Chapter XIV

Comparing Conventional and Artificial Neural Network Models for the Pricing of Options

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The pricing of options on futures is compared using conventional models and artificial neural networks. This work demonstrates superior pricing accuracy using the artificial neural networks in an important subset of the input parameter set.

INTRODUCTION

Whilst conventional option pricing models are derived using sophisticated stochastic partial differential calculus and are reasonably accurate, they are known to provide systematically biased prices (Lajbcygier et al., 1995). It is shown that a feedforward artificial neural network (ANN) – a non-parametric, inductive technique – can learn these systematic biases and can therefore provide more accurate pricing than conventional models.

In this study, we have used Australian data for options on futures, namely American-style call options on Australian All Ordinaries Share Price Index (SPI) futures. These are the Australian equivalent of the data used in previous studies (Hutchinson et al., 1994). The data used in this study is described in more
detail below. After a brief introduction to some relevant financial issues, the method and results are presented with some discussion and some directions for future work.

**Futures and Options**

A future is an obligation on two parties (a buyer and a seller) to trade for a given asset (known as the “underlying”) at some point in the future. Because of the structure of future markets, each party’s commitment is actually with a central clearing house which acts as a buffer between buyer and seller.

An option, on the other hand, gives one of the two parties concerned the right, but not the obligation, to trade on the underlying. Both options and futures have an expiry date whereupon the contract is settled. A “call” option is a right to buy, and a “put” option a right to sell (at the price specified in the contract). An option on a future is an option where the underlying is a future, not a physical commodity, bond, or share. A further refinement determines when the option can be exercised. European-style options can only be exercised at the expiry date. American-style options may be exercised at any time up to expiry.

A future is of mutual benefit to buyer and seller (of the underlying), so there is no up-front premium to be paid (note though, to minimize the clearing house risk, margins must be continually paid to cover variances between market and agreed prices for the underlying). However, because of the value of choice that an option provides, the buyer (of the option) must pay a premium to its seller. This can be regarded as a payment to cover risk transfer. This paper is concerned with comparing models that price this premium. Model quality is evaluated by comparing the models with market prices.

**The Australian Options on Futures Market**

Stock market indices are designed to reflect the overall movement in a broadly diversified equity portfolio. The Australian Stock Exchange (ASX) All Ordinaries Share Price Index (SPI) is calculated daily and represents a market value weighted index of firms that consist of over 80% by value all firms currently listed on the ASX.

A future written on the SPI is traded on the Sydney Futures Exchange (SFE). The SFE is the world’s ninth largest futures market and the largest open outcry market in the Asia-Pacific region. The August 2001 average daily volume for SPI futures was 10,100. The average open interest on futures at month’s end was 142,760 contracts.

The SPI futures option is written on the SPI futures contract. Exercise prices are set at intervals of 25 SPI points. Options expire at the close of trading on the last day of trading in the underlying futures and may be exercised on any business
Business Intelligence Conceptual Model
www.igi-global.com/article/business-intelligence-conceptual-model/53868?camid=4v1a