Chapter 13

The Use of Quantitative Methods in Investment Decisions: A Literature Review

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ABSTRACT

Quantitative methods are mainly preferred in the literature. The main purpose of this chapter is to evaluate the usage of quantitative methods in the subject of the investment decision. Within this framework, the studies related to the investment decision in which quantitative methods are taken into consideration. As for the quantitative methods, probit, logit, decision tree algorithms, artificial neural networks methods, Monte Carlo simulation, and MARS approaches are taken into consideration. The findings show that MARS methodology provides a more accurate results in comparison with other techniques. In addition to this situation, it is also concluded that probit and logit methodologies were less preferred in comparison with decision tree algorithms, artificial neural networks methods, and Monte Carlo simulation analysis, especially in the last studies. Therefore, it is recommended that a new evaluation for investment analysis can be performed with MARS method because it is understood that this approach provides better results.

INTRODUCTION

Investment decision is a very important subject for many different parties (Dinçer, Yüksel & Martínez, 2019). The main reason behind this condition is that investors put high amount of their money to this process (Dinçer et al., 2019a,b). In this framework, some investors may prefer to make risky investments whereas some others aim to be risk averse (Dinçer, Hacıoğlu & Yüksel, 2016). In addition to them, some investors can also be risk neutral. As it can be seen that the profile of the investors plays a key role in the investment decision making process (Şenel, 2019; Dinçer, Yüksel & Pınarbaşı, 2019).

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On the other side, the profitability of the investment alternatives is also significant for this decision. It is obvious that the main purpose of the investors is to make profit for their preferences (Dinçer, Hacıoğlu & Yüksel, 2017; Zengin et al., 2018). Therefore, if the investors have a loss for their decisions, it shows that the wrong decision is made by these investors (Dinçer & Yüksel, 2018a,b). Hence, it is understood that portfolio analysis should be made by using effective methodology (Dinçer, Yüksel & Çetiner, 2019). Otherwise, it brings negative results for many different parties. Especially in the last years, quantitative methods became very popular for this purpose (Dinçer, Hacıoğlu & Yüksel, 2018; Emir et al., 2016; Dinçer, Yüksel, Eti & Tula, 2018). The main reason is that quantitative methods provide objective and qualified results for the policy makers (Ersin & Eti, 2017; Çankır & Eti, 2017; Eti, 2016; Cekici et al., 2018; Kocak et al., 2018).

There are many different quantitative methods with respect to the investment decision process (Yüksel, Dinçer & Emir, 2017). First of all, probit methodology became very popular in this framework. On the other side, some researchers also preferred to use logit approach for this purpose. The main difference of these methods is that logistic distribution function is considered in logit method. In addition to them, decision tree algorithms and artificial neural networks methods are also very popular for the investment decision process. On the other side, in the last years, multivariate adaptive regression spline (MARS) approach is also considered in this framework. There are also some fuzzy multicriteria decision making models which can be used in this purpose (Dinçer, Yüksel & Şenel, 2018; Dinçer et al., 2011; Dinçer & Hacıoğlu, 2015; Dinçer & Görener, 2011)

The main purpose of this study is to evaluate the usage of quantitative methods in investment decision subject. Within this framework, the studies related to the investment decision in which quantitative methods are examined. Regarding quantitative methods, probit, logit, decision tree algorithms, artificial neural networks methods and MARS are taken into consideration. As a result of this review, it can be possible to present recommendations about the future studies in this context.

THE USAGE OF PROBIT MODEL IN INVESTMENT DECISIONS

General Information About Probit Model

Probit is a method used when the dependent variable has two categories (Yüksel, Özsarı & Canöz, 2016). Generally, the 0-1 binary variable can be coded as “successful-unsuccessful”, “yes or no” that is a method of predicting or classifying variables by means of qualitative or quantitative variables. Again, the binary variable can be used to detect variables that affect a variable (Oktar & Yüksel, 2015a).

Probit is a generalized linear model. In this model, the relationship between the independent variables and the probability that the dependent variable belongs to a category is considered linear (Yüksel & Özsarı, 2017). The general expression of a simple probit model is,

$$\text{probit}\left(\pi(x)\right) = a + bx$$

The probit link function applied to $\pi(x)$ gives the standard normal distribution (z-score) where the probability of the left tail is equal to $\pi(x)$ (Agresti, 2003).
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