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Evaluation of the Relationship between Macroeconomic Variables and Industrial Price Index in Tehran Stock Exchange

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ABSTRACT

Objective: This study investigates the separate relationships between three macroeconomic variables—the consumer price index, oil prices, and foreign exchange rates—and the consolidated price movements of a 28-industry index of stocks listed on the Tehran Stock Exchange during 2010–2014. **Methodology:** We hypothesize a significant and direct relation between each macro variable and price movements of the 28-industry index. To test our hypotheses, we use econometric methods that include ordinary least squares (OLS), linear regression, the Dickey–Fuller test, the Phillips–Perron unit root test, the F test, and the White test. **Results:** Results indicate a direct and significant relation between the CPI and the 28-industry index. However, results confirm that there is no significant relation between either the oil price or the exchange rate and the index during the period examined. **Conclusion:** Results confirmed a significant and direct relation between the CPI and the 24-industry index of Iranian stocks. The first hypothesis of this research was accepted. Our results confirm those of Shahidi and Bad Kobe-ee-Hezare. Their study found that the relation between inflation and stock price is direct, while this study identified the same relation between the CPI and the 24-industry index.

1. Introduction

Economists emphasize macroeconomic policy objectives such as permanent employment, price stability, fair income distribution, and sustainable economic growth. Economists have been considering control of inflation to be a primary objective of macroeconomic policy because of its destructive effects. Those effects include redistribution of income to property owners and erosion of purchasing power earners, decline in confidence, and macroeconomic instability. As a result of such effects, investors and policymakers reduce the time horizon of their decisions and defer long term investments (Tafazzoli, 1997).

In assessing the financial environment, investors must consider inflation, interest rates, return risk, commercial risk, and other factors. Factors such as stable retail and wholesale prices and stable interest rates lead to higher stock prices. In contrast, rising inflation and interest rates routinely erode stock prices. (Jahankhani, 1996).

Economic variables and capital markets are interconnected. If the capital market is developing, it can be a factor to change macroeconomic variables, and improving macroeconomic variables prompt an increase in the savings rate, GDP, and other measures. Improvement in variables related to saving and investment will be followed by the capital market development.

In the economic literature, capital market developments will lead to the mobilization of savings and stagnant funding. Thus, by directing resources toward investment, the conditions necessary for providing the capital demands can be met.

Since companies and manufacturers have a significant role in every country's economic ascent, identifying the factors leading to their development is highly important. Macroeconomic variables are among the aforementioned factors. The boost and development requires more investment, and for this

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objective, business units need to be financially supported.

Variables affecting investment returns are among the factors that lead to effective economic and financial decisions (Afshar, 2003).

Economic stability is among the most important factors affecting the investment in each country, while macroeconomic variables impact capital markets worldwide as well as country-specific investment. Inflation, exchange rates, and oil prices are among the aforementioned variables, and their fluctuations affect stock returns.

By evaluating the relationship between macroeconomic variables and the stock price index, we can determine whether an encouraging trend in macro variables also increases stock prices for investors. Since the goal of any investment is to achieve a return, macro variables may impact a particular investment significantly.

Investors and corporate managers observe changes in macro variables closely. Clarifying the relationship between macroeconomic variables and the stock price index will assist the accuracy of investors' and managers' planning.

2. Materials and methods

2.1 Theoretical Foundations

2.1.1 Index and its Application in Investment

Equity markets in most countries employ indices calculated according to daily market-based prices of shares for an entire market or for individual sectors of the market. Investors use these indices to identify market trends and compare performance across markets (Raei and Talangi, 2004). By analyzing market indices and other economic criteria, analysts may reveal an actionable relationship between various indices and opportunities in different economic sectors. Such a relationship is beneficial for both prediction and determination of investment strategy.

2.1.2 Price of Oil and its Relationship with Investment

Fluctuations in the price of oil potentially affect the economy of a country such as Iran that depends on oil revenues. In addition, the oil industry is an important part of Iran's economy, and a decrease in oil prices can seriously damage its economy.

Since an important proportion of government income in oil-exporting countries is derived from foreign exchange revenues, choosing the correct strategy to estimate revenue, predicting annual income, and formulating the annual plan and budget for constructional development investment, boosting of foreign exchange resources resulting from non-oil exports, and immunization of economy against exchange rate fluctuations are essential for these countries (Bid Abad and Paykarjo, 2007).

2.1.3 Exchange Rate and its Relationship with Investment

The exchange rate can be a determining factor in evaluating the profitability and efficiency of investment projects. Stable exchange rates create confidence in the domestic economy and as a result investors decide present or future investment more easily. Investors are encouraged by a more favorable exchange rate that indicates cheaper production and more profit from foreign sales (Ansari, 1995).

Since stock returns and prices indicate a company's ability to attract investment and ultimately hike investment returns, being able to assess the effect of exchange rates on a representative equity index is potentially a significant factor in making investment decisions.

2.2 Previous Research Background

Chakravarty (2006) examined the relationship between Indian stock prices and several macroeconomic variables (inflation, money supply, exchange rate, and gold price) from 1991 to 2005 using monthly serial statistics. Employing the Granger causality test. This reference is not cited in the reference list} he demonstrated a two-way causal relationship between the industry index and inflation and a one-way causal relationship between stock prices and money supply. In other words, money supply can unilaterally affect changes in stock price. He found no relation between stock prices and exchange rates and no significant relation between the price of gold and that of stocks.

Ahmed (2008) evaluated the relationship between macroeconomic variables (industrial products, exports, direct foreign investment, money supply, exchange rate, and interest rate and stock prices in India. He used the Johansen integration technique and the Granger causality test to explain the long-term relationship and utilized a BVAR model to calculate variance. He concluded that stock price changes were related to all research variables except the interest rate.

He also concluded that the stock price fluctuation is the result of not only the macroeconomic variables behavior but also other macro variables.

Examining U.S. data from 1956 to 1983, Pearce showed that stock prices anticipate the economy's trajectory. After two to four quarters of declining stock prices, the economy typically enters recession, and in almost all cases, stock prices increased before economic growth revived.

Fisher concluded that stock prices preserve purchasing power in the long term, thereby offsetting the effects of inflation.

Using multiple regressions, (Osulian and Tehrani, 2005) studied the effect of macroeconomic variables on prices of an industry stock index from 1994 to 2003 and concluded that macroeconomic variables in their study were not significantly related to price changes in stock indices.

Using data from 1992 to 2003, (Vaziri and Panah, 2006) {4.1 This reference is not cited in the reference list } evaluated the effects of macroeconomic variables (inflation rate, real exchange rate, and house price index) and confirmed a balanced relationship among variables using statistical regression and the Johansen maximum likelihood estimator. Their results indicate that the inflation rate and the house price index significantly and positively affect the stock index, whereas the real exchange rate has an insignificantly negative influence. {1.1 Please check the change}

Samimi and Zadehfar (1999) found a unilateral causal relationship between inflation and stock price index in Iran. When inflation increases, the price index increases, confirming an investment in equities as a shield against inflation.

Ghasem Zadeh (2005) evaluated the long-term relationship of the Tehran Stock Exchange All-Shares Price Index (TEPIX) with macro monetary variables using portfolio theory and Fisher's fundamental theory. His results suggest a co-integration vector between the TEPIX and monetary macro variables. In particular, the TEPIX is associated positively with liquidity and negatively with real exchange rates and real bank interest rates.

Maloieyan and Zare (2005) found a long-term balance between the TEPIX {1.1 Please check the change} and the variables they considered. Estimations of short-term and long-term models reveal that the price index, oil price, house price index, and coin price affect the stock price index positively, whereas exchange rates and money volume affect it negatively. Their results showed that the industrial production index has no effect on behavior of Iran's stock price index.

Abu Nouri and Moshrefi (2006) evaluated the effect of macroeconomic indices on an index of Iranian petrochemical stocks using a multiple regression model with ordinary least squares (OLS). {1.1 Please check the change} Their results indicated a long-term balance between inflation, exchange rates, and oil prices and prices of stocks in the petrochemical industry. The inflation rate, exchange rate, and oil price, in that order, had the most significant and positive effects on the index (Abu Nouri and Moshrefi. 2005).

2.3 Research Methodology

2.3.1 Research Method

This descriptive research investigates whether there is a relationship between selected economic variables and stock prices by employing multiple regression analysis, econometric methods, and OLS. This study has the practical objective of gleaning useful information from published data. Our aim is to develop a practical application {1.1 Please check the change} and approach is to explore ex-post data.

This study uses an inductive method. To test our hypotheses, we recorded seasonal fluctuations in our key research variables and calculated their effects on a specially constructed index of Iranian stocks for the seven years 2010–2014. Stocks in the index were drawn from 28 industries and 136 companies listed on the Tehran Stock Exchange in the manner discussed below. {1.1 Please check the change} We then examine the hypotheses for each variable and confirmed or rejected the hypothesis based on the results. Meanwhile, results of the study can be extended to the whole statistical population.

2.3.2 Research Hypotheses

We posed the following hypotheses:

1: There is a relation between the CPI and the 24-industry index of Iranian stocks.

2: There is a relation between the oil price and the 24-industry index of Iranian stocks.

3: There is a relation between the exchange rate and the 24-industry index of Iranian stocks.

2.4 Variables

2.4.1 Consumer Price Index

The inflation rate is conventionally measured by the CPI, and hence, it is included as an exogenous variable in this study (CPI). CPI data were drawn from the Central Bank of Iran data for 2010 to 2014 (Anari and Kolari. 2001).

2.4.2 Crude Oil Price

Recent years have shown a direct positive relation between revenues from oil exports and capital formation. Therefore, the price of crude oil is another exogenous variable in this study (OIL PRICE). These data were collected from the Central Bank of Iran for 2010 to 2014.

2.4.3 Exchange Rate

As a factor affecting profitability and efficiency of investment projects, the exchange rate is the third exogenous variable examined in this study (FC). Relevant data were collected seasonally from indices of the Central Bank of Iran from 2010 to 2014.

2.4.4 Dependent Variable: 28-industry Index

This variable is calculated in the same manner as the stock price index. It is seasonally calculated for 24 industries as per the formula:

$$IndustrialIndex = \frac{\sum PnQn}{\sum P \bullet Q \bullet} \times 100$$

2.4.5 Statistical Population

The population of this study consists of all companies listed on the Tehran Stock Exchange between 2003 and 2009 that met the following criteria:

1) Their fiscal year ends on March 29.

2) The company was listed and actively traded on the Tehran Stock Exchange at the end of 2003.

3) All information about the stock price index, price indices, and companies' financial statements is available in the Tehran Stock Exchange's informational collection.

The first limitation was adopted to uniformly compare the study variables. The second was dictated by the choice of the seven-year study period 2003–2009.

After we culled the sample according to these three restrictions, 136 companies remained eligible for the study. Their data were selected in the form of 24 industries to the test the hypotheses. Excel® and Eviews5® software were used to analyze the data and estimate the models.

3. Discussion and results

3.1 *Dickey– Fuller Unit Root Test Results aluminum*

Results of the Dickey–Fuller test reject the existence of a unit root. The study variables are reliable.

Table 1. Dickey–Fuller test result extended on four variables

MacKinnon 1% Critical Value	Variable
-4.44427	INDEX
-7.35794	CPI
-4.318192	FC
-6.456988	OIL PRICE

Table 2 presents the Phillips–Perron test for serial correlation among the sample periods. It shows the static of all variables in MacKinnon at the 99% confidence threshold.

3.2 Results of Phillips–Perron Test

Table 2. Phillips–Perron test results extended on the variables

MacKinnon 1% Critical Value	Variable
-4.442814	INDEX
-9.623652	CPI
-13.41566	FC
-6.456986	OIL PRICE

3.3 Estimation of the 28-industry Index of Iranian Stocks

To estimate the 24-industry index, the function below is used by applying the econometric and multivariate regression (OLS): $y = f(xi)$

The effect of the selected macroeconomic variables on stock returns is estimated on the basis of this model, while the appropriate model is estimated as a linear regression as follows:

$$INDEX = \beta 0 + \beta 1CPI + \beta 2FC + \beta 3OIL + \beta 4AR\ (1) \quad (1)$$

24-industry index: INDEX

Intercept: $\beta 0$

Consumer price index: CPI

Free market exchange rate: FC

Oil price: OIL

Autoregressive: AR (1)

Using the above modality, the research hypotheses were tested.

3.4 Regression Model

Table 3 summarizes the regression model's statistical results.

Hypothesis 1: There is a relation. between the CPI and the 24-industry index.

The independent coefficient of CPI (8.95) shows a direct relation between the variables CPI and INDEX. A one-unit increase in CPI corresponds to an increase of 8.95 in INDEX. The statistical test t = 0.04 confirms the significance of the coefficient at the 95% confidence level. Reliability of this variable is confirmed by the Dicky–Fuller and the Phillips–Perron tests.

$$INDEX = -10.58 + 8.95CPI - 0.004OIL + 0.0005FC + AR(1)1.03 \quad (2)$$

Table 3. Summary of statistical results of regression model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	−10.5764	7.646153	−1.383235	0.1805
CPI	8.950518	4.249877	2.106065	0.0468
OIL	−0.00453	0.005578	−0.812777	0.4251
FC	0.000554	0.000578	0.957555	0.3487
AR(1)	1.034524	0.032605	31.7287	0
DW = 1.44	R2 = 0.90	F = 51.69	Prob = 0.000	

Hypothesis 2: There is a relation [Remark 14] between the oil price and our 24-industry index of Iranian stocks.
The independent coefficient of OIL (8.95) indicates a direct relation between the price of oil and INDEX. A one-unit increase in OIL corresponds to a 0.004 percent decrease in INDEX. However, the statistical test of t = 0.4 does not confirm the significance of the coefficient with 95% confidence.

Hypothesis 3: There is a relation between the exchange rate of the rial and our 24-industry index of Iranian stocks.
The independent coefficient of FC 0.005 shows a negative relation between free market exchange rate and INDEX. A one-unit increase in the free market exchange rate corresponds to a 0.005 percent increase in the INDEX. The statistical test of t = 0.3 does not confirm the significance of the coefficient with 95% confidence.
In estimation of multivariate regression model, in addition to the significance test of variable coefficients, the significance of the regression model is tested by F. In this model F = 51.69 (P = 0.000) indicates the regression is significant at 95% confidence.
Likewise, the coefficient of determination (R2 = 0.90) shows that the percentage of 24-industry index changes is explained by the independent variables in the study and its effect compared with other factors is 10%.
In addition, the Durbin–Watson statistic (DW =1.44) indicates that there is no autocorrelation in this model and the model is significant. {1.1 Please check the change} For evaluating the credibility of the model, first its reliability must be confirmed by the Dickey–Fuller and the Phillips–Perron tests. We used the Lagrange multiplier (LM test) to ascertain there is no serial correlation and the White test to detect heteroscedasticity.

3.5 Evaluation of Autocorrelation among Variables

The LM test is the same as the Breusch–Godfrey test to determine serial autocorrelation, while the OLS is used.

Table (4) Results of the LM test for the second hypothesis

Breusch–Godfrey Serial Correlation LM Test	
F-statistic: 0.185891	Probability: 0.831938

As F = ۰.۱۸۵۸۹۱ and the least likelihood of H0 hypothesis approval is 0.185891, H0 hypothesis that there is no autocorrelation is accepted. There is no autocorrelation at the confidence level of 95%.

3.6 White Heteroscedasticity Test

Table (5) Results of White test for the second hypothesis

White Heteroscedasticity Test:,,,,	
F-statistic: 1.370837,	Probability: 0.277042

Results achieved from the test show that with respect to the rate of F =1.370837, significance level is 0/277042. Comparing this significance level with α = 5%, the H0 hypothesis is accepted, and heteroscedasticity is accepted.

4. Conclusion

This study has sought to establish the relationship between a carefully constructed index of Iranian stocks and three macroeconomic variables—the consumer price index, price of crude oil, and exchange rate. Research hypotheses about the possibility of such direct and significant relationships were tested using the model:

$$INDEX = -10.58 + 8.95CPI - 0.004OIL + 0.0005FC + AR(1)1.03 \quad (3)$$

Results confirmed a significant and direct relation between the CPI and the 24-industry index of Iranian stocks. The first hypothesis of this research was accepted. Our results confirm those of Shahidi and Bad Kobe-ee-Hezare. Their study found that the relation between inflation and stock price is direct, while this study identified the same relation between the CPI and the 24-industry index.

However, this study found no significant relation of either the price of oil or exchange rate with a 28-industry index of Iranian stocks. The second and third hypotheses are rejected. Both results parallel those of Osulian, Tehrani, and Chakravarty.

Appendix: Results of computer output

	Null Hypothesis: CPI has a unit root	
Prob.*	t-Statistic	
0.0000	−7.357943	Augmented Dickey–Fuller test statistic
	−3.752946	1% level Test critical values:
	−2.998064	5% level
	−2.638752	10% level

	Null Hypothesis: FC has a unit root	
Prob.*	t-Statistic	
0.0028	−4.318192	Augmented Dickey–Fuller test statistic
	−3.752946,	1% level Test critical values:
	−3.998064,	5% level
	−2.638752,	10% level

	Null Hypothesis: OIL has a unit root	
Prob.*	t-Statistic	
0.0000	−6.456988	Augmented Dickey–Fuller test statistic
	−3.711457	1% level Test critical values:
	−2.981038	5% level
	−2.629906	10% level

	Null Hypothesis: CPI has a unit root	
Prob.*	Adj. t-Statistic	
0.0000	−9.623652	Phillips–Perron test statistic
	−3.724070,	1% level Test critical values:
	−2.986225,	5% level
	−2.632604,	10% level

	Null Hypothesis: FC has a unit root	
Prob.*	Adj. t-Statistic	
0.0000	−13.41566	Phillips–Perron test statistic
	−3.724070,	1% level Test critical values:
	−2.986225,	5% level
	−2.632604,	10% level

	Null Hypothesis: INDEX has a unit root	
Prob.*	Adj. t-Statistic	
0.0017	−4.442814	Phillips–Perron test statistic
	−3.711457,	1% level Test critical values:
	−2.981038,	5% level
	−2.629906,	10% level
	Null Hypothesis: OILPRICE has a unit root	
Prob.*	Adj. t-Statistic	
0.0000	−6.456986	Phillips–Perron test statistic
	−3.711457,	1% level Test critical values:
	−2.981038,	5% level
	−2.629906,	10% level

Method: Pooled Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	−10.5764	7.646153	−1.38324	0.1805
CPI	8.950518	4.249877	2.106065	0.0468
OIL	−0.00453	0.005578	−0.81278	0.4251
FC	0.000554	0.000578	0.957555	0.3487
AR(1)	1.034524	0.032605	31.7287	0
R-squared	0.903836	Mean dependent var		6.332593
Adjusted R-squared	0.886351	S.D. dependent var		0.405724
S.E. of regression	0.136777	Akaike info criterion		−0.97535
Sum squared resid	0.411576	Schwarz criterion		−0.73538
Log likelihood	18.16724	F-statistic		51.69371
Durbin–Watson stat	1.441124	Prob (F-statistic)		0

REFERENCES

Abu Nouri, E. & Moshrefi, G. 2005. The effect of macroeconomic indices on the stock price indices in Iran's petrochemical industry by using ARDL model, Mazandaran University, Department of Economics.

Ahmed, Sh. 2008. Aggregate Economic Variables and Stock Markets in India: International Research, Journal of Finance Economics, ISSN1450-2887, Issue14 (2008).

Anari, A. & Kolari, J. 2001. Stock prices and inflation: Texas A&M university, Journal of Finance 24, 587-602.

Ansari, A. 1995. Foreign physical capital and their attraction method. Publication of the Ministry of Economy and Finance, Tehran.

Bid Abad, B. & Paykarjo, K. 2007. Simulation and prediction of global crude oil prices, Quarterly Economic Bulletin, Seventh Year.

Chakravarty, S. 2006. Stock Market and macroeconomic behavior in India: Institute of Economic Growth, Enclave University, Delhi – 110007, 1-24.

Ghasem Zadeh, M. 2006. Evaluation of a long-term relation between stock price index and macro monetary variables by using co- integration method in Iran's economy. Iran's Economic Research, Winter.

Iran's economic indices 2001-2009.

Jahankhani, A. & Parsayyan, A. 1996. Stock Exchange; Tehran University Publications, Tehran.

Maloieyan, K. & Zare, H. 2003. The evaluation of macroeconomic variables and alternative assets effect on the stock prices in Iran: a pattern of auto-correlation with distribution lag. Shiraz University, Department of Economics.

Osulian, M. & Tehrani, R. 2005. The evaluation of macroeconomic variables effect on the industry price index of the accepted companies in Tehran Stock Exchange. MS Thesis, Tehran University, Tehran.

Raei, R. & Talangi, A. 2004. Management of advanced investment in Tehran, Samt Publishing, First Print, Winter.

Vaziri, S. 2006. The effect of macroeconomic variables on stock price index in Tehran Stock Exchange. MS Thesis, Tehran University. {4.2 This

reference is not cited in the text}
Salimi Afshar, A. & Nikbakht, M. 2003. Relationship between inflation rate and the shareholders' return rate. MS Thesis, Tehran University.
Samimi, A. & Yahia Zadehfar, M. 1999. Evaluation of relation between inflation and real stock returns in the companies accepted in Tehran Stock Exchange. PhD thesis, Tehran University.
Tafazzoli, 1996. Macroeconomic theory and economic policy. Ney Publications, Tehran.

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