Export structure and economic growth in a developping country: case of Côte d'Ivoire

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EXPORT STRUCTURE AND ECONOMIC GROWTH IN A DEVELOPPING COUNTRY: CASE OF COTE D'IVOIRE

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Abstract: The aim of this paper is to examine the interactions between export structure and economic growth in Côte d'Ivoire. To reach this goal, we used a modeling based on the ARDL Bounds test of Pesaran (2001). We arrive at the results on the export basket of Côte d'Ivoire and the index of diversification act negatively on the economic growth both in short and long term. But this diversification seems to be concentrated in some sectors. These results suggest a diversification in the export basket by including other sectors and also a structural transformation of the Ivorian economy.

Introduction

The export of goods and services are considered as engines of social and economic development. They allow to influence economic growth and reducing poverty. The success of South-East Asian and Latina-America countries' model appealed to developing countries. In fact, exports provide an outlet for local goods and services and foreign currencies inflows for countries.

According to Heckscher-Ohlin-Samuelson's international trade model, countries should specialize in the production of goods for which they have a comparative advantage. However, recent literature shows that countries tend to diversify their production and exports as they develop. Economic diversification can be defined as a development strategy that involves taking a position on new markets to reduce the risk of capital volatility. Focusing on exports diversification, Alwang and Seigel (1994) and De Pineres and Ferrantino (1997) define export diversification as the development of a country's export portfolio of primary products to industrial products. Love (1983) and Hirsch and Lev (1971) define it as not specializing the export portfolio to a limited number of export goods.[1] It can therefore be deduced that the greater the number of export goods, the more diverse will be the exports of a country.

Diversification can play an important role in the development and growth of an economy. Indeed, it can contribute, according to some authors, to increase factor productivity, strengthen investment and stabilize export earnings.

The aim of our study is to examine the interactions between export diversification and economic growth in a developing country like Côte d'Ivoire.

We started by assuming that the growth rate of Côte d'Ivoire would be even higher when the growth rate of exports was high and the fact that increasing export diversification had a positive and significant effect on economic growth in Côte d'Ivoire. We described the temporal evolution of Ivorian export structure. After that, we measured the impact of the degree of diversification of exports on economic growth in Côte d'Ivoire and analyzed the causality between the export structure and Ivorian economic growth.

We showed that evolution of exports and GDP were strongly dependent and that the level of Ivorian exports' diversification affected negatively the economic growth in the long term. In fact, the Ivorian export structure presented a sectoral concentration in which the level of diversification is high.

[1] [8]

Literature review

The new theories of growth emphasize a dynamic export sector based on increasing returns to scale and external effects of the export sector on other sectors. These external effects mainly include the expansion of advanced techniques, the employment of a skilled workforce and the improvement of managerial capacities due to the intense competition of exporters from the global market (Romer, 1990; 1991, Sachs and Wagner 1995). In theory, there are several ways in which export diversification should lead to an increase in the rate of growth. Herzer and Lehman (2006) believe that export diversification should have a positive effect on the economy's growth by reducing the dependence on the limited number of primary products. This theory is proven in developing countries that are highly dependent on primary export products and the agricultural sector. Based on the theories of structural economists, developing countries, with the aim of achieving stable economic growth, are expected to migrate from primary exports to industrial export goods (Chenery 1979, Syrquin 1988). In addition, according to Prebisch-Singer's theory, export diversification can prevent weak trading relations between developing countries.

In essence, there are two main chains concerning the effects of export diversification on economic growth. The first chain involves preventing the instability of export earnings known as a portfolio effect. This approach suggests that developing countries exporting primary commodities most often suffer from volatile commodity prices. This instability makes exporters of these goods face fluctuations in their export earnings. Moreover, these fluctuations lead to an increase in the uncertainty of some macroeconomic variables and can be dangerous for long-term economic growth.

Therefore, a high degree of diversification should lead to less fluctuation by creating greater stability in export earnings and increasing purchasing power in these countries. Improving purchasing power should lead to greater investment and consequently rapid economic growth. In addition, the exchange rate in countries that are considerably dependent on a limited number of export products is subject to less fluctuation than that in countries with a larger number of exports. These fluctuations may be barriers to investment in tradable goods and services (Ghosh and Ostry 1994, Bleaney and Greenaway 2001). Also, Agosin (2007) points out that countries offering a limited range of export products, due to frequent fluctuations in their export earnings, will face a variety of fluctuations which in turn will lead to a low rate of economic growth.

The second chain of effect is associated with the dynamic benefits of export diversification. The export diversification strategy in terms of the desirable effect on resource allocation may not only lead to a guaranteed improvement in the allocation according to the relative advantages of countries in international trade, but, more importantly, would lead to the realization of a dynamic profit. As long as the reallocation of resources based on relative benefits increases the level of income, the dynamic profits of export diversification play an important role in increasing the rate of income growth. The increasing use of factor capacities, the realization of economies of scale and the creation of jobs by exporting labor intensive products have a multiplier effect that increases the demand for intermediate goods and consumer demand leading to growth in the total factor productivity.

There is a wealth of literature addressing the issue of diversification and its relationship to economic growth. But, very little deals with the issue in the case of Côte d'Ivoire. The following paragraphs presents a set of writings on the subject.

Lederman and Maloney (2003) find in examining the relationship between trade patterns and economic growth that resource-rich countries grow less quickly because the concentration of exports is due to dependence on natural resources.

Using a time-series analysis of structural change in exports and economic growth in Spain, Balaguer and Cantavella-Jorda (2004) establish a positive relationship between diversification and economic growth using cointegration and causality tests.

However, Amin Gutierez and Ferrantino (2000) using a time series analysis find an inverse relationship between export diversification and economic growth in Colombia and Chile. Their study was called into question for methodological problems due to the non-respect of certain characteristics such as normality, autocorrelation and heteroscedasticity of errors.

ESCAP (2004) uses a two-step approach to test the relationship between export diversification and economic growth for some South Asian countries. In the first step, the link between these two variables is studied through a simple regression model. In the second stage, the long-run impact of economic growth on the country's real growth is studied through Granger's causality tests to test the long-term relationships and direction of causality between export growth and overall growth. Based on Bangladesh, Myanmar, Nepal and Malaysia and using long series (1973-2001), he finds that:

- In Malaysia, vertical as well as horizontal diversification has a significant impact on total exports; in Bangladesh and Nepal, only vertical diversification has a significant impact on total exports while in Myanmar neither of the two diversifications has a significant impact on the growth of total exports;
- There is a causality ranging from the growth of exports to the economic growth of the different countries in the sample.

Using a Cobb-Douglass production function and applying cointegration tests including the Johansen trace test, a multivariate error correction model and a DOLS procedure, Herzer and Nowak-Lehman (2006) find a positive relationship between export diversification and economic growth.

Agosin (2007) develops and tests a model that highlights the introduction of a new export as the main source of economic growth in countries that are within the global technological frontier. Using manufacturing-exporting countries in America and Asia, he finds that this diversification is highly significant in explaining per capita growth over the period 1980-2003 for these countries when exports are growing rapidly.

Matadeen (2011) analyzes the relationship between export diversification and economic growth in Mauritania over the period 1980-2008. Using the Johansen cointegration procedure and an error-correction model (VECM), the author finds a relationship between the concentration of exports and the variables of economic growth. The implication of this result is that export diversification would lead to greater economic growth. This result therefore demonstrates the need for export diversification by providing the right incentives, trading with market failures, promoting entrepreneurship and discoveries that will provide a regulated and competitive business climate with the aim of improving and sustaining diversification. exports then the growth of Mauritania.

Extending over the period 1980-2007, Arip et al (2010) use cointegration techniques on temporal data and Granger causality tests to examine the long-term relationship and the dynamic interactions between export diversification and economic growth in Malaysia. They find that export diversification plays a significant role in Malaysia's economic growth. They suggest that Malaysia must diversify its export products and develop great economic and social cooperation with the rest of the world in order to support future economic growth under the static effect of the liberalization of multilateral and regional trade. Like any export economy, in the long term, export diversification strategies could help stabilize Malaysia's export earnings.

Hodey and al. (2015) provide evidence of a relationship between export diversification and economic growth using panel data from 42 Sub-Saharan African countries. Employing GMM system estimation techniques and three different diversification measures, they find that export diversification has a significant and positive effect on economic growth in sub-Saharan Africa. The results are robust but do not allow for a non-linear relationship between export diversification and economic growth.

When we look at the West African sub-region, we found essentially two studies that looked at the issue in the case of Togo. The first study is that of Johnson (2006) which aims to verify the direction of the causality between exports and the

economic growth of Togo. From the use of cointegration and causality techniques, it emerges from this study that, despite the absence of cointegration between exports and economic growth, there is a circular relationship between these two aggregates. There is no cointegration between the labor factor, exports, public spending and economic growth.

The second study written by Kpemoua (2016) is more recent. It aims to analyze empirically the impact of exports on economic growth in Togo and the existence of a causal relationship between these exports and economic growth using a model that is based on a neoclassical production function type. The methodological approach used is based on cointegration and causality techniques. The empirical results reveal a positive and significant correlation at the 1% long-term threshold between exports and economic growth and a causality in the sense of Toda and Yamamoto, from exports to economic growth.

Data

The data used in this work come from the BCEAO[2]. It covered the period 1965-2015. Several variables were selected based on the literature. These are among others:

- Real Gross Domestic Product (GDP) (constant price basis 2008).
- Real exports (EXPORTS) (constant price basis 2008).
- The active population (FORCE).
- Gross Real Fixed Capital Formation (GFCF) (at constant 2008 prices).
- The diversification index (IDIVERSIFICATION) defined as the difference to 1 of the Herfindahl's index. This method was presented by Cadot et al (2009). In their case, they use disaggregated data up to the SH6 level. In our case, we will use the level of product disaggregation as proposed by the BCEAO for the construction of our diversification index.[3]

The variables were in logarithm for the estimation of the model.

Method

We sought to analyze the existence of a long-run relationship between GDP and the different variables of the study presented above. The equation of the basic model is written as follows:

$$LGDP_t = \alpha_0 + \alpha_1 LEXPORT_t + \alpha_2 LFORCE_t + \alpha_3 \mathrm{LGFCF}_t + \alpha_4 IDIVERSIFICATION_t + \varepsilon_t$$

For the rest of the equations, we would represent the dependent variable by Y_t and the explanatory variables by X_t. Several procedures had been suggested to test the presence of cointegration between two or more variables. Indeed, cointegration captures the idea that two or more series evolve together over time and generate a long-term statistical equilibrium. In the short term, such variables can evolve in different directions. Even if they move away from each other (others), in the long term, economic forces such as a market mechanism or public intervention, will start to bring them back (some) close to each other (the others). The economic literature proposes alternative methodologies for empirically analyzing long-term relationships and dynamic interactions between several variables.

The most commonly used methods for the analysis of cointegration are the two-step method of Engle and Granger (1987) and the Johansen method (Johansen 1988, Johansen and Juselius 1990). These tests have low power and poor statistical

[2] BCEAO: Central Bank of West African States

[3] The Herfindahl index, normalized between 0 and 1, is given by the following formula: $H^* = \frac{\sum_k (s_k)^2 - 1/n}{1 - 1/n}$ where $s_k = x_k / \sum_{k=1}^{n} x_k$ is the share of exports of product k in total exports and n is the total number of goods exported. $IDIVERSIFICATION = 1 - H^*$. A value of the diversification index close to 1 means that exports tend to be fully diversified. In the opposite case of a value tending towards 0, one deduces that the exports are strongly concentrated on a type of products.

properties for small samples (Cheung and Lai 1993, Harris 1995). As a result, we use the cointegration method introduced by Pesaran, Shin and Smith (2001) applied to autoregressive time-lagged models (autoregressive distributed lag -ARDL-).

The interest of the ARDL model is that it makes it possible to distinguish the endogenous variable from the explanatory variables. The only requirement is that the variable to be explained is integrated of order 1. In addition, the test of Pesaran et al. (2001) is relatively more efficient for small samples. Also, long-term model estimators of the ARDL model have been shown to be super-coherent in small samples (Narayan and Peng, 2007). It provides unbiased estimates of long-run coefficients and valid t-statistics even when certain explanatory variables are endogenous (Inder, 1993).

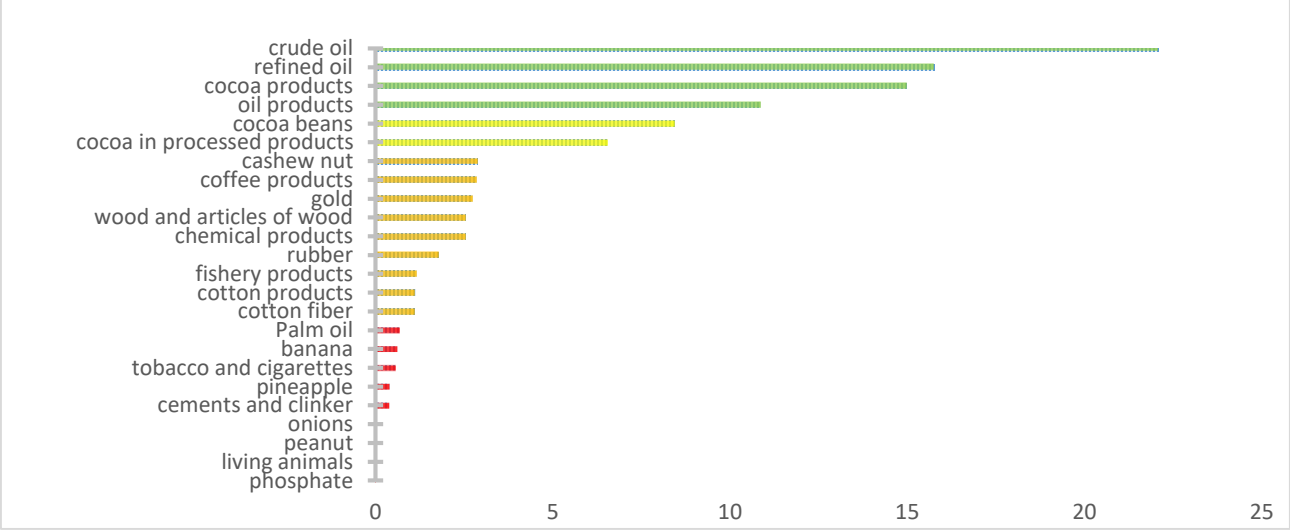
These models are increasingly used as alternatives to the usual cointegration tests because of the advantages they offer. Indeed, the traditional cointegration approaches Engle and Granger, (1987); Johansen, (1988) used to determine the presence of a cointegration relation has limits: need to have integrated variables of the same order I (0) or I (1) for example. The main advantage of the Pesaran et al method is that it can be applied regardless of whether the regressors are I (1) or I (0) and therefore does not require that the series be integrated of the same order. As a result, this method substantially reduces the uncertainties inherent in the preliminary unit root tests.

Results

1- Structure of Ivorian exports

This figure showed the average shares of each product in the sum of total exports in value over the period 1965-2015. To obtain this graph, we had, based on BCEAO data, identified all products (BCEAO categorization) exported by Côte d'Ivoire over the period. From these data, we calculated the average values per product exported and based on its values, the average shares of each product. This figure highlighted the state of the Ivorian export structure. Twenty-three (23) major product groups made up the basket of goods exported by Côte d'Ivoire. These goods were for the most part raw materials or the first processing of raw materials.

***Chart 1**: Average share of each product in exports (average over the period 1964-2015)*



***Source**: BCEAO and authors' calculations*

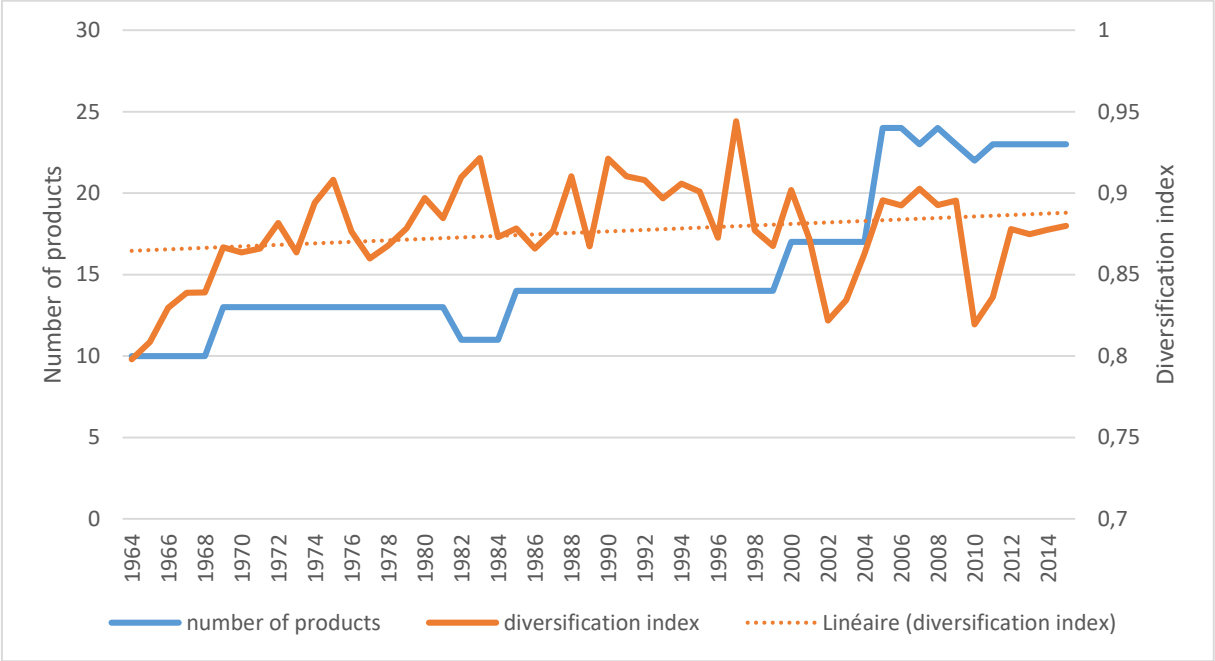
2- Diversification of the basket of exported goods

To analyze the diversification of the basket of exported goods in Côte d'Ivoire, we used the export diversification index. The index was obtained by differentiating between 1 and the Herfindahl concentration index. It made it possible to analyze the level of diversification of the basket of exported products and to judge the degree of inequality between the shares

of each product in the total value of exports of goods in Côte d'Ivoire. Its method of calculation showed its dependence on the number of products exported.

Chart 2 presents a comparative evolution of this index and the number of products (BCEAO categorization) exported over the period 1965-2015.

***Chart 2**: Evolution of the number of products exported and diversification of exports*



***Source**: BCEAO and authors' calculations*

Over the period 1965-2015, the index varied between 0.79 and 0.94 with an average value of 0.87 and a variance of 0.00078. This reflected a high level of diversification of the basket of goods exported to Côte d'Ivoire with a very small variation over the period.

The remarkable points of this figure were the periods from 1981 to 1985, from 1999 to 2003 and from 2010 to 2012. On these different dates, the observation was that the increase or decrease in the number of products exported over the first two periods was translated by a change in the diversification index in the opposite direction. The sharp drop in the export diversification index in 2010 was attributable to the crisis in the country. In fact, the basket of imported goods had not changed significantly, but the export dynamics of some products had been affected, reflecting the fall in the diversification index at this time. From 2012, these two series would know a stable evolution with a slope almost zero.

Ivorian exports were dominated by raw materials and natural resources. The diversification indicator that analyzes in a basket of exported goods its variance showed a strong diversification in the basket of goods exported by Côte d'Ivoire (values between 0.79 and 0.94). However, to analyze this diversification closely, it was clear that the basket of goods was certainly diversified but the structure of exports wasn't. The structure of Ivorian exports was concentrated in the field of raw materials; the majority of exported products were low added value products that undergo little or no transformation before leaving the territory. The variance in the basket of imported products was low (in the order of 0.06 to 0.21 over the period 1965-2015), but the export structure among the products consumed in the country reflected a low level of diversification. The analysis of trends in the number of products exported and the diversification index highlighted the negative impact of Ivorian export dynamics on the diversification index. Indeed, the introduction of new products into the basket of exported products led to the decline of the diversification index. This result gave us an insight into the relationship that might exist between the diversification of the basket of exported goods and the economic growth

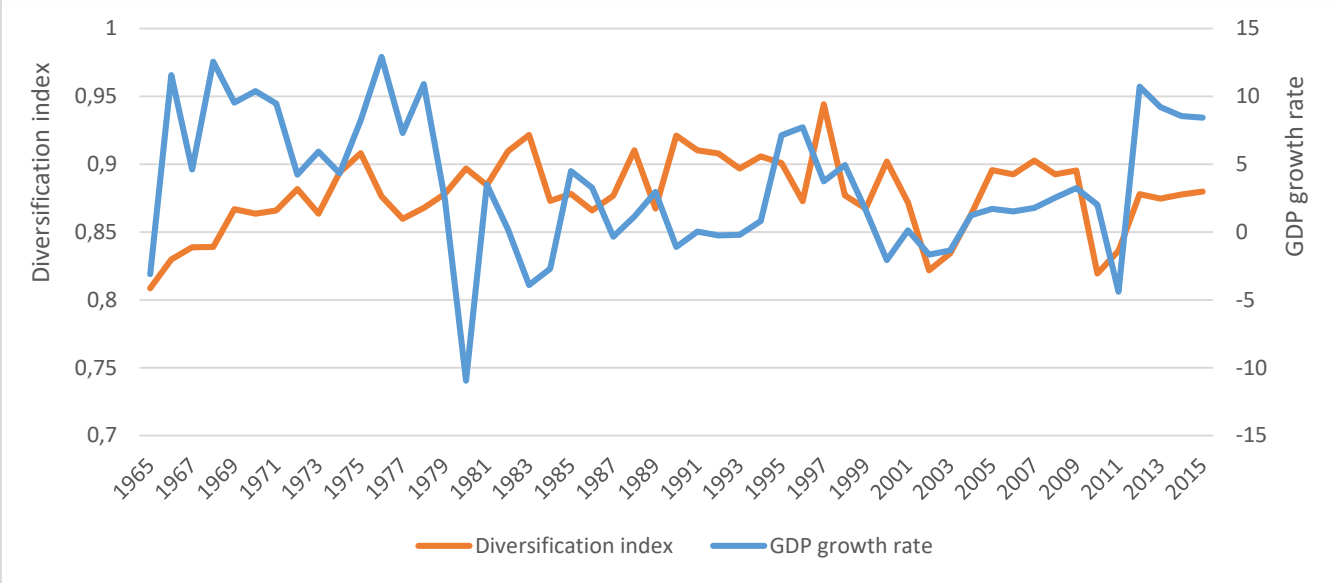
generated by a revitalization of the export sector in Côte d'Ivoire. The sign of the relationship between GDP growth and the diversification index (current level of diversification of Côte d'Ivoire) could be negative. This intuition was due to the fact that the lack of dynamism of the Ivorian export sector and its dependence on raw materials with low added value negatively influenced growth in Côte d'Ivoire and reduced the impact of exports on economic growth. .

After analyzing the structure of Ivorian exports, it was necessary to examine its relationship with GDP.

3- Evolution compared the index of exports and GDP growth rate in Ivory Coast

To determine the influence of the level of export diversification on economic growth in Côte d'Ivoire, we showed in the following graph a comparative evolution of these two series over the period 1965-2015.

***Chart 3**: Evolution of the diversification index and GDP growth rate in Côte d'Ivoire*



***Source**: BCEAO and authors' calculations*

We observed an opposite evolution of the growth of these two series from 1965 to 2000 and a similar evolution from 2000 to 2012. The period from 2012 to 2013 seemed to reproduce the observations made over the period from 1965 to 2000. To measure the meaning from the correlation between these two variables, we calculated a correlation coefficient with a value of -0.1554. This coefficient confirmed the intuition of the existence of a negative correlation between these two variables.

Estimation

In order to examine the order of integration of the variables, we used ADF and Phillips-Perron unit root tests. These different unit root tests previously conducted showed that none of our variables is I (2). Because one of the necessary conditions for the procedure of the ARDL bounds test to have a meaning is that none of the variables are integrated of order 2. All our variables were integrated of order 1 with the exception of the index of diversification which was integrated of order 0, which validates the procedure of the ARDL bounds test of Peasaran (2001).

To analyze the long-term relationship and short-term dynamic interactions between the variables, we applied the ARDL cointegration technique as developed by Pesaran et al (2001).

The Bounds Test is mainly based on an attached F-stat whose non-standard distribution under the null hypothesis of no cointegration. The first step of the test is to test the presence of a long-term relationship between the variables. We used the Akaike Information Criterion criterion to select the maximum delay order for the conditional ARDL-VECM. We

estimated firstly by OLS the first differences of the equation and then tested the joint significance of the parameters. The following table presents the results of the Bounds Test.

***Table 1**: Results of ARDL bounds test*

Test statistics	Value	K
F-statistic	8,1461	4

Critical value at 5% : [2,39 ; 3,38]

***Source**: Authors' calculations*

The test statistic is greater than the upper bound of the interval. This test assumes that there is a long-term relationship between the gross domestic product and the different explanatory variables.

The next step is to look at the marginal effects of exports, the labor force, the openness rate, gross fixed capital formation on gross domestic product.

Long term relationship

We estimated a long-term relationship between the different variables in the study. The results are recorded in the following table:

***Table 2**: Long term relationship*

Variables	Coefficient	P-value
LGFCF	0.069263	0.5011
LEXPORT	1.236978	0.0001
LFORCE	-0.790636	0.0083
IDIVERSIFICATION	-2.455763	0.0493
C	12.739299	0.0444
R2=0.993	***F-stat=149.02***	
R2 ajusted=0.986	***P-value=0.000***	

***Source**:* Authors' calculations

The analysis of table showed that all variables were significant except for gross fixed capital formation. The model was globally significant at the 5% level. According to the results, over the long term, gross domestic product was positively affected by gross fixed capital formation and exports while it was negatively influenced by the diversification index and the labor force.

This long-term analysis highlighted the negative impact of the type of export diversification on gross domestic product. In fact, an increase in the diversification index of 0.1 led to a drop in GDP of 24.56 billion. This result seemed to contradict the economic theory that postulates a positive effect of export diversification on GDP. Indeed, several studies such as those of Hesse (2008), Khodayi et al (2014) find a result consistent with the theory. In the case of Côte d'Ivoire, this result could be explained by the composition of its basket of export goods. It has a diversified basket, but it is concentrated only in a few sectors of the economy such as agriculture and first-level processing of raw materials. Côte d'Ivoire would then

be better off diversifying its economy in order to benefit by boosting its exports to better benefit from its effect on economic growth.

The estimate of the long-term relationship gave us an adjustment coefficient of -0.8261 significant at the 5% threshold and between -1 and 0. This validated our error-correction model. This coefficient gave in absolute value the speed of adjustment of the variables of the system towards the long-term target.

In principle, any deviation of a variable from its long-term equilibrium value should be corrected by the error-correcting mechanism with a shock absorption rate of 0.8261 for GDP. The inverse of this speed of adjustment made it possible to estimate the duration necessary to reduce macroeconomic imbalances and to return to the long-run equilibrium. Thus, the number of years to return to the long-run equilibrium was between one and two for GDP.

Short term relationship

This relationship was presented in the following table :

Table 3*: Short term equation*

Variables	Coefficient	P-value
D(LGDP(-1))	-0.180511	0.0854
D(LGDP(-2))	-0.391826	0.0022
D(LGDP(-3))	-0.185841	0.1055
D(LGFCF)	0.347250	0.0000
D(LGFCF(-1))	0.328117	0.0000
D(LGFCF(-2))	0.347130	0.0000
D(LGFCF(-3))	0.156643	0.0265
D(LEXPORT)	0.452009	0.0000
D(LEXPORT(-1))	-0.471744	0.0001
D(LEXPORT(-2))	-0.282237	0.0025
D(LEXPORT(-3))	-0.131992	0.0790
D(LFORCE)	-7.945032	0.0574
D(LFORCE(-1))	11.718461	0.0796
D(LFORCE(-2))	-1.081138	0.8720
D(LFORCE(-3))	10.095878	0.0167
D(IDIVERSIFICATION)	-0.801744	0.0182
D(IDIVERSIFICATION(-1))	0.770123	0.0382
CointEq(-1)	-0.8261	0.0000

Source *:* Authors' calculations

The results of the short-term relationship also showed us that diversification had a positive effect on GDP at the 5% level. Other variables such as gross fixed capital formation and exports strongly and positively influence the gross domestic product in the short term.

The Breusch-Pagan-Godfrey test allowed us to conclude that residues were homoscedastic. The Breush-Godfrey test for the absence of autocorrelation of the residues allowed us to conclude that the residues were not autocorrelated. The Shapiro-Wilk test concluded that the residues are normal. The stability test of CUSUM attested to the stability of the model over the entire period. The omission test of the Ramsey-Reset variables rejected the omission of variables hypothesis.

Conclusion

In conclusion, we noted that exports can be a huge potential for development in Côte d'Ivoire. The analysis of the relationship between the evolution of exports and that of GDP showed the strong dependence of Ivorian growth and that of exports. This study had highlighted the negative effect of the level of diversification of Ivorian exports on economic growth. The structure of Ivorian exports presents a remarkable contrast. The variance (concentration index) within the basket of exported goods was small, but the structure of exported goods appeared to be concentrated in a single sector. We noted that the Ivorian export structure presented a sectoral concentration in which the level of diversification is high. This mode of diversification negatively affected Ivorian economic growth in the long term. On the basis of these different results, we formulate the following results:

- Change the basket of products exported by Côte d'Ivoire: Côte d'Ivoire would benefit from conducting horizontal or vertical diversification as described by Berezin (2002). Its basket of exported goods has not changed significantly in the last fifteen (15) years. To this end, a transformation of its basket by adding products from other sectors could improve its mode of diversification and correct the adverse effects it has on current growth.
- Start a structural transformation of the Ivorian economy: the Ivorian economy is highly dependent on raw materials, which is evident in its basket of exported goods. A structural transformation of the economy will mean diversifying its economy and developing the industry sector. This will concretize the horizontal or vertical diversification project recommended in the first recommendation and will enable Côte d'Ivoire to obtain a good position on the scale of global value chains.

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We would like to extend our deepest thanks to our teacher, Professor KEHO Yaya. His tremendous guidance and unwavering support had been invaluable to us throughout this work.

***Table 4**: Results of ADF and Philip-Peron tests*

	ADF		PP		Décision
	En niveau	**En différence**	**En niveau**	**En différence**	
LGDP	1,1613	-6,2778	1,0835	-6,2862	I(1)
	(0,9347)	(0,000)*	(0,9253)	(0,000)*	
LGFCF	0,4736	-5,8372	0,3537	-5,8560	I(1)
	(0,8137)	(0,000)*	(0,7832)	(0,000)*	
LEXPORT	1,4370	-6,9143	1,4370	-6,9260	I(1)
	(0,9608)	(0,000)*	(0,9608)	(0,000)*	
IDIVERSIFICATION	-4,6871		-4,6526		I(0)
	(0,000)*		(0,000)*		
LFORCE	-0,1057	-3,7536	-0,0997	-2,0774	I(1)
	(0,9932)	(0,029)*	(0,9935)	(0,5451)	

***Source** :* Authors' calculations

***Table 5** : List of products used to calculate the diversification index*

Banana
Cashew nut
Cements and clinker
Chemical products
Cocoa beans
Cocoa in processed products
Cocoa products
Coffee products
Cotton fiber
Cotton products
Exports of seed cotton
Fishery products
Gold
Living animals
Oil products
Onions
Palm oil
Peanut
Phosphate
Pineapple
Refined oil
Rubber
Tobacco and cigarettes
Uranium exports
Wood and articles of wood

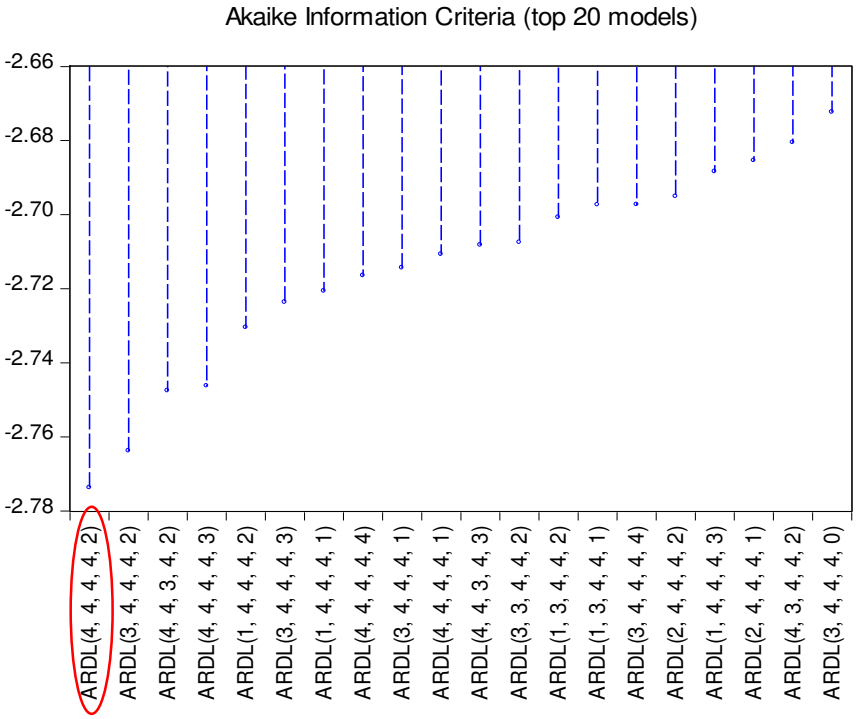
***Source** : BCEAO*

Table 6 *: Results of the calculation of the diversification index*

Year	Index	Year	Index
1965	0,80860827	**1991**	0,91035311
1966	0,82970851	**1992**	0,90792259
1967	0,83878504	**1993**	0,89675245
1968	0,83907947	**1994**	0,90574196
1969	0,86677603	**1995**	0,9008603
1970	0,86363817	**1996**	0,87270472
1971	0,86595778	**1997**	0,94414332
1972	0,88171569	**1998**	0,87710047
1973	0,86356787	**1999**	0,86744474
1974	0,89410617	**2000**	0,90189926
1975	0,90814717	**2001**	0,87178479
1976	0,87633421	**2002**	0,82175965
1977	0,85989715	**2003**	0,83434863
1978	0,86769907	**2004**	0,86273602
1979	0,87829359	**2005**	0,89553664
1980	0,89689914	**2006**	0,89248459
1981	0,88465922	**2007**	0,90272311
1982	0,90967294	**2008**	0,89262235
1983	0,92158259	**2009**	0,89542274
1984	0,87308643	**2010**	0,81938958
1985	0,8782461	**2011**	0,83610695
1986	0,86601603	**2012**	0,87801845
1987	0,87683457	**2013**	0,87476096
1988	0,91028676	**2014**	0,8776026
1989	0,86724372	**2015**	0,87985659
1990	0,92113754		

Source *: BCEAO and* authors' calculations

***Chart 4**: Choice of optimal lag*



***Source** : Authors' calculation*

***Table 7**: Heteroskedasticity Test: Breusch-Pagan-Godfrey*

F-statistic	0.797769	Prob. F(22,24)	0.7012
Obs*R-squared	19.85259	Prob. Chi-Square(22)	0.5923
Scaled explained SS	8.361209	Prob. Chi-Square(22)	0.9961

***Source** : Authors' calculation*

***Table 8**: Breusch-Godfrey Serial Correlation LM Test:*

F-statistic	3.469520	Prob. F(2,22)	0.0490
Obs*R-squared	11.26972	Prob. Chi-Square(2)	0.0036

***Source** : Authors' calculation*

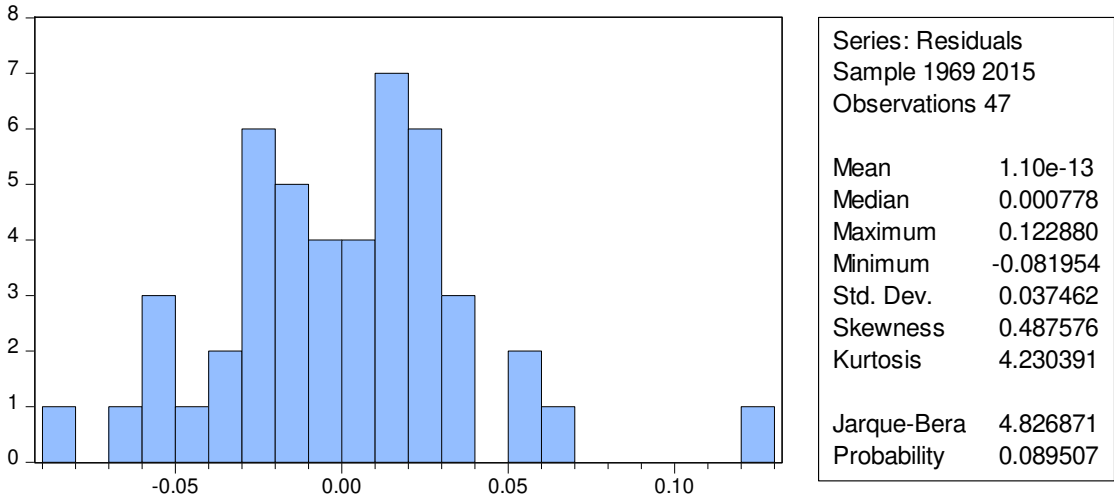
***Table 9**: Ramsey RESET Test*

Equation: UNTITLED
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	1.169337	23	0.2542
F-statistic	1.367350	(1, 23)	0.2542

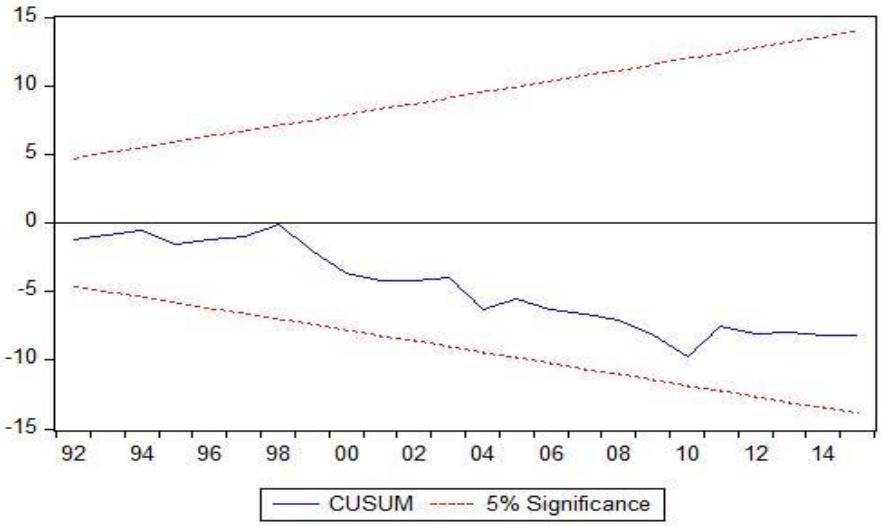
***Source** : Authors' calculation*

Chart 5: *Normality test for errors*



Source *: Authors' calculation*

Chart 6*: Test de stabilité CUSUM*



Source *: Authors' calculation*

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