

DOMESTIC MONEY, FOREIGN MONEY AND THE PERFORMANCE OF MALAYSIAN COMMON STOCKS: A LONG RUN EQUILIBRIUM ANALYSIS

Dr Noor A Ghazali

Dr Soo-Wah Low

ABSTRACT

The long run relationship between monetary conditions, i.e. changes in monetary aggregate, with performance of stock prices in developing financial market such as Malaysia is investigated in this study. We enhance existing literature by examining both, the domestic and foreign, monetary conditions in our analysis. With the increasing degree of financial liberalization together with the rapid process of economic globalization, performance of stocks in developing small open economies such as Malaysia are more exposed to monetary conditions abroad. Our results support the cointegration hypothesis between stock prices and money supply (domestic and foreign). Dynamic analysis of cointegrated series based on the error correction estimations indicate that variations in monetary aggregates dictate the long run equilibrium path for Malaysian stocks. The results also support the increasing influence of foreign monetary conditions (i.e. the U.S. money supply) in setting long run movements in the Malaysian stock prices. The evidence presented highlights the importance of incorporating data on monetary conditions in stocks analysis and the increasing role of foreign economic conditions (particularly those of developed nations) in influencing performance of stocks prices in developing small open economy.

1. INTRODUCTION

The link between the amount of money in the economy and performance of various economic sectors has been a subject of interest for volumes of studies. A comprehensive study by Friedman and Swartz (1963) over nearly a hundred-year period indicates that the rate of growth in monetary aggregate precedes changes in economic cycle. They concluded that money growth exerts significant influence on business cycles with some lag.¹ Friedman (1968) argues, in objection to the Keynesian

¹ Despite this positive association with real activity, Friedman (1970) notes that the non-neutrality of money is limited only for the short run, in the long run the only lasting impact of a persistence expansionary monetary policy is on prices, i.e. persistence high money growth translates into an inflationary environment. See Cagan (1956), Barro (1978), Gibson (1992), Beltas and Jones (1993), and Ghazali and Ramlee (2001) for some empirical evidence on the link between money and prices in the long run.

analysis, the Great Depression is a testimony to the importance of money. Misguided policy of the Fed that reduced the monetary base (the high powered money) sharply from 1929 to 1933 led to a highly deflationary policy worsening the economic depression. Thus monetary policy is potent in the short run.²

Later studies widen the understanding of the relationship between money and economic activities. Evidence by Christiano and Eichenbaum (1992), Leeper and Gordon (1992) and Kim and Ghazali (1998) show that monetary injection is followed by a reduction in short-term interest rates verifying the liquidity effect of money.³ This evidence is in line with the stickiness of prices in short-run that allows changes in money supply to have an impact on real activity.⁴

Series of studies examine the relationship between growth of monetary aggregate and performance of stock prices. The dividend valuation model of stock prices equates current share prices to the sum of present value of expected future dividends. Since increase (decrease) in money supply brings down (up) the level of interest rate and influence real output positively (negatively), stock prices are expected to react in an upward (downward) pattern. Findings that support positive link between money and stock prices include Thorbecke (1997), Patelis (1997), Ghazali and Yaakob (1998), Muradoglu et. al (2001), Muradoglu and Metin (1996), Thorbecke and Coppock (1996), and Dhakal et.al (1993)⁵. Keran (1971), Homa and Jaffee (1971) and Hamburger and Kochin (1972) explain that based on the dividend valuation model this influence could occur through the cash flow effect (linking dividend with real output) and/or the discount rate effect (negative reaction of interest rate to monetary policy).⁶ The relationships between changes in monetary aggregate and stock prices therefore receiving the interests of financial researchers and investment advisors in forecasting performance of stock prices.

² There are two possible explanations behind the non-neutrality of money in the short run, information imperfection and stickiness of prices. Lucas (1972) and Sargent and Wallace (1975) claim that with expectation formed rationally, anticipated changes in monetary policy would be ineffective on real variables. Anticipation plays a critical role in policy effectiveness. Phelps and Taylor (1977) provide a staggered wage contract model that lead to price stickiness even with a perfect foresight.

³ Kim and Ghazali (1999) verify this experience for the developing nations including Malaysia.

⁴ Ghazali and Ramlee (2001) show that, in Malaysia, it takes about 12 months before prices react completely to monetary injection. This sluggish adjustment in prices is also true for other selected Asian countries (Bangladesh, India, Indonesia, Singapore, Sri Lanka and Thailand). Slow adjustment in prices give room for interest rate to decline in accordance to the liquidity effect of monetary injection.

⁵ Darrat and Dickens (1996) find bi-variate causation pattern between stock prices and changes in money supply. Pesando (1974) and Rozeff (1974) argue that in an efficient market trading rule using lagged money supply data does not exist. Contemporary changes in relevant economic variables should influence stock prices only to the extent that they are unanticipated and lagged values of these variables should exert no significance influence.

⁶ From a different perspective, positive reaction of stock prices to monetary injection could also be due to investors' portfolio balance adjustment triggered by monetary injection. See Friedman (1988) for this real balance effect on stock price movement.

In this study we enhance the understanding of the link between money and stock prices for developing markets using the case of Malaysia. Tan (1998) 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 1987 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 rates on stock markets in the USA, Malaysia, Singapore, Hong Kong, Japan and Australia from January 1989 to June 1997. The results show that the United States money supply and interest rates do not have significant causal effect on the Asia-Pacific market. Nonetheless, they do Granger-cause the markets in the long-run. Findings by Ghazali and Yaakob (1998) support the view that in Malaysia changes in monetary aggregate trigger significant influence on variations of stock prices. We add to this evidence by investigating the influence of domestic and foreign (developed nations) money supply on Malaysian stock prices and their relative strength over different sub-periods reflecting the process of financial liberalization and economic globalization. This exercise is critical for several reasons. With the process of domestic financial liberalization and globalization of financial markets, increased capital flows are expected to increase the degree of financial integration of the world economy, thus, leading to a higher link between domestic and international economic variables. In examining linkages between stock markets, many studies that support links of stock market conclude that stock market indices across the world move parallel with each other (examples are Asimakopoulous et.al (2000), Meric and Meric (1997), Malliaris and Urrutia (1992), and Ashanapalli and Doukas (1993)). In searching for the roots of these links, many studies isolate the markets and economic conditions in developed nations such as the United States, Japan and Germany to play a significant role in setting movement in financial markets of the rests of the world. In particular, several studies such as Eun and Shim (1989), Chowdhury (1994), Kwan et al (1995), Ashanapalli and Doukas (1993) and Cheung and Mak (1992) show that the US market plays a dominant role in driving the movement of financial market elsewhere. A recent study by Conover et.al (1999) demonstrated that significant international stock market linkages can be attributed to the changes in monetary policy both in the US and in the local country.

Despite these extensive studies that examine the presence of the link between stock markets, limited studies attempt to examine the factors that contribute to these links. Intuitive explanations generally argue on the financial liberalization and globalization as a force behind these links. We propose an explicit explanation behind these links by examining the influence of a widely accepted leading indicator, i.e. the money supply, on stock prices. In an effort to stabilize world economy, leaders of developed nations occasionally adopted planned monetary policy coordination. Leachman and Francis (1995) show that central bank interventions as defined by the Plaza and Louvre Accords contributes to an increasing correlation of stock indices among the G-5 and G-7 countries. Their

findings imply that international linkages between equity markets could be the result of increasing policy coordination across different economies. The small developing economy will also have a tendency to coordinate their domestic monetary policy with policies adopted by developed nations. Policies that aim to stabilize home currency exchange rate vis-a-vis currencies of developed nations require a parallel monetary policy to be implemented. In a more rigid condition, countries that fixed their currencies are in fact submitting their monetary policy to be directed by monetary policy of an anchor country.⁷ We examine this relationship for a small developing nation using the case of Malaysia. Our objective is to identify the long run equilibrium relationship between changes of money supply in the developed nations (United States) on the performance of the Malaysian stock prices. We analyze this foreign influence in conjunction with the influence of domestic money supply. Our results indicate that movement of Malaysian stock prices are subject to an equilibrium path set by the rate of domestic and foreign monetary growth. Cointegration relationship are supported between stock price changes and changes in monetary aggregates in Malaysia and the U.S.. We also support the view that following financial liberalization and globalization the influence of foreign (U.S.) monetary growth is relatively greater. Evidence over the second sub-period (1987:1-1999:12) shows that the speed of adjustment toward deviation from the long run path dictated by the U.S. monetary growth is larger. The forthcoming sections are as follows. Section 2 describes the data set and empirical methodology employed in the study. Section 3 presents our findings and results interpretation. We conclude briefly in Section 4.

2. THE DATA SET AND EMPIRICAL METHODOLOGY

We examine the link between monetary aggregate and stock prices using the data of the Malaysian economy. The Malaysian economy is best described as a small-open economy that interacts significantly with the global economy. Being relatively small in size, Malaysian real output (measured by the Gross Domestic Products) is significantly depending on world economic performance. Being a small-open economy, Malaysia's prosperity greatly relies on the health of the world economy. Exports contribute nearly half (approximately 49.5 percent) of the nation's 1999 total demand for goods and non-factor services. The slowdown of world economy in year 2000-01 adversely affected the Malaysian economy that recently recovered from the currency crisis in 1997-98. The performance of the Malaysian stock market, the Kuala Lumpur Stock Exchange (KLSE), is frequently link to the performance of other major bourses of the developed nations in line with studies cited in the preceding paragraph. Major market downturn such as October's 1987 crashed affected KLSE's performance in a very significant magnitude. The KLSE Composite Index dropped by 15.7 percent

⁷ Friedman (1953) explains the harsh discipline of fixed exchange rate regime that lead toward loosing monetary independence. Ghazali (2001) discusses this implication with respect to the fixing of Ringgit Malaysia to U.S. Dollar in September 1998 as reaction toward the exchange rate crisis in 1997.

following the Black Monday of 1987.⁸ Foreign institutional investors play a dominant role in small market such as the KLSE. This is partly due to the liberalization effort of the Malaysian authority in internationalizing the domestic capital market. The currency crisis of 1997-98 witnessed this highly significant role of foreign investors. Panic sell-off in an effort to get out of Ringgit denominated investments caused significant decline in the value of shares traded in the KLSE. There are limited number of studies that examine the behaviour of Malaysian stock prices toward monetary conditions (see Tan (1998) and Ghazali and Yaakob (1998)). In addition to these limited studies, we extend the understanding of the behaviour of the Malaysian stock prices by investigating its relationship with domestic and foreign monetary aggregates.

We measure stock performance using the four commonly quoted share indices; the KLSE Composite Index (COMP), the KLSE Industrial Index (IND), the KLSE Finance Index (FIN), and the KLSE Property Index (PROP). These are monthly averages gathered from the Investors Digest published by the KLSE. We refer to these series as proxy for stock prices in the forthcoming discussion. The monetary aggregates for the Malaysian economy (denoted as MIM) is measured by the narrow M1-money gathered from the Monthly Statistical Bulletin published by the Bank Negara Malaysia (Central Bank of Malaysia). The foreign money is represented by the U.S. money supply, i.e. the narrow M1-money denoted as MIUS. The data were sourced from the International Financial Statistics (IFS) of the International Monetary Fund. The analysis covers a period of 18 years from 1982 to December 1999. We break our analysis into three parts: Sub-period 1 (1982:1-1987:12), Sub-period 2 (1988:1-1999:12) and the Whole period analysis (1982:1-1999:12). Several studies such as Jeon and Von Furstenberg (1990), Meric and Meric (1997) and Arshanapalli and Doukas (1993) indicate that the pattern of linkages among various stock markets have changed for the post-October 1987 period. With this framework of analysis we investigate the possibility of changing pattern of relationship (if any) between Malaysian stocks indices and measures of money supply. The second sub-period also captures the period of increasing integration between world financial markets. The greater force of globalization witnessed during these years (particularly the 1990s) could affect the reaction of domestic variables to policies of major nations.

The patterns of movement between KLSE stock indices and domestic and foreign money supply are shown in Figure 1a-c. Graphical observations of Figure 1a and b indicate that Malaysian stock performance possesses some co-movement with changes in domestic and foreign monetary aggregates. Association with domestic money growth is contemporaneous while relationship with foreign monetary changes seems to appear after some lag. As indicated in Figure 1c this lagged

⁸ Malaysia is not isolated in this case. The large influence of the US performance on domestic market of small open economy is also true for many other countries. Large significant decline in other East Asian bourses such as Japan, Taiwan and Hong Kong is also recorded following the Black Monday of 1987 (Far Eastern Economic Review (1987)).

relationship also appears between Malaysian money growth and U.S. money growth with the latter leading the changes. We estimate the strength of these linear associations by calculating the Pearson's correlation coefficients between contemporaneous stock growth and lagged money growth up till 24 months. The estimated correlation coefficients for the whole and two sub-periods are tabled in Table 1a, b and c. As a whole, these positive linear associations are significant for all pairs at all lag lengths with some exception for the correlation between stock prices and Malaysian money at the longer lag. The correlation with domestic money is stronger at the earlier lag while weaken at the longer end. On the other hand, the reverse is observed for the correlation between stock prices and foreign money where correlation is stronger at longer end. We also dictate positive associations between domestic and foreign money growth which also appear to be significant and strengthened at the longer end in line with Figure 1c. These linear associations suggest possible linkages of the Malaysian stock prices with domestic and foreign monetary policy, thus forming the motivation for our study.

For an explicit treatment of long run equilibrium relationship we proceed with the two-step cointegration analysis proposed by Engle and Granger (1987-here onward EG). Prior to the cointegration analysis we first examine the stationarity of the data set using the Augmented Dickey Fuller (ADF) test described by Dickey and Fuller (1979). We estimate the following regression on the level and first difference of the logged series of money supply and stock prices:

$$\Delta x_t = \theta + \alpha x_{t-1} + \sum_{i=1}^k \varphi_i \Delta x_{t-i} + \mu_t, \quad (1)$$

where, Δ is the first-difference operator; x_t is the series tested; and μ_t is a covariance stationary random error. The appropriate number of lagged difference (k) is determined by Akaike Information Criteria (AIC) due to Akaike (1970). Optimal choice of lag length removes autocorrelations in the error term. The null hypothesis of unit root, $|\alpha|=1$, is tested against alternative of stationarity, $|\alpha|<1$. The critical values for the test are developed by MacKinnon (1991). Evidence of difference stationary (i.e. series are $I(1)$) is a precondition for proceeding with the EG test.

EG proposed a cointegration analysis for time series that are difference stationary, i.e. $I(1)$ series. Cointegration suggests that certain pairs of economic time series are linked by a long run equilibrium force. Variables that are cointegrated may diverge from an equilibrium path momentarily but in the long run they obey a common force of attractor that links them together. EG show that it is possible for two variables to be $I(1)$ and yet their linear combinations to be $I(0)$. If such is the case the two variables are said to be cointegrated. The EG test calls for testing the stationarity of the error series derived from a cointegration regression, i.e. an ordinary least squares (OLS) regression

between the level of the $I(1)$ series. For our case we run the following cointegration regression between money supply and stock indices:

$$INDEX_t = \phi_0 + \phi_1 MONEY_t + v_t \quad (2)$$

The ADF test described above is used to test for stationarity of the error series, v_t . If the null hypothesis of unit root can be rejected, money supply and stock prices are cointegrated. Thus, they are linked by a common force of attractor in the long run. An insight into the dynamics of cointegrated series can be represented by an error correction representation. Conditioned on the results of the cointegration test, we then examine the dynamic pattern of the long run relationship between money supply and stock prices based on the following error correction model (ECM):

$$\Delta INDEX_t = \theta + \gamma v_{t-1} + \sum_{j=1}^p \theta_{p,j} \Delta INDEX_{t-j} + \sum_{j=1}^q \delta_{M,j} \Delta MONEY_{t-j} + v_t \quad (3)$$

Equation 3 is the ECM that explain the long run dynamic between changes in stock prices and changes in money supply. We regress the one period lag of the error series of the cointegration regression (Equation 2) and lagged first difference of stock prices and money supply on the first difference of stock prices. The optimal lag for the lagged terms, p and q , are determined based on a sequential process similar to Hsiao (1979a, 1979b). First we estimate an autoregressive process with only the lagged dependent variables entering the equation and choosing the optimal number of lags, p , that minimizes AIC. With p chosen, the equation is expanded to include lagged values of money growth and lag length q is determined in the same manner as described. The sequential process minimizes the computational difficulties to search for optimal lag length.

The variable of interest is the speed coefficient, γ , that reflects the sensitivity of stock price movement toward previous deviation from the long run equilibrium path dictated by patterns in money supply. The coefficient carries negative sign reflecting the correction adjustment mechanism (i.e. positive deviation in period $t-1$ requires reverse correction in the following period t and vice versa). Null hypothesis of zero adjustment is tested. Significant role for money supply in determining the long run path for share indices is achieved with the rejection of the null hypothesis. We perform the estimates using the Malaysian and U.S. money supply separately. Thus, we have two sets of estimates for the speed of adjustment denote as γ_M and γ_{US} for estimation employing the Malaysian and U.S. money supply respectively. Comparative analysis between these speed of adjustments provide us an insight into the relative response of Malaysian stock prices toward domestic and foreign money supply changes.

3. EMPIRICAL RESULTS AND DISCUSSIONS

Table 2 provides the ADF unit root test for all the series tested. Reported statistics in the first column indicate that stock prices and money supply series are non-stationary. None of the null hypothesis of non-stationarity can be rejected at the level form. Unit root hypothesis can only be rejected significantly when these series are first differenced. Thus, stock prices and money supply series are differenced stationary $I(1)$ series allowing us to proceed with the cointegration analysis proposed by EG. Cointegration regression (Equation 2) is estimated using the Malaysian and U.S. money supply data for the whole and two sub-periods. The next six columns of Table 1 provide the ADF test on the estimated error series derived from Equation 2 for respective time periods and money supply data. The null hypothesis of zero cointegration is strongly rejected at 5 percent significance level for all estimations with minor exception for the Property sector that carries no evidence of cointegration for sub-period analysis. However, for the whole period, cointegration between stock prices and money supply (domestic and foreign) is supported significantly. This indicates that Malaysian stock market performance response to both sets of monetary information. Domestic and foreign monetary policy influence stock market performance in the long run.

An insight into the dynamic adjustment of stock prices to changes in money supply is provided by the ECM estimations (Equation 3). We report the estimated speed of adjustment coefficients (γ_M and γ_{US}) for the whole and sub-periods analysis in Table 3. A quick glimpse on the coefficients of determination (R^2) indicates that there are other explanatory variables that influence movement in stock prices. Lagged stock performance and growth of money supply explain only some portion of current movement in stock prices. This however does not dismiss the importance of money supply changes in influencing the long run path for stock prices. On average the explanatory power of the Malaysian money supply equation is 21, 20, and 18 percents for sub-period 1, sub-period 2, and whole period respectively. Across indices, for the whole period Malaysian money supply explains Composite index the most with R^2 of 23 percent. On the other hand, the U.S. money equation explains 45, 22, 16 of variation in stock prices for sub-period 1, sub-period 2, and whole period respectively. Across indices, for the whole period Property index is the most affected by changes in the U.S. money supply with an R^2 of 21 percent.

All of the speed coefficients (γ_M and γ_{US}) carry negative signs consistent with the error correction process described earlier. As a whole these coefficients are significantly different from zero indicating that in the long run stock price adjusts significantly to its past deviation from the long run path set by changes in money supply. Analysis of sub-periods indicates insignificant adjustments toward changes in the U.S. money data during the first sub-period. This is true for the Composite, Finance and Property Index. Nevertheless, the case is reversed for the second sub-period. In the second

sub-period, long run movement of stock prices are significantly tied to changes in both, the domestic and foreign money supply. We interpret this as evidence of the impact of market liberalization and globalization that increased the exposure of domestic stock market to external events particularly those of the developed nations such as the U.S.. The influx of foreign investors in developing stock markets such as Malaysia through the liberalization process and the increasing interaction in economic activities between Malaysia and the United States through the process of globalization exposed Malaysian stock market to variation in foreign monetary policy, in particular the changes of U.S. money supply.

We then compare the relative strength of the long run influence of Malaysian and U.S. money supply on Malaysian stock performance in Table 4. This is proxied by the ratio between the two speed of adjustment, i.e., γ_{US} / γ_M . A ratio greater than 1 indicates the increasing importance of the U.S. money supply in dictating long run path for Malaysian stock prices. In the first sub-period Malaysian money supply dominates the long run path of stock prices indicated by the ratio of less than 1. However, the ratio of the speed coefficients is greater than 1 for all indices in the second sub-period indicating stronger adjustment to changes in the U.S. money supply. Relatively the increasing importance of the U.S. money supply on the long run path in the second sub-period is stronger in the case of the Industrial and Finance Indices. Thus, overtime, monetary conditions abroad exert increasing influence on the performance of Malaysian stocks. Nevertheless, this evidence does not reject the importance of domestic monetary conditions in setting movement in domestic stock prices. For the whole period analysis domestic money still dominates variations in stock prices. Therefore, domestic and foreign monetary conditions should be given serious attention in gauging domestic stock market performance. With increasing degree of liberalization and globalization, foreign monetary conditions play increasing role in determining performance of stocks in developing nations.

4. SUMMARY AND CONCLUSIONS

We investigate the influence of monetary conditions, i.e. changes in money supply, on the performance of stock prices in developing economy such as Malaysia. Our goal is to dictate a long run relationship that might exist between the two variables as shown by other researchers using data from developed financial markets. We enhance the understanding by examining the influence of two sets of monetary data, i.e. , domestic and foreign money supply data represented by the U.S. money supply. Our results support the important role of monetary conditions in determining stock market performances. Malaysian stock prices are found to be cointegrated with both the domestic and foreign money data. The findings also highlight the implication of financial market liberalization and the increasing degree of economic globalization. As a small open economy that

significantly relies on world economic performance, the reaction of Malaysian stock prices to foreign money supply increase parallel with the process of economic globalization. Thus, investors must incorporate domestic and foreign monetary conditions in forecasting stock market performance. Greater attention should also be given to foreign monetary policy as financial market are liberalized in line with economic globalization.

SUMMARY AND CONCLUSIONS

REFERENCES

- Altinkale, H. 1970, Autoregressive Model Fitting for Control, *Annals of the Institute of Statistical Mathematics*, **22**: 163-180.
- Arinathanapalli, B., and Doukas, J. 1993, International Stock Market Linkages: Evidence from the Pre-and Post-October 1987 Period, *Journal of Banking and Finance*, **17**: 193-208.
- Asimakopoulous, I., Goddard, J., and Siriopoulous, C. 2000, Interdependence Between the US and Major European Equity Markets: Evidence from Spectral Analysis, *Applied Financial Economics*, **10**: 41-47.
- Bank Negara Malaysia, Monthly Statistical Bulletin, various issues (January 1980-December 1999).
- Barro, R. J. 1978, Unanticipated Money, Output and the Price Level in the United States, *Journal of Political Economy*, **86**: 65-79.
- Behtas, A. and Jones, T. 1993, Money, Inflation and Causality in a Financially Repressed Economy: Algeria, 1970-88, *Applied Economics*, **25**: 473-480.
- Cagan, P. D. 1956, The Monetary Dynamics of Hyperinflation, in Milton Friedman (ed.), *Studies in the Quantity Theory of Money*, University of Chicago Press.
- Cheung, Y. L., and Mak, S. C. 1992, The International Transmission of Stock Market Flactuations Between the Developed Markets and the Asia-Pacific Markets, *Applied Financial Economics*, **2**: 43-47.
- Chowdhury, A. R. 1994, Stock Market Independencies: Evidence from the Asian NIEs, *Journal of Macroeconomics*, **16**: 629-651.
- Christiano, L J., and Eichenbaum, M. 1992, Liquidity Effects and the Monetary Transmission Mechanism, *American Economic Review*, **82**: 346-353.
- Conover, C. M., Jensen, G. R., and Johnson, R. R. 1999, Monetary Environments and International Stock Returns, *Journal of Banking and Finance*, **23**: 1357-1381.
- Dhakar, D., Kandil, M., and Sharma, S. C. 1993, Causality Between the Money Supply and Share Prices, *Quantitative Journal of Business and Economics*, **32**, 52-74.

Dickey, D. A., and Fuller, W. A. 1979, Distribution of the Estimators for Autoregressive Time Series with a Unit Root, *Journal of the American Statistical Association*, **74**: 427-431.

Engle, R. F., and Granger, C. W. 1987, Cointegration and Error Correction: Representation, Estimation, and Testing, *Econometrica*, **55**: 251-276.

Eun, C. S., and Shim, S. 1989, International Transmission of Stock Market Movements, *Journal of Financial and Quantitative Analysis*, **24**: 241-256.

Far Eastern Economic Review, The End of the Ride, 29 October 1987: 87-90.

Friedman, M. 1953 (Ed), The Case for Flexible Exchange Rates in Essays in Positive Economics. Chicago: University of Chicago Press.

Friedman, M. 1968, The Role of Monetary Policy, *American Economic Review*, **58**: 1-17.

Friedman, M., and Schwartz, A. 1963, Money and Business Cycle, *Review of Economics and Statistics Supplement*, **45**: 32-64.

Friedman, M. 1970, The Counter Revolution in Monetary Theory, First Wincott Memorial Lecture. London Institute of Economic Affairs.

Friedman, M. 1988, Money and the Stock Market, *Journal of Political Economy*, **96**: 221-245.

Ghazali, N. A. 1997, Transmission Process of Central Bank's Monetary Policy, *Banker's Journal Malaysia*: 25-29 & 34.

Ghazali, N. A. 2001, An Evaluation of Fixed Ringgit Regime: Is The Monetary Independence A Reality? *Banker's Journal Malaysia* (Journal of the Institute of Bankers Malaysia).

Gibson, J. 1992, Money, Inflation and Untested Common Factors, *Applied Economics*, **24**: 581-585.

Ghazali, N. A., and Ramlee, S. 2001, Long Run Equilibrium Relationship between Money and Prices in Selected Asian Countries, *Asian Academy of Management Journal*, **6**: 89-108.

Ghazali, N. A. and Yaakob, N. A. 1998, The Supply of Money and Stock Prices: The Case of Malaysia. *Capital Market Review*, **6**: 69-83.

- Hamburger, M. J., and Kochin, L. A. 1972, Money and Stock Prices: The Channels of Influence, *Journal of Finance* **26**: 231-249.
- Homa, K. E., and Jaffee, D. W. 1971, The Supply of Money and Common Stock Prices, *Journal of Finance* **26**: 231-249.
- Hsin, C. 1979 (a), Autogressive Modelling of Canadian Money and Income Data, *Journal of the American Statistical Association*, **74**:553-560.
- Hsin, C. 1979 (b), Causality Tests in Econometrics, *Journal of Economic Dynamic and Control*, **1**:321-346.
- Jenn, B. N., and Von Furstenberg, G. M. 1990, Growing International Co-Movement in Stock Price Indexes, *Quarterly Review of Economics and Business*, **30**: 15-30.
- Kern, M. W. 1971, Expectations, Money and Stock Markets, *Federal Reserve Bank of St. Louis Review* **32**: 417-425.
- Kim, B. J. C., and Ghazali, N.A. 1998, The Liquidity Effect of Money Shocks on Short-Term Interest Rates: Some International Evidence, *International Economic Journal*, **12**: 49-63.
- Kim, B. J. C., and Ghazali, N. A. 1999, Has the Effect of Money Shocks on Interest Rates Really Vanished? Further Evidence of the Liquidity Effect, *Applied Economics*, **31**: 743-754.
- Kuala Lumpur Stock Exchange, Investors' Digest, various issues (January 1980-December 1999).
- Kwan, A. C. C., Sim, A. B., and Cotsomitis, J. A. 1995, The Causal Relationship Between Equity Indices on World Exchanges, *Applied Economics*, **27**: 33-37.
- Leachman, L. L., and Francis, B. 1995, Long-run Relations Among the G-5 and G-7 Equity Markets: Evidence on the Plaza and Louvre Accords, *Journal of Macroeconomics*, **17**: 551-577.
- Leeper, E., and Gordon, D. 1992, In Search of Liquidity Effect, *Journal of Monetary Economics*, **29**: 341-369.
- Lucas, R. E. 1972, Expectations and the Neutrality of Money, *Journal of Economic Theory*, **4**: 103-124.

- MacKinnon, J. G. 1991, Critical Values for Cointegration Tests in Long-Run Econometric Relationships, Readings in Cointegration (Eds.) Engle, R. F. & Granger, W. J. Oxford Press, New York, 266-276.
- Malliaris, A. G., and Urrutia, J. L. 1992, The International Crash of October 1987: Causality Tests, *Journal of Financial and Quantitative Analysis*, **27**: 353-364.
- Meric, I., and Meric, G. 1997, Co-Movements of European Equity Markets Before and After the 1987 Crash, *Multinational Finance Journal*, **1**:137-152.
- Muradoglu, G., Metin, K., and Argac, R. 2001, Is There a Long Run Relationship Between Stock Returns and Monetary Variables: Evidence from an Emerging Market, *Applied Financial Economics*, **11**: 641-649.
- Muradoglu, G., and Metin, K. 1996, Efficiency of the Turkish Stock Exchange With Respect to Monetary Variables: A Cointegration Analysis, *European Journal of Operational Research*, **90**: 566-576.
- Patelis, A. D. 1997, Stock Returns Predictability and The Role of Monetary Policy, *Journal of Finance*, **52**: 1951-1972.
- Pesando, J. E. 1974, The Supply of Money and Common Stock Prices: Further Observations on the Econometric Evidence, *Journal of Finance*, **29**: 909-921.
- Phelps, E. S., and Taylor J. B. 1977, Stabilizing Powers of Monetary Policy under Rational Expectations, *Journal of Political Economy* **85**: 163-190.
- Rozeff, M. S. 1974, Money and Stock Prices, *Journal of Financial Economics*, **1**: 245-302.
- Sargent, T., and Wallace, N. 1975, Rational Expectations, The Optimal Monetary Instrument, and the Optimal Money Supply Rule, *Journal of Political Economy* **83**: 241-254.
- Tan, H. B. 1998 (a), US Money Supply Announcements, Interest rate and the Asian-Pacific Stock Prices, Book of Abstract, The 10th PACAP Conference in Kuala Lumpur, 26th to 28th October, 1998.
- Thorbecke, W., and Coppock, L. 1996, Monetary Policy, Stock Returns, and the Role of Credit in the Transmission of Monetary Policy, *Southern Economic Journal*, **62** : 989-1001.

Table 1(a)
 Pearson Correlation Coefficients Among Malaysian Money, Stock Returns and US Money
 (Whole Period: January 1982-December 1999)

Panel A Correlation of Malaysian Money with Malaysian Stock Returns					Panel B Correlation of US Money with Malaysian Stock Returns					Panel C Correlation of US Money with Malaysian Money	
Lag	COMP	IND	FIN	PROP	Lag	COMP	IND	FIN	PROP	Lag	MMONEY
1	0.650**	0.649**	0.653**	0.402**	1	0.213**	0.218**	0.241**	0.196**	1	0.024
2	0.564**	0.568**	0.565**	0.374**	2	0.239**	0.248**	0.266**	0.224**	2	0.050
3	0.481**	0.495**	0.462**	0.354**	3	0.260**	0.274**	0.288**	0.250**	3	0.082
6	0.231**	0.262**	0.181**	0.348**	6	0.298**	0.326**	0.335**	0.295**	6	0.171**
12	-0.135**	-0.093	-0.207**	0.247**	12	0.270**	0.338**	0.319**	0.284**	12	0.270**
18	-0.208**	-0.207**	-0.253**	0.105	18	0.251**	0.339**	0.256**	0.271**	18	0.336**
24	-0.156**	-0.214**	-0.109	-0.143**	24	0.173**	0.266**	0.150**	0.287**	24	0.320**
Average Correlation:					Average Correlation:					Average Correlation:	
6 months	0.439	0.453	0.417	0.361	6 months	0.263	0.279	0.293	0.254	6 months	0.098
12 months	0.216	0.246	0.172	0.337	12 months	0.273	0.307	0.311	0.276	12 months	0.166
24 months	0.013	0.024	-0.023	0.200	24 months	0.256	0.316	0.279	0.276	24 months	0.246

** Indicates significance at the 5 percent level.

Table 1(b)
Pearson Correlation Coefficients Among Malaysian Money, Stock Returns and US Money
(Sub Period 1: January 1982-December 1987)

Panel A Correlation of Malaysian Money with Malaysian Stock Returns					Panel B Correlation of US Money with Malaysian Stock Returns					Panel C Correlation of US Money with Malaysian Money	
Lag	COMP	IND	FIN	PROP	Lag	COMP	IND	FIN	PROP	Lag	MMONEY
1	0.661**	0.651**	0.666**	0.675**	1	0.476**	0.486**	0.562**	0.516**	1	0.245
2	0.551**	0.540**	0.571**	0.553**	2	0.558**	0.574**	0.636**	0.609**	2	0.350**
3	0.502**	0.494**	0.510**	0.489**	3	0.619**	0.637**	0.678**	0.676**	3	0.438**
6	0.341**	0.317**	0.341**	0.293**	6	0.589**	0.604**	0.583**	0.677**	6	0.529**
12	0.092	0.062	0.093	-0.033	12	0.308**	0.342**	0.233	0.419**	12	0.260**
18	-0.135	-0.181	-0.161	-0.256**	18	0.131	0.157	-0.019	0.208	18	-0.029
24	-0.434**	-0.477**	-0.416**	-0.545**	24	-0.169	-0.160	-0.258**	-0.152	24	-0.133
Average Correlation:					Average Correlation:					Average Correlation:	
6 months	0.481	0.462	0.488	0.462	6 months	0.585	0.600	0.630	0.648	6 months	0.430
12 months	0.342	0.319	0.349	0.288	12 months	0.505	0.525	0.503	0.593	12 months	0.421
24 months	0.083	0.051	0.080	-0.009	24 months	0.296	0.319	0.233	0.369	24 months	0.208

** Indicates significance at the 5 percent level.

Table 1(c)
Pearson Correlation Coefficients Among Malaysian Money, Stock Returns and US Money
(Sub Period 2: January 1988-December 1999)

Panel A Correlation of Malaysian Money with Malaysian Stock Returns					Panel B Correlation of US Money with Malaysian Stock Returns					Panel C Correlation of US Money with Malaysian Money	
Lag	COMP	IND	FIN	PROP	Lag	COMP	IND	FIN	PROP	Lag	MMONEY
1	0.700**	0.742**	0.680**	0.344**	1	0.254**	0.180**	0.270**	0.206**	1	0.273**
2	0.611**	0.661**	0.588**	0.341**	2	0.273**	0.205**	0.295**	0.227**	2	0.296**
3	0.511**	0.571**	0.472**	0.335**	3	0.289**	0.228**	0.318**	0.249**	3	0.328**
6	0.207**	0.292**	0.154	0.387**	6	0.345**	0.316**	0.393**	0.306**	6	0.423**
12	-0.242**	-0.144	-0.287**	0.346**	12	0.349**	0.398**	0.394**	0.331**	12	0.512**
18	-0.279**	-0.226**	-0.303**	0.235**	18	0.341**	0.434**	0.325**	0.342**	18	0.558**
24	-0.055	-0.081	-0.035**	0.011	24	0.284**	0.393**	0.216**	0.422**	24	0.510**
Average Correlation:					Average Correlation:					Average Correlation:	
6 months	0.457	0.521	0.420	0.353	6 months	0.300	0.246	0.332	0.259	6 months	0.347
12 months	0.183	0.267	0.141	0.372	12 months	0.324	0.306	0.366	0.293	12 months	0.413
24 months	-0.022	0.039	-0.051	0.284	24 months	0.329	0.366	0.341	0.328	24 months	0.479

** Indicates significance at the 5 percent level.

Table 2: Unit Root Test on Stocks Indices, Money Supply and Residuals of Cointegration Regressions

Stock Index	Level	First Difference	Whole Period (1982:1-1999:12)		Sub-period 1 (1982:1-1987:12)		Sub-period 2 (1988:1-1999:12)	
			Residuals (MSA)	Residual (USA)	Residuals (MSA)	Residual (USA)	Residuals (MSA)	Residual (USA)
Composite	-1.586 (10)	-4.003** (9)	-2.896** (10)	-2.980** (10)	-2.592** (4)	-2.782** (4)	-2.051** (0)	-2.301** (0)
Industrial	-1.536 (2)	-9.137** (2)	-2.698** (11)	-3.177** (10)	-2.838** (2)	-2.795** (2)	-2.036** (0)	-2.206** (0)
Finance	-1.622 (8)	-4.339** (7)	-3.325** (11)	-2.782** (8)	-2.971** (2)	-2.309** (4)	-2.004** (0)	-2.001** (0)
Properties	-2.164 (10)	-8.213** (2)	-2.412** (10)	-2.554** (10)	-1.618 (0)	-2.123** (4)	-0.088 (1)	-0.363 (1)
Money (Malaysia)	-2.552 (12)	-3.641** (12)	-	-	-	-	-	-
Money (USA)	-2.011 (5)	-3.234** (4)	-	-	-	-	-	-

Notes:

1. Double asterisks indicate significance at the 5% level.
3. The critical values for the ADF tests are developed by MacKinnon (1991).
4. Figures in parentheses are optimal lag that removes autocorrelations in error term of Equation 1.

Table 3) Estimates of Error Correction Equations

Dependent	Money	Whole Period (1982:1-1999:12)			Sub-period 1 (1983:1-1987:12)			Sub-period 2 (1988:1-1999:12)		
		Lags (p, q)	Error Correction Coefficient (γ_M and γ_{US})	R ²	Lags (p, q)	Error Correction Coefficient (γ_M and γ_{US})	R ²	Lags (p, q)	Error Correction Coefficient (γ_M and γ_{US})	R ²
Composite	M1M	(10, 8)	-0.105** (-3.872)	0.23	(4, 1)	-0.126** (-2.585)	0.18	(3, 11)	-0.101** (-2.662)	0.25
	M1US	(3, 1)	-0.048** (-2.500)	0.11	(12, 11)	-0.130 (-1.134)	0.54	(10, 1)	-0.105** (-3.175)	0.21
Industrial	M1M	(3, 8)	-0.093** (-3.549)	0.16	(11, 1)	-0.303** (-4.037)	0.32	(3, 6)	-0.079** (-2.726)	0.17
	M1US	(3, 10)	-0.060** (-2.788)	0.17	(11, 11)	-0.275** (-2.165)	0.55	(10, 4)	-0.117** (-3.703)	0.24
Finance	M1M	(8, 1)	-0.092** (-3.492)	0.17	(4, 1)	-0.158** (-2.582)	0.17	(10, 1)	-0.094** (-2.735)	0.20
	M1US	(7, 1)	-0.052** (-2.714)	0.15	(4, 8)	-0.082 (-1.412)	0.35	(8, 4)	-0.140** (-4.082)	0.26
Property	M1M	(10, 1)	-0.070** (-2.667)	0.14	(3, 1)	-0.078** (-2.178)	0.18	(11, 1)	-0.083* (-1.913)	0.17
	M1US	(10, 10)	-0.054** (-2.249)	0.21	(2, 10)	-0.051 (-1.077)	0.37	(10, 1)	-0.101** (-2.567)	0.18

Notes:

1. Double asterisks indicate significance at the 5 percent level and single asterisk indicates significance at 10 percent level.

2. Lag lengths (p, q) are optimal lags used for the ECM (Equation 3).

3. Error correction coefficients (γ) are speed parameters in the ECM (Equation 3) and figures beneath the speed coefficients are the t-statistics for the null hypothesis that $\gamma = 0$.

Table 4: Relative Strength of Adjustment toward Domestic and Foreign Money

Index	Whole Period (1982:1-1999:12)	Sub-period 1 (1982:1-1987:12)	Sub-period 2 (1988:1-1999:12)
Composite	0.457	1.032	1.040
Industrial	0.645	0.918	1.481
Finance	0.565	0.519	1.490
Property	0.771	0.654	1.217

Notes:

1. The reported figures are ratios of speed coefficients (γ_{US} / γ_M) derived based on the ECM in Table 3.