THE MONEY SUPPLY AND STOCK PRICES: THE CASE OF MALAYSIA

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ABSTRACT

The relationship between stock prices and macroeconomic variables has been the subject of interest for many years. Generally, movement in the stock prices is hypothesized to be affected by changes in economic fundamentals. In this paper, we investigate the relationship between changes in money supply and stock prices in the Kuala Lumpur Stock Exchange. We employ the Vector Autoregression (VAR) methodology in identifying the relationship between the two. A vector of five variables namely money, interest rates, output, consumer prices and stock prices as postulated by the standard share valuation model is incorporated in the VAR system. The Granger causality test, variance decomposition analysis (VDA), and impulse response functions (IRF) analyses are used to trace the impact of shock in money supply on stock prices. The result of the causality test show significant uni-directional causation running from money supply to stock prices. VDA also supports the importance of money supply in determining stock prices. The IRF indicates stock prices responsed positively following monetary expansion and the impact peaks after seven months from the initial shock but declines gradually thereafter. To the extent that stock prices reflect real economic performance, these findings are consistent with the long-run effect of money on the real sectors.

1. INTRODUCTION

Various studies have been conducted toward identifying the relationship and pattern of causality between macroeconomic variables and stock prices. Conventional valuation model for common stock claims that the value of a common stock is determined by the present value of all expected future cash flows. Analyses of economic fundamentals are critical as all stocks are ultimately subject to economy wide factors such as level of output, inflation, interest rates, employment, etc. which are summarized as market or systematic risk.[1] It is important to

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[1] *Conceptually there are three approaches in evaluating stocks; the fundamental approach, technical approach, and efficient market approach. The issue investigated in this paper is related to the fundamental technique with a premise that any security has an intrinsic value and it is affected by fundamental factors at three stages of information set; economy wide, industry, and company specific. The amount of money supplied in the economy is one of the exogenous factors in fundamental analysis (see Keran (1971) and Pearce (1983) for related discussions). Indirectly, the study also related to the efficient market approach as common stocks are commonly refered to as a leading indicator which supposedly incorporates new information instantaneously. Thus, the speed of adjustment toward monetary injection reflects the efficiency of the market (see Fama (1965, 1970), Fama et. al. (1969), and Lorie et. al. (1985)).*

note that these economic fundamentals are endogenous in nature, i.e. they are subject to changes in policy variables that are exogenous. In this regard, study on the impact of changes in monetary aggregates on share valuation is of interest to many researchers. Monetary policy has been shown to be an important element in the phase of economic cycles. A comprehensive study by Friedman and Swartz (1963) indicates that changes in money supply precede swings in business cycle in the United States.[2] Since money precedes economic swings, changes in money supply could also have a significant impact on stock prices. We investigate this possible relationship in the Malaysian stock market. Based on the vector auto regression (VAR) analysis we show that changes in money supply also play an important role in determining changes in stock prices. We identify a strong uni-directional causation running from money to stock prices. In addition, we also show that the reaction of stock prices occur after some lag which is consistent with the transmission mechanism of monetary policy. The next section presents briefly theoretical linkages between money supply and stock prices. In Section 3 the existing works on the issue are presented. This is followed by a description of the methodology employed in Section 4. The results of this study are discussed in Section 5 before a conclusion is derived.

2. MONEY AND STOCK PRICES: SOME THEORETICAL LINKS

The relationship between money and stock prices could be explained in two frameworks; the Dividend Valuation Model and Monetary Portfolio Model. The first is explained through the dividend discount model as proposed by Keran (1971), Hamburger and Kochin (1972) and Homa and Jaffee (1971). In brief, changes in money supply will cause investors to adjust the factors that determine stock prices which consist of the risk-free yield, earnings expectations and risk premium, thus reaching a new equilibrium level. The dividend discount model states that:

$$P_0 = \sum_{t=1} \frac{D_0 (1 + g_t)^t}{(1 + r_t + r_t)^t} \qquad (1)$$

where;

P_0 = current price of a common stock,
D_0 = current level of dividends,
g_t = rate of growth of dividends,
r_t = riskless rate of interest,
r_t = risk premium.

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[2] *The comprehensive study by Friedman and Schwartz (1963) of the history of monetary policy in the United States can be considered the first formal documentation of the money-income relationship. Positive association between money and economic activity is evidenced for almost every business cycle they examined over nearly a hundred-year period. The relationship is further strengthened by Sims' (1972) conclusion that money Granger causes income but not the reverse. The role of money as leading indicator is discussed in Hoehn (1982) and its relationship with stock prices is studied by Rozeff (1975), Pesando (1974) and Mookerjee (1987).*

Through the liquidity effect, changes in the money supply affect the level of interest rates.[3] In general, an increase in the supply of money will result in a decline of the interest rates, thus resulting in a lower level of risk-free component. Similarly, the increase in money supply will also result in the increase in demand for goods and services which eventually results in higher corporate earnings. This can be translated to higher dividend pay out. The corporates' prosperity, as seen by the high dividend pay-out, is an indication of economic growth and one can expect that the risk premium from an investment in the companies' common shares will be lower due to lower riskiness of the assets given the economy's well-being. Taking into account the effects of monetary expansion on the numerators and denominators within the dividend discount model, one can see a direct relationship between money supply and stock prices.

From the perspective of monetary economics, the relationship can be explained through the Monetary Portfolio (MP) model developed by Brunner (1961), Friedman (1961), Friedman and Schwartz (1963) and Cagan (1972). In this model, an investor is said to hold a portfolio of financial as well as human wealth. Assuming initial equilibrium position, a monetary disturbance will result in portfolio disequilibrium, causing investors to adjust their portfolio holding thus affecting asset prices. In the case of an increase in money supply, one can expect investors to channel the excess money from the desired money balances into other financial assets including stocks. As such, the latter is more attractive as an avenue for channelling the excess cash leading to the increase in demand for stocks and eventually pushing the prices up.

A point that needs to be highlighted is that the early researchers believe that monetary policy has a lagged effect on the stock market. This is evident from the studies by Sprinkel (1964), Palmer (1970), Homa and Jaffee (1971), Keran (1971), Reilly and Lewis (1971), Hamburger and Kochin (1972) and Meigs (1971). This lagged relationship deviates from the EMH which contends that an efficient market will react instantaneously to any anticipated changes in the economic variables to reflect all relevant new information in the stock prices.[4] Pesando (1974) argues the ability of the models presented by the early researchers in explaining the behaviour of stock prices. Citing few limitations of the models both theoretical and empirical, Pesando claims that the results from previous studies "may prove to be more apparent than real". He believes that stock markets are indeed informationally efficient despite the lagged relationship and attributes such phenomenon to the "unanticipated" changes within the observed economic variables. He believes that changes in the rate of return of common stocks reflect only the unexpected component of the changes in the economic variables. Thus, by no means the lagged relationship found in the early studies can be associated to market efficiency.

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[3] The decline in the level of interest rates following monetary injection is an important element in the transmission mechansim of monetary policy. Recent investigations that support the presence of liquidity effect can be found in Christiano and Eichenbaum (1992), Gordon and Leeper (1994) and Strongin (1995).

[4] For a discussion on the conflict between Monetary Portfolio and the Efficient Market Hypothesis, see Rozeff (1974).

3. EXISTING LITERATURE

Homa and Jaffe (1971) are among the early reseachers to investigate this issue based on the dividend discount model. Using the quarterly data of the growth rate of money supply and Standard & Poor's 500 Index to represent stock prices, a regression analysis was conducted to identify their relationship. The results show that the two variables are significantly correlated and the investors's ability to predict the money supply and act accordingly generates better investment return. Clearly, this suggests market inefficiency in incorporating news instanteneously into the stock prices.

Within the same context, Hamburger and Kochin (1972) analyze the pre-World War II data to examine the effects of economic and monetary instability on the general level of stock market prices. In the study, they adopt the logarithm of the standard deviation of the rate of change around trend and distinguish the "unanticipated" fluctuation from the "anticipated" trend. They find that changes in monetary growth have a number of different effects on the market. There is a direct portfolio effect but the dividend discount model cannot be ruled out totally due to the evidence of effects from corporate earnings expectations and the existence of risk premium in the general level of stock prices.

Using the Granger's (1969) causality model, Rogalski and Vinso (1977) examine the causal relationship between stock returns and money supply. Four most common indices – the Standard & Poor's 500; Fischer's link Relative Index, Dow-Jones Industrial Average and New York Stock Exchange Index – were used to calculate the market returns over twelve year period, 1963 - 1974 while the rate of change of the narrowly defined money (M1) was used as a proxy for money supply. Their findings are consistent with the proposition made by various monetary portfolio theorists and parallel to the market efficiency theory. The results also reveal a bi-directional pattern of causality between stock prices and money supply. They conclude that changes in monetary policy have a direct impact on returns from common stocks.

Mookerjee (1987) takes the subject to a more international perspective by investigating the effect of money policy in stock markets in a number of countries, namely France, Japan, Italy, Canada, Germany, United Kingdom, Netherlands, Switzerland, Belgium and United States. Applying Granger's causality model, he tests the data from 1975 to 1985. His results show that there is a causality relationship between money and stock prices in all markets except for France and Belgium. However, there appears to be some degree of inefficiency in Canada, Japan, Germany, Italy and Switzerland when different monetary aggregates and time periods are used. This claim, nonetheless, would have been disputed by Pesando (1974) who disagrees with market efficiency being linked to changes in stock prices caused by unanticipated changes in money supply.

Rozeff (1974).

Patelis (1997) examines the effect of shifts in monetary policy on the observed predictability in excess stock returns. Using long-horizon regressions and short-horizon vector auto-regressions, he discovers that monetary policy variables are significant predictors of future returns but they cannot fully account for the observed stock return predictability. He attributes this finding to the financial accelerator/credit channel propagation mechanisms which induce countercyclical factor sensitivities and expected stock returns. Tan (1998a) extends the study of monetary policy to the Kuala Lumpur Stock Exchange (KLSE) and investigates the relationships between monetary policy, economic activities and stock market. Using monthly data of stock indices, gross domestic product (GDP) and money supply covering January 1978 to September 1992, the Johansen-Jeselius multivariate cointegration test was performed to establish the relationships. The results reveal that stock prices of all sectors are cointegrated with money supply and output. She concludes that the Malaysian stock market is informationally inefficient with respect to money supply and output.

Other researchers who also adopt the causality model as proposed by Granger (1969) and Sims (1972) are Hashemzadeh and Taylor (1988) who investigate the empirical relationship between stock prices and money supply. Using US data from 1980 to 1986, they found conclusive evidence of bi-directional causality relationship which is consistent with the findings by Rogalski and Vinso (1977). They, however, caution that "the hypothesized relationship cannot be adequately explained using 'single cause' explanatory model". Instead, they propose the simultaneous equation system that used the tested variable along with other macroeconomics variables which may provide better prediction of the direction as well as the strength of stock price movements.

Lee (1994) finds evidence of market inefficiency using the bivariate model of money aggregates and stock prices. He believes that stock prices did not fully digest and reflect changes in money supply which is attributed partly to the existence of a relatively volatile relationship between money supply and overall economic activity. He also discovers that changes in monetary stock unidirectionally cause stock prices. Using the same sample, Darrat and Dickens (1996) apply the multivariate model using variables suggested in Lee's (1994) literature. The results, however, show that stock prices cause changes in monetary stocks but there is no evidence of market inefficiency, consistent with Pesando's (1974) argument.

Fitzpatrick (1994) examines the relationship between the total return on the S&P 500 Index and various macroeconomic variables including money supply. The results shows that for the period 1968 through 1987, there was no sigvificant relationship between macroeconomic data and the total return on the S&P 500 Index. He claims that for these periods, it would have a been futile exercise to study and attempt to predict future economic data as they have no meanqngful explanatory power to future direction of stock price movements. This claim contradicts the findings by Lee (1994) who finds that the market shows evidence of inefficiency which suggests that investors could have exploited the information on changes in the macroeconomic variables to generate above normal returns to take advantage of market inefficiency.

In a broader perspective, Kwon (1994) examines the response of Korean stock prices to macroeconomic variables that include foreign exchange rate, trade balance, money supply and production index. The results indicate that during the sample period, stock prices exhibit market integration with the four variables and they have long-run and equilibrium relationships. The causal relationships among them run in either one way or in both directions. The vector error correction model (VECM) affirms that the four variables are significant factors in predicting change in stock prices. Tan (1998b) examines the effect of the weekly United States' money supply announcements and interest rate on the Asia-Pacific stock prices for the period after the 1997 stock crash. Using the Johansen multivariate cointegration technique and vector error-correction model (VECM), the study examines the effect of US money supply and interest rate on stock markets in the US, Malaysia, Singapore, Hong Kong, Japan and Australia from January 1989 to June 1997. The results show that US money supply and interest rate do not have significant causal effect on the Asia-Pacific market. Nonetheless, they do Granger-cause the markets in the long run.

Clearly, from the existing literature, the relationship between the two variables - money supply and stock prices – are inconclusive. Most of the studies explained earlier involves bi-variate analysis between money and stock prices, thus limiting other important variables from affecting the relationship. In addition, limited effort has been made in identifying this relationship in emerging markets. We extend existing findings by investigating this relationship employing a system approach that incorporates important variables that affect stock valuation as described by the dividend model using data from emerging markets such as Malaysia. The results of the study provide additional understanding on the issue with regards to new methodology and data set. On this note, this study is designed to shed some light on the issue in the Kuala Lumpur Stock Exchange (KLSE).

4. DATA AND METHODOLOGY

The empirical analysis is conducted over a period of 17 years from 1980:1-1996:6. Four KLSE indices, i.e., the Composite Index (KLCI), Industrial Index (KLIND), Finance Index (KLFIN) and Property Index (KLPROP) are used as proxies for stock prices. The M1 money (M1) is used in our measurement of money supply. We use the narrow money aggregate since it does not yield interest return and, therefore, allow the portfolio adjustment effect in line with the monetary portfolio model discussed earlier to be effective. In addition, as suggested by standard share valuation model, we also incorporate interest rate and dividend in our analysis. These are proxied by the Kuala Lumpur Interbank market rate (OVR), Industrial Production Index (IPI) and Consumer Price Index (CPI) respectively. The interbank rates are a standard measure of liquidity for the Malaysian economy and used by the central bank as well as businesses in gauging the status of domestic credit market. In this study, it is used to reflect the level of interest rate in the market. We use the Industrial Production Index to proxy income in the dividend valuation model as this index captures the productivity in our economy and is available on a monthly basis.[5] The same applies for the CPI that reflects

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[5]*National output data (Gross Domestic Product) are not available on a monthly basis and exact measures of company dividends are not appropriate since they do not reflect economy wide performance and in many cases are affected by factors internal to a specific firm. Industrial production indices are commonly used as proxies for economic growth by past researchers that investigate economy wide effect.*

the general price level for the Malaysian economy. Data for stock prices are obtained from the KLSE and the rest are extracted from the International Financial Statistics (IFS) CD-ROM compiled by the International Monetary Fund (IMF).

A five-variable vector autoregressive (VAR) system of Sims (1980) that includes the variables mentioned earlier is used in the system. All variables are entered in log. Let $X_t = \{M1_t, OVR_t, IPS_t, CPI_t$ Stock Index$_t\}$ be the 5 x 1 vector of variables . The VAR system is specified as follows:

$$AX_t = B(L)X_{t-1} + \upsilon_t \tag{2}$$

where A is a 5 x 5 matrix of impact multipliers, B(L) is a k^{th}-order matrix of structural polynomials in the lag operator L, $B(L) = B_1L + B_2L^2 + \ldots\ldots + B_kL^k$, υ_t is a 4 x 1 vector of structural disturbances with zero mean, $E\{\upsilon_t\} = 0$, and covariance matrix $\Sigma_\upsilon = E[\upsilon_t \upsilon_t']$ for all t, and u_t's are serially uncorrelated. Based on the VAR system we conduct three forms of analysis; Granger causality test, variance decomposition analysis (VDA) and impulse response function (IRF) analysis.

A variable x is said to Granger-cause y if the information carried by the past and present values of x improve the forecast of y. Formally, y is Granger-caused by x if

$$\sigma^2(x_t | \Omega_t) < \sigma^2(x | [\Omega_t | \{y_s | s \leq t\}]) \tag{3}$$

where $\sigma^2(x_t | \Omega_t)$ denotes the conditional mean squared error (MSE) of the optimal forecast x_t given the information set (Ω_t) up to period t, and $[\Omega_t | \{y_s | s \leq t\}]$ refers to all information that is in Ω_t but exclude information contained in the past and present y. Condition (3) indicates that the prediction of x_t carries lower MSE when the information contained in the past and present y_t is incorporated in the data set. In the VAR system of (2), the causality test can be tested by restricting a group of lag coefficients of a variable in any one of the system's equations to zero. An F statistic can be used to test whether restricting a group of lag coefficients of a variable is binding. The causality test provides us the pattern of causality between money and stock prices.

The variance decomposition analysis identifies the sources of shocks that contribute to the forecast error variance of each of the variables in the system. This is achieved by decomposing the n-step ahead forecast error variance into each one of the shocks in the system. In a bi-variate setting (say x and y), the n-step ahead forecast error for x is given by:

$$\begin{aligned} x_{t+n} - E_t x_{t+n} = {} & \phi_{11}(0)_{xt+n} + \phi_{11}(1)_{xt+n-1} + \ldots\ldots + \phi_{11}(n-1)_{xt+1} \\ & + \phi_{12}(0)_{yt+n} + \phi_{12}(1)_{yt+n-1} + \ldots\ldots + \phi_{12}(n-1)_{yt+1} \end{aligned} \tag{4}$$

The variance of the forecast error (4) is :

$$\begin{aligned} \sigma_x(n)^2 = {} & \sigma_x^2 [\phi_{11}(0)^2 + \phi_{11}(1)^2 + \ldots\ldots + f_{11}(n-1)^2] + \\ & \sigma_y^2 [\phi_{12}(0)^2 + \phi_{12}(1)^2 + \ldots\ldots + f_{12}(n-1)^2] \end{aligned} \tag{5}$$

Decomposition of the forecast error variance is performed by weighting each term of the right hand side of (5) with the variance of the forecast error ($s_x(n)^2$). Dividing the first term of the right hand side of (5) with the forecast error variance gives the proportion of x forecast error variance which is due to its own shock and dividing the second term of (5) with the forecast error variance generates the proportion which is due to y. The influence of money supply on the stock indices is further identified by the breakdown of the forecast error variance for each of the indices.

The impulse response function (IRF) analysis depicts the reactions of stock prices to monetary shocks. Conceptually, IRF traces the sign and magnitude of the system's response over time to the shocks of a variable in the system. It is derived by specifying the VAR system (1) in the vector moving average (VMA) representation as follows:

$$X_t = C(L)n_t = \sum_{s=0}^{\infty} C_s v_{t-s} \qquad (6)$$

where $C(L) = A^{-1}\,[I - B(L)]^{-1}$ and I is the identity matrix. The elements of C_s provide a dynamic response among the variables in the system. Plotting the element of C_s against time yields the impulse response functions. The IRF will provide insights into the plausibility of the responses of stock prices to monetary injections.

5. RESULTS AND DISCUSSIONS

The results of Granger causality test between money and stock prices are presented in Table 1 and 2. The tables report the F statistics of the null hypothesis that all of the coefficients for money (Table 1) and stock indices (Table 2) are all equal to zero, i.e. there is no causation between the two. We perform our analysis for four different lag structures (3, 6, 9, and 12 months) to ensure consistency in the results. Table 1 presents the F statistics for money coefficients when the stock index is used as a dependent variable. The results strongly indicate that money Granger causes stock prices. Out of 16 estimations, 13 reject the null hypothesis of no causation. The causation is strong and consistent particularly for the Composite, Finance and Property sectors. Except for the 6 months lag, all other lag structure show a high level of significance at less than 5% level. Money affects the Industrial sector only when a shorter lag (3 months) is used but appears to be insignificant with longer lag specifications.

Table 1: F Statistics for Granger Causality Analysis
Dependant variable: Stock Prices (Null: Money Do Not Cause Stock Prices)

Indexx	Lag-period (month)			
	3	6	9	12
KLCI	5.647***	2.121*	2.193**	2.032**
	(0.001)	(0.054)	(0.026)	(0.027)
KLIND	4.272***	1.393	1.405	1.341
	(0.006)	(0.220)	(0.191)	(0.204)
KLFIN	5.699***	1.964*	2.106**	2.007**
	(0.001)	(0.074)	(0.033)	(0.029)
KLPROP	4.160***	2.146*	2.048**	1.666
	(0.007)	(0.051)	(0.038)	(0.082)

Notes: 1. The F statistics are derived based on VAR estimations composed of five variables (Money, Inter-bank Rates, Industrial Oroductions, CPI, Stock Index).
2. KLCI is the Composite Index, KLIND is the Industrial Index, KLFIN is the Finance Index and KLPROP is the Property Index.
3. Single, doble and triple asterisks indicate significcance level at 10%, 5% and 1% respectively.
4. Figures in parentheses are the significance level.

Table 2 presents the F statistics for testing reverse causation from stock prices to money. Except for Finance sector (3 and 12 months), none of the statistics is significant. Thus, reverse causation from stock prices to money cannot be supported. The significance results for Finance sector can be explained by the nature of business of the firms included in the calculation of the Finance index. Commercial banks for example are themselves a major determinant of the amount of money circulated in the economy. Their ability and willingness to issue loans play a significant role that determines the ultimate amount of money injected into the economy.[6] At the same time, issuance of loans also acts as a major business activity that supports the revenue earned. In general, share prices reflect the profitable loans issuance and loans issuance in turn creates money, justifying the causation from stock prices to money supply.

Table 2: F Statistics for Granger Causality Analysis
Dependant variable: Stock Prices (Null: Money Do Not Cause Stock Prices)

Stock Index	Lag-period (month)			
	3	6	9	12
KLCI	1.756	1.517	1.062	1.336
	(0.157)	(0.178)	(0.394)	(0.207)
KLIND	0.794	0.952	0.774	1.129
	(0.499)	(0.460)	(0.641)	(0.343)
KLFIN	2.259*	1.253	1.322	2.860
	(0.083)	(0.283)	(0.231)	(0.002)
KLPROP	1.327	1.038	1.060	1.347
	(0.267)	(0.403)	(0.396)	(0.201)

Notes: 1. See notes in Table 1.

The Granger causality analysis concludes that in the Malaysian stock market causation between money and stock prices is uni-directional running from money to stock prices but not the reverse except for shares included under the Finance sector. With regard to the Malaysian equity market, the findings from this analysis suggest that stock prices in the Malaysia are sensitive toward changes in money supply. The significant and consistent causation is expected since economic prosperity is tightly linked to the supply of money in the economy.[7] Therefore, investors should be able to gain added information by anticipating changes in monetary policy which as shown above exert a significant impact on stock prices.

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[6]*The process of money supply can be described by the multiplier model. Money is created through injection of reserves in the banking system. Reserves are one of the components of the monetary base or the high powered money. Excess reserves motivate banks to issue new loans which ultimately multiplied into money in the form of demand deposits. For descriptions and related discussions see Mishkin (1995) and Garfinkel and Thornton (1993).*

[7] *See Note 2.*

The impulse response functions (IRF) generated from the VAR estimations are depicted in Figure 1.[8] Figure 1a through d show the reaction paths of stock prices for each sector due to monetary shocks for 24 months period ahead together with the two standard error bands. It can be seen that all indices react in a similar fashion following monetary injections i.e., an upward trend can be detected during the first six months after the shock in money supply and the effect peak in the seventh to ninth month before declining gradually. As highlighted by the standard error bands the initial positive effects are significant for all sectors. The impact however declines gradually after reaching the peak but the positive effect remains to be significant at least up to 14 to 19 months except for Finance sector in which the positive effect remains strongly significant throughout the 24 months after the shock.[9] The initial patterns of these responses indicate that the market reacts with a lag rather than immediately following the monetary shock. This lagged effect is consistent with the theoretical understanding of how money affect the economy, i.e. with some lag.[10] However, proponents of market efficiency could argue that the lagged effect indicate the slow process of disseminating and incorporating the information in share valuation process. In an efficient market, share prices should incorporate all available information instantaneously if it has any effect on its value. The lagged effect results when a longer time is needed to fully absorb the implications of money supply changes on stock prices. As such, the lagged effect could be argued as sign of inefficiency in the market.[11]

Figure 1e of depicts the responses of all sectors together in one chart. This allows us to compare the relative magnitude of the responses across sectors. As shown, reactions of Finance and Property sectors are significantly above the Composite and Industrial sectors. The magnitude of responses is consistent with the Granger causality test presented earlier. The lesser impact of money on Industrial shares is obvious from the low responses generated for the Industrial index.

Further evidence on the influence of money on stock prices is described by the variance decomposition analysis presented in Table 3.[12] Overall, the results are consistent with earlier analysis. The significant explanation provided by innovation in money supply on the Finance sector is indicated by the larger percentage of variance explained by money.

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[8]*The IRF presented in Figure 1 reflects the responses derived based on VAR estimation using three months lag structure. We report this because the analysis of the causality test is strong when three months lag is used and to conserve space. IRF based on other lag structures show similar patterns of responses and are available upon request.*

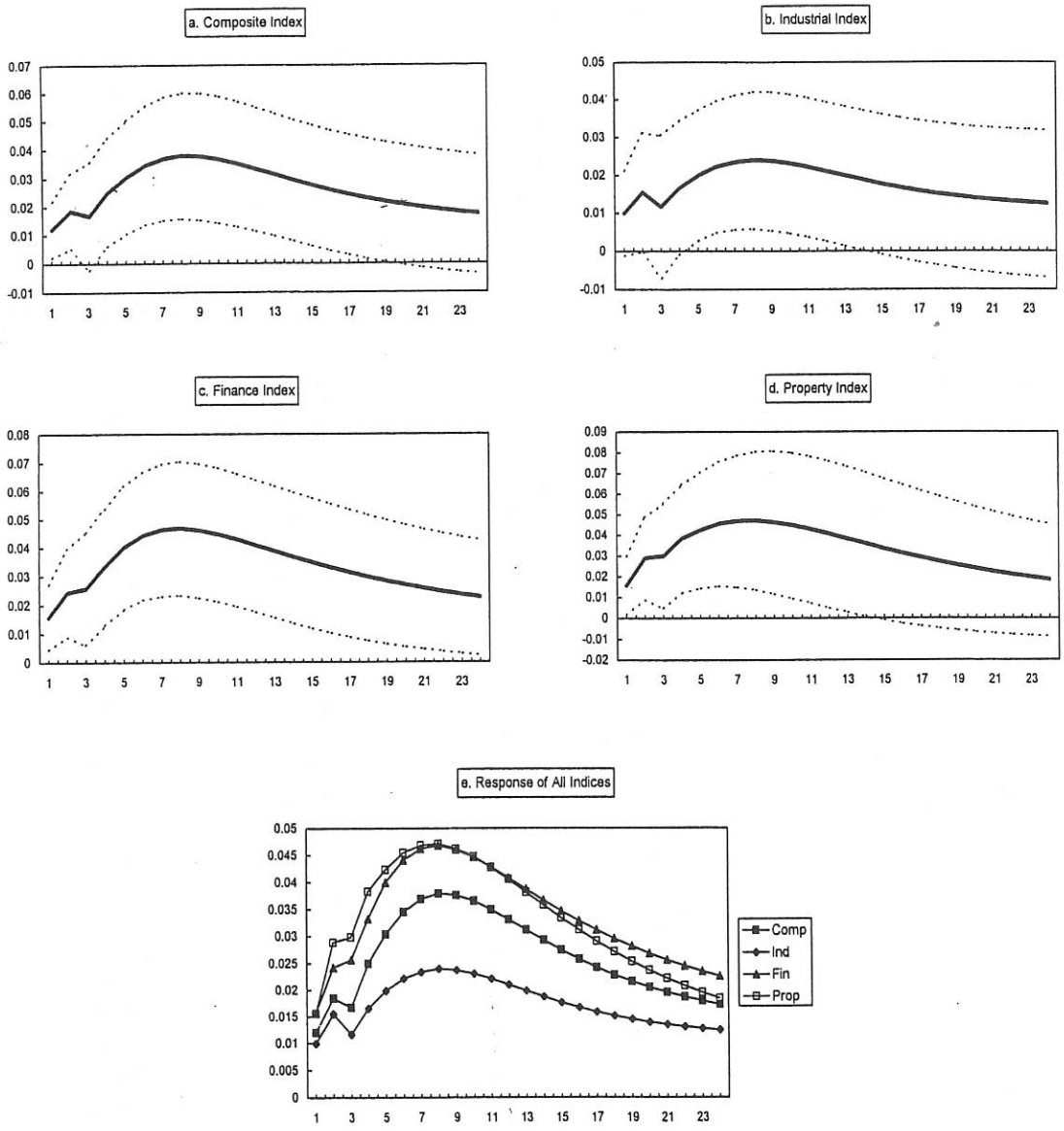
[9]*See Note 4.*

[10]*The response of economic activity due to changes in monetary policy normally occurs after some lag. Mishkin (1995) decribes this as the effectiveness lag, i.e. the actual time taken before the policy to have an impact on the economy. The length of effectiveness lag is one of the main debate between the Monetarist and Keynesian economics. See also Burger (1971) for a fine description on the issue of lagged effect.*

[11]*Our main objective is not to test the level of market efficiency. Nevertheless the results provide some implication on the efficiency of the market, we believe that further analysis needs to be performed before a strong conclusion can be made regarding market efficiency.*

[12]*See Note 6.*

Figure 1: The Response of Stock Prices to Monetary Shocks.



Note:

1. Solid lines in Figure 1a-d are impulse response functions derived based on VAR estimations composed of 5 variables (Money, Inter-bank Rates, Industrial Productions, CPI, Stock Index) and dotted lines are two standard error bands for the responses.
2. Figure 1e depicts the responses for all indices without the two standard deviation bands.

The percentage explained touches about 25 percent in eight months. Throughout the horizon reported about 42 percent of Finance sector's variance is due to money variations. This is followed by the Composite and Property indices reaching 31 and 27 percent respectively. The less significant results on the Industrial sector found earlier is also evident in the variance decomposition analysis. After 24 months money only explains about 18 percent of Industrial sector's variance. This is significantly less as compared to the other three indices averaging about 33 percent. Averaging all of the percentages (the last column of Table 3) confirms the lagged effect of money on stock prices. The significance influence begins in eight to nine months after the monetary shocks. In total money explains about 30 percent of variation in stock prices.

Table 3: Variance Decomposition A nalysis for Stock Indices (Percentage Due to Monetary Shocks)

Months	Composite Index	Industrial Index	Finance Index	Property Index	Average
1	2.93	2.09	3.84	2.68	2.88
2	4.84	3.67	7.07	5.91	5.37
3	4.80	3.44	8.10	6.49	5.71
4	6.56	4.27	10.81	8.40	7.51
5	8.94	5.50	14.29	10.33	9.77
6	11.77	7.00	17.96	12.42	12.29
7	14.73	8.59	21.42	14.43	14.79
8	17.61	10.18	24.56	16.32	17.17
9	20.22	11.63	27.28	18.02	19.29
10	22.50	12.91	26.62	19.53	21.14
11	24.43	13.99	31.63	20.84	22.72
12	26.03	14.90	33.35	21.96	24.06
13	27.33	15.63	34.83	22.90	25.17
14	28.37	16.22	36.09	23.68	26.09
15	29.20	16.70	37.18	24.33	26.85
16	29.84	17.07	38.12	24.87	27.47
17	30.33	17.36	38.92	25.30	27.98
18	30.70	17.58	39.62	25.65	28.39
19	30.97	17.76	40.21	25.92	28.72
20	31..16	17.90	40.72	26.14	28.98
21	31.28	18.00	41.16	26.31	29.19
22	31.35	18.09	41.53	26.52	29.47
23	31.38	18.15	41.84	26.52	29.47
24	31.37	18.20	42.10	26.58	29.56

Notes: 1. See notes in Table 1.

All of the three forms of analysis described above provide strong support that money supply exerts a significant impact on share prices. Changes in the amount of money supplied in the economy initiated by monetary policy carries vital information about the economy in the future. As highlighted by previous works, money undoubtedly possesses a significant influence on the economy. However, the real effect of changes in monetary aggregate is only a short-run phenomenon and over the long run money is neutral. This positive short-term effect is well captured by the stock prices in Malaysia.

Following monetary injections share prices increase with some lag but the effect gradually declines thereafter. Studying the path of monetary policy enhanced our understanding of the movement in the stock prices. Thus, incorporating information on the stance of monetary policy is vital in tracing the future movement in stock prices.

6. CONCLUSION

This study analyzes the relationship between money supply and stock prices in the Malaysian stock market. The empirical test is based on the system approach of vector autoregression methodology which provides the causality and also the dynamic analysis of the variables involved. It is found that there is a strong uni-directional causation running from money supply to stock prices. Changes in money supply generally initiate positive changes in stock prices. However, although the impact of a shock in money supply was detected immediately, it was not until the seventh to ninth month that it took the entire effect before declining gradually. Still, the impact continues to be significant even after the 24th month. The findings are consistent with a priori explanation based on the standard share valuation model and also the monetary portfolio model. Therefore, investors could gain added advantage in setting their investment strategies by incorporating monetary information. Early detection of the possibility of changes in the money supply may allow investors to formulate investment strategies that enable them to generate the better returns from their investment.

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