The Relation between Stock Prices and Money Supply in Pakistan: An Investigation

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Abstract: *This paper examines the causal relationship between money supply and stock prices. The analysis indicates a long-run relationship between stock prices and money supply. The analysis further indicates uni-directional causality from Money Supply to KSE 100 Index both in the short run and in the long run. This implies that the stock market is not efficient with respect to M_2 and past information regarding monetary assets can be helpful to predict movements in stock prices.*

Keywords: *Money Supply, Stock returns*

1. INTRODUCTION

The knowledge of the relationship between stock prices and economic growth is now becoming more important in the case of developing countries in view of the various economic reforms taking place there. Starting in the beginning of the 1990s there have been a number of measures taken for economic liberalization, privatization, relaxation of foreign exchange controls, and in particular the opening of the stock markets to international investors. These measures resulted in significant improvements in the size and depth of stock markets in developing nations and they are beginning to play their due role.

Regarding causal relation between stock prices and economic activity Mookerjee (1988) finds evidence that GDP leads stock prices in India [1] whereas Nishat and Saghir (1991) find the opposite evidence in Pakistan [2]. On the other hand, Ahmed (1999) finds the evidence that IIP leads stock prices in Bangladesh [3].

Whereas, Fazal Husain and Tariq Mahmood (1999) find a uni directional causality running from Money Supply to Stock Prices in Pakistan. [4]

Ho (1983) examined the causal relationship between money supply and stock returns for six Asian-Pacific countries. Using monthly data and employing minimum Final Prediction Errors, he finds a uni directional causality from money supply to stock prices for Japan and Philippines but bi-directional causality for Singapore. [5]

This paper examines the causal relationship between the money supply, a tool of monetary policy, and stock prices in Pakistan economy. That is, whether fluctuation in stock prices changes or is changed by fluctuation in money supply.

2. DATA SOURCES

The study is based on monthly data from December 2001 to March 2006. Stock prices are represented by Karachi Stock Exchange Index (KSE 100). Similarly, money supply is represented by M_2. The principal data source is the Monthly Bulletins published by the State Bank of Pakistan. [6]

Where:

M_2 = M_1 + Time Deposit + Residents Foreign Currency Deposit, where

M_1 = Currency in Circulation + Demand Deposits + other Deposits

3. METHODOLOGY

Descriptive statistics, as a first step, is obtained in order to get average growth and volatility of stock market and money supply. An easy and quick way to know the relationship between stock prices and economic growth is to find the correlations between them. As a preliminary analysis, therefore, the correlation coefficients are calculated.

The relationship is, however, formally investigated through co integration and error correction analyses. In this context, first the stationarity of the variables is tested by performing Unit Root Test. For this purpose, we use the Augmented Dickey Fuller (ADF) test.

Model I (with constant but no trend)

$$\Delta Y_t = \alpha + \rho * Y_{t-1} + \sum_{i=1}^{p} \delta_i \Delta Y_{t-1} + e_t$$

Model II (with constant and trend)

$$\Delta Y_t = \alpha + \beta t + \rho * Y_{t-1} + \sum_{i=1}^{p} \delta_i \Delta Y_{t-1} + e_t$$

The test is performed for differences of series for both, stock indices and money supply, for stationarity.

The co-integration between the two series is tested by running the OLS regression, called the co-integration regression:

$$Y_t = \alpha + \beta X_t + e_t$$

Then the series of residuals, e_t from this regression was tested for stationarity. Co-integration between Y_t and X_t is identified through stationarity in e_t

Then, we examined the existence of long run relations between stock prices and economic growth with the help of co-integration analysis suggested by Engle and Granger (1987) [7]. Finally, the causal relations are examined through the Error Correction Model (ECM). The ECM is an extension of the Granger causality test where an error correction term is introduced into the test, that is,

$$\Delta Y_t = \alpha_1 + \rho_1 e_{t-1} + \sum_{i=1}^{p} \beta_i \Delta Y_{t-i} + \sum_{j=1}^{q} \delta_j \Delta X_{t-j}$$

$$\Delta X_t = \alpha_2 + \rho_2 e_{t-1} + \sum_{i=1}^{p} \beta_i \Delta Y_{t-i} + \sum_{j=1}^{q} \delta_j \Delta X_{t-j}$$

Where, e_{t-1} is an error correction term representing the long run relationship. A negative and significant coefficient indicates the presence of long run causal relationship. If both coefficients are significant, this will suggest the bi-directional causality. If, e.g., only ρ_1 is significant, this will suggest a unidirectional causality from X to Y, implying that X drives Y toward long run equilibrium but not the other way around.

4. EMPERICAL RESULTS

We start by presenting the descriptive statistics and correlation in Table 1.

Table 1: Stock Index and Money Supply

Descriptive Statistics		
	D(KSE)	D(MS)
Mean	0.0431	0.0133
Std. Dev.	0.0762	0.0136
Skewness	0.0026	0.7448
Kurtosis	3.0605	3.0414
Jarque-Bera	0.0078	4.7186
Probability	0.9961	0.0945
Observations	51	51
Correlation		
	D(KSE)	D(MS)
D(KSE)	1.0000	-0.0300
D(MS)	-0.0300	1.0000

The average monthly growth rate during the sample in Stock Index is 4.31% much higher than that in Money supply which is 1.33%. However, the risk, measured by standard deviation, in stock index is even more higher, ie, 7.62%. The table also shows coefficient of correlation which is almost zero.

As a first step of formal investigation, unit root test is obtained, shown in Table 2.

Table 2: Unit roots

	Level		1st Difference	
Variables	W/O Tr.	W Tr.	W/O Tr.	W Tr.
KSE 100	-0.443	-3.021	-5.379***	-5.309***
M_2	-0.138	-4.403	-6.698***	-6.631***

(Three stars show 99% significance)

The results suggest the acceptance of the presence of unit roots in the original series indicating that none of the original series is stationary. However, the presence of unit roots is conclusively rejected in the first difference of the series for both the variables in both the models. This suggests that both the series are integrated of order one. Since both the series are integrated of same order, there is a possibility of co-integration between the series.

Next, co-integrating regression is estimated and presenting in Table 3. The table also shoes Error Correction Causality Equations.

Table 3: Stock Index and Money Supply

Co-integration (Engle-Granger)

	Const.	Coeff.	ADF
KSE on M2	-31.989***	2.754***	-2.361**

Conclusion: Evidence of Co-integration

Error Correction Causality

	D(KSE)	D(M2)
C	0.004	0.022
e(-1)	-0.274**	-0.065
D(KSE(-1))	0.131	-0.038
D(KSE(-2))	0.067	-0.038
D(MS(-1))	0.529	-0.172
D(MS(-2))	1.494**	-0.215

Conclusion: Uni directional causality from M2 to KSE both in the short and Long run.

(Three and two stars show 99% and 95% significance respectively)

The ADF test is significant at 95% indicating long-run relation between Money Supply and KSE 100 Index. Similarly, in causality equations the error term in KSE equation is significant at 95% verifying the long-run relation between the two. The causal equation further indicates uni-directional causality from Money Supply to KSE 100 Index.

5. CONCLUSION

The objective of the paper is to examine the causal relationship between money supply and stock prices. In this context monthly data on KSE 100 and M2 from Dec. 2001 to Mar. 2006 are used.

The co-integration analysis indicates a long-run relationship between stock prices and money supply. Whereas the Error Correction Equations indicate uni-directional causality from Money Supply to KSE 100 Index both in the short run and in the long run. This implies that the stock market is not efficient with respect to M_2 and past information regarding monetary assets can be helpful to predict movements in stock prices.

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