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A Fuzzy Logic Based Technical Indicator for BIST 30 Index and Islamic Index

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Abstract

Fuzzy logic, originally introduced by Lofti Zadeh in the 1960's, resembles human reasoning in its use of approximate, vague, noisy or imprecise data/information and uncertainty to generate decisions. According to Sriram (2005), fuzzy theory was designed with a specific purpose of mathematically representing vagueness and provides formalized procedures for tackling the impreciseness inherent in many variables in a multitude of problems. Crises, bubbles, fiscal politics etc. makes investing difficult in financial markets. These issues haphazardly raise and cause irregular characteristics which also raise risk. On the other hand, traders and market participants try to reduce risk and increase returns. We try to make dependable suggestion tool which contains a few technical indicators using fuzzy logic modeling. In financial markets technical analysis is commonly used to provide trading decisions. Technical analysis presumes that there are trends and patterns in financial assets' movements. In this study, BIST-30 and Islamic (Participation) Index data is used between March 2012 and November of 2014 taken from Borsa Istanbul. The aim of the study is to create a new technical analysis indicator using fuzzy logic method which could be an alternative to popular indicators used by traders. BUY and SELL signals given by indicators' after closing prices are assumed to be applied in the next day opening prices when calculating the indicators' performance. The performance of the indicator for BIST-30 and Islamic index is measured by modified sharpe ratio and compared to widely used indices like MACD, MA, RSI and OBV. The Sharpe ratio is used to calculate risk adjusted return. It shows the rate of return as opposed to risk. The asset which has the higher Sharpe Ratio is considered to yield better return for the same amount of risk.

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Keywords: Fuzzy Logic, Technical Indicator, BIST 30 Index, BIST Islamic Index

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1. Introduction

Crises, bubbles, fiscal politics etc. makes investing difficult in financial markets. These issues haphazardly raise and cause irregular characteristics which also raise risk. On the other hand, traders and market participants try to reduce risk and increase returns. We try to make dependable suggestion tool which contains a few technical indicators using fuzzy logic modeling.

In financial markets technical analysis is commonly used to provide trading decisions. Technical analysis presumes that there are trends and patterns in financial assets' movements. The success of technical analysis depends interpreting the right signals. This is why, human expertise and experience is important for traders to detect changing signals in market conditions. Recommendation structures based on technical analysis often use merely predetermined rules. Fuzzy systems have the potential to adding the human experience into the trading systems.

1.1. Literature Survey

Fuzzy logic, originally introduced by Lofti Zadeh in the 1960's, resembles human reasoning in its use of approximate, vague, noisy or imprecise data/information and uncertainty to generate decisions. According to Sriram (2005), fuzzy theory was designed with a specific purpose of mathematically representing vagueness and provides formalized procedures for tackling the impreciseness inherent in many variables in a multitude of problems.

Technical indicators are used in conjunction with fuzzy systems in many studies. Zhou and Dong estimate the ambiguity in financial assets by using fuzzy process. Their algorithm makes easier to spot trends in price movements by traders. Lin et al. use a fuzzy system with KD technical index to forecast stock indices movements. KD index is a stochastic oscillator, which consist of two lines namely K and D, where D is smoothed version of the K line. Their study displays that the fuzzy systems performance is notably better than linear regression models, neural networks and other investment strategies.

Cheng et al (2001) proposed a new fuzzy time-series model which incorporates the adaptive expectation model into forecasting processes to modify forecasting errors. Shiva (2002) presented a computational method of forecasting based on high-order fuzzy time series. Wong et al (2008) proposed traditional time series method (ARIMA model and Vector ARMA model) and Fuzzy Time Series Method (Two-factor model, Heuristic model, and Markov model) for the forecasting problem.

Ahmed, Raaffat and Nevins (2007) proposed a multi agent and fuzzy logic model for stock market decision making based on technical analysis. The model was tuned and modified using genetic algorithms. The model was verified and tested using real data form NASDAQ stock symbols.

Chueng and Kaymak (2007) tried to create a trading model that combines fuzzy logic and technical analysis to search trends in financial assets. The fuzzy system was designed to mimic human behavior in interpreting technical indicators. The membership functions of the fuzzy system are optimized by using a genetic algorithm.

2. Methodology

In this study, BIST-30 and Islamic (Participation) Index data is used between March 2012 and November of 2014 taken from Borsa Istanbul.

Islamic Index is an exchange-traded fund (EFT) based on the Participation Index. Fund shares are traded on the Istanbul Stock Exchange. The companies in the index are determined on the basis of open market value of the companies and according to the index criteria. Companies for this index are selected properly according to

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