



## Compare predicting the stock price companies in different time series: Tehran Stock Exchange

Masoume Hashemi<sup>1\*</sup>, Hamid Ravanpak Noodezh<sup>2</sup>, Seyed Nima Valinia<sup>3</sup>

<sup>1</sup>Department of Management, Qeshm Branch, Islamic Azad University, Qeshm, Iran.

<sup>2,3</sup> Department of Accounting, Qeshm Branch, Islamic Azad University, Qeshm, Iran.

### ABSTRACT

In recent years, using new methods for predicting stock price and stock index at Tehran Stock Exchange due to acceptable accuracy, has a large fans. The research population is Tehran Stock Exchange and National Iranian Copper Industries Company is considered as research sample. On this basis, the collection of data related to workdays of Tehran Stock Exchange within 5 years (2010 to 2014) was collected, and was divided to two sets of training data (2010 to end of 2013) and testing (2014). Meanwhile to the initial fitness of data and drawing graphs, the software of Excel2010 is used, to describe the collected data and also compare the fitted model, SPSS software is used.

**Keywords:** predicting price, stock price, time series, Tehran Stock Exchange.

### INTRODUCTION

Predicting as a key element of managerial decision estimates the future events with the aim of reducing risk. Usually the predictions aren't completely true and have some error, that they are reduced by having more information about the system. In such circumstances in order to continue the investors presence as the main pillars of the capital, having the model of prediction causes resource allocation and efficiency in the market.

Tehran Stock Exchange is considered as an important tool in the capital market which plays a special role in economic growth and by reducing risk, pricing, mobilization and allocation of resources and capital, provides a proper field for improving the economic situation<sup>1</sup>.

The most important characteristic of Stock Exchange is on one hand, an important gateway to finance of long-term investment projects and on the other hand, a reference for collecting savings and liquidity of the private sector. Holders of stagnant savings can search relatively safe place of investment and invest their surplus funds to buy the stocks of companies or by buying bonds have a fixed and guaranteed benefit<sup>2</sup>.

One of the important sensitivities of each community is the productivity of capital. Usually investment in state-centric economy is reflected, without proper management, which guarantees

\* Corresponding Author: masoume.hashemi63@gmail.com

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preserving capital and improving its productivity, but in the economy based on the market, investment will be reflected with quality managements, because this kind of management seeks to increase the productivity of capital. In the market economy, is trying to transfer the governmental units so that the units can easily reach to the profitability. The main objective of privatization is the increase of efficiency in the management of country's resources by reducing the role of government and the increase of the private sector role. The other specific objectives of privatization can be named the deepening to the capital market. The privatization policy in Iran is first public offering of stocks on Tehran stock exchange and in case of rejection of public companies in exchange is the use of other methods<sup>3</sup>. Twenty-year-old prospect of country, Article 44 and the general direction of the country based on transferring the governmental affairs, will pave the way for the non-governmental potential to act and to manage their affairs, that the transfer of public companies' stocks to all people, through capital market, is one of the indicators of this issue. Thus, studies on price volatility and familiarity with the model of predicting stock prices for investment are necessary, till the stock exchange changes to a profitable place for public participation in the national economy.

## **METHODS**

The population of the research is Tehran Stock Exchange and National Iranian Copper Industries Company has been selected as the sample company. Data related to dependent and independent variables over five years (beginning of 2010 to the end of 2014) are collected and divide into two categories: training and testing data. Data from 2010 to the end of 2013 are used to teach and model fitness and the data related to 2014 are used to investigate the efficiency of fitted model.

## **RESULTS**

To fit the considered models of the study, information related to the independent and dependent variables of working days Tehran Stock Exchange on the date 01.01.2010 till 29.12.2014 (1206 working days) is used as a sample. The summary of data characteristics is in the table below.

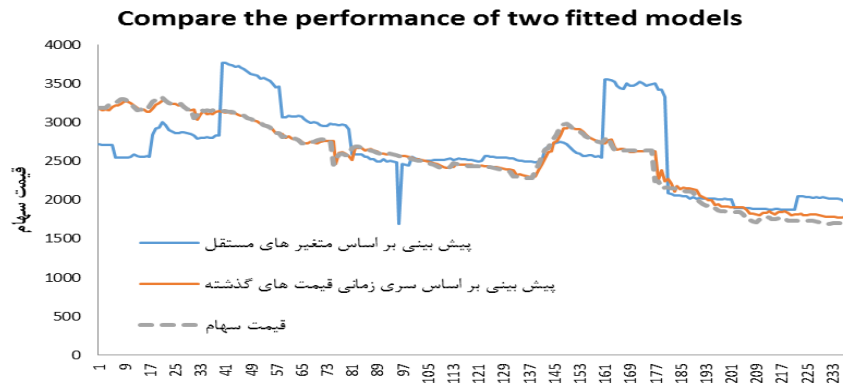
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**Table1.** Statistical characteristics of used variables in the study

	Total index of stock	Total index of basic metals	Inflation rate	Currency price (Rial)	Stock price of National Iranian Copper Company (Rial)
Number	1206	1206	1206	1206	1206
Maximum amount	89500.6	47573.70	5.33	28383	15989
Minimum amount	12613.90	6687.70	0.28	9954	1696
Mean	41959	2302.10	1.75	18208	5670.5
Standard deviation	23492.9	11172	1.07	7303.70	3085.08

Predicting and comparing the performance of two fitted models After fitting predictive models on the collection of training data, in the following the performance of fitting models based on affecting independent variables and time series of past prices, individually are compared on the collection of test data.

In Figure 5 the stock price of National Iranian Copper Industries Company in the next day, actual and predicted, for each of the two cases is shown.



**Graph 5.** Compare the performance of artificial neural network method to predict stock price of next day

In Table 4, fitted models in two ways are compared according to the criteria of prediction error and the top model is specified in each case based on any error criteria.

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**Table 4.** Compare the prediction error of two cases based on the collection of test data

Investigated model				
Criterion	Independent variables(A)	Time series of price(B)	Difference (A)-(B)	The top model in predicting the test course
MSE	166109.73	3663.69	162446.04	B
RMSE	407.56	60.53	347.04	B
MAPE	0.1196	0.0182	0.1013	B

As can be seen in Table 4, prediction is done with a good accuracy and in the meantime, the obtained results based on the time series of past prices have more accurate. To investigate the presence of significant difference between the obtained results of two cases, we study the significant test of difference between the average and variance of stock price of National Iranian Copper Industries Company in the next day, predicted based on the affecting independent variables and time series of past prices. For this purpose, Student's t test and Levine test were used. Null hypothesis and hypothesis one in the tests are as follows:

	Levine test	Student's t test
The null hypothesis:	Variance of two populations is equal.	Variance of two populations is equal.
Hypothesis 1	Variance of two populations isn't equal.	Variance of two populations isn't equal.

The results of tests for each two prediction cases are in Table 5.

**Table 5.** Test of investigating the presence of significant difference between the results of predicting the price in two ways:

	Levene's Test for Equality of Variance		T-Test Equality of Means		
	F	Sig.	t	df	Sig.
Equal Variance Assumed	1.836	0.176	-1.954	478	0.05
Equal Variance not Assumed			-1.954	469.23	0.05

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The first test (Levine) is the test for equality of variances that with amount of 1.836 for F statistic and decision criterion of 0.176 indicates that the hypothesis of variances equality will be accepted.

The second test (t test) is the comparison test of means that the same results are obtained by assuming variances equality and variances inequality. The obtained amount for the t-statistic and decision criterion is, respectively -1.954 and 0.05 and show that the null hypothesis on equality of the mean of two populations is rejected and hypothesis one is accepted, it can be said there is a significant difference between the mean of two populations.

## **CONCLUSION**

Based on the obtained results, to the authorities, Tehran Stock Exchange, financial and investment institutions and other natural and legal persons, active in the field of investment is proposed:

1. Since the company's stock price with acceptable error percent are predictable by investigating the past price trends, it refers to the non-efficiency of the stock market. So proposed to be considered the necessary measures for increasing efficiency of stock market and providing more appropriate place of investment.

2. The research results due to importance of prediction in optimal decision making and efficient allocation of financial resources in banks, financial institutions and investment, use as the main liaison between investors and companies to with appropriate allocation of resources be the witness of increased growth in our country industries.

3. To invest and predict the price of companies or different industries can be used new ways to predict, such as artificial intelligence, along with other econometric methods to obtain more accurate results and more reliable.

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