

## The Impact of Macroeconomic Variables on Tehran Stock Exchange Index Performance: An FMOLS Approach

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### Abstract

According to the literature, macroeconomic variables have significant effects on financial markets. In addition to investors and traders in these markets, researchers have also paid special attention and sensitivity to these changes. The purpose of this study is to investigate the macro-structural determinants affecting the price index of the Tehran Stock Exchange in the period 1991-2019. To this purpose, the fully modified ordinary least squares estimator (FMOLS) and the Hudrick Prescott filter (HP) were used. Based on the estimation results of the econometric model, economic growth, government budget deficit, and exchange rate have had positive and significant effects on the total price index of the Tehran Stock Exchange, while negative effects on money supply (liquidity) and oil revenue uncertainty index (extracted by HP filter). Economic growth has had a significant effect on the total price index of the Tehran Stock Exchange resulting in negative returns.

**Keywords:** Macroeconomic Factors, Oil Revenue Uncertainty, Government Budget Deficit, Exchange Rate, FMOLS.

**JEL Classification:** G12, C50, C22, E44

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## 1. Introduction

The capital market is known as an organized and official market in which both individuals and businesses can buy and sell debt and securities and its most important duty is to finance and allocate funds and convert cash into bonds and stocks. Therefore, supporting and reinforcing the capital market leads to optimal allocation, and enhancing the capital market contributes to economic growth and development. Meanwhile, a market that has more efficiency and fewer risk will be more successful in attracting investors (Fotros & Hoshidari, 2016). In an economy where the capital market operates efficiently, it is more possible for the economy to grow better.

In order to attract investors, the capital market must compete with other financial and asset markets. In the literature on financial economics and financial management, the first and most important factor influencing investors' decisions in the stock market is the stock price index. Therefore, it is important to be aware of the factors that affect stock prices. Naturally, many factors have an influence in shaping the information and viewpoint of market participants, and finally, the stock prices of companies. Part of these internal factors is related to the performance of companies and others are related to the condition of variables in macroeconomics and even outside the scope of the domestic economy. The role of macroeconomic variables in the stock index has become a critical and fascinating subject for academics and financial economics practitioners. The efficient market hypothesis suggests that all the relevant information currently known about changes in macroeconomic variables (such as money supply and interest rate) are fully reflected in current stock prices so that investors will not be able to earn abnormal profit by predicting the future of stock market movements. In general, it can be said that the current situation of the stock market depends on the current state of the economy and information about the future perspective that firms encounter (Garland, et al., 2009). If stock prices accurately reflect the basic principles, they should be used as the main indicators of future economic activity. Therefore, causal relationships and dynamic interactions between macroeconomic variables

and stock prices are important in formulating macroeconomic policies (Singh, et al., 2011). The Iranian stock market is an emerging market that acts in a socio-economic system and is strongly influenced by external factors like environmental change and macro factors. For example, macroeconomic variables such as economic growth rate, exchange rate, foreign exchange earnings, opening up of Iran's economic degree, expansion, increase in liquidity, and reducing sanctions are important environmental factors that affect the stock market (Moshrefi, 2005). Financial market shocks have a different effect on crude oil prices. In Iran, due to the strong dependence of the government budget on oil revenues, fluctuations in financial markets cause fluctuations in many economic indicators of the country and a negative impact on national security (Jafari, et al., 2018).

Since the goal of market participants is to maximize wealth, it is reasonable to consider macroeconomic conditions and fundamental variables of the company before making investment decisions. Macroeconomic indicators largely reflect the economic situation and have regular effects on discount rates, companies' ability to generate cash flows, future distributable profits, their assessment of risk premiums, and their impact on stock market returns. They also have stock market returns (Maysami & Koh, 2000). Macroeconomic indicators like GDP, money supply, interest rates, inflation, and exchange rates are the basic reasons for market movement. On the other hand, analysts argue that a company's accounting information and financial statements reflect a firm's value. For example, by using the amount of revenue, sales, assets, liabilities, growth rate, and other basic information, we can determine the intrinsic value of the stocks.

A crucial issue that forms the framework of this research is realizing how economic variables influence stock returns. In the other words, along with identifying the factors affecting stock returns, understanding how economic variables influence stock returns is more important. A review of recent studies in the field of economics shows that by developing econometric models, we discover that most of the relationships between

economic variables are not only constant in different economic conditions but also display asymmetric approach effects. This rule is infeasible in the stock market too. In this issue, based on the stock market conditions, an appropriate strategy should be applied to increase returns. In the other words, identifying the factors affecting the stock market is a necessary but not sufficient solution for implementing economic policies. Thus, along with identifying effective factors, the symmetry or asymmetry efficacy of these factors should be specified, and disregarding these effects may thwart the main aim of applying financial and monetary policies of the government and lead to unintended consequences and impose significant costs on the government, economy, and damaging investors' reliance. In fact, the stock market of each country should be considered a measure of economic power. The impact of macroeconomic factors on stock returns has been reviewed and confirmed by a large number of models and tests in different countries.

According to the above discussion, the purpose of this study is to investigate the effect of selected macroeconomic variables on the price index of the Tehran Stock Exchange during the period 1991-2019. The main goal of this research is to answer this question: what are the most important macroeconomic variables affecting the price index of the Tehran Stock Exchange and its return? Besides, this research can educate market participants to make the right decisions in the stock market and moderate government monetary policy.

The innovation of this research is modeling macroeconomic variables with more up-to-date data, using the index of oil fluctuations or uncertainty of oil revenues, and applying the fully modified ordinary least squares method (FMOLS regression).

**Review of the Literature** When making an investment decision, investors should consider effective economic factors on stock market performance. Many theories on the stock market's performance have been offered by researchers. For example, the relationship between stock prices and macroeconomic variables has been investigated assuming that macroeconomic fluctuation is influential on

stock prices through their effects on future cash flows and the rate at which they are discounted (Al-Jafari, et al., 2011). A variety of basic macroeconomic factors such as interest rate, industrial output, exchange rate, money supply, and inflation rate cause in change the stock return (Neifar, 2021a). There is a strong correlation between macroeconomic conditions and stock prices (Rasheed, et al., 2020). Interest rates are reflected in stock prices in the Jordanian capital market (Maghyereh, 2003). There is a uni-directional causal relationship between the interest rates and the general index of the Athens stock exchange, with direction from the interest rates to the general index of the Athens stock exchange (Dritsaki, 2005). In addition, Patra and Poshakwale (2006) found that a short-run and long-run equilibrium relationship exists between inflation and stock prices for stocks listed on the Athens stock exchange. On the other hand, Adrian (2008) found that the inflation rate has led to the estimation of significant relationships with the variations in the stock market. The study by Mohammad, et al. (2009) also found that the wholesale price index is significantly and positively related to stock prices.

An increase in inflation affects the stock market's performance in a negative manner, while a decrease in the rate of inflation exerts a positive effect on the equity markets and investors' confidence will be reinstated (Omran & Pointon, 2001).

Imran et al. (2010) concluded that equity markets were co-integrated with macroeconomic indicators and stock prices in Pakistan. However, for other macroeconomic variables, no causal relationship is found. Moreover, Kutty (2010) showed that stock prices and exchange rates have no long-term relationship. He also found no statistically significant relationship between the exchange rate and the development of the Malaysian stock market. This means that changes in the exchange rate will not affect the stock market's performance (Bhuiyan and Chowdhury, 2020). Similarly, Gokmenoglu, et al., (2021) discovered that exchange rate fluctuations did not affect the performance of the country's stock market unless certain market conditions were met.

According to the theories expressed by researchers, a question arises: according to the economic conditions of Iran, which economic variables affect the stock market index and securities?

The main goal of investment is expected to gain more resources in the future. Investors' goal in the stock market is to make a profit from the stock purchased, and a positive return is a powerful motivation for investors. Of course, we know that the higher the stock return is, the higher the risk will be. One of the most controversial issues in finance, according to Moreira Filho and Kutner's basic study (1962), is not only identifying the factors affecting stock returns but also finding the best model which can predict future stock returns. The general consensus gained from the theoretical and empirical literature is that a set of macroeconomic and financial variables can help predict stock returns. In addition, cross-sectional studies, mainly related to the US stock market, reveal that financial variables, including cash flow, firm size, and book-to-market ratio have considerable predictive power. Time series studies highlight the predictive ability of a wider range of variables. Predicting stock returns can be recognized as a market inefficiency and the results of unreasonable behavior of investors, which ultimately helps to formulate trading strategies in which financial and macroeconomic variables can play a very effective role.

Karimzadeh (2006) examined the long-term relationship between the stock price index of the Tehran Stock Exchange and macro variables from the years 1991 to 2003. The estimated results showed a significant positive effect of liquidity and a significant negative effect of exchange rate and real bank interest rates on the stock price index.

Mahmood and Mohd Dinniah (2007) focused on the relationship between stock prices and two macroeconomic variables in six Asia-Pacific countries (Malaysia, Korea, Thailand, Hong Kong, Japan, and Australia) from January 1993 to December 2002. They revealed that, only in Hong Kong, there is a link between the exchange rate and the stock price. However, Muller and Verschoor (2007) showed a 25% impact ability of stock returns in Asian companies, 3,634 companies from Hong

Kong, Indonesia, South Korea, Malaysia, the Philippines, Singapore, and Thailand with exchange rate fluctuations (US dollar fluctuations) in the same period (January 1993 to December 2002).

Mashayekhi (2010) examined the effect of macroeconomic variables on the relationship between the fundamental variables extracted from the financial statements and stock returns of companies listed on the Tehran Stock Exchange from 1995 to 2006. The results show that the variables of total stock price index, GDP to base price without oil, GDP, oil revenue, inflation rate, and GDP have a significant effect and the variables of the number of shares assigned to the public sector, deficit (Surplus) Budget, crude oil exports, informal foreign exchange market rate, Gini coefficient, tax revenue, unemployment rate, current account balance, and interest on one-year investment deposits have no effect on this relationship.

Hsing (2011) use the GARCH model and showed that the Bulgarian stock market index has a positive relationship with the real GDP ratio M2/Gdp and the US stock market index. It has a negative relationship with the ratio of government budget deficit to GDP, domestic interest rate, exchange rates, expected inflation rates, and the yield on eurozone government bonds.

Torabi and Hooman (2011) investigated the effect of macroeconomic variables on the return of the Tehran Stock Exchange using the aggregate method and quarterly data from 1998-2008. Estimates with five indicators for stock returns (total stock price index, price and cash return index, cash return index, industry price index, and financial price index) show that GDP, money supply, and liquidity volume are the variables affecting stock return.

Barakat, et al., (2016) investigated the relationship between the stock market and macroeconomic factors in the two emerging economies (Egypt and Tunisia) from the period January 1998 to January 2014. The results showed that in Egypt there is a causal relationship between the market index and consumer price index (CPI), exchange rate, money supply, and interest rate. The same is true for Tunisia, except for the CPI, which had no causal relationship with the market index.

Rezazadeh (2016) examined the effects of macroeconomic variables including money supply growth rate, inflation rate, industrial production growth rate, and open market exchange rate changes on the Tehran Stock Exchange instability by using quarterly data from 2003-2014 and autoregressive conditional heterogeneous variance models with explanatory variables (X-GARCH) and vector self-regression (VAR). The results showed that the growth rate of money supply and changes in the logarithm of the exchange rate had a positive and significant effect on the volatility of stock returns, and inflation had a positive but non-significant effect on stock returns. Also, the effect of the industrial production growth rate on the volatility of stock returns was negative and significant.

Fadaeinejad and Farahani (2017) examined the effects of macroeconomic variables on the total index of the stock exchange in the framework of arbitrage pricing theory using a multifactorial regression model. The results showed that the change in the growth rate of money has a negative effect on the return of the stock index. The industrial production index, oil prices, stock price volatility, and price levels had a positive effect on the return of this index. Exchange rates and gold prices have no significant effect on the performance of this index.

Uddin and Alam (2007) investigated the linear relationship between share prices and interest rates, share prices and changes of interest rates, changes of share prices and interest rates, and changes of share prices and changes of interest rates on the Dhaka stock exchange (DSE). They found that interest rates have a significant negative relationship with share prices, and changes in interest rates have a significant negative relationship with changes in share prices.

Adrian (2008) analyzed the return series behavior of the main index of the Bucharest Stock Exchange (BSE) during different periods of time, compared to the evolution of some macroeconomic variables. The results confirmed that there is a weak relation between interest rates and the stock market index.

Alam and Uddin (2009) examined the impacts of interest rates on the stock exchange. Their findings showed empirical relationship

exists between the stock market index and interest rates for fifteen developed and developing countries. For all of the countries, it is found that interest rates have a significant negative relationship with share prices and for six countries, it is found that changes in interest rates have a significant negative relationship with changes in share prices. Therefore, if the interest rate is considerably controlled for these countries, it will be a great benefit for these countries' stock exchanges through demand pull way of more investors in the share market, and supply push way of more extensional investment of companies.

Similarly, Mohammad et al. (2009) found that interest rates in Pakistan are significantly affecting stock prices. Shawtari et al. (2015) using vector error-correction models, found a long-term co-integration of macroeconomic variables including industrial production, inflation, money supply, and exchange rate with stock market prices.

Bhuiyan and Chowdhury (2020) used the cointegration and vector error correction models to examine the relationship between macroeconomic variables and stock market indices, both composite and sectoral, for the US and Canada and reported an asymmetry in the two countries in terms of how macroeconomic variables influence stock market returns. So, the findings showed that in the US, macroeconomic variables influence the composite and sectoral stock indices clearly. Money supply influences stock indices positively while the interest rate influences negatively. For Canada, the cointegration tests could not find any clear link between macroeconomic variables and stock market indices (composite and sectoral). US money supply and interest rate influence Canadian stock indices but the opposite does not hold. This relationship no longer holds after the Great Recession of 2008.

Erdoğan, et al. (2020) investigated the existence of volatility spillover effects between foreign exchange markets and Islamic stock markets in three major emerging countries, namely India, Malaysia, and Turkey using daily data for the period 2013-2019. Volatility spillover effects are investigated using the causality-in-variance test. The findings showed evidence in favor of volatility spillovers from

the Islamic stock market to the foreign exchange market only in Turkey. The time-varying test results show that the presence of volatility spillover is at least one direction between exchange rates and the Islamic stock market at specific periods.

Nasir, et al. (2021) analyzed the role of the domestic economic environment and regional markets (Thailand, Japan, Hong Kong, and China) in explaining the dynamics of the Vietnamese stock market (from July 2000 to December 2016). Key findings suggested that the easing of monetary and credit conditions, stable and stronger currency, and economic growth have played a significant and positive role in the development of the stock market in Vietnam. Inflation shocks did have a negative impact which implied that in policy setting price stability is very important for the financial stability in Vietnam. Lastly, the results also showed that as compared to the Global Financial Crisis, the recent periods showed comparatively lesser responsiveness. This could be associated with the intensive reaction during the period of financial turmoil as well as with an increase in the stability of the Vietnamese stock market as it matures.

Gokmenoglu et al. (2021) assessed the relationship between the exchange rate and stock market returns for selected emerging countries using the quantile-on-quantile approach to present an inclusive and detailed image of the association between the variables under investigation. The estimation outcome demonstrated that the examined countries' stock market performances are not affected by the exchange rate changes unless certain market conditions are established. Furthermore, the authors suggest that the exchange rate flexibility has a crucial role in determining market returns depending on the bearish or bullish conditions.

Neifar et al. (2021) explored the relationship between the stock market and macroeconomic factors (interest rate, consumer price index, and exchange rate) in the United Kingdom during the period of Pre-Global Financial Crisis 2008 (GFC); from January 1999 to December 2007. The findings revealed that the UK market formed significant relationships with all macroeconomic variables included in this study.

Moreover, Neifar (2021b) examined the short-run and long-run relationships between stock prices at the Suisse stock market and a set of macroeconomic variables including the Suisse exchange rate, interest rate, and inflation for the period from 1999 to 2018. The results showed that the stock market price forms a cointegration relationship with considered macroeconomic variables within an ARDL framework.

Economic forces were used in Shamsudin, Rosmi, and Mohamed's study (2021) to investigate the significant relationship between selected macroeconomic variables, the Malaysian stock return index for the financial sector, and the Bursa Malaysia Finance Services Index. The study sample consisted of 164 time-series observations and the macroeconomic variables examined were inflation (INF), money supply (M.S.), and the real effective exchange rate (REER). According to the findings, Malaysian inflation (INF) had a negative but significant correlation with stock market developments and the Malaysian stock market's development appeared to positively correlate with the money supply. But no statistically significant relationship was found between the exchange rate and the development of the Malaysian stock market.

## 2. Methodology and the Econometric Model

The purpose of analyzing time series data is to study the structure of data dynamically. The basic approach in time series analysis is to examine the dominant past patterns of a variable and use them to predict future behavior. In this study, to investigate the effect of the selected macroeconomic variables on the Tehran Stock Exchange total index, the following model is specified. This model is inspired by the models used by Bhuiyan and Chowdhury (2020).

$$\begin{aligned} \ln TPEX_t &= \beta_1 + \beta_2 \ln Y_t + \beta_3 \ln ER_t \\ &+ \beta_4 FOR_t + \beta_5 GBD_t + \beta_6 \ln M_t + \epsilon_t \end{aligned} \quad (1)$$

Variables are incorporated into the model in a logarithmic scale, so the coefficients are interpreted as elasticity variables (Except for government budget deficit and fluctuation index variables). In this study, Eviews software 7.1 and Statata 12 have been used for

econometric tests and estimate specification models.

**Table 1. Variables explanation**

Symbol	Scale	Description
TPEX	-	The total price index of the Tehran Stock Exchange. The tedpix is a major stock market index that tracks the performance of the major companies listed on the Tehran Stock Exchange.
Y	Million Rials	Real per capita GDP. Real GDP per capita is a measurement of the total economic output of a country divided by the number of people and adjusted for inflation. It's used to compare the standard of living between countries over time.
ER	Rials	Informal exchange rate. In finance, an exchange rate is a rate at which one currency will be exchanged for another currency. Here is the value of one dollar in Rials.
FOR	-	Indicates oil revenue fluctuation index (extracted from Hodrick-Prescott filter).
GBD	-	It represents the government budget deficit relative to GDP. A budget deficit occurs when expenses exceed revenue, and it can indicate the financial health of a country.
M	-	Liquidity (Money + quasi Money) relative to GDP.
$\epsilon_t$	-	The term is a residual variable in order to consider the effect of factors and variables that are ignored.

### 2.1. Hodrick-Prescott Filter (HP)

There are different methods to detect shocks in time series, recently applying Hodrick-Prescott (HP) filter become common in experimental studies. The Hodrick-Prescott (HP) filter is a tool commonly used in macroeconomics. It is named after economists Robert Hodrick and Edward Prescott who first popularized this filter in economics in the 1990s. The Hodrick-Prescott (HP) filter is a two-way linear filter that provides a smooth path over a period of time. In reality, it is a data-smoothing technique. The HP filter is commonly applied during the analysis to remove short-term fluctuations associated with the business cycle. In other words, the HP filter decomposes time series into two components: long-term trends and cyclical fluctuations (shocks). Positive fluctuations are considered positive shocks and

negative fluctuations as negative shocks (Moradi, 2009). In relation (2)  $s$  is actually the long-term trend (smoothed variable) of  $y$ , which is obtained by minimizing the variance of  $y$  around  $s$ .

$$\sum_{t=1}^T (y_t - s_t)^2 + \lambda \sum_{t=2}^{T-1} ((s_{t+1} - s_t) - (s_t - s_{t-1}))^2 \quad (2)$$

and  $\lambda$  is the parameter that controls smoothing intensity, and if it tends to be infinitely positive,  $s$  becomes linear (Hodrick & Prescott, 1997).

### 3.2. Fully Modified Ordinary Least Squares Method (FMOLS)

In this paper, a fully modified ordinary least squares (FMOLS) method has been used to extract long-term co-integration vectors. The FMOLS method was introduced for the first time by Phillips and Hansen (1990). The FMOLS method is an estimator that uses a semi-parametric correction to eliminate the long-term correlation problems between co-integration equations and innovations of stochastic regressors. The Fully Modified OLS Estimator (FMOLS) is asymptotically unbiased and fully efficient. In addition, initial estimates of the FMOLS estimator are from a one-way symmetric covariance matrix of long-term residual. Also, this estimator is asymptotically normal and gives the corrected standard deviation which we can statistically infer. Therefore, the t-test has sufficient validity for long-term coefficients. Another advantage of this method is that, in small samples, it performs better and has more efficient results compared to Johansen's method. Also, results are not affected by interval length. Equations 3 to 5 represent the FMOLS method.

$$X_t = \hat{\Gamma}_{21}' D_{1t} + \hat{\Gamma}_{22}' D_{2t} + \hat{\epsilon}_{2t} \quad (3)$$

$$\Delta X_t = \hat{\Gamma}_{21}' \Delta D_{1t} + \hat{\Gamma}_{22}' \Delta D_{2t} + \hat{u}_{2t}$$

$$y_t^+ = y_t - \hat{\omega}_{12} \hat{\Omega}_{22}^{-1} \hat{u}_{2t} \quad (4)$$

$$\hat{\lambda}_{12}^+ = \hat{\lambda}_{12} - \hat{\omega}_{12} \hat{\Omega}_{22}^{-1} \hat{\Lambda}_{22}$$

$$\hat{\theta} = \begin{bmatrix} \beta \\ \hat{\gamma}_1 \end{bmatrix} = \left( \sum_{t=2}^T Z_t Z_t' \right)^{-1} \left( \sum_{t=2}^T Z_t y_t^+ - T \begin{bmatrix} \hat{\lambda}_{12}^+ \\ 0 \end{bmatrix} \right) \quad (5)$$

Where  $Z_t = (X_t', D_t')$ .

## 4- Findings

### 4.1. Descriptive Statistics and Data

The dependent variable in the present study is the total price index of the Tehran Stock Exchange. The Stock Price Index, the weighted average of stock price ratios with a weight equal to the stock value at the base time, is calculated by the Laspeyres price index as follows:

$$\text{price index} = \frac{\text{Stock base value}}{\text{current stock value}} * 100$$

The base number of the total stock price index is considered to be 100 in April 1990. Figure 1 shows the price index of the Tehran Stock Exchange trend during 1991-2019. We can understand from the chart that the stock price index looks up-trending and the average return of investing in the Tehran Stock Exchange increased over time. Table 1 shows a summary of the most important descriptive statistics of research variables.

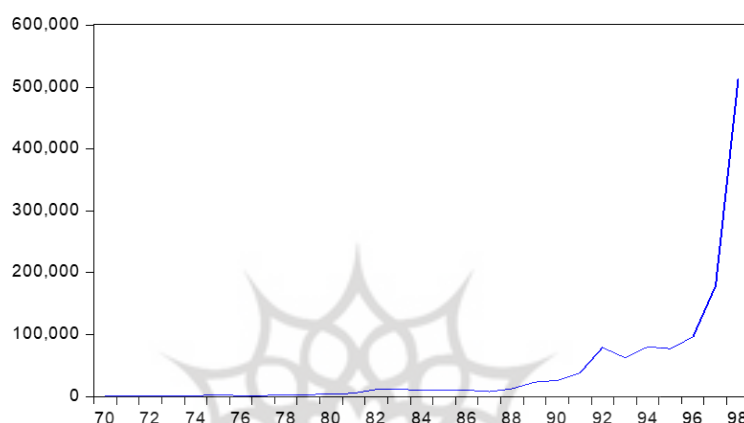


Figure 1. Trend of the Tehran Stock Exchange Stock Index during the Period 1370-1396 (1991-2019)

Source: Central Bank of Iran (1991-2017)

Table 1. The Most Important Descriptive Statistics of Research Variables

M (GDP%)	FOR	Y (Million Rials)	GBD (GDP%)	ER (Rial)	ETPX	← Variables
						↓ Descriptive Statistics
0.275828	6.90E-11	52.16303	-80880	16205.47	27044.04	Average
0.091888	0.063927	53.54945	-47387.6	8894.5	9640.2	Median
1.515413	2.749209	66.63243	338.8	103378	178659	Maximum
0.002033	-3.550271	35.68265	-354618	1420.2	403.5	Minimum
0.393677	1.000000	11.99014	97999.48	20664.27	41622.86	Standard deviation
1.837478	-0.887566	-0.14442	-1.25581	2.8979	2.12097	Skewness
5.623109	8.480407	1.333873	3.659103	12.38375	7.423121	Kurtosis
24.63310	40.09969	3.335978	7.866471	141.9205	43.81772	Jarque-Bera Test
0.000004	0.000000	0.1886	0.0195	0.0000	0.0000	Probability value) Prob(

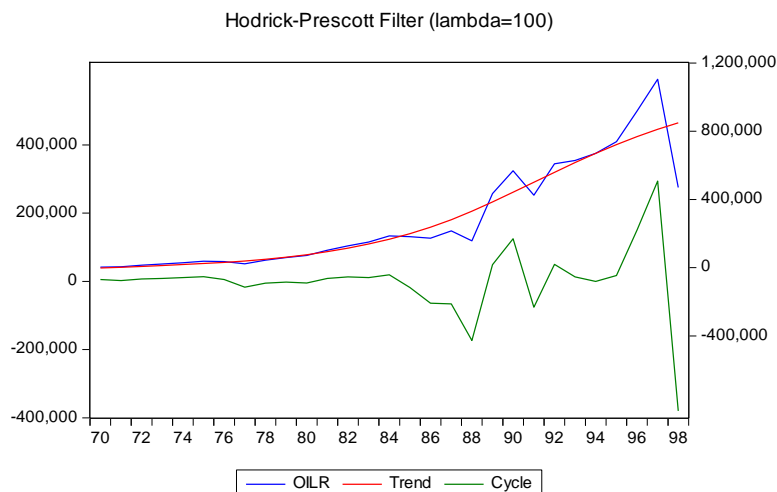
Source: Authors

### 4.2. Fluctuations in Exchange Rates and Oil Revenues

As mentioned above, the Hodrick-Prescott filter is used in this study to extract the index of oil revenue uncertainty. Figure 2 shows the Hodrick-Prescott filter output for oil revenues.

In this figure, three trends can be seen: The main trend, normalized long-term trend (trend), and shock (fluctuations) (cycle). As can be seen, in recent years, shocks and fluctuations in oil revenues increased and the risk of oil revenues increased too.





**Figure 2. Results of Hodrick-Prescott Filter for Oil Revenue Variables**

Source: Authors

In the Hodrick-Prescott filter, it is possible to extract the index of fluctuations and shocks (cycle) as a variable and use it in statistical modeling and econometrics.

#### 4.3. Results of Unit Root Tests and Stationarity

Table 2 shows the result of the Generalized Augmented Dicky Fuller unit root test for the logarithmic scale of the variables. We understand from Table 2 that all research variables are in the stationary surface at least in one of the states, and the null hypothesis of a unit root test is rejected in them.

**Table 2. Model Variables Reliability Test, Augmented Dicky Fuller Unit Root Test (ADF)**

Variables	on the surface		Once differentiated	
	y-intercept	y-intercept and time trends	y-intercept	y-intercept and time trends
<b>lnTEPIX</b>	-0.9634 (0.7639)	-3.9440 ** (0.0136)	-	-
<b>lnFOR</b>	-2.6824 * (0.0807)	-3.8113 ** (0.0199)	-	-
<b>lnM</b>	-1.4908 (0.5344)	-3.2127 *(0.0877)	-	-
<b>lnER</b>	-0.8649 (0.7956)	-3.6413 ** (0.0312)	-	-
<b>GBD</b>	-2.6363 *(0.0892)	-2.6780 (0.2480)	-	-

\*\*\*, \*\*, and \* indicate significance at the level of 1, 5, and 10%. The values in parentheses () are the corresponding probability values.

Source: Authors

#### 4.4. Econometric Model Estimation

Table 3 shows the results of estimating the econometric model. According to the results, economic growth and an increase in real per capita income have a positive and significant effect on the Tehran Stock Exchange price index and cause a positive return on the Tehran Stock Exchange. In addition, the government budget deficit has a positive and significant effect on the price index of the Tehran Stock Exchange and we can say that the government

tries to compensate budget deficit by intervening in the Tehran Stock Exchange and selling its shares.

The exchange rate has a positive and significant effect on the price index of the Tehran Stock Exchange increasing the exchange rate. It directly and indirectly affects the performance of the listed companies and increases their gross profit. In Iran's economy, devaluation of the national currency as a result of increasing the exchange rate stimulates the

growth of the capital market due to income enhancement of export companies and the addition in the replacement value of companies. Also, exchange rate fluctuations are more upward and in a positive direction. Liquidity (money and quasi-money) proliferation, has a negative effect on the price index of the Tehran Stock Exchange that can be the result of an imbalance in markets. Also, the index of uncertainty and fluctuations in oil revenues has a negative effect on the price index of the Tehran Stock Exchange and decrease its return

in the intended period. One characteristic of oil economies is the existence of Dutch disease in these economies. A rise in oil prices and oil revenues increases the wealth of these countries. By increasing wealth, the non-tradable sector of the economy promotes and the tradable sector of the economy weakens. In this case, activities such as services and construction grow, but activities like industry and agriculture stagnate. At this time, the Dutch disease occurs (Karimzadeh et al., 2009).

**Table 3. Results of Estimating the Research Econometric Model (dependent variable of the natural logarithm of the Tehran Stock Exchange price index)**

explanatory variables	Coefficients	Standard deviation	t-statistic	Probability value (PV)
LnY	3.767748	0.239716	15.71756	***0.0000
GBD	7.155109	2.234618	3.201939	***0.0041
LnER	1.068134	0.043812	24.38009	***0.0000
LnM	-0.092398	0.018138	-5.094190	***0.0000
FOR	-0.078529	0.023202	-3.384619	***0.0027
C	-15.70996	0.766323	-20.50045	***0.0000

\*\*\*, \*\*, and \* indicate significance at the level of 1, 5, and 10%. Note: Increasing the natural logarithm of a variable means the growth of the variable.

## 5. Conclusion

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The aim of this study was to investigate the effect of selected macroeconomic variables on the capital market and the return of the stock exchange in the Iranian economy over the period of 1991-2019. For this purpose, the FMOLS time series pattern and the Hodrick-Prescott (HP) technique were used. The macroeconomic variables selected in this study include real per capita production, government budget deficit, liquidity, exchange rate, and oil revenue uncertainty. According to the findings, the Iran stock market's development appears to positively correlate with the money supply. This means that any change in the money supply will have an impact on the Iran stock market's development. This implies that an increased money supply will fuel stock market growth. This also implies a similar result in Iran, where an increase in the money supply would stimulate growth in the Iran stock market. The findings are consistent with those of Bhuiyan and Chowdhury (2020), who discovered a positive and significant correlation between money supply and stock market development when studying factors influencing

the stock market development in different countries. The analysis reveals a statistically significant relationship between the exchange rate and the development of the Iranian stock market. This means that changes in the exchange rate will affect the stock market's performance, but Gokmenoglu et al. (2021) discovered that exchange rate fluctuations did not affect the performance of the country's stock market unless certain market conditions were met.

The results of this study have a direct relation with the policy decisions of governments, politicians, and investors. According to the results, economic growth and an increase in real per capita income have a positive and significant effect on the price index of the Tehran Stock Exchange and its return. The government budget deficit index (government budget deficit to GDP) has a positive and significant effect on the return of the Tehran Stock Exchange, and its coefficient has the maximum amount. We can say that the government, in order to compensate budget deficit, should boost the capital market and list

its companies and IPO<sup>2</sup> them which causes the return ratio of the Tehran Stock Exchange. Moreover, the exchange rate has a positive and significant effect on the Tehran Stock Exchange. As it was mentioned, the exchange rate impresses capital market companies through different channels such as increasing the sales amount of export companies, increasing the cost of raw materials, and increasing the replacement value. On the other hand, according to the results that reveal fluctuations in oil revenues have a negative and significant effect on the return of the Tehran Stock Exchange and reduce the total price index of the Tehran Stock Exchange. So, in order to restrict its reduction, appropriate mechanisms should be considered. In this regard, National Development Fund reinforced institutionally and administratively and dependence of the current government budget on oil revenues should be reduced to a minimum amount. According to the results, traders should consider the macroeconomic environment in their investment decisions and arrange their portfolios and guide Iranian policymakers toward reassessing their policies regarding those macroeconomic variables and their influence on the stock market. They should be aware that any change in their policies regarding the macroeconomic variables would affect the stock market.

Moreover, the following suggestions can be proposed:

1. By focusing on our stock market conditions, the government should decrease selling securities in the capital market to compensate for its budget deficit and fulfill its demand in other ways.

2. Our stock market needs repose and the government should control shocks and prevent fast and sudden policies and rectify the economy step by step.

3. Although rising inflation excites the stock market to grow, this growth is relative and not conjunct to value creation and real growth, so decreasing inflation is necessary because increasing the inflation rate is destructive.

4. It is suggested that the Central Bank independently acts out to the government by creating an appropriate exchange rate system, preventing a sudden increase in the exchange

rate in the short term, and decreasing the growth rate of creating liquidity.

Finally, it is recommended that future researchers use more variables such as unemployment, GDP, export, import, and interest rate to investigate the mutual relationships. Also, researchers can use different time frame data such as quarterly, monthly, or weekly to find relationships between macroeconomic variables and the Stock Exchange index. This is because different independent variables can react differently at different frequencies.

## References

- Adrian, Z. I. (2008). The analysis of the relation between the evolution of the bet index and the main macroeconomic variables in Romania (1997-2008). *Annals of Faculty of Economics*, 3(1), 632-637.
- Alam, M. D., & Uddin, G. (2009). Relationship between interest rate and stock price: Empirical evidence from developed and developing countries. *International Journal of Business and Management (ISSN 1833-3850)*, 4(3), 43-51.
- Al-Jafari, M. K., Salameh, R. M., & Habbash, M. R. (2011). Investigating the relationship between stock market and macroeconomic variables: Evidence from developed and emerging markets. *International Research Journal of Finance and Economics*, 17(17), 6-30.
- Barakat, M. R., Elgazzar, S. H., & Hanafy, K. M. (2016). Impact of macroeconomic variables on stock markets: Evidence from emerging markets. *International Journal of Economics and Finance*, 8(1), 195-207.
- Bhuiyan, E. M., & Chowdhury, M. (2020). Macroeconomic variables and stock market indices: Asymmetric dynamics in the US and Canada. *The Quarterly Review of Economics and Finance*, 77, 62-74.
- Central Bank of the Islamic Republic of Iran. (1991-2017). *Trend of the Tehran Stock Exchange Stock Index during the Period 1370-1396 (1991-2019)*. National accounts available at: <https://tsd.cbi.ir/Display/Content.aspx>
- Dritsaki, M. (2005). Linkage between stock market and macroeconomic fundamentals: Case study of Athens stock exchange. *Journal of Financial Management and Analysis*, 18(1), 38-47.

<sup>2</sup> Initial Public Offering

- Erdoğan, S., Gedikli, A., & Çevik, E. (2020). Volatility spillover effects between Islamic stock markets and exchange rates: Evidence from three emerging countries. *Borsa Istanbul Review*, 20(4), 322-333.
- Fadaeinejad, E., & Farahani, R. (2017). The effects of macroeconomic variables on Tehran stock exchange index. *Financial Economics Quarterly*, 39, 1-26.
- Fotros, M., & Hoshidari, M. (2016). The Effect of crude oil price volatility on volatility in Tehran stock market GARCH multivariate approach. *Journal of Iranian Energy Economics*, 5(18), 147-177.
- Garland, E., & Gaylord, S., & Park, J. (2009). The role of mindfulness in positive reappraisal. *Explore*, 5(1), 37-44.
- Gokmenoglu, K., Eren, B. M., & Hesami, S. (2021). Exchange rates and stock markets in emerging economies: New evidence using the quantile-on-quantile approach. *Journal of Quantitative Finance and Economics*, 5(1), 94-110.
- Hodrick, R. J., & Prescott, E. C. (1997). Postwar US business cycles: An empirical investigation. *Journal of Money, Credit, and Banking*, 29, 1-16.
- Hsing, Y. (2011). Impacts of macroeconomic variables on the stock market in Bulgaria and policy implications. *Journal of Economics and Business*, 14(2), 41-53.
- Imran, A., Kashif, U. R., Ayse, K. Y., Muhammad, A. K., & Hasan, A. (2010). Causal relationship between macroeconomic indicators and stock exchange prices in Pakistan. *African Journal of Business Management*, 4(3), 312-319.
- Jafari, M., Shakeri, A., & Mohammadi, T. (2018). Impact of fluctuations in financial markets on oil prices and Iran's economic security. *Strategic Studies Quarterly*, 21(80), 101-134.
- Karimzadeh, M. (2006). Examining the long - term relationship of stock market price index with macroeconomic variables using the co-integration method of Iran. *Quarterly Journal of Economic Studies*, 8(26).
- Karimzadeh, M., Nasrallah, Kh., Samadi, S., Dalali Esfahani, R., & Fakhar, M. (2009). Study of dutch disease in iranian economy the impact of exchange relationship on investment structure. *Quantitative Economics*, 23, 147-173.
- Kutty, G. (2010). The relationship between stock market prices and exchange rate. *North American Journal of Finance and Banking Research*, 4, 1-12.
- Maghyereh, A. (2003). The empirical relationship between expected return and risk in the Amman stock exchange. *SSRN Electronic Journal*, 10.2139/ssrn.364360.
- Mahmood, W. M., & Mohd Dinniah, N. (2007). Stock returns and macroeconomic influences: Evidence from the six Asian-Pacific countries. *Financial Economics and Futures Market Research Paper*, 1-21.
- Mashayekhi, B. (2010). The impact of macroeconomic variables on the relationship between variables extracted from financial statements and share returns. *Quarterly Journal of the Stock Exchange*, 12, 109-127.
- Maysami, R. C., & Koh, T. S. (2000). A vector error correction model of the Singapore stock market. *International Review of Economics & Finance*, 9(1), 79-96.
- Mohammad, S. D., Hussain, A., Ali, A., & Jalil, M. A. (2009). Impact of macroeconomic variables on stock prices: Empirical evidence in case of KSE (Karachi Stock Exchange). *European Journal of Scientific Research*, 38(1), 96-103.
- Moradi, M. A. (2009, June). Oil resource abundance, economic growth and income distribution in Iran. In *the Proceedings of International Conference on Policy Modeling, Ottawa, Canada*.
- Moreira Filho, H., & Kutner, M. B. (1962). *Contribuição para o conhecimento das diatomáceas do manguesal de alexandra*. Universidade do Paraná.
- Moshrefi, G. (2005). Investigating the causes of fluctuations in the stock exchange (the position of the stock exchange in the macro economy). *Tadbir Monthly Journal*, 161-160.
- Muller, A., & Verschoor, W. F. C. (2007). Asian foreign exchange risk exposure. *Journal of the Japanese and International Economics*, 21(1), 16-37.
- Nasir, M. A., Shahbaz, M., Mai, T. T., & Shubita, M. (2021). Development of Vietnamese stock market: Influence of domestic macroeconomic environment and regional markets. *International Journal of Finance & Economics*, 26(1), 1435-1458.

- Neifar, M. (2021a). *Multivariate Causality between Stock price index and Macro variables: Evidence from Canadian stock market*. Munich Personal RePEc Archive: MPRA. Retrieved from <https://mpra.ub.uni-muenchen.de/105715/>
- Neifar, M. (2021b). *Suisse stock return, macro factors, and efficient market hypothesis: evidence from ARDL model*. Munich Personal RePEc Archive: MPRA. Retrieved from <https://mpra.ub.unimuenchen.de/105717/>
- Neifar, M., Dhoub, S., Bouhamed, J., Ben Abdallah, F., Arous, I., Ben Braiek, F., & Mrabet, D. (2021). *The impact of macroeconomic variables on stock market in United Kingdom*. MPRA Paper 106246, University Library of Munich, Germany. <https://ideas.repec.org/p/pra/mprapa/106246.html>
- Omran, M., & Pointon, J. (2001). Does the inflation rate affect the performance of the stock market? The case of Egypt. *Emerging Markets Review*, 2(3), 263-279.
- Patra, T., & Poshakwale, S. (2006). Economic variables and stock market returns: Evidence from the Athens stock exchange. *Journal of Applied Financial Economics*, 16(13), 993-1005.
- Phillips, P. C., & Hansen, B. E. (1990). Statistical inference in instrumental variables regression with I (1) processes. *The Review of Economic Studies*, 57(1), 99-125.
- Rasheed, A., Saeedi, M., Gebriil, N., & Hariraj, K. (2020). Impact of macroeconomic variables on stock market of Malaysia. *International Journal of Psychosocial Rehabilitation*, 24(2), 1204-1205.
- Rezazadeh, A. (2016). The impact of macroeconomic variables on tehran stock market returns volatility: GARCH-X approach. *Quarterly Journal of Applied Theories of Economics*, 3(2), 121-136.
- Shamsudin, N., Rosmi, M. I., & Mohamed, S. (2021). Macroeconomic variables influence on stock market performance. *International Journal of Academic Research in Business and Social Sciences*, 11(8), 1364-1376.
- Shawtari, F. A., Salem, M. A., Hussain, H. I., Hawariyuni, W., & Omer, A. (2015). Long run relationship between macroeconomic indicators and stock price: The case of South Africa. *Journal of Internet Banking and Commerce*, 21(S2), 007.
- Singh, T., Mehta, S., & Varsha, M. S. (2011). Macroeconomic factors and stock returns: Evidence from Taiwan. *Journal of Economics and International Finance*, 3(4), 217-227.
- Torabi, T., & Hooman, T. (2011). The effects of macroeconomic variables on the output indicators of Tehran stock exchange. *Quarterly Journal of Economic Modelling*, 4(1), 121-144.
- Uddin, M. G. S., & Alam, M. M. (2007). The impacts of interest rate on stock market: Empirical evidence from Dhaka Stock Exchange. *South Asian Journal of Management and Sciences*, 1(2), 123-132.



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