Study of Effects of Asymmetric Liquidity Risk in the Capital Market of Iran

Hadi Panahi\textsuperscript{a}, Solmaz Daryani\textsuperscript{b}, Shahin Amiri\textsuperscript{c}

\textsuperscript{a} Department of Accounting, Islamic Azad University of Tabriz, Tabriz, Iran
\textsuperscript{b} Department of Industrial Engineering, Islamic Azad University of Tabriz, Tabriz, Iran
\textsuperscript{c} Department of Industrial Engineering, Payam Noor University, Tehran, Iran

Abstract

Cash-flow risk is one of the main factors influencing in the capital market of Iran. In this regard, the study has examined the effect of Iran's asymmetric liquidity risk in the capital market. This study is based on econometric model of EGARCH from the family of heterogeneity of variance model after extracting the positive and negative shocks analyzes that leverage effect has different effects for a unit of positive shock and a single unit of negative shock, goods price index and consumer services, exchange rate and liquidity risk on dividends. As well as significant negative impact of liquidity risk, significant positive impact of exchange rate, consumer services and goods price index can be seen on the index of dividends.

1. Introduction

Volatility is one of the most important aspects of the development of financial markets, and plays a major role in portfolio management, dealing option pricing and governing trading regulations of market. In the last two decades, the majority of financial economists have focused on economic time series modeling and estimation of volatility. The reason for this is mainly due to the volatility that is used as a measure to calculate risk.

However, developments and fluctuations of stock prices and macroeconomic variables were associated with changes in the economy, therefore any changes in variables such as interest rates, gross national product, investment risk, inflation and the exchange rate has been influential on the stock market [1].

The first and most important factor influencing the decisions of investors in the stock exchange is the stock price index. Hence, having knowledge of the factors affecting these indicators are important. Inflation as an indicator of instability at the macroeconomic level that is effective on the Company's financial and economic decisions. Therefore, managers, shareholders and investors are paying particular attention to inflation and inflation expectations. Therefore the clear relationship between inflation and stock prices can be helpful for managers and investors in the investment decisions [2].

Also in some economic theories, the exchange rate is the most important variable of the monetary economy. This variable with its uncertainty and instability has made changes in the stock price index. Also inversely relationship of the effect of volatility in the stock exchange price index has been occurring on the exchange rate uncertainty. Therefore existing of a reciprocal relationship between these two variables is not far-fetched [3, 4].

The relationship between stock returns and risk is an important criterion for investment in the stock markets. Stock risk, indicates the uncertainty of achieving a return on equity; thus the volatility of stock returns, is a good indicator of risk perception of the stock. The quality and volatility of stock returns is not the same in different markets. For this reason many studies have been done on the reciprocal impacts of returns and volatility stock on each other. In examining...
the relationship between returns and volatility, three kinds of cause and effect can be detected: the impact of the return on the volatilities, the impact of volatilities on returns and their affection at the same time. The first case is studied through the leverage effect. One of the theories used to study the latter case, is known as the volatility feedback. The reaction also is emphasized on the fact that the main reason of getting stock to price volatility in a day is the optimistic or pessimistic reaction of the market participants about the published news and with the passing of time and further processing of published information, the incorrect responses is expected to be corrected.

In several studies it is indicated that negative shocks or bad news has more effect on the volatility in compare with positive shocks or good news with the same size, so that fluctuations or volatilities in the stock markets are asymmetric [5].

Considering the key role of stock market in the economy, this study sought to evaluate the effects of asymmetric liquidity risk in the capital market of Iran. Based on organized issues of the article, in the second part, the literature will be reviewed, and experimental studies will be mentioned. Third, the research hypotheses will be proposed and in fourth section research methodology will be expressed and in fifth part the introduction of the research and operational definition of variables which are used in the model will be discussed. Part six is dedicated to empirical findings, interpretation of results and policy conclusions and recommendations are presented as the final section of the study.

2. Theoretical foundations and research background

2.1. Theoretical foundations

2.1.1. Fama’s hypothesis (1981)

Fama analyzes the negative correlation between inflation and real stock returns through the chain effects of short-term negative correlation between inflation and real economic activities and short-term positive correlation between real activities and stock returns (alternative hypothesis). Fama believed that in the Fisher equation, some macroeconomic monetary variables such as liquidity and interest rate have been ignored. He concluded in his study that inflation has negative impact on the stock value; therefore this conclusion is a strike on one of the oldest accepted financial models (Fisher hypothesis) [6].

2.1.2. Feldstein hypothesis

Feldstein proposed the tax effect hypothesis to explain the negative relationship between higher inflation and lower stock price. He believed that the negative impact of rising inflation on stock returns is based on the fundamental features of America’s tax law, particularly the reduction of historical cost and the taxation of nominal incomes of capital [7].

2.1.3. Modigliani and Kahn hypothesis

Modigliani and kahn [8] offered the inflationary illusion hypothesis. They believed that stock market investors are exposed to inflationary illusion, when inflation rises, they tend to discount the future earnings and expected future dividends severely by higher nominal interest rate, and this leads to negative relationship Lof stock returns-inflation.

2.2. Literature of study

In a research with the title: The temporal changes of liquidity risk in growth and value stocks it have been studied the effect of temporal changes of liquidity risk on the growth and value stocks. They found that in times of recession, the liquidity risk of value stocks is higher than their liquidity risk in the boom times. Whereas for the growth stocks we have the opposite form (The liquidity risk in boom times is higher than the liquidity risk in times of recession) [9].

Davivongs [10] has done documented researches on liquidity risk of emerging markets. He emphasized the importance of market liquidity in emerging markets, but he came to the conclusion that as we move toward regional and global markets the importance of the market liquidity is reduced. In his research he concluded that the issue of market liquidity in Asian emerging markets, especially markets of China and Taiwan is very important.

Deuskar [11] has offered a model for the behavior of liquidity and volatility of stock price. In this model, the investors try to predict the recent price changes (the prediction is by risk) for the changes of an asset. When the changes of an asset is high, the risk premium of that asset is high and its current return reduces, rate of returns on riskless assets is also low and the market is faced with illiquidity.

Marcelo and Quiros [12] have studied the factor of illiquidity risk in Spain’s stock market from 1994 to 2002. In this study, they have used the factors of controlling the size and ratio of book value to market value as a criterion for illiquidity
that has been suggested by Amihud. The result of this study indicated that the factor of illiquidity must be considered as a key component of pricing the assets.

3. Research Hypothesis

1. Liquidity risk has an asymmetric effect on the dividends index in the capital market of Iran.
2. Volatility of the exchange rate has an asymmetric impact on the stock dividends index in the capital market of Iran.
3. Rate of inflation has an asymmetric effect on the dividend index in the capital market of Iran.

4. Research methodology

This study according to objective is in applied form and the sample which is studied includes 40 views and in time series is seasonal from 2003 to 2012. Subsequently, after the introduction of the research and operational definition of variables, the model using Pro 9 EVEIWS software after checking the stability of the variables from the model of variance heterogeneity EGARCH, determination of the effect of asymmetric variables will be discussed. And to collect data, library method is used and the required data has been extracted from the central bank and the Tehran stock exchange.

5. Verifying the model

The used model in this study is according to Equation 1 and liquidity risk is emphasized in this model. In this model for estimating the liquidity risk in the capital market of Iran, first we checked the reliability of variables and then by using the EGARCH mode, we continued the process.

\[
SRT_t = \alpha_0 + \alpha_1 LQR_t + \alpha_2 EXF_t + \alpha_3 INF_t + U_t
\]

(1)

\(SRT_t\) = dividends index in period t,
\(LQR_t\) = Liquidity risk in the period t,
\(EXF_t\) = Exchange rate fluctuations in period t,
\(INF_t\) = the inflation rate in period t.

5.1. Operational definition of variables

5.1.1. Stock dividends

The weighted average price of all shares listed on the Stock Exchange compared to the base year.

5.1.2. Liquidity risk

The concept of liquidity is simple, that is not directly visible, nevertheless, often ease of treatability and converting an asset to cash is called liquidity. Liquidity risk shows the response of price to the trading volume. In 1985, Amihud has introduced the Amihud illiquidity criterion for measuring illiqudity (reversal criterion of liquidity) for calculating risk size. The data of this criterion can be deduced using the hit returns and turnover (\(v\)) during relatively long time periods (T). This shows the absolute price change ratio (\(r\)) for turnovers with the effect of the orders amount price. The lower this ratio, the higher the share of liquidity, that is the lower the risk share, or vice versa, the high proportion of this ratio indicates a lack of greater liquidity or a higher risk of that share.

\[
A_{it} = \frac{1}{T} \sum_{i=1}^{T} \frac{r}{v}
\]

(2)

5.1.3. Inflation rate

Inflation in terms of economics means to increase the general level of prices over a specified time. The inflation rate is equal to the change in a price index that usually is the consumer price.

5.1.4. Exchange rate volatility

Value or price of the exchange rates of domestic currency with foreign currencies, includes all equipment of foreign payments. Volatilities in exchange rate are interpreted to the risk that is arising from unexpected changes in exchange rate.
6. Empirical findings and interpretation of results

6.1. Evaluating the reliability of variables

Table 1 indicates testing of reliability of variables based on generalized test of Dyky-Fuller. Absolute value of statistic in generalized test of Dyky-Fuller is larger than Mckinons absolute value of critical amounts when the error level is 5 percent, therefore the hypothesis $H_0$ that there is a unit root is rejected and all variables are stationary in first difference $I_1$.

| Variable | Dyky-Fuller test | p-value |
|----------|------------------|---------|
| srt      | -3.756374        | 0.0000  |
| Lqr      | -4.308890        | 0.00078 |
| exf      | -6.673273        | 0.0000  |
| Lcpi     | -3.920847        | 0.00045 |

6.2. Heterogeneity of variance

Based on the results presented in table 2 white test $H_0$ hypothesis, on the lack of heterogeneity of variance, is rejected. So the model has heterogeneity of variance and we can use the heterogeneity of variance models.

| Heteroskedasticity Test: White | 0.0141 | Prob.(6.32) | 3.201275 | F-statistic |
|--------------------------------|--------|-------------|----------|-------------|
| 0.0234                         | Prob. Chi-Square(6) | 14.62864 | ObswR-squared |
| 0.0000                         | Prob. Chi-Square(6) | 39.37551 | Scaled explained SS |

7. Estimation of Model

7.1. Estimating model around the average

According to estimates based on the equation around the mean as:

$$srt = -88.35999 Lqr + 0.092635 Exf + 674.964 cpi + u_t$$  \hspace{5cm} (3)

The significant and negative effect of liquidity risk and the significant and positive effect of exchange rate and the index of consumer are remarkable on dividends index. In other words, by change of one percent in the risk of liquidity, dividend index has changed - 88.35 units. Also, if exchange rate changes only one unit, in line with this change, dividend will change 0.092 units. In this regard, if the consumer index changes only one percent the dividend will increase 6741.964 units.
Table 3. The results of EGARCH test

\[ \text{LOG(GARCH)} = C(4) + C(5) \cdot \text{ABS(RESID)} + C(6) \cdot \text{RESID} + C(7) \cdot \text{LOG(GARCH)} \]

| Variable | Coefficient | Std.Error | z-Statistic | Prob  |
|----------|-------------|-----------|-------------|-------|
| lqr      | 88.35999    | 6.790647  | 13.01201    | 0.0000|
| exf      | 0.092635    | 0.134180  | 0.690380    | 0.4900|
| lcp      | 6741.964    | 1225.612  | 5.500896    | 0.0000|

Variance Equation

| C(4) | 15.69396 | 3.4E-103 | 4.6E+103 | 0.0000 |
|------|----------|----------|----------|--------|
| C(5) | 2.244735 | 2.8E-103 | 7.9E+102 | 0.0000 |
| C(6) | 0.420289 | 0.077989 | 5.389079 | 0.0000 |
| C(7) | 0.067528 | 0.004767 | 14.17535 | 0.0000 |

7.2. Estimating model around the variance

In order to study the leverage effect of the positive and negative shocks of explanatory variables of model on economic growth, the equation around EGARCH output variance is used.

According to the results and significance of dissimilarity coefficient of variance GARCH C (7) asymmetry and leverage effect, it is confirmed that this effect by the following analysis of the coefficients of the model (around variance) can investigate the affection of positive and negative impulses of the explanatory variables.

\[
\alpha + \gamma = -2.2447 + 0.4202 = -1.8245 \quad (4)
\]

\[
-\alpha + \gamma = -(-2.2447) + 0.4202 = 2.6649 \quad (5)
\]

According to the results, only a positive shock (one unit) of the explanatory variables increases the dividends index 1.8245 units, and a negative shock (one unit) of the explanatory variables, reduces the index 2.6649 units. These results reflect the leverage effect of the explanatory variable on the index dividends in the period under consideration.

8. Conclusions

8.1. Test of hypotheses

According to the results of model estimation, the first hypothesis of research regarding that the liquidity risk has an asymmetric impact on dividends index in Iran, by the equation of around the variance this hypothesis is confirmed.

And also the second hypothesis that the volatility of exchange rate has as asymmetric effects on dividends index in Iran, according to the equation (around the variance), is confirmed.

Finally, the third study assumes that the inflation rate has an asymmetric impact on the dividends index in Iran, according to the equation (around the variance), is confirmed.

8.2. Conclusions around the mean conditions

The significant and negative correlation between the logarithm of the liquidity risk and the indicators of dividends index is confirmed.

The significant and positive relationship between the first difference of the exchange rate and the dividends index is confirmed.

The significant and positive correlation between the first difference and the logarithm of the price index of consuming goods and services and the dividends index is confirmed.

8.3. Conclusions in terms of estimating around the variance

According to the results of this kind of estimating the leverage effect and the asymmetry of the model is confirmed.
The effect of a positive shock for one unit, is leading to an increase in the dividend index (2.6649 units).
The effect of a negative shock for one unit, is leading to a reduction in the dividends index (1.8245 units).

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