Investigating the Relationship Between Bank, Automotive, Cement, Base Metals, and Petroleum Products in Tehran Stock Exchange in Positive and Negative Return by Asymmetric TVP-VAR[1]

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INTRODUCTION

The most important issue facing an investor is the selection of an optimal asset portfolio. This issue is of greater importance in markets that experience more volatility. In recent years, investment in Tehran Stock Exchange has witnessed periods of boom and recession. On the other hand, the volatility of the total index is also of high importance, because usually investors who do not have enough information about it tend to invest in this market. This can have important consequences for a) the credibility of the capital market and b) the stability of the macro economy. In the first part, the decline in the credibility of the capital market can lead to the exit of real money from this market and reduce the depth of the market. In the second part, creating dissatisfaction will be accompanied by increasing social unrest. Therefore, it is

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necessary to conduct studies with the aim of increasing the awareness of investors in the stock exchange. Therefore, this study tries to investigate the relationship between some of the important industrial groups in Tehran Stock Exchange from 01/05/1394 to 02/17/1402. The purpose of the study is to investigate the relationship between the studied groups in positive and negative returns. The results of this study will answer the following questions: 1) Are the relationships of all the studied groups symmetrical in periods with positive and negative returns? 2) Which groups have played a leading role and which groups have played a follower role in positive and negative returns? In other words, which groups were the risk transmitters and receivers? 3) How was the risk transmission in the pairwise relationship of the groups in positive and negative returns?

METHODOLOGY

According to Adekoya et al.'s study (2022), positive and negative returns are used in the TVP-VAR method to calculate the asymmetric relationship. According to the method of Antonakakis et al. (2020), using the Bayesian Information Criterion (BIC) for the TVP-VAR model, we will have:

1. $\quad z_t = B_t z_{t-1} + u_t \qquad\qquad u_t \sim N(0, \Sigma_t)$

2. $\quad vec(B_t) = vec(B_{t-1}) + v_t \qquad v_t \sim N(0, R_t)$

Since the concept of Generalized Forecast Error Variance Decomposition (GFEVD) which was established by Kopp et al. (1996) and Sons and Shin (1998) based on Wold's theorem, the estimation made by the TVP-VAR model should be related to the TVP-VMA process to be converted. This is done using the following relationship:

3. $\quad z_t = \sum_{i=1}^{p} B_{it} z_{t-i} + u_t = \sum_{j=0}^{\infty} A_{jt} u_{t-j}$

First, we consider the case where variable i transmits the shock to other variables, j:

4. $\quad C_{i \to j,t}^{g}(H) = \sum_{j=1, i \neq j}^{k} \tilde{\psi}_{ji,t}^{g}(H)$

When the variable i receives the shock from other variables, j, the desired relationship is as follows:

5. $\quad C_{i \leftarrow j,t}^{g}(H) = \sum_{j=1, i \neq j}^{k} \tilde{\psi}_{ij,t}^{g}(H)$

By subtracting the relation 5 from 6, the directional net effect of variable i in the whole pattern is obtained. In order to calculate the communication index in the investigated model, the following relationship can also be used:

$$6. \qquad C_t^g(H) = \frac{\sum_{i,j=1, i \neq j}^{k} \tilde{\psi}_{ij,t}^g(H)}{\sum_{i,j=1}^{k} \tilde{\psi}_{ij,t}^g(H)} = \frac{\sum_{i,j=1, i \neq j}^{k} \tilde{\psi}_{ij,t}^g(H)}{k}$$

RESULTS OF THE MODEL ESTIMATION

In the time period under study, basic metals had the greatest impact on the market of other groups in terms of total return and positive return. On average, basic metals were risk transmitters to other markets.

On the other hand, banks had the same effect on other groups in all three cases. Specifically, in positive and negative returns, banks maintained their impact on other groups almost equally. The only difference is that in negative returns, it was the banks that were the net risk transmitters to basic metals. In the other two cases, this is the opposite.

In addition, petroleum products were affected by other groups in all three cases. Interestingly, cement was an influencer in positive returns and an influencer in negative returns. On average, in the period under study, the banking, basic metals and cement groups had an impact on petroleum products in all three cases, and petroleum products were the net risk transmitters to the automotive group in all three cases.

- Risk Transmitters and Receivers

Therefore, it can be concluded that, on average, basic metals and banks were the largest risk transmitters and automotive and petroleum products were the largest risk receivers in the period under study. In other words, on average, basic metals and banks played a leading role and automotive and petroleum products played a follower role in the set under study.

- SPECIFIC FINDINGS

- Basic metals had the greatest impact on the market of other groups in terms of total return and positive return.
- Banks had the same effect on other groups in all three cases.
- Petroleum products were affected by other groups in all three cases.
- Cement was an influencer in positive returns and an influencer in negative returns.

- On average, in the period under study, the banking, basic metals and cement groups had an impact on petroleum products in all three cases.
- Petroleum products were the net risk transmitters to the automotive group in all three cases.
- On average, basic metals and banks were the largest risk transmitters.
- Automotive and petroleum products were the largest risk receivers.
- Basic metals and banks played a leading role.
- Automotive and petroleum products played a follower role.

Conclusion and Recommendations

The public's interest in investing in the capital market in recent years has highlighted the importance of paying attention to this market more than ever. This interest has advantages and disadvantages that need to be considered. Deepening the capital market and reducing speculative activities in different markets such as currency and gold are among the advantages of increasing people's willingness to enter the capital market. On the other hand, the risk of losing capital is an important factor in the sustainability of people's willingness to stay in this market. Therefore, increasing the awareness of investors in making the right decision will be of great importance.

In this study, by examining the relationship between five important industrial groups in Tehran Stock Exchange, including banks, cement, petroleum products, automotive and basic metals in three states of symmetry, positive return and negative return, it was tried to answer the question that whether the total relationship and pairwise relationships of the mentioned groups in positive and negative return conditions are different or not?

The result of the study indicates a positive answer to the question raised. In other words, what is obtained from the study shows that in terms of the total relationship index in recent years, the amount of relationship in negative return has been higher, which indicates an increase in the intensity of risk transmission between the groups studied in periods with negative return. Also, it was found that in the network created in this study, banks and basic metals played the role of risk transmitters. On the other hand, the automotive and petroleum products group were the risk takers in the period under study.

Based on the findings of this study, the following suggestions for investment in the mentioned groups are provided:

- Investors should be aware that in periods with negative returns, the relationship between the industrial groups mentioned in this study is stronger. Therefore, risk transmission between groups will also be higher in this period. In this case, investors should be more cautious in diversifying their investment portfolio in periods with negative returns.
- Considering that the banking and basic metals group were net risk transmitters and the automotive and petroleum products group were net risk takers in the period under study, investors should note that a portfolio including these four groups cannot protect them from risk. In other words, if the investment portfolio includes shares of the four mentioned groups, due to the relationship between these four groups, the increase in risk in the two groups of banks and basic metals will be quickly transferred to the two groups of petroleum products and automotive.
- The results obtained in relation to the cement group show that this industrial group has fluctuated between net influencer and net influencee in relation to the other four groups, and this fluctuation has been more in positive return. Also, its pairwise relationship with other groups also indicates the low level of its influence and influence. Therefore, the cement group can play the role of a stabilizing factor in the portfolio.

Based on the findings of this study, the following recommendations are made for future research:

- Examining the relationship between other industrial groups in Tehran Stock Exchange
- Investigating the relationship between the groups studied in this study in a longer period of time
- Examining the relationship between the groups studied in this study in other countries

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