The Impact of Interest Rate on the Stock Market Return Case Study: Tehran Stock Exchange

Author’s Details:

(1) Khalil Talebnia (2) Kamran Yeganegi (3) Nabi aalah Mohamadi
(1) Department of business management, Islamic Azad University-zanjan Branch, Zanjan, Iran (2) Department of Industrial Engineering, Islamic Azad University, Zanjan Branch, Zanjan, Iran (3) Department of government management, Islamic Azad University-zanjan Branch, Zanjan, Iran

Abstract

The current study was carried out with the objective of studying and evaluating the dynamic impact of interest rate on the stock returns of the Tehran stock exchange. Based on the literature review, two hypotheses were pointed out, and in order to test these hypotheses, the data from the Iran Central Bank were used after theoretical investigations. The collected data were investigated annually for 16 years from 2002 through 2016. The collected data were estimated using the GARCH model. The analyses were performed in Excel and Eviews, and the results were obtained to be as follows. The results imply that the changes in this variable in the studied period was initially low at the beginning of the period and increased gradually in a generally oscillatory manner and increases in 2013. Observing the changes in this variable in the studied period shows that this variable is oscillatory in a sinusoidal form. The maximum changes drop, and the maximum changes were observed in 2008 and 2013, respectively. Also, the changes to this variable in the studied period were smoothly increasing

Keywords: Dynamic interest rate, stock returns

1- Introduction

Today, considering the growing importance and expansion of capital markets in collecting the small personal capitals toward production activities, identifying the behavior of the investors and effective variables on the stock returns in these markets are of great importance. Undoubtedly, investment in the stock exchange is an important part of the whole economy of a country, and the highest amount of funds are exchanged through stock exchanges throughout the world, and the national economy is immensely affected by the performance of the stock exchange. Also, this market is accessible by both professional investors as well as the public as an investment tool. Understanding the relationship between the interest rate and stock price is a vital issue in many economic fields including asset allocation, portfolio management, risk management, asset pricing, and fiscal policies and therefore, the investors, financial managers, guilds managers, and fiscal policy-makers have a great interest in this field. The relationship between the interest rate and stock return is based on finance theories. The modern finance theory assumes that any corporate generates an instantaneous cash flow and the price of the stock of that corporate is equal to the current value of all expected future cash flows by investing in its proper rate. The interest rate affects the stock price through two initial channels.

First, interest rate changes directly affect the investment rate used in the evaluation of the stockholders’ rights. Second, an interest rate change considerably affects the corporate forecast regarding the future cash flow by adjusting the investment cost, particularly incorporates with high debts. As a result, the interest rate is a special indicator which determines the stock price. Accordingly, based on the observations of Graham and Harvey, interest rate risk is considered the second financial risk in the United States by the corporates CEOs just after the credit risk.

Great interest is assigned to the relationship between the interest rate changes and the market values of the corporates in the literature. Many of these researches have addressed financial institutions due to the fact that the major portion of their incomes and costs are directly dependent on the interest rate. However, the interest rate changes might be important for non-financial institutions due to their impact on the borrowing costs and financial assets and bonds value considered by these corporates.

http://www.ijmsbr.com
An extensive number of researches in the literature has provided empirical observations for the significantly negative relationship between stock return and interest rate for developed countries. These relationships are favorable when emerging economies are considered along with thin economies which could be affected by economic policies. Emerging stock exchanges are more prominent compared to more developed markets. Therefore, the investors’ decisions in these markets are more affected by macroeconomic policies, and consequently, the role of central banks in taking actions on fiscal policies for industrial markets are far more complex.

The role of fiscal policy-making characteristics in the return of emerging stock markets has been of great interest. However, it is somewhat neglected in Iran, and few types of research are carried out on this subject, particularly regarding the impact of interest rate changes on the stock return of stock exchanges. Therefore, this paper’s effort is to use panel data analysis to study the interest rate dynamic changes on the stock returns of the Tehran stock exchange.

2- a Literature review

In 2015, Stephanos Papadamou et al. carried out research titled “Interest rate dynamic effect on stock returns and central bank transparency: Evidence from emerging markets.” They used an extensive set of data from developing countries in a panel data framework and presented observations implying a negative relationship between the stock return and interest rate changes. However, this negative effect is reduced due to the transparency of the central bank in a non-linear fashion. This study was carried out during 1998 through 2008 in which basic fundamental changes occurred in the transparency of the central bank. The results of this research show that preventive monetary policies under high transparency lead to a smoother decrease in stock returns.

In 2015, Pablo Moya-Martíne et al. carried out research titled “Interest rate changes and stock returns in Spain.” This research evaluated the relationship between the interest rate changes and stock returns in Spain during January 1993 through December 2012 using the wavelet transform method. The empirical results of this research show that Spanish industrial corporations show significantly susceptibility to interest rate changes in terms of stock prices.

In 2015, AAMD Amarasinghe carried out research titled “Dynamic relationship between Exchange rate and Stock Returns; Empirical Evidence from the Colombo Stock Exchange.” This research studies the causal relationship between the stock price and interest rate using monthly data from Sri Lanka stock exchange obtained from the central bank of Sri Lanka for the time interval of January 2007 through December 2013. Augmented Dicky-Fuller test was used conservation of the data series. The results showed that APSI data and interest rate are conserved in the initial change. Granger causality test was performed for studying the causal relationship between the stock period, and interest rate and the outputs showed that a unidirectional causality exists among the variables.

Martinez et al. (2013) studied the relationship between the interest rate changes and stock return in Spain based on wavelet method for the period January 1993 through December 2012 where they used HTW wavelet transform and concluded that the changes in the 10-year stock returns of the Spanish government had a small impact on the stock return of a broad group of industries such as chemicals and paper industries, finance, construction, and hygiene while having a significant impact on the urban services, banking, food and beverage and real estate. Also, the relationship between the variables and the interest rate and the stockholders’ rights returns became more prominent in shorter intervals while in long-term, these relationships have become stronger with fewer frequencies. Furthermore, they concluded that the role of interest rate is maintained in long-term as the main factor for specific industries.

Shah et al. (2012) studied the relationship between interest rate and stock return in Pakistan using the VAR method and Granger causality test for the period 2007 through 2010. The main motivation for addressing this
subject was the unpredictable behavior of KSE\(^1\)-100 indexes during 2007 through 2010 while the state bank of Pakistan revised their policies during this time interval for a number of times. By implementing ADF test for investigating the durability of the abovementioned time series and then applying Johansen cointegration test in long-term, they found out that the interest rate and stock price are not related in long-term. Granger causality test was then employed to find the causal relationship between these two variables which led to the conclusion that this relationship is a unidirectional relationship and the interest rate does not lead to the stock price, but the stock prices lead to the interest rate.

Korkeamaki (2011) used a simple linear regression model to study the relationship between the interest rate and stock return in Europe before and after introducing Euro currency. The studied data were considered to be monthly with the period before introducing Euro was from 1990 to 1998 and the period after introducing Euro was from 1999 to 2006 where the results showed that the relationship between the stock return and interest rate of EMU countries was negative and introducing Euro made it positive.

Taiwari (2012) investigated the time-frequency decomposition of the relationship between stock price and interest rate based on wavelet analysis for India. In this research, the monthly data were considered for the time period from January 1990 through March 2009. The results implied the existence of an inverse causal relationship between the stock price and interest rate where this relationship is different depending on the studied time scale and time interval.

Trifi and Hamrita (2011) studied the multi-scale relationship among the interest rate, currency rate, and stock price using the wavelet transform method. They used the definitions of wavelet variance, wavelet correlation, and wavelet auto-correlation as well as the lead-lag relationship of the time series for the Interest rate, currency rate and stock price in the United States for the time period of January 1990 through December 2008. The results showed that in all time scales, interest rate and currency rate are significantly different from zero and the interest rate return and stock index return are merely significantly different than zero in large scales. Also, the currency rate return and stock index return have a mutual relationship in long-term.

Kasman (2011) investigated the impact of interest rate and currency rate changes on the stock return of the Turkish banks using OLS and GARCH approximation model. However, due to the autocorrelation of the residuals, GARCH models generate more efficient coefficients compared to OLS. The results of this study show that the currency rate and interest rate changes have a significant negative impact on the stock return and the stock return and currency rate fluctuations are the main determining factors for the fluctuations of the bank stock return. Moreover, the results show that the stock market return has an important role in determining the dynamic stock return of the banks.

Ferre et al. (2010) studied the impact of interest rate risk on Spanish corporations in industrial level during 1998 to 2008. In this research, the standard linear model was generalized for the interest rate with a nonlinear component, and then, the asymmetric behavior was studied in the model where the results showed inhomogeneous interest rates in different industries. Along with other markets, much stronger industries (construction and real estates) and controlled industries (electricity and public services) and the banking industry have the highest sensitivity to the interest rate. Also, it is evident that the linear model is economically more significant than the nonlinear model.

Laopodis (2010) investigated the interdependence of monetary policies and stock price for the period of 1970 to 2003 using the cointegration and error correction models. In this study, the relationship between the variables was investigated in the time period of three decades. The results showed a negative relationship between these two variables, and in each decade, this relationship had different degrees. During the 1970s and 1980s, no cointegration exists, and the short-term dynamic relationship between these two variables only exists during 1970s. Particularly, in the 1990s, there seems to be a disconnection between the federal activities and the

\(^1\) Karachi Stock Exchange

http://www.ijmsbr.com
feedback b the stock market and vice versa. In general, the results show that no continuous and stable relationship exists between the monetary policy and stock market and the nature of such dynamic form is different in each of these three decades which coincided with three different federal operating regimes.

Dos (2005) examined whether the interest rate and stock price have a normal trend. In this research, monthly data from January 1985 to January 2003 are used. This research was performed for three Asian countries including India, Pakistan, and Bangladesh. Due to the inaccessible interest rate in long-term for each of these countries, 3-month treasury documents rates are used. Also, the stock market data consist of a market index. In this research, except for India, few evidence exists regarding the normal trend for stock price and interest rate. However, a normal cycle exists in other countries.

Kim and In (2007) investigated the relationship between the stock price and bonds return changes in G7 countries based on wavelet analysis. The results showed that the correlation between the changes of stock price and bonds returns are different in different countries and it also depends on the time scale such that in different time scale, this relationship is negative for all countries but positive for Japan. The relationship between these two variables in each country depends on monetary and financial policies of the country.

Siefer and Ozone (2008) addressed the prediction of the impacts of the interest rate on the stock price in Turkey based on wavelet analysis. The data consisted of 780 daily datasets and the studied period was from 2/1/2013 to 22/2/2006, and they concluded that the impact of interest rate on the stock return is negative and semi-parametric prediction models are beneficial at the time of investors’ decision-making, and the investors could predict their investment using ISE-100 index and interest rate.

<table>
<thead>
<tr>
<th>Researcher</th>
<th>Year</th>
<th>Title</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stephanos Papadamou</td>
<td>2015</td>
<td>Interest rate dynamic effect on stock returns and central bank transparency: Evidence from emerging markets</td>
<td>They used an extensive set of data from developing countries in a panel data framework and presented observations implying a negative relationship between the stock return and interest rate changes. However, this negative effect is reduced due to the transparency of the central bank in a non-linear fashion. This study was carried out during 1998 through 2008 in which basic fundamental changes occurred in the transparency of the central bank. The results of this research shows that preventive monetary policies under high transparency leads to a smoother decrease in stock returns.</td>
</tr>
<tr>
<td>Pablo Moya-Martínez et al.</td>
<td>2015</td>
<td>Interest rate changes and stock returns in Spain</td>
<td>This research evaluated the relationship between the interest rate changes and stock returns in Spain during January 1993 through December 2012 using the wavelet transform method. The empirical results of this research shows that Spanish industrial corporations show significantly susceptibility to interest rate changes in terms of stock prices.</td>
</tr>
<tr>
<td>AAMD Amarasinghe</td>
<td>2015</td>
<td>The dynamic relationship between Exchange rate and Stock Returns; Empirical Evidence from the Colombo Stock Exchange</td>
<td>This research studies the causal relationship between the stock price and interest rate using monthly data from Sri Lanka stock exchange obtained from the central bank of Sri Lanka for the time interval of January 2007 through December 2013. Augmented Dicky-Fuller test was used conservation of the data series. The results showed that APSI data and interest rate are conserved in the initial change. Granger causality test was performed for studying the causal relationship between the stock period, and interest rate and the outputs showed that a unidirectional causality exists among the variables.</td>
</tr>
</tbody>
</table>
3- Research findings

First hypothesis: A significant relationship exists between the stock total return index and interest rate

Zeroth hypothesis: A relationship exists between the stock total return index and interest rate.

Research hypothesis: No relationship exists between the stock total return index and interest rate.

\[ \begin{align*}
    H_0: & \beta_{xy} = 0 \\
    H_1: & \beta_{xx} < 0
\end{align*} \]

The research hypothesis was tested through regression analysis using GARCH. The F statistic is larger than the critical value shows the linear relationship between the two variables.

In the estimated model, the impacts of the risk-free interest rate are significantly related to the stock return such that its coefficient is equal to 0.488 which is significant with significance level P<0.001. Considering the obtained results, the first hypothesis of the research is verified.

Second hypothesis: The impact of dynamic changes of interest rate is significantly related to the Tehran stock exchange return index.

Zeroth hypothesis: A relationship exists between the stock total return index and interest rate.

Research hypothesis: No relationship exists between the stock total return index and interest rate.

\[ \begin{align*}
    H_0: & \beta_{yx} = 0 \\
    H_1: & \beta_{xx} < 0
\end{align*} \]

The research hypothesis was tested through regression analysis using GARCH. The F statistic is larger than the critical value shows the linear relationship between the two variables.

In the estimated model, the impacts of the risk-free interest rate are significantly related to the stock return such that its coefficient is equal to 0.547 which is significant with significance level P<0.001. Considering the obtained results, the second hypothesis of the research is verified.

4- Summary and conclusion

This research was carried out with the objective of investigating and evaluating the dynamic impact of interest rate on the Tehran stock exchange return. As discussed, the most important criterion for evaluating the performance of a corporation is its stock return. The financial information listed in financial statements affect the stock prices and investors’ decisions. Using the information obtained through the disclosure of financial statements by the audit, the stock return and return of capital are determined. The investors analyze this information and select investing in corporate stocks with lower risks and higher economic added value and efficiency. According to the performed literature review, two hypothesis was proposed, and after the theoretical investigations in the second chapter, the data from the Iranian central bank was used for testing the research hypotheses. The collected data were examined in the form of annual data for 16 years from 2000 through 2015. The collected data were estimated using the GARCH model. ARCH and GARCH models are usually employed in studies associated with financial economics such as stock exchanges, currency rate fluctuations, and inflation. The condition for using these types of models is the assumption of consistency of the error term variance. ARCH and GARCH models are designed for modeling the conditional variance equation of the error term. In order to estimate these types of models, maximum likelihood estimation method is used. While having many advantages, ARCH and GARCH models have a number of disadvantages as well which lead to the generalization of this method to the cases such as EGARCH and TARCH which unlike GARCH model, reactions to shocks are considered to be symmetric and the impacts of positive and negative shock could be analyzed. The analyses were performed in Excel and Eviews, and the results were obtained to be as follows.
The results showed that the mean total return index (RJ) was equal to 12 and the standard deviation covers from 0 to 2. The results imply that the changes in this variable in the studied period was initially low at the beginning of the period and increased gradually in a generally oscillatory manner and increases in 2013.

The mean cash return index (TEFIX) is equal to 1.6 with a standard deviation of 1.9. Similar to the previous variable, the total return index changes show an increasing trend. Also, the mean interest rate changes (TEFIX-RF) is equal to 2.4 with a standard deviation of 1.01. Observing the changes in this variable in the studied period shows that the change of this variable in oscillatory and sinusoidal with the highest drop and changes in 2008 and 2013, respectively.

The results showed that the independent variable of mean risk-free interest rate (RF) is equal to 15.2 with a range amplitude of 2.9. Also, the variations of this variable in the studied period was smoothly increasing.

The results obtained from GARCH model test showed that the model was symmetric and the applied shock on the stock return by the risk-free interest rate variable was symmetric, i.e., the impact of positive and negative shocks are similar on the stock return.

5- References


xxiii. Pazooki, Nima, Hamidian, Akram, Mohammadi, Shapoor, Mahmoudi, Vahid. Using wavelet transform for investigating the correlation of different currencies rates, oil price, gold price, and Tehran Stock Exchange index in different time scales. Investment knowledge scientific research quarterly, 2nd Year, No. 7, Fall 2013.