

**ÇANKAYA UNIVERSITY  
GRADUATE SCHOOL OF SOCIAL SCIENCES  
DEPARTMENT OF ECONOMICS**

**MASTER'S THESIS**

**THE RELATIONSHIP BETWEEN EXPORTS AND ECONOMIC GROWTH  
THE CASE OF IVORY COAST:  
EVIDENCE FROM AUTOREGRESSIVE DISTRIBUTED LAG (ARDL) MODELS**

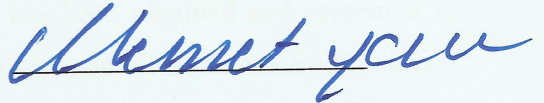
**ABO YANNICK WILFRIED LANGUI**

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Submitted by: **Abo Yannick Wilfried Langui**

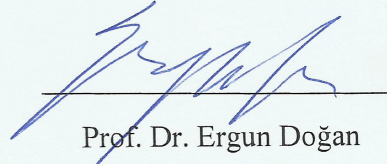
Approval of the Graduate School of Social Sciences, Çankaya University



Prof. Dr. Mehmet YAZICI

Director

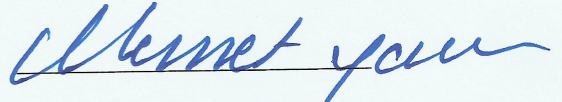
I certify that this Thesis satisfies all the requirements as a thesis for the degree of Master of Science in Financial Economics.



Prof. Dr. Ergun Doğan

Head of Department

This is to certify that we have read this thesis and that in our opinion it is fully adequate, in scope and quality, as a thesis for the degree of Master of Science in Financial Economics.




Prof. Dr. Mehmet YAZICI

Supervisor

Examination Date: 27/06/2016

Examining Committee Members:

Prof. Dr. Mehmet YAZICI (Çankaya University) 

Prof. Dr. Ergun Doğan (Çankaya University) 

Prof. Dr. Timur Han Gür (Hacettepe University) 

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Name, Last Name: Abo Yannick Wilfried Langui

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## **Abstract**

THE RELATIONSHIP BETWEEN EXPORTS AND ECONOMIC GROWTH  
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EVIDENCE FROM AUTOREGRESSIVE DISTRIBUTED LAG (ARDL) MODELS  
ABO YANNICK WILFRIED LANGUI

M.Sc. Financial Economics

Supervisor: Prof. Dr. Mehmet Yazici

This study looks at the relationship between export and economic growth in Ivory Coast. Bounds testing approach and Autoregressive Distributed Lag were used in the analysis for the sample period 1987-2013. The results tells us that, export has a positive and statistically significant effect and on Real GDP, in the long run and also gross capital formation and labour force growth rate have statistically significant and positive effect on Real GDP.



# ÖZET

## IHRACAT VE EKONOMİK BÜYÜME İLİŞKİŞİ FİLDİŞİ SAHİLİ ÖRNEĞİ ARDL modellerinden kanıtlar

ABO YANNICK WILFRIED LANGUI

Finansal Ekonomi, Yüksek lisans programı

Danışman, Prof. Dr. Mehmet Yazıcı

Bu çalışmada Fildişi sahili ekonomisinde 1987-2013 döneminde ihracat ve ekonomik büyüme arasındaki ilişki analiz edilmiştir. Söz konusu amaç için sınır testi ve ARDL yaklaşımı kullanarak ihracatın reel GSYİH üzerine olan etkisi araştırılmıştır. Sonuçlar Fildişi ekonomisinde ihracatın uzun vadede ekonomik büyümeyi etkilediğini göstermiştir. Gayri safi sabit sermaye oluşumu ve işgücü büyüme oranı için de reel GSYİH üzerine istatistiksel etki bulunmuştur.

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## CHAPTER 1

In this chapter, we should give the justification of the research, furthermore show that, this subject on export has in importance by giving the different difficulties encountered by Ivory Coast from the independence period till now.

### **1. Introduction**

In the recent three decades, the relationship between export and economic growth became an ultimate subjects for a large number of Economists and researchers around the world. Especially for least developed countries of which the principal number of these countries are in Africa and Asia. Mainly most of the African countries have their economy based on crude oil or based on the export of Agricultural products. The case of Ivory Coast, a member of ECOWAS (economic community of West African states), is one of the important countries in the west of Africa, precisely the second economic power after Nigeria in the region. Its GDP is divided by 28% in industry, for the Agriculture sector 26% and service 45%.

Furthermore, Cote d'ivoire is a French colony and during the last decade has been in political crisis which lead to a war, and of course had a negative impact on the society and economic situation of the country. First producer and exporter of Cocoa beans in the world, it is also one of the principal producer and exporter of palm oil, coffee, cotton and rubber, in Africa and the whole world. In fact, the economy may be influenced by the international prices and the climatic condition, as well. Therefore, Export of good and services seems to be one of the most important macroeconomic indicator which can influence the economy of Cote d'ivoire.

Defined by some economists in these terms, exports are the source of foreign exchange which may be used to ease pressure on the balanced of payments and create more job opportunities. From this approach, we may consider export as an engine of growth.

A number of researchers have checked the export led growth hypothesis for many countries. For the case of Cote d'ivoire some studies have been done but precisely before the crisis, also mostly without a special study of cointegration or granger causality analysis. We decided therefore to check the relation between the export of good and services and the economic growth both in the short and in the long run to see whether export may influence significantly the economic growth which is represented by Growth domestic production.

## **1.1 Statement of the problem**

The trade in Cote d'ivoire has gone through many steps. Before the independence of the country (before 1960), the policy of the trade was defined only by France. During this period, the GDP was very high. Especially, the commodities were exported and the manufactured products imported.

After the independence, from 1960 to 1980, the policy of trade was the import substitution industrialization. During this period the country became independent, the government policy focused on producing some primary commodities instead of import them and generate more profit for the country. The first objective in this period was to produce more commodities for the local markets rather than exporting them. The second objective of this policy was to create more job opportunities, stimulate innovation, and make the country strong in certain areas such as technology, food, and so on.

In 1970's, the deterioration of economy performance appeared in Cote d'ivoire. Due to that deterioration, an economic program named ERP (economic recovery programme) was started in 1980. The principal objective of ERP was to achieve a higher economic growth by the strict way of increasing the resource allocation, for instance sell the primary commodities on the local market, with a local market prices sensibly equal to the international market prices. This period of course was the beginning of the trade liberalization and therefore the period of economic growth strategy.

From some reports of World Bank, from 1980's til now, we remarked that Export and GDP have been moving upward together. Obviously, we might ask the following questions, is the increase in GDP due to the increase in Export? Again, perhaps is the growth in export due to the increase in GDP? Or maybe, is the rise in GDP due to some other factors? Finally in any case, is there any link between these two macroeconomic indicators, namely export and economic growth?

An empirical investigation on the relation between Export and economic growth has therefore its importance.

## **1.2 Objectives of the study**

The general objective of our study is to ascertain whether Exports affects economic growth, if so positively or negatively. For this investigation, the specific objective is given below:

- Analyse the nature of the relationship between export and economic growth.

## **1.3 Research's hypothesis**

This Research is designed to look at the relationship between export and economic growth, especially whether there is a long run relationship between them, for that, there are two following hypothesis,

- H0 : Export of good and services does not enhance economic growth,
- H1: Export of good and services enhances economic growth.

## **1.4 Scope and Limitations**

First of all, we need to check the nature of the relation between the inputs and the real domestic output. As our subject is to look at whether exports and GDP are cointegrated, we shall determine if export leads growth in Ivory Coast.

For that, it is therefore compulsory to build the appropriate model for the empirical analysis. It means that the stationary of the data should be investigated, and other specific diagnostic like correlation, normality and heteroskedasticity. The period of our study is 1987-2013, and the scope should be extended to investigate the effects of gross capital formation and labour force to the economy of Ivory Coast.

Therefore in our model, labour force growth rate and gross capital formation as a percentage of GDP should be included as input in the model.

The principal limitation of our study is related to the confidentiality of the data. We wanted to make our analysis with a quarterly data, particularly which might be interesting for our analysis where unfortunately, it was quite impossible to get it for the sample period analysis.

Given these constraints our study was sufficiently comprehensive.



## **1.5 Organisation of the report**

In order to present the report of this empirical analysis, we have 6 chapters. To begin with, in the chapter one, there are included the introduction of the all study, the problem of which we are working on this topic, the different objectives, general and specifics ones.

The chapter two presents some notions about the the Ivory Coast's Economy, its structure and its principal components. Of course some factors influences its economy, therefore it seems irrelevant to discuss about it and explain briefly how its economy is moving other time, after her Independence until Now. We should notice some of macroeconomic indicators are given in this part, specifically with the consideration of our period of analysis to show, obviously their probably impact on the economy of Ivory Coast concerning a certain time.

In the chapter three, it is question of the literature review. In this section we present the theoretical review of the analysis, which are the principal models or economic theories that we used to ascertain our research. Those theories are based on the neoclassical theory of export led growth. Furthermore, we present also in this section the empirical review of the study, which can be defined as the entire or a part of research done on the same topic or area of studies by some other researchers or economists. This empirical analysis, therefore help us to make the feasibility of our analysis, and likewise, create the opportunity of understanding the theories related to the topic.

For the purpose of chapter four, the description of the data, its source and the method used for its analysis has been shown in this section. In addition, we decide to talk about the method of testing the stationary or not of the data, the methodology of cointegration and the estimation of the model, with obviously some diagnostics checking namely as autocorrelation, heteroskedasticity and normality.

In the chapter five, we discuss on the different results or findings of the analysis.

Finally in the last chapter, in chapter six, we conclude study where we summarize our findings and make policy suggestions based on findings.

## CHAPTER 2

In this part of the thesis, it is necessary to give some information relative to the economy of Ivory Coast.

### **2. Background of the study**

#### **2.1 Overview of Ivory Coast**

Cote d'ivoire named Ivory Coast in English is a French colony which obtained her independence, on the 7<sup>th</sup> August of 1960. Due to the fertility of the land, and the openness to the Atlantic Ocean, Cote d'ivoire has a lot of advantage for the production of raw materials and their export to the rest of the world.

It is considerably the largest producer and exporter of cocoa bean, (40% of the world's production), and obviously the first producer of Rubber and cashew in Africa, the fifth producer of palm oil in the world and also, it is one of the biggest producer and exporter of coffee in the world. Many other agricultural products exists and also their production and export generate profit for the country. To sum up, Cote d'ivoire is a perfect agricultural country, and used to be one of the leader in economic performance in West Africa. In addition, it exports also gold and fish and exports is a huge amount of crude oil which is 30 % of the total amount of export.

Unfortunately from 1999 to 2010 the country faced some political crisis which led to a war and the country were divided into two parts from 2002 to march 2007. This situation had an effect on the stability on the country, and of course on her economy.

Now, the country is stable, no war, and the reunification of the country impact positively the relation with other nations. From this positive environment, Cote d'ivoire was ranked among the 10 best reformers consecutively in 2014 and 2015 (World Bank's Doing Business report).

## **2.2 Export and the Ivorian Economy**

The three principal export partners of Ivory Coast are: European Union countries, United States, and Nigeria for respectively, 46 %, 11 %, 7% and obviously 36 % for the rest of the world. The period of trade liberalization started with the economic recovery programme. This programme was developed through many steps over time. Especially between the years (1986-1988), the amount of export of the country started to decrease and impacts considerably on the economy of the country. And then after this problem, another programme was made in 1990, with the objective to stabilize the financial situation of the country. We therefore show some economic indicators in the following table.

<b>Economic indicators</b>	<b>Period before 1987</b>			<b>Period after 1987</b>		
	1982	1985	1987	1990	1994	2013
GDP growth rate (%)	0.20	4.50	-0.348	-1.095	0.811	9.21
GDP per capita ( constant 2005 US \$ )	1460.08	1264.37	1208.037	1118.64	973.33	1019.30
Consumer price index (cpi)	29.52	33.12	38.85	41.64	56.85	109.01
Import % GDP	39.32	32.39	29.62	27.11	29.30	41.15
Export%GDP	36.423	46.774	33.429	31.689	40.527	43.758
FDI inflow %GDP	0.627	0.417	0.867	0.445	0.938	1.302
Official exchange rate (LCU per US dollar)	328.60	449.26	300.53	272.264	555.20	494.04

### **Remark**

1982 first programme of ERP started between (1981-1983)

1985 second programme of ERP

1987 third programme of ERP

1990 The fourth programme

1994 Year of depreciation of the currency

**Source: world Bank data**



### **2.3 Economic Situation of Ivory Coast**

Ivory coast's GDP reached approximately 8.4% in 2015, and according to the World Bank, it is expected to rise 8.5% in 2016. We remarked that the economy activity continue to rise, all the sectors took benefit from the private and public investments. Regarding to the agricultural sectors the production has increases in major crops such as cocoa for 36%, coffee 16%, cashew nuts 18 %, and finally sugar cane for 12 % respectively. The industry benefited also from a system of prices, which is called system of guaranteed prices for producers and likewise, the implementation of both public and privates programs to stimulate the production. The general index of manufacturing and construction stand at 10 and 23 %, respectively while the index of industrial production rise to 10.5%. In the services sector, the index of sales climbed 7%, the number of subscribers to telecommunication services increased by 14%, and transportation services related indicators also rose.

### **2.4 Social situation of Ivory Coast**

From the last four years, Ivory Coast is experiencing an economic success, illustrated by its higher GDP growth, which resulted in a decline of the poverty. The government decided to adopt a new National Development Plan (NDP) for the period 2016-2020, to improve the economy and the social situation of the country. This development plan encompasses major structural reforms in order to sustain the private sector and inclusive growth, and definitely transform the economy. This new plan is based on the lessons learned from the implementation of the previous NDP (2012-2015). Ivory Coast hope to be emerging economy in 2020, and substantially reduce its poverty rate. In the past, between 1985 and 2008, the severity and depth of poverty has significantly intensified, with an increase in the poverty rate from 10 to 49% approximately. According to the latest survey of the extent of living achieved in 2015 by the World Bank, the incidence of poverty has declined about 51% in 2011 to 46% in 2015; this improvement is the result of the recent economic recovery which concerned both rural than urban areas. However, poverty remains a predominantly rural phenomenon, manifested in unequal access to essential services and the gender gap and that feeds divisions between income groups and between urban and rural populations.

## **CHAPTER 3: LITERATURE REVIEW**

### **3.1 Theoretical review**

The principal theory for the export led growth hypothesis is the neoclassical theory of export led growth, which can be subdivided into two parts:

- Supply side of export led growth
- Demand side of export led growth

#### **3.1.1 Neoclassical theory of export led growth**

The neoclassical theory considers the export as a cure of a low productivity protected economy (Abedian; Standish, 1992:100). The precursors of this theory say that export is an engine of economic growth and it can considerably have an impact on the economy.

Adam Smith and David Ricardo respectively in 1776 and 1817 focused in the division of labour, especially the importance of its specialisation. Their principal idea was based on the role of the specialisation in the enhancement of knowledge and different skills required for the production. Adam Smith's ideas were based on the absolute advantage of the process of international trade and David Ricardo's ideas were based on the comparative advantage of the international trade.

For the neoclassical theory, it concerns the supply side and the demand side of the export led growth.

##### **3.1.1.1 Supply side of export led growth**

The theory of supply side shows that why export can be used to drive the economy, in other terms, the power of the export in the raising of the economy

First of all, in the neoclassical framework, the export can be considered as an input in the production function. Ram (1985: 417) proposes a model which is following defined as:

$Y = f(K, L, \text{ and } \text{Exp})$ , where K is the capital input in the production function, and the Labour force and Exp are both input too in the production function.

Secondly the first model can be used to another way, Harrison and Rod (2009), where  $Y = A f(K, L)$ , and A represents the Total factor productivity (TFP).

And finally we can use GDP net of export instead of GDP to represent economic growth or use GDP and in the other equation export as a share of GDP because according to some researcher export is already included in the GDP, via the income national accounting identity (Chigusiwa L 2011).

We decide to use this approach of supply side of export led growth in the thesis.

### **3.1.1.2 Demand side of the export led growth**

According to J.M Keynes (1936),  $GDP = G + I + C + (X - M)$

With G means Government expenditure, I represents gross domestic investment, C for household consumption, X for export and finally M represents Imports.

GDP is therefore generated by the sum of both foreign demand for national goods and domestic demand. The domestic demand comprises the household expenditure, the domestic investment and the government expenditure, while the foreign demand for national goods is registered in the exports account. The domestic demand is composed not only by the national goods, but also the foreign goods, which is the amount of imports.

Since the objective should be to check the effects of export on the economic growth, the Keynesian GDP can be used in order to identify whether any fluctuations on exports can affect significantly the economic growth.

### **Empirical review**

Several studies of export led growth hypothesis have been done around the world by a large number of researchers. Among those studies, some justify that export enhances economic growth and others the opposite of it. Mostly, researchers conducted the analysis with time series, cross sectional and panel data.

Khaled R.M. Elbeydi, Abdulbaset M. Ham, Vladimir Gaz (2010), looked at the long run and the short run relationship between Export and Economic growth in Libya. In this analysis they employed a Johansen cointegration, Vector error correction model (VECM) and granger causality test. The period of the analysis started from 1980 to 2007, and an annual data was used for the empirical analysis. In the analysis, exchange rate was included as an input to capture the relation between export and economic growth, while gross domestic product was used as a proxy of economic growth, and represent the real domestic output.

The results of the empirical analysis concluded that all the inputs and the output were co-integrated, meaning that, there is a long run relationship between Export, Exchange rate and GDP. A short run and long run bidirectional causality was also found between Export and GDP using the VECM and Causality test.

Ku 'Azam Tuan Lonik (2006) investigated the relation between economic growth and manufacturing and primary export for Malaysia. The empirical analysis was based on annual data which started from 1978 to 2002. The inputs of the analysis were manufacturing exports and primary export, on the other hand, the output used was gross national product (GNP) as a proxy of economic growth. In this research paper, an ARDL (autoregressive distribution lag model) approach was used to check the long run relationship between the inputs and the output. The findings of the analysis showed that, there was co-integration between manufacturing exports, primary exports, and GNP. Manufacturing exports, in comparison to the primary exports, have a higher significant role on the economic growth of Malaysia.

Sarbapriya Ray (2011) checked the relation between export and economic growth in India. To make a better analysis, he decided to work with an annual data from the period 1972-2001 which represents 29 observations for the analysis. Johansen co-integration and granger causality were used for the empirical analysis, while export and GDP represented the input and output of the analysis respectively. The results of the analysis showed that, there was Co-integration between Export and GDP and also, a bi-directional causality. Therefore, it can be said that export enhanced growth in this case.

Omoke Phil Chimobi and Abakaliki (2010), with Nigeria as a case study, investigated the long run relationship between exports, investment and GDP over the period 1970-2005, using an annual data. GDP was used as a proxy of economic growth and therefore represented the real domestic output. In this paper, Johansen co-integration, VAR model and granger causality were used for the empirical analysis. From the findings, co-integration was not found between the inputs (exports, investment) and the output (GDP). Even though, no co-integration was found, the causality analysis gave short run causation between the inputs and the export, and that test showed short run causality between GDP and Investment, and the same case between Investment and export but an insignificant causation was found between GDP and export.

Athar Iqbal, Irfan Hameed, and Komal Devi (2012) investigated the relationship between export and economic growth for Pakistan. The period of the study was from 1960 to 2009, meaning that, there were 49 observations for this empirical analysis and an annual frequency data was employed. To capture the relation between export and GDP, they added the real terms of trade as an input. For this empirical analysis, unit root and granger causality tests were used. They concluded that there is unidirectional causality from economic growth to export and not vice versa.

Serge Constant N'guessan Bi Zambe (2010) checked the relationship between export and economic growth for the case of Ivory Coast. In this analysis, an annual data was used as a frequency data and the sample period of this paper started from 1980 to 2007. The inputs included in this empirical analysis were: export, exchange rate and labour force, and GDP was used as a proxy of economic growth in Ivory Coast. The bound testing approach methodology was used to look at the relation between export and GDP. The results of the analysis showed that, there were long run equilibrium relationship between export and GDP and bi-directional causality between GDP and export.

Ruba Abu Shihab, Thikraiat Soufan Shatha, and Abdul-Khaliq (2014) investigated the relationship between export of goods and services and GDP, in Jordan. The empirical analysis were based on annual data and the sample period started from 2000-2012, 12 observations. Unit root and granger causality were used to check the relation between the input and the real domestic output, which is GDP - a proxy of economic growth. The paper concluded that, only unidirectional causality from economy growth to export was found.

Adil Khan Miankhel, Shandre Mugan Thangavelu, Kaliappa Kalirajan (2009), looked at the relationship between export and economic growth for the case of 6 countries; which are Mexico, Chile, Thailand, Pakistan, India and Malaysia. The analysis was based on annual data from 1970 to 2005 - 35 observations. Unit root, co-integration, VECM and granger causality were used in order to verify how export impacts on economic growth. To meet this objective, they included export and foreign direct investment (FDI) as inputs and also use GDP as a proxy of economic growth. The results of the findings were therefore subdivided into two parts. First of all, in the short run, in Malaysia, they found a bidirectional relation between the inputs (exports, FDI) and the output (GDP). The others countries, such as Pakistan, India, Mexico and Chile many different kinds of relations were found between the input and outputs, while for Thailand, unidirectional causality from GDP to export was found. Secondly,

in the long run, only GDP led to export growth for Pakistan and in India GDP led to FDI growth, also for Mexico and Chile export impact positively on output and FDI.

Chien-hui lee, Bwo-nung huang (2002), checked the relationship between export, import and gross capital formation and economic growth for at least 5 Asian countries which were: Hong Kong, Japan, Korea, Philippines and Taiwan. The frequency of data used in this analysis was annual data, and the sample periods were different among the countries, but generally between 1955 and 2000. To investigate the relationship between inputs and real domestic output, VAR model and causality were used. The conclusion of the analysis showed that there was an export led growth for all the Asian countries but under certain regimes.

Emmanuel Anoruo (1998) investigated the export led growth analysis for 5 Asian countries, namely, Indonesia, Philippines, India, Korea and Malaysia. The period of the analysis was different for all the countries, but generally it ranges between 1949 and 1998, and the frequency of the data was annual. To look at the relationship between export and economic growth, Export growth rate, Real exchange rate and Real money supply were included as inputs and GDP growth rate as output – a proxy of economic growth. In this research paper, Co-integration was found between the inputs and output. The researcher concluded that, there was an Export led growth for Indonesia, Philippines, India, Korea and Malaysia.

Andre c. Jordaan Joel hinaunye eita (2007), analysed the relationship between Export and economic growth, in Namibia. In this empirical analysis, the researchers make an analysis with two different outputs, but with the same inputs. For the output, he first of all, took Real GDP as a proxy of economic growth and  $f$  as inputs. Real Export, Real import, real import were added only to capture the relation between Real export and Real GDP, on the other hand, in the second model, GDP per capita was used as a proxy of economic growth and the inputs of the previous model were used. The sample period of the study started from 1970 to 2005, while an annual frequency data was employed. In addition, unit root, cointegration analysis and granger causality are the methods used in this paper. The researcher concluded that, there was a long run equilibrium relation between Exports and GDP or GDP per capital and Import in both model, and Real Exports granger causes Real GDP or GDP per capital, and there is a bi-directional causality between Real Export and Real Import.

P. K. Mishra (2011), looked at the relationship between export and economic growth for India. To achieve his objective, the researcher used a frequency annual data, with a sample period starting from 1970 to 2009. As for the methodology of the empirical analysis, Unit root, Cointegration analysis and Vector error correction model were used to check how export may influences economic growth in India. Total Export represented the input and Real GDP the output. From his findings, the researcher concluded that there was a Long run relationship between Total Export and the output Real GDP, but in the short run, disequilibrium appeared to have taken placed.

Wong Hock Tsen (2007), investigated the relation between export and economic growth, and he also look at how others input namely: private consumption, Government expenditure and Investment may influence the economic growth for some Middle East countries, specifically, Bahran, Saudia Arabia, Oman, Qatar, Syria, Iran and Jordan. The frequency data used in this study was annual data, over the period 1960-2004, and different periods have been used for each country. The ordinary least square (OLS) method was used for the empirical analysis. In this paper, the researcher used different outputs such as, Nominal GDP, GDP deflator, GDP per capital (Nominal GDP/ GDP deflator) with the same inputs mentioned above.

From the findings for all the aforementioned middle income countries, export, private consumption and investment are important for economic growth, and economic growth is also important for export, private consumption and investment.

Nikolaos Dritsakis, Erotokritos, Varelas, Antonios Adamopoulos (2006), checked the relation between some inputs namely as Exports, Gross capital Formation, Foreign direct investment and the real domestic output which is GDP. This analysis concerned Greece for the period starting from 1960 to 2002, which is about 42 observations using an Annual data. To achieve their objective, the researcher used Unit root, Johansen co-integration and VAR model. In the conclusion of the empirical analysis, the researchers found that, there is only one co-integrating vector, meaning that there is a long run equilibrium relationship between the inputs and the output GDP.

Victor Ushahemba (2015), investigated the impact of Real exchange rate, Real agricultural export, Index of trade openness, Inflation rate on economic growth for Nigeria. In this paper, the data used is annual and the sample period started from 1970 to 2012, which is about 42 observations.

GDP growth rate was used as a proxy of economic growth. A variety of methods were used for this research paper. These methods are ADF unit root test, Johansen co-integration, and error correction model.

The researcher concluded from the findings that, Cointegration between the variables has been found and from the error correction model the findings showed that Agricultural export has contributed positively to the economy of Nigeria.

Ekiran Joseph Ojo, Awe, i.t., Ogunjobi, Joseph Olufemi (2014), looked at the relation between Agricultural export and economic growth, specifically focusing on how the export of agriculture products may affect economic growth in Nigeria. To reach their goal, these researchers used Agricultural export value, Agricultural output value, Net capital flow World price of Nigeria as input in the model, and GDP used as a proxy of economic growth. The empirical analysis used an annual data frequency data, and the period of study started from 1980 to 2012. In the conclusion of this analysis, they found that, there is an existence of co-integration between the inputs and the output. Meaning that, there is long run relationship between agricultural export and economic growth in Nigeria.

Noula A Gilbert, Sama G Linyong, Gwah M Divine (2013), analysed the effect of agricultural export on economic growth for Cameroon. The period used in this analysis started from 1970 to 2009, which is about 39 observations and an annual data was used in the study. Real GDP was used as a proxy of economic growth. In order to capture the relationship between agricultural exports on economic growth, a number of inputs were used, namely: Fixed capital formation, CPI, labour force, Cacao exports, Coffee export, and Cotton export. With regards to the methodology used, Engle and Granger co-integration was used. They concluded that, Agricultural export have mixed effect on economic growth in Cameroon.

Some research papers have found that export does not impact on economic growth, to be more specific, export has no effect on economic growth and in some cases, it may even have a negative relation with the economic growth in some countries. The following analysis have found that export may not enhance economic growth at all the time.

Enriques Sadorsky (1996), investigated the export led economic growth hypothesis for Canada. To capture the relation between export and economic growth, terms of trade and exports were treated as inputs and GDP as output to represent economic growth. The period of study started from 1870 to 1991. With regards to the methodology, Philips Peron and ADF test were both used to check the stationarity of the variables, Johansen cointegration,



Granger causality and VAR model were also used in the analysis of the data. The findings showed that, the exports of Canada and its economic growth have no long run relation. Meaning that, exports do not enhance economic growth.

Darrat (1996), looked at the relationship between exports and economic growth for 4 Asian countries, namely: Hong Kong, Korea, Singapore and Taiwan. The period of the analysis started from, 1960 to 1982, and the frequency of the data was annual. GDP was used as a proxy of economic growth. The Granger causality methodology was employed to check the relation between the input and output. The paper concluded that for all the countries above, export does not lead to growth.

Dipendra Sinha (1999), checked the relation between export instability and economic growth for 9 Asian countries. Unit root test and co-integration analysis was used to look at the relation between the inputs and the output of the model. The following inputs were used: Real export of goods and services, Gross capital formation, Population, and absolute value of the deviations of export from its five-year moving average (export instability). The period of analysis differ for the 9 countries, but in general it ranges between 1950 and 1997. The results of the empirical analysis showed that, there was a partial Negative relationship between Export instability and Economic growth for Malaysia, Japan, Philippines and Sri - Lanka.

Jin Yu (1996), investigated the impact of export on economic growth of USA. To capture the relation between export and GDP, the researcher added Real exchange rate, Capital, Labour, Foreign output shocks as inputs in the model. Also GDP was used as economic growth. The data used in this empirical analysis was quarterly, and the period of study is 1959/1.1992/3. The methodology of the analysis was based on ADF to test unit root, and Engle granger causality to check whether there was co-integration or not. The conclusion of the analysis showed that, export has an insignificant impact on GDP, and also, GDP has insignificant effect on Export.

## Chapter4: Data and methodology

This chapter describes the theoretical model, the data and the empirical methodology used in our study.

### 4.1 Theoretical framework

Generally, there exist several theoretical models to analyse export –led growth hypothesis. For the most part, researchers use a neoclassical model of export led growth which includes Export in the production function as an input. Therefore; our analysis will employ a neoclassical production function used by Ram (1985:417), and Feder (1985); with  $Y = A_t K_t^\alpha L_t^\beta$

Where, Y represents the real domestic output,  $A_t$  Level of total factor productivity at time t,  $K_t$  and  $L_t$  respectively capital stock and labour force at time t.

We assume Total Factor of Productivity (TFP) can be expressed as a function of export, and thus  $A_t = f(X_t)$ , therefore we have,  $Y = k_t^\alpha l_t^\beta x_t^\gamma$  Where  $\alpha$ ,  $\beta$  and  $\gamma$  are elasticities of production function.

Here specifically in our model we used, GDP at a constant price 2005 as proxy of economic growth, Gross capital formation as a percentage of GDP, which represents stock of capital, labour growth rate as proxy of labour force, and export of goods and services as a percentage of GDP to represent export in the model.

Thus, our theoretical model is specified below:

$$RGDP = f(CAP, LABG, EXP)$$

Where the dependent variable is real GDP and CAP, LF and EXP represent capital, Labour force growth rate, and Exports of goods and services, respectively.

## **4.2 Description of the data**

Secondary data has been used for the analysis. Data for the variables have been obtained from World Bank data and UNCTAD (the United Nations Conference of Trade and Development). The following table gives a summary description of the data set.

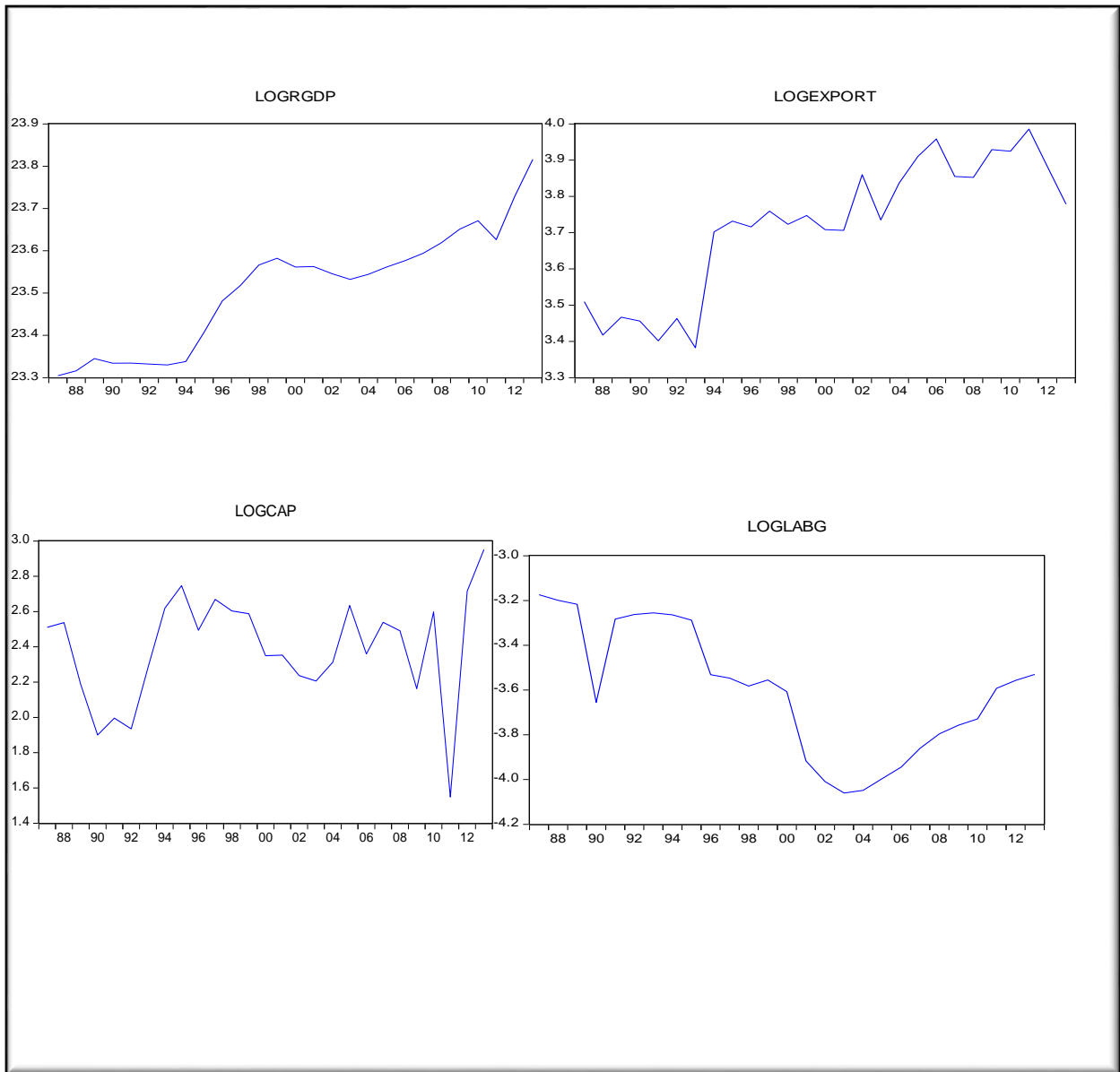
**Table/ Descriptive statistics**

	<b>Real GDP in millions of USD</b>	<b>Gross capital formation % GDP</b>	<b>Labour force growth rate</b>	<b>Export of good and services %GDP</b>
<b>Mean</b>	<b>16,389.90</b>	<b>11.59593</b>	<b>0.028405</b>	<b>41.86442</b>
<b>Median</b>	<b>16,820.166</b>	<b>12.11207</b>	<b>0.027816</b>	<b>41.89142</b>
<b>Maximum value</b>	<b>22,039.81</b>	<b>19.14302</b>	<b>0.041818</b>	<b>53.82022</b>
<b>Minimum value</b>	<b>13,215.91</b>	<b>4.703464</b>	<b>0.017524</b>	<b>29.44245</b>
<b>Standard deviation</b>	<b>2,315.97</b>	<b>3.204347</b>	<b>0.008037</b>	<b>7.414692</b>
<b>observations</b>	<b>27</b>	<b>27</b>	<b>27</b>	<b>27</b>

**Sample period: 1987-2013**

### **Plots of data**

The plots of the data are shown below. Real gross domestic production has a little fluctuation from 1987 to 1994. But especially from 1994 to 2000, it increases. This maybe due to the depreciation of the currency of the country which occurred in 1994. The increasing of GDP was little from 2000 to 2010, maybe due to the economically crisis faces by the country. And then after 2010 we remark a raise again of the GDP. For gross capital formation, the data decreasing and raising over the sample period, the same remark for the labour force growth rate. For the exports of goods and services, from 1987 there was a decreasing fluctuations and from 1994 to 2013 a raising in fluctuation maybe due to the depreciation likewise in the currency of the country, because when there are depreciation of money the goods on the local markets becomes cheaper and attract more investors.



**Figure 4.1** Plots of the data

### 4.3 Empirical methodology

The ARDL bounds testing methodology involves testing for cointegration first, and deriving the error correction model and the long run coefficients next. In our model, we use natural logarithms of RGDP, CAP, LABG and EXP (LOGRGDP, LOGCAP, LOGLABG, and LOGEXP respectively), from which our test equation is:

$$\begin{aligned} \Delta \text{LOGRGDP}_t = & \beta_0 + \sum_{i=1}^p \beta_{1i} \Delta \text{LOGRGDP}_{t-i} + \sum_{i=0}^p \beta_{2i} \Delta \text{LOGCAP}_{t-i} + \sum_{i=0}^p \beta_{3i} \Delta \text{LOGLABG}_{t-i} \\ & + \sum_{i=0}^p \beta_{4i} \Delta \text{LOGEXP}_{t-i} + \mu_1 \text{LOGRGDP}_{t-1} + \mu_2 \text{LOGCAP}_{t-1} \\ & + \mu_3 \text{LOGLABG}_{t-1} + \mu_4 \text{LOGEXP}_{t-1} + \varepsilon_t \end{aligned}$$

Where,  $\beta_0$  is the drift (intercept) and  $\varepsilon_t$  is the standard error, and  $\mu_i$  are the long run multipliers.

We have, two hypotheses to do bounds testing for cointegration, which are presented below:

$$H_0: \mu_1 = \mu_2 = \mu_3 = \mu_4 = 0$$

$$H_1: \mu_1 \neq 0, \mu_2 \neq 0, \mu_3 \neq 0, \mu_4 \neq 0,$$

The null hypothesis indicates the absence of a long-run relationship.

The test which normalizes on RGDP is denoted by:

$$F_{RGDP} (\text{RGDP} \mid \text{CAP, LABG, EXP})$$

It also computes two asymptotic critical values, the lower bound and the upper bound. We can conclude that, there is cointegration when the F statistic is greater than the upper bound, in the opposite when it is lower than lower bond, it means no cointegration found. If this statistic falls between both bounds, we cannot conclude.

Finally we can therefore determine the equations of long run and short run models.

- **Long run model**

$$LOGRGDP_t = \alpha_0 + \alpha_1 LOGCAP_t + \alpha_2 LOGLABG_t + \alpha_3 LOGEXP_t + \varepsilon_t$$

After determining the long run model, we should establish the short run model.

- **Short run model**

$$\begin{aligned} \Delta LOGRGDP_t = & \beta_0 + \sum_{i=1}^q \beta_{1i} \Delta LOGRGDP_{t-i} + \sum_{i=0}^l \beta_{2i} \Delta LOGCAP_{t-i} + \sum_{i=0}^m \beta_{3i} \Delta LOGLABG_{t-i} \\ & + \sum_{i=0}^p \beta_{4i} \Delta LOGEXP_{t-i} + \varphi EC_{t-1} + \varepsilon_t \end{aligned}$$

The error correction term,  $EC_{t-1}$  captures the short-run dynamics. It tells us the speed with which our model returns to the equilibrium. The error correction term should be negatively signed, because a positive signed means a movement away from the equilibrium. The coefficient ( $\varphi$ ) of the error correction term should be between 0 and 1.

0 means no adjustment, while 1 indicates full adjustment.

We should also explain why we use log transform in the model. This transformation of log is due to many reasons. We therefore classify in three main reasons which are:

- The log transformation is generally used to remove the serial correlation from the model
- It also permits to reduce the problem of heteroskedasticity
- Furthermore, when the data is converted into Log, we therefore interpret the results, specifically the coefficients in percentage. Because in Log transformation coefficients are elasticities.

#### **4.4 Stationarity and unit root test**

The objective of the analysis is to investigate the nature of long-run relationship among the variables of interest. For that, we need to do a bound testing approach to cointegration, but before applying this bound test we should check the stationarity of the variables and make sure that none of the variables is I(2). Also the use of a non-stationary data can lead to spurious regression. A stationary data means the one with constant mean, constant variance and constant autocovariances for each given lag. (Chris brooks 2008).

For checking the unit root test, there are a large number of tests. The early work of testing the unit root was done by Dickey Fuller in 1979.

With,  $y_t = \Theta y_{t-1} + \mu_t$ , the objective of this test is to examine the null hypothesis of  $\Theta=1$ , which stipulates that, there is a unit root (non stationarity). And then the other hypothesis is there is no unit root which means stationarity, with  $\Theta < 1$ . Generally this following regression is used

$$\Delta y_t = \psi y_{t-1} + u_t, \text{ with } (\psi = \Theta - 1)$$

Therefore we have two hypothesis for the unit root test.

**H<sub>0</sub> : there is a unit root**

**H<sub>1</sub> there is no unit root**

The ADF (Augmented Dickey Fuller test) is defined as follow:

$$ADF \text{ statistic} = \frac{\psi}{SE(\psi)}$$

Where, the numerator represents the coefficient ( $\psi$ ) of the regression and the denominator is its standard error.

## CHAPTER 5: EMPIRICAL RESULTS

In this chapter, we present the findings of the analyses that were done using the data set and the methods described in the above-mentioned chapter. Objectively, the analyses was done through two steps: First of all, the unit root test to determine, the order of integration of the series and secondly, the bound testing and ARDL estimation.

### 5.1 Unit root

To begin with, we conducted the tests for unit root using the Augmented Dickey Fuller (ADF) method with Akaike information criterion (AIC). Here the remark is that, to reject the null hypothesis of a unit root test, we compared the value of the ADF statistic with the critical values. In terms of absolute value, when the t statistic is higher than the critical value generally at 5 %, we reject the null hypothesis otherwise we accept it. The following series were tested for unit root: LRGDP, LGCF, LLABG, and LEXP. We presented the results in two different panel.

**Panel 1: ADF test with intercept only**

variables	level	First difference	5% critical value	1% critical value	Integrating order
LOGRGDP	0.527116	-3.051674	-2.986225	-3.724070	I(1)
LOGGCF	-3.720061	-7.475913	-2.981038	-3.711457	I(0)
LOGLAB	-1.654403	-5.452050	-2.986225	-3.724070	I(1)
LOGEXP	-1.530964	-6.385812	-2.986225	-3.724070	I(1)



**Panel 2: ADF test with intercept and trend**

variables	level	First difference	5% critical value	1% critical value	Integrating order
LOGRGDP	-2.893058	-3.099667	-3.603202	-4.374307	I(2)
LOGGCF	-3.202497	-7.505155	-3.603202	-4.374307	I(1)
LOGLABG	-1.200992	-5.744525	-3.603202	-4.374307	I(1)
LOGEXPORT	-2.594765	-6.427442	-3.603202	-4.374307	I(1)

We established two panels to see whether the variables are I(1), or I(0). The remark is that in the second panel ADF test with intercept and trend, LOGRGDP is I(2). We cannot at this time use the variable of LOGGDP to make any analysis of bound testing. Therefore we decide to apply an ADF-GLS which is much more robust than the normal ADF test to see if the problem of second order of integration can be removed from the LOGGDP.

**ADF-GLS test**

We should apply a DF-GLS test, which is a modification of the normal ADF test. In 1996, Elliot, Rothenberg and Stock proposed an efficient test called Dickey fuller generalized least squares. It is better to use the DF-GLS test for short sample and the principal difference with the normal ADF-test is that before performing the test, the time series is transformed via a generalized least square.

**ADF-GLS test with intercept only**

<b>variables</b>	<b>level</b>	<b>First difference</b>	<b>5% critical value</b>	<b>1% critical value</b>	<b>Integrating order</b>
<b>LOGRGDP</b>	<b>0.358047</b>	<b>-3.150357</b>	<b>-1.955020</b>	<b>-2.660720</b>	<b>I(1)</b>
<b>LOGGCF</b>	<b>-3.634560</b>	<b>-7.599137</b>	<b>-1.954414</b>	<b>-2.656915</b>	<b>I(0)</b>
<b>LOGLABG</b>	<b>-1.251013</b>	<b>-5.569729</b>	<b>-1.955020</b>	<b>-2.660720</b>	<b>I(1)</b>
<b>LOGEXP</b>	<b>-1.335099</b>	<b>-5.361944</b>	<b>-1.955020</b>	<b>-2.660720</b>	<b>I(1)</b>

**ADF-GLS test with intercept and trend**

<b>variables</b>	<b>level</b>	<b>First difference</b>	<b>5% critical value</b>	<b>1% critical value</b>	<b>Integrating order</b>
<b>LOGRGDP</b>	<b>-3.180194</b>	<b>-3.309762</b>	<b>-3.190000</b>	<b>-3.770000</b>	<b>I(1)</b>
<b>LOGGCF</b>	<b>-3.940022</b>	<b>-7.822789</b>	<b>-3.190000</b>	<b>-3.770000</b>	<b>I(0)</b>
<b>LOGLABG</b>	<b>-1.259412</b>	<b>-5.973667</b>	<b>-3.190000</b>	<b>-3.770000</b>	<b>I(1)</b>
<b>LOGEXP</b>	<b>-2.777086</b>	<b>-6.421380</b>	<b>-3.190000</b>	<b>-3.770000</b>	<b>I(1)</b>

Since no macroeconomic variables are I(2), we can apply a bound testing to check the cointegration between the variable. Therefore we shall select the model by applying ARDL in eviews9

## 5.2 ARDL model

### 5.2.1 Technique of estimation

- The ARDL model can be used, if the data are purely I(0) or I(1) or different order of integration but none I(2)
- The ARDL is efficient for small sample size, the case of our study is 27 observations, which is relatively small in our study.

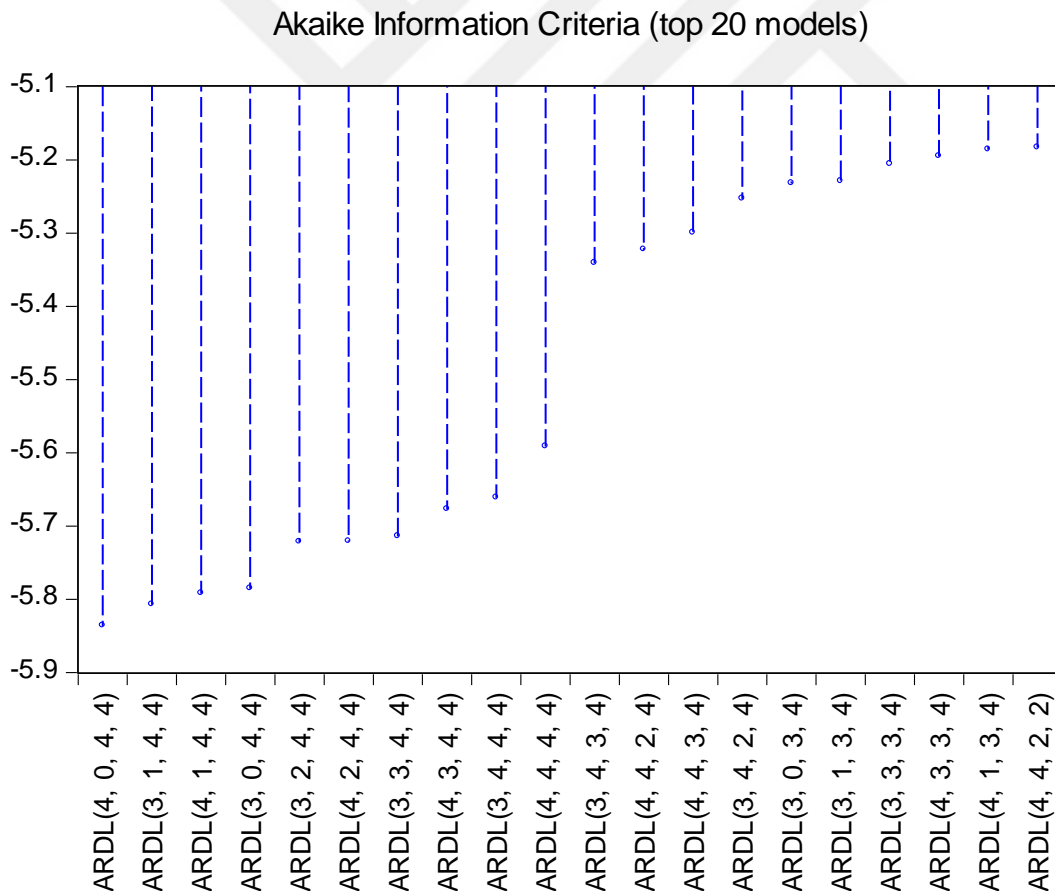
### 5.2.2 Estimation of ARDL

We should estimate the ARDL model, and on this model make our analysis which is check the relations between export and economic growth.

### 5.2.3 Model selection criteria

There exists two types of model selection criteria, the criteria graph and the criteria table.

#### 5.2.3.1 Criteria Graph



From the Graph, the best model is ARDL (4, 0, 4, 4)

### 5.2.3.2 Criteria table

Model	LogL	AIC*	BIC	HQ	Adj. R-sq	Specification
101	83.115634	-5.836142	-5.046233	-5.637482	0.991337	ARDL(4, 0, 4, 4)
201	82.784234	-5.807325	-5.017416	-5.608665	0.991084	ARDL(3, 1, 4, 4)
76	83.606420	-5.791863	-4.952584	-5.580786	0.990315	ARDL(4, 1, 4, 4)
226	81.530340	-5.785247	-5.044707	-5.599003	0.991300	ARDL(3, 0, 4, 4)
176	82.799431	-5.721690	-4.882411	-5.510614	0.989611	ARDL(3, 2, 4, 4)
51	83.790180	-5.720885	-4.832238	-5.497393	0.988563	ARDL(4, 2, 4, 4)
151	83.710616	-5.713967	-4.825319	-5.490474	0.988483	ARDL(3, 3, 4, 4)
26	84.289404	-5.677339	-4.739322	-5.441431	0.986311	ARDL(4, 3, 4, 4)
126	84.102207	-5.661061	-4.723044	-5.425153	0.986086	ARDL(3, 4, 4, 4)
1	84.298738	-5.591195	-4.603808	-5.342870	0.981763	ARDL(4, 4, 4, 4)
131	79.418131	-5.340707	-4.452059	-5.117215	0.983273	ARDL(3, 4, 3, 4)
11	79.206993	-5.322347	-4.433700	-5.098855	0.982963	ARDL(4, 4, 2, 4)
6	79.941736	-5.299281	-4.361264	-5.063373	0.980021	ARDL(4, 4, 3, 4)
136	77.408457	-5.252909	-4.413631	-5.041833	0.983399	ARDL(3, 4, 2, 4)
231	74.164932	-5.231733	-4.540563	-5.057906	0.985326	ARDL(3, 0, 3, 4)
206	75.133538	-5.229003	-4.488464	-5.042760	0.984825	ARDL(3, 1, 3, 4)
156	76.866294	-5.205765	-4.366486	-4.994689	0.982597	ARDL(3, 3, 3, 4)
31	77.743015	-5.195045	-4.306397	-4.971552	0.980650	ARDL(4, 3, 3, 4)
81	75.636825	-5.185811	-4.395902	-4.987151	0.983400	ARDL(4, 1, 3, 4)
13	75.604296	-5.182982	-4.393073	-4.984322	0.983353	ARDL(4, 4, 2, 2)
276	76.545046	-5.177830	-4.338552	-4.966754	0.982104	ARDL(2, 3, 4, 4)
106	74.269049	-5.153830	-4.413291	-4.967587	0.983641	ARDL(4, 0, 3, 4)
16	76.265930	-5.153559	-4.314281	-4.942483	0.981665	ARDL(4, 4, 1, 4)
181	75.161695	-5.144495	-4.354586	-4.945835	0.982700	ARDL(3, 2, 3, 4)
18	73.906715	-5.122323	-4.381783	-4.936079	0.983117	ARDL(4, 4, 1, 2)
8	75.883610	-5.120314	-4.281036	-4.909238	0.981045	ARDL(4, 4, 3, 2)
401	74.739967	-5.107823	-4.317914	-4.909163	0.982054	ARDL(1, 3, 4, 4)
138	73.694784	-5.103894	-4.363355	-4.917651	0.982803	ARDL(3, 4, 2, 2)
56	75.685889	-5.103121	-4.263842	-4.892045	0.980716	ARDL(4, 2, 3, 4)
12	75.605724	-5.096150	-4.256872	-4.885074	0.980581	ARDL(4, 4, 2, 3)
251	76.561579	-5.092311	-4.203664	-4.868819	0.978556	ARDL(2, 4, 4, 4)
17	74.343774	-5.073372	-4.283463	-4.874712	0.981425	ARDL(4, 4, 1, 3)
7	76.100232	-5.052194	-4.163546	-4.828702	0.977678	ARDL(4, 4, 3, 3)
137	74.062317	-5.048897	-4.258988	-4.850237	0.980965	ARDL(3, 4, 2, 3)
256	75.024572	-5.045615	-4.206337	-4.834539	0.979575	ARDL(2, 4, 3, 4)
3	75.884494	-5.033434	-4.144787	-4.809942	0.977255	ARDL(4, 4, 4, 2)
301	73.864403	-5.031687	-4.241778	-4.833027	0.980634	ARDL(2, 2, 4, 4)
133	73.861875	-5.031467	-4.241558	-4.832808	0.980630	ARDL(3, 4, 3, 2)
376	74.848356	-5.030292	-4.191013	-4.819216	0.979259	ARDL(1, 4, 4, 4)

According to the table, the ARDL (4, 0, 4, 4) is the best model, because it has the minimum akaike information criteria.

### 5.3 Specified Model

Dependent Variable: LOGRGDP  
 Method: ARDL  
 Date: 01/05/16 Time: 15:52  
 Sample (adjusted): 1991 2013  
 Included observations: 23 after adjustments  
 Maximum dependent lags: 4 (Automatic selection)  
 Model selection method: Akaike info criterion (AIC)  
 Dynamic regressors (4 lags, automatic): LOGCAP LOGLAB LOGEXPORT  
 Fixed regressors: C  
 Number of models evaluated: 500  
 Selected Model: ARDL(4, 0, 4, 4)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LOGRGDP(-1)	0.180461	0.145914	1.236762	0.2561
LOGRGDP(-2)	-0.542014	0.199469	-2.717292	0.0299
LOGRGDP(-3)	0.289906	0.318553	0.910071	0.3930
LOGRGDP(-4)	0.221953	0.218206	1.017171	0.3429
LOGCAP	0.052435	0.011424	4.589799	0.0025
LOGLABG	0.024435	0.026079	0.936962	0.3800
LOGLABG(-1)	0.047791	0.028365	1.684886	0.1359
LOGLABG(-2)	0.025396	0.026141	0.971514	0.3637
LOGLABG(-3)	0.052226	0.024523	2.129639	0.0707
LOGLABG(-4)	0.079442	0.027900	2.847333	0.0248
LOGEXPORT	0.045919	0.039812	1.153378	0.2866
LOGEXPORT(-1)	0.147237	0.045558	3.231860	0.0144
LOGEXPORT(-2)	0.257772	0.047113	5.471343	0.0009
LOGEXPORT(-3)	0.229044	0.058282	3.929962	0.0057
LOGEXPORT(-4)	0.218662	0.054952	3.979174	0.0053
C	17.38068	3.124308	5.563049	0.0008
R-squared	0.997244	Mean dependent var	23.54260	
Adjusted R-squared	0.991337	S.D. dependent var	0.127006	
S.E. of regression	0.011821	Akaike info criterion	-5.836142	
Sum squared resid	0.000978	Schwarz criterion	-5.046233	
Log likelihood	83.11563	Hannan-Quinn criter.	-5.637482	
F-statistic	168.8360	Durbin-Watson stat	2.274200	
Prob(F-statistic)	0.000000			

\*Note: p-values and any subsequent tests do not account for model selection.

Before the model can be used to calculate the long run coefficients and to derive the error correction model, some diagnostics should be done.

### 5.3.1 Diagnostics

Generally the diagnostics consists on serial correlation, normality, Heteroskedasticity and Ramsey test and they are presented below.

#### Serial correlation

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.249612	Prob. F(1,6)	0.6351
Obs*R-squared	0.918628	Prob. Chi-Square(1)	0.3378

**P value is higher than 5%, no problem of autocorrelation**

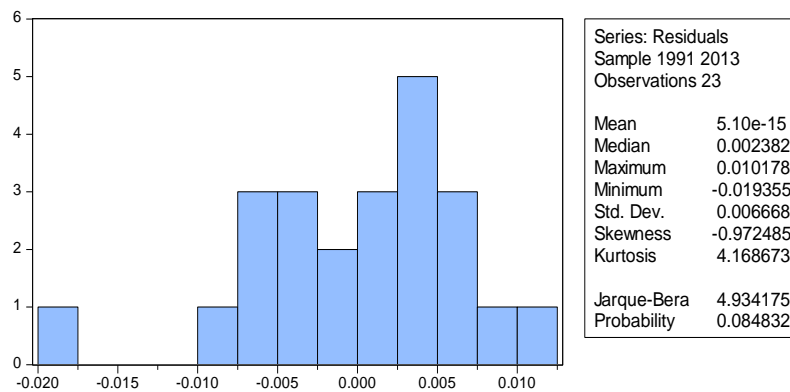
#### Heteroskedasticity check

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.395015	Prob. F(15,7)	0.9379
Obs*R-squared	10.54374	Prob. Chi-Square(15)	0.7842
Scaled explained SS	1.547328	Prob. Chi-Square(15)	1.0000

**P value is higher than 5%, no problem of heteroskedasticity**

#### Normality check



**P value is higher than 5%, our residual are normally distributed**

### Ramsey test (functional form)

Ramsey RESET Test			
Equation: UNTITLED			
Specification: LOGGDP LOGGDP(-1) LOGGDP(-2) LOGGDP(-3)			
LOGGDP(-4) LOGCAP LOGLAB LOGLAB(-1) LOGLAB(-2) LOGLAB(-3)			
LOGLAB(-4) LOGEXPORT LOGEXPORT(-1) LOGEXPORT(-2)			
LOGEXPORT(-3) LOGEXPORT(-4) C			
Omitted Variables: Squares of fitted values			
	Value	df	Probability
t-statistic	1.070989	6	0.3254
F-statistic	1.147018	(1, 6)	0.3254
F-test summary:			
	Sum of Sq.	df	Mean Squares
Test SSR	0.000157	1	0.000157
Restricted SSR	0.000978	7	0.000140
Unrestricted SSR	0.000821	6	0.000137

**The model is not misspecified, since P value is higher than 5 %.**

We summarized all diagnostics in the same table.

**Table 5.2 Diagnostic Tests**

Test statistics	LM version	F version
<b>A: Serial Correlation</b>	<b>CHSQ(1) = 0.918 [0.3378]</b>	<b>F(1, 6)=0.249 [0.6351]</b>
<b>B:Functional Form</b>	<b>CHSQ(1) = 1.0709 [0.3254]</b>	<b>F(1, 6)=1.147018 [0.6351]</b>
<b>C:Normality</b>	<b>CHSQ(2) = 4.934 [0.084]</b>	<b>Not applicable</b>
<b>D:Heteroscedasticity</b>	<b>CHSQ(1) = 10.543 [0.7842]</b>	<b>F(15, 7)=0.395 [0.9379]</b>

Notes: p-values are in brackets. Test results were obtained by using Eviews 9.

ARDL(4,0,4,4) selected based on Akaike Information Criterion. Dependent variable is LRGDP. 23 observations used for estimation from 1991 to 2013.

A:Lagrange multiplier test of residual serial correlation

B:Ramsey's RESET test using the square of the fitted values

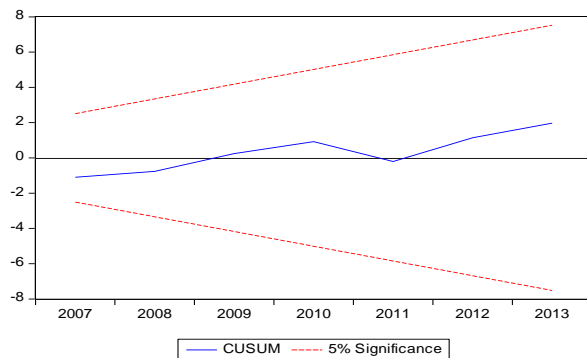
C:Based on a test of skewness and kurtosis of residuals

D: Based on the regression of squared residuals on squared fitted value

### 5.3.2. Stability condition

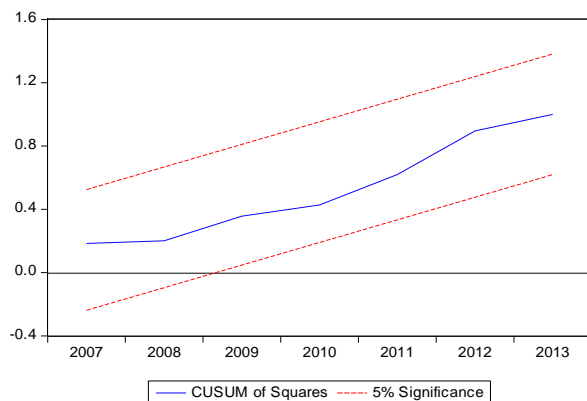
Cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) methods are used to check the stability conditions. The null hypothesis of all coefficients are stable cannot be rejected if the two plots of the CUSUM and CUSUMSQ remain within the critical bounds of a 5% significance level, which is the case here.

- Cusum test



By applying the CUSUM test, the blue line is within the two red lines. The model is stable from the Cusum test.

- CusumQ test



By applying the CUSUMQ test, the blue line is within the two red lines. The model is stable from the CUSUMQtest.

### **Plots of the CUSUM and CUSUMSQ Stability tests (obtained by using eviews 9)**



### 5.3.3 Bound test

ARDL Bounds Test		
Date: 01/05/16 Time: 16:13		
Sample: 1991 2013		
Included observations: 23		
Null Hypothesis: No long-run relationships exist		
<hr/>		
Test Statistic	Value	k
<hr/>		
F-statistic	6.209583	3
<hr/>		
Critical Value Bounds		
<hr/>		
Significance	I0 Bound	I1 Bound
<hr/>		
10%	2.72	3.77
5%	3.23	4.35
2.5%	3.69	4.89
1%	4.29	5.61
<hr/>		

F statistic 6.209583 is higher than upper bound 4.35, therefore, there is cointegration, which means long run equilibrium between the variables. We can estimate therefore, the error correction model and the long run coefficient

### 5.3.4 Error correction model and the long run coefficients

The error correction model is responsible for restoring the model to equilibrium following any shock to at least one of the independent variables. The ECT (Error correction term) should be negative and statistically significant for a reliable model. Another major property of a good ECM is that its ECT should have an absolute numerical value which lies between one and zero.

## Error correction and long run coefficient

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOGGDP(-1))	0.030155	0.114618	0.263093	0.8001
D(LOGGDP(-2))	-0.511859	0.141980	-3.605156	0.0087
D(LOGGDP(-3))	-0.221953	0.218206	-1.017171	0.3429
D(LOGCAP)	0.052435	0.011424	4.589799	0.0025
D(LOGLABG)	0.024435	0.026079	0.936962	0.3800
D(LOGLAB(-1))	-0.025396	0.026141	-0.971514	0.3637
D(LOGLABG(-2))	-0.052226	0.024523	-2.129639	0.0707
D(LOGLABG(-3))	-0.079442	0.027900	-2.847333	0.0248
D(LOGEXPORT)	0.045919	0.039812	1.153378	0.2866
D(LOGEXPORT(-1))	-0.257772	0.047113	-5.471343	0.0009
D(LOGEXPORT(-2))	-0.229044	0.058282	-3.929962	0.0057
D(LOGEXPORT(-3))	-0.218662	0.054952	-3.979174	0.0053
CointEq(-1)	-0.849694	0.149088	-5.699281	0.0007
Cointeq = LOGGDP - (0.0617*LOGCAP + 0.2699*LOGLABG + 1.0576 *LOGEXPORT + 20.4552 )				
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGCAP	0.061711	0.020378	3.028370	0.0192
LOGLABG	0.269851	0.049536	5.447550	0.0010
LOGEXPORT	1.057597	0.076568	13.812580	0.0000
C	20.455228	0.142127	143.922585	0.0000

### 5.3.5 Interpretation of the results

In the short run, only changes in Capital, D(LOGCAP), D(LOGGDP(-2)), D(LOGLAB(-3)), D(LOGEXPORT(-1)), D(LOGEXPORT(-2)), D(LOGEXPORT(-3)) are the only variables that are statistically significant in the short run. The error correction term is negative and statistically significant.

The model shows that approximately 84.97 percent of error is corrected per year in the short run. To see what happens in the long run, we should check the panel of the long run coefficient.

From the results we can say that, all the variables, LOGCAP for gross capital formation, LOGLAB, for labour force growth rate, and LOGEXPORT for exports and goods and services have a positive and statistically impact on Real GDP.

One percent change in gross capital formation increases RGDP by approximately 0.06%, and one percentage change in labour force growth rate increase RGDP by 0.27 % and finally one percent change in exports of goods and services increases RGDP by 1.06%.

### **5.3.6 A look at alternative models**

We built different model in relation with the theoretical models for export led growth hypothesis. Also we included, different control variables as FDI (foreign direct investment), sometime we included imports of goods and services and also real effective rate. But problem of autocorrelation happened, or stability of the model. Also the error correction term in the short run were not in all the case between 0 and 1.

We should remind that we check the models where both linear trend and constant were included.

And finally for the export led growth analysis it is better to include only export of goods and services as a factor of production in the production function represented as Real GDP. But to eliminate the problem of autocorrelation, because in the Real GDP, export is already included therefore , as an advice the real gdp net export should be used or the export as percentage of GDP. Therefore we decided to apply these two approach with real gdp and another model with Real GDP per capital.

We decided to construct our model following these theories, and the findings were much better than the old previous approach by adding other factor of production, because we found cointegration for only two suitable model and decided to choose the better one according to some diagnostic checking and other analysis of stability. From this last theory we summarize all the findings on the following table.

**TABLE OF SENSITVITY ANALYSIS**

<b>Dependant variable</b>	<b>Independent variables</b>			<b>Automat Maximu m lags</b>	<b>F - stat bound test</b>	<b>Outcome</b>	<b>Model</b>
LOGRGDP	LOGGCF %GDP	LOGLAB ORG	LOGEXPORT %GDP	4	6.209	<b>Cointegration</b>	<b>Best model</b>
LOGRGDP	LOGGCF %GDP	LABORG	LOGEXPORT %GDP	4	11.06	<b>Cointegration but not stable model</b>	
LRGDPcap	LOGGCF %GDP	LOGLAB ORG %GDP	LOGEXPORT %GDP	4	4.29	<b>No cointegration</b>	
LOGRGDP CAP	LOGGCF %GDP	LABORG	LOGEXPORT %GDP	4	6.267	<b>Cointegration</b>	
LOGRGDPCAP	LOGGCF level	LABORG	LEXPORT level	4	2.89	<b>No cointegration</b>	
LOGRGDPCAP	LOGGCF level	LOGLAB ORG	LOGEXPORT level	4		<b>Autocorrelati on problem</b>	
LOGRGDP	LOGGCF level	LOGLAB ORG	LOGEXPORT level	4		<b>Autocorrelari on problem</b>	
LOGRGDP	LOGGCF level	LABORG	LOGEXPORT level	4		<b>Autocorrelati on problem</b>	
LOGRGDPnet	LOGGCF level	LABORG	LOGEXPORT level	4	9.13	<b>Cointegration founded but instability</b>	
LOGRGDPnet	LOGGCF level	LOGLAB ORG	LOGEXPORT level	4		<b>Autocorrelati on problem</b>	

**Period 1987-2013**

## CHAPTER 6: SUMMARY AND CONCLUSION

The objective of this analysis was to check whether the export in Ivory Coast, impacts positively on the economic growth. For this analysis we decided to use a neoclassical theory of export led growth, specifically the supply side of export led growth where, export is considered as an input in the production function.

Even though we looked at the relation between export and GDP, gross capital formation and labour force growth rate were included too in the specified model. From the findings, we founded long run relationship between all the inputs and the real domestic output.

That means, export enhances the economic growth in Ivory Coast, with a positive relation and statistically significant, for the period of study.

The same results has been found by Serge Constant N'guessan Bi Zambe (2010), who applied a bound testing approach by UECM for the period (1980-2007), and found cointegration between export and economic growth. Some economic reports tell us that the economy of Ivory Coast depends essentially on the agricultural products, specifically their exports.

We can therefore ask the following matter, between primary exports and manufacturing exports, which one influence highly Ivory Coast or what are their contribution on the Ivory Coast economy?

Previously as we said, the accessibility of the data were not easy as well, but this new topic, should be take it considerably by Ivory Coast and might probably help its Government, to have a review on the economics politics.

Since Exports has a positive and significant effect on GDP, Ivory Coast's government should support exporters through some economic incentive like subsidies to stimulate the economic growth, for instance the Government can give some financial support for trade promotions and missions, it can help through low cost loan and Tax relief for exporters, or Tax credits for exporting, and Work out standardised procedures for different products and export markets. Government can also help exporters by finding new exports markets.

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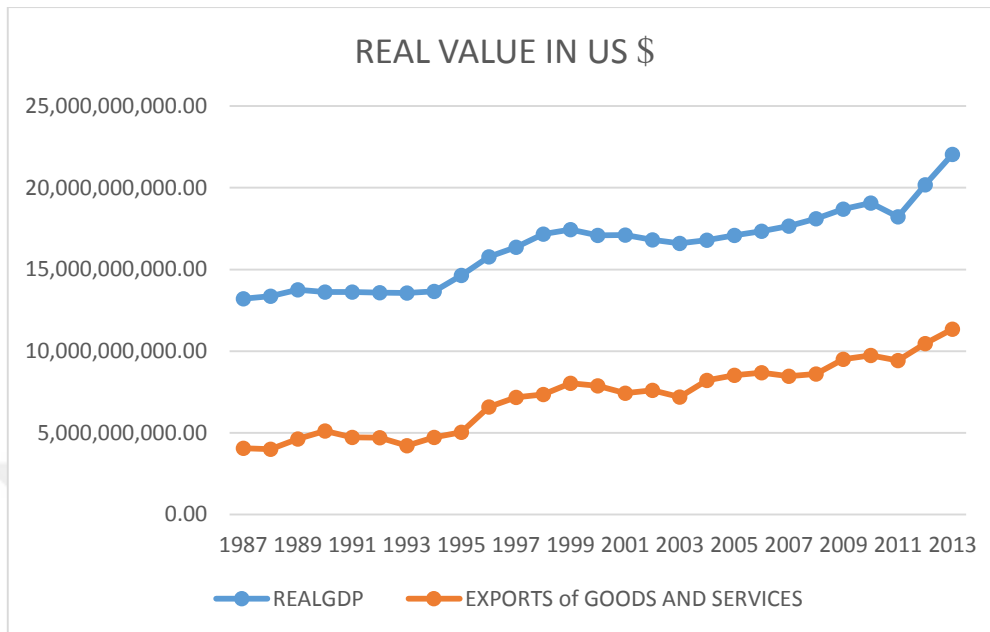
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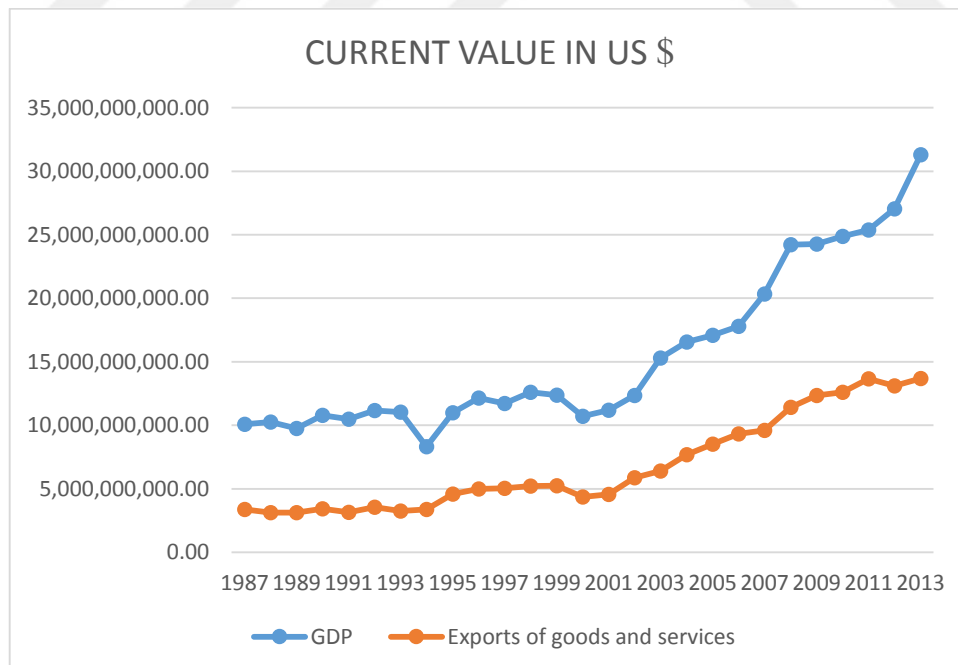
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## APPENDIX

### TREND IN GDP AND EXPORT OF GOODS AND SERVICES



#### Based on world bank and UN data



#### Based on World Bank data

## DATA USED FOR THE STUDY

YEAR	REALGDP	Gross capital form % GDP	Labour growth rate	Export goods and services % GDP
1987	13,215,907,949.54	12.31724466	0.041817761	33.4299902
1988	13,366,104,624.02	12.65035275	0.040806159	30.48812849
1989	13,760,138,049.29	8.90395595	0.040092326	32.03333564
1990	13,609,339,539.02	6.688803339	0.025854082	31.68987467
1991	13,614,909,184.19	7.36	0.037507697	30.01172634
1992	13,581,612,478.94	6.923884602	0.038305607	31.90948693
1993	13,555,469,898.57	9.793071084	0.038577582	29.44245287
1994	13,665,432,776.53	13.71571807	0.038227895	40.52740186
1995	14,639,196,631.64	15.59844581	0.037340899	41.75929966
1996	15,770,708,071.26	12.11207057	0.029262049	41.10099509
1997	16,361,092,909.04	14.42444857	0.028816359	42.91595731
1998	17,167,805,984.10	13.51926727	0.027816169	41.39640228
1999	17,445,499,957.26	13.30789947	0.02858778	42.4023849
2000	17,084,657,226.13	10.4845624	0.02713419	40.78102913
2001	17,105,393,201.86	10.51608017	0.019916929	40.70005794
2002	16,820,136,456.90	9.364770174	0.018161505	47.46234948
2003	16,591,460,656.19	9.079177833	0.017244708	41.89141613
2004	16,795,829,762.27	10.1012411	0.017454933	46.40501472
2005	17,084,927,539.85	13.93881658	0.018394203	49.89836053
2006	17,343,908,109.30	10.59140593	0.019365326	52.36758894
2007	17,650,034,467.17	12.67022898	0.021072366	47.22598261
2008	18,098,846,864.17	15.01532996	0.022459632	47.11608733
2009	18,687,322,493.60	11.61306756	0.023348861	50.69633663
2010	19,064,365,124.06	13.43703222	0.024012629	50.63264302
2011	18,227,961,888.82	4.703464428	0.027536971	53.82022214
2012	20,179,540,055.85	15.11866042	0.028525744	48.47612521
2013	22,039,806,841.81	19.14301746	0.029299541	43.75877361

SUMMARY OF RELATED LITERATURE					
Authors	Country, period of studies, frequencies	Methodology	Inputs	Outputs	Results
Khaled R.M. ELBEYDI Abdulbaset M. HAM Vladimir GAZ 2010	Libya, 1980-2007 Annual data	Johansen Cointegration, VECM (vector error correction model) Granger causality	Export Exchange rate	GDP	The relation between GDP and Export was checked. GDP and exports, and exchange rate are cointegrated. Short run and Long run bidirectional causality was found between GDP and exports.
Omoke Phil Chimobi Abakaliki, 2010	Nigeria 1970-2005 Annual	Johansen Cointegration VAR model Granger causality	Investment Export	GDP	No cointegration has been found between, GDP, export and investment. Short run bidirectional causality, between GDP and Investment, also Investment and export. The causation between GDP and export was insignificant

<p>KU 'AZAM TUAN LONIK 2006</p>	<p>Malasya,  1978-2002 Annual</p>	<p>Autoregressive Distributed Lag (ARDL)</p>	<p>Manufacturing exports primary exports</p>	<p>GNP</p>	<p>Cointegration founded among GDP, and Manufacturing and primary exports.  Especially, Manufacturing exports, compared to the primary exports has a very significant role on economic growth</p>
<p>Athar Iqbal Irfan Hameed Komal Devi 2012</p>	<p>Pakistan  1960-2009 Annual</p>	<p>Unit root test  Granger causality</p>	<p>Real terms of trade  Real exports</p>	<p>Real GDP</p>	<p>unidirectional causality from economic growth to Export and not vice versa</p>

<p>Ruba Abu Shihab Thikraiat Soufan Shatha Abdul-Khaliq 2014</p>	<p><b>Jordan</b> 2000-2012 Annual</p>	<p>Unit root Granger causality</p>	<p>Exports of goods and services</p>	<p>Real GDP At market prices</p>	<p>Unidirectional causality from economic growth to export was found.</p>
<p>Sarbapriya Ray 2011</p>	<p><b>India</b> 1972-2011 Annual</p>	<p>Johansen Cointegration Granger causality</p>	<p>Exports</p>	<p>GDP</p>	<p>Cointegration were founded between GDP and exports, and bidirectional causality between them.</p>

<p>Muhammad S. Anwer R.K. Sympathy 1997</p>	<p><b>96 countries</b> Different from 1960 to 1992</p>	<p>unit root cointegration granger causality</p>	<p>Export</p>	<p>GDP</p>	<p>Among 96 countries, only eight [8] show unidirectional or bidirectional causality from export to GDP, also a positive relation among the variables. On the other side, it was found that only nine [9] countries has a causality from GDP to Exports with also a positive relation between GDP and Exports.</p>
<p>Wong Hock Tsen 2007</p>	<p>Some middle east countries  Different from 1960 to 2004 Annual</p>	<p>OLS</p>	<p>Export  Private consumption  Government expenditure  Investment</p>	<p>Check with different output  Nominal GDP GDP deflator GDP per capital (Nominal GDP/ GDP deflator)</p>	<p>For Bahran, Saudia Arabia, Oman, Qatar, Syria, Iran and Jordan, export, consumption and investment are important for economic growth, also economic growth is important for export, consumption and investment</p>



<p>Adil Khan Miankhel</p> <p>Shandre Mugan Thangavelu Kaliappa Kalirajan</p> <p>2009</p>	<p><b>6 countries</b></p> <p>1970-2005 Annual</p>	<p>Unit root</p> <p>Cointegration</p> <p>VECM</p> <p>Granger causality</p>	<p>Real value FDI</p> <p>Real value Exports</p> <p>Both 2000 prices using GDP deflator</p>	<p>Real value GDP Growth</p> <p>2000 prices using GDP deflator</p>	<p>In the short run, Export led growth for the case of Pakistan and India. For Mexico and chili different kind of relation were founded. For Malasya, bidirectional relation between FDI, export and GDP. In Thailand, unidirectional relation from GDP to export. <b>In the long run,</b> In the case of Pakistan, GDP led Export growth For India GDP led FDI Exports impact positively on output and FDI for Mexico and Chile.</p>
<p>SERGE CONSTANT N'GUESSAN BI ZAMBE</p> <p>2010</p>	<p>Ivory coast</p> <p>1980-2007 Annual</p>	<p>KPSS unit root</p> <p>UECM</p> <p>Granger causality</p>	<p>Real Export</p> <p>Real Labour force</p> <p>Real Exchange rate</p> <p>Real Imports</p>	<p>Real GDP</p>	<p>Cointegration founded between export and GDP Bidirectional causality among GDP and export. Imports and exchange rate affects negatively the economy growth</p>

<p>Seyed Mohammad Alavinasab 2013</p>	<p>Iran 1976-2010 Annual</p>	<p>OLS Unit roots Cointegration</p>	<p>Real exchange effective rate Inflation rate Exports</p>	<p>Real GDP</p>	<p>For the case of Iran, the inputs have a positive and significant effect on GDP in Iran.</p>
<p>Wong Hock Tsen 2010</p>	<p>China 1978-2002 Annual</p>	<p>ERS unit root PP unit root Bound testing approach Granger causality</p>	<p>Exports, household consumption &amp; government consumption</p>	<p>GDP per capita</p>	<p>Bidirectional causality between the inputs and the output, also dynamic relation between export, domestic demand and economic growth</p>

<p>Noula A Gilbert, Sama G Linyong, Gwah M Divine 2013</p>	<p>Cameroon 1975-2009 Annual</p>	<p>Engle and granger cointegration</p>	<p>Fixed capital formation, Cpi, labour force, Cacao exports, Coffee export, and Cotton export.</p>	<p>Real GDP</p>	<p>Agricultural export have mixed effect on domestic growth, in Cameroon.</p>
<p>Chien-hui lee Bwo-nung huang 2002</p>	<p>5 Asian countries Different from 1955 to 2000</p>	<p>VAR Granger causality</p>	<p>Export Import Gross capital formation</p>	<p>Real GDP</p>	<p>Objective of the analysis, looked at the relationship of the inputs and output for Hong kong, Japan, Korea, Philipines and Taiwan, except for Hong kong it founded export led growth for the remaining countries under certain regimes.</p>

<p>Dipendra Sinha 1999</p>	<p>Nine Asian Countries Different from 1950 to 1997</p>	<p>Unit root cointegration</p>	<p>Real export of goods and services Gross capital formation Population absolute value of the deviations of export from its five-year moving average (export instability</p>	<p>REAL GDP</p>	<p>Negative relationship was found among Export instability and Economic growth for Malaysia, Japan, Philippines and Sri Lanka. For South Korea, Pakistan, Myanmar, and Thailand, the results showed a positive relation among export instability and economic growth. The case of India the results are mixed. For all the countries Investment has a positive relation with economic growth.</p>
<p>Emmanuel Anoruo 1998</p>	<p>Five Asian countries (Indonesia, Philippines, India, Korea and Malaysia) Different periods From 1949 to 1998 Annual</p>	<p>Unit root test, Johansen Cointegration test, Vector error correction model</p>	<p>Export growth rate Real exchange rate Real money supply</p>	<p>GDP growth rate</p>	<p>Long run equilibrium relationship founded for all the five countries between the inputs and output. Export led growth for Indonesia, Philippines, India, Korea and Malaysia.</p>

<p>Innocent Chukwuka Ogbonna Nkechinyere .R. Uwajumogu Ebele Nwokoye Geraldine Nzeribe</p> <p>2012</p>	<p>Nigeria</p> <p>1986-2010 Annual</p>	<p>OLS Granger causality</p>	<p>FDI Net Export CPI Exchange rate Gross capital formation</p>	<p>GDP</p>	<p>1% increase in FDI causes the GDP to increase by 13%.</p> <p>Bidirectional relation were found between FDI and GDP. Furthermore others inputs (Net export, CPI, exchange rate and Gross capital formation) influence the output GDP.</p>
<p>Andre c. Jordaan Joel hinaunye eita</p> <p>2007</p>	<p>Namibia</p> <p>1970-2005 Annual</p>	<p>Unit root, Cointegration, Granger causality</p>	<p>Real Export Real import</p>	<p>Check with Real GDP or GDP per capita</p>	<p>Cointegration has been founded between Exports and GDP or GDP per capital and Import. Exports granger causes GDP or GDP per capital, and there is a bidirectional causality among Export and Import</p>

<p>Ali Acaravci Ilhan Ozturk 2012</p>	<p>Ten European countries  Different form 1994 to 2008 Quarterly</p>	<p>ARDL cointegration Analysis  Causality by employing ECM</p>	<p>Ratio of FDI to GDP  Real Export (Constant 2005, national currency in millions)</p>	<p>GDP (Constant 2005, national currency in millions)</p>	<p>Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic and Slovenia.  The causality and the cointegration was checked. The result showed that, there Is long run relation between variables and also in both short and long run causality for only four countries. For more precision, the FDI led growth hypothesis is true for Czech Republic and Slovak Republic</p>
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<p>P. K. Mishra 2011</p>	<p>India 1970-2009 Annual</p>	<p>Unit root Cointegration Vector error correction model</p>	<p>TOTAL EXPORT</p>	<p>Real GDP</p>	<p>Long run relationship founded between Total Export and the output Real GDP, but in the short a disequilibrium appeared.</p>
<p>Jung Marshall 1985</p>	<p>37 countries 1950-1981</p>	<p>Granger causality</p>	<p>Export</p>	<p>GDP</p>	<p>Only for Indonesia, Egypt, Ecuador and Costa Rica, export led growth, unidirectional causality from economic growth to export has been found for Kenya, Iran and Thailand</p>

<p>Tolulope Odetola Chinoso Etumnu 2013</p>	<p>Nigeria 1960-2011 Annual</p>	<p>VAR Granger Causality</p>	<p>Weighted agricultural growth rate, Agricultural growth rate, Wheighted industry growth rate Wheighted industry growth rate Wheighted wholesale and retail trade growth Wheighted growth rate of services Wheighted building and construction Wheighted growth rate of forestry Wheighted growth rate of fisheries Wheighted growth rate of crop production</p>	<p>Real GDP growth rate</p>	<p>The objective was to check the contribution of agricultural sector to the economic growth. There is unidirectional causality from agriculture sector to Economic</p>
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<p>Mohsen Mehrara Bagher Adabi Firouzjaee 2011</p>	<p>73 devolving countries 1970-2007 Annual</p>	<p>Panel data, Cointegration, Granger causality two models / bivariate tri-variate</p>	<p>Wheighed growth rate of livestock production Export Openness</p>	<p>GDP</p>	<p>There is long run causality in both model and in both group of countries. There is no short run causality in both models for the oil developing countries, in the other hand it exited a short run causality for non-oil countries</p>
<p>NIKOLAOS DRITSAKIS, Erotokritos, varelas Antonios Adamopoulos 2006</p>	<p>Greece 1960-2002 Annual</p>	<p>Unit root Johansen cointegration VAR model Granger causality</p>	<p>Ratio Exports to GDP Ratio Gross capital Formation to GDP Ratio Foreign direct investment to GDP</p>	<p>GDP per capita</p>	<p>There is only one cointegrated vector between the inputs and output in Greece Unidirectional causality Between export and capital formation, also between FDI and economic growth.</p>

<p>Victor Ushahemba 2015</p>	<p>Nigeria 1970-2012 Annual</p>	<p>ADF unit root test Johansen cointegration error correction model</p>	<p>Real exchange rate Real agricultural export Index of trade openness Inflation rate</p>	<p>GDP growth rate</p>	<p>Long run relation between the variables has been found and from the error correction model the findings showed that Agricultural export has contributed positively to the economy of Nigeria</p>
<p>E.M. Ekanayake 1999</p>	<p>8 Asian countries 1960-1997 Annual</p>	<p>Cointegration Error correction model</p>	<p>Real export</p>	<p>RGDP</p>	<p>It existed bi-directional causality for all the countries. There is also evidence of short run causality from economic growth to export for all the countries except Sri Lanka. Likewise there is no evidence of short run causality running from export to economic growth for all of them.</p>

<p>Ekiran joseph ojo Awe, i.t.</p> <p>Ogunjobi, joseph olufemi</p> <p>2014</p>	<p>Nigeria</p> <p>1980-2012</p> <p>Annual</p>	<p>Phillips-Peron unit root,</p> <p>multivariate Johansen cointegration</p> <p>error correction</p>	<p>Agricultural export value</p> <p>Agricultural output value</p> <p>Net capital flow</p> <p>World price of Nigeria</p>	<p>GDP At current factor cost</p>	<p>The result of the analysis showed that there is a long run relationship between agricultural export and economic growth</p>
<p>Darrat</p> <p>1986</p>	<p>4 Asian countries</p> <p>1960-1982</p>	<p>Granger causality</p>	<p>Exports</p>	<p>GDP</p>	<p>In all the countries which are Hong kong, Korea, Singapore and Taiwan, export does not enhance growth. It is only for the case of Taiwan, growth leads to exports</p>

<p>Enriques Sadorsky</p> <p>1996</p>	<p>Canada</p> <p>1870-1991</p> <p>Annual data</p>	<p>Pp unit root</p> <p>ADF unit root</p> <p>Johansen cointegration</p> <p>Granger causality</p> <p>VAR model</p>	<p>Export</p> <p>Terms of trade</p>	<p>GDP</p>	<p>Export led growth was not found. But GDP led growth for the case of study</p>
<p>Jin Yu</p> <p>1996</p>	<p>United States</p> <p>1959/1.1992/3</p> <p>Quaterly data</p>	<p>ADF unit root test</p> <p>Engle Granger's cointegration</p>	<p>Exports</p> <p>Real exchange rate</p> <p>Capital</p> <p>Labour</p> <p>Foreign output shocks.</p>	<p>GDP</p>	<p>Export led growth was not found. But GDP led growth for the case of study</p>

# Curriculum Vitae

## PERSONAL INFORMATION

Surname, Name: Langui, Abo Yannick Wilfried

Nationality: Ivorian

Date of birth: 04 /03/1988

Marital status: Single

Phone : +90 507 032 6814

## EDUCATION

2014-2016 Master degree in Financial Economics at Çankaya University

2009-2010 Bachelor degree in Finance and Accounting at Groupe Ecole d'Ingenieurs HETEC (year of Graduation 2013)

2007-2009 Brevet of Tech. Sup option Finance and Accounting. National Diploma  
(Year of Graduation 2012)

2005-2006 High School Diploma Specialising in scientific subjects at College Singa Yopougon, national Diploma

## OTHER CERTIFICATES

Jan 2016. Certificate in macroeconomic forecasting, issued January 4, 2016, an online learning initiative of the International Monetary Fund through EDX.

2013-2014. Certificate C1 of Turkish language at Ankara University tömer in Turkey

## FOREIGN LANGUAGES

French (native speaker), English, Turkish