THE EFFECT OF TRADE LIBERALIZATION ON STOCK MARKET INDEX IN IRAN

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ABSTRACT: *Stock exchange as one of the financial markets has an important role in the economic growth and development of countries. Development of this market will lead to progress in other sections of economy. Change of market stock index is used as a measure to check the stock market boomer recession. This index is influenced by many variables such as macroeconomic variables. Accordingly, in this paper, the effect of trade liberalization, on the Tehran stock exchange market index, using Auto Regression Distributed Lags Model (ARDL) is investigated. The results showed that trade liberalization in the long run have a significant effect on stock index. Moreover, in the short run, trade liberalization has negative and significant effect on stock prices.*

Keywords: *G1, G22, D53*

1. INTRODUCTION

The system based on a market economy, at the macro level, is based on the four markets. These markets include: Commodity markets, labor markets, money and capital markets. Financial market is a formal and structured market in which the transfer of funds is from individuals and units that are faced with surplus funds to individuals and entities applying for funds. Financial markets, using financial instruments, provide the needed facilities to deliver savings from legal and real entities to other persons who have productive investment opportunities and need financial resources. The primary role of financial markets is to help borrowers and lenders by facilitating the flow of funds from individuals, units that have additional funds to individuals, organizations, and governments that need funds [1].

Capital markets closely relate to the country's economic structure, and the strength and weakness of it may indicate the economic situation in the country. Development of capital markets can play an important role in the growth of national income and general welfare of the society. This market has become widespread in developed countries. In developing countries, the expansion of the market as a goal has always been the case. Achieving this end, i.e. the expansion of the performance of financial markets, requires knowledge of the factors that affect these markets.

Stock indices in all financial markets around the world, including Iran, are as one of the most important measures of performance of the stock market, arevery importance. Investors, in their decisions to invest in the stock market, pay close attention to changes in these indices. Capital market performance is affected by many factors such as political, economic, social, etc.. In other words, changes in the stock index are affected by many factors such as macroeconomic variables. Any change in macroeconomic performance affects the stock index and, as a result, will affect investment return in Exchange. Checking the correlation and performance relation and macroeconomic variables with stock index makes it clear that as macroeconomic variables change, the stock index and investment return follow what kinds of changes. Since the Economy of the country has experienced a lot of changes in the stock index and macroeconomic performance in the recent years, examining the effects of macroeconomic variables of the country on stock exchange index is important. Therefore, the main objective of this study is to study one of the factors affecting stock indices and how they can affect so that one can identify investment opportunities and maximize possible gains. The selected macroeconomic variables whose effects on the stocks will be studied is trade Liberalization. The main research question is whether trade liberalization affects the index? Thus the main objective of the study is to test the hypothesis that explains liberalization impacts on stock indices.

To evaluate the effect of trade liberalization on the Tehran Stock Exchange, research has focused on seven areas. After an introduction that was mentioned in the first part, the second part addresses the impact of liberalization on stock index. The third section includes literature review. In the fourth part, the research methodology and how to evaluate the effect of the macroeconomic variables on stock indices are discussed. After that, in section VI, the research modelis estimated and the results are analyzed. The final section is devoted to the study conclusions and recommendations.

Literature Review

in an article, tested the mutual effects between New Zealand stock index and a set of seven macroeconomic variables. Economic variables included inflation rate, exchange rate, GDP, money supply, long run interest rate, short-term interest rate, and retail price of local oil. Johansson co-integration test results showed that there is a long run relationship between New Zealand's share price index and tested economic variables. Granger causality test results also showed that New Zealand stock price index of Granger causality is not for changes in economic variables. It is because New Zealand stock market, compared to the stock markets of developed countries, is small. studied the effects of macroeconomic variables on stock indices in Pakistan. They estimated VAR model, Johansen co-integration and Granger causality test using the seasonal data of the period 1990-2008. Macroeconomic variables included inflation, exchange rate, trade balance and industrial production index. The results showed that there is co-integration between industrial production and stock prices. This is despite the fact that there is no co-integration between the other variables and stock prices, which means it

is impossible to choose macroeconomic performanceto predict the stock price. In addition, the stock price in Pakistan cannot correctly reflect the economic situation.

examined the effect of macroeconomic variables on stock prices in India. To do so, the seasonal data of the period 2008-2009 and multiple regression model were used. The independent variables were the following: changes in exchange rates, foreign exchange reserves, inflation and gold prices. The results showed that exchange rates and gold prices strongly affect stock price. However, the effects of inflation and foreign exchange reserves on stock prices are negligible.

Pourzamani et al. [2], in an article,investigated the effects of growth rate of employment variables, GDP, inflation and growth in the stock price index stock on stock returns of companies listed in Tehran Stock Exchange, during the years 200 to 2006. They used multivariate linear regression for this purpose and used OLS methods to estimate models. The results showed that the growth rate of employment does not impact on stock returns; GDP has a little, but a positive, impact on stock returns. Inflation has a negative and limited impact on stock returns, while the impact ofthe stock price index growth on stock returns is significant and positive.

Falahati et al [3], in an article entitled "The effect of inflation on the performance of financial markets in the country", reviewed the relationship between inflation and financial market development in Iran, using annual data for the period 1976 to 2007. They used a simple linear model for this purpose and estimated the model using the OLS method. Model results indicate that there is a negative relationship between inflation and financial development indicators of money market and a positive relationship between inflation and development indicators of stock market.

Research Methodology

In this paper, Auto-Regressive Distributed Lag (ARDL)method has been used to investigate the effect of the selective macroeconomic variables on stock price index used. ARDL model, if there are only two variables of x_t and y_t, is as follows:

$$A(L)y_t = B(L)x_t + u_t \qquad (1)$$

In the above equation, A (L) and B (L) are interrupt operator, and are as follows:

$$A(L) = 1 - \alpha_1 L - \alpha_2 L^2 - \cdots - \alpha_p L^p$$

$$B(L) = \gamma_0 + \gamma_1 L + \gamma_2 L^2 + \cdots + \gamma_q L^q$$

By placing in the last two equations in equation (1), the following equation is obtained:

$$y_t = \alpha_1 y_{t-1} + \alpha_2 y_{t-2} \cdots + \alpha_p y_{t-p} + \gamma_0 x_t + \gamma_1 x_{t-1} + \gamma_2 x_{t-2} + \cdots + \gamma_q x_q + u_t \qquad (2)$$

This model is known as Autoregressive Distributed Lag Model (ARDL). The general form of ARDL (p, q_1, q_2, ..., q_k) can be expressed as follows:

$$Q(L,p)Y_t = \sum_{i=1}^{k} \beta_i(L,q_i)X_{it} + \delta' W_t + u_t \qquad (3)$$

In which:

$$Q(L,p) = 1 - Q_1 L - Q_2 L^2 - \cdots - Q_p L^p$$

$$\beta_i(L,q_i) = 1 - \beta_{i1} L - \beta_{i1} L^2 - \cdots - \beta_{iq} L^q$$

For $i = 1,2,\ldots,k$. L, interrupt operator, X_{it} shows dependent variable, X_{it} represents the vector of the explanatory variables, $q_i \ (i = 1,2,\ldots,k)$ is the number of optimized interruptions for each of the explanatory variables, p is the number of optimal variables relating to dependant variable and W_t is Categorical variables like intercept vector, seasonal variations, or exogenous variables with constant interruptions.

To test co-integration in models (2), it is necessary to test the following hypothesis:

$$H_0: \sum_{i=1}^{p} \hat{\alpha_i} - 1 \geq 0$$

$$H_1: \sum_{i=1}^{p} \hat{\alpha_i} - 1 < 0$$

The quantity of t-statistic for the test is calculated as follows:

$$t = \frac{\sum_{i=1}^{p} \hat{\alpha_i} - 1}{\sum_{i=1}^{p} S\hat{\alpha_i}}$$

In which $S\hat{\alpha_i}$ shows standard deviation of $\hat{\alpha_i}$. If the absolute value of the t statistic calculated from the equation is greater than the critical value given by the H0 hypothesis is rejected. Therefore, it can be concluded that there is a long-run equilibrium relationship between the variables of the model. The existence of co-integration between a set of economic variables provides a statistical basis of using the error correction model. These patterns have growing fame in the experimental work. The main reason for the reputation of error correction models (ECM) is that they relate short-term fluctuations of variables to their long run equilibrium values. Error correction model with two variables $x_t$and $y_t$are shown as follows:

$$\Delta y_t = \alpha_0 + \alpha_1 \Delta x_t + \alpha_2 \hat{u}_{t-1} + \varepsilon_t \qquad (4)$$

In the above equation, $\hat{u}_{t-1}$ is the error pattern, obtained as follows:

$$y_t = \beta x_t + u_t \quad \rightarrow u_t = y_t - \beta x_t \tag{5}$$

Since the aim of assessing the impact of trade liberalization and chosen macroeconomic variables on the stock market index in Iran, stock index of the dependent variable and other variables are considered dependent variable. Thus, the modified model of Rushi et al [4] is used. According to the explanations given so far, the appropriate ARDL model for this thesis is as follow:

$$SMI_t = \alpha_0 + \sum_{j=1}^{p} \alpha_j SMI_{t-j} + \sum_{j=0}^{q_1} \alpha_{1j} TL_{t-j} + \sum_{j=0}^{q_2} \alpha_{2j} CPI_{t-j} + \sum_{j=0}^{q_3} \alpha_{3j} OP_{t-j} + \varepsilon_t \tag{6}$$

In the above model, SMI_tshows stock index in year t. TL_t is trade liberalization in Iran in the year t. This variable can be measured as follows:

$$TL_t = \frac{EXP_t + IMP_t}{GDP_t} \tag{7}$$

According to the calculated Dickey-Fuller statistic and comparing it with the critical values at different levels of confidence, the result is that all variables, except trade liberalization Logarithm and the Logarithm of price index, have a unit root. In other words, the null hypothesis that represents unit root in variables is rejected. The null hypothesis of the Logarithm of unit root for consumer price index and the Logarithm of trade liberalization at 95 and 90 % confidence levels, respectively, are rejected. As a result, these variables are of the integration of Zero zone.

The usual approach in econometrics to stationary variables is to take the differences between the variables. If the difference of first-order variables is stationary, the variables are said to be anintegrate of number one or I (1). The results of the unit root test for first-order difference variables, except for that ofthe price index logarithm and trade liberalization logarithm, are shown in Table 2. Comparing Dickey-Fuller statistics and critical values indicate that the null hypothesis about the first order difference of the logarithm of the stock index and the first-order difference of the log of oil prices, is rejected at the 99% confidence level. In conclusion,it can be said that the logarithm of the stock index and oil price index are integrate of number one or I (1).

In recent relationship,EXP_t is export,$IMP_t$is import and $GDP_t$is gross domestic product in year t. Other independent variables in the model are:

CPI_t: Consumer Price Index

OP_t: OPEC oil price

ECM model about the stock index can be formed as follows:

$$\Delta SMI_t = \alpha_0 + \alpha_1 \Delta TL_t + \alpha_2 \Delta CPI_t + \alpha_3 \Delta OP_t + \alpha_4 ECM(-1) + \varepsilon_t$$

In the above equation, ECM is the error correction model.

4. The model Estimation and analysis of the results

If the variables of time series used in the estimation of the coefficients model are unreliable, in case of using OLS, there is the probability of encountering false and inaccurate results of the regression model. Therefore, at first, unit root tests are performed to test the reliability of variables. Unit root test is done using EVIEWS7 software. Unit root test results are shown in Table 1.

When data models are, using traditional method of ols is not possible. Co-integration is way to escape from the problem of non-static data. Although the existence of co-integration between a set of economic variables ensurescomplete compatibility ofestimated coefficients by ols model, when the sample size is small, estimating long run relationship,due to neglectingshort-term dynamics reaction between the estimated model variables,will not be presented without unbiased model coefficients. Hence, it is necessary to use an appropriate model which has short-term dynamics in itself. Autoregressive distributed lag modelis a perfect model which considers short-term dynamics. In this

Table (1): Unit root test of variables

Variable	Critical amount			Dickey-Fuller statistic	Test Result
	99% level	95% level	90% level		
Log(SMI)	-3.83	-3.02	-2.65	-0.51	H0 not rejected
Log(CPI)	-3.83	-3.02**	-2.65	-3.5	H0 rejected
Log(TL)	-3.83	-3.02	-2.65***	-3	H0 rejected
Log(OP)	-3.83	-3.02	-2.65	-0.19	H0 not rejected

* Significant at 99% confidence level, ** Significant at 95% confidence level, *** Significant at 90% confidence level

Resource: EVIEWS7 Output

Table (2): unit root test for first-order difference Logarithm variables

Variable	Critical amount			Dickey-Fuller statistic	Test Result
	99% level	95% level	90% level		
dLog(SMI)	-3.88*	-3.05	-2.66	-4.33	H0 rejected
dLog(OP)	-3.85*	-3.04	-2.66	-4.43	H0 rejected

* Significant at 99% confidence level, ** Significant at 95% confidence level,

Resource: EVIEWS7 Output

model, paying attention to the static degree of variables does not matter. Also, through determining appropriate lags for variables, appropriate and unique, without prejudice and using the application of economic theories, areselected.

The first step in anAutoregressive Distributed Lag Model is to determine the number of lagsof the model. Since the size of the sample is small, the Schwartz-Bayesian criterion is used to determine the number of lags. Using this method, the number of optimal lags for all the variables of algorithms for all stocks, trade liberalization, prices index and oil prices is determined, respectively, three, three, one, and three lags. TheAutoregressive Distributed Lag Model, after determining the optimal number of lags, would be as follows:

$$\log(SMI_t) = \alpha_0 + \alpha_{11}\log(SMI_{t-1}) + \alpha_{12}\log(SMI_{t-2}) + \alpha_{13}\log(SMI_{t-3}) + \alpha_{20}\log(TL_t) + \alpha_{21}\log(TL_{t-1}) + \alpha_{22}\log(TL_{t-2}) + \alpha_{23}\log(TL_{t-3}) + +\alpha_{30}\log(CPI_t) + \alpha_{31}\log(CPI_{t-1}) +) + \alpha_{40}\log(OP_t) + \alpha_{41}\log(OP_{t-1}) + \alpha_{42}\log(OP_{t-2}) + \alpha_{43}\log(OP_{t-3}) + \varepsilon_t \quad (9)$$

The results of the estimation are shown in Table 3. In the first column of the table, variable type, the second column, the estimated coefficient of the variable, and, the third column, the student t-statistic of the estimating coefficient, are indicated. In the following, the results of the estimation of dynamic models (9) are interpreted. Estimated intercept is equal to 4.4139, and according to the student t-statistic, is significant. Intercept has no economic interpretation. In the model, threelags of stock indexlogarithms appear in the right. The estimated coefficient is not statistically significant. So,it can be said that the stock price index does not follow its previous values.

The most important variable in the model is the logarithm of trade liberalization in the current and past periods. The estimated coefficient for the logarithm of the current trade liberalization is not statistically significant. So, current liberalization does not affect the stock index. The estimated coefficients of trade liberalization logarithm with one or two lags, according to the t-statistics, are significant. The numerical value are 3.3774 and 4.1102, respectively, and show that, by one percent increase in trade liberalization during the past one and two periods, the stock index increase 3.37 and 4.1, respectively. The ratio of trade liberalization Logarithm with three lags is not significant.

Table (3): model (9) estimation results using ARDL method

Variable	Coefficient	t statistic
Intercept	4.413	4.04**
$\log(SMI_{t-1})$	0.845	2.24
$\log(SMI_{t-2})$	-0.1729	-0.03
$\log(SMI_{t-3})$	-0.4202	-1.28
$\log(TL_t)$	-0.9711	-1.62
$\log(TL_{t-1})$	3.3747	5.80*
$\log(TL_{t-2})$	4.1102	2.71***
$\log(TL_{t-3})$	0.897	1.05
$\log(CPI_t)$	1.3205	1.50
$\log(CPI_{t-1})$	2.247	2.02
$\log(OP_t)$	-1.049	4.69**
$\log(OP_{t-1})$	-1.0248	-2.08
$\log(OP_{t-2})$	-0.5852	2.42***
$\log(OP_{t-3})$	-0.5347	$-1/56$
R^2	0.99	
Durbin-Watson	2.8	

* Significant at 99% confidence level, ** Significant at 95% confidence level,
Source: Microfit 4.1 Output

The other variable included in the model is the log of the consumer price index in the current and the previous period. The sign of coefficients for both variables is positive, which reflects the positive impact of rising prices (inflation) on the stock index. In other words, by increasing the price index, the stock index increases. However, according to the t-statistic, the coefficient of none of these variables is statistically significant.

Finally, the log of oil price is the last variable included in the model. Sign of the estimated coefficient of the logarithm of the price of oil is negative which reflects the negative impact of rising oil prices on the stock index. It should be noted that only the coefficients of the logarithm of the price of the current period and the log of oil prices with two lags are significant.

In the table of results, the coefficient of determination is obtained 99%. This ratio shows that about 99% of the stock index changes can be explained by the independent variables. In addition to the coefficient of determination, the Durbin-Watson statistic is also shown. As this statistic is close to 2, it can be said that there is no correlation between model disturbing sentences.

After estimating ARDL equation, co-integration between variables must be ensured. If the sum of the coefficients of the variables with lag to dependent variable is smaller than one, the dynamic model will be tended towards the long run equilibrium. The t-statistic associated with co-integration test for the estimated model is as follows:

$$t = \frac{0.28891 - 1}{0.13496} = -5.27$$

The computational amount of t is more than theprovided critical quantity by Banerjee, Dolado and Master (4.46) at 95 percent confidence level. Therefore, the null hypothesis that there is no long run relationship is rejected and the hypothesis that it existsis accepted. Afterbeing sure about a long run relationship, it is estimated and interpreted.

The results of long run estimation have been shown in Table 4. The results of Table show that, in the long-run, the coefficients of all variables at the 95% confidence level are significant. Accordingto the results of long run pattern, it can be said that, in long run, trade liberalization of the consumer price index has a positive effect on stock index, while oil price has a negative effect on it.

Table 4: Estimation results of a long run relationship

Variable	Coefficient	t statistics
Intercept	7.458	3.78**
$\log(TL_t)$	12.5227	3.36**
$\log(CPI_t)$	6.0285	3.95**
$\log(OP_t)$	-5.3973	-3.15**

** Significant at 95% confidence level,

Source: Microfit 4.1 Output

The existence of co-integration between a set of economic variables provides the statistical basis of using the error correction model.These patterns have growingfame in the experimental work. The main reason for the reputation of error correction models(ECM) is that short-term swings relate the variables to long runequilibrium amounts. Since the existence of co-integration between the variables has been confirmed in the previous section, the error correction model is estimated in this part. Error correction model isas follows

$$\begin{aligned}\Delta\log(\mathrm{SMI})_t = {} & \alpha_0 + \alpha_1\Delta\log(\mathrm{SMI})_{t-1} + \alpha_2\Delta\log(\mathrm{SMI})_{t-2} + \alpha_3\Delta\log(TL)_t \\ & + \alpha_4\Delta\log(TL)_{t-1} + \alpha_5\Delta\log(\mathrm{TL})_{t-2} + \alpha_6\Delta\log(\mathrm{CPI})_t + \alpha_7\Delta\log(\mathrm{OP})_t + \alpha_8\Delta\log(\mathrm{OP})_{t-1} + \alpha_9\Delta\log(\mathrm{OP})_{t-2} \\ & + \alpha_{10}\mathrm{ECM}(-1) + \varepsilon_t\end{aligned} \quad (10)$$

The results of Error correction model estimation are shown in Table 5. The coefficients of variablesin the error correction model show short-term relationship between the independent variables with stock index. According to the results reported in Table 5, the coefficients of trade liberalization and oil price variables are 95 percent significant. The negative sign liberalization coefficient indicates that, in short-term, this variable hasa negative impact on the stock index.

Table 5: Results of the estimation for error correction equation

Variable	Coefficient	t statistics
Intercept	4.4139	4.06*
$\Delta\log(\mathrm{SMI})_{t-1}$	0.4377	1.59
$\Delta\log(\mathrm{SMI})_{t-2}$	0.4206	1.28
$\Delta\log(TL)_t$	-0.9711	-1.62
$\Delta\log(TL)_{t-1}$	-5.0074	-2.24***
$\Delta\log(TL)_{t-2}$	-0.8972	-1.05
$\Delta\log(\mathrm{CPI})_t$	1.3205	1.5
$\Delta\log(\mathrm{OP})_t$	-1.0492	-4.69*
$\Delta\log(\mathrm{OP})_{t-1}$	1.12	2.56**
$\Delta\log(\mathrm{OP})_{t-2}$	0.5347	1.56
ecm *(-1)*	-0.5917	-3.01**
R^2	0.97	
Durbin-Watson	2.8	

* Significant at 99% confidence level, ** Significant at 95% confidence level,

Source: Microfit 4.1 Output

In the equation of error correction coefficients (-1),ECMis important. In the estimated model, this coefficient is equal to – 0.5917. The coefficient is statistically significant and shows that, in each period, 59% of the imbalance in the stock index are moderated and get closer to its long-run trend. In other words, if, due to a shock in each of the variables of the model, the stock index gets away from its long run rates, in the next period, about 59 percent of this imbalance are lost and moves towards the long run rates.

Conclusion and Recommendation

Stock exchange market is an official market to buy and sell the stock of companies on the basis of specific laws and regulations. Many factors affect the stockprice. One part of this is due to the internal factors and the other parts are variables outside the company. Macroeconomic variables are among the variables that are outside the control of the firms and impact on the firm's stock price. One of the most important macroeconomic variables, whose effect on the stock price index of Tehran Stock Exchange has been studied, is trade liberalization.

The results of estimating dynamic model showed that the variables oftrade liberalization logarithm with one and two lags have positive effect on stock indices, while the logarithm of the oil price and its one lag has a negative effect on the stock index. It should be noted that the estimated coefficients of other variables were not statistically significant. The coefficient of dynamic pattern showed that 99% of the stock index changes can be explained by the variables in the model.

In addition, the results of test co-integration show that the variables of the model are co-integrated and there is a long run relationship between variables, so, some variables, being not stationary, do not cause a problem for the model. The long-run relationship between the variables was estimated and the research hypotheses were tested based on that. Estimation results of long run pattern show that trade liberalization hypotheses significant positive effect on the stock index in the long run. Also, the logarithm of oil price has a negative effect and stock price hasa significant and positive effect on the stock index.

Finally, error correction model of stock price index was estimated. The results showed that trade liberalization has a significant and negative effect on the stock price index in short term, while oil price has a significant and negative effect on stock prices in the short term. Also, thecoefficient ecm (-1) is estimated to be equal to – 0.5917. This factor is statistically significant and show that, in each period, 59% of the imbalance in the stock index is moderated and will get closer to its long-run trend. In other words, in case of a shock in each of the variables of the model, the stock price index gets away from its long-run rate, in the next period, about 59 percent of the imbalance are lostand move towards its long run rates.

According to the results, the following policies are recommended to strengthen the stock market:

"As trade liberalization in the long run has a significant positive effect on the stock price index, it is suggested that the basis of movements move towards trade liberalization are provided."

To reach the best results in studyingthe factors affecting the stock price index, the researchers are suggested to take the following topics into consideration for the future research:

1. Investigating the effect of selected macroeconomic variables on stock price indices in the form ofpanel modelsfor a set of countries
2. Using vector Auto-regression (VAR) pattern to investigate the effect of selected macroeconomic variables on stock price.
3. Checking the effect of political factors, such as economic sanctions, on the Stock Exchange Index.

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