

POPULAR SCIENCE PROJECT ABSTRACT

The title of the following project is Financial asset portfolio with present value burdened with the risk of imprecision. By the present value we understand the discounted future cash flows and the imprecision of information is connected with its ambiguity and indistinctness.

Considering the influence of present market value in the expected rate of return model causes the increase of cognitive value of the description of an financial asset. Unfortunately, that kind of action is resulting in the appearance of imprecision and undecidability risk, connected with the considered financial instrument.

A part of the risk connected with the asset, understood as the responsibility for results of decisions made, is passed by the investor to advisors or used analytic software. Therefore, most of the time the investor limits his decisions to alternatives recommended by the analysts or software. This way he is able to reduce the risk of his own responsibility for financial decision made.

The increase of ambiguity risk means that the number of alternative investment recommendations is getting higher. The immediate result is the increase in risk of making the wrong decision, that is a decision which will be burdened with losing an investment chance. For measuring the ambiguity of return rate of an instrument in following project we will use the energy measure.

The increase of indistinctness is connected with the boundaries between different recommended alternatives getting more blurry. This results in increasing chances of taking the alternative, which was not recommended. This way, the increase of indistinctness risk influences the growth of personal responsibility risk. For the measure of indistinctness risk burdening the return rate of an asset in the following project we will use the entropy measure.

The main objective of the preformed research is to define the relations between the risk of uncertainty of future revenue from a financial asset portfolio and the risk of imprecision of appointing that revenue. The uncertainty is considered here as the lack of certainty toward future events. The imprecision on the other hand is considered as ambiguity and indistinctness of information.

Corresponding to the stated problem a following research hypothesis was stated: The creation of financial asset portfolio which reduces the risk of uncertainty does not reduce the imprecision risk. The hypothesis was divided to several supporting hypotheses, reflecting the scope of planned research, that is depending on the shape of fuzzy number modeling the imprecise present value and the number of assets in the portfolio.

The imprecision of determining a portfolio revenue derives from the imprecision of appointing the present value of assets of which the portfolio consists. The mentioned imprecision is connected with behavioral and subjective premises and modeled by a fuzzy number.

The proposed research will begin from portfolio analysis in case of present value of assets creating the portfolio being described imprecisely by a triangular fuzzy number. Based on that, a method of measuring the risk of imprecision of determining portfolio revenue will be formulated. Following, a model of two-asset portfolio which encompasses the risk of imprecision will be formulated. The next step will be to define the characteristics and behaviors of the portfolio depending on different level of imprecision and uncertainty.

With the help of literature studies, a method of comparing different portfolio revenues will be determined. Based on that, a problem of revenue maximization with minimized or given level of uncertainty and imprecision risk will be formulated. Next, relations between the risk of uncertainty of future portfolio revenues and risk of imprecision of appointing them will be researched using computer simulations.

Further in the project, the reasoning will be repeated for present value of assets in the portfolio given as a trapezoidal fuzzy number and the fuzzy number with bounded support. Finally, all previous steps will be generalized for the case of n-asset portfolio, with imprecision risk given as imprecise present value of all the mentioned forms.

The effect of performed research will be reflected in a series of articles connected with each particular stage of research. The intermediate steps will be presented in articles published in appropriate reviewed domestic journals. Simultaneously, results of performed research will be presented on two domestic and one foreign conference. The final effect of the project will be presented in a doctoral thesis, consisting of all performed research.

The innovation of proposed research derives from the fact, that the act of encompassing the imprecision risk of appointing present value in creating a portfolio gives a new and not explored way of modeling imprecision risk and improving the realism of modeling the market. What is more, the presented model allows the usage of whole up to date and general knowledge about probability for purposes of portfolio analysis.

The main reason for approaching this problem of research was the possibility of improvement of investing decisions and the assumption of behavioral premises having influence on determining the value of financial instruments. Those factors seem to be the reason of present value being determined imprecisely and not satisfactory. What follows is arising risk of imprecision which influences the creation and management of the portfolio.

The second reason for choosing this research problem was the fact and the problem of fully reducing the risk of uncertainty burdening the portfolio. What is more, the introduction of the term of imprecision risk creates is becoming easily researchable with the help of constantly developed tools of computing and comparing fuzzy numbers.

The last but not least, the reason for researching the problem is the intuitive feeling supported by the investor which revels in the situation when reducing the uncertainty risk by diversification does not reduce the feeling of risk burdening the investment. There is no possibility of certain statement of the precise value of future revenue. The investor intuitively sees the risk of imprecision burdening the revenue and is aware of the fact that imprecision overlapping in the process of creating portfolio create a higher imprecision of the final portfolio revenue.

The expected results of performed research and simulations are creating and analyzing models of two- and n-asset portfolios which take into account the risk of imprecision. That creates a possibility of portfolio management becoming easier due to the awareness of the revenue risk being heterogeneous. What is more, there may arise the possibility of better determination of future value of revenue or determining the revenue as too imprecisely appointed to be taken into account by the investor.