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The Impact of Interest Rate on Stock Returns: Evidence from Tehran Stock Exchange

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ABSTRACT: Interest rate is a price which is paid for the money and bonds. Interest is the price of money and as such is the reward primarily paid to the lender in order to persuade them to part with their cash. Considering the upward trend of the inflation rate and the relative stabilization of the nominal interest rate in Iran, this question becomes important: how have the stock returns of different industries reacted to these macroeconomic variables? This research examines the effect of the interest rate on the stock returns of 247 listed companies on the Tehran Stock Exchange (TSE). In the present research, the relationships between the two variables are examined on a monthly basis during 2002-2007. Probit models in Stata software were used to investigate the relationship between the stock returns and the interest rate. The results do not show a significant relationship between the interest rate and stock returns.

KEYWORDS: interest rate; stock returns; Tehran Stock Exchange (TSE)

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1. INTRODUCTION

Central banks around the world adjust their policy rule (the benchmark interest rate) downwards when their economies weaken and upward when facing little inflationary pressures. Best understood as "Taylor rule" (1993), these adjustments become more important for some countries compared to others. It could also be that other (possibly external) factors are relevant in the central bank's decision rule. In any case, it is likely that financial markets of developed and developing economies react differently to monetary policy. Due to the need to attract foreign capital, developing market economies may be reluctant to cut rates that would decrease the attractiveness of their fixed-income financial assets in local currency. Developed countries, on the other hand, may face other problems with interest rates becoming extremely low, thus reducing the effectiveness of monetary policy (Swanson and Williams (2014).

Changes in interest rates affect stock prices in two ways: (1) by causing an investor to expect further subsequent rises in interest rates; (2) by increasing the company's cost of capital and the cost of the investor. Thus, the net effect of the interest rate on the stock price is worked out through investor expectation of future interest rates and the changes in cost of capital). If the central bank increases the interest rate, investors expect a further increase in the interest rate. Therefore, the first effect prevails over the second effect. But after the interest rate passes the threshold value, fewer investors expect an increase in the interest rate. In addition, a higher interest rate increases the company's cost and decreases its profit. As a result, the second effect prevails over the first effect (Papadamou et al, 2017).

Whether fluctuations of interest rates as a result of monetary policy have an effect on the stock market is thus a relevant research question. And it would be increasingly so after the recent global financial crises of 2008-2009 led to a decline in world economic growth and encouraged monetary policies attempting to restore economic stability. In this paper, we contribute to the literature by providing empirical evidence about the uneven effects of monetary policy in developed and developing countries. Whereas strategic declines in benchmark interest rates in developed countries have contributed to a bull market, interest rates have not influenced stock market returns in developing countries as domestic monetary policy pursues different goals than those in developed countries. To our knowledge, comparable findings have not been documented as no other study has explored a similar research question.

2. Theoretical framework

Classical economists believe that the two factors of investment demand and savings determine the interest rate in the capital market. According to the classical school, savers and investors make decisions with a common factor (interest rate) in the market. In this theory, investment demand is an inverse function of the interest rate, and savings is a direct function of the interest rate. Therefore, the interest rate is in equilibrium if the amount of savings is equal to the amount of investment. But Keynesian economists argue that savers and investors are not a single group

but two different groups that entered the market for different reasons. Therefore, according to them, savings and investment determine the equilibrium national income and the interest rate is determined by the money market (Zafar et al, 2008).

Fundamental analysts believe that each company's stock has a certain intrinsic value that is influenced by the future stock earnings. That is, the future earnings estimation determines the stock value. On the other hand, the opportunity cost of keeping money is the interest rate, and the future stock earnings are adjusted by the interest rate as the discount rate. Therefore, according to the future-oriented nature of the stock market, a decrease in the interest rate is associated with an increase in the share value. In addition, an investor decides whether to invest in a bank or the stock market, given the rate of return on assets in each market. The investor prefers to invest in the stock market when the return in the stock market is higher than in the bank. Conversely, the higher the interest rate is, the higher the return on investment (saving) in the bank is, and the less attractive the stock market becomes to the investor (Mehrotra & Schanz, 2017).

Changes in interest rate affect stock prices in two ways: one, by causing the investor to expect further rise/fall in interest rate, when interest rate increases/decreases, another, by increasing/decreasing the company's cost of capital and the cost of investors following a rise/fall in interest rate. The net effect of the interest rate on the stock price is determined by the two aforementioned effects. If the central bank increases the interest rate, investors tend to expect a further increase in the interest rate. Therefore, the first cause (investor expectation) prevails over the second cause (cost of capital). However, as the interest rate passes the threshold value, fewer investors expect an increase in the interest rate. In addition, a higher interest rate means a higher cost and a lower profit for the company. Here, the second cause prevails over the first cause(Zafar, 2008).

Yamak and Cucukale (1995) examined the rational hypothesis stating that only unpredictable monetary policy causes changes in stock prices in the Turkish economy. They found that the predicted changes in money supply had a positive effect on the stock price, and the predicted changes in the inflation rate and interest rate had a negative effect on the stock price. But the unexpected changes in the exchange rate had no effect on the stock price.

Wongbangpo and Sharma (2002), in their study of monetary variables, examined the stock returns forecast using monetary policy indicators in the American economy including the federal funds rate, the difference between the federal funds rate and ten-year bonds rate, the difference between the yield on six-month commercial papers and six-month treasury bills, the amount of non-borrowed reserves and the Strongin index (the share of the growth of non-borrowed reserves from total reserves) for the period 1962 to 1994. They established a positive relationship between stock market returns and expansionary monetary policy.

Jareño et al (2016) examined the relationship of inflation and interest rates with the stock market of different sectors of the United States in the period 2003 to 2013 with the quantile panel approach and found that inflation and interest rates had varying effects over time and in different sectors on the stock market. In addition, they found that interest rates and inflation had a greater effect on stock returns in booming market conditions. Their sector analysis showed that this

effect was stronger in information technology, health care, telecommunication services, materials and industries than in other sectors. According to their findings, the energy and financial sectors were least affected by the changes in the interest and inflation rates.

Papadamou et al (2017) investigated the effect of interest rates on stock returns over the period 1998 to 2008. Their empirical results showed that interest rates had a negative effect on stock returns in developing countries.

3. Research method

In this research, the information published by the Tehran Stock Exchange (TSE) and the statistics and various publications of the Central Bank on the money supply and liquidity were used. The statistical sample consisted of 247 TSE-listed companies with actively traded stocks on the stock exchange during the 6-year period of 2002-2007. To examine the effect of money volume on stock returns and estimate the regression models, the econometric method probit model in Stata software was used.

To convert qualitative variables into quantitative ones, as required in regression analysis, dummy variables are used to which the values of 0 and 1 are assigned, depending on whether an attribute or quality is present or not (i.e. 0 when absent and 1 when present). These variables are also called virtual variables. One of the methods that use such variables is the probit model. The probit model is a type of econometric model with qualitative dependent variables. The probit model was proposed by Chester Ittner Bliss in 1934 in an article published in Science. The probit model is as follows:

$$Ii = \beta 0+\beta 1Xi+Ut \qquad (1)$$

In this study, money volume is the independent variable and stock returns the dependent variable. Stock returns are influenced by a variety of factors including:

1. A rise in stock price, itself being a function of different factors such as quantitative and qualitative changes, new investment, and inflation, etc.
2. Paid cash dividend; a company that pays a lower cash dividend spends its funds on new investments with an increase in liquidity, which ultimately results in appreciation of the company's share price.

Thus, the yield of a stock held for one year is equal to the sum of the yield from the received dividends and the yield from capital gain or loss, which can be expressed as follows:

$$Rit = \frac{Pit - Pit-1}{Pit-1} + \frac{Dit}{Pit-1} \qquad (2)$$

Where Rit is the rate of stock return of company i at time t, Pit the share price of company i in the first period, Pit is the share price of company i at the end of period t, Dit is the ownership interest resulting from the dividend, Pit-Pit-1/Pit-1 is the return from capital gain or loss, and Dit/Pit-1 is the return obtained from dividends.

Interest rate: interest rate is a price which is paid for the money and bonds. Interest is the price of money and as such is the reward primarily paid to the lender in order to persuade them to part with their cash.

Research hypothesis and model

Hypothesis. An increase in the interest rate increases the probability of the stock return increase on Tehran Stock Exchange.

To examine the relationship between interest rate and stock returns, the probit model was used as follows:

(3) $des= \beta 0+ \beta 1\ i +ut$

(4) $pestr= \beta 0+ \beta 1 T1\ I + ut$

In equation (3), des is the stock returns considered as the dependent variable. In addition, β0 and β1 are the coefficients of the independent variable that express the causal relationship between the independent (interest rate) and dependent (stock returns) variables, depending on the sign, and m1 the interest rate as the independent variable whose likely impact on return is to be examined. And ut in the above equation is the error term.

In equation (4), pestr is the stock return as the dependent variable and I t1 is the interest rate with a time interval as the independent variable.

4. Findings

In the research hypothesis, we investigated the relationship between interest rate and stock returns. This means that if the interest rate changes by one unit, what is the probability for a change in stock returns? Since here we seek to measure the probability of the relationship significance, the probit model is used.

Table 1. The relationship between interest rate and stock returns based on probit

Pestr	Coef	. Std. Err.	Z	P>|z|	[95% Conf.	Interval]
i	-.2137072	.2015565	-1.06	0.289	-.6087506	.1813362
_cons	3.367225	3.161984	1.06	0.287	-2.830148	9.564599

In table 1, the relationship between interest rate and stock returns is tested monthly for a period of 6 years. In the above table, i is interest rate and. Coef. its coefficient. The negative sign of Coef. indicates an inverse relationship between interest rate and stock returns. Since 0.289 is greater than 0.10 at the 90% confidence level, there is no statistically significant relationship between the above two variables.

Table 4 examines the marginal effect of the change interest rate on stock returns. The marginal effect is used when the relationship between the variables is significant to make sure of the significance. But here, the marginal effect is examined to make sure of the initial results.

Table 4. The marginal effect of the change of interest rate on stock returns

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
it1	-.0852443	.0804	-1.06	0.289	-.242825	.072336	15.6761

Since at the 90% confidence level, 0.852 is more than 10%, the dy/dx coefficient is not significant, so, neither the marginal effect indicates a significant relationship between the two variables. In case the relationship between the two variables was significant at the above level, it would be stated that with an expansionary monetary policy, by creating a time interval, for one unit change interest rate, the stock return will fall by 1.06.

Therefore, given the test results, the first hypothesis is rejected. That is, there is no significant relationship between interest rate and stock returns.

5. Conclusion

Mankiw (2015) considers the interest rate a major macroeconomic variable. Interest rate is the cost of borrowing or the opportunity cost of holding cash. The interest rate affects different markets including the stock market. When the interest rate changes, the investor's expectation changes accordingly, affecting stock returns and prices. The effect of interest rate on the stock market is worked out through two channels. One, with the change of interest rate, the price of securities changes, leading to a change in the portfolio made up of stocks and securities. Second, an increase in the interest rate draws investors to the money market and reduces the demand for stocks, lowering thereby stock prices.

In this study, the probability of the increase in the stock returns due to the increase in interest rate was examined using the probit model, the result of which did not support our hypothesis. Hence, it was concluded that no significant relationship exists between the two variables. Further, to verify the result with more certainty, this hypothesis was also tested with the OLS model, and this time; too, the former results were obtained, leading to the rejection of the research hypothesis. Subsequently, the test was performed by introducing a time gap (interval) in the interest rate. This time, the situation even worsened and no significant relationship was deduced. Having thus made sure of the initial result, it was inferred that, during the understudy period (2002-2007), interest rate had no significant effect on the stock returns of the listed companies on the TSE.

This finding is consistent with the results documented by some of the foreign researchers including Jones and Noel (1987), Karamostafa and Kucukkale (2003), Man, Atra, and Dowen (2004), and Hartmann, Kempa, and Pierdzioch (2008) who neither found a significant relationship between money supply and stock returns.

This study fills the existing research gap regarding the reaction of the stock returns in different industries to inflation and interest rates. In addition, the results of this study have important policy implications for the investors and monetary authorities of the country.

Since the stock return reflects the actual state of the market (Geetha et al, 2011) and given the effect of macroeconomic variables on the stock return, this study makes suggestions to help the capital market thrive and boost up stock return and win the trust of potential investors.

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Authenticity of the texts, honesty and fidelity has been observed.

AUTHOR CONTRIBUTIONS

Planning and writing of the manuscript was done by the authors.

CONFLICT OF INTEREST

Author/s confirmed no conflict of interest.