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The Stock Market and the Economy in Pakistan

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This paper re-examines the causal relationship between stock prices and macro variables like consumption expenditure, investment spending, and economic activity (measured by GDP) in Pakistan. Using annual data from 1959-60 to 1998-99 and applying cointegration and error correction analysis, the paper indicates the presence of long-run relationship between stock prices and macro variables. Regarding the cause and effect relationship, the analysis indicates a one-way causation from macro variables to stock prices, implying that in Pakistan fluctuations in macro variables cause changes in stock prices. The findings suggest that the stock market in Pakistan is not that developed to play its due role in influencing aggregate demand. A disturbing feature of the stock market in Pakistan is that it cannot be characterised as the leading indicator of economic activity. In the absence of other strong indicators, shooting up of stock prices may indicate a speculative bubble.

I. INTRODUCTION

The stock market plays an important role in the economy by mobilising domestic resources and channelling them to productive investment. This implies that it must have a significant relationship with the economy. The relationship can be seen, in general, in two ways. The first relationship views the stock market as the leading indicator of the economic activity in the country, whereas the second focuses on the possible impact the stock market may have on aggregate demand, particularly through aggregate consumption and investment. In other words, whether changes in stock market cause fluctuations in macroeconomic variables, like Consumption Expenditures, Investment Spending, Gross Domestic Product (GDP), Index of Industrial Production (IIP), etc., or are caused by these variables is an interesting issue to be examined. The former case implies that stock market leads economic activity, whereas the latter suggests that it lags economic activity.

The knowledge of the relationship between stock prices and macro variables is now becoming more important in the case of developing countries in view of the various economic reforms taking place there. From the beginning of the 1990s, a number of

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measures have been taken for economic liberalisation, privatisation, relaxation of foreign exchange controls, and in particular the opening of the stock markets to international investors. These measures have resulted in significant improvements in the size and depth of stock markets in developing nations and they are beginning to play their due role.

The empirical evidence regarding the direction of causality between stock prices and macro variables is not conclusive. For example, a unidirectional causality from stock prices to consumption expenditures is observed by Nishat and Saghir (1991) in Pakistan and Ahmed (1999) in Bangladesh, whereas Mookerjee (1988) observes the opposite case in India. Similarly, Mookerjee (1988) and Ahmed (1999) report a unidirectional causality from stock prices to investment spending for India and Bangladesh respectively, whereas the opposite case is reported by Nishat and Saghir (1991) for Pakistan. Regarding causal relation between stock prices and economic activity, Mookerjee (1988) finds evidence that GDP leads stock prices in India, whereas Nishat and Saghir (1991) find the opposite evidence in Pakistan. On the other hand, Ahmed (1999) finds the evidence that IIP leads stock prices in Bangladesh.

The objective of this paper is to re-examine such causal relations for Pakistan. The paper by Nishat and Saghir (1991) does not include the period of 1990s, which is crucial for stock market, as it became really active in early 1991 following the liberalisation measures opening the market to international investors. Moreover, following convention, the paper uses the Granger Causality test, which is valid only if the variables are not co-integrated. Hence the appropriate procedure is to test for the existence of any cointegrating relations among variables. If the variables are not cointegrated, then the Granger causality test may be applied. However, if the variables are cointegrated, then Error Correction Model, an extension of the Granger causality test, should be used. In this process, the variables should also be tested for stationarity. We follow this procedure.

The paper is organised as follows. Section II provides the theoretical background of the causal relationship between stock prices and macro variables. Section III discusses the data and explains the methodology for testing the stationarity, the existence of cointegration, and the direction of causality. Section IV reports the results regarding the causal relationship between stock prices and macro variables. Finally, Section V discusses the conclusions and policy implications.

II. STOCK PRICES AND MACRO VARIABLES

The studies dealing with the causal relationship between stock market and macro variables focus on the relationship of stock prices with consumption expenditures, investment spending, and economic activity. In these studies the economic activity is generally measured by Gross Domestic Product and/or Index of Industrial Production.

(i) Stock Prices and Consumption Expenditures

The relationship between stock prices and consumption expenditures is based on the life cycle theory, developed by Ando and Modigliani (1963), which states that individuals base their consumption decision on their expected lifetime wealth. Part of their wealth may be held in the form of stocks linking stock price changes to changes in consumption expenditure. Thus, an increase in stock prices will increase the expected wealth, which, in turn, will increase the consumption expenditures, suggesting the direction of causality from stock prices to consumption expenditures. On the other hand, an increase in consumption expenditures may result in an increase in the corporate sector's earnings, which will result in higher stock prices, implying causality from consumption expenditures to stock prices.

(ii) Stock Prices and Investment Spending

The relationship between stock prices and investment spending is based on the q theory of Tobin (1969), where q is the ratio of total market value of firms to the replacement cost of their existing capital stock at current prices. According to the theory, the firms would increase their capital stocks if q is greater than one, implying that the market value of firms is expected to rise by more than the cost of additional physical capital. Thus an increase in stock prices will result in an increase in the market value of firms, implying that firms would increase their capital stocks reflecting an increase in investment spending.

Another link, though less direct, between stock prices and investment spending is based on the neoclassical or cost-of-capital model. The model assumes that firms first determine the desired stock of real capital on the basis of prices of labour, capital, and expected sales and then determine the rate of investment depending on how fast they wish to reach the desired capital stock in the face of significant adjustment cost. Thus, the expected changes in sales and planned output are the major factors affecting investments. However, as noted by Bosworth (1975), if higher earnings are implied by higher expected output that increases stock prices, then the market valuation model implicitly accounts for the effect of expected output.

(iii) Stock Prices and Economic Activity

Finally, the relationship between stock prices and economic activity is investigated to examine the role of stock market, that is, whether it leads or lags economic activity. Moreover, the relationship of stock prices with the components of aggregate demand, consumption, and investment sometimes provide conflicting results, causing an ambiguity concerning the direction of causality between stock price changes and macro variables. As mentioned above, the economic activity is generally measured by GDP and/or IIP.

III. DATA AND METHODOLOGY

The study is based on annual data from 1959-60 to 1998-1999. Stock prices are represented by State Bank General Price Index (SBGI), with base 1980-81. Similarly, consumption expenditures, investment spending, and GDP at constant prices of 1980-81 are used. The principal data source is *50 Years of Pakistan in Statistics*. The *Economic Surveys* by the Finance Division of the Government of Pakistan and the *Annual Reports* and *Monthly Bulletins* by the State Bank of Pakistan are also used.

An easy and quick way to know the relationship between stock prices and macro variables is to find the correlations between them. As a preliminary analysis, therefore, the correlation coefficients are calculated. In addition to the full sample, the correlations are also calculated for two sub-samples consisting of periods from 1960-61 to 1989-90 and from 1990-91 to 1998-99. The division of the sample is done to examine the effects of various economic reforms on the relationship.

The relationship, however, is formally investigated through cointegration 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. Then, we examine the existence of long-run relations between stock prices and macro variables with the help of cointegration analysis suggested by Engle and Granger (1987). 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* towards long-run equilibrium but not the other way around.

On the other hand, the lagged terms of ΔY_t and ΔX_t, found as explanatory variables, indicate short-run cause-and-effect relationship between the two series. Thus, if the lagged coefficients of ΔX_t appear to be significant in the regression of ΔY_t, this means that *X* causes *Y*.

As mentioned above, the Pakistan economy has been brought under various economic reforms in the 1990s. The most significant measure is the opening of the Pakistani equity market to international investors in early 1991. To take care of these reforms, a dummy variable is used for the period from 1990-91 to 1998-99.

IV. EMPIRICAL RESULTS

The correlation coefficients of stock prices with real consumption expenditure, real investment spending, and real GDP are presented in Table 1. The table shows that the correlations are low and are almost equal to zero in the cases of consumption and investment. Similarly, in the first sub-sample, consisting of the pre-reform period, the correlations are almost zero. However, the post-reform period shows a significant increase in correlation coefficients. In particular, the correlation between stock prices and GDP becomes quite high.

Table 1

Correlation Coefficients between Changes in Stock Prices and Macro Variables

Variables	1960-61 to 1998-99	1960-61 to 1989-90	1990-91 to 1998-99
Changes in Real Consumption	–0.008	–0.099	0.178
Changes in Real Investment	0.073	0.042	0.146
Changes in Real GDP	0.223	–0.032	0.510

At the first step of the formal investigation of the relationship between stock prices and macro variables, the ADF Unit Root Test is applied to all the variables to test for the stationarity of these variables. The test is applied to both the original series and the first differences. Moreover, both the models, with and without trend, are tested. The results, reported in Table 2, indicate that all the series are non-stationary at their level. They become stationary after employing difference operator of degree one. That is, these series are integrated of order one, I(1).

Table 2

Augmented Dickey Fuller Test for Stationarity of Variables

Variables	Without-trend		With-trend	
	Levels	Ist Diff.	Levels	Ist Diff.
Stock Prices	–0.629	–6.632***	–2.255	–5.661***
Real Consumption	–1.573	–6.587***	–0.638	–7.205***
Real Investment	–2.259	–4.462***	–0.760	–4.867***
Real GDP	–2.064	–6.337***	–0.592	–6.425***

Note: The critical values for Model without-trend are 2.61, 2.94, and 3.61; and with-trend are 3.20, 3.53, and 4.21 at 10 percent, 5 percent, and 1 percent respectively.

*** Represent significance at 1 percent.

Next, cointegrating regressions, stock prices on macro variables, are estimated and are reported in Table 3. Further, the series of residuals are obtained from each regression and are tested for stationarity through ADF, also reported in Table 3. The results indicate the presence of long-run relations between stock prices and macro variables.

Table 3

Cointegration between Stock Prices and Macro Variables

Variables	Constant	Coefficient	CRDW	ADF
Real Consumption	–9.526	1.183***	0.291	–2.071**
Real Investment	–10.771	1.452***	0.391	–2.721***
Real GDP	–9.839	1.194***	0.299	–2.222**

Note: The critical values are 1.62, 1.95, and 2.62 at 10 percent, 5 percent, and 1 percent.
** and *** represent significance at 5 percent, and 1 percent respectively.

Since we have found the evidence of an association between stock prices and macro variables, the next step is to explore the nature of this association, that is, whether stock price changes affect or are affected by the fluctuations in macro variables. For this purpose, the ECM is used. In this model, the conclusion regarding causality depends on the significance of the error term. That is, a significant error term indicates causality even if the coefficients of lagged terms are insignificant. The results of the ECM are reported in Table 4.

The table shows the coefficients of the error term and the F-values of lagged terms up to three lags. It can be seen that the F-values are not significant in any case, indicating the absence of causal relations. However, the coefficients of error term are significant in stock prices equation for all the macro variables at all lags. On the other hand, the error terms in macro variables equations are not significant in any case. Interestingly, the results are same for all the macro variables, which would make it easier to draw conclusions regarding the causal relations. The significant error terms in the stock prices equation not only endorse the long-run relations between stock prices and macro variables but also suggest a unidirectional causality from macro variables to stock prices. In other words, fluctuations in macro variables cause changes in stock prices, but not vice versa.

Since lagged values are not significant in any case, the test of instantaneous causality that includes the current value of independent variable in the model is also tried. However, the results are not changed and suggest the same pattern of causality. Similarly, the inclusion of dummy variable does not prove useful and provides the same results. Hence, it can be said that although there is a stable long-run relation between stock prices and macro variables, the short-run fluctuations in one do not affect the other.

Table 4

Error Correction Model between Stock Prices and Macro Variables

	Stock Prices and Consumption			
	Lags on Consumption		Lags on Stock Prices	
	Err Term	F-value	Err Term	F-value
Lag 1	–0.149*	0.007	–0.010	0.522
Lag 2	–0.218**	2.235	–0.016	0.359
Lag 3	–0.291***	1.957	–0.130	0.454
	Stock Prices and Investment			
	Lags on Investment		Lags on Stock Prices	
	Err Term	F-value	Err Term	F-value
Lag 1	–0.189*	0.002	0.029	1.656
Lag 2	–0.243**	0.426	0.012	1.111
Lag 3	–0.314**	0.324	–0.190	1.142
	Stock Prices and GDP			
	Lags on GDP		Lags on Stock Prices	
	Err Term	F-value	Err Term	F-value
Lag 1	–0.161*	0.199	–0.010	0.225
Lag 2	–0.228**	1.821	–0.012	0.267
Lag 3	–0.234**	2.025	–0.130	0.196

Note: *, **, and *** represent significance at 10 percent, 5 percent, and 1 percent respectively.
Conclusion: Unidirectional Causality from Macro Variables to Stock Prices.

V. CONCLUSIONS AND POLICY IMPLICATIONS

The purpose of the paper is to re-examine the causal relationship between stock prices and macro variables, consumption expenditures, investment spending, and GDP, in Pakistan. We use annual data from 1959-60 to 1998-1999 and apply the cointegration and error correction analysis, in addition to the simple correlation analysis, to investigate the relationship.

The correlation analysis shows low correlations between stock prices and macro variables. However, there is evidence of significant increase in these correlations in the period subject to reforms, suggesting that these reforms resulted in significant improvement in the behaviour of stock market and its linkages to the economy.

The cointegration analysis indicates the presence of a long-run relationship between stock prices and macro variables. Regarding the cause-and-effect relationship, the error correction analysis suggests a unidirectional causality from macro variables to stock prices, implying that in Pakistan fluctuations in macro variables cause changes in stock prices. The analysis does not verify the evidence of improvement in the linkages of stock market to the economy, which are indicated by the correlation analysis.

The findings suggest that the stock market in Pakistan is not much developed to play its due role in influencing aggregate demand. The lifecycle hypothesis and Tobin's *q* theory, which provide the basis of linkages between stock prices and consumption and investment expenditures respectively, do not seem to be valid in Pakistan. It can be implied, however, that the government can use the aggregate demand to influence the stock market.

Another disturbing feature of the stock market in Pakistan is that it cannot be characterised as the leading indicator of economic activity. The study clearly indicates that it lags economic activity. It can be said that individuals, institutions, and government should be aware of speculative bubbles. In the absence of other strong economic indicators, shooting up of stock prices should be dealt with care.

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