

The Effect of Macroeconomic Variables on the Stock Price Index of Iran's Automotive Companies

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Abstract

Stock market works as one of the evaluative indicators of economic status of countries. An increase in investment in the market and earn capital requires an increase in stock market return, a decrease in risks, and emergence of favorable conditions for investment. Since macroeconomic variables such as exchange rate, price levels, liquidity, GDP, would influence stock market index, determining the direction and degree of the effects of each can pave the path for managers and investors to make decision. The present study examines the effect of the foregoing variables on the stock price index of the country's automotive companies. To this end, quarterly data over the period 1991-2011 and ARDL model have been used. The results obtained from the pattern indicated that exchange rate (price of a dollar in terms of IRR), general level of prices, liquidity, domestic GDP had positive effect as opposed to bank interest rate that had negative effect on the stock price index of automotive companies.

Keywords: automotive industry, exchange rate, stock price index, ARDL model.

1- Introduction

The automotive industry of Iran was initiated roughly during 1950s as it currently has a special place in terms of intersectional links in Iran economy in the face of various rise and fall. The industry in Iran came with a great deal of effort over the Fourth Developmental Program and after Islamic Revolution with the aim of localization, but little progress has been made in this respect a on a global scale so far. However, Iran's car manufactory will experience new prospects both in competitive arena and global market as it is bound to adopt suitable strategies in order to come up with suitable quality and price and better presence in global market.

The present article seeks to evaluate the effect of macroeconomic variables on the stock index of automotive companies. According to this, the paper consists of six parts. After introduction, the theoretical foundation of the study is presented in part two. In the third and fourth parts, theoretical foundations and background of the study are

given. In the fourth part, the research model is presented. In part five, the findings of the study are shown, and part six, the final part, deals with conclusion and suggestions.

2- Theoretical foundations

Several factors are responsible for stock price index, all of which are explained as follows.

Exchange rate

It is expected that exchange rate increase (i.e. devaluation of Rial) exerts positive effect on the stock price of automotive companies, because exchange rate increase would hike up the cost of foreign cars in the country, and it also results in an increase in demand for domestic vehicles, increased sales, increased profits, and an increase in stock price of automotive companies. On the contrary, many of spare parts and pieces are imported, so increase in exchange rate would increase total price of cars. Due to exclusivist of automotive companies, increased costs would be

passed on to customers and an increase in their profitability will follow.

Liquidity

Increased liquidity, on the one hand, would result in decrease in exchange rate and transferring resource from monetary market to capital market. It would step up demand for stock and its price, including stock price of automotive companies. On the other hand, increased liquidity would expand bank's capability to lend to stock companies as it increases investments, production, sales, profit, and finally the stock price of the companies. In addition to this, increased liquidity might step up demands, including demand for cars, thereby increasing profitability and the price index of car stock.

Gross domestic product (GDP)

It is expected to be an increase in GDP which exerts positive effect on stock price index of automotive companies; as demand for investment in stock market is stepped up, so is GDP on the one hand, and raise stock return of companies as well. On the other hand, demand for buy and sell is stepped up which in turn positively influence car price and stock price index of car stock.

Bank interest rate

According to theoretical foundations, it is expected that bank interest rate exert negative effect on stock price index. As it increases on the one hand, demand for investment is transferred from capital market to monetary market, so stock price may decline as demand for share is reduced. On the other hand, as bank interest rate accelerates, banks set out to offer facilities with further interest rate, thereby increasing production costs which may result in cuts in profits and return of share.

3- Research background

Heidari and Bashiri [2] in a study into the relationship between the uncertainty of real exchange rate and stock price index in Tehran

Stock Exchange using monthly data of 1999-2011 in Iran and using a bivariate autoregressive model based on conditional heteroscedasticity, found out that there was a negative relationship between the uncertainty of real exchange rate variable and stock price index, and also there was no significant relationship between the uncertainty of stock price and exchange rate.

Shaki and Tofighi [4] in an article entitled the effect of exchange rate volatility on the return of stock market using monthly data between 1998-2008 in Iran, and analyzing the relationships between variables using his extended autoregressive model, and estimated heterogeneous condition variance¹, and using Johansen cointegration and vector autoregressive model with distributive intervals², immediate reaction functions³, and variance analysis⁴, examined the effect of exchange rate on Iran's stock market return; the result of which suggested that there is a positive relationship between stock market return and exchange rate, while there was a negative relationship between oil price and stock market return.

Torabi and Homan (2011), in a study entitled the effects of macroeconomic variables on the return indexes of Tehran Stock Exchange, examined the effect of macroeconomic variables on stock return using seasonal data between 1998-2008 in Iran as well as using cointegration technique, concluding that GDP, liquidity, and size of liquidity are considered key influential variables in stock return, as exchange rate and housing price depending on selective index of stock market would exert effect on the return of Tehran Stock Exchange. Likewise, periodical presidential elections greatly influence the return of stock market.

¹ GARCH

² VAR

³ IRF

⁴ VD

Saeedi and Amiri [3] studied the relationship of macroeconomic variables including exchange rate to total index of Tehran Stock Exchange with seasonal data of the period 2001-2007. The results of the study indicated that the relationship between consumer index, exchange rate of free market and total stock market index was not significant.

Abbasian and colleagues [5] in a study entitled the effect of macroeconomic variables on the total index of stock exchange, examined the effect of exchange rate, trade balance, inflation, liquidity, and interest rate on stock return using data of the period 1998-2005 in Iran, and cointegration technique, error correction models, implicit reaction functions, and variance analysis, concluding that exchange rate, trade balance exert positive effect on stock return, as inflation, liquidity, and interest rate has negative effect on it.

Babai and Keshavarz Hadad (2008) studied and modeled the market volatility of Tehran Stock exchange using panel data and GARCH model. The results showed that we cannot expect the same fluctuate structure for available shares in industry department or at higher level for selective industry departments of Tehran Stock Exchange, whether in terms of the mean stock return, or in terms of the sameness of the volatility structure of return, or the sameness of the mean return volatility.

Chinzara [8] in an article entitled the uncertainty of macroeconomic variables and stock market volatility in South Africa, examined the relationship of the uncertainty of macroeconomic variables to stock price in the period 1990-2009 using VAR-GARCH model, concluding that the uncertainty of macroeconomic variables has significant effect on market volatility.

Alagidede et al (2010), in a study entitled the casualty relationship between stock value and exchange rate, examined the relationship of exchange rate to stock price using data of the

period 1992-2005 in Canada, Switzerland, Britain, as well as using cointegration test, and Granger casualty test.

Morley [11] in a study entitled exchange rate and stock value in the long run and short run, examined the relationship between stock price and exchange rate in long and short term using time series data of 1985-2005 in Japan, Switzerland, and Canada, and using boundary tests, concluding that there is a long-run positive relationship between exchange rate and stock price.

Beer and Hebein [1] in a study entitled the evaluation of stock market and exchange rate in industry and developing market, examined the effect of exchange rate and stock price using EGARCH model and the observations during 1995-2006 for two groups of developed countries including USA, Canada, Japan, and Britain, and developing countries such as China, Singapore, South Korea, India, and the Philippines, came to the conclusion that there are stable volatility in stock market and exchange rate of developing countries, while the volatility are not stable in the developed countries.

Adam and Tweneboah (2008), in a study entitled "is there any role assumed by macroeconomic variables in stock market stream?", examined the relationship between macroeconomic variables and stock market using data of the period 1991-2006 in Ghana, and using Johansen's cointegration test, and vector error correction, arriving at the conclusion that stock price has a positive relationship between direct foreign investment and inflation rate, as it has a negative relationship between exchange rate and interest rate.

Miller and Shufeng (2001), using panel data of 38 companies during 1990-2000, come to the conclusion that decrease in exchange rate has a negative effect on stock return in the stock market of South Korea, and exchange rate volatility would fluctuate stock market.

4- Model Specification

The present study seeks to examine the effect of macroeconomic variables on the stock price index of the automotive companies of Iran using the seasonal data during 1991-2011.

The model used in the present study is based on the theoretical foundation and experimental studies as follows:

$$(1) \quad LPI = \alpha_0 + \beta_1 LER + \beta_2 LP + \beta_3 LM2 + \beta_4 LGDP + \beta_5 R + e_t$$

In the analysis, PI stands for the stock price of automotive companies, ER exchange rate (price of a dollar in terms of Rials), P price index, M₂ liquidity, GDP gross domestic production, and R the interest rate of bank facilities. According to the above discussion, it is expected that the effect

of all the variables except the interest rate of bank facilities remain positive. The model is estimated based on ARDL techniques and using Microfit software.

The statistical data was collected from the bank information of the time series of the Central Bank and the website of Tehran Stock Exchange.

5—Estimation of the model

The results obtained from the estimate of ARDL dynamic pattern

In table (1), the results obtained from the estimate of ARDL dynamic patterns can be noticed.

Table (1) examination of the coefficients of the stock price function of automotive companies in ARDL dynamic model

abbreviations	coefficients	Standard deviation	probability
LPI(-1)	0.10693	0.03673	0.021
LER	0.04730	0.16414	0.028
LP	0.99737	0.17303	0.000
LGDP	0.65727	0.29261	0.023
LM2	0.20882	0.03537	0.000
LR	0.95766-	0.03769	0.000
C	0.16524	0.14652	0.095

Ref: the findings of the study

Diagnostic tests

As can be noticed in the following table, the values of the possibility of the diagnostic tests (normality, serial correlation, proper functional

form, heteroscedasticity) is greater than the critical value, 5%. Therefore, according to both statistics, the pattern in question is unaffected by the problem with lack of normality of error statements and unfit pattern correction, heteroscedasticity, and self-integration.

Table (2) diagnostic tests

The name of diagnostic test	X ² and its probability	F and its probability
Serial correlation	0.011(0.914)	0.092(0.924)
functional form	0.340(0.559)	0.273(0.605)
Normal distribution	1.34(0.511)	Not applicable
Heteroscedasticity	0.419(0.517)	0.400(0.532)

Ref: research findings

A test for long run relationship

In order to test whether a short run relationship can incline to long run stability, a total of coefficients should be less than dependent variant interval. To do so, we need to deduct number 1 from a total of coefficients with dependent variant interval and divide it by a total of the standard deviation of the foregoing coefficients:

$$(0.10693-1)/0.03673 = -24.31446$$

Since absolute value t is greater than that of critical values introduced by Banerji, Dolado and Master (-3.35), the null hypothesis about a lack of cointegration is rejected as a long run relationship is accepted.

F test thus was introduced by Pesaran et al (2001) in order to demonstrate a long run relationship between variables. Low and high limits of the critical values at 5% significance level stand at 2.649 and 3.805 in the table, and the computational F was obtained 10.4252. Since the computational F is greater than the one in the table, it can be confirmed that there is a long run relationship.

As there is cointegration between the variables of the model, it allows for using error correction patterns. The major reason for the importance of the model is that it can associate short run volatility with its long run stability values.

The results obtained from estimating a long run pattern

In table (3)), the estimate of a long run pattern can be noticed.

Table (3): The results obtained from the estimate of a long run pattern

abbreviation	coefficients	Standard deviation	probability
LP	0.17341	0.0798	0.042
LER	0.13124	0.0639	0.048
LGDP	0.24666	0.0337	0.036
LM2	0.16384	0.0276	0.031
LR	-0.6121	0.0607	0.024
C	-0.4812	0.0713	0.021

Ref: research findings

Therefore, the long run relationship is proposed as follows:

$$(2) \quad \text{LPI} = -0.48 + 0.17\text{LP} + 0.13\text{LER} + 0.24\text{LGDP} + 0.16\text{LM2} - 0.61\text{LR}$$

As can be expected, the increase in the general level of prices in a long run can increase the stock price index of automotive companies and the elasticity of the stock price index of automotive companies is about 0.17 with respect to P. Exchange rate has a positive effect on the stock price index of automotive companies in a long run, so that the elasticity of the stock price index of the automotive companies is 0.13 with respect to exchange rate. The results suggest that GDP exert a positive effect on the stock price index of automotive companies, in that the

elasticity of the stock price index of automotive companies is 0.24 with respect to GDP. Liquidity has a positive effect in a long run on the stock price index of automotive companies, and the elasticity of the stock price index of automotive companies was estimated to be 0.16 liquidity. The long run interest rate of bank deposits has also a negative impact on the stock price index of the automotive companies in a long run.

The estimate of the error correction model

ECM test indicates the error correction rate and the tendency to maintain a long run stability. The test shows how much percent of the lack of dependent variable stationary is modified for each run and draw close to a long run relationship. The results of the short run coefficients of ECM test are shown in the following table:

Table (4) ECM estimate

abbreviation	coefficient	Standard deviation	probability
DLPI	0.34409	0.10973	0.002
DLP	0.27855	0.042673	0.000
DLER	0.58102	0.098578	0.000
DLGDP	0.052654	0.0087441	0.000
DLM2	0.99736	0.11016	0.000
DLR	-0.53829	0.071720	0.000
ECM(-1)	-0.10161	0.044194	0.024

Ref: research findings

With respect to the results, ECM coefficients are statistically negative and their absolute value remain less than a unit, which indicates there is a significant long run relationship between the variables of the pattern. ECM (-1) suggests that about 10 percent of deviation in the stock price index should be corrected through its long run route by the variables of the pattern in each season; that is to say, about 1% of the dependent variable can be modified over this period.

According to long run and short run relationships, it can be said that price index can exert a positive effect on the stock price of automotive companies, thus if consumer price index rises by 1%, stock price index in a long run and short run will rise by 0.17% and 27% respectively.

Moreover, if liquidity rises by 1%, stock price index in a long run and short run will respectively rises by 0.16% and 99%.

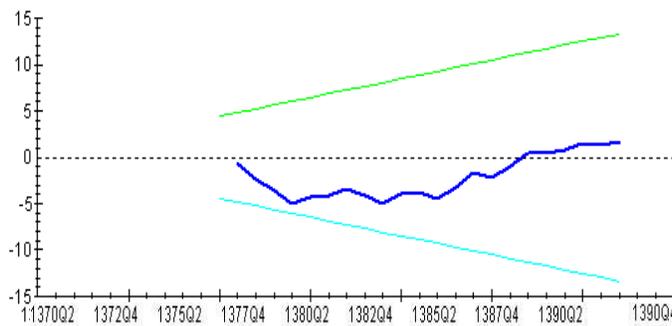
According to long run and short run relationships, it is evident that increase in GDP would result in a rise in the stock price index of automotive companies, so that if GDP increases by 1%, stock price index in a long run and short run increases by 0.24% and 52% respectively.

Bank interest rate has had a negative effect on stock price index. Thus, if it increases by 1%, stock price index in a long run and short run will decrease by 0.61% and 53% respectively. Therefore, according to the results obtained from the pattern estimate, it can be noticed that all the relevant coefficients, except interest rate, have a positive effect on stock price index and long run interest rate has a negative effect on stock price index.

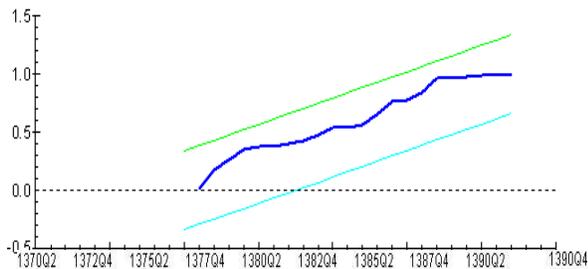
Stability tests for the model

Stability test can be more applicable to time series data, especially when we are not certain when a structural failure might have happened. Once short run and long run stability of the

model are simultaneously examined, we are allowed to utilize the forms, the cumulative sum of the recursive residuals test and the squared cumulative sum of the recursive residuals test. According to Oskooee's theory in 2001, the null hypothesis about the stability of stock price index model cannot be accepted, if the statistical graph obtained from cuts either of the bands at 5% level. Since, for the forms obtained (CUSUM and CUSUM Q), middle graph couldn't cut either of bands, long run stability for the stock price index model can be acceptable.



Graph (1) the cumulative sum of the recursive residuals (CUSUM)



Graph (2) the squared cumulative sum of the recursive residuals test (CUSUM Q)

Ref: research findings

6- Conclusion and Suggestions

The main goal of the study is to examine macroeconomic variables in the stock price index of automotive companies. The result of the short run test suggested there is a positive effect of

exchange rate on the stock price index of automotive companies. Furthermore, the effects of other variables (GDP, liquidity, price levels) were estimated to be positive as long run interest rate was negative.

As for long run, the coefficient of exchange rate was obtained positive. Moreover, the long run results indicated that liquidity variables, price levels, GDP have a positive effect on the stock price index of automotive companies. The negative coefficient obtained from the long run interest rate variable suggested its negative relationship to the stock price index of automotive companies. Moreover, liquidity, price levels, GDP had positive effects on the stock price index.

According to the findings of the study, the following suggestions are worth presenting:

- Directors of stock exchange organization as a supervisor institution in capital market are advised to take a step to make influential policies and provide a safe environment for investment by means of the results of the study and recognition of contributing factors in stock price index variations, especially in automotive sector.
- Providing capital market with growing transparency and supporting the rights of investors through publicizing can be feasible. The results of the study and explanation of the relationship between variables can help investors as part of the process.
- Since the automotive industry makes an invaluable contribution to the route of satisfying society's requirements for transportation sector and providing job opportunities as well as yielding added values, it is essential to take the variables (exchange rate, liquidity, bank interest rate, etc.) into account in an attempt to develop regulations and influential strategies for stock index.
- With respect to an outlook for Iran to be admitted to World Trade Organization as a

member and the necessity for the automotive industry to be active under regulations of WTO and strengthening car manufacturers' competitive ability, it is necessary to take a step to reduce stock index volatility of the sector by fortifying competitive advantages of the industry and relieving the supportive burden upon the government.

- With reference to the negative effect of bank interest rate increase on the stock value of automotive companies, it is essential to make provisions for this sector under such growing circumstances of bank interest rate and stock value decrease forecast with a view to preventing activity recession.

- Upon the route of strengthening the stock price index of automotive companies among influential factors, real GDP increase due to positive economic repercussions can be taken into consideration with special priority.

- Macroeconomic plan makers give priority to the effects of exchange rate volatility, liquidity, general price levels, and bank interest rate for automotive industries when making monetary and financial programs.

References

[1] Babaei, A. Keshavaraze-Hadad, Gh. (2008), "A study of the volatility of stock returns in Tehran Stock Exchange using panel data and GARCH model", Master's thesis, Sharif University of Technology, economic and social system engineering

[2] Heidari, H. Bashiri, S. (2012), "a study of the relationship of the uncertainty of real exchange rate to stock price index in Tehran Stock Exchange: evidence from VAR-GARCH model", *Journal of Economic Modeling*, PP 56-71.

[3] Saeedi, P. Amiri, A (2010) "a study of the relationship of macroeconomic variables to the total index of Tehran Stock Exchange", *Journal of Economic Modeling*, Year II, No.2, 2-45

[4] Shaki, S. Tofighi, H. (2012), "the effect of exchange rate volatility on Iran's stock market return", *Second National Conference on Strategies for economic development with an emphasis on regional planning*", Islamic Azad University of Sanandaj.

[5] Abbasian, E (2008), "the effect of macroeconomic variables on the total index of Tehran Stock Exchange", *Journal of Iran's Economic Studies*, No. 36, 12-24

[6] Arouri, Mohamed El Hedi & Lahiani, Amine & Nguyen, Duc Khuong (2011)," Return and volatility transmission between world oil prices and stock markets of the GCC countries", *Economic Modeling*, pp 1-12.

[7] Baron DP, 1976. "Fluctuating Exchange Rates and the Pricing of Exports", *Economic Inquiry*, Vol.14, 425-438.

[8] Chinzara, Z. *Macroeconomic Uncertainty And Conditional Stock Market Volatility In South Africa*. *South African Journal of Economics*, Economic Society of South Africa, vol. 79(1), pages 27-49, 03. 2011.

[9] Clark PB., 1973. "Uncertainty, Exchange Risk, and the Level of International Trade", *Western Economic journal*, Vol. 6, 302-313.

[10] Magnus, F.J. and Fosu, O.E., "Modeling and Forecasting Volatility of Returns on the Ghana Stock Exchange Using GARCH Models," MPRA Paper, No. 593, posted 07, 2006.

[11] Morley, B. *Exchange Rates and Stock Prices in the Long Run and Short Run*. Department of Economics, University of Bath, Bath, UK. 2009.