Chapter III

Forecasting Stock Returns with Artificial Neural Networks

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ABSTRACT

During the last few years there has been growing literature on applications of artificial neural networks to business and financial domains. In fact, a great deal of attention has been placed in the area of stock return forecasting. This is due to the fact that once artificial neural network applications are successful, monetary rewards will be substantial. Many studies have reported promising results in successfully applying various types of artificial neural network architectures for predicting stock returns. This chapter reviews and discusses various neural network research methodologies used in 45 journal articles that attempted to forecast stock returns. Modeling techniques and suggestions from the literature are also compiled and addressed. The results show that artificial neural networks are an emerging and promising computational technology that will continue to be a challenging tool for future research.
INTRODUCTION

Over the past two decades, many important trends have changed the environment of the financial markets. Investors are becoming more dependent on advanced computer algorithms and technologies to benefit from a wider range of investment choices (Elton & Gruber, 1991). One of the techniques that has caused the most excitement in the financial environment is artificial neural networks (ANNs). ANNs are interesting techniques that approximate nonlinear continuous functions on a compact domain to any designed degree of accuracy (Cybenko, 1989). The novelty of ANNs lies in their ability to model nonlinear processes without a priori assumptions about the nature of the generating process (Hagen et al., 1996). This is useful in security investment and other financial areas where much is assumed and little is known about the nature of the processes determining asset prices (Burrell & Folarin, 1997).

In the past, several studies have reviewed the use of ANNs in a wide range of business problems. These studies include Burrell and Folarin (1997), O’Leary (1998), Wong et al. (1997), Vellido et al. (1999), and Zhang et al. (1998). However, each study did not provide an in-depth analysis of a specific number of financial areas. This chapter provides a more in-depth review of ANN applications for forecasting stock returns and makes a result comparison among alternative parametric methods used as benchmarks reported in the academic journals. The review draws from 45 journal articles published from 1996 to 2002 that investigated the use of ANNs for stock return forecasting. The presentation is highlighted on summary tables compiling a variety of datasets, network modeling, modeling benchmarks, and performance measurements adopted in the literature. This review should shed some light on whether the well-documented nonlinearity of the financial markets can be modeled by way of ANNs to provide accurate forecasts of stock return.

BACKGROUND

Stock return forecasting is an important financial topic. This is because once the prediction of returns is successful, monetary rewards will be substantial. However, predicting stock returns is very difficult since it depends on several known and unknown factors, and frequently the data used for prediction is noisy, uncertain, and incomplete. Two techniques typically used during stock price analysis are fundamental analysis and technical analysis. Readers interested in fundamental and technical analysis may refer to Ritchie (1996) and Murphy (1999), respectively. Most studies attempt to capture the relationship between the available data and the stock return using linear assumptions.
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