Efficient Portfolio Selection and Its Applications to Decision Making

Nebojsa M. Ralevic & Vladimir Dj. Djakovic
Faculty of Technical Sciences,
University of Novi Sad,
Novi Sad, Serbia
nralevic@uns.ac.rs,
v_djakovic@uns.ac.rs

Goran B. Andjelic
Faculty of Business Economy,
Educons University,
Sremska Kamenica, Serbia
goran.andjelic@educons.edu.rs

Jelena S. Kiurski
Faculty of Economics and Engineering Management,
University Business Academy,
Novi Sad, Serbia
jelena.kiurski7@gmail.com

***Abstract*—Dynamic nature of investment return requires the application of the appropriate methodology, especially regarding enhanced volatility induced by frequent extreme events occurrence. The subject of the research is to analyze the possibility of efficient portfolio selection on the transitional financial market of the Republic of Serbia. The main objective is to gather empirical evidence about the investment portfolio performance with special attention to the decision making process. The methodology in the research implies the usage of the appropriate portfolio optimization methods. The research results stress the significance of efficient portfolio selection in contemporary business conditions. It can be concluded that it is necessary to examine the volatility of the portfolio assets and thus enabling the efficient portfolio selection, which is especially challenging on transitional markets.**

***Index Terms*: Portfolio, Return, Decision making, Investments, Transitional market.**

I. INTRODUCTION

The questions about the investment optimization possibilities regarding maximization of the investment return with acceptable level of risk are essential in the decision making process. Frequent risk occurrence, that is, the extreme events and the dynamic nature of the investments, induce the necessity of modern methods, techniques and tools application.

Efficient portfolio selection is of the outmost importance while enabling the maximization of the expected return and/or risk minimization in the investment processes. This process is even more difficult and challenging having in mind risk/return characteristics of the transitional markets. Thus, the subject of the research is to analyze the possibility of efficient portfolio selection and especially risk/return trade-off on the transitional financial market of the Republic of Serbia. It is necessary to analyze the tested market specificities which include high level of systematic risk and affect the diversification possibilities.

Transitional markets are interesting for the study especially regarding their transitional features [1]. The research objective is to test the investment portfolio performance with the special attention to the individual portfolio assets in function of adequate decision making.

The research is significant because it represent empirical evidence about the investment possibilities on the transitional financial market of the Republic of Serbia, both for academic and professional community, especially recognizing the investors preferences that affect the decision making process.

II. METHODOLOGY

The data used in the research are the historical stock prices from the Belgrade Stock Exchange. The methodology is set to test the efficient portfolio selection while recognizing the data volatility and the optimization necessity.

Methodology used in the research is based on the following [2]:

$$\sum_{j=1}^{n} \sigma_{ij}\omega_j - \lambda_1 \bar{r}_i^{\,p} - \lambda_2 = 0, \quad i = 1,2,...,k \tag{1}$$

$$\sum_{i=1}^{n} \omega_i \bar{r}_i^{\,p} = \bar{r}_\pi^{\,p} \tag{2}$$

$$\sum_{i=1}^{n} \omega_i = 1 \tag{3}$$

where

p takes the values: 1, 2 and 3, etc.

III. RESULTS AND DISCUSSION

Efficient portfolio selection is based on the available data from the Belgrade Stock Exchange. Volatility peculiarities of the tested stocks present a significant factor while considering their risk/return characteristics in decision making process.

The research results are shown in the following tables.

IJSMS

Table I. Efficient Portfolio Selection (P=0.33)

Covariation Matrix	NIIS	AERO	ALFA	MTLC	BASB	AIKB
NIIS	0,00166	0,00109	-0,00015	-0,00011	0,0017	0,00072
AERO	0,00109	0,00468	0,00243	0,00046	0,00178	0,00113
ALFA	-0,00015	0,00243	0,00264	0,00027	0,00143	0,00027
MTLC	-0,00011	0,00046	0,00027	0,00054	-0,00001	0,00069
BASB	0,0017	0,00178	0,00143	-0,00001	0,00878	0,00164
AIKB	0,00072	0,00113	0,00027	0,00069	0,00164	0,00176
Variance	0,000048638540	0,000000000000	0,000327515950	0,000117078459	0,000000000000	0,000167417419
Expected Return	-0,277633109855	0,423953596441	0,369382950090	-0,216870288525	-0,348702680253	0,169849925224

Source: the authors' calculations

Table II. Efficient portfolio selection (p=0.20)

Covariation Matrix	NIIS	AERO	ALFA	MTLC	BASB	AIKB
NIIS	0,00166	0,00109	-0,00015	-0,00011	0,0017	0,00072
AERO	0,00109	0,00468	0,00243	0,00046	0,00178	0,00113
ALFA	-0,00015	0,00243	0,00264	0,00027	0,00143	0,00027
MTLC	-0,00011	0,00046	0,00027	0,00054	-0,00001	0,00069
BASB	0,0017	0,00178	0,00143	-0,00001	0,00878	0,00164
AIKB	0,00072	0,00113	0,00027	0,00069	0,00164	0,00176
Variance	0,000056333567	0,000000000000	0,000283384796	0,000118428644	0,000000000000	0,000184990397
Expected Return	-0,463535237808	0,597573038035	0,550156321197	-0,399687010571	-0,531463167184	0,345174906598

Source: the authors' calculations

Table III. Efficient portfolio selection (p=0.33): risk/return values

Weight Sum	1,00000
NIIS	0,15122
AERO	0,00000
ALFA	0,33072
MTLC	0,30454
BASB	0,00000
AIKB	0,21352
Portfolio Variance	0,00066065
Expected Portfolio Return	0,050400001392348

Source: the authors' calculations

Table IV. Efficient portfolio selection (p=0.20): risk/return values

Weight Sum	1,00000
NIIS	0,16043
AERO	0,00000
ALFA	0,30568
MTLC	0,30568
BASB	0,00000
AIKB	0,22821
Portfolio Variance	0,000643137
Expected Portfolio Return	0,050400012802524

Source: the authors' calculations

IJSMS

IV. CONCLUSION

Results of the research indicate the necessity of the efficient portfolio selection and its application to decision making, especially having in mind risk/return trade-off from the investment activities.

It is important to examine the volatility of the portfolio assets recognizing the appropriate weights. Hence, an appropriate decision making process requires the overview of the investors risk attitudes and consequently enabling the efficient portfolio selection.

Further research implies continuous monitoring the volatility of the portfolio assets and thus undertaking the necessary changes in the investment portfolio selection, which is particularly challenging on the transitional markets.

ACKNOWLEDGMENT

The authors acknowledge the financial support of the Ministry of Education, Science and Technological Development of the Republic of Serbia, within the Project No. TR34014.

REFERENCES

[1] V. Djakovic, I. Mladenovic, and G. Andjelic, "An empirical examination of investment risk management models for Serbia, Hungary, Croatia and Slovenia", Acta Polytech Hung, vol. 12, no. 4, 2015, pp. 201-220.

[2] N. M. Ralevic, J. S. Kiurski, V. Dj. Djakovic, and G. B. Andjelic, "Portfolio Optimization in Investments: Empirical Evidence from the Republic of Serbia", The 22nd International Symposium on Analytical and Environmental Problems, 10th October 2016, SZAB, University of Szeged, Department of Inorganic and Analytical Chemistry, H-6720 Szeged, Dóm tér 7, Hungary, pp. 274-277.

IJSMS