

## THE DYNAMIC STOCK RETURNS VOLATILITY AND MACROECONOMIC FACTORS IN MALAYSIA: A SECTORAL STUDY

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### ABSTRACT

*This paper analyzes the impact of selected macroeconomic factors, namely Gross Domestic Product, exchange rate, interest rate, inflation rate, money supply, economic crisis and economic liberalization towards stock returns volatility of four economic sectors in Malaysia. In this paper, the dynamic stock returns volatility estimation shows that stock returns volatility is persistent in nature where previous shock will influence the current stock performance. This research also documents the existence of leverage effects in the stock market, where negative news brings larger magnitude of shocks compared to positive news. Based on cross-sectional time series model, the investigation shows significant relationships of all macroeconomic factors towards stock returns volatility across all economic sectors. This paper is important for policy makers, firms and academicians.*

**Key words:** Dynamic Stock Returns Volatility, Individual Firms, Macroeconomic Factors, Sectoral Study.

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### Introduction

Bursa Malaysia, previously known as Kuala Lumpur Stock Exchange (KLSE), is among the largest stock markets in ASEAN where in 2014 alone market capitalization of securities are worth RM 1651 billion and average daily trading values reached up to RM 2162 billion<sup>1</sup>. Currently, Bursa Malaysia is listed as the second largest stock market in ASEAN in terms of dividend yields behind Singapore Exchange and positioned as the highest funds raiser with RM 24.3 billion worth of funds raised last year<sup>2</sup>. Besides the well-developing Securities Market, Bursa Malaysia also consists of two additional yet equally essential growing markets, the Derivatives and Islamic Markets<sup>3</sup>.

Generally, stock markets are vital to the economy especially in channeling funds or capital from those who have excess resources to firms or individuals who can use these funds productively (Mishkin and Eakins, 2012). Besides that, it also helps to modernize financial regulations (Goldsmith, 1969), act as reflector of future economic development (Demirguc-Kunt and Levine, 1996) and catalyze economic progress (Levine, 1991).

The performance of the stock market, measured by stock returns volatility, is highly related with several macroeconomic factors. Based on Corradi et. al. (2013), macroeconomic variables contribute to 75 percent of changes in stock market volatility for the United States, and 73 percent of it comes from the seasonally adjusted industrial production index. Murungi (2012), using a dynamic method to measure stock returns volatility, believes that inflation is detrimental in influencing the stock returns volatility. This is supported by Ouma and Muriu (2014), who says that stock return variability is highly related not just to inflation but also to two additional factors, namely money supply and exchange rates.

In the meantime, the effect of economic liberalization towards stock returns volatility is still ambiguous. Researchers such as Levine and Zervos (1996) and Bachetta and Wincoop (2000) for instance tried to find the impact of economic liberalization and identified that stock market volatility will increase following the event of economic liberalization. It is similar with Stiglitz (2004), who states that financial liberalization will intensify stock market volatility due to pro cyclical nature of the capital market<sup>4</sup>. But these findings are contradicted with just as large number of studies such as Henry (2000), Wang (2007) and Umutlu et. al (2010), who shows that financial liberalization causes stock returns volatility to lessen.

In Malaysia, there are several analysis that have been employed such as Zulkarnain and Sofian (2012) who try to identify the relationship on index level and Ching and Siok (2013) that focus solely on the estimation of dynamic stock returns volatility. Unfortunately, investigations to assess dynamic stock returns volatility on individual firms based on economic sectors are scarce.

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<sup>1</sup>Based on OMT (On the Market Transaction) and DBT (Direct Business Transaction) average trading volume.

<sup>2</sup>Local traders hold 76 percent of market capitalization for securities in Bursa Malaysia.

<sup>3</sup>Total Accumulated Commodity Trade Value for Islamic Market is RM 1687.9 billion in 2014. Source: Bursa Malaysia Annual Report 2014.

<sup>4</sup>See Stiglitz (2004) for more details.

According to Bley and Saad (2011), one of the advantages of using individual firm panel data is that it can be used to identify relationship between variables on cross-sectional conditional volatility. Besides that, it also helps to avoid conceptual and econometric disturbances (Levchenko et. al., 2009). In the mean time, conducting the research on a sectoral basis will help to assist any firms on implementing accurate sector-rotation strategy.

Specifically, this study will analyze the relationships between macroeconomic factors and individual firms stock returns volatility based on dynamic volatility estimations where individual firms will be categorized into i) Primary economic sector, ii) Secondary economic sector, iii) Tertiary economic sector and iv) Financial sector. Apart from that, assessments will also be conducted to know whether previous shocks in the stock market are persistent in influencing current stock performance for each sectors as well as identifying whether negative news creates a bigger magnitude of impact on stock returns volatility compared to positive news<sup>5</sup>.

This research believes that obtaining accurate estimations of stock returns volatility for individual firms and understanding its relationship with macroeconomic factors in different economic sectors is crucial. Based on information obtained from this research, firms in a specific industry that is directly involved in the stock market will be able to construct the correct strategy in managing their portfolio and assisting policy makers in drawing ideal economic plans for the country. It will also broaden students' understanding on the stock market, particularly Bursa Malaysia.

The remainder of this study is organized as follows. In Section 2, we review related literatures that discuss the impact of macroeconomic factors towards stock returns volatility. Then, the study will explain methods used in estimating stock returns volatility and analyze the relationship between the macroeconomic factors and stock returns volatility in Section 3. Results analysis will be discussed extensively in Section 4 while Section 5 concludes the study.

### Related previous articles

Tarika et. al (2011) studied the impact of macroeconomic factors on stock returns in Taiwan by focusing on employment rate, exchange rate, GDP, Inflation and money supply. Exchange rate and GDP are proved to be detrimental in influencing stock returns of firms of all sizes, meanwhile money supply and inflation is said to be significant only for medium and small sized firms. Yaya and Shittu (2010) on the other hand focused on the effects of exchange rate and inflation using the QGARCH model and identified that these variables have a significant relationship towards stock returns volatility in the Nigerian Stock Exchange. This is supported by Ouma and Muriu (2014) who also found similar results on the Kenyan stock market. By using the OLS method, they recognized the strong connection with positive relationship between money supply measured by M2 and stock market volatility.

Economic liberalization also has greater importance, yet the direction of the impacts of liberalization is ambiguous. Edison et al. (2004) states that the reason why there is no consensus among researchers about the impact of financial liberalization on the economy is because of the mixture in empirical measures in previous studies<sup>6</sup>. In one strand of literatures, Bachetta and Wincoop (2000) said that after liberalization, volatility will increase and be more sensitive to external macroeconomic development volatility as more foreign investors flock into the local market. The economy will move from an insulated market to an open and vulnerable international integration that will lead to higher volatility, according to Bley and Saad (2011). Another reason is explained by Xu and Malkiel (2003), who reported that the idiosyncratic volatility will increase after liberalization because liberalization elevates firm specific information due to the increase in investment analyzed coverage. In contrast, other strand of literatures such as Christoffersen et. al (2004) use panel regression with Weighted Least Square (WLS) estimation and show that emerging market volatility of stock seems to have not been affected by stock market liberalization. Similarly, Hargis (2002) found that the opening of local market investment opportunity to foreign investors will create a large excess to capital, and any local financial weaknesses are coped by foreign investment that will eventually create a market with low level of volatility.

Acknowledging the influence of economic crisis on stock returns, Umutlu et. al. (2010) included the economic crisis as additional factors on their analysis. They divided 25 countries into small, medium and large GDP samples and discovered that Asian-Russian crisis as well as Peso crisis has a significant and positive relationship with volatility across all countries studied. This implies that during an economic recession, stock returns volatility will also increase as can be seen in any stock markets during depression.

Meanwhile the impact of interest rate can be found in the work of Nazir et. al (2010), where they analyzed the impact of interest rate together with other macro-economic factors, namely inflation, income per capita, exchange rate and stock performance index as well as political stability indicators towards stock return and volatility after Pakistani equity markets liberalization. Based on the EGARCH estimation method, they found that interest rate has lowering effects towards stock return. This is contradicted with the findings of Zulkarnain and Sofian (2012), who discovered a positive relationship between Base Lending Rate, a proxy to interest rates and stock returns volatility; although, the relationship is not significant<sup>7</sup>.

### Methodology

<sup>5</sup>This phenomenon is also known as the Leverage effects.

<sup>6</sup>See Edison et. al. (2004) for extensive analysis on factors that cause ambiguity of the impacts of economic liberalization.

<sup>7</sup>Refer to Subeniotis et. al. (2011), Abdul & Suleman (2012), Şebnem & Bengü (2012), Dubravka & Petra (2012) and Nopphon (2012) for further reading on the relationship between stock market performance and macroeconomic factors

The research collects individual firms' monthly stock price listed in Bursa Malaysia from Thomson Reuters Datastream together with other important macroeconomic data.

### 1. Dynamic stock returns volatility estimation

The estimation of volatility including stock return relies mostly on static standard deviation or variance in the past. But it contains a major weakness in estimating financial volatility since financial data is known to have variances which constantly change. In later years, Engle (1982) produced a method to estimate volatility of inflation through Autoregressive Conditional Heteroskedasticity (ARCH) and marked the beginning of dynamic volatility estimation method. ARCH models have been acknowledged by its ability to capture stylized features of real world volatility, and according to Wong and Kok (2005), it is superior to capture the stock market volatility. By accounting several aspects that will be elaborated later, this study decided to use an extension of ARCH model called Exponential Generalized Autoregressive Conditional Heteroskedasticity in order to estimate stock returns volatility.

Shown below is a case of ARCH (1) where the time varying variance ( $\sigma_t^2$ ) is a function of a constant term ( $\alpha_0$ ) and the squared error term of previous lag 1 period ( $\alpha_1 e_{t-1}^2$ ) taken from Hill et. al (2008) and Nelson (1991);

$$\gamma_t = \beta_t + e_t \tag{1a}$$

$$e_t | I_{t-1} \sim N(0, h_t) \tag{1b}$$

$$\sigma_t^2 = \alpha_0 + \alpha_1 e_{t-1}^2, \alpha_0 > 0, \quad 0 \leq \alpha_1 \leq 1 \tag{1c}$$

Based on this model, the study will be able to estimate the time-varying variances or volatility that depends on lagged effects (Hill et. al., 2008). But the main problem of ARCH (q) model is that the number of parameters in the model depends on the number of lags, and the accuracy of the model tends to decrease when the number of lags (q) increases.

Bollerslev (1986) then developed the Generalized ARCH (GARCH) to capture the long lagged effects with fewer parameters where;

$$\sigma_t^2 = \alpha_0 + \alpha_1 e_{t-1}^2 + \beta_1 \alpha_1 e_{t-2}^2 + \beta_1^2 \alpha_1 e_{t-3}^2 + \dots \tag{2}$$

This can be simplified into GARCH (1,1) model;

$$\sigma_t^2 = \alpha_0 + \alpha_1 e_{t-1}^2 + \beta_1 \sigma_{t-1}^2 \tag{3}$$

Extension of the GARCH (1,1) can be made to capture more lags in the squared error or error terms (q) and the conditional variance (p) to form GARCH (p,q) model;

$$\sigma_t^2 = \alpha_0 + \sum_{i=1}^q \alpha_i e_{t-i}^2 + \sum_{j=1}^p \beta_j \sigma_{t-j}^2 \tag{4}$$

Nelson (1991) realized the restriction of positive and symmetry constraint on GARCH model and later proposed the Exponential GARCH (EGARCH) models. There are several methods to express the conditional variance equation where one of the possible ways to express the EGARCH (1,1) model is;

$$\ln(\sigma_t^2) = \omega + \beta \ln(\sigma_{t-1}^2) + \gamma \frac{e_{t-1}}{\sqrt{\sigma_{t-1}^2}} + \alpha_1 \left[ \frac{|e_{t-1}|}{\sqrt{\sigma_{t-1}^2}} - \sqrt{\frac{2}{\pi}} \right] \tag{5}$$

Since the conditional variance is expressed in log, the model does not require the restriction of positive constraint on the estimated coefficients imposed by GARCH models, or in other words, the  $\sigma_t^2$  will always positive even though the parameters are negative.

Stock returns volatility estimation on this research will be measured from 1995 until 2015 by removing outliers based on the EGARCH (1,1) model as it produces the lowest Akaike Info Criterion and Schwarz Criterion. Eq. (1) will include one lagged monthly stock return (x) before EGARCH (1,1) estimation is regressed on each firms;

$$\gamma_{it} = \alpha_i + \beta_i x_{i,t-1} + e_{it} \tag{6}$$

Where;

$\gamma_{it}$  = monthly excess return of firm (i) in time (t).

$x_{i,t-1}$  = monthly stock return of firm (i) in time (t-1).

$e_{it}$  = error terms of firm (i) in time (t).

Stock return is calculated based on the formula shown below;

$$x_{it} = \log \left( \frac{p_{it}}{p_{i,t-1}} \right) \tag{7}$$

$x_{it}$  acts as a risk factor or monthly stock return of firm (i) in time (t), meanwhile  $p_{it}$  is the monthly stock price of firm (i) at time (t).

## 2. Leverage effects on stock returns volatility

The Exponential Generalized Autoregressive Conditional Heteroskedasticity (EGARCH) allows for the investigation of the asymmetric nature of stock returns volatility and identifies whether a similar scale of bad news and good news will produce the same impact towards stock returns volatility. Based on previous literature such as Engle and Ng (1993), bad news or negative shocks will produce greater volatility impacts compared to positive news with the same magnitude or scale where this condition is also called as Leverage Effect.

$$\ln(\sigma_t^2) = \omega + \beta \ln(\sigma_{t-1}^2) + \gamma \frac{e_{t-1}}{\sqrt{\sigma_{t-1}^2}} + \alpha_1 \left[ \frac{|e_{t-1}|}{\sqrt{\sigma_{t-1}^2}} - \sqrt{\frac{2}{\pi}} \right] \quad (8a)$$

The EGARCH estimation in this research is based on Eviews specification for conditional variance where;

$$\ln(\sigma_t^2) = \omega + \sum_{j=1}^q \beta_j \ln(\sigma_{t-j}^2) + \sum_{i=1}^p \alpha_i \left| \frac{e_{t-i}}{\sigma_{t-i}^2} \right| + \sum_{k=1}^r \gamma_k \frac{|e_{t-k}|}{\sigma_{t-k}^2} \quad (8b)$$

The  $\gamma \neq 0$  represents the asymmetric nature of shocks towards stock returns, which indicates that negative shock will not produce a similar impact towards the conditional volatility as a positive shock with identical scale. Meanwhile  $\gamma < 0$  signifies the existence of leverage effects where the negative news will produce greater shocks than positive news.

The study will then diagnose the persistency of shocks based on the value of ( $\beta$ ) where  $\beta \approx 1$  indicates that previous announcements or news are highly persistent in the time series and influences the volatility in present time.

## 3. Macroeconomic factors

Country or macroeconomic explanatory variables used in this research are selected based on empirical studies made by previous researchers and considering the availability of data for Malaysia. Macroeconomic factors included in this research are the economic development (measured by GDP per capita), exchange rate (Ringgit Malaysia/USD), Consumer Price Index (a proxy for inflation), interest rate (measured by Base Lending Rate), financial crisis (Dummy), money supply (measured by M2) and economic liberalization (Measured by CI, LMF and MI). All variables are expressed in log except for economic liberalization and financial crisis.

Due to the unavailability of monthly data, quarterly GDP per capita will be transformed into monthly basis by using the Cubic; Match Last frequency conversion method available on Eviews 7. Meanwhile, the effects of the Asian financial crisis in 1997/98 and global financial crisis 2007/09 are included in the study by incorporating dummy variables in the model where 1 represent financial recession period from 1997 until 1999 as well as 2007 until 2009 meanwhile 0 represents others.

In order to understand the impact of economic liberalization in Malaysia, this paper uses three methods to achieve stronger assessment and identify the difference in estimations between these three measures.

### i. Chinn and Ito (CI) Index

Constructed by Chinn and Ito (2007) based on IMF's Annual Reports on Exchange Arrangements and Exchange Restrictions (AREAER), CI is grouped on a type of liberalization measure called *De Jure*, which is a liberalization index that assesses the official restrictions of international financial flows. This study retrieves the data from the Chinn and Ito online database<sup>8</sup>.

### ii. Monetary Independence (MI) Index

MI index is also based on the IMF's report of AREAER, where it depends on the annual correlation of the monthly interest rates between home country and base country. The data is retrieved online from the Trilemma Indexes database<sup>9</sup>.

### iii. Lane and Milesi-Ferreti (LMF) index

LMF measures are developed specifically to reflect the country's actual degree of financial integration. The capital flows used to measure cross-border transaction restrictions is separated into i) net foreign direct investment, ii) net portfolio equity investment, iii) net debt portfolio investment and iv) net other investments including loans and trade finance (Reinhardt, Ricci and Tressel, 2010). LMF index is retrieved from the External Wealth of Nation II online database developed by Lane and Milesi-Ferretti (2007)<sup>10</sup>.

## 4. Random effects (Feasible Generalized Least Squares) estimator

Fixed effects and random effects estimations are commonly used in panel data analysis. According to Verbeek (2012), the fixed effects model is based on least squares estimation. Meanwhile, random effects model is based on generalized least squares or GLS. Depending on the Hausman Test, generalized least squares regression is preferable in this analysis compared to fixed

<sup>8</sup> See Chinn and Ito (2008) for further explanation about the CI or also known as KAOPEN index.

<sup>9</sup> CI index is regularly analyzed together with MI index in Trilemma Indexes to analyze economic liberalization.

<sup>10</sup> LMF is the most widely used measure in group of liberalization measures called de facto (Quinn, Schindler and Toyada, 2011)

effects model because it enables this study to assess the effects of time in-variant individual variables. Besides that, GLS estimator also produces smaller variance, which is preferable when compared to least squares estimation (Hills et. al., 2008).

**Result analysis**

Table 1: EGARCH statistical summary for selected firms in Bursa Malaysia

Statistics	Primary	Secondary	Tertiary	Finance
Percentage of firm with persistent volatility	88%	94%	93%	100%
Percentage of firm with negative asymmetry (Leverage Effects)	33.3%	79.6%	77%	91%

Table 1 shows the summary statistics for stock returns volatility based on dynamic estimation of EGARCH by removing firms with outliers and selecting 299 active firms that have been listed in the Bursa Malaysia since 1995. The majority of firms in all economic sectors experience persistent volatility in the stock returns measured by the total number of firms with significant ( $\beta$ ) in the EGARCH model, which suggests the importance of previous volatility influence towards current stock return performance.

Data analysis also shows that majority of firms in secondary, tertiary and financial sectors exhibit leverage effect. This indicates that negative news brings a larger magnitude of volatility compared to positive news with similar scale. But there is an exception in the findings as demonstrated by the primary sector, where only 33.3 percent of firms show signs of the leverage effect.

Based on the estimation of dynamic stock returns volatility of individual firms by using EGARCH, the analysis is continued by regressing the volatility or  $\ln(\sigma_t^2)$  estimated with macroeconomic factors, namely the economic crisis, interest rate, inflation, exchange rate, economic development, money supply and economic liberalization as independent variables. The study analyzed 12 different panel data based on GLS estimation in order to assess the impact of three types of economic liberalization measures on four economic sectors. The GLS estimation is selected after conducting the Hausman Test which indicates the suitability of random effect estimation. The results are shown in Table 2 – 4 below;

Table 2: Generalized Least Squares (GLS) statistical summary on the regression between stock returns volatility and macroeconomic factors with Chinn & Ito liberalization index

Independent Variables	Primary	Secondary	Tertiary	Finance
Constant	-0.025431*** (-3.724414)	-0.103916*** (-6.073337)	-0.028357*** (-4.009436)	-0.016995*** (-2.649165)
Economic Crisis	0.000807*** (6.740481)	0.000562* (1.870947)	0.000856*** (6.901818)	0.000966*** (8.584169)
Interest Rate	0.014672*** (19.27934)	0.023695*** (12.40579)	0.014752*** (18.70217)	0.013146*** (18.37195)
CPI	0.047129*** 6.938544	0.020512 1.203255	0.050180*** 7.127578	0.063885*** (10.00288)
Exchange Rate	0.050209*** (19.64218)	0.075458*** (11.76175)	0.051610*** (19.47953)	0.055923*** 23.26724
GDP	-0.050777*** (-16.86530)	-0.066369*** (-8.783090)	-0.044846*** (-14.37074)	-0.053520*** (-18.90545)
Money Supply	0.009206*** (4.479062)	0.024004*** (4.653145)	0.006821*** (3.201696)	0.006446*** (3.335220)
CI	-0.000874* (-1.935291)	0.002442** (2.153344)	-0.000184 (-0.393346)	-0.001129*** (-2.656334)
R-Squared	0.179700	0.023173	0.174106	0.416496
Adj. R-Squared	0.179273	0.022981	0.173676	0.415716
F-Stat (Prob.)	420.7334 (0.000000)	120.5141 (0.000000)	404.8734 (0.000000)	533.9107 (0.000000)

Chin & Ito (CI) has been used as a measure of economic liberalization, where the data is available until 2014. T-statistics are shown in parentheses. \*, \*\*, \*\*\* indicate statistical significance at 10%, 5% and 1% level, respectively.

All macroeconomic factors are significant in influencing the stock returns volatility as shown in Table 2 except for consumer price index, a proxy to inflation and economic liberalization for secondary and tertiary sectors respectively. Gross domestic product has a negative relationship with stock returns volatility in all economic sectors, which shows that when GDP falls, volatility of stock returns will increase.

Similar to the finding of Bley and Saad (2011), economic liberalization is proved to have lowering effects towards stock returns volatility shown by the negative coefficient of CI. It suggests that when Malaysia improves its economic liberalization, it contributes to lower stock returns volatility. All remaining sectors exhibit a positive relationship with stock returns volatility, where the increase of macroeconomic variables such as exchange rate and economic crisis lead to more volatility in the stock market.

Table 3: Generalized Least Squares (GLS) statistical summary on the regression between stock returns volatility and macroeconomic factors with Lane & Milesi-Ferretti liberalization index

Independent Variables	Primary	Secondary	Tertiary	Finance
Constant	0.079073*** (5.507461)	-0.034495*** (-3.119917)	0.019263 (1.713733)	0.049907*** (4.896853)
Economic Crisis	0.000737*** (4.416659)	-7.23E-05 (-0.462082)	0.000619*** (3.897471)	0.001044*** (7.246773)
Interest Rate	0.015227*** (7.721113)	0.022276*** (19.66595)	0.016201*** (14.07262)	0.010889*** (10.42798)
CPI	-0.040297*** (-2.681835)	-0.049840*** (-3.645606)	0.013532 (0.973880)	-0.009257 (-0.734768)
Exchange Rate	0.027920*** (4.982844)	0.062914*** (18.02163)	0.042614*** (12.01008)	0.047784*** (14.85558)
GDP	-0.002384 (-0.290960)	-0.042110*** (-7.813451)	-0.024556*** (-4.482868)	-0.027333*** (-5.504393)
Money Supply	-0.002069 (-0.502433)	0.021400*** (7.419596)	0.001572 (0.536362)	0.003578 (1.346330)
LMF	0.008663*** (11.84675)	0.006429*** (8.103676)	0.004922*** (6.104246)	0.006125*** (8.378811)
R-Squared	0.190238	0.113504	0.177485	0.432304
Adj. R-Squared	0.189622	0.113244	0.176859	0.431194
F-Stat (Prob.)	308.6321 (0.000000)	436.4243 (0.000000)	283.4785 (0.000000)	389.3470 (0.000000)

Lane & Milesi-Ferretti (LMF) has been used as a measure of economic liberalization, where the data is available until 2007. T-statistics are shown in parentheses. \*, \*\*, \*\*\* indicate significance at 10%, 5% and 1% level, respectively.

It appears that all variables are also significant in influencing stock returns volatility when LMF is used as a proxy to economic liberalization. These macroeconomic factors influence stock returns volatility with different magnitudes of impact across different economic sectors. Inflation produces the largest impact towards stock returns volatility in primary sectors, meanwhile exchange rate has become a dominant contributor of volatility in secondary, tertiary and financial sectors. LMF, which is a proxy for economic liberalization, seems to have a significant and positive relationship with stock returns volatility. It is contradicted with the findings in Table 2, where CI is proved to have negative association with volatility.

Table 4: Generalized Least Squares (GLS) statistical summary on the regression between stock returns volatility and macroeconomic factors with Monetary Independence liberalization index

Independent Variables	Primary	Secondary	Tertiary	Finance
Constant	-0.031828*** (-3.784597)	-0.077171*** (-13.73666)	-0.030266*** (-5.698569)	-0.025764*** (-5.349612)
Economic Crisis	0.000710*** (4.154873)	0.000790*** (6.927119)	0.000928*** (8.613928)	0.000925*** (9.470174)
Interest Rate	0.015051*** (13.10049)	0.018996*** (24.77072)	0.014412*** (19.89757)	0.013341*** (20.30596)
CPI	0.048320*** 4.596510	0.011778 1.678555	0.045907*** (6.926980)	0.061921*** (10.30074)
Exchange Rate	0.050740*** (13.80216)	0.067725*** (27.60091)	0.051415*** (22.18496)	0.056169** (26.71944)
GDP	-0.050772*** (-11.02727)	-0.059971*** (-19.51443)	-0.044100*** (-15.19308)	-0.052647** (-19.99635)
Money Supply	0.009458*** (3.267794)	0.021628*** (11.19500)	0.007430*** (4.071689)	0.007108*** (4.294624)
MI	0.000434 (0.669999)	0.001205*** (2.786908)	0.000671 (1.642867)	0.001151*** (3.106280)
R-Squared	0.076333	0.094463	0.178100	0.422257
Adj. R-Squared	0.075876	0.094291	0.177694	0.421524
F-Stat (Prob.)	167.0765 (0.000000)	547.0997 (0.000000)	438.0918 (0.000000)	575.5115 (0.000000)

Monetary Independence Index (MI) is used as a measure of economic liberalization, where the data is available until 2015. T-Statistics are shown in parentheses. \*, \*\*, \*\*\* indicate statistical significance at 10%, 5% and 1% level, respectively.

Results in Table 4 strengthen the findings that all macroeconomic factors are significantly and positively related towards stock returns volatility except for gross domestic product, where the impact is negative. It is identical to the findings of previous researchers who found a positive relationship between stock returns on money supply and exchange rate (Bing, 2012) and inflation (Vanita & Arnav, 2014). Similar to LMF, MI also contributes to the increase in stock returns volatility, although it is not significant in influencing volatility for primary and tertiary sectors.

This study believes that the change in direction of the relationship between CI and LMF as well as MI towards stock returns volatility happens because these indexes measure economic liberalization in different contexts. CI measures liberalization based on the country's legal restrictions published by the IMF on the AREAER meanwhile LMF evaluates it based on foreign equity and direct assets as well as liabilities. MI on the other hand estimates economic liberalization based on the correlation of the interest rate in Malaysia based on a base country (Aizenman, Chinn and Ito, 2008). This provides further evidence on the claim previously made by Edison et. al. (2004), where one of the reasons for the ambiguity on the impact of economic liberalization on stock returns performance is due to the difference in empirical measures used by earlier studies.

## Conclusion

This paper investigates the impact of macroeconomic variables namely economic crisis, interest rate, inflation, exchange rate, economic development, money supply and economic liberalization towards stock returns volatility in four economic sectors. Firstly, the analysis shows that current stock returns volatility, measured by the EGARCH is persistent in influencing future stock returns performance across all economic sectors. Also, leverage effects are present in the secondary, tertiary as well as financial sectors; meanwhile the primary sector exhibit positive asymmetry in the stock returns where good news delivers greater impact towards stock returns volatility compared to bad news with similar magnitude.

Results from generalized least squares (GLS) regressions imply that all selected economic variables are significant in affecting stock returns volatility where inflation, exchange rate and economic growth are proved to be the major factors in determining the performance of stocks in all sectors. The investigation also shows that all economic factors except for economic growth are positively related to stock returns volatility suggesting that an increase in any of the determinants will elevate volatility. Nonetheless, the values of the coefficients of explanatory variables are different across economic sectors and shows that macroeconomic factors will bring different magnitudes of impact in the stock returns volatility for different economic sectors. In this study, three different types of economic liberalization are used in order to assess its impact on stock returns volatility. It is shown that the economic liberalization can either increase or lower stock returns volatility depending on what type of liberalization measures are used. Both LMF and MI are proved to cause stock returns volatility to increase, meanwhile the effects of CI are reversed. The difference in liberalization measures used explains why previous researchers found contradicting results in finding the relationship between stock returns volatility and economic liberalization.

As Bursa Malaysia will continue to grow in terms of trade value and number of participating firms, this study is important to assist both policymakers and firms. It is suggested that any policies implemented by regulators that will make these macroeconomic factors to shift should be assessed in depth so that it will not indirectly make stock returns volatility increase, which will eventually harm the financial market of Malaysia.

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