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The Long Run Interaction Between Macroeconomic Variables and Stock Prices in Iran

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Abstract: The increasing importance of financial asset's market makes it necessary to evaluate the related issues of these markets continuously. Thus, the stock exchange is considered as one of the most important components of financial markets. Since, there is a significant relationship between the changes in stock market and the economic depressions and booms, macroeconomic policies, especially monetary policies can affect the stock market indicators drastically. Therefore, the purpose of the current study was to test the hypothesis about the existence of mutual interaction between macroeconomic variables and the stock prices for the period from 1991-2013 using Auto Regressive Distributed Lag (ARDL) approach. The results of the study indicated that the GDP, liquidity stock were statistically significant and had a positive significant effect on the stock prices, while the exchange rate and banking interest rate had a significant negative effect on the stock prices.

Key words: Stock price, macroeconomic variables, ARDL approach, depressions, GDP

INTRODUCTION

Each property including financial or reality are valuable. The key factor for investment and property management is understanding the value and effective source on the value of those properties. All the assets can be evaluated but evaluation of some of these properties is easier and others more complex. Stock is considered as part of financial assets of investors that its supply and demand is done in stock market. Stock is one of the important sections of official investment marketing in which buy and sell the stock and saving bond of accepted firms have been done under controlled situations and special regulations. And by reduction of risk among investors and firms, gathering the investor's fund, allocated sources by gaining information aand speciality, help firms to be economically prospered. In addition, lead the current funds to the markets which have more capability and through providing financial sources and changing individual's savings to investment can help economical prosperity and development. Thus havin efficient stock market for each country is vital and important (Khasorow and Mohammadreza, 1967). Stock market at one hand works in a larger system called Iran social-economic system, so is strongly affected by this system. This effectiveness is considerable; because Iran stock market is in in young and forming condition. Because of this, it has been affected by environmental changes. Thus, SME factors such as economic growth rate, currency rate, the interest of other economy activities, currency income of this country, degree of the degree and intensity of liberalization and opening up the economy, expanding the liquidity increase are environmental factors that influence stock market. Moreover, tax law as a factor in the development of the stock market and other environmental factors can be effective. Economic stability is considered as the most important factor in each country affecting investment in any country, including Issues that capital markets in the world and also on the amount of investment involved in these markets are macroeconomic variables that affect the volatility of stock returns. In a economic growth periode with relative price stability and regarding the fact that in this periode savors, investors and traders and stocjk market are three different groups and behave differently based on motivations. Firm investors pass the normal trend and in tterm of investment for construction factory, purchase production tools and increase inventory production. Thus, the economic capacity regulary is increased and will result in increasing economic efficiency. Since, companies and production firms have significant role in economic growth in all countries, recognizing foctors and agents which will cause their development and improvement are important and examining macroeconomic variables are included in these agents. Growth and development requires more investment and business units to achieve this would need to be provided financially. Due to impact of inflation on

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investment returs, it can be considered as an effective factor in financial and economical dicision making (Salimi and Mohammadreza, 1962).

The base of this research is that if there is an interaction between macroeconomic variable and stock price index? If it is positive, how is the relation?

Theoretical issues: Effective factors on stock price index is the most common starting point for investors at the time of stock buying have stock price changes. Effective factors on stock price index can be classified into two main groups.

Internal factors: Effective factors on stock price is in relation with firm dicision and operation, these factors include each share (EPS), Divided Per Share (DPS), the ratio of Price to Earnings (P/E), increasing stock analysis and internal factors in other companies.

External factors: These factors include can not be controlled firm management that in a way affect firm activities divided into two sections: political factors economical factors. Effective economical factors on stock price is divided into two groups real variables (GDP, savings, tax rates; Monetary variables (liquidity volume, currency rate, banking interest rate, inflation rate) (Samadi *et al*., 1966).

Theoretical foundations the relation between stock price and macroeconomic variables in this research by considering economical factors for examining the interaction between stock price index and macroeconomic variables, portfolio theory and fundamental theory Fisher was used.

Portfolio theory: Portfolio represents the investment portfolio which it maintains with various combinations of various financial assets. Portfolio theory represents appropriate efficient property by considering its effective factors. Some of these finanicial properties like banking interest have stabke returns and no risk and some others like bonds, currencies and uncertain returns and cell phones are not risky. Since, people in their financial portfolios keep different combinations like cash, stock, banking deposit, bonds, gold and currencies, changes in money supply, exchange rate, interest rate and inflation rate affect demand for the maintenance of any one of the components of demand for the new shares to its impact on the state if the stock price (Karimzadeh, 1965).

Fisher theory: The second theory used for achieving theoretical framework of the relationship between stock price index and variablesis is the basic theory Fisher. The basic Fisher equation states that the normal interest rate can be obtained by difference between nominal interest rates and inflation rates. In a way that:

$$Rs = Rt\_INF \tag{1}$$

In which Rtn is a real interest, Rnt is nominal interest rate and INF_t is inflation rate. Fisher states this kind of relation for stock returns in a way that:

$$RS = RS\text{-}INFt \tag{2}$$

Pst and Rsnt = dlnPSt is the stock price. Regarding this Eq. 2, Fisher introduced econometric model and states that inflation rate has been effective on stock returns:

$$RStr = y^0 - y1INFt + Ut \tag{3}$$

In 1981 Fama suggests that the Fisher equation of monetary variables including liquidity and interest rates has been ignored. Fama by considering the relation of money market and stock market have used money market equilibrium for proving his claim:

$$\frac{M_t}{P_t} = M\left(Y_t, R_t\right) \tag{4}$$

Where:
M_t = Liquidity in economic
P_t = General price level
Y_t = National income
R_t = Interest rate

Thus, Fama has introduced money demand:

$$Ln\left(\frac{M_t}{P_t}\right) = aLnY_t - bLnR_t \tag{5}$$

$$LnP_t = -a_1LnY_t - a_2R_t + LnM_t \tag{6}$$

Regarding the fact that is Eq. 8 can be obtained:

$$dLnP_t = a_1dLnY_t - a_2dR_t + dLnM_t \tag{7}$$

By replacing these expressions in Eq. 3 the following equation is obtained:

$$INF_t = -\alpha_1 dLnY_t + \alpha_2 dLnM_t + U_t \tag{8}$$

By replacing these expression in Eq. 3 the following Eq. 9 is obtained:

$$RS_t^r = \beta_0 + \beta_1 dLnY_t + \beta_2 dR_t + \beta_3 dLnM_t + U_t \quad (9)$$

In a way that: $\beta_0 = Y_0, \beta_1 = -Y1\alpha1, \beta_2 = Y1\alpha2, \beta_3 = Y_1$ by using this existed equation between the nominal yield and the actual yield stock:

$$RS_t^n = RS_t^r + INF_t$$

The above equation can be written as follows (Eq. 10):

$$RS_t^n = \beta_0\beta_1 dLnY_t + \beta_2 dR_t + \beta_3 dLnM_t + \beta_4 INF_t + U_t \quad (10)$$

At the end this equation for stock price as the following is being stated (Eq. 11):

$$LnRS = \beta_0 + \beta_1 LnY_t + \beta_2 R_t + \beta_3 dLnM_t + \beta_4 P_t + U_t \quad (11)$$

Review of literature: Chettry Antonio examined the political effects of fiscal and monetary policy on stock market performance in Germany, the UK and the US. His results show that these policitics directly and indirectly are effective on stock market and the relationship between monetary and fiscal policy is very important. Then therefore, investors should consider these policies at the same time. Chatziantoniou *et al.* (2013) measured the effect of monetary policy on stock returns in Nigeria. He indicates that positive leverage effect that positive changes play important role to negative changes in stock returns. He also Unforeseen changes in monetary policy is more important for stability in the Nigerian capital market. Heran in a study titled "Fractional Co-integration Between Oil Prices and Stock Markets Examine Run Long Relation Between Oil Prices and Stock Price Index". The results indicate that co-integration fraction between oil price and stock price index in Germany, US, England and Canada and no other empirical evidence suggests there is a relationship of co deficit in other Member States. Hemriyta and Terifa in a study titled "the relation between interest rate, currency rate and stock price with a small wave analysis" examine the relation between mentioned variable. The results of this study significant statistical relation cannot found between interest rate and currency rate. While the relation between interest rate and return rate of stock is not statistically significant. Sayilgan and Suslu (2011) investigate the effect of macro economic variables on stock returns. The results show that stock returns are negatively correlated with the exchange rate and has a positive and significant relation between consumer price index and money supply. Adjasi *et al.* (2008) investigates the relation between macroeconomic variables and stock market in Ghana method. The results indicate that mutual and positive relation between Stock market volatility and consumer price index and negative relation between stock market fluctuations and there is a rate treasury bonds. Avaniz and Kantiakas have examined the effect of money policies on stock returns. Overall, based on obtained results monetary policy has considerable effect on stock returns. This conclusion has confirmed monetary policy transmission mechanism through stock market. Hamp and McMilen have shown the impact of macro economic variables on run long transmission in stock market. The results show a positive relation between industrial productions, consumer price index and short-term interest rates and stock prices as well as a negative relation between long-term interest rates and the stock market. Saeedi and Amiri have investigated the relation between macro economic variables such as Index of consumer market exchange rate, oil price with total index of Tehran stock. The findings have both verified the long term relation between variables and have stated that stock price index has a negative relation with oil income and currency rate, positive relation with inflation rate.

Piraei and Shahsavar have examined the effect of macroeconomic variables on Iran investment market. The results show that stock price index have a direct relationship with gross domestic productive and general level of prices and inverse relation with currency rate and liquidity volume. Azizi has examined the interaction between inflation and stock returns in Tehran stock exchange. The research findings indicate that inflation is explanation of cash index and total return (price and cash). However, the index does not explain stock price. On the other hand Cash flow return on total output) cash prices and stock price do not explain inflation.

Pattern introduction: Measured in stock prices as a major challenge show the researchersthat researchers do their best for evaluating the effective financial factors on stock price. Therefore, based on Fama (1981) model and Saeedi and Amiri's studies the following model can be estimated:

$$LPS = \beta_1 LGDP + \beta_2 LM + \beta_3 LER + \beta_4 CPI + \beta_5 LIR + C$$

Where:

LGDP = Gross Domestic Product
LM = Liquidity volume
LER = Log currency
LCPI = Logarithm of the Price Index
LI = Log in Interest rates
LPS = Log of Stock Price

This equation in its pattern has been estimated as paused expanded description. And investigate to identift the relationship between endogenous and exogenous variables in periode of 1370-1392.

MATERIALS AND METHODS

In this study long run interaction between macroeconomic variables and stock price through Microfit software for time periode of 1370-92 has been investigated. Data have been gathered from references and different journals and central bank. The pattern of self-description with widespread lag (p, q1, …, p2) ARDL that has been presented by Pesaran, Pesran and Shin is estimated as the following:

$$i = 1, 2, ..., k\alpha(L, p)y_t = \alpha_0 + \sum_{i=1}^{k}\beta_i(L, q_i)x_{it} + u_t \quad (12)$$

Where:

L = An interval factor
α = An intercept
y = Dependent variable
L = An interval factor it can be written that

$$L^jY_t = y_{t-j} \quad (13)$$

So, it can be written this way:

$$\alpha(L,p) = 1 - \alpha_1 L^1 - ... - \alpha_p L^p$$
$$\beta_i(L,q_i) = \beta_{io} + \beta_{i1}L + \beta_{i2}L^2 + ... + (\beta_{iqi}L_i^q) \quad (14)$$

To use ARDL approach at the first stage, the existence of long-term relationship between the investigated variables in other words co-integration between variables could be done by using two methods. In the first method co-integration between variables can be examined by Fstatistics which was presented by Pesaran and Pesaran (1997).

They calculated critical values corresponding to the number of regressions and the fact that if this model has intercept or not and they presented two groups of critical values: one group based on that all variables are stable and other is completely unstable.

If calculated F is put out of this area, a final decision has been made without knowing that variables are I(0) or I(1). If calculated F is further than the area, null hypothesis based on lack of long run relation is rejected. And if it is lower than the lower limit, the null hypothesis that there is no long-term relationship will be accepted (Ahmad, 1964).

Another statistics by which co-integration of variables can be investigated is t statistics that was presented by Berenji, Dollado, Master. At first Eq. 14 has been estimated by using ols for all possible combination of values p = 0, 1, 2, …, m and i = 1, 2, …, k, qi = 0, 1, 2, 0, m, it means according to number of (m+1).

The maximum number of intervals is determined by researcher and estimation has been conducted in time limit of t = n, m+1. And this possibility is given to the researcher to choose one of the regression among the estimated ones regarding four criteria of Ackaiick (AIC), Bayesian Schwartz (SBC) Henan Quinn (HQC).

In Macrofite, selection is done by software, null hypothsis indicates the lack of integration or long-terrelationship because its condition that short term daynamic relation is tended to long-run equilibrium ia that total coefficient is <1.

For conducting this test, number one from the sum with interval variable the dependency becomes less and is divided to overall standard deviation. If the obtained absolute value of t is higher than the critical absolute value which is presented by Berenji and Dolladow and Master, null hypothesis has been rejected and the existence of run long interaction has been accepted. That in this study, the second method for examining run long interaction has been used (Ahmad, 1964). In the next phase the coefficient related to run long pattern and standard deviation related with long term coefficient have been selected and calculated based on ARDL pattern. Analysis of ARDL are based on the three principles of interpretation of the dynamic, long-term and error correction (Noferesti, 1958).

RESULTS AND DISCUSSION

Before investigating run long relationship, the stability of variable has been examined. The results show that the variables of currency rate, GDP and the rate of banking interests are at the stable level. In addition liquidity, stock price and index prices become stable by differncing.

Long run relationship between variables hasve been investigated by using t test. When the existence of run long relation of variables has been assured in a way that after estimation of stable equation, an equation can be obtained in which dependent variable is observed in the form of interval in Table 1. By conducting t-test,

Table 1: Daynamic results (dependent variable-stock price)

Variables	Coefficient	t-statistics	Significance level
LPS (-1)	0.71	12.270	0.000
LM	0.27	0.943	0.009
LGDP	0.25	1.790	0.027
LGDP (-1)	0.28	1.985	0.031
LER	-0.28	-0.662	0.010
LCPI	1.06	3.348	0.001
LCPI (-1)	0.89	3.005	0.004
LIR	-0.12	-0.493	0.023
C	0.26	0.260	0.796

Table 2: Long term estimated results of ARDL

Variables	Coefficient	SD	t-statistics	Significance level
LM	0.2150	0.237	0.905	0.008
LGDP	0.1870	0.639	0.292	0.027
LER	-0.2180	0.355	-0.615	0.040
LCPI	-1.3270	0.994	-1.334	0.036
LIR	-0.9620	1.818	-0.529	0.038
C	2.0200	7.376	0.275	0.784

calculations equals to 4.92 has been obtained since absolute value of t corresponding to Berenji, Dolladow and Master's table at level 95% equals 4.05 is higher, null hypothesis based on lack of long term interaction is rejected and its existence has been accepted. According to table 1, the determined degree in this study has been obtained (1, 1, 0 , 0, 1, 0).

After confirmation of run long relation existence among the variables of this model, long run relation has been estimated that its results are shown in Table 2.

After confirmation of run long relation existence among the variables of this model, long run relation has been estimated that its results are shown in Table 2. Run long equation of coefficient which is obtained can be written as the following:

$$LPS = 0.187LGDP + 0.215LM - 0.218LER - 1.327CPI - 0.962LIR + 2.02 \quad (15)$$

Based on Table 2 and its data, it can be said that in run long the variables LGDP (Gross Domestic Product) and LM (liquidty volume) have been significant statistically and have positive effect and variables LER (log currency) and LCPI (log of price index) and LIR (log of interest rate) have been significant in a way that they have negative effect on stock price. In a long time one percent change in gross domestic product will increase 0.18% change in stock price.

In another word, increasing the national income and economic growth (increase in production over the long-term trend) investor's expectations about the profitability of certain activities and influences the CL investment.

Economic growth reduces economic uncertainty and increase the expected investment profitability. These factors with expected wealth will result in the increase in demand for assets such as stocks and prices.

Coefficient of liquidity in the long term is positive. It means if in long time one percent change in volume liquidity variable happenes, it will cause 0.46 increases in stock price. Continuous increase liquidity at a rate more than the product of the growth rate of real income and income elasticity of demand for money is a necessary and sufficient condition for sustained inflation comes to (Noferseti, 1958).

Thus, mainly the increase in liquidity results in increasing demand and present costs. Previous studies in the field of monetary theory of inflation in Iran has shown that an increase in liquidity in the community and not in line with the increase in gross domestic product and is considered as aggravating factor of inflation.

Therefore, the relation between liquidity log and stock price index is a positive interaction. Currency rate in long term has been effective on stock price index. And this effect of this variable is opposite. In a way that one percent increase in currency rate decreases, stock price index at 0.21.

The role of currency in economic system especially in developing countries is undeniable. Its reason is clear. Developing countries in their most economic sections are dependent on industrial countries. And for imports requires more currency. Most manufacturing firms take action to import for purchasing raw materials, technology and machinery.

If as a result of economic changes and other affecting factors the exchange rate rises, firms are forced to pay more money for imports. Exchange rate increased the debt on the one hand and on the other hand increases the cost of products and offered services by these companies. Increased debt associated with lack of liquidity and lack of liquidity of economic institutions have has a negative effect on profit distribution of interest and stock index.

Thus, the negative effect of exchange rate on stock price follows. The logarithm of the price index (inflation) index has a negative sign. In fact, each variable in the variable causes 32/1% decrease in the stock price. Logarithm of the interest rate coefficient is a negative sign. In fact, each one percent change in the variable causes 0.96 reduction in the stock price.

Investors are looking for investment goods basket. So theu fill the property portfolio of compounds such as cash, stocks, bank deposits, bonds and..... based on the experiences gained from the results of efficiency in stock

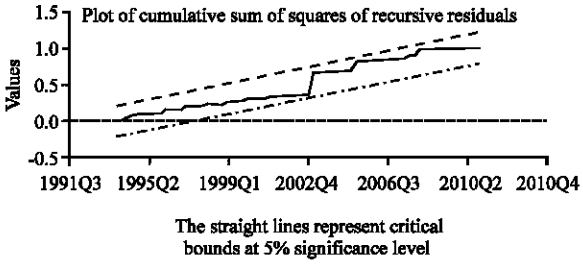

Fig. 1: CUSUMQ test

Table 3: The results obtained from shor time estimation

Variables	Coefficient	t-statistics	Significance level
dLM	0.0270	0.943	0.049
dLGDP	0.2580	1.795	0.027
dLER	-0.0280	-0.662	0.010
dLCPI	-1.0690	-3.348	0.001
dLIR	-0.1230	-0.493	0.023
dC	0.2603	0.260	0.795
ECM (-1)	-0.1280	-2.204	0.031

market and risk of its investment, investors donot consider receive returns from investment in the stock market to its risk enough.

On the other hand, interest rates of long term bank deposit without any risk in Iran causes that this macroeconomic variable turns up as competitor for investment in stock market. So, increasing in rate of real bank interest has negative relationship with total index of stock price.

In order to determine the percentage of short-term imbalances in adjusting the short-term macro variables to long term one, ECM model were used. ECM coefficient states the percentages of imbalances in short term has adjusted the stock price to achieve long term balance (Table 3).

Regarding the coefficients of regression model (3), coefficient of LM and LGDP statistically has been significant and has positive direction and this indicates that one percent increase in these variables will increase, respectively 0.27 and 0.25 of stock price.

The coefficient of other variables is negative and shows the variables of price index, banking interest index and currency rate have inverse relationship with run short stock price. Error correction coefficient in the short term is 0.12 in other words 12% in each period of imbalance has been adjusted in stock price and approach long term trend.

Structural stability test: As the Fig. 1 shows the statistics of this test are in straight lines that this means confirmation coefficients are ar significance level of 5%. In another words null hypothesis based on confirmation coefficient at confidence level of 95% has been rejected.

In long time one percent change in gross domestic production with stock price has significant and direct relationship. In another words, economic growth (increase in production over the long-term trend) investor's expectations about the profitability of certain activities and investment confidence are affected. Economic growth, reduce economic uncertainty and profitability increases the expected investment. These factors with expected wealth increasing will result in increase in demand for all assets such as stock and its price.

CONCLUSION

Continuous increase liquidity at a rate more than the product of the growth rate of real income and income elasticity of demand for money is a necessary and sufficient condition for sustained inflation. Thus, mainly the increase in liquidity volume results in increase in demand and variable costs. Studies done in monetary theory of inflation in Iran indicte that increasing in liquidity is not consistent with gross domestic production and is considered as aggravating factor of inflation.

Therefore, the interaction between liquidity log and index of stock price is a positive relation. Currency rate in long time has been effective on stock price index.

The role of currency in economy especially in developing countries is undeniable. Its reason is clear. Developing countries in most economical sections are dependent on industrial countries and for imports require more currency.

Most productive firms take action to import for purchasing raw material, technology and machinaries. If due to economy changes and various effective factors the currency rate increases, economy firms will be obliged to pay more cost for their imports.

Currency rate increase in one hand will increase debt rate and on the other hand will increase production cost and offered productions and services by these firms. Increased debt will have lack of liquidity and economical firm's lack of liquidity has negative impact oninterest disturbution and stock price.

Index price log (inflation) has a coefficient with negative mark in a long time. In fact, each one percent increase in this variable will decrease 1.32% in stock price index. Log of banking interest rate has a coefficient with negative mark. Investors are looking for investment basket.

They filled property portfolio of compounds such as cash, stocks, bank deposits, bonds and... Regarding the experiences obtained from return investment in Iran stock market and its risky, investors donot consider receive returns from investment in the stock market sufficient for the risk. On the other hand, there is long-term bank

deposit interest rate without risk in Iran is causing the macro-economic variables as a competitor to invest in the stock market. The real interest rate of the Bank, inflation is deducted from banking nominal rate. Therefore, an increase in the real interest rate the bank has negative relation with the stock price index.

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