

Universiti Teknologi MARA

**Coherence Wavelet Method and
Wavelet-Granger Causality Tests to
Measure COVID-19 Pandemic-Induced
Uncertainties**

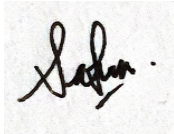
Siti Norsafura Binti Md Sobri

**Report submitted in fulfilment of the requirements
for Bachelor of Science (Hons.) Management
Mathematics Faculty of Computer and
Mathematical Sciences**

February 2021

STUDENT'S DECLARATION

I certify that this report and the research to which it refers are the product of my own work and that any ideas or quotation from the work of other people, published or otherwise are fully acknowledged in accordance with the standard referring practices of the discipline.



.....
SITI NORSAFURA BINTI MD SOBRI
2019545043

FEBRUARY 27, 2021

ABSTRACT

Due to COVID-19 outbreak, the economic policy became uncertain. The fall of oil price has caused the stock market to respond. It has been a question on whether economic uncertainty and oil prices were affected by COVID-19, or is it the fall of oil price that contributed to the economic instability and stock market volatility. In this study, the researcher analysed the connectivity between the recent spread of COVID-19 in Malaysia, Malaysia stock market, oil prices in Malaysia and Global Economic Policy Uncertainty (GEPU) in time-frequency domain. The coherence wavelet method was used to analyse the movement of each variable and to evaluate the interactions between the selected variables for 25th January until 25th May 2020. The researcher also applied the Wavelet-based Granger Causality to test the robustness of the coherence wavelet. This study disclosed the impact of COVID-19 reported cases towards the oil price slumps. Stock market volatility was affected by the GEPU index while oil prices were influenced by stock market and GEPU index. To obtain more precise results, it is recommended that future researchers use Economic Policy Uncertainty of Malaysia instead of GEPU and add more sample data.

Keywords: COVID-19, oil prices, stock market, economy policy uncertainty, wavelet, causality.

TABLE OF CONTENTS

CONTENTS	PAGE
SUPERVISOR’S APPROVAL	ii
STUDENT’S DECLARATION	iii
ACKNOWLEDGEMENT	iv
ABSTRACT	v
LIST OF FIGURES	viii
LIST OF TABLES	ix
LIST OF ABBREVIATION	x
CHAPTER ONE: INTRODUCTION	
1.1 Background of the Study	1
1.2 Problem Statement	2
1.3 Objectives of the Study	3
1.4 Scope of the Study	3
1.5 Significance of the Study	3
1.6 Summary	4
CHAPTER TWO: LITERATURE REVIEW	
2.1 The Connection of Oil Prices, Stock Market, Policy Uncertainty, and COVID-19 Pandemic in the US Economy	5
2.2 H7N9 Hit Stock Market in China	7
2.3 Ebola Outbreak Affected Geographic Proximity of Information and Stock Prices	9
2.4 GEPU, Stock Price, Oil Price Shocks, and Geopolitical Risk in Malaysia	10
2.3 Differences and Similarities Between Previous Study	12

2.4 Summary	13
CHAPTER THREE: RESEARCH METHODOLOGY	
3.1 Study Design	14
3.2 Data Collection and Data Analysis	15
3.3 Model Development	16
3.4 Summary	22
CHAPTER FOUR: RESULTS AND DISCUSSION	
4.1 Objective 1: To Describe the Movement of Each Variable Within Time-frequency Using CWT	23
4.2 Objective 2: To Evaluate the Interactions Between Selected Variables Using WC	26
4.3 Objective 3: To Test the Robustness of WC and CWT using WGC Test	31
CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS	
5.1 Conclusions	36
5.2 Recommendations	37
REFERENCES	39