THE EMPIRICAL RELATIONSHIP BETWEEN MACROECONOMIC VARIABLES AND STOCK RETURNS: EVIDENCE FROM MALAYSIA AND THAILAND

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บทคัดย่อ

ผลตอบแทนของหุ้นในตลาดเกิดใหม่มีความผันผวนสูง อย่างไรก็ตามการศึกษาที่ เกี่ยวกับปัจจัยพื้นฐานซึ่งผลักดันให้เกิดความผันผวนนี้มีค่อนข้างจำกัด บทความนี้ใช้ดัชนีชี้วัดของ MSCI และอัตราผลตอบแทนของตั๋วเงินคลัง 3 เดือนของสหรัฐอเมริกาเป็นตัวแทนในการตรวจสอบผลกระทบของตัวแปรระหว่างประเทศ นอกจากนี้ บทความนี้ยังศึกษาปัจจัยทางเศรษฐกิจมหภาคที่สำคัญ ได้แก่ อัตราแลกเปลี่ยน อัตราดอกเบี้ย การผลิตภาคอุตสาหกรรม และปริมาณเงินของประเทศมาเลเซียและประเทศไทย เพื่อดูว่าตัวแปรแต่ละตัวสามารถอธิบายถึงผลตอบแทนของหุ้นได้หรือไม่ จากการศึกษาแบบจำลอง vector autoregressive (VAR) ซึ่งประกอบไปด้วยตัวแปรอิสระ 6 ตัวแปร ได้แก่ อัตราแลกเปลี่ยน อัตราดอกเบี้ย การผลิตภาคอุตสาหกรรม ปริมาณเงิน ดัชนีชี้วัด MSCI และอัตราผลตอบแทนของตั๋วเงินคลัง 3 เดือนของสหรัฐอเมริกา ผลการศึกษา พบว่า การผลิตภาคอุตสาหกรรมสามารถอธิบายถึงผลตอบแทนของหุ้นในทั้งสองประเทศได้อย่างชัดเจน ในขณะที่ตัวแปรปริมาณเงิน อัตราดอกเบี้ย และอัตราผลตอบแทนของตั๋วเงินคลัง 3 เดือนของสหรัฐอเมริกาสามารถอธิบายถึงผลตอบแทนหุ้นมาเลเซียได้ และ MSCI สามารถอธิบายผลตอบแทนของหุ้นไทยได้อย่างมีนัยสำคัญ

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ABSTRACT

The stock returns in emerging markets are described as being highly volatile by the high volatility. However, there are limited studies about the fundamental factors that are driving this volatility level. Employing the (Spell out this acronym) (MSCI) world index and the U.S. 3-month T-bill yield as a proxy to examine the effect of international variables, this paper also investigates the key macroeconomic factors which are exchange rates, interest rates, industrial production and money supply in Malaysia and Thailand to see whether each of these variables can explain the stock returns. By examining a six-variable vector autoregressive (VAR) model, it was the result shows that industrial production can significantly explain the stock returns in both countries. While the U.S. 3-month T-bill, interest rates, and money supply variables can explained Malaysian stock returns, whereas the global indicator, such as like the MSCI, can significantly explained Thai stock returns.

Keywords: Emerging markets; Macroeconomic volatility; Stock returns; Vector Autoregressive Model

Introduction

Market volatility of emerging markets has drawn more attention from international investors comparing to the developed markets (Aggarwal et al., 1997). Emerging markets' capital flows has kept rising and growing. This trend has continued despite a number of financial crises (IFC). Baudouh and Richardson (1993) discuss that there is a relationship between macroeconomic variables and stock returns, as well as the sensitivity of stock returns to macroeconomic news and financial participants when there is a policy announcement or the new economic data released especially from developed markets. Taking Thailand and Malaysia as the samples of study, this paper tries to find whether the macroeconomic variables affect the stock returns in emerging countries.

Malaysia and Thailand are one of the newly industrialized market economies with the outstanding growth and high trading stock volume among ASEAN developing economies. The Malaysian economy is highly robust and diversified with the export value up to USD 175 billion

and it is ranked second in stock trading value among ASEAN developing countries. As well as Thailand, Thai economy is export dependent with more than two-third of its GDP. Moreover, Stock Exchange of Thailand (SET) has outstanding potential with the highest trading value in ASEAN (World Bank). With these facts, it is reasonable to take Malaysia and Thailand as the example of this study for investigating the relationship between the macroeconomic volatility and market returns.

This paper investigates whether the key macroeconomic variables which are exchange rates, interest rates, industrial productivity, and money supply significantly explain the market returns. MSCI world index and U.S. 3-month Treasury bill yield are included to proxy the global variable effects and also to define the relative roles of the country and international factors. The model employed for this study is a six-variable vector autoregressive (VAR) model.

The two important questions to investigate are: 1. whether the shocks to domestic macroeconomic variables and global factors are significantly transmitted to market returns and 2. whether the relative effects of country and global macroeconomic factors are different in explaining the market returns. The empirical results show that the global factor of MSCI can explain the stock return in Thailand and T-bill can explain the stock returns in Malaysia. The domestic variables like industrial production can significantly explain both countries' market returns. In addition, money supply factor and interest rates can explain the Malaysian stock market.

Literature Review

The selection of variables is based on theoretical propositions and existing evidence in the literatures. The relationship of exchange rate and equity returns is supported by simple financial theory which says that the currency appreciation lowers the cost of importing goods which are a large part of production inputs for emerging countries. The currency appreciation generally accompanied by increase in reserve, money supply and a decline in interest rates (Pebbles and Wilson, 1996). The decreasing cost of capital and the imported input is expected to increase the returns. On the contrary, the currency depreciation against US dollar would increase the competitiveness in the exporting sectors and result in the increasing stock returns (Wongbangpo & Sharma, 2002). The relationship of interest rate and return is expected to be negative through

the inflation or the discount factor effect supported by Fisher effect that the nominal interest rates should move with the expected inflation (Fisher, 1930). Money supply and stock returns may have positive or negative relationship depends on the situation. If the monetary policy is not credible, money supply innovations may negatively affect the stock returns by the effects of inflation uncertainty. But if the money supply is backed by foreign reserves, through the exchange rate discussed earlier, it may have a positive relationship with the return (Asprem, 1989). The growth in productivity or the industrial production is evidenced to be positively related to stock returns (Fama, 1990); with increasing production, the firms should be able to sell more and generate more profits, thus increasing stock price. MSCI world index, as the proxy of state of the world economy, is expecting to have a positive sign with the returns (Harvey, 1991) and lastly, theoretical intuition is expecting negative sign between stock returns and T-bill relationship.

Recently, there are several empirical studies trying to explain the relationship between macroeconomic variables and stock return relationships in developed countries. The studies show the significant positive relationships between the stock price and industrial production but negative relationship between stock price and inflation, exchange rate and money supply (Kim, 2003; Humpe and Macmillan, 2009). However, the equity markets in emerging countries are observed to be inefficient such as Khan *et al* (2015) who examined the global and local factors that influence the stock returns in South Asian countries namely Bangladesh, Pakistan, Sri Lanka and India as well as Gay (2016) who investigate the macroeconomic variables and stock returns relationship in BRIC countries (Brazil, Russia, India and China)

Data and Methodology

This study uses monthly data from August 2004 to April 2017 from CEIC generates. The monthly returns measured by month end index. Domestic macroeconomic variables are nominal effective exchange rate, interest rates measure by lending rates, industrial production index and money supply (M1). The U.S. 3-month T-bill and MSCI world index from (MSCI website) are used as proxies for international variables.

Econometric methodology used is a six-variable vector autoregressive (VAR) model to investigate the possible interaction between the chosen variables and the market returns. For

time series analysis, VAR is employed to determine the linear interdependence among multiple time series variables. Because of very few restrictions required, VAR model is the effective model to see the dynamic interactions among variables. In addition, VAR model can be viewed as a flexible approximation to the reduced form of the correctly identified but unknown model of the true economic structure. The informational transmission and incorporation of stock returns are not always instantaneous which may come from the delaying report; therefore, the lag should be included. In addition, VAR model also allows the appropriate lag lengths inclusion.
The VAR model equation for this study is expressed as

$$R_t = \delta_0 + \sum_{s=1}^{\kappa} \alpha_s Z_{t-s} + \varepsilon_t$$

Where R_t is the vector of stock returns series for the market (Malaysia and Thailand). δ_0 is the deterministic component and α_s is the matrix of coefficient exchange rates, interest rates, industrial production, money supply, MSCI world index, and the U.S. 3-month T-bill yield. The lag length is denoted by **K** and ε_t is the vector of innovations and is unrelated to the past R values. After VAR model estimation, impulse response functions (IRFs) are derived to measure the time profile of the shock's effect on the behavior of a series. This study plots the "generalized" impulse response functions to ensure that it is invariant to any reordering of the variables in VAR.

The Akaike information criteria (AIC) from the lag selection suggested the appropriate lag length is determined to be one for Thailand and three for Malaysia. The stationary property for time series data is tested to see the possibility of spurious model. The results by using Augmented Dickey-Fuller (ADF) and Phillips-Perron unit root test are shown to be stationary and integrated of order *I(1).*

Empirical results

In pair comparison, from figure1 and 2, the money supply in Malaysia increase the stock return around fourth month, then fluctuated and become negative around eighth month. For Thailand, it shows relatively no money supply shock to the stock returns except for slightly negative shock around fifth month. For MSCI index, Malaysian stock returns response positively

in lag two then drop to negatively after third month. Meanwhile in Thailand, Thai stock returns response positively for lag one and peak around lag two, then show relatively no shock afterward. T-Bill response negatively to stock returns both in Thailand and Malaysia, however it takes different time to adjust. In Malaysia, T-bill responses positively to stock returns at peak around fifth month while in Thailand, T-bill responses to stock returns fourth to sixth month. Both markets are response negatively by exchange rate around third month; in Thailand, it shows a positive effect during lag four. Interest rate variable shows small positive shock to stock returns in Malaysia around lag one then drops to negative around lag two, unlike Thailand, it shows the negative shock for all the period. Lastly industrial production shows the opposite results to the stock returns. Malaysian stock returns response negatively to industrial production but Thailand response positively around lag one to lag four, then slightly negative shock and become stable.

Table 1 reports the summarized results from VAR model for each country with respect to the global and domestic factors. The results show that industrial production factors are significantly explained the market returns for both countries. The macroeconomic variables that can significantly explain stock returns for each country are as followed:

Table 1

VAR coefficients for the response of stock markets to macroeconomic shocks

	Malaysia		Thailand	
	Estimates	S.E.	Estimates	S.E.
C	0.0054	-0.0037	0.005	-0.0049
MSCI world index(-1)	0.1280	-0.0847	0.2803*	-0.1505
MSCI world index(-2)	-0.0899	-0.0855		
MSCI world index(-3)	-0.0512	-0.0830		
U.S. 3-month T-bill(-1)	-0.0162	-0.0217	-0.0379	-0.0361
U.S. 3-month T-bill(-2)	-0.0353	-0.0232		
U.S. 3-month T-bill(-3)	0.0579***	-0.0215		

Table 1 (continued)

VAR coefficients for the response of stock markets to macroeconomic shocks

	Malaysia		Thailand	
	Estimates	S.E.	Estimates	S.E.
Exchange rate (-1)	-0.2607	-0.2311	-0.1882	-0.3667
Exchange rate (-2)	0.1622	-0.2372		
Exchange rate (-3)	-0.1497	-0.2254		
Interest rate (-1)	0.0206	-0.0325	-0.0402	-0.0693
Interest rate (-2)	-0.0150	-0.0301		
Interest rate (-3)	-0.0597***	-0.0302		
Industrial production (-1)	-0.1412*	-0.0765	0.1061**	-0.0487
Industrial production (-2)	-0.3083***	-0.0941		
Industrial production (-3)	-0.2169***	-0.0748		
Money supply (-1)	0.0003	-0.1346	-0.0281	-0.1940
Money supply (-2)	-0.0046	-0.1421		
Money supply (-3)	-0.2867*	-0.1464		
R-squared	0.2741		0.1853	
Adj. R-squared	0.1541		0.1008	
Sum sq. resids	0.1309		0.4216	
S.E. equation	0.0321		0.0559	
F-statistic	2.2834		2.1932	
Log likelihood	312.8536		227.7365	
Akaike AIC	-3.9041		-2.8365	
Schwarz SC	-3.4605		-2.8365	

***,**, and * denote significance at the 1%, 5%, and 10% levels respectively

Malaysia

The significant variables that can explain stock returns are T-Bill, interest rate, industrial production and money supply. Figure 1 shows that T-bill has a positive shock around forth month. This result is consistent with Dhaka Stock market (Quadir, 2012). Moreover, there is a significantly negative shock of interest rate around forth month; Fisher Effect and discounting rate in a simple financial theory may apply to Malaysia stock market. In addition, there is a significantly negative shock starting from the second to fourth month to stock returns for

industrial production factor. Though this is an unusual result, it is evidenced to be consistent with Rahman et al. (2009)'s work who also find this inverse relationship in Malaysia stock market and industrial production. Lastly, money supply has a negative shock in the fourth month to stock returns; this result may come from the inflationary uncertainty point of view.

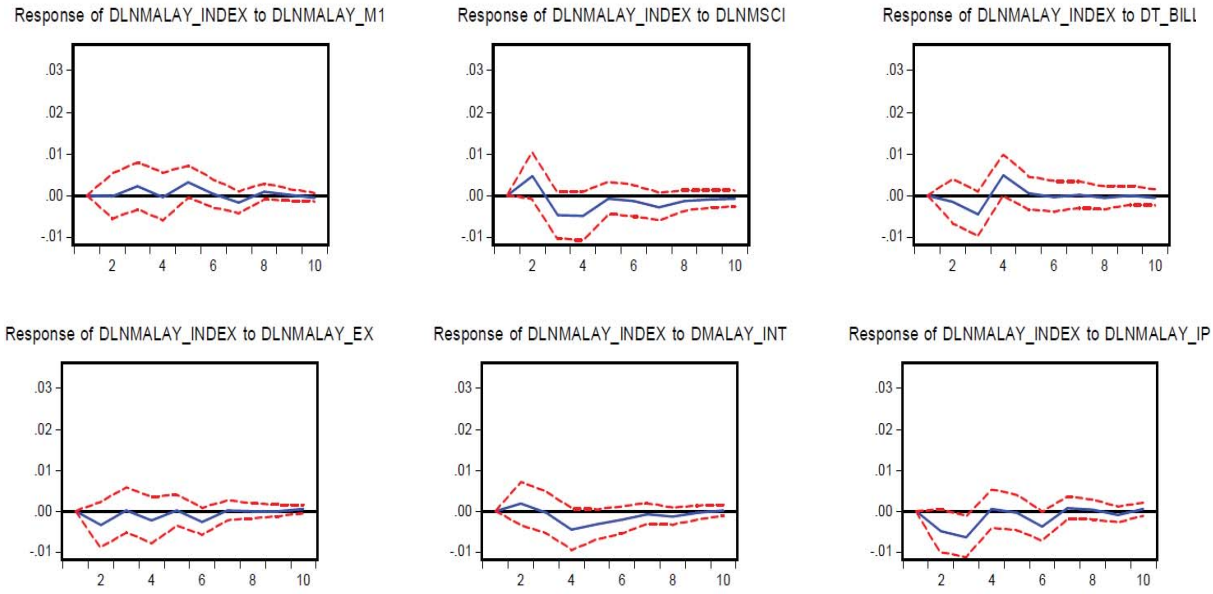

Figure 1. Malaysia

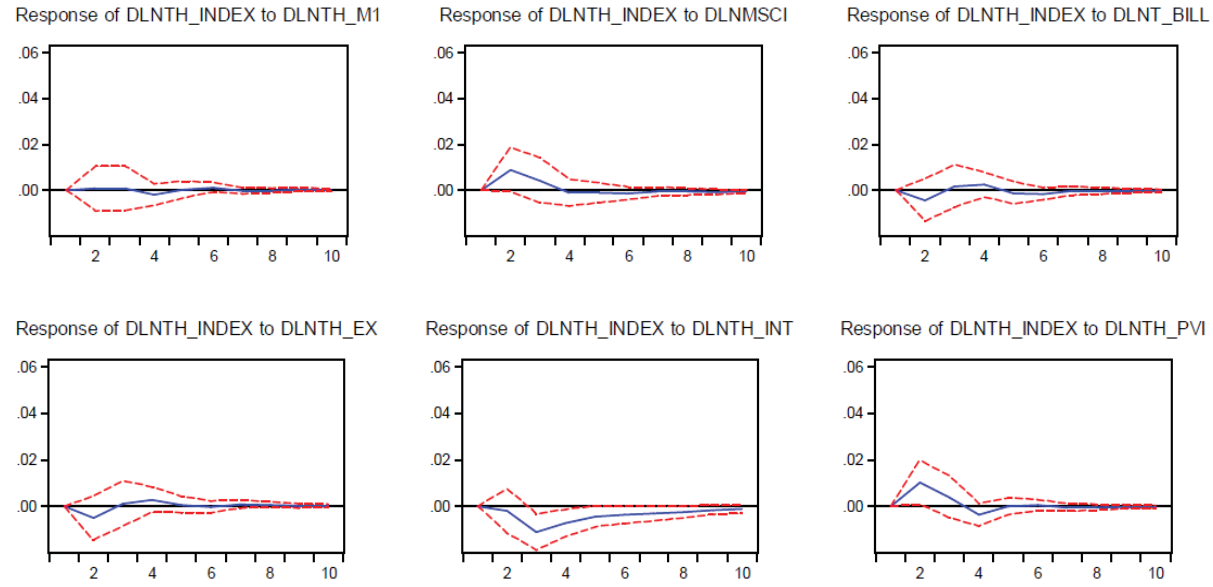

Figure 2. Thailand

Thailand

The significant variables are MSCI world index and industrial production index. Figure 2, the impulse response functions show that the MSCI index has the significant positive shock around the second month; this global factor may take two months to transmit the shock or information to Thai market. Finally, industrial production index, the impulse response functions show that there is a positive shock around the second month. So, the increase in production may enhance the company's profitability and improve Thai stock returns.

Discussion and Conclusion

The empirical results show that the domestic shocks from the country's variables are transmitted to the stock returns. Industrial production plays a significant role in explaining the stock returns for both countries. Malaysian stock returns show the negative estimates which is inconsistent our expectation. Hamid et al (2017) test the weak-form market efficiency in Asia-Pacific markets and concluded that the markets, both Thai and Malaysian, are inefficient or price anomaly. Khil and Lee (2000) discuss that Thai market show the pro-cyclical monetary regime while Malaysian market shows the counter-cyclical monetary regime which response in higher outputs expectation. In addition, major largest public companies in Malaysia are in the banking sector which represents the distinctive operation from its high leverage and high regulation requirements. The operation and profit generation are different from other sectors. On the other hand, major Thai largest public companies are oil and gas, conglomerates and retails, so, the increase in output or industrial production represent the higher sales and higher profits which increase the stock price. However, that shock may take one or up to 3 months to transfer that information to the market.

The contributions of studying volatility in returns from domestic and global variables give knowledge in the context of multivariate framework. This empirical investigation may have important implications in making the decision by investors and national policymakers. From investors' view, they can improve their portfolio performance by considering the variations in economic fundamentals. Investors who are lacking of local knowledge about the country's fundamentals may fail to take the arbitrage opportunities. From the policy views, this empirical

study may provide some insights information to stabilize the financial markets by formulate or implement the appropriate monetary and fiscal policies.

Despite the low R-squared which determine how well the model fits the data, this model provides the significant variables that can explain the stock returns and it is quite a typical value reported for monthly data (Kandel and Stambaugh, 1996; Errunza and Hogan, 1998). To further improve this model, more macroeconomic variables may be added to see which other macroeconomic factors can determine the stock returns. Moreover, since the stock markets in Malaysia and Thailand are the most active among ASEAN countries, the daily data is also interesting to observe. Also, as the ASEAN collaboration is highly recognized and gained interest from both domestic and international investors, if the data is available, the whole ASEAN equity market would be an interesting sample of the stock returns in emerging market to investigate.

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