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Foreign Direct Investment and Economic Growth: An Application of Markov Switching Model for Liberia

By

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Declaration

This study was conducted from October 2014 to May 2015. Earnestly, the contents of this paper are declared as the original work of the author.

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Approval

After being examined, this dissertation is hereby approved to have fulfilled the partial requirements for the Master of Arts Degree in Economics.

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Professor P.M. Makepe Supervisor	Date
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Dedication

To my mother, sister, and would-be wife

Acknowledgement

The journey through this master's program was not easy, but God always assures us of His mercy, as He says in Qur'an 93:3 *your Lord has neither forsaken you nor is He displeased with you.* I am therefore very grateful to God Almighty for His continuous mercy.

I wish to express profound gratitude to the Department of Economics in general, and my lecturers in particular, for the great intellectual capacity they have imbued me with. I am especially grateful to my supervisors, Professor Patricia M. Makepe and Professor Narain Sinha, for the guidance they gave me in the conduct of this study. I am very thankful to them for the time out of their busy schedules to read my work and make significant suggestions.

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Contents

Acronyms

ADF: Augmented Dickey Fuller

AMU: Aid Management Unit

AR: Autoregressive

ARMA: Autoregressive Moving Average

CAPIN: Capital Inflows

DAC: Development Assistance Committee

ECOWAS: Economic Community of West African States

FDI: Foreign Direct Investment

FTP: Fixed Transition Probabilities

GDP: Gross Domestic Product

MA: Moving Average

MSM: Markov Switching Model

PP: Phillips Peron

R&D: Research and Development

TVTP: Time Varying Transition Probabilities

WDI: World Development Indicators

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Abstract

This study models the long run effect of FDI on economic growth in Liberia using a two-regime fixed transition probabilities (FTP) Markov Switching Model (MSM). This model, which is advantageous in capturing asymmetry and persistence in extreme observations in the data, is applied to a yearly time series data set covering the period 1970-2012. During this period, the Liberian economy experienced major structural changes which may have imposed some asymmetric effects on macroeconomic variables. The results of the empirical analysis show that regime changes in Liberia are sudden and sporadic, with the economy remaining in the sustainable growth regime most of the time. FDI is positively related to growth when the economy is in the sustainable growth regime, and negatively related to growth when the economy is in the depressed growth regime. Given that the sustainable growth regime has a longer duration and lower probability of transitioning to the depressed growth regime, the study concludes that FDI has an overall positive impact on growth. Therefore, government policies that will encourage domestic resource mobilization (through savings, for example) and control inflation are recommended in attracting more FDI inflows to Liberia.

Keywords: Regime, State, Depressed, Sustainable, Pre-war, War, Post-war, Growth, FDI,

CHAPTER ONE
INTRODUCTION

1.1 Background of the Study

The idea that foreign direct investment (FDI) has an impact on economic growth underlies all the discussions in this paper. It is fair to say that growth theories are concerned with a search of sources of a country's economic growth, and therefore this study is an exploration of the role of FDI as a source of growth in Liberia.

Economic growth, usually defined in terms of an increase in per capita output, has been a major objective pursued by many countries over the years. This is because economic growth is believed to lead to an increase in a society's social and economic well-being (Elias, 1992; Black, Hashimzade, & Myles, 2012). Throughout the economic growth literature, considerable emphasis is placed on the role of capital as a source of growth. For this reason, capital accumulation continues to form a key part of policy targets in developing countries (Elias, 1992). However, because of lack of relevant capacities such as sufficient savings for domestic capital accumulation in developing countries, policy focus in these countries continues to be redirected towards attracting foreign capital for growth (Fry, 1995). Foreign resources, irrespective of their origin, are therefore seen as a catalyst for growth in developing countries' context, a belief that is further strengthened by the experience of the newly industrialized East-Asian countries[1] (Mohan & Kapur, 2010; Fasanya, 2012; Nkoro, 2012).

For Liberia, the human and physical capacity gaps continue to reinforce the need for foreign resources especially in the form of FDI. Since independence in 1847, Liberia has gone through three distinct periods which exacerbate the challenge of domestic resource mobilization for growth, thereby laying emphasis on the need for foreign resources. The post-independence period of 1847-1989, the war period of 1989-2003, and post-war period, of 2003-2013, are described as "growth without development", destruction, and recovery, respectively (World Bank, 1978, 2012). Liberia is a natural resource-rich nation; water, minerals, iron ore, oil (recently discovered), and about 40% of West Africa's total rainforest are among the country's natural endowments (AFDB, 2012). Despite these, the prospect for

[1] China, India, Indonesia, Malaysia, Philippines, and Thailand. The newly industrialized countries (NICs), by definition, are industrialized countries which were formerly classified as less developed but have increased their proportions of industrial production and export (Black et al., 2012).

impressive growth has remained bleak since the pre-war[2] period. This period was characterized by poor governance, socioeconomic disparities, and political exclusions that led Liberia into a 14 year civil crisis which completely ruined the country. Commercial and productive activities shut down, as investors fled the country with their capital and expertise, while warlords looted and vandalized infrastructures, making domestic resource generation difficult. At least 270,000 people lost their lives, as over 500,000 were displaced (Twalla, 2011). Families were broken down; communities uprooted; and social, political, and economic activities destroyed. Gross Domestic Product (GDP) declined drastically, and gross domestic savings went in negatives even after the war. In fact, post-war per capita income and annual GDP growth rate fell below their pre-war levels. GDP fell by 91% during 1979-1996, the worst fall among 12 African countries[3] that experienced GDP declines during war periods. Agriculture, which has always constituted the largest sectorial contribution to Liberia's GDP and employment, was severely damaged. Annual average grain yield fell from 87% of consumption requirements in 1974 to as low as 23% in 1995, thereby increasing the country's food insecurity even in this post-war period (World Bank, 2012; Government of Liberia, 2012, Ministry of Agriculture, 2010). The flow of FDI, like that of many other foreign resources, also reduced considerably between the start of the war in 1989 and the end in 2003. World Development Indicators (WDI) statistics show that net FDI flow fell by about 87% from about 656 million in 1989 to 83 million in 2005, the year of the first post-war democratic elections.

These indications underscore the importance of foreign capital to economic growth in Liberia. Not surprisingly, Liberia has received both private and official flows of foreign resources since the end of the civil war in 2003 and the installation of the first post-war democratic government in 2005. Foreign capital in Liberia's contexts, both in terms of need and amount of flow, comprises FDI, Official Development Assistance (ODA), bilateral flow from Development Assistance Committee (DAC), official flows from United Nations agencies such as United Nations Development Programme (UNDP), United Nations International Children's Emergency Fund (UNICEF), etcetera, and remittances which became important only after the war when many Liberians became displaced to the Diaspora (IMF, 2014, World Bank, 2013).

[2] Liberians generally refer to pre-war periods as "normal days". In this study, these periods largely refer to the years between 1970 and 1989. During the normal days, things appeared seemingly well with a much peaceful environment (compared with the war period) and much affordable cost of living (compared with the post-war period), but at the macro level the economy was not doing well.

[3] Liberia, Sierra Leone, Rwanda, Democratic Republic of Congo, Mozambique, Zimbabwe, Chad, Angola, Burundi, Gabon, Uganda, and Guinea Bissau

In in this study the interest is to model the growth effect of FDI in Liberia. The relationship between FDI and economic growth has been extensively researched over the years for many countries. Studies such as Fasanya (2012), Esso (2010), and Fambon (2013) have found a positive effect of FDI on economic growth in the recipient country. However, a major shortcoming of these studies is their failure to consider the nature of economic growth in the recipient country. That is, they do not consider the effect of FDI on growth when the economy is in different growth states or regimes. It can be observed that the flows and effects of different types of capital vary with different regimes of the economy. For instance, while FDI will be attracted by higher growth rates and prospects, aid may be the reverse.

This study employs a yearly time series data set for the period 1970-2012, which comprises the pre-war, war, and post-war periods, as discussed in chapter two. The Markov Switching model (MSM), also known as Markov Regime Switching model, is then used to empirically distinguish between low and high economic growth regimes and analyse the effect of FDI on growth for the different regimes.

1.2 Problem Statement

Liberia is not starved from lack of financing resources; foreign resources from aid and FDI are flowing in, and are expected to continue in years to come, especially in the natural resource sectors (World Bank, 2012). In this regard, growth is expected to increase. Whether this is true or not is an inference left for the results of the study. However, while countries like China, India, South Korea, etcetera, that were recipients of foreign resources especially in the form of aid have turned into donors, it can be observed that recipient countries in Africa still remain heavily poor and dependent on these inflows. Liberia as one of such countries continues to receive inflows of foreign capital but still remains largely poor and deficient of significant economic growth. For instance, in 1979, net FDI as a percentage of GDP was about 5.1% and GDP per capita was recorded at about US$445. Three decades after, in 2009, FDI more than doubled to about 11% but GDP per capita fell to about US$302 (World Bank, 2013). Additionally, despite the considerable increase in FDI, Liberia was, in 2009, the World's third poorest country after Burundi and Democratic Republic of Congo (World Bank, 2012). This raises serious questions about the effectiveness of FDI in enhancing growth in Liberia and therefore a study of this nature, aimed at empirically understanding the role of FDI in economic growth in Liberia appears to be imperative.

Furthermore, given the increasing volume of empirical studies on FDI and economic growth, there is still a significant research deficit on this matter for Liberia. To the best of the researcher's knowledge, no empirical studies have considered Liberia exclusively, especially in the context of economic regime changes. Most of the studies on this subject have generally assumed that the period under study is homogenous with respect to economic growth. For a country like Liberia, such a generalization may not be applicable because the country has undergone various distinct periods which may have affected its economic growth. The nature of these periods may have also affected the flow and/or effect of FDI in Liberia. In other words, the effect of FDI on growth during the different periods, for example, pre-war period (1970-1989), war period (1989-2003), and post-war period (2004-2012), is not expected to be the same. As Kuan (2002) puts it, macroeconomic variables are expected to behave differently with different times and circumstances. For instance, during expansions GDP growth rates fluctuate around a higher level and are more persistent, and during contraction they are low and less persistent. It is therefore necessary for this study to explore the nature of growth in Liberia using a Markov Regime Switching Model.

1.3 Research Questions

This study attempts to address the following questions:

i. What are the growth regimes that the Liberian economy experiences?
ii. What is the relationship between FDI and growth under different regimes?
iii. To what extent does FDI affect growth under each different regime?
iv. What policy implications can be deduced from the research findings?

1.4 Objectives of the Study

In light of the research questions, the study assumes two sets of objectives: main objective and specific objectives. The main objective is to investigate the effect of FDI on economic growth under different growth regimes. The specific objectives are:

i. To empirically determine the different growth regimes in Liberia
ii. To determine the relationship between FDI and different economic growth regimes
iii. To examine the magnitude of the growth effect of FDI under each regime.
iv. To make policy recommendations based on the research findings.

1.5 Significance of the Study

In spite of the increasing volume of empirical literature on the relationship between FDI and economic growth, it is worth noting that none has exclusively considered Liberia especially in the context of regime switching. Liberia is one of Africa's leading recipients of foreign resources especially in the form of FDI, remittances, and aid. Given the importance of FDI to economic growth in Liberia, understanding its growth effects implies understanding the country's growth prospects. Therefore, a study of this nature seems to help fill a major literature gap and at the same time provide empirically supported policy information for Liberia. For instance, the results can suggest whether policy choices of government should aim at attracting FDI or not, given the growth regime which the economy is in at a given period.

This study also contributes to the econometric aspect of literature by using the MSM. This non-linear approach to the topic makes the study different from others that generally use linear models. The MSM is a relatively new approach and is particularly advantageous because it considers complex issues such as asymmetry and persistence in extreme observations in the data, and reaches solutions by non-linear means (Kuan, 2002). The study also provides a basis for other future researchers especially on this topic.

1.6 Organization of the Study

The rest of this paper is organized as follows: chapter two presents the performance of economic growth and FDI in Liberia, chapter three is the review of relevant theoretical and empirical literature. The methodology for the study is presented in chapter four. Chapters five and six respectively contain the empirical results and conclusions of the study.

CHAPTER TWO
FOREIGN DIRECT INVESTMENT AND GROWTH PERFORMANCE IN LIBERIA

2.0 Introduction

This chapter presents an overview of the economic performance of Liberia, considering the historical perspectives of the growth process during the pre-war, war, and post-war periods. As such, the first section presents the class system that existed and greatly influenced economic growth in Liberia, and how the socioeconomic and political implications of this system led to the 14 year civil war, greatly influencing the growth process in the post-war period. The second section is about FDI in Liberia, relative to trends, sources, and sectorial shares.

2.1 History of Economic Growth in Liberia

Having got independence in 1847 from the American Colonization Society (ACS), Liberia is considered the oldest African republic. However, its economy is still one of the world's poorest. Liberia's journey from independence has not been a smooth one; the country has faced series of challenges ranging from socioeconomic and political divides to economic mismanagement and then a brutal civil war. As a result, lack of adequate domestic capital, as well as improved socio-political and economic infrastructure, continues to pose challenges to the country's economic growth. In the 1940s and 1950s, attracting foreign resources to augment the scarce domestic ones was seen as a better alternative to accelerate growth in Liberia. However, the class system that existed in the country would not allow equitable distribution of the gains from the increased growth.

For more than a century after independence, Liberia was ruled by a class of Liberians known as the "Americo-Liberians[4]" who succeeded in stratifying the country into a socioeconomic and political class system comprising four distinct classes. At the apex was the class known as the "Mulattos", who were decedents of ex-slaves and largely light skinned people of mixed white and black breeds. Second in the hierarchy were those of dark-skinned Americo-Liberians consisting mostly of the plantation labourers. The third class consisted of the re-captives, also known as the "Congos", who were rescued along the way and brought to Liberia by the U.S. slave ship. Finally, the bottom of the hierarchy was made up of the indigenous African Liberians. However, as time passed by, the four class system reduced into

[4] The Americo-Liberians were generally the freed slaves from America.

only two classes: one comprising the erstwhile three classes, known (up to present) as the Congos or the Americo-Liberians, and the indigenous African Liberians making up the other (Dennis, 2006). This class system did not only determine the socio-political and economic systems of Liberia at the time, it also greatly influenced the future of the country's economy. Economic productivity was low and not equitably distributed among the country's small population less than two million at the time; the benefits accrued only to the small elite class comprising of a mere 3.9% of the population, who controlled over 60% of incomes (Carter, 1968).

Pre-war Period: During the 1940's, two policies were introduced, viz: the open door policy and unification policy, aimed at encouraging the flow of foreign investments and bringing the indigenous Liberians into socioeconomic and political spheres, respectively. As a result, foreign investments came into the economy, resulting into opening of iron ore mines and increased rubber production (Carter, 1968; Dennis, 2006). The most successful period of the century long Americo-Liberian rule seems to be the decades of 1950s and 1960s when the Liberian economy recorded one of the world's highest growth rates in excess of 7%, outpaced only by Japan.

By 1965, Liberia was one of the world's leading producers of iron ore. This high growth appeared to have propelled the country towards becoming a middle-income country, with per capita income peaking at US$940 (constant 2000) in 1972 (World Bank, 1978). Growth was driven largely by the mining (iron ore) and agriculture (cash crops) sectors; iron ore accounted for 30% of GDP while rubber and other cash crops accounted for 15%. The fall in global demands for iron ore in late 1960s reduced the competitiveness of the iron ore sector and led to agriculture being the largest contributor (about 60% at present) to GDP (World Bank, 1978; Government of Liberia, 2008).

Even before the fall in its exports, the high capital intensity of the iron ore sector allowed for only few Liberians to be employed therein, making agriculture the largest employer of the vast majority of Liberians. In the agriculture sector, specifically the rubber subsector, labour was provided both on traditional basis and for lower wages. As a result, the rapid economic growth benefited only a small percentage of the population. To achieve inclusive and sustainable growth, it is argued that the scope of economic activities in the agriculture sector should have been widened beyond rubber production to include, for instance, mechanized production of Liberia's staple foods such as rice and cassava, in order to properly reap from the country's vast rainforest and rich soil. So far, formal economic activities did not expand

beyond rubber production, with most Liberians employed in subsistence traditional agriculture where per capita income was only about US$120 as compared to almost US$2,400 in the concessional sector which was fuelled by increased foreign investment (Carter, 1968). Thus the period of 1950 through 1979 is what economic pundits referred to as growth without development in Liberia. That is, the high growth that the country experienced did not lead to structural economic change that would absorb many Liberians into new productive activities and skills (World Bank, 1978; Carter, 1968).

War Period: As the socioeconomic division in the country widened in favour of the small elite class, the discontentment of indigenous Liberians deepened. This led to series of civil unrests including a military coup in the year 1980 when Mr. Samuel K. Doe, an indigenous Liberian, emerged as president of the country. The decade after the coupe was characterized by gross economic mismanagement. During this period, the socioeconomic disparity and political exclusions further increased, coupled with economic collapse and widespread poverty. As a result, the unrests increased, leading to the outbreak of the civil war in 1989 which ended in the year 2003, lasting for a period of fourteen years. The war basically destroyed everything, including the economy. Table 1 below shows the rate of decline in sectorial shares of GDP as a result of the war.

Table 1: Sectorial Shares of GDP Before and After the Civil War

Sectors	**1987**	**2005**	**Decline (%)**
Agriculture	368.7	177.9	51.8
Forestry	56.6	59.0	-4.3
Mining and Spinning	124.9	0.7	99.4
Manufacturing	86.9	51.7	40.5
Services	529.9	112.3	78.8

Source: Government of Liberia, 2008

It can be observed from the table that between the years 1987 and 2005, agricultural production declined by 51.8%. It was mainly due to a fall in production of the cash crops, namely rubber, coffee, and cocoa, which declined sharply by 30.7%, 90.8%, and 79.5% respectively, with rice and cassava which are the country's main staple foods, falling respectively by 75.7% and 23.3%. The highest decline (99.4%) was experienced in the mining and spinning sector, followed by the service sector (78.8%). Major industries like

trade and financial institutions also declined by 73.1% and 93%, respectively (Government of Liberia, 2008; World Bank, 1978, 2012).

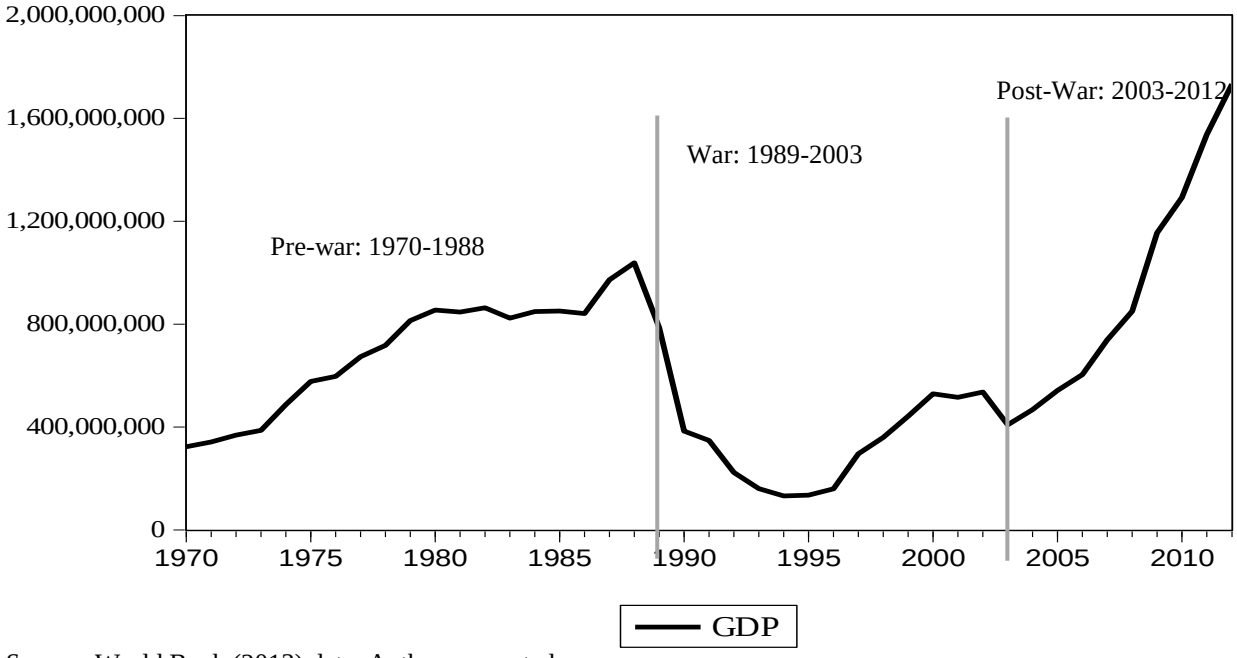
Post-war Period: With the civil war ending in the year 2003, and the installation of the first post-war government in 2005 led by Africa's first female president, Madam Ellen Johnson Sirleaf, the pattern of growth has taken another trend. The causes and effects of the civil crisis continue to make post-war policymakers very keen about the quality of the growth process, as the country aims at becoming a middle income country by the year 2030. The government is to achieve this target through the exploitation of natural resources, maintaining sound macroeconomic policies, improving the business environment, properly allocating aid funds, among others (World Bank, 2012; Government of Liberia, 2012). These efforts have yielded some good outcomes in the following decades. Growth of real GDP increased from 6.1% in 2010 to 8.3 in 2012, but declined marginally to 8.1% in 2013 (Government of Liberia, 2012, 2013). Over these years, growth has been driven significantly by the influx of concession related FDI in the mining sector, as exports of iron ore resumed in 2011 for the first time since the pre-war period (Hettinger & James, 2014; Government of Liberia, 2013). Before the outbreak of the Ebola Virus Disease (EVD) in late 2013, the economy of Liberia was seemingly performing well at various macro and micro levels.

The mainstay sector of the economy, agriculture, was experiencing increases in areas such as cocoa and coffee production, which had increased by 3.2% and 49.6%, respectively. Even though the aging of existing rubber trees and the long gestation period of new ones caused a fall in productivity of the rubber subsector, general prospects of the agriculture sector remained good (Ministry of Finance, 2013). Government's supports through provision of micro-loans, agricultural inputs, and access to markets continued to be underway, with about US$36 million ratified credits invested to boost smallholder agricultural productivity as at 2013. Other key sectors such as mining and manufacturing also maintained similar growth paths. By 2013, the mining sector had recorded a significant growth, as earnings from iron ore production increased by more than 100% from US$ 155.8 million in 2012 to US$351.2 million in 2013. Even though the expansion by 13% in the manufacturing sector was less than that of 2012, subsectors such as cement production recorded a good performance with about 49.6% increase (Government of Liberia, 2013;Ministry of Finance, 2013).

Figure 1 below gives a trend summary of Liberia's GDP performance for the period 1970-2012. It can be observed that the good performance of growth during the 1960s continued to

the 1970s, as indicated by the rising trend in GDP. However, the outbreak of the "rice riot", a violent response to government's announcement of an increase in the price of rice in 1979, slowed down growth, with a further decline to occur after the 1980 coup d'état. This April 1980 coup, followed by a decade long socioeconomic and political mismanagement, coupled with dictatorship, ensured the outbreak of the 14 year civil crisis in late 1989.

Figure 1: Trends in GDP for the Period 1970-2012



Source: World Bank (2013) data. Author computed.

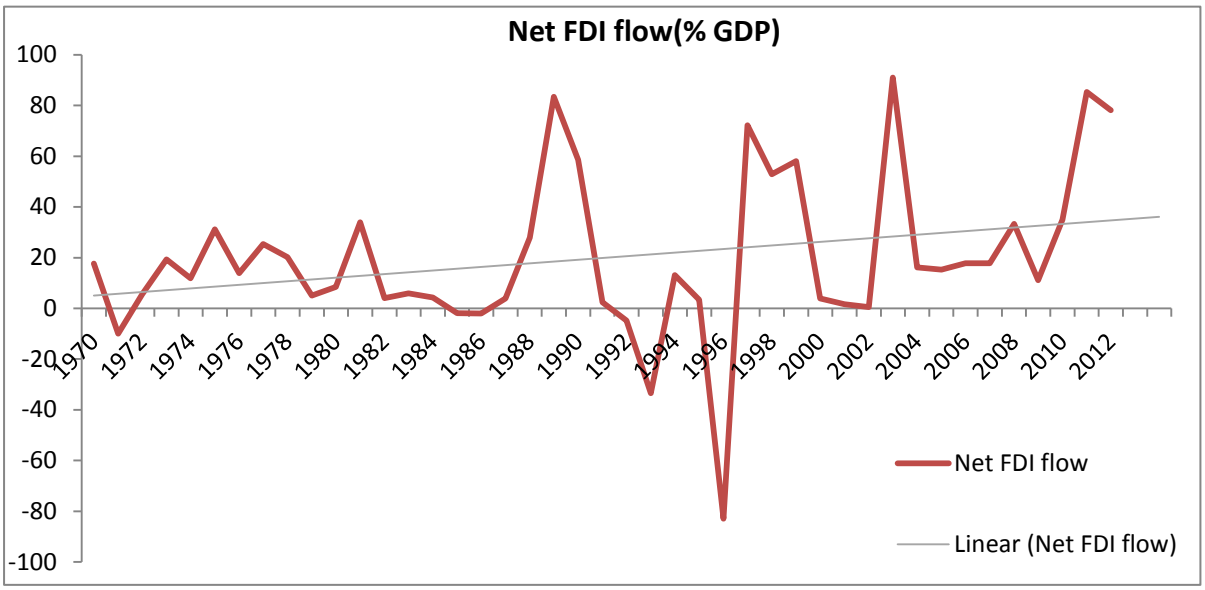
The struggling economy further collapsed during the 1990s. By 1996/97, Liberia experienced a temporary period of peace characterized by the arrival of international peacekeepers and the election of Mr. Charles Taylor as President of the country and the economy picked up. The intensive resume of the crisis, which lasted from 1998 till the signing of the 2003 Comprehensive Peace Agreement (CPA) in Accra, caused the economy to take a downward trend again (Government of Liberia, 2008; World Bank Group, 2013). Since the end of the civil crisis in 2003, and the inauguration of Madam Ellen Johnson Sirleaf as the first elected post-war president, GDP has been rising, as depicted in figure 1 above.

2.2 FDI and Economic Growth

Besides the open door policy of 1944, Liberia adopted many other trade policies in order to enhance both national and international business environments. For instance, in addition to national policies, Liberia became part of many multinational and regional trade frameworks between 1966 and 1994. The Paris convention for the Protection of Industrial Property of

1983, Convention on the Settlement of Investment Disputes between States and Nationals of other States of 1965, Revised Treaty of the Economic Community of West African States (ECOWAS), are among these foreign regulations (UNCTAD, 2006). These steps must have influenced the flow and growth effect of FDI over the years. World Bank statistics on FDI show that net FDI flows as a percentage of GDP increased from about 12% on average in the pre-war regime of 1970-1988 to about 40% in the post-war regime of 2003-2012. During 1990-2000, the periods of intensive civil crisis, FDI flows fell significantly, with the greatest fall of over -80% recorded in 1996/1997. Figure 2 below depicts the changes in the ratio of net FDI flows to GDP over the periods 1970-2012.

Figure 2: Net FDI for the Period 1970-2012



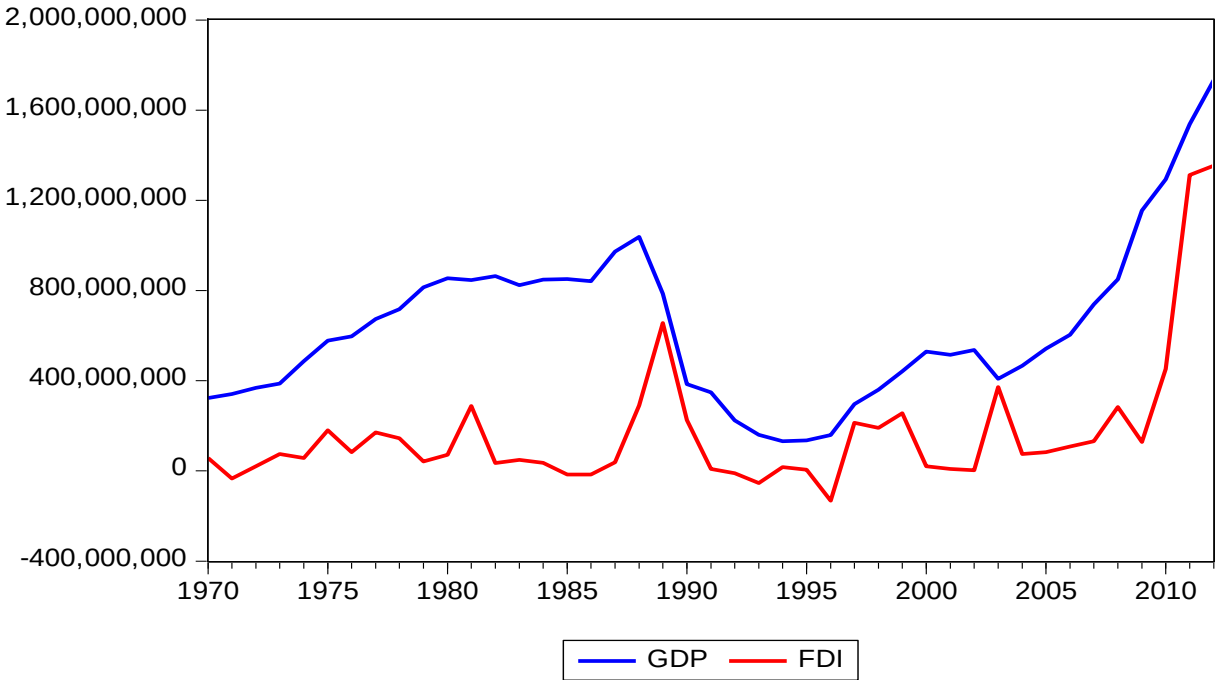
Source: World Bank (2013) data. Author computed.

It can be observed from the graph that the changes in FDI flow largely correspond to the socioeconomic and political atmospheres of the country during the pre-war, war, and post war periods. It can also be observed that if its initial performance had not been interrupted, FDI flow would have experienced a continuous increase to about 50% by now, as shown by the linear curve on figure 2.

The changes in net FDI flows had significant impacts on growth in Liberia over the study period. Figure 3 below depicts the trend of FDI and GDP during the period 1970-2012. It can be observed that during the years of 1970 to 1989, growth and FDI flows were predominantly positive and rising. However, as presented in section one (above), the socioeconomic and political exclusions during the periods after independence had caused lots of dissatisfactions among the Liberian people by 1980. The ensuing socio-political upheavals such as the "rice

riot" of 1979 and the coup d'état of 1980 risked the investment climate in Liberia, hence leading to some volatilities in FDI flow between 1970 and 1980. Between 1981 and 1989, net FDI flow experienced a sharp rise. This was because the change of regime gave hope of a much stable business environment, and hence reduced the outflow of FDI, among others. However, with the outbreak of the civil crisis in 1989, both FDI and GDP fell considerably. Since the end of the civil crisis in 2003 and the installation of the first post-war government in 2005, FDI and growth have been rising.

Figure 3: Trend of FDI and GDP over the Study Period



Source: World Bank (2013) data. Author computed.

Generally, one can observe from figure 3 that FDI and GDP have followed very similar trends in Liberia over the years. This suggests that FDI is an important component of the growth process in Liberia, hence underscoring the importance of an empirical understanding of its effects on growth.

Sectorial Distribution of FDI: In Liberia, the major shares of FDI continue to go to mining sector and cash crops production such as rubber and palm oil production. Recent reports show that this trend will persist for some years unless otherwise intervention is made. Government has identified the need to increase FDI to other sectors of the economy especially the non-extractive sectors. This is critical to inspiring innovation, creating employment, and producing for export. Concession related FDI in Liberia increased from US$153 million in 2010 to US$431 million in 2011, with expectations of a further increase

from US $ 821 million in 2012 to US $ 903 million in 2013. Liberia has also attracted FDI to several other sectors including petroleum, hotels, finance, industry, and infrastructure (Government of Liberia, 2012, 2013).

Major Sources of FDI to Liberia: The potentials for growth that followed the many years of crisis and underinvestment may have given hope to Liberia's existing trade partners and encouraged new ones such as China to come in. Investment to Liberia rose from virtually nothing to US$1.3 billion between 2006 and 2010. The major sources of FDI to Liberia over the years include Belgium/Luxemburg, Croatia, France, Germany, Malaysia, Netherlands, Portugal, Sweden, and United States of America, including new partners such as China and India (Government of Liberia, 2012; UNCTAD, 2006).

2.3 Concluding Remarks

For over a century since independence in 1847, Liberia has experienced series of socioeconomic and political mismanagements which have greatly affected its economic growth. As a result of the class system which largely characterized the pre-war period, there was a mounting discontentment among Liberians; this phenomenon fuelled the outbreak of the 14 year civil war which tumbledown the economy. As a result, FDI flows in Liberia fell greatly, leading to a fall in GDP. It is observed that changes in FDI and GDP follow similar patterns in Liberia, indicating the importance of FDI to the Liberian economy.

CHAPTER THREE
THEORETICAL FRAMEWORK AND LITERATURE REVIEW

3.0 Introduction

This chapter presents a review of theories and empirics that explain the relationship between FDI and economic growth. The first section presents the theoretical concepts, which is followed by review of related empirical studies in the second section. The third section is a synthesis of the empirical literature.

3.1 Theoretical Framework

This section motivates the empirical analysis to follow by reviewing the theoretical foundations underlying the premise that FDI influences economic growth.

The dominant theory in the literature for growth analysis is by Solow (1956). In this pioneering neoclassical concept, output is a function of capital (K), labour (L), and knowledge/technology (A). Assuming a constant return to scale Hicks-neutral[5] technological progress production function, the output equation can be written as follow:

$$Y = Af(K, L, \nu) \qquad (1)$$

where *Y*, *K*, *L*, and *A* represent output, capital, labour, and knowledge or efficiency of production, respectively; and ν is a vector of auxiliary variables. For studies such as this, the auxiliary variables include FDI and other macroeconomic variables that are relevant in explaining a particular economy's growth process. Taking log transformation and time difference of equation (1) yields:

$$g_Y = g_A + \alpha g_K + \gamma g_L + \beta g_\upsilon \qquad (2)$$

where g represents the growth rate and the subscripts are defined in per capita terms of the variables. The coefficients α, β and γ represent the respective elasticity terms of physical capital, labour, and the auxiliary variables.

Solow's model has been considerably cross-examined over the years. For instance, Lucas (1990) observed that the prediction of the Solow model that capital flows from developed countries to developing ones is unrealistic. Lucas therefore argues three points which the Solow growth model does not take into account. First, he argues that there are differences in human capital, underlining the fact that countries do not have the same level of human capital

[5] If knowledge enters the equation in the form *Y=F(AK,L)*, technological progress is said to be capital augmenting known as Solow-neutral technological progress; if it enters in the form *Y=f(K,AL)*, it is said to be labour augmenting, known as Harrod-neutral technological progress.

endowment and that the level of domestic capital has an influence on capital flows such as FDI. Secondly, he insists that there are external benefits of human capital in the form of differences in the level of knowledge, namely *A*, as opposed to it being constant across countries. Such technology may be in the form of education. Thirdly, Lucas argues that the many socioeconomic and political factors that affect the markets for capital may cause capital market imperfections and hence distort capital flows.

Similar to Lucas' (1990) concept, Mankiw, Romer, and Weil (1992) argue that omitting human capital accumulation in Solow's model would cause bias in estimating the coefficient on saving and population growth. They argue that cross-country variations in income-per-capita are a function of variations in the rate of saving, the rate of population growth, and the level of labour productivity.

Motivated by the drawbacks of the neoclassical exogenous model, the endogenous growth models have gained prominence since the seminar work by Romer (1986). A key feature that makes endogenous models different from exogenous ones is that growth can be influenced by endogenous factors such as government policy (Aghion & Banerjee, 2005). Romer (1990) argues that FDI accelerates economic growth through strengthening human capital, the most essential factor in research and development (R&D) effort.

Therefore, to capture the concept of endogenous factors such as the effect of intervention on growth, the study adopts the $Y=AK$[6] model as applied by Bailliu (2000). The model assumes that at time *t*, investment (I_t) is derived from savings (S_t) and financial intermediaries are those that transform savings into investment. In so doing, they draw a fraction, θ, of savings in the form of transaction costs and $1-\theta$ is available for investment, with the result that a dollar saved is less than a dollar's worth of investment. Equilibrium in the model requires that the net savings (after financial intermediaries have taken their share) must be equal to investment.

$$\theta S_t = I_t \qquad (1)$$

Given these assumptions, the steady state growth rate of output, *g*, with financial intermediation is given as:

$$g = A\left(\frac{I}{Y}\right) - \gamma = A\theta s - \gamma \qquad (2)$$

[6] In the Solow model, the production function is $Y = AK^{\alpha}L^{1-\alpha}$. Assuming *A* is constant and setting $\alpha = 1$ gives the AK model, named after the production function which is linear in capital.

Equation (2) shows the efficiency with which savings and capital are allocated to investment by financial intermediaries and how the allocation can affect economic growth.

Suppose that the economy can attract foreign capital flows, say through FDI. The higher the net capital inflows, the larger will be the capacity for investment than in the absence of the inflows (as above). Thus the capital market equilibrium becomes:

$$\theta^{*}\left(S_{t}+CAPIN\right)=I_{t}^{*} \qquad (3)$$

where *CAPIN* is capital inflows, in this case in the form of FDI and * represents the presence of foreign factors. Substituting (3) into (2) gives the steady state growth rate as:

$$g^{*}=A^{*}\theta^{*}s^{*}-\gamma \qquad (4)$$

Comparing (2) and (4) shows that capital flows lead to growth, ($g^{*}>g$), if they increase investment rate ($s^{*}>s$), all else held constant. For "s^{*}"to be greater than "*s*", it must be the case that the capital inflows are used for optimal investment and that they must not lead to crowding out of domestic investment (Bailliu, 2000).

3.2 Review of Empirical Literature

This section reviews related studies in line with the problem currently at hand, as reflected in the research questions of this study. The literature review is expected to shed more light on the problem and objectives of the study (Gay, Mills, & Airasian, 2011).

For both developed and developing countries, the relationship between FDI and economic growth continues to be an unsettled debate. The debate has largely centred around four major areas: (i) determinants of growth (ii) determinants of FDI (iii) direction of causality, and (iv) role of multi-national firms in host countries (Esso, 2010; Chowdhury & Mavrotas, 2005). The role of FDI as a determinant of growth has been prominent in the literature, with a wide spectrum of diverging views and approaches. Many authors of both cross country and country specific studies have found FDI to affect growth in different ways.

At the macro level, the extent to which FDI inflows lead to an overall increase in investment, productivity, and economic growth depends on the technological condition of the host country (De Mello, 1997). This implies that FDI may have limited growth effect in developing countries since these countries must have a certain level of human and physical infrastructure in order to reap higher benefits of FDI. A number of studies have found this to

be the case. For instance, Borensztein, Gregorio, and Lee (1998) tested for the effect of FDI on economic growth in a cross-country regression framework using the seemingly unrelated regressions (SURE) technique. They utilized panel data for two separate decades (1970-79 and 1980-89) on FDI flows from industrialized countries to 69 developing countries. Their results suggested that FDI is an important vehicle for transferring technology, hence contributing more to growth than domestic investment. A different conclusion was however made for Nigeria. Employing time series techniques, Fasayan (2012) found that FDI inflows have a positive impact on growth in Nigeria but domestic investment has more impact than FDI. Both studies meanwhile argued that higher productivity of FDI holds only when the host country has a minimum threshold stock of human capital. In this regard, FDI contributes to economic growth only in the presence of sufficient capacity of host country to absorb the associated advanced technologies with FDI. Similar findings were established by Li and Liu, (2005). They applied both single equation and simultaneous equation system techniques using panel data for 84 countries over the period 1970-1999 and found a positive effect of FDI on economic growth through its interaction with human capital in developing countries. Their findings however show a negative effect of FDI on economic growth through technology gap.

The role of financial intermediation in the host country has also claimed a lot of attention in the FDI-growth literature. This is especially so because financial intermediaries such as banks continue to play increasing roles in the flow of FDI (Mishkin, 2013; Fry, 1995). Financial sector development is both a key determinant of FDI inflows (Mupimpila & Okurut, 2012), and a significant influencer of the effects of FDI on growth (Azman-Saini, Law, & Ahmad, 2010; Alfaro, Chanda, Kalemli-Ozcan, & Sayek, 2004). Using a threshold effect model in a cross-country regression of 91 countries for the period 1975-2005, Azman-Saini et al. (2010) found that FDI only exerts a positive effect on growth when financial development exceeds a certain threshold. That is, FDI leads to growth in host countries where the level of financial development is high. Similarly, Alfaro et al. (2004) studied the effect of FDI on economic growth given the role of local financial markets for 71 countries for the periods 1975-1995. They found that considering FDI alone without the role of financial development, the growth effect of FDI is ambiguous. They found that countries with well developed financial markets gain more from FDI than others with less developped financial markets.

Many studies that have looked at the growth effect of FDI have also considered the direction of causality between the two. In analysing the link between FDI and economic growth in

Ireland, Kim and Bang (2008) used the autoregressive distributed lag (ARDL) approach on an annual time series data set for the periods 1975-2006. They found not only that FDI significantly impacts growth in both short and long runs, but also a long run relationship between FDI and growth. Their granger causality test indicated that FDI causes economic growth. While Fambon (2013) found similar result of a short run and long relationship between FDI and economic growth in Cameroon, Esso (2010) found different directions of causality for some Sub-Saharan African (SSA) countries. Considering ten[7] SSA countries for the periods 1970-2007, the study employed the Toda-Yamamoto (1995) approach to non-causality and found a positive long run relationship between FDI and economic growth in Angola, Cote d'Ivoire, Kenya, Liberia, Senegal and South Africa. Furthermore, while FDI significantly causes economic growth in the other four countries above, it is economic growth that causes FDI in Liberia and South Africa.

Though diverse, the empirical studies on the relationship between FDI and growth in developing countries do not seem to have received all the attention in the literature that they ought to. Growth econometrics in general and FDI-economic growth nexus in particular have not paid much attention to the role of growth volatility (Byrne, 2010). Just as FDI is determined by different factors (Bilgili, Tülüce, & Doğan, 2012; Dunning, 2001), so does it and other macroeconomic variables affect growth in different ways given the state or regime in which the economy is in at a time (Choi, Chung, & Kim, 2013; Misas & Ramirez, 2006). Many studies on economic growth have established that real outputs respond in different ways to shocks, given the state of the economy.

Byrne (2010) applied the time varying transition probabilities (TVTP) approach of a Markov Switching Model (MSM) to a panel data set for SSA countries to study the effect of output collapse on economic growth. The study found that the probability of the economy remaining in a high growth regime increases with terms of trade, among others.

With a TVTP approach to MSM, Misas and Ramirez (2006) analysed the effect of terms of trade, capital inflows, and government expenditure on economic growth under different growth regimes in Colombia. They found terms of trade and government expenditure to be positively related to growth and capital inflows negatively related to growth when the economy is in a low growth regime. When the economy is in a high growth regime, terms of trade and capital inflows were positively related to growth but government expenditure was negatively related to growth.

[7] Angola, Cameroon, Congo, Cote d'Ivoire, Ghana, Kenya, Liberia, Nigeria, Senegal, and South Africa;

Choi, et al., (2013) also applied the MSM to study the effects of different types of capital inflows on exchange rate volatility in Korea. They found FDI inflows to be very significant in explaining exchange rate volatility under both high and low volatility regimes.

3.3 Concluding Remarks

Generally, the empirical studies on the effect of FDI on growth conclude that FDI is an important source of capital and often associated with job creation and technology transfer among other benefits. It leads to improvements in human capital through knowledge and skills development, eventually leading to an overall increase in economic growth (Chowdhury & Mavrotas, 2005). The studies therefore largely support the hypothesis of the reviewed growth theory that capital inflows lead to higher economic growth ($g^* > g$).

Appendix one contains a summary of the reviewed empirical studies. It is worth noting, however, that none of the reviewed empirical studies was exclusively on FDI and economic growth under a MSM approach. This implies that studies on this subject have not distinguished the different growth regimes/states that an economy might be in at a time. It is important, especially for policy implications, to understand the growth effect of FDI when the economy is in a given growth state. Therefore, the fact that this study uses an MSM gives it a fundamental edge over other studies in explaining the effect of FDI on economic growth.

CHAPTER FOUR
METHODOLOGY

4.0 Introduction

This chapter explains the methodology employed in the empirical analysis of this study. In so doing, the chapter discusses the conceptual framework that informs the empirical model. This discussion is followed by the specification of the model to be estimated.

4.1 Markov Switching Model Conceptual Framework

Economic time series data, particularly financial data, occasionally undergo changes in their behaviour. Since the seminar work of Hamilton (1989) to introduce the concept of regime switching, Markov Switching Model (MSM) has proved to be a productive path for empirical research on the behaviour of macroeconomic and financial variables (Hamilton, 2005; Chen & Brown, 2013; Bilgili et al. 2012; Kim & Nelson, 1999). The original MSM focuses on the mean behaviour of the variable(s) of interest, and it involves multiple equations to model those variables under different regimes. The idea of the model is that, instead of choosing either a deterministic or a continuously changing stochastic specification, the trend is assumed to be "regime specific", with the regime varying randomly over time. A key feature of the MSM is that the switching mechanism is controlled by an unobservable state variable that follows a first-order Markov chain. Particularly, the current value of the state variable depends on its immediate past value, hence a structure may prevail for a random period of time and it will be replaced by another structure when a switching takes place. The model is advantageous because it considers asymmetry and persistence in extreme observations in the data, and reaches solutions by non-linear means, hence giving it an edge over linear models (Kuan, 2002; Canova, 2007; Bilgili, et al. 2012). Common classical bivariate or multivariate linear models such as Autoregressive (AR), Moving Average (MA), Autoregressive Integrated Moving Average (ARIMA), etcetera, are not able to capture some sophisticated nonlinear properties such as asymmetry across regimes (Kuan, 2002). Even among other nonlinear models such as logit and probit models, the MSM is found to have superiority especially for dating and forecasting purposes (Laytona & Katsuura, 2001).

MSM analyses involve estimating a latent variable, and the model posits that regime changes are caused by exogenous factors. The technique has become popular since Hamilton (1989)

employed the latent variable(s) to study the USA post-war business cycles (Bilgili et al. 2012; Hamilton, 1988, 1989; Enders, 2004).

4.2 Empirical Model

Detecting Different Economic Growth Regimes

Under the regime switching model, the economy is assumed to enter different states (S_t) at different times, each state being characterized by the state of the economy such as the trends in GDP at different time period. This implies that changes in real output occur stochastically (Misas & Ramirez, 2007). Following Misas and Ramirez, (2007), Byrne, (2010) and Choi, Chung, and Kim, (2013), the MSM to capture economic growth regimes is specified as:

$$\Delta \log(GDP)_t = g_t = \phi\beta_{S_t} X_{it} + \varepsilon_t, \quad S_t = 0,1 \tag{1}$$

$$\varepsilon_t \mid S_t \sim iid\ N(0, \sigma^2_{S_t}) \tag{2}$$

$$\sigma^2_{S_t} = \sigma^2_0(1 - S_t) + \sigma^2_1 S_t \tag{3}$$

$$\beta_{S_t} = \beta_0(1 - S_t) + \beta_{1S_t} \tag{4}$$

where $\Delta \log(GDP)_t$ represents the differenced series of the log of GDP. Equation (1) implies that growth (g_t) depends on its lags (ϕ) and a vector of macroeconomic variables (*X*), as well as on an identically and independently distributed (*i.i.d*) random variable which follows a normal distribution with zero mean and regime or state (S_t) dependent variance (equations 2&3). Equation (4) presents the state of the economy as an unobserved latent variable modelled as a first order Markov process[8] (two regimes); it is the nonlinear component of the model. Under regimes *0* and *1*, the parameters are given by β_0, σ^2_0, and β_1, σ^2_1 respectively. Suppose that the evolution of g_t can be described by an AR(1) process as follow:

$$g_t = \beta_{s_t} + \lambda(g_{t-1} - \beta_{s_{t-1}}) + \varepsilon_t \tag{5}$$

where the terms are as defined above. In practice[9], the evolution of a given regime is not always observable. A key factor that determines the state of g_t is what Hamilton (1989) refers to as transition probabilities, defined as:

$$\begin{aligned} &\Pr[S_t = 0 \mid S_{t-1} = 0] = q, \qquad &&\Pr[S_t = 1 \mid S_{t-1} = 1] = p \\ &\Pr[S_t = 0 \mid S_{t-1} = 1] = 1 - q \qquad &&\Pr[S_t = 1 \mid S_{t-1} = 0] = 1 - p \end{aligned} \tag{6}$$

[8] The case where the current state (S_t) depends only on the state in the preceding period (S_{t-1})

[9] If a priori, S_t is known for *t=1, 2, ……, T,* then (5) becomes just a usual dummy autoregressive problem.

where *q* and *p* are the transition probabilities of S_t between regimes *0* and *1*, respectively. At time *t*, the probability of remaining in regime *0*, given that the economy was in regime *0* at *t-1*, is given by *q*. Similarly, *p* is the probability of staying in regime *1* at *t*, given that the economy was in state *1* at *t-1*. The probabilities *1-q* and *1-p* are the transition probabilities for switching from one regime to the other.

Equation (6) is the case of fixed transition probabilities (FTP) and implies that the switching of regimes between *0* and *1* follows a Markov Chain with time-invariant transition probabilities. Following Hamilton (1989) and Misas and Ramirez (2006), let regime *0* represent the case when the Liberian economy was repressed and not on a sustainable growth path, hence referred to as "depressed growth", while regime *1* is the case when the economy is said to be sustainable, hence referred to as "sustainable growth". To estimate this model, the joint density of $g_t, S_t, \text{and}\, S_{t-1}$ is derived conditional on a set of information (I_{t-1}) as follows:

$$f(g_t, S_t, S_{t-1} \mid I_{t-1}) = f(g_t \mid S_t, S_{t-1}, I_{t-1}) \Pr[S_t, S_{t-1} \mid I_{t-1}]$$

$$= \frac{1}{\sqrt{2\pi\sigma_{S_t}}} \exp\left[-\frac{(g_t - \varphi_{S_t})^2}{2\sigma_{S_t}^2} \right] \tag{7}$$

From equation (7), the conditional density $f(g_t \mid I_{t-1})$ is derived as follows:

$$\begin{aligned} f(g_t \mid I_{t-1}) &= \sum_{S_t=0}^{1} \sum_{S_{t-1}=0}^{1} f(g_t, S_t, S_{t-1} \mid I_{t-1}) \\ &= \sum_{S_t=0}^{1} \sum_{S_{t-1}=0}^{1} f(g_t \mid S_t, S_{t-1}) \Pr[S_t, S_{t-1} \mid I_{t-1}] \end{aligned} \tag{8}$$

The sample conditional log likelihood for the sample 1970-2012, is obtained from equation (8) as follow:

$$\ln L = \sum_{t=1}^{T} \ln \left[\sum_{S_t=0}^{1} \sum_{S_{t-1}=0}^{1} f(g_t \mid S_t, S_{t-1}, I_{t-1}) \Pr[S_t, S_{t-1}, \mid I_{t-1}] \right] \tag{9}$$

where $\Pr[S_t = i, S_{t-1} = j \mid I_{t-1}] = \Pr[S_t = i, \mid S_{t-1} = j] \Pr[S_{t-1} = j \mid I_{t-1}]$ for all *i*, *j* = 1,0. The weight term or probability smoother, $\Pr[S_t, S_{t-1} \mid I_{t-1}]$ in (9) can be computed by updating it once g_t is observed at time *t*, as:

$$\Pr[S_t = i, S_{t-1} = j \mid I_{t-1}] = \frac{f(g_t \mid S_t = i, S_{t-1} = j, I_{t-1}) \Pr[S_t = i, S_{t-1} = j \mid I_{t-1}]}{\sum_{S_t=0}^{1} \sum_{S_{t-1}=0}^{1} f(g_t \mid S_t = i, S_{t-1} = j, I_{t-1}) \Pr[S_t = i, S_{t-1} = j, \mid I_{t-1}]} \tag{10}$$

$$\Pr[S_t = i \mid I_t] = \sum_{S_{t-1}=1}^{1} \Pr[S_t = i, S_{t-1} = j \mid I_t]$$

Iterating (9) and (10) for *t=1,2,…,T,* gives the appropriate weighting terms in $f(g_t \mid I_{t-1})$ (See Hamilton, 1989).

4.3 Model Estimation

After all the necessary adjustments are made to the data, the final data are fitted to a Fixed Transition Probabilities (FTP) Markov Switching Model. In the FTP approach, the parameters are time invariant conditional on an unobservable regime variable that indicates the prevailing regime (Krolzig, 1998). The vector of regime parameters and coefficients are jointly estimated through Maximum Likelihood (ML) methods. The study uses the 8th version of the Econometric Views (EViews 8) statistical package for the estimations.

4.4 Concluding Remarks

Even though modeling the MSM involves multiple equations and requires improved statistical packages such as EViews 8, it has become an increasingly useful tool for modeling nonlinearity in time series. The fact that regime switching in the MSM is controlled by an unobservable state variable makes it particularly different from and superior to other nonlinear models. Consequently, the use of the MSM in this study implies a much deeper analysis of the Liberian economic growth because the effect of unobservable factors, such as asymmetry, will be taken care of. This is particularly necessary for an economy like Liberia's because of the different structural changes that have occurred in the country.

CHAPTER FIVE
ANALYSIS OF DATA AND RESEARCH FINDINGS

5.0 Introduction

Before estimating the Markov Switching FTP model, the data were subjected to careful scrutiny in order to ensure that the necessary characteristics for credible results are met. This was particularly necessary because the Liberian data may have undergone series of alterations owing to the socioeconomic and political statuses of the country over the study period. The results of all the empirical estimations are presented and discussed in this chapter.

The chapter is arranged to begin with data description in section one, followed by the descriptive statistics in section two, and the unit root and cointegration tests outputs in sections three and four, respectively. The results of the Markov Switching FTP regression are presented in section five.

5.1 Data Description

In equation (1), on page 21 above, X_{it} denotes the i*th* explanatory variables at time *t*, as found by other literature to be relevant to the study. Specifically, X_{it} includes: (1) Net FDI flows (FDI), (2) trade openness (TRD), (3) population growth (POPGR), (4) official exchange rate (EXR), (5) inflation (INF), (6) Government consumption (GCON), and (7) Gross Fixed Capital Formation (GFCF). Following Fasanya (2012) and Elias (1992), all other variables apart from the traditional labour and capital variables of growth models, are included to capture the effects of specific factors that are relevant to the study. In so doing, TRD is to capture the effect of trade openness. As Elias (1992) puts it, foreign trade is considered not only as a source of a country's welfare but also of its economic growth. EXR and INF are to capture the effect of monetary policy, and GCON is to capture the effect of fiscal policy.

The data format for the study is yearly time series and covers the period 1970-2012. This period is chosen for two reasons: First to capture the effect of FDI on economic growth when growth is gloomy, as during the 1970s and 1980s due to the series of civil instabilities, and then the 14 year period of civil war. Second is to capture the growth effect of FDI after the war, when growth is said to be sustainable. Even though the political events over the study period suggest different regimes, the Regime Switching Model is employed for detecting them empirically.

All data are obtained from the World Bank Development Indicators 2013 (World Bank, 2013) and the United Nations Conference on Trade and Development (UNCTAD) online databases. Whereas data for FDI, GDP, EXR, INF, and POPGR are obtained from WDI, those for TRD, GCON, and GFCF, are obtained from UNCTAD. It is worth noting that these sources use estimates for some series. Furthermore, as a result of missing data owing to the 14 year civil war, this study uses proxies for some variables. As a result of these situations, caution is taken in interpreting the empirical results based on these data.

5.2 Descriptive Statistics

For the purpose of the analysis, eight variables are selected; these are: (1) Log of GDP (LNGDP) in millions, current U.S. dollars (2) Net FDI flows, in millions of U.S. dollars, defined as FDI inflows minus outflows; it has been considered in level because of negative values for some years. (3) Log of official exchange rate (LNEXR), defined to be the exchange rate between U.S dollars (US$) and Liberian Dollars (LR$). (4) Log of Gross Fixed Capital Formation (LNGFCF) to GDP as a proxy for capital stock. (5) Log of government consumption (LNGCON) as a share of GDP. (6) Inflation (INF), proxied by GDP deflator because of missing data in Consumer Price Index (CPI) for the war period; this variable is considered in levels because of presence of negative values. (7) Population growth (POPGR) as a proxy for labour force has also been considered in level because of presence of negative values due to the war. (8) Log of trade openness (LNTRD), measured as the sum of exports and imports to GDP.

The summary statistics of these variables contain the mean, median, maximum, minimum, standard deviation, kurtosis, skewness, and the Jarque-Bera (JB) test values, which are presented in table 2 below. The analysis is also strengthened by the values of the kurtosis and the skewness. They are respectively the measures of tallness or flatness and symmetry in the distribution. The benchmark value for kurtosis is 3 (known as mesokurtic). When the value of kurtosis is less than 3, the distribution is fat or short-tailed and is known as platykurtic, while it is slim or long-tailed (known as leptokurtic) when the value of kurtosis is greater than 3. The benchmark for symmetrical distribution (skewness) is how close the variable is to zero (Gujarati & Porter, 2009).

Table 2: Summary of Descriptive Statistics, 1970-2012.

	LNGDP	FDI	LNEXR	INF	LNGFCF	LNGCON	POPGR	LNTRD
Mean	20.1115	169.3021	1.4117	5.2913	4.4317	4.3992	2.5775	-0.1059
Median	20.1743	74.8400	2.77E-07	5.2672	4.4066	4.4106	2.8409	0.0156
Maximum	21.2735	1354.100	4.2974	29.0533	5.3749	5.1029	7.8358	0.3768
Minimum	18.6998	-132.1300	-1.00E-09	-10.0088	3.5708	3.4804	-1.8262	-1.1538
Std. Dev	0.6196	298.4083	1.9550	7.6252	0.4615	0.4082	2.2891	0.3367
Skewness	-0.5558	2.9007	0.6450	0.8184	-0.0185	-0.4371	-0.1273	-0.7910
Kurtosis	2.9357	11.5809	1.4305	4.3303	2.2005	2.5422	3.2252	3.5229
JB	2.2220	192.2264	7.3954	7.9701	1.1478	1.7447	0.2070	4.9745
Probability	0.3292	0.0000	0.0247	0.0185	0.5633	0.4179	0.9017	0.0831
Observation	43	43	43	43	43	43	43	43

Source: Study Descriptive Statistics Test

As may be observed from the table, LNGDP, LNEXR, LNGFCF, LNGCON are platykurtic, while FDI, INF, POPGR, and LNTRD are leptokurtic. Similarly, LNFDI, LNGFCF, and LNGCON have the most skewed distribution. The JB statistic is the test of normality under the hypothesis that the residuals are normally distributed (Gujarati & Porter, 2009). Therefore, with the JB probability relatively high for LNGDP, LNGFCF, LNGCON, POPGR, the researcher fails to reject the null hypothesis of the JB test.

5.3 Unit Root Tests

Time series analysis assumes that the time series data are stationary; that is they have zero mean and a finite variance (Gujarati & Porter, 2009). If a time series contains nonstationary variables, as Granger and Newbold (1974) puts it, one might end up with a spurious regression. This is a type of regression whose outputs have a high R^2 and/or significant *t*-statistics but the results do not make much "economic sense." Before estimating the MSM therefore, the time series property of stationarity of all the variables was checked by means of the predominantly used unit root tests of Augmented Dickey Fuller (ADF). The null hypothesis of the ADF test is that the variable under consideration has a unit root. This hypothesis is rejected if the computed test statistic is greater (in absolute terms) than the

critical value at given significance levels (Enders, 2010, 2004). Table 3, below, shows the results of the ADF tests.

Table 3: ADF Test Results.

Variables	LEVEL		FIRST DIFFERENCE		Order of Integration
	Constant, no trend	Constant and linear trend	Constant, no trend	Constant and linear trend	
LNGDP	-1.671334	-1.663527	-3.480322[b]	-3.489013	I(1)
FDI	-0.713646	-1.278782	-6.322735[a]	-6.502586[a]	I(1)
LNEXR	-0.493843	-1.963672	-6.421687[a]	-6.413498[a]	I(1)
INF	-4.906179[a]	-4.838050[a]	-	-	I(0)
LNGFCF	-2.712268	-3.005230	-7.728338[a]	-7.618613[a]	I(1)
LNGCON	-1.372689	-1.349097	-5.126324[a]	-5.068527[a]	I(1)
POPGR	-2.529013	-2.640915	-2.766088	-2.733561	NS
LNTRD	-2.185228	-2.130014	-7.391251[a]	-7.333942[a]	I(1)

Source: Study Stationarity Test Results

Note: *a represents 1% and b represents 5% significance levels at which the null hypothesis was rejected for each variable.*

It can be observed from the table that with the exception POPGR which is nonstationary (NS), and INF which is stationary in levels (I(0)), all other variables are intergrated of order one (I(1)). This result confirms a popular characteristic of most macroeconomic time series being I(1) (Gujarati & Porter, 2009).

The Dickey-Fuller type tests assume that the errors in the data are independent and have a constant variance. However, there might be structural breaks over the sampled period, and these breaks might impact the errors and variances in the data (Enders, 2010, 2004). Therefore, one must be careful when performing unit root tests in the case where structural change in the variables occurred. For the case of the Liberian data, the political atmosphere over the study period indicates possible structural breaks. When there are structural breaks, as Enders (2010, 2004) put it, the various Dickey-Fuller test statistics are biased towards failing to reject the null hypothesis of a unit root in the variable. In this case, a unit root test based on the Dickey-Fuller type tests requires splitting the sample into parts, but the danger in this proceedure is that one may not know where the break point lies. Moreover, the degree of freedom is also reduced for each resulting regression. It is therefore preferable to run a single test on the full sample (Enders 2010, 2004).

Perron (1989) argues that the evidence in favor of unit roots based on Dickey-Fuller type tests on the full sample has been overstated because they do not have adequate power against trend-stationarity with structural breaks in trend level or growth rate. In this study therefore, the variables are further tested for unit roots using Phillips-Perron (PP), and the results are as shown in table 4 below.

Table 4: Phillips-Perron (PP) Test Outputs.

Variables	LEVEL		FIRST DIFFERENCE		Order of integration
	Constant, no trend	Constant and linear trend	Constant, no trend	Constant and linear trend	
LNGDP	-1.393961	-1.414754	-3.555687[b]	-3.489577	I(1)
FDI	-0.790651	-1.398394	-6.350262[a]	-6.583142[a]	I(1)
LNEXR	-0.493843	-1.977269	-6.421687[a]	-6.413510[a]	I(1)
INF	-4.874057[a]	-4.803370[a]	-	-	I(0)
LNGFCF	-2.644638	-3.005230	-8.855316[a]	-8.667812[a]	I(1)
LNGCON	-1.661621	-1.656960	-5.126324[a]	-5.049989[a]	I(1)
POPGR	-2.154345	-2.181378	-2.495047	-2.477894	NS
LNTRD	-2.175044	-2.128120	-7.393098[a]	-7.350906[a]	I(1)

Source: Study Stationarity Test Results

Note: *a and b are respectively 1% and 5% significance levels at which the null hypothesis was rejected for each variable.*

The results are similar to those of the ADF; that is, with the exception of INF which is I(0), and POPGR which is NS, all the other variables are I(1).

Based on the unit roots results, POPGR is excluded from all further regression models in order to avoid spurious regression outputs.

5.4 Cointegration Test

In determining the number of Cointegrating Equations (CEs), trace test and maximum eigenvalue test were applied. The assumptions of intercept and intercept and trend are respectively model1 and model2. Tables 5 and 6 below show the results of the cointegration tests.

For both assumptions of intercept and intercept and trend, as presented in the tables, Max-Eigenvalue and Trace tests indicate no cointegrating equations at both 5% and 1% significance levels.

Table 5: Johansen-Juselius Maximum Likelihood Cointegration Test Results.
MODEL 1: (LNGDP, FDI, LNEXR, LNGFCF, LNGCON, LNTRD)

Hypothesized No. of CE(s)	Eigen Value	Max-Eigen value	Critical Value		Trace statistic	Critical value	
			5 percent	1 percent		5 percent	1 percent
None	0.784376	62.90305[b(a)]	39.37	45.10	130.8826[b(a)]	94.15	103.18
At most 1	0.521353	30.20851	33.46	38.77	67.97951	68.52	76.07
At most 2	0.366748	18.73236	27.07	32.24	37.77100	47.21	54.46
At most 3	0.305088	14.92275	20.97	25.52	19.03865	29.68	35.65
At most 4	0.092953	4.000023	14.07	18.63	4.115894	15.41	20.04
At most 5	0.002822	0.115871	3.76	6.65	0.115871	3.76	6.65

Source: Study Cointegration Test Results
a and *b* =1% and 5% significance levels respectively
b(a) means rejection of hypothesis at both 5% and 1% levels

Table 6: Johansen_Juselius Maximum Likelihood Cointegration Test Results.
MODEL 2: (LNGDP, FDI, LNEXR, LNGFCF, LNGCON, LNTRD)

Hypothesized No. of CE(s)	Eigen Value	Max-Eigen value	Critical Value		Trace Statistic	Critical value	
			5 percent	1 percent		5 percent	1 percent
None	0.821984	70.76113[b(a)]	43.97	49.51	156.3840[b(a)]	114.90	124.75
At most 1	0.574429	35.02726	37.52	42.36	85.62285	87.31	96.58
At most 2	0.390059	20.27012	31.46	36.65	50.59559	62.99	70.05
At most 3	0.313535	15.42421	25.54	30.34	30.32547	42.44	48.45
At most 4	0.233522	10.90394	18.96	23.65	14.90126	25.32	30.45
At most 5	0.092894	3.997313	12.25	16.26	3.997313	12.25	16.26

Source: Study Cointegration Test Results
a and *b* =1% and 5% significance levels respectively
b(a) means rejection of hypothesis at both 5% and 1% levels

5.5.1: FTP Results with Regime Parameters Only

The fixed transition probabilities (FTP), indicated in equation 6 on page 21, imply that the switching of regime between regimes *0* and *1* follows a Markov Chain with time-invariant transition probabilities. Following Hamilton (1989) and Misas and Ramirez (2006), let regime *0* represent the case when the Liberian economy was repressed and not on a sustainable growth path, hence referred to as "depressed growth", while regime *1* is the case when the economy is said to be sustainable, hence referred to as "sustainable growth".

A first-order two-state MSM with fixed/constant transition probabilities was estimated for the Liberian economy using annual time series data of the first differenced log of GDP for the period 1970-2012. This first step was to estimate the regime coefficients (β_{S_t}, p, q, $\sigma^2_{S_t}$, ϕ). In so doing, the basic Hamilton (1989) two state four-order Markov Switching Autoregressive (MSAR(4)) model, which was employed to study the USA post-war business cycles, was estimated. In this approach, the economy depends on its lags. Initial regime

probabilities were obtained through ergodic solution, and convergence obtained after 11 iterations. Table 7 below shows the maximum likelihood estimates of this FTP estimation. From the table, it can be observed that all the parameters of the model, except β_0 (constant of regime *0*), q (probability of regime *0*) and ϕ_3 (3rd lag of the log of GDP), are statistically significant. Furthermore, it can be observed that the Standard Errors of Estimate (S.E.E) of parameters in regime *0* are greater than those of regime *1*. As found by Enders (2010), and as the nature of the Liberian economy suggests, this result could be attributed to higher unpredictabilities in the Liberian economy associated with regime *0* than regime *1*.

Table 7: Maximum Likelihood Estimates of Regime Parameters and Assymptotic Standard Errors of Estimates.

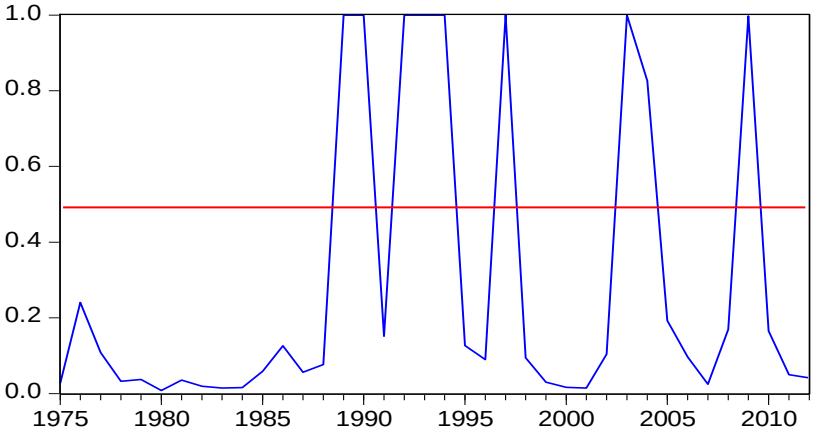
Parameter	**Estimate**	**S.E.E**
β_0	-0.067375	0.083634
β_1	0.072482[a]	0.016775
q	0.474270	0.868203
p	0.788422[b]	0.674997
σ_0^2	-1.103246[a]	0.263055
σ_1^2	-3.023598[a]	0.195755
ϕ_1	0.170574[a]	0.063828
ϕ_2	0.152570[b]	0.076682
ϕ_3	0.118303	0.071946
ϕ_4	-0.242161[a]	0.077046
Durbin-Watson stat		1.54
Akaike info criterion		-0.81
Schwarz criterion		-0.38

Source: Study MSM Estimation Results
a=1% and b=5% significance levels.

The association of regime *0* with depressed growth and regime *1* with sustainable growth is supported by the sample likelihood coefficients of β_{st}, where β_0 and β_1 are statistically different. The maximized likelihood shows a statistically significant and negative coefficient of β_0, and a statistically significant and positive coefficient of β_1. Specifically, regime *0* records, on average, a negative growth of about 6.7% per year, while regime *1* records a positive growth of about 7.3% per year. This finding implies that there are two different growth regimes for the Liberian economy and that growth decreases with the depressed growth regime and increases with the sustainable growth regime for the period 1970-2012. Similarly, the transition probabilities (q and p) show that regime *1* (sustainable growth regime) is more stable than regime *0*, (depressed growth regime).

The probability ($q=P_{00}$) of the economy staying in a depressed growth regime at time *t*, given that it was in depressed growth regime at time *t-1* is given by 0.47, which is relatively low when compared with the 0.78 probability ($p=P_{11}$) of the economy being in sustainable growth regime, given that it was in that regime at time *t-1*. Similarly, there is a high probability of transitioning from a depressed to sustainable growth regime[10]. Appendix II shows the transition probability table and graphs. The probability of transitioning from depressed to sustainable growth regime (*1-q*) is about 0.53, while the probability of transitioning from sustainable to depressed growth (*1-p*) is about 0.21. This result indicates that it is likelier for the economy to move to sustainable growth when it is in depressed growth than it is for the economy to move to depressed growth when it is in a sustainable growth. It is important to note, as shown by figures 4A and 4B, which show the smoothed transition probabilities of the state of the economy through time, that the economy visits each regime at different periods. The graphs plot the weighted or smoothed probabilities of being in each growth regime at each date in the sampled period. The inference is based on the full sample and the estimated maximum likelihood parameters presented in table 7 above.

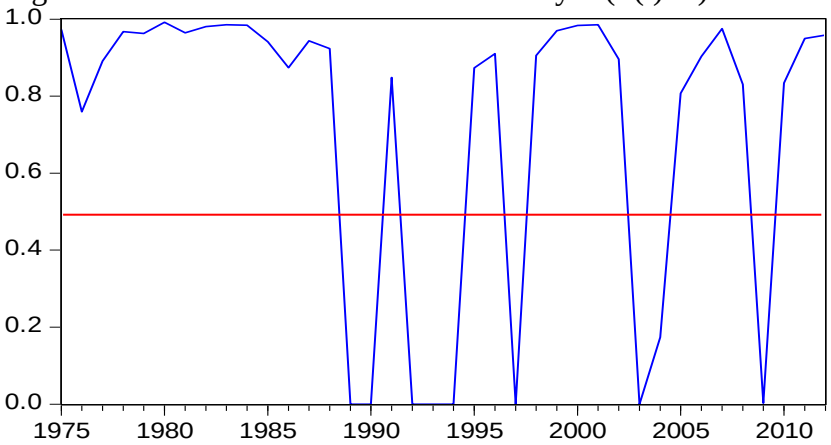
Figure 4A: Smoothed Transition Probability: P(S(t)=0).



Source: Study MSM Estimation Results

[10] Similar findings are provided by Hamilton (1989) for the US economy and Misas and Ramirez (2007) for the Colombian economy.

Figure 4B: Smoothed Transition Probability: P(S(t)=1).



Source: Study MSM Estimation Results

Following Misas and Ramirez (2007), the transition of regimes is benchmarked by the probability of 0.5 (the horizontal line in panels A and B of figure 4). The switching probabilities are given by $\Pr[S_t, S_{t-1} \mid I_{t-1}] \leq 0.5$ for regime *0* and $\Pr[S_t, S_{t-1} \mid I_{t-1}] \geq 0.5$ for regimes *1*.

It can be observed from figures 4A and 4B, above, that up to 1989, there was a high probability of the economy staying in the state of sustainable growth, implying a low probability of remaining in the state of depressed growth. Thereafter, the economy continuously experiences fluctuating transition probabilities up to 2012. The high probability of staying in regime *1* during the pre-war period could be explained by the possible long run effect of the high growth that Liberia experienced during the decades between 1950 and 1970. On the other hand, the fluctuation in transition probabilities during the post war period could be explained by two factors: the long run effect of economic mismanagements and the 14 year civil war on one hand, and the effect of external factors on the other hand. As a small open economy, the Liberian economy is vulnerable to external shocks which influence the determination of the state of the economy. For instance, the low probability of staying in a high growth regime between 2008 and 2010 could be attributed to the effect of the 2008 global financial crisis.

However, what matters most is the duration of the economy in each regime. Appendix II shows the table and graphs of the constant expected duration of each regime. The expected duration of sustainable growth is more than twofold that of depressed growth. That is, regime *0* has an expected duration of about 2 years while regime *1* has an expected duration of about 5 years. This finding is similar to that of Byrne (2010) who found a larger transition probability for P_{00} and P_{11}, as well as longer expected durations of 5.88 years and 20 years

respectively for regimes *0* and *1* in Liberia. Even though both results speak to the same conclusion, it is worth mentioning that Byrne (2010) employed a time varying transition probabilities (TVTP) approach for a panel data set, while this study employed a fixed transition probabilities (FTP) approach for a time series data set.

In general, one can conclude that as presented in chapter 2, the nature of growth in Liberia largely corresponds to the above results. Growth is much impressive and sustainable since the end of the civil crisis. One reason that is attributable to the positive growth and long expected duration associated with regime *1* than regime *0* is the many sound macroeconomic policies adopted by the Liberian government since the end of the civil crisis.

5.5.2: FTP Results with Macroeconomic Explanatory Variables

Once the regimes have been identified endogenously and analysed, the next step was the estimation process to examine the behaviour of the various macroeconomic variables (FDI, LNGFCF, LNGCON, INF, LNEXR and LNTRD) under each regime. Table 8 below presents the results of the MSM with each of these macroeconomic explanatory variables. The bottom part of the table shows the summary statistics of the regression.

Table 8: Maximum Likelihood Estimates Coefficients and Assymptotic Standard Errors of Estimates.

Regime *0*			**Regime *1***		
Coefficient	**Estimate**	**S.E.E**	**Coefficient**	**Estimate**	**S.E.E**
β_0(FDI)	-0.000195[a]	1.98E-05	β_1(FDI)	0.000899[a]	3.97E-05
β_0(LNGFCF)	0.118297[a]	0.009670	β_1(LNGFCF)	-0.096313	0.072189
β_0(LNGCON(-1))	0.013153	0.030230	β_1(INF)	-0.004811[b]	0.001873
β_0(INF)	0.006753[a]	0.000724	β_1(LNGCON(-1))	-0.143168[a]	0.041660
β_0(LNEXR)	0.033687[a]	0.007662	β_1(LNEXR)	-0.039100[c]	0.021304
β_0(LNTRD)	-0.297800[a]	0.016595	β_1(LNTRD)	0.420355[a]	0.058364
Durbin-Watson *d* stat.					1.6
AIC					-2.1
SIC					-1.3

Source: Study MSM Estimation Results
a=1%, b=5%, and c=10% significance levels.

As measures of goodness of fit of the regression, the values of Akaike's Information Criterion (AIC) and Schwarz Information Criterion (SIC) show less deviation from the fitted regression line, implying that the included macroeconomic variables properly explain the

changes in GDP. The Durbin Watson *d* statistic of 1.6428 also shows that there is no serial correlation or auto correlation in the model specification.

In terms of magnitude, it can be observed from table 8 that all the variables, except government consumption and capital stock, are statistically significant in both regimes *0* and *1*; government consumption is significant only in regime *0* and capital stock is significant only in regime *1*. Generally, the significance of these variables show that Liberia's economic growth depends on FDI, gross fixed capital formation, fiscal and monetary policies, and the level of trade openness.

The results (table 8) show that FDI is significant but negatively related to growth in regime *0* and positively related to growth in regime *1*. Specifically, for every one million dollars increase in the net flow of FDI, on average, GDP will decrease by about 0.02% when the economy is in the depressed growth regime. On the other hand, a million dollars increase in FDI, when the economy is in the sustainable growth regime, leads to about 0.089% increase in GDP. Two inferences can be drawn from this finding: First, when the economy is considered holistically, FDI appears to have an ambiguous effect on growth, a finding similar to that of Alfaro et al. (2004). Second, FDI appears to exert a larger effect on growth in regime *1* than in regime *0*. As discussed in section 5.5.1 above, given the high probability of the economy transitioning from depressed to sustainable growth regime, and the long expected duration of the sustainable growth regime, it can be concluded that FDI generally has a positive effect on growth in Liberia. This finding is in line with the findings of Li & Liu, (2005) and Borensztein, et al. (1998). However, the fact that FDI has different effects on growth in different regimes in Liberia signals that the state of economic growth has a considerable influence on the inflows, hence the effect, of FDI on growth in Liberia. This reasoning is supported by Esso (2010) who found that it is FDI that causes economic growth in other African countries but for Liberia, it is economic growth that causes FDI.

Fiscal and monetary policies, as measured in this study by government consumption, inflation, and exchange rate, also have key impacts on growth in Liberia. Fiscal policy, measured by government consumption, is significant only in regime *1*. Although sound fiscal policy is crucial to a country's growth, economic theories suggest that increased government interventions can undermine growth, especially in developing economies (Fry, 1995). The negative coefficient of the lag of GCON in regime *1* suggests similar phenomenon for Liberia. It suggests that when the economy is in a sustainable growth regime, government

intervention through fiscal policy could have a crowding out effect, hence negatively affecting growth. On the other hand, monetary policy is significant in both regimes. Economic literature posits that monetary policy tools of inflation and exchange rate are a measure of the overall macroeconomic stability of a country (Mishkin, 2013). Higher inflation rates, for instance, can imply disincentives on FDI to a country, as they lead to an increase in the user cost of capital. The results of this study show that growth increases with monetary policy tools in regime *0* and decreases with them in regime *1*. This finding suggests that economic agents, such as investors, are rational and they take advantage of the short term gains from policy announcements (such as an increase in inflation) in the short run. As the economy stabilizes in the long run (as in regime *1*), changes in monetary tools lead to a disincentive in economic activities such as investment, hence growth falls. This result shows the asymmetry effect of government policies on the Liberian business cycle, which in turn affects economic growth.

Capital stock, proxied by gross fixed capital formation (GFCF), is significant only in regime *0.* The elasticity of GDP with respect to GFCF in the depressed growth regime suggests that if capital formation goes up by 1%, on average, economic growth will increase by about 0.12%. Similarly, the elasticity of growth with respect to trade openness, which is significant in both regimes, suggests that if trade openness increases by 1%, on average, growth decreases by about 0.29% when the economy is in the depressed growth regime, and increases by about 0.42% when the economy is in a sustainable growth regime. By convention, an elasticity coefficient less than 1, in absolute terms, is said to be inelastic (Gujarati & Porter, 2010). Therefore, one can infer that economic growth changes proportionately less than the changes in capital stock and trade openness in Liberia.

5.6: Model Selection Criteria

Several criteria are available for selecting the best fitted regression of a model. In this study, the final model was selected based on the values of AIC, SIC, and Durbin-Watson *d* statistic. Yarmohammadi, Mostafaei, and Safaei, (2012) used the value of AIC among others to select the best fitted Markov Switching Autoregressive (MSAR) model for time series. The AIC and SIC statistics aim at minimizing the residual sum of squares (RSS), and at the same time imposing harsher penalties for adding regressors to the model. In comparing two models, the convention holds that the model with the lowest values of AIC and/or SIC is preferred (Gujarati & Porter, 2009; Akaike, 1979, 1974). Similarly, the widely used Durbin-Watson *d*

Test for serial correlation was also used to compare competing outputs of the MSM. The "rule of thumb" for the Durbin-Watson *d* Test is how close the statistic is to 2. That is, if the statistic is about 2, one may reject the hypothesis of serial correlation among the variables (Gujarati & Porter, 2009).

For the purpose of this study therefore, the target was a model with the lowest possible values of AIC and SIC, as well as a Durbin-Watson value closer to 2. In this regard, the model was initially estimated with only FDI. The output of this estimation was found short of the desired model. See Table III in appendix III for this output. The model was then estimated by gradually adding additional explainatory variables. The ensuing final model (with low AIC and SIC values, as well as high Durbin-Watson statistic) is as presented in table 8.

5.7 Concluding Remarks

This chapter contains all the empirical analyses of the study. After detailed descriptions of the data, the chapter proceeds with the diagnostics tests which include the unit root and cointegration tests, and then the estimation of the MSM. As a result of the unit root test, one variable, namely POPGR, was excluded from all further estimations because it was found to be nonstationary under both the ADF and PP tests. This was necessary in order to avoid spurious regression outputs. The FTP Markov Switching Model was then simulated with the remaining variables and the results reveal two regimes for the Liberian economy for the study period. Similarly, the results show that FDI is significant in both regimes and has an overall positive effect on economic growth in Liberia.

CHAPTER SIX
CONCLUSION AND POLICY IMPLICATION

6.0 Introduction

In this final chapter, the study's summary, conclusions, policy implications, limitations, and suggested area(s) of further studies are presented. The chapter begins with the summary and conclusion in section one, followed by the policy implications of the study in section two, limitations of the study and suggested area(s) of further studies in sections three and four, respectively.

6.1 Summary and Conclusion

This study modelled economic growth in Liberia using an annual time series data set for the period 1970-2012. As outlined in section four of chapter one, the study set to answer some questions relating to FDI and economic growth in Liberia. In so doing, it employed a new and an increasingly popular method of modelling economic series involving unobserved structural changes. The two-regime first order Markov Switching model used in this study seemed particularly well suited for the Liberian data. This is because the many economic mismanagements, as well as the 14 year civil war and then a decade of recovery during the sampled period, may have imposed some asymmetries and structural changes in the data. As a nonlinear model, the Markov Switching Model is advantageous because it considers asymmetry and persistence in the data, the effect of which was particularly important for this study.

After scrutinizing the data set for its time series requirements, the first step in estimating the MSM was to determine the regimes of the Liberian economy. Two main results of this regression emerged. First, it was found that the Liberian economy visits two growth regimes and experiences a longer duration in the sustainable growth regime than in the depressed growth regime. While changes between regimes are found to be sudden and more sporadic especially for the period 1989-2012, sustainable growth regime is more persistent than depressed growth regime. This finding answers the question relating to the number of growth regimes in Liberia. Second, the probability of transitioning from regime *0* to regime *1* was higher than that of transitioning from regime *1* to regime *0*. That is, the economy switches

easily from depressed to sustainable growth than it switches from sustainable to depressed growth.

After identifying and analysing the nature of the economy, the next step was to examine the behaviour of FDI and other macroeconomic variables under the various growth regimes. Prominent among the findings of this regression were the answers to the questions relating to the FDI-growth relationship, given the different growth regimes. FDI was found to be a significant part of growth in Liberia. If the economy is in a depressed growth state, net flow of FDI is inversely proportional to growth, while it increases with growth when the economy is in the sustainable growth state. The long duration of the sustainable growth regime and the high probability of transitioning from depressed to sustainable growth regime imply that FDI can have a longer positive impact on the economy and that its inflows should be encouraged.

In general, the conclusion is that this study supports the concept of asymmetry and other unobservable factors affecting macroeconomic variables and hence the state of an economy. The evidence of two different growth regimes in Liberia indicates this phenomenon for the Liberian economy. The structural changes that the country has gone through over the decades have had significant effects on macroeconomic variables in Liberia. This finding is in line with other studies including Byrne (2010), Misas and Ramirez (2006) and Hamilton (1988).

Furthermore, it can be concluded that this study confirms the predominant findings in literature that FDI leads to economic growth. This finding for Liberia means that the country can benefit extensively from the new technologies, new employments, and improved management skills, among others, that are associated with FDI flows. This finding is in line with many studies as presented in section two of chapter three.

6.2 Policy Implications of the Findings

The findings generally suggest that the decades of socio-political exclusions, economic mismanagement, and the civil war in Liberia had long run impacts on the economy, as evidenced by the nature of regime switching. To mitigate this situation and further reduce the probability of the economy transitioning into the depressed growth regime, government of Liberia needs to pursue broad based and sustainable socioeconomic policies. Policies that will reconcile the war-ravaged country, decentralize economic activities, and bring Liberians into much sustainable economic scopes, will reduce the socio-political and economic gaps that characterize the country. For instance, giving that agriculture constitutes the largest sectorial shares of GDP and employment in Liberia, government policies should go beyond

providing microloans to farmers and target industrializing the sector. In this way, the lives of the vast majority of Liberians will be improved, hence eradicating the class system and reducing the possibility of social unrests occurring. Eventually, the probability of the economy transitioning into the depressed growth state will continue to reduce and growth will then be sustainable.

It was also found that the long duration of the sustainable growth regime and the high probability of transitioning from depressed to sustainable growth regime imply that FDI inflows can have an overall positive long run effect on economic growth in Liberia. Therefore, the government should design and implement sound fiscal and monetary policies which will encourage domestic resource mobilization (through savings, for example) and control inflation. Success in this direction will not only accelerate the country's accumulation of capital stock, it will also imply an improved role of fiscal and monetary policies in achieving economic growth in Liberia. With increases in domestic capital stock and FDI, the country is likely to transform from a largely subsistence agriculture based economy to that of improved productive and absorptive capacities which will eventually reduce unemployment and increase economic growth.

6.3 Limitations of the Study

The challenge of obtaining the necessary data for the study made this work both tiresome and time consuming. It is worth noting that the 14 years of civil crisis greatly affected data generation in Liberia, the result of which is the unavailability of series for many variables. Consequently, proxies were used for some variables such as inflation and capital stock. Also, unlike many other studies on this subject, this study used net flow (inflows minus outflows) of FDI in place of stock of FDI.

As a result of the above constraint, the time frame for this study became an inevitable limitation.

6.4 Area(s) of Further Study

In this paper the fixed transition probabilities (FTP) approach was employed to study the effect of FDI on economic growth in Liberia. As a drawback, this approach assumes that the expected durations of depressed and sustainable growth regimes can differ but they are forced to be constant over time. Transition probabilities are therefore more restrictive under the FTP

approach (Moolman, 2004). The time varying transition probabilities (TVTP) approach on the other hand allows transition probabilities to be determined endogenously by explanatory variable(s) such as FDI (Misas and Ramirez, 2006; Diebold, Lee, and Gretchen, 1994). Therefore, for a much robust analysis of the Liberian economy, it is suggested that further research work considers this subject for a TVTP approach.

Appendix I:

Summary of some empirical studies

Study		Sample	Methodology	Key variables (Dependent variable first)
Author	**Title**			
Fambon (2013)[11]	Foreign capital inflow and economic growth in Cameroon	Cameroon; Yearly time series: 1980-2008	ARDL, CUSUM and CUSUMSQ	GDP, SI (for capital) FDI, FA, LAB
Choi, et al. (2013)	Capital Inflows and Exchange Rate Volatility in Korea	Korea; Monthly time series: 1990:02-2011:07	MS GARCH-in-Mean VAR	Exchange rate, FDI, Equity, Bond, Bank loan
Fasanya (2012)[12]	Capital flows-economic growth nexus in Nigeria: Has foreign direct investment played a role in accelerating economic growth?	Nigeria; Yearly time series: 1970-2010	OLS and ECM	GDPR, POPGR (labour force), INV/GDP (domestic capital), FDI, OPEN, GCON/GDP (fiscal tools), EXR & INF (monetary tools).
Bilgili et al. (2012)	The Determinants of FDI in Turkey: A Markov Regime-Switching approach	Turkey; 1988-2010	Markov Regime-Switching approach	FDI, GDP, export, import, labor cost index, electricity price,
Byrne (2010)	Output Collapse, Growth and Volatility in Sub-Saharan Africa: A Regime Switching Approach	Sub-Saharan Africa; Panel data: 1960-2004	MSM, OLS	GDP per worker, terms of trade, institutional quality, education
Esso (2010)	Long run relationship and causality between foreign direct investment and economic growth: Evidence from ten African countries	Angola, Cameroon, Congo, Cote d'Ivoire, Ghana, Kenya, Liberia, Nigeria, Senegal, and South Africa; Time series: 1970-2007	Pesaran et al. (2001) Toda-Yamamoto (1995), UECM	GDPC, RFDI (ratio of FDI to GDP)
Azman-Saini et al. (2010)[13]	FDI and economic growth: New evidence on the role of financial markets	91 countries; Cross country: 1975-2005	Threshold effect	GDP, FDI, FIN, initial GDPPC, POP, INV, HCAP(avg. year of secondary schooling), GEXP/GDP
Kim & Bang (2008)	The impact of FDI on economic growth: A case study of Ireland	Ireland; Yearly time series: 1975-2006	ARDL	GDP,FDI,
Misas and Ramirez (2006)	Colombian economy under Markov Switching Regimes with endogenous transition probabilities	Colombia; Yearly time series: 1925-2005	Markov Switching Model	GDP, terms of trade, capital inflows, government expenditure
Li and Liu (2005)[14]	Foreign direct investment and economic growth: an increasingly endogenous relationship	84 countries; 1970-1999	Single equation and simultaneous equation systems	GDPPCGR, POPGR, SCH, INV, FDI, X (country-group dummies and policy variables).
Alfaro et al (2004)[15]	FDI and economic growth: the role of local financial markets	71 countries; 1975-1995	Growth models, OLS	GDP, FDI, SCH, INF, TRDV, GCON, POPGR, Financial markets, Black market premium [(parallel exchange rate/official exchange rate-1)x100]
Borensztein et al (1998)	How does foreign direct investment affect economic growth?	69 developing countries; two decades: 1970-79 and 1980-89	Seemingly Unrelated Regressions (SUR)	GDP,FDI, H (human cap.) A (GCON, INF, black market premium, political instability, political right as a proxy for financial dev., quality of institutions)

[11] Methodology: Autoregressive Distributive Lag (ARDL), Cumulative Sum (CUSUM) and Cumulative Sum of Square (CUSUMQ). Variables: Share of investment (SI), Foreign Aid (FA), Labour force (LAB)
[12] Population growth rate (POPGR), Government consumption (GCON), Exchange rate (EXR), Inflation (INF).
[13] Financial market indicator (FIN) acts as sample splitting or threshold variable
[14] Growth rate of GDP per capita (GDPPCGR), Level of secondary school attainment (SCH),
[15] Trade volume (TRDV)

Appendix II:

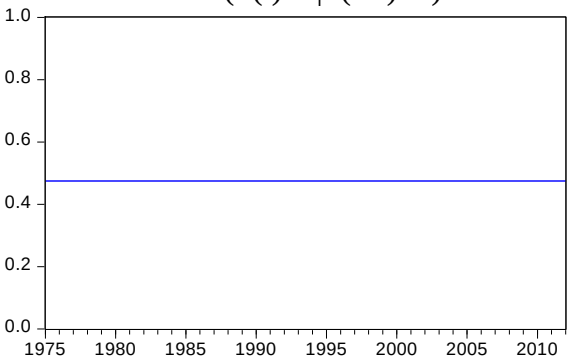
Fixed Transition Probabilities and Expected Durations

Table IIIA: Constant/Fixed Transition Probabilities

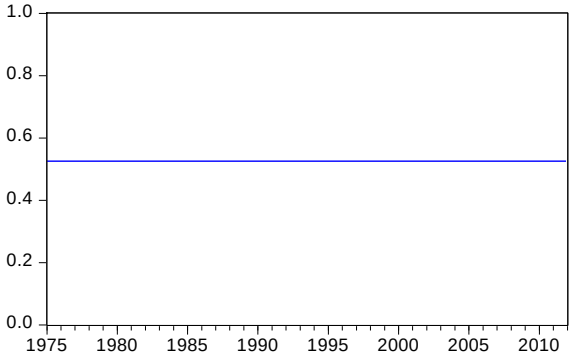
Regime	0	1
0	0.474270	0.525730
1	0.211578	0.788422

Figures IIIA-D: Constant/Fixed Transition Probabilities

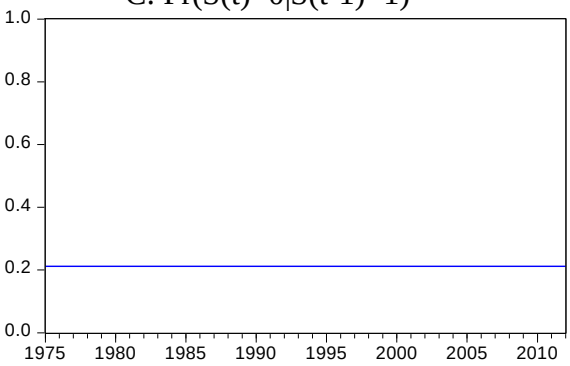
A: Pr(S(t)=0|S(t-1)=0)



B: Pr(S(t)=1|S(t-1)=0)



C: Pr(S(t)=0|S(t-1)=1)



D: Pr(S(t)=1|S(t-1)=1)

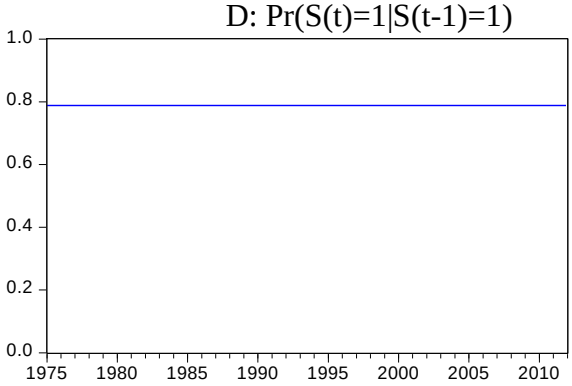


Table IIIB: Constant/Fixed Expected Regime Duration

Regime	1	2
Duration	1.902132	4.726400

Figure IIIA: Constant expected duration of regime *0*

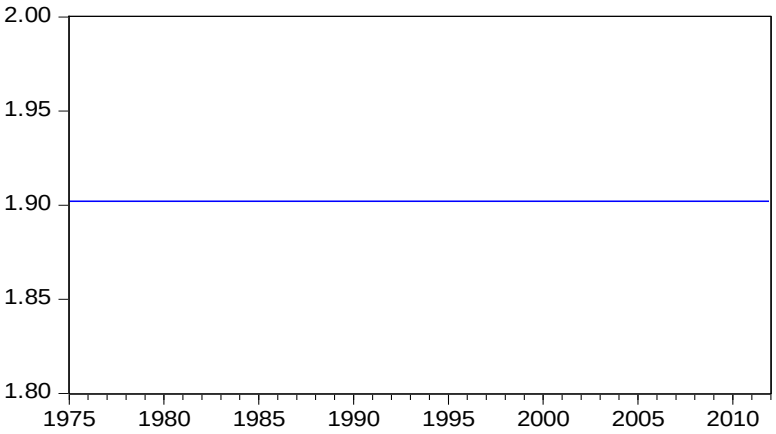
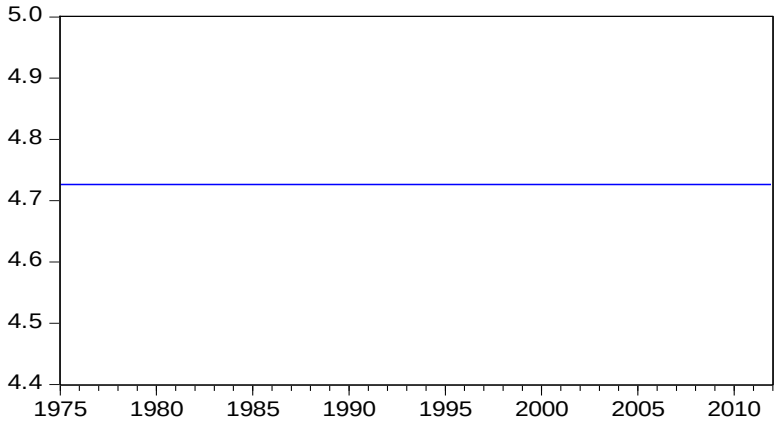


Figure IIIB: Constant expected duration of regime *1*



Appendix III:

Alternative model

Table III:

Regime *0*		
Coefficient	**Estimate**	**S.E.E**
β_0 (FDI)	-0.021728	0.021421
σ_0^2	-2.723131[a]	0.202780
Regime *1*		
β_1 (FDI)	-0.040290[a]	0.006302
σ_1^2	-3.917607[a]	0.349811
Durbin-Watson *d* stat		1.329374
AIC		-1.743025
SIC		-1.267238

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