Original Article

Impact of macro factors on stock market capitalization

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Abstract: This article studies the impact of macro factors on the market capitalization of countries around the world. The study uses inflation, interest rates, exchange rates, GDP growth and foreign direct investment as a proxy for macroeconomic factors. Data for all variables are collected for the period 2008-2019. Estimation methods for the balanced panel data are used in this study. The results from the generalized method of moments (GMM) show that inflation, interest rates and foreign direct investment are important factors that significantly affect the capitalization of the stock market. The higher the net foreign direct investment capital, the more support for the development of the stock market. Conversely, higher inflation and interest rates will hinder stock market development in these countries. In addition, the study results confirm that developed stock markets have significantly higher capitalization values than the rest.

Keywords: Exchange rate, foreign direct investment, inflation, gross domestic product growth, interest rate, market capitalization.

1. Introduction

Market capitalization is an important market indicator of a stock's value and a company's value (Toraman et al., 2009; Dias, 2013), as well as evaluating the investment performance of the stock market. Bryan et al (1998) argue that huge market capitalization gives companies a real advantage in acquiring other companies and seizing global growth opportunities while protecting them from being acquired. In contrast, slow growth of market capitalization makes a company vulnerable to takeovers, especially as the global stock market becomes more integrated. As a result, public companies face a market capitalization imperative: they must become and remain global growth companies, or risk losing control of their destiny.

Statistics on the World Bank website record that the total market capitalization of the global stock market increased from 2.53 trillion USD in 1980 to 93.69 trillion USD in 2020, showing that the stock market is growing and becoming more attractive to investors. Several previous studies found that macroeconomic fluctuations have a significant effect on stock market capitalization. However, these conclusions were drawn only in one country (Maghyereh, 2002; Kyereboah-Coleman & Agyire-Tettey, 2008; Adam & Tweneboah, 2009) or a region (Garonfolo, 2011; Raza & Jawaid, 2014; Phuong, 2020a, 2020b) which makes the research results very specific. Therefore, it is necessary to study objectively and evaluate the impact of macro factors on the capitalization value of stock markets in the world. Consequently, this article studies the impact of macro factors on stock market performance.

The contribution of the study is reflected in the following aspects: (i) Providing empirical evidence on the influence of macro factors on the stock market capitalization of countries around the world. (ii) Retesting that more developed stock markets attract more capital into the stock market, or have higher market capitalization. (iii) Finally, the research results provide a reference channel for investors to consider and adjust their investment portfolio appropriately to achieve the best performance in the current period of globalization. It also provides a source of reference information for businesses and policy managers to promptly respond to the general fluctuations of the economy.

2. Literature review and hypothesis

2.1. Literature review

The efficient market theory of Fama (1970) states that the more efficient a stock market is, the faster it will reflect the factors that affect it. In other words, the stock market's movements will reflect all the macro factors of the economy and the market's expectations in the future for these factors.

The economic cycle theory states that during the recovery period, the economy grows strongly, causing GDP to increase sharply and at this time inflation also begins to increase. When GDP increases to the maximum, inflation also increases and is maintained until GDP changes direction to decrease. At a later stage, when GDP declines, inflation also gradually decreases and eventually bottoms out. After bottoming, the economy recovers and a new cycle begins (NBER, 2011). This theory has provided us with more information about the fluctuations of macro factors in each economic period. Thereby, the analysis of macro factors should pay attention to the level of development of each economy and the context in the research period.

2.2. Hypotheses

Basically, the value of an asset will be determined by the cash flow that will be generated from that asset with the discount rate, which is very sensitive to macro factors. Because the discount rate will depend on investors' requirements for future cash flow fluctuations (Oyama, 1997). A company's future cash flows on the stock market will be affected by its own business. Therefore, market capitalization is used to analyze the overall performance of the stock market (Prescott et al., 1986; Mwalukumbi, 2011).

Inflation and market capitalization

Previous empirical studies showed the relationship between inflation and market capitalization. Kyereboah-Coleman and Agyire-Tettey (2008) showed a negative influence of this factor on market capitalization. When inflation increases, the company's operating costs and the cost of capital for investors increase, making the stock market less attractive. Inflation negatively impacted market capitalization for banks in the Middle East (Qurashi & Zahoor, 2016), markets in Keyna (Oriwo, 2012; Mjomba, 2017) and in Nigeria during 1986-2015 (Odiche & Udeorah, 2020). However, research by Garonfolo (2011) and Ndunda (2016) showed that inflation has a

positive impact on market capitalization, but not significantly. It can be seen that previous studies indicate a significant negative effect of inflation on stock market performance. Therefore, the study hypothesized H1 as follows:

H1: Inflation has a negative impact on market capitalization.

Interest rates and market capitalization

The empirical results of the above studies showed that almost all interest rates have a negative relationship with market capitalization. Because, when interest rates increase, the operating costs of companies listed on the exchange will increase because interest rates are considered a fixed part of the business (Kyereboah-Coleman & Agyire-Tettey, 2008). Not only that, the study of Lipsey and Chrystal (2011) concluded that rising interest rates also indicate that the government is tightening monetary policy. At this time, investors are also more cautious, thereby making the stock market less attractive. However, there are a few studies by Garonfolo (2011) and Çiftçi (2014) that do not find an impact of interest rates on stock market performance. Therefore, we hypothesize H2 as follows:

H2: Interest rates have a negative impact on market capitalization.

Exchange rates and market capitalization

Exchange rates are believed to be an important factor in determining stock market performance (Solnik, 1987; Ma, 1990). When the local currency depreciates, investors will benefit (Kyereboah-Coleman & Agyire-Tettey, 2008). The positive effect of the exchange rate on the stock market is shown by the appreciation of the local currency, which will reduce input costs, thereby increasing the stock market performance (McConnell, 2008). However, there are a few studies that do not find an impact on market capitalization by the exchange rate, such as in the Middle East (Qurashi & Zahoor, 2016), Sub-Saharan Africa (Garonfolo, 2011). Therefore, this paper proposes the following hypothesis H3:

H3: The exchange rate has a positive effect on market capitalization.

Economic growth and market capitalization

Studies by Chen et al. (1986), Geske and Roll (1983), Mukherjee and Naka (1995) all conclude that there is a significant positive influence of gross domestic product (GDP) growth on stock market performance. They argue that an increase in economic output will increase future cash flows, thereby creating more investment opportunities in the stock market (Chen et al., 1986; Geske & Roll, 1983; Mukherjee & Naka, 1995). In contrast, some studies show the opposite effect of these two variables such as Garonfolo (2011) in Sub-Saharan Africa, Wang and Ajit (2013) in China, Qurashi and Zahoor (2016) in the Middle East. Therefore, this study proposes the following hypothesis H4:

H4: GDP growth rate has an impact on market capitalization.

Foreign direct investment (FDI) and market capitalization

Adam and Tweneboah (2009) found a positive relationship between FDI and stock market capitalization in Ghana. FDI increases the likelihood of MNCs listing on the stock market (Alfaro et al., 2010). In both the short and long run, FDI has a significant impact on the development of the stock market (Shahabaz et al., 2013). It is positively associated with stock market capitalization in the short term in Nigeria (OlugBenga & Grace, 2015) and in the long term in Pakistan (Raza et al., 2015). In addition, some studies suggest that foreign direct investment has no significant impact on market capitalization (Odo et al., 2016). In the current trend of economic integration, this article proposes the following hypothesis H5:

H5: Foreign direct investment has a positive effect on market capitalization.

Stock market development and market capitalization

Besides these 5 hypotheses, the article tests a sixth hypothesis based on Phuong's view (2020a) to test whether a more developed stock

market contributes significantly to the increase in overall capitalization of the stock market or not. Therefore, hypothesis H6 is proposed as follows:

H6: The stock market has a level of development that contributes significantly to the increase in global capitalization.

3. Data and methodology

3.1. Data

To achieve the research objective, the study was conducted in countries with sufficient data for all variables collected from 2008 to 2019. Data is taken from the Data World Bank database. Markets are graded according to Morgan Stanley Capital International's criteria for the collected data set.

3.2. Methodology

3.2.1. Model

To determine the macro factors affecting the market capitalization value in the studied countries, based on collected data and previous studies, the study uses the following model:

$$LnMRC = \beta_0 + \beta_1 INF_{i,t} + \beta_2 LnINTR_{i,t} + \beta_3 LnOER_{i,t} + \beta_4 GDPG_{i,t} + \beta_5 FDII_{i,t} + \beta_6 class + u_{i,t}$$

Where:

Dependent variable (*LnMRC*): Represents market capitalization, calculated as the logarithm of market capitalization as % of GDP.

Independent variables:

$INF_{i,t}$: Represents inflation, as measured by the annual consumer price index. $LnINTR_{i,t}$: Represents the interest rate, expressed as the logarithm of the % difference between the annual loan and deposit rates. $LnOER_{i,t}$: Represents the exchange rate, expressed in logarithms of the local currency's official exchange rate against the US dollar. $GDPG_{i,t}$: Is the annual GDP growth rate. $FDI_{i,t}$: Represents FDI, calculated as a ratio of net foreign investment inflows to GDP. *Class*: is a dummy variable, taking the value 1 if the market is developed (Singapore and Hong Kong) and taking the value 0 for the rest of the markets. Markets receiving zero value include nine emerging markets (i.e.: Brazil, China, Colombia, Egypt, Indonesia, Korea, Malaysia, Mexico, Peru; three frontier markets (Jordan, Mauritius, Vietnam), and a standalone market (Panama). This classification is based on the criteria of Morgan Stanley Capital International (https://www.msci.com/).

3.2.2. Estimation method

Panel data estimation techniques are applied in the regression model. First, we test the fit of the model by the coefficient of determination R2. It helps to assess the fit of the model with the research sample and shows the explanatory level of the independent variables with the variation of the dependent variable. Second, check for multicollinearity using the correlation coefficient and using the variance exaggeration (Farrar & Glauber, 1967). Third, F-test and Hausman test to choose the appropriate model (Hausman, 1978). The consequence of heteroscedasticity makes the estimates obtained by the OLS method stable but ineffective, the regression coefficients are no longer reliable. Therefore, the White test (1980) is used to check for heterogeneity problems, and the Wooldridge test (2002) is used to test the autocorrelation between the errors. If the model has heterogeneity and autocorrelation, then the feasible generalized least squares (FGLS) estimate is used after these phenomena have been overcome. However, the FGLS model can be endogenous because the variables can have a bidirectional relationship. Therefore, the generalized method of moments (GMM) estimation is preferred because it can both overcome problems such as the FGSL model and also overcome the endogenous phenomenon in the research model.

4. Research results and discussion

4.1. Descriptive statistics

The descriptive statistics in Table 1 show that:

Market capitalization (LnMRC) has a minimum value of 2.3050 in an emerging market. In Egypt in 2016, the largest value was 7.2075. The Hong Kong SAR in 2019, had a mean of 4.1827 and the standard deviation was 0.9826.

Inflation (INF) in the study countries had an average value of 4.3067, a minimum of -0.8769 in Jordan in 2015 and a maximum of 29.5066 in emerging market Egypt in 2017.

Table 1: Statistical results of data used in the model

Variable	Obs	Mean	Std. dev.	Min	Max
LnMRC	180	4.1827	0.9826	2.3050	7.2075
INF	180	4.3067	4.0092	- 0.8769	29.5066
LnINTR	180	1.5277	0.7657	- 0.6444	3.6802
LnOER	180	3.2999	3.3532	- 0.3430	10.0454
GDPG	180	2.8339	2.9008	- 6.6742	12.5085
FDII	180	6.8501	9.2662	- 0.2045	58.5188
Class	180	0.1333	0.3409	0	1

Source: Compiled by the authors.

The average spread (LnINTR) is 1.5277 and standard deviation is 0.7657. This variable had a low of -0.6444 and a high of 3.6802 in two markets, Mauritius in 2010 and Brazil in 2016.

The exchange rate (LnOER) has a mean of 3.2999 with a standard deviation of 3.3532. The minimum and maximum values of this variable in both frontier markets were -0.3430 in Jordan in 2008 and 10.0454 in Vietnam in 2019.

GDP growth (GDPG) of the 15 countries studied in the period 2008-2019 averaged 2.8339 with a standard deviation of 2.9008. The minimum value of -6.6742 in Mexico in 2019 represents the state of the economy of the country was not good. The maximum value of 12.5085 in Singapore in 2010 was in a developed market.

Net foreign direct investment (FDI) averaged 6.8501 with a standard deviation of 9.2662; the minimum value was -0.2045 in the emerging market of Egypt in 2011, and the maximum value of 58.5188 was in Hong Kong's developed market SAR in 2015.

Table 2: Matrix of correlation coefficients between pairs of variables

	LnMCR	INF	LnINTR	LnOER	GDPG	FDI
LnMCR	1.0000					
INF	- 0.3688*	1.0000				
LnINTR	- 0.1040*	0.1318*	1.0000			
LnOER	- 0.2333*	0.1467*	- 0.2813*	1.0000		
GDPG	- 0.1214*	0.0140*	- 0.2323*	0.2077*	1.0000	
FDI	0.7504*	- 0.1164*	0.0784*	- 0.2509*	- 0.0129*	1.0000

Source: Calculations by the authors.

In Table 2, the correlation between the dependent variable LnMCR and the independent variables INF, LnINTR, LnOER, GDPG, FDI is shown as follows: LnMCR is only positively

correlated with the FDI variable and has statistical significance. For variables INF, LnINTR, LnOER, GDPG and LnMCR, all show negative correlation and have statistical significance. The correlation coefficient test in Table 3 shows that there is no serious multicollinearity because the correlation coefficient between the pairs of variables is less than 0.8 (Farrar & Glauber, 1967).

Table 3: Test of multicollinearity using variance inflation factor (VIF)

Variable	VIF	1/VIF
CLASS	4.37	0.2291
FDI	4.31	0.2322
LnOER	1.21	0.8231
LnINTR	1.17	0.8543
GDPG	1.13	0.8875
INF	1.08	0.9232
Mean VIF	2.21	

Source: Calculations by the authors.

Based on Table 3, the results of all variables have VIFs less than 10, so multicollinearity in the model is assessed as not serious.

4.2. Results and discussion

In Table 4, the F-test - comparison test between the two OLS and FEM models, shows FEM is the better model. In the Hausman test, the FEM model is more suitable than the REM model. However, these models suffer from heterogeneous variance (White test) and autocorrelation (Woodridge test), so the FGLS model is used to overcome these phenomena. On the other hand, the FGLS model is endogenous, so the most reliable result is the GMM model. Therefore, the discussion of factors affecting market capitalization is done on the GMM model.

The regression results from the GMM model confirm hypotheses H1, H2, H5, H6 but do not confirm hypotheses H3 or H4. The next section will analyze and discuss related research results for statistically significant variables.

Table 4: Regression results with dependent variable LnMRC

	OLS	FGLS	GMM
INF	- 0.056***	- 0.031***	-0.022*
LnINTR	- 0.195***	- 0.145***	-0.018*
LnOER	- 0.008	- 0.016	0.006
GDPG	- 0.033***	- 0.014	0.003
FDII	0.035***	0.012	0.005*
class	1.310***	1.759***	1.489*
L1LnMRC			0.480*
_cons	4.421***	4.301***	2.139**
N	180	180	165
R - squared	72.71%		
Adjusted R2	71.76%		
F-test	F (14, 160) = 45.06	Prob > F = 0.0000	
Hausman test	Chi2 (5) = 8.15	Prob > chi2 = 0.1481	
White test	chi2(20) = 68.88	Prob > chi2 = 0.0000	
Wooldridge test	F(1, 14) = 347.325	Prob > F = 0.0000	
AR(1)		0.081	
AR(2)		0.567	
Sargan test		0.995	
Hansen test		0.805	

Notes: ***, **, * are symbols for 1%, 5%, and 10% significance levels, respectively.

Source: Calculations by the authors.

Inflation (INF): Through the regression results for data of 15 countries in the world for the period 2008-2019, inflation, as expected, has a negative coefficient with a significance level of 10%, showing a negative relationship between these two variables. This result is appropriate because in an economy with high inflation, people need to tighten their spending, and input costs of businesses increase. These lead to less attractive stock prices and tighter stock market cash flows. This result is consistent with the research results of Oriwo (2012) in Kenya, Kyereboah-Coleman and Agyire-Tettey (2008) in Ghana, Qurashi and Zahoor (2016) for banks in the Middle East. This conclusion does not support the study of Garonfolo (2011) in sub-Saharan Africa or Ndunda (2016) in Nairobi.

Interest Rate (LnINTR): The normalized beta of the variable LnINTR is less than zero, indicating that interest rate differentials have a negative impact on LnMRC. In other words, as interest rate differentials increase, market capitalization decreases. This result argues that the increase in lending interest rates directly affects the cost of enterprises, increasing the cost for investors to use borrowed capital. As a result, businesses have to face the possibility of profit decline, making them think more carefully about expanding production and investors when participating in securities have to recalculate profits due to increased costs. In addition, rising interest rates increase the opportunity cost of holding cash and potentially lead to a substitution effect between stocks and other interest rate instruments by investors. In other words, if interest rates increase, part of the cash flow will transfer money from securities investment to other more attractive channels or lead to investment in safer channels like government bonds. These reasons make the stock investment channel less attractive. In addition, when bank interest rates increase, the borrowing costs of businesses, especially those with low financial credibility, will increase. At the same time, the cost of equity increases, making profits decrease and the intrinsic value of the business decreases. This result is consistent with the study of Maghayereh (2002), Bernanke and Kuttner (2005).

Net foreign direct investment (FDI): The regression results show that FDI inflow is an important factor in the development of the stock market. The regression coefficient is positive and statistically significant, showing the positive impact of FDI on market capitalization. This result clarifies the question of Raza and Jawaid (2014) that FDI inflows do not compete with the domestic stock market but support the development of the stock market. It is similar to and supports research findings on the Nigerian stock market (OlugBenga & Grace, 2015) and in Ghana (Adam & Tweneboah, 2009). Hong Kong and Singapore have the highest average capitalization of the group of stock markets included in the data sample. These are also two developed markets with a net FDI inflow ratio of 34.3 and 20.4 respectively in the period 2008-2019, significantly higher than the average value of all fifteen markets of 6.8. This implies that a part of FDI inflows contributed by investors through share trading can help the liquidity of the stock market to increase. Therefore, the transaction value can increase and make the securities investment channel more attractive.

The regression coefficient of the class variable is positive and statistically significant, showing that the market rating has a positive impact on the capitalization value of the stock market. Markets with higher ratings attract more capital to invest in the stock market. This result is similar to the previous study of Phuong (2020a).

5. Conclusion and implications

5.1. Conclusion

To determine the macro factors affecting the capitalization value of stock markets in the world, this study conducts tests for countries with data of all variables in the research model continuous from 2008 to 2019. Inflation rates, interest rates, exchange rates, GDP growth and foreign direct investment are the annual macro factors of the 15 countries examined. The dependent variable is the ratio of capitalization to GDP used on the last trading day of each year. The GMM estimation method for the balanced

panel data shows that factors such as inflation, interest rates and foreign direct investment have a significant impact on the countries studied. In addition, stock markets develop and contribute significantly to the overall capitalization of the group of countries studied. The research results provide some implications for policy makers, businesses and investors.

5.2. Implications

For policy makers: Macro factors play an important role for investors in determining the country of investment. Therefore, policy managers need to pay attention to macroeconomic stability (such as inflation and interest rates) in order to create a solid foundation for attracting domestic and foreign capital into the stock market. Besides, research shows that attracting FDI has a supporting role for the development of the stock market through increasing market capitalization. Therefore, governments, especially those that are not classified as emerging stock markets such as Vietnam, Jordan, Mauritius and Panama, need solutions to attract FDI because this capital both helps to contribute to growth and helps to support the development of the stock market.

The results of this study also show that the more developed stock markets have significantly higher capitalization values than the less developed stock markets. Therefore, the implication for countries in the lower group is that they need to pay attention to macroeconomic stability and have solutions to attract FDI in a sustainable and long-term way to contribute to the development of the stock market.

For businesses: High inflation and interest rates will negatively affect the development of the stock market. This implies that businesses need to be proactive in responding to changes in macro factors, such as adjusting capital structure appropriately when inflation and interest rates start to tend to increase, to ensure business performance. This is especially important for those businesses that are using high financial leverage.

For investors: Investors need to consider the impact of macro variables on stock market performance to have a better overview in making investment decisions. The research results show that the variables of inflation and interest rates have a negative impact on the market capitalization value. Therefore, investors need to have an effective portfolio management plan when these factors increase because a drop in market capitalization can cause huge losses for investors. Meanwhile, FDI is a variable that has a positive impact with market capitalization. When this net capital inflow increases, investors can benefit from the stock market. In addition, investors need to consider these factors according to the characteristics of the industry and business to ensure the highest investment efficiency.

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