FORECASTING THE GROSS DOMESTIC PRODUCT (GDP) OF SARAWAK

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Forecasting the Gross Domestic Product (GDP) of Sarawak

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Statement of Originality

The work described in this Final Year Project, entitled

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is to the best of the author’s knowledge that of the author except where due reference is made.

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ABSTRAK

Meramal keluaran dalam Negeri Kasar (KDNK) di Sarawak

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Kajian ini bercadang untuk mengkaji penentu keluaran dalam Negeri kasar (KDNK) di Sarawak dan kemudian menggunakananya untuk meramal KDNK Sarawak. Ujian empirical yang digunakan termasuk ujian kepegunan dan ujian kopengamiran Johansen-Juselius. Model yang digunakan untuk meramal KDNK ialah model *Autoregressive Integrated Moving Average (ARIMA)*, model *Vector Error Correction (VEC)*, dan model asas. Keputusan daripada kajian ini mengesahkan bahawa eksports mempunyai perkaitan yang kuat dengan KDNK. Seterusnya, kajian ini juga mengesahkan bahawa model *Vector Error Correction (VEC)* menghasilkan ramalan yang paling tepat untuk ramalan sampel penuh dan sampel dalam manakala model asas menghasilkan ramalan yang paling tepat untuk ramalan sampel luar.
ABSTRACT

Forecasting the Gross Domestic Product (GDP) of Sarawak

By

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This study intends to examine the determinant of Gross Domestic Product (GDP) of Sarawak and use them to forecast the GDP of Sarawak. The empirical test that is used in this study includes unit root test and Johansen-Juselius cointegration test. The models that are employed are Autoregressive Integrated Moving Average (ARIMA), Vector Error Correction (VEC) model, and fundamental model. The results state that exports has strong relationship with GDP. The results also indicate that Vector Error Correction (VEC) model produces the highest forecast accuracy for full sample and in-sample forecast whereas fundamental model produces the highest forecast accuracy for out-sample forecast.
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# TABLE OF CONTENTS

| LIST OF FIGURE ............................................................... | I |
| LIST OF TABLE ................................................................ | II |

## CHAPTER 1: INTRODUCTION

1.0 Introduction ...................................................................... 1 - 2
1.1 Background of the Study
   1.1.1 History of Sarawak ................................................. 2 - 3
   1.1.2 Geography .......................................................... 3
   1.1.3 Economy Background of Sarawak .............................. 4 - 9
1.2 Motivation of Study ....................................................... 9 - 10
1.3 Problem Statement ....................................................... 10 - 11
1.4 Objective of Study
   1.4.1 General Objective ................................................. 12
   1.4.2 Specific Objective ................................................ 12
1.5 Significance of Study ................................................... 12 - 13
1.6 Structure of Study ....................................................... 13
## CHAPTER 2: LITERATURE REVIEW

2.0 Introduction ..............................................................14

2.1 Theoretical Framework

2.1.1 Export ........................................................14 - 15

2.1.2 Population Growth ..........................................15

2.1.3 Inflation Rate ...................................................16

2.1.4 Investment ......................................................16 - 17

2.1.5 Consumption ....................................................17

2.1.6 Exchange Rate ..................................................17 - 18

2.1.7 Interest rate .....................................................18

2.1.8 Government Expenditure ....................................18 - 19

2.2 Empirical Testing Procedures

2.2.1 Specification of models

- Cobb-Douglas Function ........................................19 - 20
- Autoregressive Distributive Lag (ARDL) Model ........21
- Vector Autoregression (VAR) Model .......................22 - 23

2.2.2 Forecasting Model

- Univariate Autoregressive Integrated Moving Average (ARIMA) ........................................23 - 24
- Dynamic Factor Model ............................................24 - 25
- Dynamic Stochastic General Equilibrium (DSGE) Model ..................................................25 -28
- Vector Autoregressive (VAR) Model .......................28 - 29
2.2.3 Empirical Method

- Unit Root and Stationary Tests ......................... 30 - 32
- Cointegration Test ........................................... 32 - 33

2.2.4 Forecast Criteria

- Root Mean Squared Error (RMSE) and Mean Absolute Error (MAE) ........................................... 34 - 35
- Diebold-Mariano Test ........................................... 35 - 37
- Encompassing Test ........................................... 37 - 38

2.3 Empirical Evidence ........................................... 38 - 39

2.4 Concluding Remarks ........................................... 39 - 40

CHAPTER 3: METHODOLOGY

3.0 Introduction .................................................. 82

3.1 Model and Data Description ................................ 83 - 84

3.2 Empirical Testing Procedure

3.2.1 Unit Root Tests

- Augmented Dickey-Fuller (ADF) Test ................. 85 - 86
- Phillips-Perron (PP) Test ........................................... 86

3.2.2 Cointegration Test ........................................... 86 - 88

3.2.3 Forecasting Models

- ARIMA Model .................................................. 88
- VAR/VEC Model .................................................. 89
- Fundamental Model ........................................... 89
3.2.4 Diagnostic Checking for VAR/VEC Model and Fundamental Model
   • Normality Test ................................................ 90

3.2.5 Forecast Evaluation Criteria
   • Root Mean Square Error (RMSE) ......................... 90
   • Mean Absolute Percentage Error (MAPE) .................. 91

CHAPTER 4: EMPIRICAL RESULTS AND DISCUSSION

4.0 Introduction ............................................................... 92

4.1 Unit Root Test Results .................................................. 93 - 94

4.2 ARIMA Model ............................................................... 95
   4.2.1 Forecast Accuracy of ARIMA Model ................. 96 - 99

4.3 Vector Error Correction (VEC) Model ......................... 99 - 100
   4.3.1 Johansen-Juselius Multivariate Cointegration Test...100 - 101
   4.3.2 Result Interpretation of Estimated VEC Model.....101 – 102
   4.3.3 Diagnostic Checking for Estimated VEC Model ........... 102
      • Multivariate Normality Tests
   4.3.4 Forecast Accuracy of estimated VEC Model ........ 102 – 103

4.4 Fundamental Model .......................................................... 103
   4.4.1 Diagnostic Checking for Estimated Fundamental Model
      • Normality Test ............................................... 103
   4.4.2 Forecast Accuracy of Estimated Fundamental Model ..... 104

4.5 Comparison of Best ARIMA Model, VEC Model, and
    Fundamental Model ............................................... 104 - 105
LIST OF FIGURES

Figure 1: Map of Sarawak ................................................................. 3
Figure 2: Gross Domestic Product (GDP) of Sarawak from 1980 until 2012 .......... 6
Figure 3: Total Export in Sarawak from 1980 until 2012 .............................. 9
LIST OF TABLE

Table 2.1: Summary of Literature Reviews ........................................... 41 – 81
Table 4.1: ADF Unit Root Tests Results ................................................. 94
Table 4.2: PP Unit Root Tests Results ..................................................... 95
Table 4.3: Forecasting Performance of ARIMA Models with Constant ........ 97
Table 4.4: Forecasting Performance of ARIMA Models without Constant .... 99
Table 4.5: Johansen and Juselius Cointegration Test ............................... 101
Table 4.6: VEC Model ............................................................... 101
Table 4.7: Result of Multivariate Normality Test ..................................... 102
Table 4.8: VECM Forecast Accuracy ..................................................... 103
Table 4.9: Fundamental Model ........................................................... 103
Table 4.10: Result of Normality Test ..................................................... 103
Table 4.11: Forecast Accuracy of Estimated Fundamental Model ............. 104
Table 4.12: Forecast Accuracy of Fundamental Model ......................... 105
CHAPTER ONE

INTRODUCTION

1.0 Introduction

Gross Domestic Product (GDP) is commonly used to indicate the economy performance of a country. “GDP is the market value of all final goods and services produced within a country in a given period of time” (Mankiw, Goh, Ong, Yen, Cheng, Mustafa, & Lee, 2013, p. 472). Measurement of GDP consists of three methods which are expenditure basis, income basis, and output basis. For expenditure basis, it calculates how much money was spent in a country. For income basis, it calculates how many income (profit) was earned. For output basis, it calculates how many goods and services were sold. In this study, GDP that measured by expenditure approach is employed.

In general, forecasting is the process of predicting the future value of a variable. This study attempts to forecast the GDP of Sarawak which is one of the states in Malaysia. The objectives in this study are to forecast the Sarawak GDP, to examine the determinants of Sarawak GDP to estimate the forecasting accuracy of the forecast models. The factors considered include export in which according to the theory of Economic-Led-Growth (ELG) hypothesis, inflation rate (consumer price index) in which according to the theory of Fisher effect, import and government expenditure in which are important components of GDP.
In order to produce forecasting results with high accuracy, Autoregressive Integrated Moving Average (ARIMA) models, Vector Error Correction model, and fundamental models are estimated. Based on the previous study, fundamental models performed the best from ARIMA time series model and random walk model whereas random walk model performed the worst among the three models. Apart from that, previous study shows that export, population growth, inflation rate, investment, consumption, exchange rate, interest rate, and government expenditure are crucial determinants of economy in many countries.

Chapter 1 is differentiated six sections. Section 1.1 gives a brief overview on the background of study. Section 1.2 states the motivation of the study following by section 1.3 which is about the discussion on problem statement. Section 1.4 mentions the objectives of this research. After that, section 1.5 discusses the significant of study. Finally, section 1.6 provides the organization of the study.

1.1 Background of Study

1.1.1 History of Sarawak

In 1839, an English adventurer who is James Brooke arrived and quelled the revolt voluntarily to when Sarawak was protesting against the Brunei Sultanate, (State Planning Unit, 2014). Brooke was success in the war and thus Pengiran Mahkota of Brunei rewards Brooke by assigning him to be the King of Sarawak in 1841 (State Planning Unit, 2014).

According to Sarawak Government (2014), James Brooke died in 1868 and his nephew named Charles Brooke succeeded him in 1867. Charles Brooke ruled Sarawak
from 1868 until 1917 and he passed to his second son, Charles Vyner Brooke who ruled Sarawak from 1917 until 1941 (Sarawak Government, 2014).

In 1941, Japanese forces occupied Sarawak. After war, it was successively ceded to Britain and British Crown Colony was formed in early 1946 (Sarawak Government, 2014). Sarawak joined Malaysia in 1963.

1.1.2 Geography

Sarawak is the largest state in Malaysia. "Sarawak is situated instantly north of the Equator between latitude 0° 50' and 5°N and longitude 109° 36' and 115° 40' E with an area of 124,449.51 km²" (Sarawak Facts and Figures, 2012, p. 6). Sarawak is separated from Peninsular Malaysia by South China Sea with a distance of 600 km and is joined directly with the state of Sabah to the northeast (State Planning Unit, 2014). Inland, the watershed marks the boundary between the State and Kalimantan Borneo because it divides those rivers flowing in a southerly direction into the Java and Celebes Seas (State Planning Unit, 2014). The detail is shown in the map below:

Figure 1: Map of Sarawak

1.1.3 Economy Background of Sarawak

Based on Sarawak Score (2014), Sarawak has the strongest economic foundation among the 13 states in Malaysia. It is the only state to be awarded A-rating by Standard & Poors Rating Services (S & P). Over the past few years, Sarawak has maintained a steady growth and has created surpluses in the four consecutive years.

The trend of GDP is shown in Figure 2. In overall, the Gross Domestic Product (GDP) of Sarawak grew from RM 5317 million in 1980 until RM 102887 million in 2012. During 1980s, the GDP trend showed a small fluctuation. From 1980 to 1984, it increased slowly from RM 5317 million to RM 8897 million with an increasing growth rate of 67.3%. However, GDP in Sarawak slumped in 1985 because of international economic recession that happened during early of 1980s. Due to international economic recession, goods and services were difficult to sell out because the purchasing power of peoples declined. When the demand of goods and services declined, the production of goods and services declined also. As a result, the GDP of Sarawak in 1985 increased in a decreasing rate with 5.3%. The GDP growth rate from 1984 to 1985 is slower when compared to the growth rate from 1983 until 1984. The international economic recession continued to impact the Sarawak GDP from 1987 until 1988. In 1988, GDP of Sarawak declined from RM 10388 million in 1987 to RM 10271 million with a decreasing rate of 1.2%. However, it climbed again to RM 11377 million in 1989 with an increasing rate of 10.8%.

In 1990s, GDP growth rate of Sarawak is faster than 1980s. GDP of Sarawak rose from RM 12314 million in 1990 to RM 25475 million in 1999. However, fluctuation trend of GDP still existed in 1990s. From 1990 to 1991, GDP rose up from
RM 12314 million in 1990 to RM 13951 million with an increasing rate of 13.3 % in 1991 and declined slowly to RM 13203 million in 1993 with a decreasing rate of 5.4 %. After 1993, the GDP of Sarawak grew rapidly until RM 22097 million in 1997 with a growth rate of 67.4 %. However, a slower growth rate of 1.93 % had been recorded in 1998. A slight decrease in GDP is due to Asian Financial Crisis that happened in 1997. Uddin and Ahsan (2014) mentioned that Asian Financial Crisis is started from the depreciation of Thai baht in 1997 which in turn caused the devaluation of Malaysian currency that rendered a heavy outflow of foreign capital. In order to counter this particular situation, Malaysia government pegged its Ringgit at RM3.80 to the US dollar.

After Asian Financial Crisis, the policy makers managed to bring Malaysia out of the financial crisis and GDP grew rapidly until RM 32006 million in 2000 with a growing rate of 33.8 % but it started to drop again to RM 30140 million in 2001 with a decreasing rate of 5.8 %. The decrease in GDP from 2000 to 2001 is as a result of the global economic downturn. Economic downturn is a part of economic cycle. It happens when economic growth rate is decreasing. Economic downturn might cause the economy of certain country enters into recession. In 2008, GDP of Sarawak climbed up speedily until RM 89387 million and it began to drop sharply until RM 76663 million with a decreasing rate of 14.2 % in 2009 because of the Global Financial Crisis 2008 due to the bankruptcy of Lehman Brothers. According to McKibbin and Stoeckel (2009), collapse of Lehman Brothers in September 2008 caused the banks virtually stopped lending to each other which in turn caused the falling in investment. Nonetheless, the policy makers still managed to recover the economy after 2009. Thus, GDP in Sarawak
increased from RM 76663 million in 2009 until RM 102887 million in 2012 with an increasing rate of 34.2 %.

Figure 2: Gross Domestic Product (GDP) of Sarawak from 1980 until 2012


Economy of Sarawak is export-oriented because it has abundance of natural resources such as palm leaves, pandanus, rattan, bamboo, bemban reed, hard wood tree bark, and so forth. Contribution of natural resources towards the economic growth of state and Malaysia is very high. Further information regarding the export of Sarawak is shown in the paragraph below which is adapted from State Planning Unit (2014):

"Natural resource is the key driving force of Sarawak economy. Her wealth was being built up from exportation of natural resource mostly in the form of timber, oil, and gas since independence in 1963. In 2011, extraction and processing of these commodities had contributed 50 % of state output. Emerging business of Sarawak is exportation of crude palm oil. Competitive advantage of Sarawak in
this economically-noticeable part of the primary sector is guaranteed through the commitment of both private and public resources. Production of crude palm oil in 2011 exceeded well over 2 million tonnes and it was exported primarily to China and India. Premium grade peppers and rubber are other important products of Sarawak. Sarawak GDP is contributed approximately 40% by services sector. In terms of monetary contributions, the level of importance for trades and hospitality is same with finance, insurance, utilities, transport, storage, and communication.”

Figure 2 illustrates that the trend of total export in Sarawak from 1980 until 2012. The graph shows that the trend of total export is almost the same with GDP. This implies that GDP of Sarawak is highly depends on total exports. During 1980s, the total export trend showed a small fluctuation. From 1980 to 1985, it increased slowly from RM 4041.4 million to RM 8446.8 million with an increasing growth rate of 109%. However, total export in Sarawak decreased suddenly in 1985 because of international economic recession that happened during early of 1980s. Due to international economic recession, goods and services were difficult to sell out because the purchasing power of peoples declined. As a result, total export of Sarawak in 1985 decreased sharply to RM 6641.9 million with a decreasing rate of 21.4%. The international economic recession continued to impact the total export of Sarawak from 1987 until 1988. In 1988, total export of Sarawak declined from RM 7595.9 million in 1987 to RM 7218.6 million in 1988 with a decreasing rate of 5.0%. However, it climbed again to RM 8979.4 million in 1989 with an increasing rate of 24.4%.
In 1990, the total export of Sarawak was recorded as RM 11283.5 million, rose up to RM 13026 million in 1992. After that, it declined sharply to RM 12497.1 million in 1992. This is mainly due to the impact of implementing Log Export Restriction Policy for timber by the state government in 1992 and reducing log export since 1990s. However, it climbed back immediately to RM 12610 million in 1993 and continued to grow up until RM 21089.9 million in 1997. In 1998, Asian Financial Crisis had caused the depreciation of Malaysians currency which in turn decreased the amount of total export. Hence, total export of Sarawak declined sharply to RM 20100.8 million in 1998.

After that, it continued to climb up until RM 31152 million in 2000 with an increasing rate of 55% but it dropped until RM 30140 million in 2002 with an increasing rate of 41.1%. The decrease of total export in Sarawak from 2000 to 2002 is as a result of the global economic downturn. The demand of goods and services slowed down in the worldwide during economic recession. Hence, the total export of Sarawak also declined. After that, total export of Sarawak climbed up speedily until RM 91341.4 million in 2008 and it began to drop sharply to RM 61967.6 million with a decreasing rate of 32.2% in 2009 because of the global financial crisis that happened in 2008. After that, it continued to increase until RM 103631.3 million in 2012 with a growing rate of 67.2%.
Figure 3: Total export of Sarawak from 1980 until 2012

1.2 Motivation of Study

Natural resources can be the backbone of economy because it can fulfill the internal demand without depending on import goods. It can create revenue for a country by exporting it to the other countries. In addition, it is crucial in manufacturing process. Based on Barbier (2003), natural resources are natural capitals which are crucial economic assets to a country. Sarawak has high potential of economy growth because it consist a lot of natural resources. Motivation in carrying out this study was induced because of the high potential of economy growth in Sarawak. This study tends to forecast the GDP of Sarawak to know the contribution of Sarawak towards economic growth of Malaysia in the future.
GDP can be influenced by many factors such as investment, consumption, trade, government expenditure, exchange rate, interest rate, and so forth. Knowing the determinants of GDP is crucial in making policy. Although Sarawak is under Malaysia, but the GDP trend of Sarawak is quite different with the GDP trend of Malaysia. For example, GDP of Malaysia had increased by whereas GDP of Sarawak had decreased by 0.2% in 1992 (Yearbook of Malaysia, 1992). It shows that the determinants of GDP in Sarawak are different with Malaysia. Therefore, it had created the motivation to investigate the factors that affect Sarawak GDP and how these factors affect the future trend of Sarawak GDP. Apart from that, Sarawak is the third largest contributor for the GDP of Malaysia after Selangor and Kuala Lumpur in 2013. Economic development of Malaysia always focuses on Selangor and Kuala Lumpur, so it is normal when they are the largest contributors towards the GDP of Malaysia. However, the GDP of Sarawak is very high when compared to many states. Thus, the motivation of examining the factors influencing the GDP in Sarawak is higher than other states.

1.3 Problem Statement

In overall, GDP of Sarawak shows a fluctuating trend from 1980 until 2012. In 1998 and 2009, the GDP dropped suddenly because of financial crisis which happened in 1997 and 2008 respectively. However, it is rather astonishing because the GDP during 1997 and 2008 still increases in a small percentage but it did not decrease as in 1998 and 2009. Other than that, it showed a drop in 1988, 1992, and 1993 although there is no any serious economic and financial crisis happened. The volatility of Sarawak GDP is not a good scenario because it will decrease the confidence of investors
which might decrease the private investment of Sarawak. In addition, the fluctuating
trend of Sarawak GDP creates an issue to policy makers that renders the policy
prediction of Sarawak GDP difficult.

The future of Sarawak is uncertain because the fluctuation of GDP growth rate in
Sarawak is frustrated. For example, the Sarawak GDP growth rate increased from -5.8%
in 2001 to 34.3% in 2002. Other than that, a small but sudden decrease of GDP in 1988,
1992, and 1993 also create a risk in the future that the GDP of Sarawak might drop
suddenly. The volatility of Sarawak GDP creates the difficulty to policy makers in
making policy. Hence, forecasting the GDP is important for state and federal
government in decision making. However, there are a lot of methods that used by
previous researchers and accuracy of forecasting models is an uncertainty.

GDP can be influenced by many factors. It cannot be simply predicted without
doing a research. Therefore, this study in the end attempts to solve:

i. What are the driving forces that determine the GDP of Sarawak?

ii. Which forecasting models can provide a satisfactory accuracy for the
GDP of Sarawak?