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AN ECONOMIC ANALYSIS OF THE RELATIONSHIP BETWEEN STOCK RETURNS AND THE ANTICIPATED AND UNANTICIPATED MONEY GROWTH: THE CASE OF MALAYSIA

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ABSTRACT

This paper investigates the relationship between stock returns and both the anticipated and unanticipated components of money supply growth using quarterly data for the period 1978:1 - 1997:4. The objective of the paper is to determine whether the components of both, narrow (M1) and broad (M2) money supply growth has been incorporated in the movements of stock returns. Using the Barro two-step procedure, our results suggest that the efficient market hypothesis for the KLSE cannot be rejected with respect to both narrow and broad money components.

ABSTRAK

Kertas ini meninjau hubungan di antara pulangan stok dengan kedua-dua komponen pertumbuhan penawaran wang dijangka dan tidak dijangka dengan menggunakan data suku tahunan untuk jangka masa 1978:1 - 1997:4. Tujuan kertas ini adalah untuk menentukan sama ada komponen kedua-dua pertumbuhan penawaran wang M1 dan M2 telah diambil kira dalam pergerakan pulangan stok. Menggunakan kaedah dua peringkat Barro, keputusan kajian menyarankan bahawa hipotesis pasaran cekap terhadap KLSE tidak boleh ditolak apabila dikaitkan dengan kedua-dua komponen penawaran wang sempit dan juga meluas.

INTRODUCTION

The objective of this paper is to analyse empirically the short-run relationship between the anticipated and unanticipated growth of money supply aggregates

(M1 and M2) and stock prices using Malaysian quarterly data for the period 1978:1 - 1997:4. Unlike previous studies[1] that relied on equilibrium data,[2] this paper expands our understanding of the short-run relationship between monetary policy and stock prices by decomposing the monetary aggregates into two components, namely the anticipated and unanticipated variables.

We interpret the anticipated component as expected changes in monetary policy actions and the unanticipated component as surprise or unexpected changes in monetary policy actions. The motivation is to provide empirical evidence about whether or not the stock returns (stock prices growth) are informationally efficient with respect to the components of both narrow (M1) and broad (M2) money supply growth. In an efficient market,[3] current and past information is fully reflected in current stock prices movements and thus monetary policy action will not have a systematic lagged effect on stock returns.[4]

Why are monetary components important? As pointed out by Barro (1977), money surpluses are much more important than actual money. The anticipated changes in the money supply have no impact on real economic variables, but unanticipated changes affect real economic variables. For example, Barro found that the lagged responses of output and prices to unanticipated money component have provided precise estimates compared to the anticipated money component. In the literature, this proposition is also known as the rational expectation hypothesis (REH).[5] Generally, the REH contends that the anticipated monetary policy actions have no impact on real economic variables, both in the long run and in the short run and it is opposite in effect to the unanticipated component. Based on this proposition, we expand our empirical analyses by looking into the effects of money components on the financial variable, that is, stock prices.

An interesting point to be highlighted is how to relate the link between real variable and financial variable. Our argument is based on one popular hypothesis in the financial economics literature, that is, the monetary portfolio theory.[6] This theory places emphasis on the changes in monetary policy (proxy by money supply changes) affecting the investors asset portfolio spectrum via money balances. Briefly, a contractionary monetary policy leads to a decline in investor's money balances, which indirectly shrinks the investors' asset portfolio, thereby causing a decline in financial market activities and vice versa. This transmission mechanism channel provides the basis of a relationship between money supply and stock prices.

In considering the above hypothesis, the monetary aggregate can be decomposed into two main components, namely the anticipated and unanticipated components.[7] As in previous studies (see for example, Habibullah and Baharumshah, 1996, 1999), using the Malaysian data which only examined the relationship between stock prices and equilibrium money supply, the present study expands the issue by integrating the components of money supply aggregates into the hypothesis mentioned above. By and large, we can statistically say that the market is informationally efficient if money components do not have a lagged systematic effect on the stock prices and *vice versa*.

In this paper, Section 2 presents the univariate autoregressive (AR) procedure to decompose the components of money supply aggregates and sets up a single equation model to underpin the hypothesis; Section 3 reports the empirical findings, and concluding remarks are offered in Section 4.

METHODOLOGY

Decomposing Money into Anticipated and Unanticipated Components

Following Serletis (1990), and Lynch and Ewing (1995), among others, the money supply variable say *M*, can be decomposed using univariate autoregressive (AR) or lag polynomials by varying the lag in the autoregression of the series. This technique was chosen because we do not have any predetermined theory behind the money growth in Malaysia, and thus we are relying on a statistical procedure as proposed by Mishkin (1982). In this study, the fourth-order AR(4) log differencing is estimated to generate the money growth rate into the anticipated (expected changes) and unanticipated components (unexpected changes)[8] as indicate by equation (1) below

$$M_t = a_0 + a_i\,(L)\,M_t + e_t \qquad (1)$$

where M_t is the rate of growth in M ($\log M_t - \log M_{t-1}$), e is white-noise error term, L is a lag operator and $a_i(L)$'s are polynomials in the lag operator;

$$i.e.\ \ a_i\,(L) = \sum_{i=1}^{m} a_i \text{ for i} = 1,2,3,4$$

The predicted values from equation (1) are used to proxy the anticipated component (ANM) while the residuals represent the unanticipated changes (UNM) in monetary policy action.

The Baseline Model

Once the components of money supply growth are found, the second step involves estimating the following equation from Barro (1977, 1978)[9] as follows:

$$CI_t = \beta_0 + \Sigma_{i=0}^{n} \beta_{1,i} ANM_{t-i} + \Sigma_{i=0}^{n} \beta_{2,i} UNM_{t-i} + \eta_t \qquad (2)$$

where *CI* is the log difference of the Kuala Lumpur Composite Index; ANM and UNM are the anticipated and the unanticipated money growth respectively; and η is white noise error term. In the present study, since there is no a priori basis as to which money supply definition should be used, we have utilised both *M*1 and *M*2 for our analysis.

A related issue regarding the Granger-type tests of the relationship is the determination of the appropriate finite lag lengths for the two variables. Since no end point restrictions were imposed in our model, the lag polynomial was determined by the $\bar{R}^2$ criterion. Specifically, the lag length that provides highest value of $\bar{R}^2$ is selected as the preferred specification in the analysis that follows.

In this study, we are interested in testing the stock market efficiency hypothesis that the anticipated and unanticipated policy variables have no effect on *CI*. In order to conduct the hypothesis testing, the conventional *F-test* for the joint significance is used to test whether the sum of the coefficients of the restricted variables is significantly different from zero. In order to conduct the *F-test*, equation (2) is treated as the unrestricted equation, with the unrestricted equations justified on the following discussions.

According to the market efficiency hypothesis (EMH), the contemporaneous and historical estimates of the anticipated monetary policy moves should have no effect on stock returns since this information would already be reflected in current stock return movements. Thus, we would expect all $\beta_{1,i}$ (i=0,1,...,n) to be statistically insignificant.

As to the unanticipated monetary variable, the EMH contends that the lagged coefficients on the unanticipated monetary policy variables (i.e. $\beta_{1,i}$ (i=1,2,...,n)) should also be insignificant as these coefficients relate to known values of monetary policy measures affecting current stock returns.

Furthermore, according to the EMH, only the contemporaneous coefficient on the unanticipated monetary policy variables ($\beta_{2,0}$) can be significantly non-zero since this coefficient represents new (unexpected) information to investors in the stock market (see McMillin and Laumas, 1988; Darrat, 1988).

Sources of Data

In this study, we have used quarterly data for the period from 1978:q1 to 1997:q4.[10] Money supply measures for both *M*1 and *M*2[11] were collected from various issues of the *Quarterly Bulletin* published by Bank Negara Malaysia. In this study we used the KLSE Composite price index (CI) to proxy for stock price. *CI* is collected from various issues of the *Investors Digest* published monthly by the Kuala Lumpur Stock Exchange. All variables were transformed into natural logarithms.

EMPIRICAL RESULTS

It has become standard practice that when estimating equation (2) all variables must be stationary. The reason for checking these properties is to ensure that the series used is free from time dependency. Moreover using the nonstationary variables may lead to spurious regression results.

We have utilised the semi-parametric Phillips-Perron's procedure developed by Phillips and Perron (1988) for the test and found that in all cases the variables are stationary in their first differences.[12] The result indicates that the variables are all integrated of order one, *I*(1) or each of them is stationary after first differencing. Therefore the variables must be differenced once, before proceeding to the estimation of equation (2).

Having done these preliminary requirements, we proceed to estimate equation (2) for both *M*1 and *M*2 components. For comparison purposes, however, we have estimated equation (2) using two different lag lengths - 4 and 12 lags. For brevity, we only report the results of estimates for four lags.[13]

Table 1 presents the results of estimating equation (2) for money $M1$. The hypotheses that the anticipated and unanticipated monetary policy variables have no effect on the stock market were tested using the *F-test* and these are reported in the lower-half of Table 1. The hypothesis that the coefficients on anticipated and unanticipated components (as a proxy of monetary policy) are jointly equal to zero clearly cannot be rejected. It indicates that both components of monetary policy actions do not affect stock returns on the Kuala Lumpur Stock Exchange (KLSE).

However, the contemporaneous effect is the only significant effect for both variables. Nevertheless, this initial positive impact of contemporaneous anticipated and unanticipated variables is eliminated over time. Thus, in the longer run monetary actions whether anticipated or unanticipated have no effect on the stock returns. Our results are consistent with the findings of McMillin and Laumas (1988) for the United States.

The impact of money $M2$ components is presented in Table 2. The results are similar to $M1$. Both the anticipated and unanticipated components have no effect on the stock return. The only significant variable is the contemporaneous effect of the unanticipated component. However, in the longer run, this effect will be eliminated. In conclusion, the results from both $M1$ and $M2$ suggest that the Kuala Lumpur Composite Index has incorporated the growth of both anticipated and unanticipated components of money $M1$ and $M2$. This implies stock market efficiency for the KLSE during the period under study.

CONCLUSION

This paper reports the empirical evidence on whether or not the components of narrow and broad money supply *Granger cause* the stock price movement. Using the Barro (1977) two-step procedure, the findings appear statistically to support the efficient market hypothesis with respect to both narrow and broad money components for the period under study.[14] The results imply that neither the expected nor the unexpected monetary policy actions, measured by both narrow and broad money components *Granger cause* stock price movements, thereby indicating an efficient stock market. As a result, the monetary authority cannot affect the stock market even temporarily through changes in the growth of money supply (anticipated or unanticipated).

Table 1
Results of Joint Significance of the *F-test* for *M1*
(Dependent variable ΔCI)

	Estimated Coefficient and (Standard Error)	
Constant	0.07 (0.08)	
$\beta_{1.0}\,\Delta ANM1_t$	4.05 (1.76)**	
$\beta_{1.1}\,\Delta ANM1_{t-1}$	-0.86 (1.13)	
$\beta_{1.2}\,\Delta ANM1_{t-2}$	0.96 (1.07)	
$\beta_{1.3}\,\Delta ANM1_{t-3}$	1.22 (1.08)	
$\beta_{1.4}\,\Delta ANM1_{t-4}$	-1.82 (1.39)	
$\beta_{2.0}\,\Delta UNM1_t$	1.74 (0.61)*	
$\beta_{2.1}\,\Delta UNM1_{t-1}$	0.81 (0.61)	
$\beta_{2.2}\,\Delta UNM1_{t-2}$	0.93 (0.63)	
$\beta_{2.3}\,\Delta UNM1_{t-3}$	-0.20 (0.65)	
$\beta_{2.4}\,\Delta UNM1_{t-4}$	-1.16 (0.87)	
R^2	0.27	
SEE	0.14	
DW	2.12	
Ljung-Box Q(17)	21.05 [0.224]	
Chow *F*-test	F(9,45) = 0.59 [0.793]	
Null hypothesis:	**F-test**	**Remarks**
$\Sigma\beta_{1.i\,(i=0,1,2,3,4)} = 0$	F(5,60) = 1.81 [0.124]	Cannot reject EMH
$\Sigma\beta_{2.i\,(i=1,2,3,4)} = 0$	F(1,60) = 1.33 [0.268]	Cannot reject EMH

Note: The standard errors are in parentheses. Figures in square brackets are p-values. Asterisks (**), (*) denote statistically significant at the 5% and 1% level respectively.

Table 2
Results of Joint Significance of the *F-test* for *M2*
(Dependent Variable ΔCI)

	Estimated Coefficient and (*Standard Error*)
Constant	0.23 (0.16)
$\beta_{1.0}\,\Delta ANM2_t$	6.25 (4.09)**
$\beta_{1.1}\,\Delta ANM2_{t-1}$	-4.89 (3.21)
$\beta_{1.2}\,\Delta ANM2_{t-2}$	2.55 (2.84)
$\beta_{1.3}\,\Delta ANM2_{t-3}$	-0.41 (2.81)
$\beta_{1.4}\,\Delta ANM2_{t-4}$	-0.66 (2.85)
$\beta_{2.0}\,\Delta UNM2_t$	0.12 (0.85)
$\beta_{2.1}\,\Delta UNM2_{t-1}$	0.05 (0.91)
$\beta_{2.2}\,\Delta UNM2_{t-2}$	0.97 (0.93)
$\beta_{2.3}\,\Delta UNM2_{t-3}$	-1.84 (1.14)
$\beta_{2.4}\,\Delta UNM2_{t-4}$	-1.64 (1.41)
R^2	0.16
SEE	0.15
DW	2.05
Ljung-Box Q(17)	16.21 [0.508]
Chow *F*-test	F(9,45) = 0.56 [0.818]

Null hypothesis:	**F-test**	**Remarks**
$\Sigma\beta_{1.i\ (i=0,1,2,3,4)} = 0$	F(5,60) = 1.77 [0.133]	Cannot reject EMH
$\Sigma\beta_{2.i\ (i=1,2,3,4)} = 0$	F(4,60) = 1.12 [0.353]	Cannot reject EMH

Note: The standard errors are in parentheses. Figures in square brackets are p-values. Asterisks (**), (*) denote statistically significant at the 5% and 1% level respectively.

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Endnotes :

1. See for example, Habibullah and Baharumshah (1995, 1996) and Mohamed and Murinde (1993).
2. Published data can be decomposed into anticipated and unanticipated components using available decomposition techniques. In Malaysia, the effect of these two components of the money supply on the stock market has yet to be explored.
3. The efficient market hypothesis was formalised by Fama (1970).
4. The question of whether money supply has an effect on the stock market has been subject to numerous empirical testing in the literature. However, the results are mixed. Studies have found out that money supply tends to lead the stock market and vice versa depending on the period of study, the sample countries - developed versus developing nations, monthly versus quarterly data, etc. Therefore, the informational market hypothesis of a stock market with respect to money supply growth is at best an empirical question. See Habibullah and Baharumshah (1999) for a survey on this topic.
5. Further readings can be referred to Lucas (1972) and Sargent and Wallace (1975).
6. It is beyond the scope of the present study to analyse the precise ways in which money supply can affect stock prices. However, excellent discussions on how money growth can affect stock prices are provided by Homa and Jaffee (1971), Hamburger and Kochin (1972), Cooper (1974) and Rozeff (1974).
7. Discussions on this concept can be found in Barro (1977, 1978).
8. For other methods in decomposing the components, see for example Beladi and Samanta (1988).
9. Additional information can also be found in McMillin and Laumas (1988).
10. We prefer low frequency data (quarterly) as opposed to higher frequency data as higher frequency data (such as daily) on money supply is not available in Malaysia. Moreover, at the macro level, low frequency data is more appropriate to represent long-run equilibrium and for policy inferences. Higher frequency data is short-run in nature and therefore policy inferences made inappropriate. Furthermore, daily data are susceptible to the day-of-the week effect.

11. *M*1 equals currency in circulation plus demand deposits held by would be the non-bank private sector. *M*2 equals *M*1 plus savings, fixed deposits, Central Bank Certificates, NCDs and repos at commercial banks.
12. For brevity, we do not report the full results here but they are available upon request from the first author.
13. Results using 8 and 12 lags are available from the authors. The results are qualitatively similar.
14. Annuar *et al.* (1994) showed that at the micro level and using higher frequency data, the EMH cannot be rejected for the KLSE.

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