Chapter XII

Neural Networks for Technical Forecasting of Foreign Exchange Rates

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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
deam 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,