Consequences of government Decisions in Relationship to deficits and surpluses of Budget and Money Volume on the Stock price index of Tehran Stock Exchange

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ABSTRACT

The purpose of this study is to investigate the relationship between government deficits and surpluses of budget volatility and money volume volatility with Tehran's stock price index volatility. The data used in this study is the total price index of Tehran Stock Exchange and fiscal policies of governments and monetary policies of central bank, including deficits and surpluses of budget and money volume as a seasonal period (1996 - 2008). For describing long-term relationships between variables VAR model is used and for investigating this relationship the effect of macroeconomic variables namely interest rate, consumer price index, house price index on the Stock Exchange index are considered. Estimation results show that changes in stock price index have a positive relationship with the money volume and a positive relationship with government deficits and surpluses of budget.

Introduction

Stock market is one of the key dimensions of capital market and has a huge contribution for gathering and transferring capital for business. Therefore mechanism of stock exchange is one of the tools for business to be financed. The volatility of economic variables in the period of time is one of the main problem of business due to difficulties it has for predicting and planning for future. Thus, knowing the effect of economic variables on stock prices could be useful for speculators to plan for their future.

Due to importance of deficit and surpluses of government budget and money volume on economic activities of a country, and with respect to important role of these variables on macro-economic variables such as price index, interest rate and property prices, the aim of this study is to investigate the effect of budget surpluses and deficit and money volume on two important aspects of nation expenditure with use of econometric methods. By using econometric methods we would be able to investigate government policies regarding deficit and surpluses in a specific period of time with use of determined scenarios. Therefore, we can analyze monetary and financial principals of government in the determined years with quantitative methods.Moreover, price index (TEPIX) is influenced by both systematic and nonsystematic risks. Nonsystematic risk is derived from internal and managerial factors and systematic risks are derived from external and environmental factors. it seems that in Iran, environmental factors are more vital in determining the prosperity of business. in last decades, relation of price index and macro-economic variables were investigated by plenty of researchers and the main result is that the stock price is determined by several key macro-economic variables namely, consumer price index, interest rate and inflation rate.

Because Stock prices and price index are indicators of general condition of the market, decrease and increase in price index for investors and brokers is of much importance. In last years, the price index was violated severely which several

factors such as economic factors were responsible for it. Therefore, the aim of this study is to investigate the consequences of government decisions regarding deficit and surpluses in budget and price volume on price index of Tehran stock exchange in the period of 1996-2008.

Therefore, following question will be answered by this research:

1- What is the relation of theoretical concepts between changes in deficit and surpluses of budget with Tehran Stock Exchange's price index?

2- What is the analyze of the relation of stock price index and changes in money volume?

Literature review

Numerous studies have been conducted in recent years to analyze the relationship between stock market index and macroeconomic variables. Studies reveal strong relationships between macroeconomic variables and stock returns.

Fama (1982) stated that expected inflation is negatively associated with the share price. Darrat (1990) found that budget deficits, long term bond rates, the amount of industrial production and the volatility of interest rate have an impact on the stock returns. Achsani and Strohe (2002) examined the relationship between inflation and the index of Jakarta stock exchange and concluded that inflation has a negative relationship with stock exchange index.

Nishat and Shaheen (2004) investigated the relationship between a set of macroeconomic variables and the index of Karachi stock market. The results showed that industrial production has a positive impact on the performance of the index and inflation has a negative relationship with stock exchange index. Aggarwal (1981) found that there is a positive relationship between US stock prices and exchange rate. A study conducted by Chen (1991) revealed that market excess returns can be predicted by using lagged production growth rate, treasury bill rate, and the term structure. Mukherjee and Naka (1995) investigated the role of macroeconomic variables on the

index of Tokyo stock exchange. They found a long-term equilibrium relationship between the index of Tokyo stock exchange and macroeconomic variables such as money supply, exchange rate and long-term bond rate.

Apergis and Eleftherio (2002) investigated that the relationship among the index of Athens stock exchange, interest rate and inflation and concluded that inflation has greater impact on the performance of the index of Athens stock exchange than interest rate. Rapach (2001) analyzed the long run relationship between inflation and the stock prices. Using macroeconomic data from sixteen developed countries, it is concluded that there is a weak relationship between inflation and stock prices. Liu veShrestha (2008) examined the relationship between a set of macroeconomic variables and the index of Chinese stock market. By employing heteroscedastic integration, they found that asignificant relationship exists between the index of the Chinese stock market and macroeconomic variables. They concluded that inflation, exchange rate and interest rate have a negative relationshipwith the index of Chinese stock market. Hashemzadeh and Taylor (1988) tested the casual relationship among the prices of US common stock, money supply and interest rate. They found that there is a two-way causation between the price of US common stock and money supply and interest rate leads US stock price.

Durukan (1999) studied the link between macroeconomic variables and the stock prices in Istanbul stock exchange. The empirical results showed that interest rate is negatively associated with the stock price and there is no statistically significant relationship between inflation and stock price.Aydemir and Demirhan (2009) investigated the relationship between exchange rate and the index ofIstanbul stock exchange. By employing Toda-Yamamoto causality test, they found that there exists atwo-way causation between stock exchange index and exchange rate. Erdem et al., (2005) analyzed the relationship between macroeconomic variables and the index of Istanbul stock exchange. They concluded that there is a negative relationship between inflation and the stock price, and real economic activity peroxide by industrial production has a positive effect on the stock price.

The relationship between stock prices and interest rates has received considerable attention in the literature. Fama (1981) argues that expected inflation is negatively correlated with anticipated real activity, which in turn is positively related to returns on the stock market. Therefore, stock market returns should be negatively correlated with expected inflation, which is often proxied by the short-term interest rate. On the other hand, the influence of the long-term interest rate on stock prices stems directly from the present value model through the influence of the long-term interest rate on the discount rate. Rather than using either short-term or long-term interest rates, Campbell (1987) analyzed the relationship between the yield spread and stock market returns. He argues that the same variables that have been used to predict excess returns in the term structure also predicts excess stock returns, deducing that a simultaneous analysis of the returns on bills, bonds and stock should be beneficial. His results support the effectiveness of the term structure of interest rates in predicting excess returns on the US stock market. Kaul (1990) studied the relationship between expected inflation and the stock market, which, according to the proxy hypothesis of Fama (1981) should be negatively related since expected inflation is negatively correlated with anticipated real activity, which in turn is positively related to returns on the stock market. Instead of using the short-term interest rate as a proxy for expected inflation, Kaul (1990) explicitly models the

relationship between expected inflation and stock market returns. Zhou (1996) also studied the relationship between interest rates and stock prices using regression analysis. He found that interest rates have an important impact on stock returns, especially on long horizons, but the hypothesis that expected stock returns move one-for-one with ex ante interest rates is rejected. In addition, his results show that long-term interest rate explain a major part of the variation in price-dividend ratios and suggests that the high volatility of the stock market is related to the high volatility of long-term bond yields and may be accounted for by changing forecasts of discount rates.

Lee (1997) used three-year rolling regressions to analyze the relationship between the stock market and the short-term interest rate. He tried to forecast excess returns (i.e. the differential between stock market returns and the risk-free short-run interest rate) on the *Standard and Poor 500* index with the short-term interest rate, but found that the relationship is not stable over time. It gradually changes from a significantly negative to no relationship, or even a positive although insignificant relationship. Jefferis and Okeahalam (2000) worked on South Africa, Botswana and Zimbabwe stock market, where higher interest rates are hypothesized to depress stock prices through the substitution effect (interest-bearing assets become more attractive relative to shares), an increase in the discount rate (and hence a reduced present value of future expected returns), or a depressing effect on investment and hence on expected future profits. Harasty and Roulet (2000) worked on 17 developed countries and showed that stock prices are cointegrated with earnings (a proxy for dividends) and the longterm interest rate in each country (except the Italian market for which the short-term interest rate was used). Spyrou (2001) also studied the relationship between inflation and stock returns but for the emerging economy of Greece. Consistent with Kaul's results, Spyrou (2001) found that inflation and stock returns are negatively related, but only up to 1995 after which the relationship became insignificant.

Arango (2002) found that some evidence of the nonlinear and inverse relationship between the share prices on the Bogota stock market and the interest rate as measured by the inter bank loan interest rate, which is to some extent affected by monetary policy. The model captures the stylized fact on this market of high dependence of returns in short periods. These findings do not support any efficiency on the main stock market in Colombia. Hsing (2004) adopts a structural VAR model that allows for the simultaneous determination of several endogenous variables such as, output, real interest rate, exchange rate, the stock market index and found that there is an inverse relationship between stock prices and interest rate. Zordan (2005) said that historical evidence illustrates that stock prices and interest rates are inversely correlated, with cycle's observable well back into the 1880's; more relevant to the period subsequent to World War II. From the late 1940's to the mid 1960's, inflation was low, and interest rates were both low and stable. Stocks did well during this period, both in nominal and real terms. The inverse relationship between interest-sensitive asset classes like stocks, bonds, and real estate and commodity prices has been known through history. That relationship can be observed in the 1877 to 1906 cycle, the 1906 to 1920 cycle, the 1920 to 1929 cycle, the 1929 to 1949 cycle, and the 1949 to 1966 cycle. Uddin and Alam (2007) examines the linear relationship between share price and interest rate, share price and changes of interest rate, changes of share price and interest rate, and changes of share price and changes of

interest rate on Dhaka Stock Exchange (DSE). For all of the cases, included and excluded outlier, it was found that Interest Rate has significant negative relationship with Share Price and Changes of Interest Rate has significant negative relationship with Changes of Share Price.

Methodology

In this research for investigating consequences of government decisions regarding the effect of deficit and surpluses of budget and volatility of volume of price on stock exchange price, the statistical society was all the registered firms in Tehran Stock Exchange. The index price was considered for period of 1996-2008, which is consistent of 52 observations. Information regarding the index is gathered by using reports of Tehran Stock Exchange and central bank of Iran.

Analysis

Test of stability of variables

For preventing the phenomenon of fake regression, stability of variables are investigated. With use of common root test consisting Diki-Fooler test, stability of variables are investigated. Results shows that TEPIX, M1, RLB, IR variables with one minus procedure with significance level of 99% and HI variable with use of two minus procedure with significance level of 99% and CPI variable with one minus procedure with significance level of 95% are stable.

Determining intercept length of optimized model

For determining the intercept length of optimized model in this research, Schowars-Bezin, Akayik and HananKooen are used. Results shows that Akayik and HananKooen factors in interruption 4 have the least amount and Schowars factor in interruption 1 has the least amount. Therefore, Akayik factor and HananKooen are considered and the optimized length of 4 is extracted for this model.

Co-aggregated test

With use of Diki-Fooler test in the prior section, stability of all variables were proved and with use of minus procedure they were shown to be stable. It worth mentioning that with use of minus procedure, valuable information regarding the level of variable will be missed. With use of co-aggregated test we can test the existence of co-aggregation which is case of existence; we can test the propriety of variables. In this research, with use of Johanson method, co-aggregated vectors are extracted by which the long term relation among variables was investigated which is shown in table below:

Regarding the maximum amount in table 1 and considering the factors of this test, 6 convergence vectors among variables of the model are extracted and the existence of a long term significant relation between variable of time series are proved.

Test of determination of number of co-summation based on effect test (test of hypotheses)

Regarding the results of table 2 and with consideration of factors of this test which all the probabilities are less than 0.05, 6 convergence vectors among variables of the model are identified and the long term significant relation of time series variables are proved to be true.

Considering results of Johonso and Josilos, equation for convergent and normal vector for estimation of the model is as below:

TEPIX=-210844.1+0.00844RLB+0.56014M1+59117.77IR-555.270HI+822.855CPI

(0.08686)   (0.12313)   (8924.0)   (172.047)
(346.005)

Coefficients of the variables are indicating that there is a relation among each variable with TEPIX variable. In parenthesis numbers are indicators of analyze of variance which by

estimation of t statistics, is a prove for significant variables. As it is show in the equation, surpluses and deficits are indicating that government expenditures have a long term effect on price index of Tehran Stock Exchange.

Money volume has a long term effect on stock price index because with increase in money volume, demand for consumption and financial property will be boost up in return and finally there will be more production in different sectors of economy. The final consequence will be more financial transactions and increase in price index in Tehran Stock Exchange.

Increase in CPI will be result in increase in price index because inflation has a negative return for deposits and therefore tendency for keeping cash will be decrease and tendency for keeping other kind of assets like stocks will grow. In fact, in this situation, stock will be considered as inflation guard.

Growth in real state will cause the price index to decrease in the long term. From theory perspective, real state is among that kind of property which its price changes will cause changes in other properties prices. Investment in real state is considered as one of the main investment methods among investors. From economic point of view, the relation between real state and stock prices is not clear because increase in real estate prices makes this market favorable for investors and will cause demand for stock exchange to be decreased and from other hand, those investors who cannot afford to invest in real state, will invest their money on stock which will result on increase in stock prices.

**Pattern of fallacy correction and near term result**

Method of fallacy correction can both determine the causality between variables and discriminate long term and short term causality. Existence of convergence among variables is a basis for using correcting models. Patter of fallacy correction is in fact relating short term volatilities among variables to long term relation of them. According to Angel and Gerner (1987), each long term relation has a short term model which will provide balance.

According to results, coefficients for model in the equation are equal to 0.062138. Therefore, when going from time t to time t+1, the variance of the stock price will be corrected by the variables of the pattern and will move toward long term balance.

Reflection functions of pattern

Reflection functions are useful tools for analyzing dynamic behavior of variables of the model in times of unpredicted shocks on other variables of the model. This ability is because this function reflects the shock on all of the variables in one of the variables. Reflection function, will present reflection of an endogenous variable in comparison to change to one of the variables in time. In fact, this function shows the effect of shock to independent (exogenous) variables which are M1, RLB, IR, HI and CIP to endogenous variable which is TEPIX in this research. Therefore analyzing the reaction to the force is a proper tool for analyzing effects among variables.

As it is shown in the diagram above, the effect of positive shocks of money volume on price index in short term will makes the price index to increase. From theory perspective, money volume will have a positive effect on price index of stock exchange because increase in money volume will increase demand and production in different sections in economy will increase in tern which gradually increase price index of stock exchange.

Diagram 1: response to Cholesky
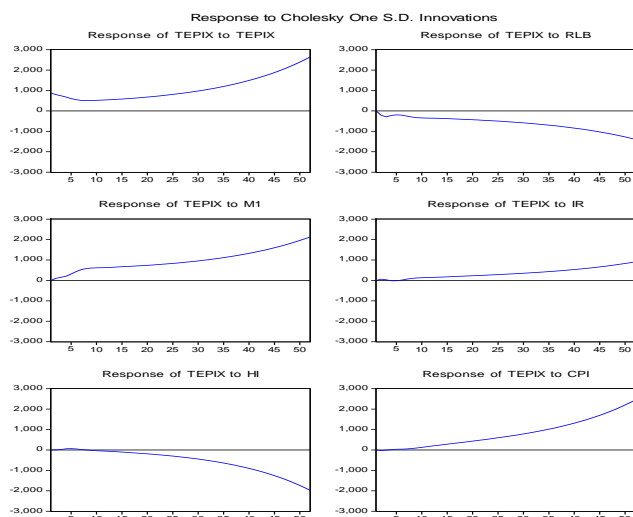
Positive shock by deficit or surplus of the budget is a indication of increase in government's expenditures and in short term will decrease price index of stock exchange. this is because imbalance in budget in short term is presented as a consumption expenditure in short term and decrease in production will have a negative effect on price index of stock exchange.

Positive effect of interest rate in short term will make price index to increase. From theory perspective, increase in interest rate must have a negative effect on stock prices because increase in inflation will increase interest rate and increase in interest rate will increase expected payoff of stockholders. Expected payoff of stockholders is considered as discount rate for investors. Therefore, increase in payoff rate of investors will decrease present value of future assets and will gradually lead to decrease in stock values. It worth mentioning that the value of financial assets is equal to present value or discounted value of future returns of that asset. Thus, increase in inflation will decrease present value of future return of stocks. The reason is that in Iran the nominal interest rate is often lower than real interest rate and in fact real interest rate is often negative. Therefore increase in interest rate could not be considered as motivating act for investors to deposit in banks or bonds and people prefer to use assets like stocks to maintain the value of their money.

The effect of positive shock ofindex of real state will decrease stock prices in short term. With regard to portfolio theory these to assets are exchangeable and therefore from economic perspective, this relation is rationale.

The effect of positive shock on consumer prices in short term will lead to increase in price indexes because present value of firms in stock market will increase by inflation and increase in current prices will cause prices of stocks to increase and therefore price index of stock exchange market will increase eventually.

Analyze of variance

While reaction functions will depict shock effect of a endogenous variable on other variable of the model, analyze of variance will discriminate changes of endogenous variable from other exogenous variables. In this method the share of a imported shocks to different variables will be anticipated in variance of error on short term and long term variables. With analyzing variance of error, share of each variable in response to shocks will be shared to all the variables of the model. In this condition it is possible to measure the share of each variable on other variables through the time.

By looking at the table we can see in the first period, 100% of the changes of price index is explained by the variable itself and other variables had not any part in it. In the other periods, this explanations is reduced which is a indication that in long term the contribution of other variables for changing the price index is increasing.

RLB variable in the second period explained 2.1% of the variation in price index but explanation will increase to 20% in 20 period and then decreasing trend is followed which decreased this explanation to 8.6% in period 40.

M1 variable has increasing trend in the periods and its explanation is increased from 0.04% to 13.6% in period 30 and then a decreasing trend is followed.

CPI variable which explain 0.08% of the variance of price index in second period, has increasing trend and reached 21.8% of explanation at the last period. According to volatilities it has, it is one of the effective variables.

IR variable has reached 0.8 in the second period and increased to 35.6 in following periods. Although interest rate is our peripheral variable, it has pretty strength in explaining the variation in price index.

HI variable is one of the effective variables due to reaching 6.1 from 0.6 in the second period which show an increasing trend.

Conclusion

Main conclusion of the research is as below:

The increase in money volume has a significant positive relationship with price index of stock exchange. Surplus and deficit in budget in Iran has a significant positive effect on price index of stock exchange market.

According to research hypotheses, first hypothesis which is existence of a long term relationship among surplus and deficit in budget and price index has been confirmed. Second hypothesis which is existence of a long term relationship between money supply and price index has been confirmed either. Other conclusions are as below:

1- Deficit and surpluses in budget in long term have positive effect and in short term has negative effect on stock price index.

2- Money volume has positive effect on stock price index in both long and short term.

3- Increase in interest rate has increasing effect in both long and short term on stock price indexes.

4- Increase in real state price has decreasing effect on stock price index in long term.

5- Consumer price index has a significant positive effect on stock price index

According to this research and since the results show key role of inflation on stock price index, stock market could be considered as a guard against inflation in the mind of people, and therefor development of capital market is a good plan for motivating people and investors to participate in this market.

Black side of considering stock market as a guard against inflation is possibility of bubble formation in the long term. The reaction of money volume to price bubbles must be different in comparison with reaction to stock price increase. Increase in shares must be based on rules like increase in interest rate and profit. Bubble formation can cause different imbalance in economy which can have serious consequences like inflation or even stagflation. Therefore paying attention to this point is really serious for economic managers and decision makers.

Since in Iran price index of stock exchange is more influenced by money volume, central bank must concentrate on this variable and put higher attention on it in comparison to other variables.

Table 1: results of research based on EVIEWS estimations

Null hypothesis	Alternative hypothesis	Statistical λ_{max}	Significance level in 95%	probability
$r=0$	$r=1$	260.31	103.85	0.000
$r\langle=1$	$r=2$	171.98	76.97	0.000
$r\langle=2$	$r=3$	111.91	54.08	0.000
$r\langle=3$	$r=4$	64.78	35.19	0.000
$r\langle=4$	$r=5$	29.53	20.26	0.000
$r\langle=5$	$r=6$	11.45	9.16	0.000

Table 2: results of research based on EVIEWS estimations

Null hypothesis	Alternative hypothesis	Statistical λ_{max}	Significance level in 95%	probability
$r=0$	$r=1$	88.32	40.96	0.000
$r\langle=1$	$r=2$	60.07	34.80	0.000
$r\langle=2$	$r=3$	47.13	28.59	0.000
$r\langle=3$	$r=4$	35.24	22.30	0.005
$r\langle=4$	$r=5$	18.08	15.89	0.0223
$r\langle=5$	$r=6$	11.45	9.16	0.0181

Table 3: Analyze of variance

Period	TEPIX	RLB	M1	CPI	HI	IR
1	100.00	0.000	0.000	0.000	0.000	0.000
2	96.23	2.108	0.044	0.083	0.66	0.87
10	71.13	0.906	0.47	1.51	1.40	24.59
20	29.16	20.08	5.67	15.92	4.67	21.48
30	35.53	5.78	13.64	10.94	6.38	27.73
40	17.71	8.65	9.89	21.90	6.19	35.66

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