ASSESSING THE PREDICTABILITY OF ALL SHARE PRICE INDEX OF COLOMBO STOCK EXCHANGE USING DIFFERENT MODELS: A CASE STUDY DURING THE COVID-19 PANDEMIC

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Dissertation submitted in partial fulfillment of the requirements for the
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DECLARATION

I declare that this is my own work and this Dissertation does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or Institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text. I retain the right to use this content in whole or part in future works (such as articles or books).

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The above candidate has carried out research for the Master of Science in Financial Mathematics Dissertation under my supervision. I confirm that the declaration made above by the student is true and correct.

Name of Supervisor: Dr. J.A.B.U. Jayasinghe

Signature of the Supervisor: Date:

DEDICATION

I would like to convey my sincere gratitude to my parents for their unwavering affection and support.

ACKNOWLEDGEMENT

I extend my deep appreciation to Dr. Bimali Jayasinghe, my supervisor, for her invaluable support, advice, and exceptional guidance throughout this research. I am also grateful for her assistance and guidance in composing the report and presenting the findings, which I acknowledge with gratitude.

I would also like to extend my sincere gratitude to my thesis committee for providing valuable feedback and suggestions.

Finally, I extend my gratitude to all the individuals who participated in my research, generously dedicating their time and openness in sharing their experiences. Their invaluable contribution made this project attainable.

ABSTRACT

The aim of this investigation was to assess the predictability of three models: Auto-regressive Integrated Moving Average (ARIMA), Seasonal Auto-regressive Integrated Moving Average (SARIMA), and Dynamic Harmonic Regression (DHR) model, both prior to and following the Covid-19 outbreak. Every model was crafted with great care and then compared to determine the optimal method for predicting future outcomes. The findings suggested that, during the Covid-19 period, the DHR model outperformed the other models as it had the lowest Corrected Akaike's Information Criterion (AIC) value. According to the Portmanteau test, the residuals were random and not correlated, indicating that all the models were adequate for making predictions. Although the rapid decline of CSE was captured by both the ARIMA and DHR models, the DHR model yielded more significant results. In contrast, prior to the pandemic, the ARIMA model performed well and effectively captured the underlying trend compared to other models. However, forecast errors indicated that DHR model was more appropriate for predicting daily share indices with long intricate seasonal variations compared to the SARIMA model. As a consequence, stakeholders were able to make accurate investment decisions even in the midst of the outbreak. Finally, the Engle's ARCH test was conducted to analyze the occurrence of volatility clusters during the pandemic, and it was identified that there were notable fluctuations in volatility throughout the pandemic period.

Keywords: All Share Price Index, ARIMA, SARIMA, Dynamic Harmonic Regression (DHR), Covid-19 Pandemic

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LIST OF ABBREVIATIONS

Abbreviation	Description
AIC	Akaike Information Criterion
ARCH	Autoregressive Conditional Heteroscedastic
ARIMA	Autoregressive Integrated Moving Average
ASPI	All Share Price Index
CSE	Colombo Stock Exchange
DHR	Dynamic Harmonic Regression
GBM	Geometric Brownian Motion
RMSE	Root Mean Squared Error
SARIMA	Seasonal Autoregressive Moving Average
VAR	Vector Autoregression

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