

## A comparative study on value at risk versus TEFIX 30: Evidence from Tehran Stock Exchange

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### ABSTRACT

The aim of this study is to learn the effects of the value at risk (VaR) and the index of 30 largest companies (TEFIX 30) on the index of 30 large firms' prices listed on Tehran Stock Exchange (TSE). This research study is based on analysis of libraries and analytical panel data and proposes a regression function where the index of 30 large companies' prices is a linear function of VaR and TEFIX 30. The study collects the information of 90 publicly traded TSE firms over the period 2011-2013. The results have indicated that while the index of 30 large companies' prices had a meaningful relationship with VaR but it had no meaningful relationship with TEFIX 30.

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## 1. Introduction

One of the primary concerns on investment strategies is to setup appropriate portfolio with reasonable risk and return. Many investors normally look at index components and setup their portfolio based on different indexes (Gilli & Küllezi, 2002). Such index trackers believe the overall market provides better picture on stock market movements. Passive portfolio management strategies, such as index tracking, have been popular in the past (Maringer & Oyewumi, 2007). Dose and Cincotti (2005), for instance, presented a stochastic-optimization method based on time series cluster analysis for index tracking and enhanced index tracking problems. The study solved the problem in two steps: first by choosing a subset of stocks and then setting the weight of each asset as a result of asset allocation. They also compared their computational results based on clustering selection to those of random techniques and described the importance of clustering in forecasting applications in index tracking. Rounaghi et al. (2015) implemented multivariate adaptive regression splines (MARS) model and semi-parametric splines model for forecasting stock price in this study. The MARS model as a nonparametric method was an adaptive technique for regression and it fits for problems with high dimensions and different

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variables. They also used semi-parametric splines technique and applied 40 variables for forecasting stock price using the MARS model based on semi-parametric splines technique. After investigating the models, they chose 4 accounting variables including book value per share, predicted earnings per share, P/E ratio and risk as important variables on forecasting stock price using the MARS model.

Adabi Firouzjaee et al. (2015) provided a model for estimation of daily VaR (Vasicek, 2002) for TSE index using parametric, nonparametric and semi-parametric approaches. They used conditional and unconditional coverage backtesting for examining the accuracy of calculated VaR and to compare the performance of mentioned approaches. The result has indicated that GARCH type of volatility models under student-t distribution could overestimate magnitude of value at risk.

Hosseini et al. (2013) determined the optimal investment portfolio in TSE listed firms. They described that the Pharmaceutical Industry, Financial Group and Cement Industry had the most quotas in portfolio since they retained the minimum variance and maximum return among all other industries. Aloui and Mabrouk (2010) evaluated VaR and the expected shortfalls for crude oil and gas commodities. Their results indicated that considering for long-range memory, fat-tails and asymmetry could possibly perform better in forecasting a one-day-ahead VaR for both short and long trading positions. Molodpoor and Darabi (2015) investigated the relationship between actual as well as forecasted earnings and growth domestic product during the economic growth and recession on firms listed on TSE. Based on the data gathered from 60 firms over the period of 2007-2012, the study determined that there had been a positive relationship between earnings forecast and growth domestic product during economic growth. The study also reported a meaningful relationship between actual earnings and growth domestic product during the recession.

Ahmadi and Baghani (2015) presented an empirical investigation to study the impacts of quality of earnings forecasts in predicting stock returns on 121 firms traded on TSE from 2009 to 2013. They studied the impacts of three year means of earnings forecast accuracy on investors' investment decisions according to volume and time horizon, i.e. short term and long term investment sentiment. Using some regression analysis, the study has detected a positive relationship between the quality of earnings forecast and investment time horizon. Nevertheless, the study could not detect any meaningful relationship between earnings forecast accuracy and volume of investment.

## 2. The proposed study

The aim of this study is to learn the effects of the value at risk (VaR) and the index of 30 largest companies (TEFIX 30) on the index of 30 large firms' prices listed on Tehran Stock Exchange (TSE). This research study is based on analysis of libraries and analytical panel data and proposes a regression function where the index of 30 large companies' prices ( $P_{i,t}$ ) is a linear function of VaR ( $Var_{i,t}$ ) and TEFIX 30 ( $TEFIX30_{i,t}$ ). The study collects the information of 90 publicly traded TSE firms over the period 2011-2013. The proposed study uses the following model,

$$P_{i,t} = \alpha_0 + \beta_1 Var_{i,t} + \beta_2 TEFIX30_{i,t} + \varepsilon_{i,t}, \quad (1)$$

where  $\alpha_0$ ,  $\beta_1$  and  $\beta_2$  are coefficients to be estimated and  $\varepsilon_{i,t}$  represents the residuals. Table 1 demonstrates the summary of some basic statistics.

**Table 1**

The summary of some basic statistics

Variable	N	Mean	Std. Dev.	Min	Max	Skewness	Kurtosis
$P_{i,t}$	90	0.2271	0.2741	0.0044	1.8207	3.034	12.900
VaR	90	0.4148	0.0657	0.2233	0.5544	-0.254	-0.209
TEFIX 30	90	0.3963	0.0954	0.0176	0.5566	-1.479	3.503

As we can observe from the results of Table 1, all components of the survey are within desirable levels. The implementation of Kolmogorov-Smirnov on dependent variables yields  $K-S = 2.020$  (Sig. = 0.001), which means the dependent variable is not normally distributed. Therefore, we have made some normalization on the data and the results have yielded  $K-S = 0.530$  (Sig. = 0.941). Next, we need to examine the relationship between different pairs of independent variables to make sure there would not be a strong correction among them. Table 2 presents the summary of our findings.

**Table 2**  
The summary of the correlations among different variables

Variable	$P_{i,t}$	VaR	TEFIX 30
$P_{i,t}$	1	0.586(0.001)	-
VaR		1	0.1(0.348)
TEFIX 30			0.09(0.396)

According to the results of Table 2, there is no meaningful relationship between independent variables but there is a positive correlation between dependent variable ( $P_{i,t}$ ) and VaR, i.e.  $r = 0.586$  (0.001). Next, we present the results of the implementation of Chow and Hausman tests for selection of the type of method for regression technique. Table 3 shows the results of our survey.

**Table 3**  
The summary of some Chow and Hausman tests

Variable	N	Statistics	Statistics	df	P-value	Results
Chow	90	F	1.4096	29,58	0.0424	Panel
Hausman	90	Chi-Square	3.0333	2	0.0194	Fixed effect

As we can observe we need to use Panel method and Fixed effect to perform the regression technique.

**3. The results**

In this section, we present the results of the implementation of the regression technique stated in Eq. (1). Eq. (2) presents the results.

$$\begin{array}{l}
 P_{i,t} = 0.0327 + 0.3981 Var_{i,t} + 0.0736 TEFIX30_{i,t} + \varepsilon_{i,t} \\
 \text{t-value} \quad 0.3885 \quad 1.2618 \quad 0.2591 \\
 \text{P-value} \quad 0.6990 \quad 0.0121 \quad 0.7965
 \end{array} \tag{2}$$

Adjusted R-Square = 0.44 F-value = 1.4701 (Sig. = 0.1020)

Durbin-Watson = 2.19 Jarque-Bera = Chi-Square = 1.8849 (0.7271)

According to the results of regression model stated in Eq. (2), R-Square value is equal to 0.44, which means the independent variables approximately predict 44% of the changes on dependent variable. In addition, t-student values for VaR and TEFIX30 are 1.2618 (0.0121) and 0.2591(0.7965), which means while there was a positive and meaningful relationship between  $P_{it}$  and Var, there is no meaningful relationship between  $P_{it}$  and TEFIX30.

**4. Conclusion**

In this paper, we have presented an empirical investigation to compare the value at risk (VaR) with an index of 30 largest companies (TEFIX 30) listed in the Tehran Stock Exchange (TSE). The study was based on analysis of libraries and analytical panel data and proposes a regression function where the index of 30 large companies' prices is a linear function of VaR and TEFIX 30. The study has collected the information of 90 publicly traded TSE firms over the period 2011-2013. The results have indicated

that the index of 30 large companies' prices had a meaningful relationship with Var but had no meaningful relationship with TEFIX 30.

This study can be extended in different ways. First, the relationship could be examined by clustering firms into different groups or based on the present ISIC classification. This would help investors determine sectors, which are highly volatile and adjust their portfolio, accordingly. In the present study, no control variable has been used, however, in real-world circumstance, one may use some common variables such as abnormal return, systematic risk, etc. In addition, one may use macro-economic factors such as growth domestic product, oil price, etc. as control variables.

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