elemental questions of the paper that dictate different market foundations during AFC and GFC, as well as providing evidences on the potential varying significant levels when bilateral causality is considered (Granger causality) compared to unidirectional relationship (OLS). The detailed analyses may guide future researcher to conduct the study of currency exposure by approaching different direction of causal relationship between currency exposure and stock re and market conditions.

Keywords: currency exposure, Granger causality, foreign currency, stock returns

1. Introduction

The significance of exchange rate movements as a form of risk to global multinational corporations became more apparent upon the collapse of the Bretton Woods system in early 1970s. Relationship between exchange rate movements and firms' stock return gives rise to sizeable currency exposure for firms, with currency exposure is defined as the sensitivity of cash flow to exchange rate changes. With the development of the international investment and trade, currency movements have become more integral towards the cash flows of multinational companies. In fact, non-multinational firm will still be affected by the economic exposure despite its non-involvement with international trade due to indirect exposure experienced by the whole market.

In line with the acknowledged importance and substantial theoretical prediction of foreign currency exposure, numerous studies attempted to gauge the magnitude of the currency exposure effect to various markets (Bacha et al., 2013; Bartram & Bodnar, 2012; Dewenter et al., 2005; Muller & Verschoor, 2006; Parsley & Popper, 2006; Yip & Nguyen, 2012). Another traditional conjecture in the financial market is the relatively more volatile currency in developing markets, which simultaneously signals higher exposure in the markets compared to developed countries. Bacha et al (2013) showed that 71% of the listed firms in the Malaysian market were significantly affected by currency exposure, in contrary to the 5% of significantly exposed firms in the U.S by Jorion (1990). Still, modest level of currency exposure was reported in the extensive study by Bartram and Bodnar (2012) on the currency exposure level in 37 countries. The small exposure level in developed market is attributed to the existence of various hedging tools and advanced derivative practice. On the other hand, the developing countries are less involved with hedging practice.

This paper selects Malaysia as the focus study mostly due to its small and open economy that is heavily involved with the global economy. The country is actively involved with international trade. The extensive trade activities in Malaysia is illustrated by the trade-to-GDP ratio (134%) which signifies high degree of openness compared to developed countries such as the United States (28%), the United Kingdom (56%), and Japan (36%). Malaysia has also been showing excellent financial development partly due to its friendly market and liberal foreign policies dating back to the credit boom in the 1990s (Muniandy & Uning, 2006). The country's heavy foreign trade activities rank Malaysia among the top 20 global trading nations (Bacha et al., 2013). Preliminary analysis on the sample firms shows majority of the sample firms in this study are importers, in parallel with the assertion by Bacha et al. (2013) of the import-base nature of Malaysian trades. Our analysis shows 137 out of 207 firms (66.18%) firms are importers due to relatively higher trade payable amounts than trade receivable amounts in their financial reports.

For an exporting country, the foreign currency liabilities become more difficult to oblige when the local currency depreciates. As a result, the firms may face greater risk of financial stability and prompt the market to follow monetary policy of the base-country (Georgiadis & Zhu, 2020). The move work in two stages as it initially helps to avoid any build-up of foreign currency exposure. In times when the foreign currency exposure manages to build up to an unfavourable amount, the move helps to preserve the financial stability of the firms. However, the effects were no more meant to stabilize the business cycle, but rather on dampening the financial cycles transmitted within the open economy.

Apart from extensive trading activities due to its open economic policy, Malaysia was hit by two financial crises; the Asian financial crisis (AFC) in 1997 and global financial crisis (GFC) in 2008. Currencies of the ASEAN countries including Malaysia were badly attacked during the Asian financial crisis, leading to closer regional cooperation in political, economic, and monetary aspects among its members (Tan et al., 2009). Subsequently, Malaysia experienced another subtle financial period in 2008 that majorly hit the American subprime market. The study considers interesting periodical events of the 2008 GFC and 1997 AFC as event-specific factor which is believed to play crucial role in the study of foreign currency exposure. Detailed explanation and description of the crises are provided in Table 1:

Table 1: Financial Crises Timeline

Crisis	Date	Denotation	Description
Middle AFC	July 1997 – June 1998 (Kim & Wei, 2002; Mizeri & Tsoukas, 2012; Weis et al., 2014)	MA (Middle AFC)	The East Asia crisis set off after the announcement of managed-floating baht by the Bank of Thailand.
Middle GFC	September 2008 – March 2009 (Chen et al., 2011; Copestake, 2010; Claessens et al., 2012; Weis et al., 2014)	MG (Middle GFC)	The global financial crisis arose from the downturn of the U.S. housing sector.

As currency exposure is indeed one contentious uncertainty that work bi-directionally with the MNC's cash flow and the economy at large, numerous research have been conducted to tackle the issue through various approaches. Considering the significance of the financial events as exhibited in Table 1, accentuating different time periods in the measurement is relevant for the study. Utilising the Malaysia market as the sample study, this study attempts to answer two questions. Firstly, could event-specific method provide more in-depth overview on the level of currency exposure under different financial periods encompassing two financial crises with different crisis foundations? Secondly, the paper argues that OLS estimation is mainly dependent on the theoretical relationship linking the variables. Thus, OLS estimation is confined to uni-directional relationship. This reasoning prompts this study to utilise Granger causality. A flight from past practice, this study attempts to explore the causal relationship between the two variables. The study adopts the preposition put forward by Foresti (2006) that stock prices can be used to predict growth but not the other way round. With this, the paper contributes to the existing literature by providing a fresh approach by simultaneously measure the currency exposure levels during two financial crises which could be an evergreen referral for future studies on stock return and financial crises. Secondly, the paper also contributes in term of comparing the outcomes from OLS and Granger causality estimations.

This paper is divided into five sections. Section 2 presents the relevant literature and synthesises the key findings. Subsequently, Section 3 describes the data source and methodologies. Section 4 presents the results and analysis. The final Section 5 concludes the paper by drawing out the key findings and implications.

2. Literature Review

Previous studies on the relationship between exchange rate changes and firm values have been modestly successful. The pioneering theory of investment by Modigliani-Miller (1958) connoted no effect from currency fluctuations under perfect market without any unexpected uncertainties. This was in parallel with the total exposure model by Adler and Dumas (1984). Adler and Dumas (1984) prompted various studies on exchange rate exposure to establish the relationship between the stock returns and exchange rate changes. The model considered the effect of currency fluctuations towards the firm values as a single comprehensive measure that summarized the sensitivity of the firm to exchange rate. However, the modern finance theory held that the value of a firm was equal to its expected cash flow by taking into consideration the interest rate. Such evolution was also incorporated in the study of currency exposure by

Jorion (1990) through the inclusion of market index to form the 2-factor residual exposure model. Market index was included to contain the potential effect of market changes and ensured the effect of currency movement exclusively represented the currency movement without the extraneous effect from the market condition.

Throughout the years, several methodological changes were applied into the measurement of currency exposure. Event study method with precaution on the asymmetric behaviour of the exchange rate movements was undertaken by Dewenter et al. (2005) to examine the currency exposure among the U.S multinational firms. Still, the study only found small significant exposure and attributed the low result to the efficient hedging practice and insufficient information to respond to currency movements, rather than methodological weakness. Similarly, Bartram and Bodnar (2012) asserted the slow response due to lagged information as weakening the relationship between currency movement and stock return. Low currency exposure level was also often recorded in developed countries due to the efficiency and better operational structure in their markets (Allayannis & Ofek, 2001; Bartram, Burns, & Helwege, 2013; Bodnar & Marston, 2002; Bodnar & Wong, 2003; Iorio & Faff, 2000). The low exposure level in the study by Allayannis and Ofek (2001) was also attributed to the extensive hedging in the U.S market.

Apart from hedging practice efficiency, nonlinearity in measurement from imposing fixed coefficient over long periods also caused the low currency exposure (Dewenter et al., 2005). Glen and Jorion (1993) highlighted the role of time variation to affect the expected returns in the international market, in which the change caused structural change in the symmetry and investment structure of the firms (Ammer, 2010). This was showcased in the study by Dewenter et al. (2005) which avoided many problems encountered in previous works by taking into account the bilateral declines in the Mexican peso and Thai baht. Indeed, the study found contemporaneous relation between stock prices and exchange rates. A closer study by Bacha et al. (2013) affirmed the time-variant nature of currency exposure in Malaysia market and concluded the significant exposure to USD even during the peg period.

Researchers also argued that sample selection problems are to blame for the low currency exposure levels in past studies. Issues on the sample selection were either due to insufficient exposure of the sample firms to the chosen exchange rate or the commingling of the positive and negative exposures. Another possible measurement differential might arise from the way the causal directions between the variables were set. Regression analysis might be apt to denote the relationships among variables, but it failed to implicitly imply that the relationship was causal (Tabachnick & Fidell, 2013). In this sense, causality was not a statistical issue, but considered as a logical and experimental problem. With this, Granger causality test was often used to tackle issues regarding causal relationship (Solakoglu & Orhan, 2012). The statistical test used a series of t-tests and F tests to determine whether one time series was useful in predicting another time series. The Granger causality test did not necessarily address the cause-and-effect relation between variables as it may not indicate true causality. In similar tune, Yadav et al. (2023) enhanced the notion by Solakoglu & Orhan (2012) that Granger causality test identified the direction of causality in a time series data as either unidirectional, bidirectional or none. If a variable Granger caused the other variable, it was thus suggested that the past value of the first variable contained important information that helped to predict the value of the latter variable. In contrary to OLS, Granger causality tests was run without depending on any priori hypothesis. Rather, the test mainly assumed the cause could occur before the effect or led to distinctive knowledge of future values. With this, Granger causality

test was regarded as a par comparison for our analysis on the relationship between currency exposure and stock return in Malaysia.

3. Methodology

3.1 Sample Description

Data on stock return, currency exchange (MYR/USD) and market index were collected from Bloomberg database on monthly basis for a sample of 1,000 Malaysian non-financial firms. In order to maintain a comprehensive data collection, the firms were required to be non-financial firms with sufficient stock returns data from 1995 to 2009. Financial firms were excluded as they were not directly involved with export-import activities (Allayannis & Ofek, 2001). The exposure of these financial firms was different from non-financial firms because financial firms were also market makers in foreign currency market. With this restriction, the final sample for the study only comprised 207 firms while 793 firms were excluded. KLCI index was used to represent the market index for Malaysian market.

3.2 Research Methods

In the preliminary stage of the analysis, the estimation process test the stationarity of the data using the Augmented Dicky-Fuller (ADF) and Phillip-Perron tests in order to determine the order of data integration. If a time series is determined to be stationary, its variance, mean, and covariance are considered as constant over time and the analysis is reliable for forecasting (Padder & Mathavan, 2021). The tests were carried out using the following models:

$$\Delta R_t = \alpha_0 + \alpha_1 R_{t-1} + \sum_{j=1}^k \alpha_j \Delta R + e_t \quad (1)$$

$$\Delta R_{mt} = \alpha_0 + \alpha_1 R_{t-1} + \sum_{j=1}^k \alpha_j \Delta R_m + e_t \quad (2)$$

Where ΔR and ΔR_m are data series, t is linear time trend, Δ is the first difference operator, α_0 is constant, k is the optimum number of lags in the independent variables.

Secondly, the study follows with the regression analysis. It is a mainstream belief that the overall exchange rate exposure had been a major concern among investors. Still, the firm level exposure held likewise importance for investors that were keen on specific investment strategies. Assessing the market level exposure was also important due to the offsetting effect existing in firm level analysis through diversification practice by the firms. Still, the varying exposure levels for each firm also emphasise the importance of assessing the individual exposure towards each firm under study. For this purpose, the study conducted firm-level analysis on the data both OLS and Granger causality estimations.

i. OLS event-specific exposure model

Incorporating event-specific factor into equation by Jorion (1990) with j to denote the time periods included in the study:

$$R_t = \gamma_0 + \gamma_1 R_{mt} + \sum_{j=1}^5 \beta_{US\$} D_j S_{US\$,t} + \mu_t \quad (3)$$

R_t is monthly stock return of a firm measured as $R_t = \ln \frac{P_t}{P_{t-1}}$

R_{mt} is monthly return on the index

$S_{US\$,t}$ is nominal monthly change in USD exchange rate measured as $S_{US\$,t} = \ln \frac{S_t}{S_{t-1}}$

The dummy variable D_j in this model denote the following time-frame;

$D_1 = 1$, middle Asian financial crisis (July 1997- June 1998)
= 0, otherwise

$D_2 = 1$, middle global financial crisis (September 2008 – March 2009)
= 0, otherwise

As this study dealt with financial time series with non-constant variance, the study followed the precaution taken by Bacha et al. (2013) to add a Generalised Autoregressive Conditional Heteroscedasticity (GARCH (1,1) specification into equation (3).

ii. Granger causality model

In testing for causality, the Granger causality test was used involving the F-tests to test whether lagged information on a variable currency movement provided any statistically significant information about stock returns in the presence of lagged stock return data. If not, then currency movement was considered as not Granger-cause stock return. Otherwise, if this equality did not hold, stock return was said to Granger-cause currency movement. If stock return could predict future currency movement, over and above what lags of stock return itself could, then stock return Granger caused currency movements.

Test for Granger causality by estimating the following models for each pairwise combination of currency exposure and stock returns series:

$$R_t = \mu_1 + \sum_{i=1}^p \alpha_{1,i} S_{US\$,t-i} + \sum_{i=1}^p \beta_{1,i} R_{t-i} + \varepsilon_{1,t} \quad (4)$$

If the null hypothesis: $H_0 = \sum_{i=1}^p \alpha_{i1} = 0$ was rejected: “Currency Exposure Granger cause Stock Return”.

$$S_{US\$,t} = \mu_2 + \sum_{i=1}^p \alpha_{2,i} R_{t-i} + \sum_{i=1}^p \beta_{2,i} S_{US\$,t-i} + \varepsilon_{2,t} \quad (5)$$

If the null hypothesis: $H_0 = \sum_{i=1}^p \alpha_{i1} = 0$ was rejected: “Stock Return Granger cause Currency Exposure”.

If the null hypothesis was rejected from both cases, it was said that there was a feedback relationship between currency exposure and stock return.

4 Results

4.1 OLS event-specific relationship between currency exposure and stock return

Event-specific relationship between currency exposure and stock return was obtained using Eq. (1) and reported in Table 2. The highest number of firms were exposed to currency exposure during the AFC at 71.49% which was similar to the finding by Bacha et al. (2013). Firstly, the findings sit well with the fact that Malaysia is a small open economy. Despite the numerous and persistent hedging practices to dampen the level of currency exposure in a small open economy, deviations of the country's interest rate from the rest of the world would not exhibit

any opportunities for arbitrage profit neither any chance of leverage (Georgiadis & Zhu, 2020). Secondly, the finding was within expectation for AFC as the financial crisis mainly affected the currency market. The analysis provided evidences of relatively lower exposure level among the sample firms in Malaysia during GFC. With this, the OLS estimates provided insight on the different exposure level among the selected firms due to the different foundation of the financial crises.

Table 2: Firm-level Event-specific Currency Exposure

	MIDDLE AFC	MIDDLE GFC
Mean	-0.8775	-0.1107
Median	-0.8465	-0.0528
Maximum	3.6921	10.0461
Minimum	-13.8061	-8.2245
Std. Dev.	1.3330	2.4719
Positive Cases	38	101
%	18.36	48.79
Negative Cases	169	106
%	81.64	51.21
Significant Cases at 10%	148	49
%	71.49	23.67

This table reports the result of the following regression: $R_{it} = \alpha_{0i} + \alpha_1 R_{mit} + \sum_{j=1}^5 \beta_{j,US\$} D_j S_{US\$,it} + \mu_{it}$. p-values are shown in parentheses with significance at 10% level.

In order to further accentuate the findings across different financial periods, the figures also showed more than 80% of the firms were negatively affected by currency exposure during AFC. A rather subtle effect was showcased during GFC as the compositions of negatively and positively affected firms were quite in balance. True to its essence, the adverse effect of AFC was more transparent because the crisis directly involved the currency market in South East Asia, particularly Malaysia.

4.2 Event-specific Granger Causality between Currency Exposure and Stock Return

Before conducting the Granger causality analysis, the time series properties of the data must be investigated. In this part, the augmented Dickey–Fuller (1981) and Philip–Perron tests were conducted to establish the order of integration for stock return and currency exposure. Table 3 shows the results of the tests for presence of a unit root at level. The results clearly provided evidence of unit roots in the levels with strong rejection of the null hypothesis in all series. Then, all data series were integrated of level order. So, the data series of the variables at level order were stationary.

Table 3: Unit Root Test

AFC		GFC	
ADF	PP	ADF	PP

	Level	Level	Level	Level
Stock Returns	-0.9072 (0.0331)	-0.9072 (0.0331)	-3.1923 (0.0807)	-4.1261 (0.0264)
Currency Exposure	1243.76 (0.0000)	1383.02 (0.0000)	852.13 (0.0000)	1056.91 (0.0000)

We had shown the composition of affected firms measured through OLS estimation in the previous subsection. We further analysed the currency exposure and stock return using Granger causality to cater for causality issue arising in the OLS estimation. In the middle AFC period, lower composition of firms with “stock return Granger cause currency exposure” at 7.73%. Meanwhile, firms with “currency exposure Granger cause stock return” was 9.17%. Similar trend was observed for figures under middle GFC where the composition of firms with significant causal relationship (regardless of direction) was a far cry lower than those obtained in OLS.

Table 4: Composition of Firms with Significant Granger Causality Estimations under Asian Financial Crisis and Global Financial Crisis

	Middle AFC	Middle GFC
Composition of Firms with Significant “Stock Return Granger Cause Currency Exposure”*	16 (7.73%)	11 (5.31%)
Composition of Firms with Significant “Currency Exposure Granger Cause Stock Return” *	19 (9.17%)	15 (7.25%)

*at 10% significant level

Closer scrutiny on Table 4 shows bigger proportion of firms with “Currency Exposure Granger cause Stock Return” compared to firms with “Stock Return Granger cause Currency Exposure”. First, we commended that the dataset followed the conventional direction of effect running from currency exposure to firms’ stock return. Secondly, the study would like to highly the existence of firms which the effect running from their stock return to their currency exposure level. To explain this finding, we looked at the selection of the firms in which the firms were selected on the basis of 1000 listed firms. These firms could be conglomerates that were fundamental towards the Malaysian market, particularly those with substantial trading volumes. Hence, performance of these firms outwardly influenced the movement of Ringgit against the USD during these financial crises.

5 Conclusion

This paper examined the currency exposure of Malaysian non-financial firms. Monthly data of 207 firms were regressed using OLS and Granger causality tests. While a large body of research focused on estimating exchange rate exposure, little attention was given on the importance of time variation towards currency exposure especially to incorporate and compare two financial crises in one study. Hence, this paper was motivated by relatively higher currency exposure observed from past empirical findings pertaining developing market, in addition to Ringgit’s position among the favourite of global investors in Southeast Asia. Adopting Malaysia as the

sample, the study strove to provide more detailed findings on currency exposure through the incorporation of two significant financial events. In addition to the approach, the study also attempted to investigate the differences results arising from utilising different estimations (OLS and Granger causality) on the currency exposure in Malaysia.

From the financial crises viewpoint, the varying significance levels for different financial crisis periods showed the market had either being affected differently by each crises or learnt from the devastating impact of AFC (Bacha et al., 2013; Kiyamaz, 2003). In both estimations (OLS and Granger causality), we managed to prove existence of high significant exposure during the AFC and lower currency exposure level during the GFC. With this, the study concluded the decreasing levels of significance across the two financial crises signalled the possible market advancement and better hedging practice in Malaysian financial market.

Secondly, the compositions of affected firms in OLS (under both AFC and GFC) were higher compared to the compositions of firms acquired through Granger causality estimations (under both AFC and GFC). Apparently, strong relationship between variables could stem from many causes, including the influence of other unmeasured extraneous variables (Tabachnick & Fidell, 2013). This was despite the precautionary action taken by the study to incorporate market index to control for other external macroeconomic that were correlated with currency movements. Another possible explanation was the restriction put on the OLS that pre-decided the direction of effect coming from the currency exposure (as the independent variable) towards the stock returns (as the dependent variable). On the other hand, the direction of effect in Granger was bi-directional and provided insight of the real direction of causality between the variables being studied.

This study is believed to contribute to the overall body of knowledge by providing an insight on the possible direction of relationship running between currency exposure and stock returns in a particularly small open economy such as Malaysia. In addition, country specific analysis is crucial for domestic firms as a guidance to structure and construct the best risk management framework that suits the local market conditions. On the other hand, this study proposes future studies to avoid a few methodological weaknesses in analysing the currency exposure such as exploring the time-variation and hedging factors of currency exposure more thoroughly. While this study is limited to only address the currency exposure through the methodological changes on a classical sample study in Malaysia, future studies may also expand the research to other countries that also go through a few significant financial events likewise to Malaysia.

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