THE RELATIONSHIP BETWEEN EDUCATION, LAND, LABOR AND AGRICULTURE OUTPUT IN MALAYSIA

Heng Sze Woon

Bachelor of Economics with Honours
(International Economics)
2015
THE RELATIONSHIP BETWEEN EDUCATION, LAND, LABOR AND AGRICULTURE OUTPUT IN MALAYSIA

HENG SZE WOON

This project is submitted in partial fulfilment of the requirements for the degree of Bachelor of Economics with Honours (International Economics)

Faculty of Economics and Business

UNIVERSITY MALAYSIA SARAWAK

2015
Statement of Originality

The work described in this Final Year Project, entitled

“The Relationship between Education, Land, Labor and Agriculture Output in
Malaysia”

is to the best of the author’s knowledge that of the author except

where due reference is made.

______________________  _________________________
Date Submitted                  Heng Sze Woon
                                  36222
ABSTRACT

THE RELATIONSHIP BETWEEN EDUCATION, LAND, LABOR AND AGRICULTURE OUTPUT IN MALAYSIA

By

Heng Sze Woon

This study examines whether relationship exists between education, land, labor and agriculture output in Malaysia over 33 years period starting from year 1980 to 2012. The estimation has been conducted to examine whether there is any cointegration and/or causality relationship between education, land, labor and agriculture output. Unit Root test, Johansen-Juselius Cointegration test, and VAR Granger Causality are employed in this study. The empirical results shows that all the variables are stationary after first differencing and are integrated of order one, I(1). Although there is no existence of cointegration, unidirectional causality relationship does exist between education, land, labor and agriculture output. The causality relationships are running from all the independent variables which are education (LEDUEX), land (AGLN) and labor (EMPAG) towards the dependant variable, agriculture output (LAVA). Besides that, there is also causality relationship running from AGLN towards EMPAG.

Keywords: Agriculture, Education, Land, Labor
ABSTRAK

HUBUNGAN ANTARA PENDIDIKAN, TANAH, BURUH DAN PERTANIAN OUTPUT DI MALAYSIA

Oleh

Heng Sze Woon


Kata Kunci: Pertanian, Pendidikan, Tanah, Buruh
Acknowledgement

Respectfully stated, I would like to express my deepest appreciation and gratitude towards my supervisor, Dr. M. Affendy Arip of the Faculty of Economics and Business, Universiti Malaysia Sarawak (UNIMAS) for the chance to improve and enhance my educational accomplishments under his exemplary guidance and encouragement on various aspects leading to the completion of this study. Last but not least, I would also like to thank my family and friends for their encouragement and support.
# Table of Contents

LIST OF TABLES ........................................................................................................... ix  
LIST OF FIGURES ........................................................................................................... x

CHAPTER 1 ......................................................................................................................... 1  
INTRODUCTION ............................................................................................................. 1  
1.0 Introduction ........................................................................................................... 1  
1.1 Background of Study ............................................................................................ 4  
1.2 Problem Statement ............................................................................................... 11  
1.3 Objectives of Study .............................................................................................. 15  
  1.3.1 General Objective .......................................................................................... 15  
  1.3.2 Specific Objectives ....................................................................................... 15  
1.4 Significance of Study ............................................................................................ 16  
1.5 Organisation of Study ......................................................................................... 17

CHAPTER 2 ....................................................................................................................... 18  
LITERATURE REVIEW ..................................................................................................... 18  
2.0 Introduction .......................................................................................................... 18  
2.1 Conceptual Framework ......................................................................................... 19  
  2.1.1 Production Function Approach .................................................................. 19  
  2.1.2 Human Capital Theory .............................................................................. 20  
  2.1.3 Natural Resources Scarcity Theory .............................................................. 21  
  2.1.4 Labor Supply .............................................................................................. 23  
2.2 Empirical Finding ................................................................................................. 27
CHAPTER 3 .............................................................................................................. 36

METHODOLOGY ................................................................................................. 36

3.0 Introduction .................................................................................................... 36

3.1 Research Design ............................................................................................. 36

3.2 Model ................................................................................................................ 37

3.3 Data Collection and Description ..................................................................... 38

3.4 Methodology .................................................................................................... 39

3.4.1 Unit Root Test .............................................................................................. 39

3.4.1.1 Augmented Dickey Fuller (ADF) Test .................................................. 39

3.4.1.2 Dickey Fuller-Generalized Least Square (DFGLS) .............................. 41

3.4.1.3 Philips and Perron (PP) Test ................................................................. 42

3.4.2 Johansen Cointegration Test ...................................................................... 42

3.4.3 Granger Causality Test .............................................................................. 44

3.4.4 Dynamic Analysis ....................................................................................... 49

3.4.4.1 Variance Decomposition ...................................................................... 50

3.4.4.2 Impulse Response Function .................................................................. 51

CHAPTER 4 .............................................................................................................. 53

EMPIRICAL RESULTS ........................................................................................... 53

4.0 Introduction .................................................................................................... 53

4.1 Unit Root Test Result ..................................................................................... 54

4.2 Johansen-Juselius Cointegration Test ............................................................. 57

4.3 VAR Granger Causality Test Results .............................................................. 58

4.4 Dynamic Analysis .......................................................................................... 59

4.4.1 Variance Decomposition (VDC) ............................................................... 59

4.4.2 Impulse Response Function (IRF) ............................................................. 62

4.5 Conclusion ...................................................................................................... 64

CHAPTER 5 .............................................................................................................. 66

CONCLUSION ....................................................................................................... 66

5.0 Introduction .................................................................................................... 66

5.1 Summary of Finding ....................................................................................... 66
5.2 Policy Implication.................................................................................................................. 69
5.3 Limitation of Study and Recommendation...................................................................... 73
REFERENCE.......................................................................................................................... 74
APPENDIX
LIST OF TABLES

Table 4.1: Unit Root Test Result ................................................................. 55
Table 4.2: Johansen-Juselius Coinegretion Test Result ................................. 57
Table 4.3: Granger Causality Test Result ...................................................... 58
Table 4.4: Variance Decomposition Result .................................................... 60
LIST OF FIGURES

Figure 1.1: Malaysia’s Agriculture Value Added in Billion (constant 2005 USD) from 1980 to 2012.................................................................4

Figure 1.2: Growth Rate of Malaysia’s Agriculture Value Added (constant 2005 USD) from 1980 to 2012.................................................................6

Figure 1.3: Malaysia’s Agriculture Land (% of Land Area) from 1980 to 2012........7

Figure 1.4: Employment in Agriculture (% of Total Employment) in Malaysia from 1980 to 2012.................................................................8

Figure 1.5: Adjusted Saving: Education Expenditure in Billion (Current USD) in Malaysia from 1980 to 2012.................................................................10

Figure 2. 1: Individual Consumption/Leisure Trade-Off Model..............................25

Figure 4.1: Short Run Granger Causality Direction.............................................59

Figure 4.2: Impulse Response Function (IRF) Result...........................................63
CHAPTER 1

INTRODUCTION

1.0 Introduction

Agriculture plays a vital role since the past decade and some issues regarding to agricultural productivity has been raised up in every corner of the world. Following by the transformation of 21st century, many countries although, trying hard to transform into industrialized country, agriculture sector still composed major part among country’s economic sector. Many strong and developed countries such as United State put much concern towards the crop production in the country. As the world technology is getting improved, quality of life has become more emphasized by the people and thus drives both the food sustainability and food security issue to become hot topic that have been discussed and concerned by people nowadays.

Due to the world population is bursting since the last decade, people are concerned about whether the present agriculture sector output is able to provide abundant and sustainable food to them. Abundant supply of food is important to sustain the society, to ensure the living standard of human and also to give people the secure of basic human needs.

However, many people in this world are still facing the crisis of insufficient food supply in which starving has become an everyday routine in their daily life. Recent statistics show that agricultural production needs to increase by 70 percent in the year 2050 in order to feed the world (World Bank, 2007). Many organizations and researchers from all aspect including economists have work hard to find out the
way to ensure those factors affecting agriculture sector output and also develop better technologies to improve the quality and quantity of agriculture productivity in order to meet the aim of food sustainability and food security in every corner of the world. Thus, this study emphasize on the relationship between education agriculture land, labor and agriculture output to find out the determinants of agriculture output in Malaysia.

Agriculture has been broadly defined as the science or practise of farming which include soil cultivation for growing up crops and rearing livestock from the natural resources in the earth in order to provide food, wool and other products. Nowadays, there are 3 common use approaches which are production (the level of output), productivity (output per unit of input) or efficiency (actual output relative to the potential output or best practices) as indicators of the performance in agriculture sector (Chang & Zepeda, 2001). The agricultural production used in this study is agriculture value added at constant 2005 USD which defined as net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources. The origin of value added is determined by the International Standard Industrial Classification (ISIC), revision 3. Data are in constant 2005 U.S. dollars.

Many previous studies have found that there are quite a number of factors that can affect the agriculture output be it from environment, biotic or economic field, for example, rainfall distribution, temperature, fertilizer used, technological change, available workforce in agriculture sector and also available natural resources such as land and water. Some of the determinants can be simplified as the factor of
production which are land, labour and human capital from the economic perspective. By using a two-stage data envelopment analysis (DEA), Aktan and Samut (2013) analyzed the efficiency of Turkey’s agriculture sector in 2009 and found that literacy rate is significant to the efficiency of agriculture sector in Turkey. Pingali and Heisey (1996) proposed that the technological transformation of cereal crop production system into three phases which are land-augmentation phase, labor-substitution phase and the knowledge and management-intensity phase. Some researchers also proposed that the success strategies from pro-poor growth in agriculture passed through better improvement in agricultural productivity and technological innovation (Bravo-Ortega & Lederman, 2005). Dhrifi (2014) study about the role of technological innovation in agricultural output and poverty alleviation and found that employee’s agriculture (% of employment) is one of the determinants of agricultural output.

From all the previous studies, it is vital to carry out study on those determinants of agricultural output in order to increases the performance of agriculture sector and ensure people in all around the world enjoy food sustainability and food security until our next generation. Thus, this study is to examine the effect of agriculture land (as the proxy of land), employment in agriculture sector (as the proxy of labor) and education expenditure (as the proxy of education and technological level) towards agricultural value added (as the proxy of agriculture output) in Malaysia. In addition, the relationship between these three variables and agricultural output also is an interest of this study.
1.1 Background of Study

Malaysia is an ASEAN country which known for its unique and outstanding features that Malays, Chinese, Indian and other ethnic group live together in a peace and harmony atmosphere. Malaysia is a federal constitutional monarchy among the Southeast Asia country which is wealthiest and most developed, outranked in GNP only by Singapore and oil-rich Brunei. It consists of thirteen states and three federal territories. Malaysia is divided into two regions which consist of peninsular Malaysia and Malaysia Borneo.

Figure 1.1: Malaysia’s Agriculture Value Added in Billion (constant 2005 USD) from 1980 to 2012


Agriculture sector plays a dominant role among the economic sectors in Malaysia. By recognizing the vital importance of food security and nutrition in meeting the national level needs, the Malaysia’s Permanent Representative to the United Nations (UN) Datuk Hussein Haniff said Malaysia had made it a point to ensure that sustainable agriculture and food security and nutrition were high on its
national agenda (Borneo Post Online, 2013). Many efforts have been devoted by the government to foster the agricultural production in Malaysia. To the extent to this, better infrastructure such as road and communication system, better education level, knowledge and skill provided to the farmer and also great expenditure spent on the research and development (R&D) in the agriculture sector have been carried out by the government. According to Jala (2013), government is setting up pilot “21st Century Villages” which will have modern facilities such as broadband so that the youngsters in the urban areas have the same opportunity to access things they used to having as youngsters in town. All of the efforts done by the government have seen a good result in the performance of agriculture sector since the past 10 years. Mass number of departments and organizations are involved to ensure smooth progress of agriculture sector in Malaysia. Among some of the departments are Department of Agriculture, Department of Fisheries, Malaysia Agriculture Bank (BPM), Farmers’ Organization Authority (FOA), Malaysian Agricultural Research and Development Institute (MARDI) and etc.

From Figure 1.1, we can see that the trends of agriculture value added which known as the agricultural output in the latter part of this study is increasing steadily from year 1980 until 2012 except for the fluctuation in between the year 1990 until 1998. The steady rising trend in agricultural output after 1998 is most probably due to the implementation of Third National Agricultural Policy (NAP3) which sets the strategic directions for agricultural and forestry development from year 1998 to the year 2010 (Ministry of Agriculture, 2014). This policy is projected to set in place the enabling and supportive measures as well as an environment which is conducive to encourage growth in the agricultural sector. After the implementation of this policy,
the agriculture output performance has shown a rapid growth since 1999 until today. The latest statistics shows that Malaysia’s agriculture output recorded the amount of USD 14.81 billion in year 2013.

Figure 1.2: Growth Rate of Malaysia’s Agriculture Value Added (constant 2005 USD) from 1980 to 2012

![Growth Rate of Malaysia’s Agriculture Value Added](image)


Figure 1.2 shows the agricultural output growth in terms of agriculture value added in Malaysia from year 1980 to 2012. Although the agricultural output shows an upwards slope in the previous figure, to better understanding about the actual performance of agriculture output is by measuring the growth. Figure 2 give an insight about agricultural output growth is in a fluctuated condition. The unstable growth arise a great concern that some preventive and practical steps should be undertaken to ensure a steady growth in agricultural productivity. Steady growth in agricultural output is to ensure Malaysia to be able maintain at the food security and food sustainability level to the nation and even the world.
Figure 1.3: Malaysia’s Agriculture Land (% of Land Area) from 1980 to 2012


Figure 1.3 shows the trend of available agriculture land which measured in the percentage of total land area in Malaysia. According to World Bank (2014), agricultural land refers to the share of land area that is arable, under permanent crops, and under permanent pastures. Arable land includes land defined by the Food and Agriculture Organization (FAO) as land under temporary crops (double-cropped areas are counted once), temporary meadows for mowing or for pasture, land under market or kitchen gardens, and land temporarily fallow. Land abandoned as a result of shifting cultivation is excluded. Land under permanent crops is land cultivated with crops that occupy the land for long periods and need not be replanted after each harvest, such as cocoa, coffee, and rubber. This category includes land under flowering shrubs, fruit trees, nut trees, and vines, but excludes land under trees grown for wood or timber. Permanent pasture is land used for five or more years for forage, including natural and cultivated crops.
From the figure, the trends of agriculture land seem to be increased in a periodic trend. From year 1980 until 1989 the trends increases steadily but come to year 1990 the trends of agriculture and starts to increase in quite slow pace which is around 20 to 21 percentage of total land area. In the year 2002, the agriculture land rise to 23.95% of the total land area and remain the same value in the following years until year 2012 which shows a slightly drops at 23.58%.

**Figure 1.4: Employment in Agriculture (% of Total Employment) in Malaysia from 1980 to 2012**

Source: *World Development Indicators (2015)*

Figure 1.4 shows the trends of share of employment in agriculture from the total employment in Malaysia. According to World Bank (2014), employees are people who work for a public or private employer and receive remuneration in wages, salary, commission, tips, piece rates, or pay in kind. Agriculture corresponds to division 1 (ISIC revision 2) or tabulation categories A and B (ISIC revision 3) and includes hunting, forestry, and fishing. This study includes employment in agriculture sector as one of the explanatory variables to act as an indicator of labor is
intends to study whether the labor available in the agriculture sector give how much impact on the agricultural productivity in Malaysia.

The trend shows a declining rate from year 1980 to 1997 which is 37.2% to 17.3%. According to Indrani (2001), the declining of employment in agriculture is due to the implementation of Sixth Malaysia Plan (1990-1995) which aims to move Malaysia towards an industrialization nation in order to achieve vision 2020. The motive to move from an agricultural economy to an industrial economy is due to agriculture sector considered as unproductive and labor-and-capital intensive. In the year 1998, Third National Agricultural Policy (NAP3, 1998-2010) was announced during the 1997-1998 financial crisis to give agriculture sector a renewed role to meet the concerns of food security. The re-highlight of agriculture sector during financial crisis opens job opportunities for citizen and cause the employment in agriculture to rise at proximately 18.5% during year 1998 to 2000 (Siwar & Hossain, 2001). However, the employment in agriculture drop back to 15.1% from year 2001 to 11.5% in year 2011 and only seen slight increase to12.6% in year 2012.
In this study, adjusted saving for education expenditure in billion (current USD) is used as a measurement of education level and technological knowledge of the farmer. According to World Bank (2014), education expenditure is defined as the current operating expenditures in education, including wages and salaries and excluding capital investments in buildings and equipment. Education expenditure is significant towards the agricultural output growth as it reflects how willing the government and public spent on the human capital to improve the skill and knowledge. According to Huffman and Orazem (2007), education contributes to a better potential of the field in every aspect.

From Figure 1.5, we can see that the education expenditure (current USD) shows a gradually increment from year 1980 to 1996 and experienced a drop in between year 1997 and 1998 due to the Asian financial crisis. The financial crisis was a result of the wholesale and uncritical adoption of financial deregulation, in both capital accounts and the banking sector, pushed by the International Monetary Fund (IMF) and the United States (Lim & Goh, 2012). According to Varghese
(2009), in response to the financial crisis, different governments have different policy. Some governments choose to reduce public funding for higher education while some increases, and some maintained the same level of funding. Thus, Malaysia government and public probably cut off the spending in education to face with the deteriorated economic environment. However, the education expenditure has increases quickly since 1999 after the financial crisis. This is due to the launching of National Economic Recovery Plan, by Dr. Mahathir, our former Prime Minister. The plan is treated as an alternative to conservative IMF policies. Several objectives are to be achieved in the National Economy Recovery Plan, which are to stabilise the local currency, restore market confidence, maintain financial market stability, restructure corporate debt, recapitalise and restructure the banking sector and revitalise the economy (Lim & Goh, 2012). Thanks to the recovery plan, the trend of education expenditure by government and public shows and upward movement indicating that they are giving great emphasize on education since the transition to millennium year.

1.2 Problem Statement

Agricultural sector is an important sector in every nation as it provides food which is vital for the sustainable of human life. Prolonged low production in agriculture will lead to food shortage and human will be distinguished from the world due to hunger and starvation. The agriculture output in Malaysia is rising over time however the question rising from here is whether the output in the production of agriculture is enough to meet the food security level and food sustainability within the nation and even the world as we the growth in the agriculture output shows an
unstable and fluctuated trend. Besides providing food and generate export in Malaysia, the agriculture sector also plays an important role in creating employment for people living in rural area. As rice is a staple foodstuff in the everyday diet of Malaysians and is a symbol of Malaysian traditional food culture, the production of rice plays a significant role in the country's agriculture. Despite this, the overall production of rice still not enough to meet the country's needs as Malaysia are importing rice from neighboring nation such as Thailand and Vietnam. Malaysia is among the Asia country that full of endowment of natural resources that foster agriculture sector growth and thus it is able to play a part in create a world that is free of hunger by fully utilized the natural resources wisely and effectively. Also, the question on how to boost agriculture production is greatly been discussed due to the agriculture could bring about Malaysia’s economic growth and development by exporting agriculture product to other nations.

Agriculture output can affect the economic growth as well as development and raise the issue of food security and food sustainability in Malaysia. A consistent growth in agriculture sector is able to boost the country’s development and increase social welfare of a nation by creating more job opportunities and drive out people from poverty. Food crisis problem has been a problem that rises since the fuel crisis and situation is deteriorated following by the financial crisis that happened in year 2008. According to Tey (2010), up to 90% of rice is produced and consumed in Asia countries and the trends of shifting the fundamentals in both supply and demand side has been emerged. A Chatham House Report by Ambler-Edwards et al. (2009) has proposed that the global food system will undergoes a renewed pressure from the combination impact of seven fundamental factors, which are population growth,
nutrition transition, energy, land, water, labor and climate change. Thus it is crucial to find out which factors do affect agriculture output the most and effort can be made on those determinants that found to be having effect on agriculture output.

Several plans and policies have been implemented in Malaysia to generate the growth of agriculture sector output since the nation gain independence in year 1957 such as National Agricultural Policy (NAP). NAP 1 which implemented during year 1984-1991 aims to increase income through efficient utilized of nation natural resources (Indrani, 2001). NAP2 introduced in year 1992-2010 is aimed to transform the agriculture sector into market-led, commercialized, efficient and competitive sector. NAP3 was introduced due to the financial crisis in 1997 by reviewing on NAP2 that is not suitable on the economic situation beyond the critical period. NAP3 which implemented during 1998-2010 is aims to ensure food security in Malaysia, but in fact, the policy does not match the food security. The main objective in NAP3 is to enhance food security, increase productivity and competitiveness of agriculture, deepen linkages with the economic sectors and create new areas of growth for agriculture. But the question arise in this policy is that how can competitive agriculture ensure food security.

According to Ashraf and Galor (2008), by using land and labor as inputs, the economy will produces a single homogeneous good on every period of time in an overlapping-generations economy. The supply of land is exogenous and fixed over time whereas the evolution of labor supply is governed by households decisions in the preceding period regarding the number of their children. The employment in agriculture has seen a downward sloping trend in recent year while the agriculture sector’s output which measured by the valued added in agriculture at constant 2005