

STOCK MARKET FORECASTING: ARTIFICIAL NEURAL NETWORK AND LINEAR REGRESSION COMPARISON IN AN EMERGING MARKET

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Abstract

In this research, we compare the forecasting performance of ANN and linear regression strategies in Istanbul Stock Exchange and we get some evidence of statistical and financial out perform of ANN models. Although the out-of-sample forecast accuracy statistics (RMSE, MAE and Theil's U) of ANN models which employ daily and monthly data are not better than the alternative regression models, we get significant evidence for a superior market direction prediction of ANNs. The ANN models correctly predict the signs of stock indexes up to 57,8 per cent, 67,1 per cent and 78,3 per cent for daily, weekly and monthly data respectively. The ANN models also generate better returns than the linear regression models when they are used as trading strategies. A hypothetical portfolio of 1 YTL initial value reach up to 2,76 YTL, 2,63 YTL and 3,35 YTL for daily, weekly and monthly data respectively, which are better than regression and buy-and-hold strategies.

Key Words : Turkish stock market; Stock market; Forecasting; Neural network; Emerging markets; Backpropagation; Prediction

JEL Classification: G11, G14, G15

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Introduction

Stock market forecasting seems to be a challenging task especially in emerging markets with their complex and inefficient structures. But Harvey¹ states that, emerging markets' predictability potential is larger than the developed ones as their informational efficiencies are lower. According to the efficient market hypothesis of Fama², the best forecast of stock price is its last price as all relevant information are immediately reflected in the prices when they occur. But many researchers, for example Urritia³, Huang⁴, Worthington and Higgs⁵, Buguk and Brorsen⁶ could not find strong evidence in favour of random walk behavior of stock prices in various emerging

markets. Although there are some nonpromising evidence for emerging markets, there are some evidence for the random behavior of stock prices in developed markets [there are supporting evidence especially at weak form level, for example Fama⁷ and Alexander⁸]. Nevertheless, Grudnitski and Osburn⁹ note that prices present a noisy nonlinear process and random walk behavior of stock prices can be seen as a veil of randomness which is hiding this structure. So, inventing this hidden nonlinear structure and application of nonlinear procedures may improve explanatory power of price forecasting activities. Donaldson and Kamstra¹⁰, notes that artificial neural network models have the advantage of flexibility in order to uncover the hidden nonlinear relationships.

The authors own full responsibility for the contents of the paper.