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**PREDICTING MACROECONOMIC TIME SERIES IN MALAYSIA:
USING NEURAL NETWORKS APPROACHES**

By

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This dissertation is submitted in Partial Fulfilment of the requirements for
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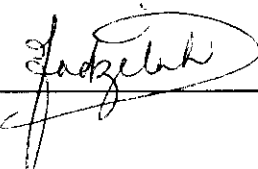
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ABSTRACT (BAHASA MALAYSIA)

Sejak kebelakangan ini, neural buatan telah banyak mendapat sambutan dan perhatian yang sungguh menggalakkan daripada kalangan peramal makroekonomi. Hal ini adalah disebabkan oleh potensi yang ada pada neural buatan dalam mengesan dan menyelesaikan masalah hubungan linear dan tidak linear terhadap set pemboleh ubah. Kajian ini menyediakan satu pengenalan terhadap neural buatan dan memperkenalkannya sebagai pendekatan baru kepada teknik-teknik ekonometrik yang standard. Keputusan empirik dalam meramal pemboleh ubah siri masa model makroekonomi terhadap Keluaran Dalam Negara Kasar (KDNK) di Malaysia mengesahkan bahawa kedua-dua tempoh '*in-sample*' dan '*out-of-sample*' menunjukkan ramalan menggunakan model neural buatan adalah lebih baik berbanding model regresi dengan pengurangan ralat di antara 8 *peratus* hingga 57 *peratus*.

Kajian-kajian yang lepas mencadangkan bahawa neural buatan secara umumnya lebih baik berbanding dengan model linear untuk ramalan '*out-of-sample*' output ekonomi dan pelbagai pemboleh ubah kewangan seperti harga stok. Walau bagaimanapun, tinjauan karya yang dipaparkan tidak harus dianggap sebagai kesimpulan yang mutlak kerana sekarang ini kedapatan masih kurang lagi kajian-kajian yang berkaitan dengan bidang ini. Potensi neural buatan boleh dieksploitasi sepenuhnya bersama-sama dengan model linear regresi. Oleh kerana itu, neural buatan seharusnya dilihat sebagai satu '*new tool*' yang patut digunakan bersama-sama dengan '*toolbox*' yang lain khususnya bagi peramal makroekonomi.

ABSTRACT (ENGLISH)

In recent years, neural networks have received an increasing amount of attention among macroeconomic forecasters because of their potential to detect and reproduce linear and nonlinear relationships among a set of variables. This study provides an introduction to neural networks and its establishment to standard econometric techniques. An empirical study in forecasting macroeconomic variables to GDP growth in Malaysia was initially introduced. For both the in-sample and the out-of-sample periods, the forecasting accuracy of the neural network is found to be superior to a well established linear regression model, with the error reduction ranging from 8 per cent to 57 per cent.

A thorough review of the literature suggests that neural networks are generally more accurate than linear models for out-of-sample forecasting of economic output and various financial variables such as stock prices. However, the literature should still be considered inconclusive due to the relatively small number of reliable studies on macroeconomic forecasting. The full potential of neural networks can probably be exploited by using them in conjunction with linear regression models. Hence, neural networks should be viewed as an additional tool to be included in the toolbox of macroeconomic forecasters.

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CHAPTER 1

INTRODUCTION

1.1 Overview

Macroeconomic forecasting is a very difficult task due to the lack of an accurate, convincing model of the economy. The most accurate models for economic forecasting, “black box” time series models assume little about the structure of the economic (Moody, 1995). Recent research suggests that neural networks may prove useful to forecast volatility financial variables that are difficult to forecast with conventional statistical methods, such as exchange rates (Verkooijen, 1996) and stock performance (Refenes, Zappranis and Francis, 1994). Neural networks have also been successfully applied to macroeconomic variables such as economic growth (Tkacz, 1999), industrial production (Moody, Levin and Rehfuss, 1993) and aggregate electricity consumption (McMenamin, 1997).

Most of these applications would benefit from the inclusions of nonlinearity in the forecasting function. However, nonlinear time series forecasting is not straightforward and theory does not guide the model building process by suggesting a functional relationship between relevant lags and the response variable. Within sample fit criteria are less effective in choosing a nonlinear rather than a linear model, and the best fitting nonlinear model may not produce the most accurate out-of-sample forecast.

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