



The Study of Grey Relational Analysis and Artificial Neural Network for Forecasting Carbon Price

Yu-Fang Huang^{1,*}, Fu-Ying Chen^{2,†} and Jo-Hui Chen^{3,‡}

1. *Fu Jen Catholic University, Taiwan*

2. *Ph.D. Program in Business, Chung Yuan Christian University, Taiwan*

3. *Department of Finance Chung Yuan Christian University, Chung-li, Taiwan*

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A B S T R A C T

This paper uses economic variables and financial market indices, such as Baltic Dry Index, PJM electricity price, Brent crude oil future price, steel price index, Hot-Rolled Coil Steel Futures, interest rate, unemployment rate, stock index, money supply (M2), consumer price index, industrial production index, and Commodity Research Bureau futures index, which are related to the carbon price. Gray relational analysis (GRA) is employed in this research to determine variable rankings, and artificial neural network (ANN) models are utilized to forecast carbon prices. According to the results, the predictions of the high gray relation variables were superior to those of the low gray relation variables. Four ANN models, namely, feedforward with backpropagation network (BPN), principal component analysis network (PCA), radial basis function (RBF), and recurrent neural networks (RNN), were compared. The GRA model helped simplify the ANN model to facilitate carbon price forecasting, and the ANN model can effectively reduce forecasting errors. The results indicate that the RNN is more suitable for forecasting EU carbon allowances (EUA).

Keywords: Carbon Futures, Grey Relational Analysis (GRA), Artificial Neural Network (ANN)

JEL Classification: G13, G17

* Fu Jen Catholic University, Taiwan, R.O.C. E-mail: 014447@mail.fju.edu.tw

† Corresponding Author, College of Business, Chung Yuan Christian University, Chung-Li, Taiwan, R.O.C.
E-mail: ares.fy.chen@gmail.com

‡ Dept. of Finance, Chung Yuan Christian University, Chung-Li, Taiwan, R.O.C. E-mail: johui@cycu.edu.tw