Macroeconomic Determinants of Stock Prices in Saudi Arabia

البحوث

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Introduction

Literature on the development process stresses the importance of capital accumulation, and the role of capital markets and financial institutions in that process. Capital markets enable investing units to raise investment funds through stocks and bonds issues and provide savers and financial institutions with a further outlet for their funds. They enhance growth to the extent that they serve to allocate resources to the places in the economic system where their social return is greatest. They have an important role in the allocation of resources, both directly as a source of funds and as a determinant of firm's value and borrowing capacity. In the meantime stock markets are thought to have substantial influence on consumption behavior of households and investment decisions of business firms. A change in the real value of stocks is likely to have impacts on consumption demand and investment spending. In this regard the prospect for equity values is a concern for public policy. This is because the primary goal of a national policy is to achieve a high rate of capital formation and also because movements of stock prices are viewed as prime indicator of the private sector's evaluation of current and future business conditions. The valuation of a nation's productive assets in the stock market will influence business's willingness and ability to undertake new investment.

One of the most important tasks in developing countries is the creation of financial institutions and capital markets to fill gaps in the kinds of credit and equity provided by private individuals and institutions. The advantages of introducing financial and capital markets in these countries are in terms of increased opportunities for savers, extended credit for investment and increased control

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over corporate management efficiency. Financial and capital markets creation gives more flexibility to the economic system in choosing the desired combination of growth and consumer's wealth. Increases in the variety and magnitude of financial institutions and services would improve the allocation of saving and investment. Savers and investors in developed countries are faced with a wide range of choices about the types of investment instruments which will suit their choices. In developing countries it is different where the majority of these countries either do not have a stock market, or if it exists, the degree of diversification in the instruments traded is limited and trading techniques are simple. Equity markets in developing countries as the case of Saudi Arabia can provide important channels in mobilizing resources and allocating them to productive investment, since well developed capital market can play a vital role in the country's continuing economic development. This follows from the increased emphasis in Saudi Arabia on the private sector as the main engine for economic development.

Since the establishment of the Saudi Arabian Monetary Agency (SAMA) in 1952 the financial system in Saudi Arabia has developed rapidly and undergone dramatic changes. Prior to December 1984 stock trading was not regulated, but a number of stockholders were informally putting buyers and sellers of stocks in touch. The emergence of organized and regulated stock market in Saudi Arabia in the early 1980's attracted considerable attention and involvement of the private sector, thereby potentially providing important financing sources for productive investment activities in the country. Fear of stock market crisis because of speculations, manipulations, and lack of regulations to organize and monitor trading activities drove the government to intervene and take actions, but it left trading in the hands of the commercial banks.

Stock market in Saudi Arabia expanded rapidly in the 1980's and early 1990's. This expansion might indicate that investors believed that they not only obtain rewards of economic growth, but also that equity and stock values would rise whenever prices increased. It did not take long for these investors to realize that the market would fluctuate and lose most of its early steam following the decline in oil prices and other crisis facing the economy.

Currently, stock market in Saudi Arabia is an over the counter trading system. All brokerage activities are confined to commercial banks comprising the Saudi Share Registration Company (SSRC). Banks are not allowed to take positions in stock. Only cash settlements are allowed, margin trading and forward deals are strictly prohibited.

The aim of the paper is to investigate the relationship between aggregate returns on stock prices and number of important macroeconomic variables including monetary and fiscal policy actions as Tobin (1969) has suggested that both money growth and budget deficits may have significant impact on stock prices and returns. He emphasized the importance of stock returns as a link between the real and financial sides of the economy. The attempt here is to analyze the factors determining and affecting stock prices and returns in Saudi Arabia.

Stock Market Efficiency - An Overview

Publicly traded stock markets serve a key role in the formation of cpaital and the transformation of debt and equity into productive capital. Since the allocation of a country's saving is influenced by stock prices it is important to define and identify the major characteristics of the efficiency in capital markets. The term efficiency in capital market has been used to describe several distinct but interrelated concepts which include allocational, operational, and informational efficiencies. According to the efficient market hypothesis, in an informationally efficient market prices fully and instantaneously reflect all available relevant informantion about future profitability of firms. This means that the prices of publicly traded stocks are accurate signals for capital allocation and in such market, price is a good estimate of the intrinsic value of a security. Fama (1970, 1991) defines three types of informational efficiency based on the information available: Weak form of efficiency, semi strong form of efficiency, and strong form of efficiency. "I take the market efficiency hypothesis to be the simple statement that security prices fully reflect all available information. A precondition for this strong version of this hypothesis is that information and trading costs, the costs of getting prices to reflect information are zero. A weaker and ec-

onomically more sensible version of the efficiency hypothesis says that prices reflect information to the point where the marginal benefits of acting on information (the profits to be made) do not exceed marginal cost. Each reader is then free to judge the scenarios where market efficiency is a good approximation (That is, deviations from the extreme version of the efficiency hypothesis are within information and trading costs) and those where some other model is a better simplifying view of the world", Fama (1991, 1575).

Most of the empirical research in the area of efficiency has been primarily concerned with whether stock prices fully reflect available information on monetary policy. Sprinkel (1964) who pioneered the study on the relationship between money supply and stock market concluded that there is a strong relationship between the stock market and money supply in the United States. Since then money supply-stock market relationaship has been widely tested for various economies because of the belief that money supply changes have important direct effects through portfolio changes and indirect effects through their effect on real economic activity, which in turn postulated to be fundamental determinants of stock prices. (Palmer, 1970; Keran, 1971; Homa and Jaffee, 1971; Hamburger and Kochin, 1972; Malkiel and Quandt, 1972 and Pesando, 1974). This linkage between stock prices and money supply has been questioned by many studies and that capital markets are efficient and all past information (including money supply changes) are incorporated in current stock prices (Fama, 1970, 1991; Cooper, 1974; Rogalski and Vinso, 1977; and Kraft and Kraft, 1977). Recently there is a large number of studies relating stock prices movements and money supply in different countries such as the United States, France, Japan, Italy, Canada, Germany, United Kingdom, the Netherlands, Belgium, Switzerland, Czechoslovakia, Hungary, Poland, Sweden, and Asia-Pacific region. (Malliaris and Urrutia, 1991; Mookerjee, 1987; Hashemzadeh and Taylor, 1988; Jeng, Butler, and Liu, 1990; Thornton, 1993; and Habibullah and Baharumshah, 1996).

While most of the studies have examined the effects of money supply and stock prices, few have examined the relationship between national output and other macroeconomic variables and stock prices. Fama (1981, 1990) showed that

there is a strong relationship between stock prices and industrial production as well as gross national product. Cheng and Pinegar (1989), Chen, Roll and Ross (1986), and Thornton (1993) also concluded that there is a close relationship between the stock market and domestic economic ativity. Less attention has also been devoted to the investigation of the effects of fiscal policy or the impact of the government actions as the changes in its expenditures and budget deficits on stock prices. It is possible that both monetary and fiscal policies could have important effects on the returns of assets, including stock prices. Tobin (1969) emphasized the importance of stock returns as a link between the real and financial sides of the economy. His analysis suggests that both money growth and budget deficits may have significant impact on stock prices and returns. Malliaris and Urrutia (1991) found that money supply leads the stock market and the performance of stock market may be used as a leading indicator for measuring real economic activities in the United States.

Methodology

Granger causality tests estimated from vector autoregressions (VAR) are employed in this study to determine the causal relationships between stock prices and macroeconomic variables. Since many economic time series variables are non-stationay (Nelson and Ploser, 1982), following Engle and Granger (1987) a test for unit roots is performed by using Augment Dicky-Fuller (ADF) test. It is first necessary to transform the variables into a stationary process so that any estimated effects are not attributed to serial correlation. This was accomplished by applying ADF test for unit roots on each variable which involves regressing a particular variable on a constant, a time trend, the dependent lagged variable and lags of the differenced series. Since transforming the data into first differences can lead to the loss of important long run information, the cointegration test was employed to determine whether the set of variables possesses any long run relationships. This test first runs ordinary least squares (OLS) regression of a variable in level form on the levels of remaining variables, a constant, and a trend variable. Using the estimated residuals from this cointegrating regression, the

next stage involves running OLS of the differenced residual on lagged residual term and lags of the differenced residual. (Granger, 1986; Mills, 1990; Hamilton, 1994; and Harris, 1995).

ADF test for unit roots is based on the regression,

$$\Delta Y_t = \alpha + \beta Y_{t-1} + \sum_{t=1}^{n} \delta \Delta Y_{t-1} + \varepsilon \qquad (1)$$

The null hypothesis of the test is that Yt is a non-stationary series. The test for cointegration can be estimated as follows,

$$Y_t = \delta X_t + \mu t \qquad (2)$$

Then retrieving the residuals of regression to estimate

$$\Delta \mu t = a + b\mu t\text{-}1 + \sum_{t=1}^{n} b1 \Delta \mu t\text{-}1 + \varepsilon t \qquad (3)$$

Where: α, β, and δ are constants, Y and X are time series, ε is serially uncorrelated residual. The t-statistics value is used to test the null hypothesis of no cointegration in Y and X.

Causality Test:

The Granger-Sims causality test is the most commonly used test of causality. In macroeconomics, there have been numerous empirical studies which have tried to clarify the causality relationship between money, income, prices, interest rates, inflation, stock prices and other economic variables which have been investigated. (Sims, 1972; Barth and Bennet, 1974; Williams, Goodhart, and Gowland, 1976; Ciccolo, 1978; Fiege and Peace, 1979; Hsiao, 1981; Friedman, 1983; Litterman and Weiss, 1985; Stock and Watson, 1989; Kraft and Kraft, 1977 a, b; among others). The investigation of the causal relationship between these economic variables usually conducted within the framework of Granger (1969)

causality test method which can yield useful information about the causal flows in bivariate reduced form model testing. The main purpose of Granger causality testing is to determine the direction of causal flows between the relevant set of test variables. Consequently, this method is particularly suitable for providing empircal evidence on the direction or the absence of causal flows between macroeconomic variables and the movement of stock marker prices. Resolving the issue of causal flows between these variables will also indicate which of the variables under examination are exogenous and which are endogenous.

According to standard Granger (1969), given two variables X and Y, X is said to cause Y if Y is better predicted using the past values of X than by not using them and Y is said to cause X if X is better predicted using the past values of Y than by not using them. The Granger test in the bivariate system can be written as follows,

$$Yt = \alpha + \sum_{t=1}^{p} \theta 11\, Yt-1 + \sum_{t=1}^{q} \theta 12\, Xt-1 + a1t \qquad (4)$$

$$Xt = \beta + \sum_{t=1}^{p} \theta 21\, Yt-1 + \sum_{t=1}^{q} \theta 22\, Xt-1 + a2t \qquad (5)$$

Where α, β are constants, Y and X are time series and θ's are vector polynomials of lag operators, and p and q are the optimal lags of series Y and X. In the equations (4 and 5) it can be said that X does not cause Y if all coefficients of Xt (vector $\theta 12$) in equation (4) are insignificantly different from zero. Similarly, Yt does not cause Xt if all coeficients of Yt (vector $\theta 21$) in equation (5) are insignificantly different from zero. Bidirectional causality exists if a least one of the coefficients of lag variables of Y and X ($\theta 12$ and $\theta 21$) in equations (4 and 5) respectively, is not zero. The non-causality is observed if all coefficients of Y and X in $\theta 21$ and $\theta 12$ vectors are zeros. As Ericsson (1992) pointed out, cointegration implies and implied by the existence of error correction representation of the relevant variables. Thus, Engle and Granger (1987) also suggest the use of error correction method to test for causality. They indicate that co-

integrated variables because they possess common stochastic trends, must also exhibit Granger causality in at least one direction. Thus, the error correction model introduces an additional channel through which Granger causality can emerge. Error correction test can be conducted by adding the lagged residual (ut-1) which comes from the corresponding cointegration regression to equations (4 and 5). The error correction term, when cointegration exists, provides two avenues for statistical causality to emerge, the significance of the lagged differenced variables and the significance of the once lagged error correction term. Thus, in contrast to standard Granger causality test, the error correction approach allows for the finding that X Granger cause Y, even if coefficients on lagged changes in X are not jointly significant, (Engle and Granger, 1987). The erorr correction approach also allows us to distinguish between short run and long run versions of Granger causality. Assuming cointegration holds, in the short term, deviations from this long run equilibrium will feedback on the changes in the dependent variable in order to force the movement towards the long run equilibrium. If the dependent variable is driven directly by this long run equilibrium error, then it is responding to this feedback, if not, it is responding to only short run shocks to the stochastic environment. Thus, via error correction models, cointegration brings together short and long run information in modeling the data. (Ericsson, 1992).

$$\Delta Yt=\alpha 0 +\Delta\sum_{t=1}^{p}\theta 11\ Yt-1 +\Delta\sum_{t=1}^{q}\theta 12\ X +ut-1 + at1 \qquad (6)$$

$$\Delta Yt =\alpha\ 0 +\Delta\sum_{t=1}^{p}\theta 21 Yt-1 + \Delta\sum_{t=1}^{q}\theta 22\ Xt-1+ut-1 +at2 \qquad (7)$$

To account for lagged effects as well as for feedback between the variables VAR technique is used where each variable is regressed on its own past history and on the past history every other variable in the model. Some studies: Glick and Hutchinson (1990) and Hafer and Sheehan (1991) impose a common lag length structure for all variables in the VAR on the ground that the estimated co-

efficients are unbiased and as Hafer and Sheehan have shown that using different lag structure in VAR models results in varying policy conclusions. On the other hand the arbitrariness of lag length may affect the reliability of the statistical tests of causality and seriously bias implications of the results (Hsiao, 1981; Saunders, 1988, 1994; and Thornton and Batten 1985). Kang (1989) suggests that in order to remove arbitrariness, even though when there is no unique criterion for selecting lag length, one may use the Final Prediction Error (FPE) method to determine the optimal lag of the explanatory variable. Minimum FPE criterion is also suitable for investigating causal relationships which are tested with a relatively short sample of data. Given a small data sample, investigating long lag structure often leads to a serious problem of the loss of degrees of freedom (Hsiao, 1979). This may lead to a bias toward investigating only short lag specifications even though economic theory may require investigating long lager lags. Minimum FPE causality testing method alleviates this problem as it allows a complete investigation of all theoretically relevant lags. Following Hsiao (1979, 1981), Thornton and Batten (1985), Kang (1989) and Saunders (1994) among others, considering the variables in the equation in Granger's causality test, the determination of optimal lag length based on the FPE can be done as follows. In the estimating equation, the lag length p is determined from the minimum FPE, defined as,

$$FPE\ (p) = n+p+1/\ n-p-1\ *\ SSE/n \qquad (8)$$

where n is the number of observation and SSE is the squared errors. We choose that lag (p^*) which minimizes FPE (p^*). Taking p^* as given, the next step is to run a number of bivariate regressions, each containing the optimal own lag and one of the remaining explanatory variables. Conditional upon the chosen lag length (p^*) pf Y the optimal length of X in the equation can be determined by estimating the following equation,

$$Yt=\alpha + \sum_{t=1}^{p} \alpha i\ Yt-1 + \sum_{t=1}^{q} \beta i\ Xt-1 + \delta ut-1 + vt \qquad (9)$$

where p is the optimal lag length chosen from the first step and q is the length

chosen from the minimum FPE (p,q) where,

$$FPE\ (p,q) = n+p+q+1/\ n-p-q-1^{*}\ SSE/n \qquad (10)$$

by repeating the above method, the optimal lag length of the variables can be determined.

Since cointegration clarifies the 'spurious regression' or 'nonsense correlation' problem associated with trending time series data (Ericsson, 1992), and OLS regression tests based on the differenced variables is conducted to investigating the impact of the independent variables on stock market prices and performance, the following relationships are tested,

$$\Delta SPt = f(\Delta Yt, \Delta GEt, \Delta mst, \Delta INFt, \Delta INTt) \qquad (11)$$

where: SP stands for stock prices and share index, Ms includes M1 and M2, and Δ is change.

Determinants of Stock Prices in Saudi Arabia:

It is always difficult to say precisely why assets prices rise or fall. Several conditions have clearly been relevant to the growth of emerging stock markets, as the case of the stock market in Saudi Arabia, including the effects of a broad range of macroeconomic variable and structural changes and reforms the country had implemented in the past two decades. Because macroeconomic stability has a positive effect on the growth of the economy and because of the rapid growth of the economy in Saudi Arabia during the period of 1970's and 1980's, the government had been taking active roles in creating financial instiutions, in regulating them, and in directing credit to enhance the stability of the economy and the solvency of the financial institutions and in a way that meant to enhance future growth of the economy.

It is assumed that real stock returns are positively related to real variables as expenditure on capital, the real rate of return on capital, and output. This is because the relations among real variables are presumed to be the fundamental determinants of stock prices and returns. Consumer confidence and credit market conditions will also have important impacts on stock prices. The nature of the

Saudi Arabian economy could affect the performance of the stock market and the movements of stock prices and returns. Income generated from oil revenue will have an impact on gevernment expenditure and in turn on the growth of the economy.

The informational (variables) set considered by some researchers (Darrat and Mukhreeje, 1987; Kraft and Kraft, 1977 a, b; Gupta, 1988; Saunders, 1994 among others) consisted of changes in past stock prices, money stock (supply), interest rate, proxy for aggregate demand, and inflation. They suggested that these variables play an important role in determining stock returns. Their focus among other things was on whether these variables cause changes in stock prices. In this study Granger Causality Method is used to investigate the relationship between these variables.

GDP (Y): growth of real GDP as a proxy of GNP will have a positive impact on the demand for stocks since people will have more income and can afford to save and invest some of this income in the stock market. It is expected also that at least part of financing growth of GNP would come from financial and capital markets through the sales of stocks and bonds. Fama (1981, 1991) and Chen, Roll and Ross (1986). Chen (1991) argued that lagged macroeconomic variables which have predictive power for future income can forecast future returns.

Governmant Expenditure (GE): even though the Saudi Arabia economy is based on the principles of free economy where a substantial part of the production of goods and services is left to individuals and groups enjoying freedom in their dealings and transactions, the economy depends on the production of oil as the source of income which is used by the government to increase its domestic expenditure. This is an indirect avenue used by the government for the distribution fo oil revenue through its budget. The support that the government gives to the specialized credit agencies comes also as part of the goverment expenditure. Thus, changes in this income available to the government will directly and indirectly affect the output of the other sector including stock market. This variable is expected to have a positive impact on stock market activities and on stock returns.

Interest Rate (INT): Sprinkel (1964, 279) wrote, "Expectations concerning inflation, hence interest rates, and corporate earnings exert major influene on equity prices... Rising inflationary expectations cause higher interest rates as does the short run impact of the tighter monetary policy, and these influences depress equity prices". In the case of Saudi Arabia an increase of interest rate ecourages outflow of funds for overseas investment opportunities and depresses market performance. This is because there is no formal interest rate in Saudi Arabia and the economic system is an open economy with no restrictions on capital movement where the Saudi Arabian investors have the opportunity to invest their funds outside the country with no restrictions and foreign interest rate becomes a substitute for investing in domestic stock market. Eurodollar rate is used here as a proxy for interest rate. The relationship between interest rate and stock prices and returns is expected to be negative.

Inflation (INF): Fama and Schwert (1977) and Kaul (1987) find evidences that stock returns and various measures of inflation are negatively correlated. This relationship contradicts the belief that stocks should prove to be a good hedge against inflation, since stocks represent claims to real assets. Stocks were widely assumed to be an attractive investment in an inflationary environment because they are based on real assets. If rates of return on common stocks move directly with rate of inflation, investors will on average be fully compensated for erosion in purchasing power. That is because common stocks represent, in part, a claim to real resources and the value of these resources should increase with inflation (Nelson, 1976). Fama (1981) suggests that inflation and equity return correlation are due to a negative inflation future output and a positive future output equity return correlation. On the other hand, some researchers argue that inflation return correlation is a result of investors shifting from stocks to interest bearing assets in inflationary period. Modigliani and Cohen (1979) argue that many investors mistakenly use nominal discount rate because of money illusion. They do not evaluate real profits or the relevant discount rate correctly because they do not distinguish between real and nominal interest rates. Others emphasized the effect of inflation uncertainty. Friedman (1977) argues that inflation uncertainty is positively related to the level of inflation, and that uncertainty de-

presses future output because it discourages investment. However, Feldstein (1980) argues that inflation increases the effective tax rate, hence it depresses output. This theory of tax burden might apply and become particularly attractive for the period of high and persistent inflation. Pearce (1982) found evidences which show that a rise in the level of inflation is accompanied by an increase in both the variability and the dispersion of relative price movement. Here inflation can have some effects on profits and earnings through some factors, as tax effects on required rate of return. 'As rises in inflation will raise profits and therfore taxes, even when real profits have not increased, this will result in an after tax earning fall'.

Inflation measure used here is proxied by the consumer price index (CPI) which measures the cost of living in Saudi Arabia. It is assumed here that an increase in CPI means less money is available for investment and a negative effect on the market performance results, a decrease in CPI means more money available for investment and a positive effect on the market performance is expected. However, because of the CPI deficiency caused by the government intervention, a disruption in the expectation may occur. In Saudi Arabia, direct and indirect financial and economic policies could disrupt the usefulness of the CPI as a measure of changes in the country's cost of living. The direct government intervention, aimed at curbing inflation, affected prices through commodity subsidization and housing policies. The indirect policies influenced and supported domestic industry, agriculture and services productions. These policies by the government might distort the validity of this measure.

Domestic liquidity (Money Supply, Ms): It is expected that an increase in domestic liquidity will result in an increase in almost all economic activities including stock market. An increase in domestic liquidity is expected to increase demand for stocks which, in turn, leads to an increase in stock prices. On the other hand, a deline in the level of liquidity puts downward pressure on all domestic activities including stock prices. Sprinkel (1964, 279) wrote, "Since changing monetary growth establishes incentives to either acquire or expand liquidity, it is not surprising that changes in money exert a direct influence on stock market fluctuations. Furthermore, the indirect effects of monetary changes are even

more dramatic and influential". We expect a positive relationship between the current and lags in changes in domestic liquidity and stock prices and returns.

Dependent variables used in this study as proxies and guide for the general market trend and performance are defined as follows:

Stock Prices (SP) this variable is defined by taking the values and quantities of shares traded during the period and dividing share by quantity of shares traded reported by SAMA representing a return on stocks and computed as (SP = Pt - Pt-1 / Pt-1).

Shares Index (IND) this is based on information supplied by the National Center for Finance and Economic Information (NCFEI) and reported by SAMA. NCFEI calculates the index by taking the average of the high and low stock prices movements for the period.

Empirical Results:

Data used in this study are quarterly data and covers the period 1985.1 - 1995.4. Stock prices (SP) and index (IND), Money Supply (M1 and M2), and inflation (INF) data are obtained from SAMA Quarterly reports "Money and Banking Statistics". GDP Government Expenditures (GE) are obtained from Ministry of Planning "Facts and Figures" issues. Interest rate (Eurodollar rate) (INT) data are obtained from IMF-Financial Statistics Various issues.

Tables 1 - 9 Show the results of the statistical test conducted to investigate the causality and the correlation between macroeconomic factors represented by monetary and fiscal policies and the performance of the stock market in Saudi Arabia by using Granger causality test.

Before applying the causality test, a stationary test was applied to the data by using augmented Dicky-Fuller (ADF) unit root test. Table 1 shows the (ADF) and cointegration tests, table 2 shows the Minimum Final Prediction Errors (FPE) results. Table 3, 4 and 5 show the results of the causality tests between stock prices (SP) and shares index (IND) and independent variables, and table 6 shows the correlation coefficients between SP and IND and independent var-

iables. Table 7 (A. B, C and D) presents the results of the error correction test. Since cointegration clarifies the spurious regression problem, an OLS regression test on the differenced variables with respect to SP and IND was conducted and the results are presented in tables 8 and 9. Coefficients of the independent variables with respect to SP and IND can be summarized from the results in tables 8 and 9 as follows:

	Y	GE	M1	M2	INT	INF
SP	- 0.156, 2.45*	0.24, 0.45	1.11, 1.17*	1.30*	- 0.14, - 0.19	-1.23
IND	3.74, 4,8*	- 0.133, - 0.17	0.22, 0.24	0.34, 0.42	- 0.14, - 0.17	- 0.19 - 0.26
Effects of lage						
Sp	- 0.25, 9.6	- 0.07 0.53*	- 0.43, 0.88	-0.3, 1.2*		
IND	- 0.97, 2.66	- 0.04, 0.27	-0.2, 0.77*	- 0.05, 1.2*		

Given the time series nature of the data, a test for unit roots and the common trend of the variables was conducted. Table 1 presents the results of the augmented Dickey-Fuller (ADF) and cointegration tests results where the ADF results reveal that the variables are non-stationary in their level data. With first differences these variables become stationary at I(1). Because all variables have been proven to be non-stationary at their level terms and integrated of order I(1) as the results show, the differenced series are I(0), or stationary. In this case we can perform the Granger causality test with these differenced variables, since even when these variables are I(1), their linear combination still be I(0) and the results in table 1 show that differenced variables are stationary and cointegrated at least at the 5 per cent levels. Thus, these results indicate that a long run relationship exists between these variables. Tables 3, 4 and 5 show the results of

the causality tests by using FPE to conduct VAR test any using arbitrary lag lengths. While these results show that there is at least one direction Garnger Causality running from independent variables to dependent variables there are some cases where a bidirectional causality exists.

Table 7 (A, B, C and D) presents the results of the error correction test which introduced additional channels through which Granger causality has emerged. These results confirm the direction of causality from independent variables to stock prices and indexes. They also show the speed of adjustment to long run equilibrium and that independent variables have a significant impact on stock prices movements.

Empirical results seem to confirm the hypothesis that both monetary and fiscal policies have significant impacts on stock prices and returns. They seem to be econometrically reliable in indicating that growth of the economy and growth of current and lagged values of money supply have a highly significant relationship with stock prices. These results are in agreement with the results obtained by Darrat and Mukhrejee (1987), Jeng, Butler and Liu (1990), Mukhrejee (1987) Hashemzadeh and Taylor (1988), Malliaris and Urrutia (1991). It seems that current and lagged values of money supply (M1 and M2) have positive and significant impacts on stock prices and returns. While Cooper (1974) suggests that lead and lag cros spectra of stock returns and changes in money supply are consistent with market efficiency Rozeff (1974) indicates that changes in current monetary growth rates that effect current stock returns do not conflict with the market efficiency, but stock returns with a lag would. Ho (1983) concluded from his results that information on money supply is useful in predicting stock prices.

Interest rate had a negative impact on stock prices and returns. Hence, it appears that common stocks and overseas investment are close substitutes by the wealth holders since these investors have the ability to invest outside the country with no restrictions. That is foreign interest rate may play a major depressing role in the development of the stock market in Saudi Arabia, since foreign assets become a substitute and available alternative channels for potential savers and investors to allocate their savings and investment.

It was found that inflation has some negative impacts on stock returns, a sim-

ilar finding to that of Fama and Schwert (1977) and Kaul (1987) among others. Thus, common stocks in Saudi Arabia may not be considered as a hedge against inflation. But as mentioned before, government policies and interventions that caused CPI to be deficient may indicate that the results are not accurate and reliable. The results further indicate that changes in fiscal policy represented by macroeconomic activities and government actions play an important role in determining stock prices and returns. These results show the presence of a positive relationship between the fiscal measures represented by government expenditure and stock prices and returns. The correlation coefficients between SP and IND and the individual independent variables other than inflation have the expected signs. The highest correlation coefficients are between GDP and money supply which range between 0.82 and 0.89.

These findings are clearly at odds with the market efficiency hypothesis. In other words, it appears that publicly available information on monetary and fiscal policies is not efficiently incorporated into current stock returns. Causes of this inefficiency could be related to the nature of the economy and the working of the stock market in Saudi Arabia since capital markets in developing countries (including Saudi Arabia) are typically characterized by being narrow and thin. In fact a small amount of financial saving by households sector were directly mobilized by the corporate sector and that about 7% of issued shares are traded in the market. Moreover, the financial market is over the counter market and registration should go through commercial banks and somewhat fragmented and the flow of information is not as quick or efficient as in more developed countries.

Consequently, it appears that careful analysis of fiscal and monetary policies in Saudi Arabia could potentially increase the profit of some investors. However, such profitable opportunities, as Darrat and Mukhrejee (1987) indicated, would gradually disappear as an increasing number of investors begin to utilize available information on fiscal and monetary policies, leading to a more efficient stock market.

Conclusion and Policy Implications

The main message of the empirical results for the period 1985-1995 on a quarterly base is that investors can develop profitable trading rules in the stock

market in Saudi Arabia. It is possible as Darrat and Mukhrejee (1987) suggested, that measurement errors, model specifications or any empirically related problems may have been responsible for the inefficiency evidence found in this study. There is the possibility that the model employed here and the data are inadequate in revealing market efficiency. It is expected that the profitable trading opportunities implied by this estimated model would gradually disappear as an increasing unmber of investors become more sophisticated and begin to utilize available information on monetary and fiscal policies actions in their investment decision making. Competition among profit maximizing investors will not be able to develop profitable trading rules with this information. Pearce (1987, 30) concluded "When transactions costs are taken into account, many of the apparent deviations from the efficient markets model are too small to allow investors to earn excess returns". Thus, although the Saudi Arabian stock market seems to have been inefficient, attempts to benefit from this inefficiency would render it efficient.

Merton (1987, 102) suggests that changes in aggregate stock prices are important leading indicators of macroeconomic activities. "Indeed, it is the best single predictor of future changes in business fixed investment, earnings, and dividends. Moreover, the forecast errors in the realization of future earning changes are significantly correlated with the contemporaneous changes in stock prices. Thus, if the stock market in Saudi Arabia proves to be informationally inefficient certain policies need to be formulated and implemented to improve the performance of the market. Indigenous small firms are able to raise new capital only when a large number of investors are willing to take the risk and reliable information is made available. The imperfections of capital markets are also ascribed to excessive risk, risk aversion and preference for ownership of tangible assets rather than financial assets such as stocks and bonds.

Even though the operations of the stock market have become significantly more efficient, there is still room for further improvements, particularly in terms of information. There are significant barriers to the dissemination of information, and companies appear to release less information with a greater time lag than is customary in well developed countries.

One of the obstacles to the emergence of bond market in Saudi Arabia is the absence of a market for government securities because the government did not run a deficit and did not need to borrow and when it started issuing bonds and bills it traded them only with commercial banks and semi government agencies. With no market for government securities, there is no bench mark risk free rate, and risk premium associated with a specific corporate bonds. The government has to take steps to foster the growth of bond market and establish a rating agency for bonds.

Although a certain volume of speculation is needed to maintain market liquidity and efficient pricing, excessive speculation or trading on inside information can be destabilizing. financial instability creates uncertainty that can seriously impair market efficiency and lead to significant instability. Measures to increase the liquidity of the market, reduce transaction costs and improve pricing efficiency include instituting legal provisions to prohibit insider trading and the means to enforce them, improving accounting and reporting standards and simplifying procedures. Audited corporate financial information that conforms to the standards of generally accepted accounting principles is essential. Without effective regulations and enforcement, investors will be reluctant to commit resources to the stock market. Thus, there is a consensus that, by prohibiting unfair practices, the government helps to create a more active stock market and promote investors confidence, if there is a widespread view that the market is rigged, trade will conitnue to be thin and the market will not function well. Furthermore, there is a large number of small firms owned by families or by individuals, encouraging these firms to merge in large firms and go public which will expand the stock market and increase its trading activities.

The challenge is to attain a balance between a system that ensures adequate protection for investors and one that does not deter market growth. Stiglitz (1994) noted, "Although limitations on markets are greater in developing countries, so too, many would argue, are limitations on governments. It is important to design government policies that are attentive to limitations".

Table (1)

ADF-Stationarity and Cointegration Tests

ADF-Stationarity Test			Cointegration Test			
Variables	Levels	Difference	Variables		Variables	
SP	-2.6007	-9.203*	SP, Y	-9.77*	IND, Y	-3.930**
IND	-1.869	-3.232***	SP, GE	-9.528*	IND, GE	-5.105*
Y	-2.474	-3.485**	SP, M1	-9.379*	IND, M1	-5.488*
GE	-1.886	-4.317*	SP, M2	-9.390*	IND, M2	-5.626*
M1	-2.126	-7.075*	SP, INT	-9.445*	IND, INT	-5.222*
M2	-2.8312	-7.191*	SP, INF	-9.030*	IND, INF	-5.253
INT	-1.365	-3.276***	SP, Y, GE,		IND, Y, GE,	
INF	-2.659	-4.617*	M1, INT,	-8.933*	M1, INT,	-6.786*
			INF		INF	
			SP, Y, GE,		IND, Y, GE,	
			M2, INT,	-9.00*	M2, INT,	-6.939*
			INF		INF	

* Significant at 1% Level,

** Significant at 5% Level,

*** Significant at 10% Level.

MacKinnon critical values:

ADF 1% -4.1896

5% -3.5189

10% - 3.1898

All variables are in real terms and log terms.

Cointegration 1% -4.7256

5% -4.0196

10% 3.674

SP = Stock Prices, IND = Stock Prices Index, Y = GDP

GE = Government Expenditures

M1 = Money Supply (currency in circulation + demand deposits+

M2 = Money Supply (M1+Time Deposits), INT+Interest Rate, INF = Inflation.

Table(2)
Minimum FPE

SP (4) 0.305	IND (3) 0.00904
SP (4), Y (3) 0.236 < 0.305	IND (3), Y (3) 0.00854 < 0.00904
SP (4), GE (0) 0.299 < 0.305	IND (3), GE (2) 0.00898 < 0.00904
SP (4), M1 (4) 0.279 < 0.305	IND (3), M1 (3) 0.00788 < 0.00904
SP (4), M2 (3) 0.303 < 0.305	IND (3), M2 (3) 0.00866 < 0.00904
SP (4), INT (0) 0.304 < 0.305	IND (3), INT (0) 0.0090 < 0.00904
SP (4), INF (2) 0.274 < 0.305	IND (3), INF (3) 0.00861 < 0.00904

Table (3)
Granger Causality Test-F-Statistics from VAR

To/From	SP	IND	Y	GE	M1	M2	INT	INF
SP	10.87*	7.975*	8.645*	6.761*	7.267*	5.731*	5.827*	7.539*
IND	0.975	1.92	2.024***	1.386	2.626**	2.209***	1.546	1.904
Y	14.490*	11.48*	15.88*	11.589*	11.578*	12.249*	15.682*	8.789*
GE	0.280	0.326	28.506*	34.70*	25.87*	19.534*	18.807*	18.30*
M1	2.056***	2.124***	2.807**	2.825**	4.171*	2.954**	2.56**	4.429*
M2	2.088***	2.843**	3.172*	2.284**	2.573**	3.577*	2.613**	4.401**
INT	1.402	2.088***	1.863	2.072***	1.369	1.417	2.785**	1.639
INF	5.411*	2.255*	10.373	5.998*	5.708*	5.713*	6.351*	11.219*

Table (4)

Causality Between SP and Other Variables (With Arbitrary Lags)

Var./ Lags	1	2	3	4	5	6
GDP=>SP	15.49*	12.44	3.32**	3.59**	2.42**	1.50
SP=>GDP	5.05*	0.68	0.48	0.43	0.87	0.49
GE=>SP	1.64	0.83	0.87	0.56	----	----
SP=>GE	0.02	0.23	0.17	0.16		
M1=>SP	12.31*	8.48*	2.20***	2.50**	1.82	----
SP=>M1	0.01	0.24	0.47	0.19	0.07	
M2=>SP	15.15*	11.82*	2.61**	2.79**	1.83	----
SP=>M2	0.75	0.48	0.03	0.02	0.34	
INF=>SP	2.04***	0.93	1.88	1.13	0.83	----
SP=>INF	0.04	0.19	0.45	0.69	0.69	
INT=>SP	1.91	1.81	1.53	3.56**	2.22***	3.24**
SP=>INT	0.01	0.63	0.58	0.81	0.83	1.07

Table (5)

Causality Between IND and Other Variables (With Arbitrary Lags)

Var./ Lags	1	2	3	4	5	6
GDP=>IND	1.42	3.65**	3.23	2.44**	1.91	----
IND=>GDP	1.27	0.33	0.23	0.08	0.09	
GE=>IND	7.11*	3.23**	2.25***	1.84	----	----
IND=>GE	0.08	0.47	0.35	0.37		
M1=>IND	1.39	2.98**	3.02**	2.80**	2.18**	1.94
IND=>M1	1.72	1.33	1.21	0.72	0.46	0.53
M2=>IND	0.63	1.29	1.98	1.77	1.22	----
IND=>M2	0.50	0.28	0.67	0.82	0.32	
INF=>IND	13.54*	6.77*	3.65**	3.21**	3.44**	3.4**
IND=>INF	0.62	0.59	0.21	0.13	0.31	0.26
INT=>IND	0.34	0.30	1.20	0.97	0.97	1.30
IND=>INT	7.27*	3.23**	1.95	1.33	1.33	0.93

Table (6)

Correlation Coefficiencts Between (SP, IND) and Independent Variables

Variables	IND	GDP	GE	M1	M2	INF	INT
SP	0.665	0.886	0.3371	0.833	0.870	0.040	- 0.600
IND	-----	0.823	0.590	0.863	0.819	0.133	- 0.772
GDP	-----	-----	0.573	0.968	0.975	0.237	- 0.650
GE	-----	-----	-----	0.508	0.467	0.280	- 0.416
M1	-----	-----	-----	-----	0.988	0.221	- 0.723
M2	-----	-----	-----	-----	-----	0.187	- 0.691
INF	-----	-----	-----	-----	-----	-----	- 0.095

Table (7) Error Correction Test

7 A-Dependent Variable Δ SP

	1	2	3	4	5	6
ΔΣ SPt-1	0.266	0.319	0.445**	0.480**	0.305	0.321
ΔΣ Yt-1	- 2.519					
ΔΣ GEt-1		- 0.566				
ΔΣ M1t-1			- 2.375			
ΔΣ M2t-1				- 3.365		
ΔΣ INTt-1					- 0.315	
ΔΣ INFt-1						2.183
ut-1	- 0.981*	- 0.814*	- 0.981*	- 1.037*	- 0.778*	- 0.768***

7 B - Dependent Variable Δ IND

	1	2	3	4	5	6
ΔΣ INDt-1	0.770**	0.836	1.078	1.277**	0.283**	1.017
ΔΣ Yt-1	1.297					
ΔΣ GEt-1		0.272***				
ΔΣ M1t-1			0.527			
ΔΣ M2t-1				- 0.522		
ΔΣ INTt-1					- 0.004	
ΔΣ INFt-1						1.22**
ut-1	- 0.778**	- 0.687	- 1.06	- 1.15**	0.243*	- 0.884

7C - Dependendent Variables
(Y, GE, M1, M2, INT, INF with SP)

Idep./ Dep	Δ Yt	Δ GEt	Δ M1t	Δ M2t	Δ INTt	Δ INFt
ΔΣ Yt-1	0.663*					
ΔΣ GEt-1		- 0.019				
ΔΣ M1t-1			- 0.079			
ΔΣ M2t-2				- 0.181		
ΔΣ INTt-1					- 0.1444	
ΔΣ INFt-1						- 0.0529
ΔΣ SPt-1	0.0012	- 0.0072	0.017	0.0162	0.0172	0.0118
ut-1	- 0.0019	- 0.0185	- 0.014	- 0.011	- 0.0492	- 0.0129

7D - Dependent Variables
(Y, GE, M1, M2, INT, INF with IND)

Idep./ Dep	ΔYt	ΔGEt	ΔM1t	Δ M2t	Δ INTt	Δ INFt
ΔΣ Yt-1	0.739**					
ΔΣ GEt-1		- 0.0159				
ΔΣ M1t-1			- 0.141			
ΔΣ M2t-2				- 0.414*		
ΔΣ INTt-1					- 0.198	
ΔΣ INFt-1						- 0.107
ΔΣ INDt-1	- 0.0004	- 0.085	0.339	0.083	- 0.340	- 0.082
ut-1	0.0002	0.235	- 0.371	- 0.058	- 0.006	- 0.041

Table (8)

Dependent Variable SP

Var.	1	2	3	4	5	6	7	8
C	6.860	2.053	- 4.172	0.692	1.031	- 1.614	- 5.689	- 8.012
	(0.85)	(0.24)	(- 0.68)	(0.08)	(0.113)	(-0.169)	(- 0.766)	(- 1.089)
GDP	- 1.556	- 0.827	1.4264	- 0.156	- 0.073	0.073	1.922	2.45***
	(- 0.85)	(0.41)	(1.207)	(- 0.082)	(- 0.124)	(0.034)	(1.389)	(1.816)
GE	0.4236	0.445	0.447					
	(1.472)	(1.543)	(1.617)					
M1				(1.17**	1.111**			
				(2.031)	(1.905)	1.30***		
M2						(1.769)		
INT					- 0.147		- 0.193	
					(-0.813)		(- 1.046)	
INF								- 1.229
								(- 1.076)
R	0.827	0.831	0.822	0.823	0.8206	0.822	0.809	0.8176
F	29.78	30.57	49.47	49.51	39.416	49.511	45.548	48.059
D.W.	1.924	1.920	1.949	1.908	1.923	1.913	1.9654	1.9551

* Significant at 1% Level,
** Significant at 5% Level,
*** Significant at 10% Level.

Figures in parenthesis are t-statistics.
R = adjusted R squared. D.W. = Durbin Watson statistics.

In all tables:
C = constant, PS = log of stock prices, IND = log of stock prices indes.
GDP = log of gross domestic product (GDP), GE = log of government expenditures,
M1 = log of M1 (M1 = currency in circulation + demand deposits).
M2 = log of M2 (M2 = M1 + time deposits), INT = interest rate (proxide by Eurodollar rate),
INF = log of inflation (proxied by Consumer Price Index (CPI).

Table (9)
Dependent Variable IND

Var.	1	2	3	4	5	6	7
C	-17.667	- 17.735	- 20.779	- 18.137	- 17.882	- 17.638	- 19.042
	(-2.937)	(- 2.834)	(- 3.378)	(- 2.976)	(-2.858)	(- 3.567)	(- 3.105)
GDP	3.931*	3.8153*	4.7897*	3.9784*	3.7484*	4.009*	4.3493*
	(3.018)	2.718)	(4.137)	(3.089)	(2.7525)	(4.384)	(3.877)
GE	- 0.138	- 0.1328	- 0.1748				
	(- 0.768)	(- 0.747)	(- 1.003)				
M1	0.2215			0.2393			
	(0.583)			(0.645)			
M2		0.3428			0.4196		
		(0.744)			(0.9402)		
INT	- 01483	- 0.1422				- 0.1681	
	(-1.271)	(- 1.22)				(- 1.528)	
INF	- 0.251	- 0.2447					- 0.1879
	(- 0.3443)	(- 0.336)					(- 0.257)
R	0.940	0.9403	0.9423	0.9401	0.9408	0.943	0.94008
F	94.689	95.454	172.45	165.72	167.92	174.798	165.74
D.W.	1.9337	1.9359	1.9006	1.9234	1.928	1.9418	1.9218

* Significant at 1% Level,

** Significant at 5% Level,

*** Significant at 10% Level.

Figures in parenthesis are t-statistics,

R = adjusted R squared, F = F= statistics, D.W. = Durbin Watson statistics.

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