INTRODUCTION

Foreign exchange rates are amongst the most important economic indices in the international monetary markets. Many highly correlated factors such as economic, political, and psychological influences have great impacts on foreign exchange rates. To forecast the changes of foreign exchange rates is thus generally very difficult. Various forecasting methods have been developed by many researchers and experts. Like many other economic time series, foreign exchange has its own trend, cycle, season, and irregularity. It is a major challenge to identify, model, extrapolate, and recombine these patterns in order to forecast foreign exchange rates.

Traditionally, statistical models such as Box-Jenkins models (Box, 1976) dominate the time series forecasting. White (1989) suggests that the relationship between neural networks and conventional statistical approaches for time series forecasting is complementary. Refenes et al. (1994) also indicate that traditional statistical techniques for forecasting have reached their limitation in applications with non-linearities in the data set, such as stock indices. Neural network technology has
seen many application areas in business, especially when the problem domain involves classification, recognition, and predictions.

This chapter describes the application of neural networks in foreign exchange rate forecasting between American dollar and five other major currencies: Japanese yen, Deutsch mark, British pound, Swiss franc and Australian dollar. Technical indicators and time series data are fed to neural networks to mine, or discover, the underlying “rules” of the movement in currency exchange rates. The results presented in this chapter show that without the use of extensive market data or knowledge, useful prediction can be made and significant paper profit can be achieved for out-of-sample data with simple technical indicators. The neural-network-based forecasting is also shown to compare favorably with the traditional statistical approach.

**NEURAL NETWORKS AS A FORECASTING TOOL FOR FOREIGN EXCHANGE RATE**

There are two basic steps in financial forecasting: analyzing data series and selecting the forecasting method that best fits the data series. Generally, there are three schools of thought in terms of the ability to profit from the financial market. The first school believes that no investor can achieve any trading advantages by basing his or her judgment on the historical and present information. Major theories belonging to this school include the Random Walk Hypothesis and Efficient Market Hypothesis (Peters, 1991). The second school’s view is that of fundamental analysis. It looks in-depth at the financial condition of each country and studies the effects of supply and demand on each currency. Technical analysis belongs to the third school of thought, which assumes that the exchange rates move in trends and that these trends can be captured and used for forecasting.

Technical analysis uses tools such as charting patterns, technical indicators, and specialized techniques like Gann lines, Elliot waves, and Fibonacci series. To maximize profits from the market, many traders use various techniques that they deem best. Assisted with powerful computer technologies, traders no longer rely on a single technique to provide information about the future of the markets but, rather, use a variety of techniques to obtain multiple signals, nowadays. Classical time series analysis, based on the theory of stationary stochastic processes, does not perform satisfactorily on economic time series (Harvey, 1989). Economic data are not simple autoregressive-integrated-moving-average (ARIMA) processes. They are not simple white noise or even random walks and thus cannot be described by simple linear structural models. Hence the major challenge ahead is the development of new methods, or the modification or integration of existing ones,
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