Has Export Diversification Impacted Economic Growth in Cote d'Ivoire? Evidence from an econometric analysis.

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This paper empirically investigates the relationship between export diversification and economic growth in Côte d'Ivoire from 1995 to 2018. We analyzed the time series characteristics of the data and opted for an error-correction ARDL(2,4,4,4) model. Using the Bounds test we found support for a long run relationship among the variables. We also found a positive relationship between export diversification and economic growth in the short run. Whereas, in the long run, we found a negative relationship. Thus, specialization would be beneficial to the country's economic performance. Moreover, in the long run investment will positively impact growth whereas labour participation rate would have a negative impact on growth.
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I. Introduction

In many developing countries, where domestic demand is often very low, exports remain one of the few channels that contribute significantly to growth of per capita income (Hesse, 2018). Indeed, exports enable countries to earn foreign exchange and fund development programs. The importance of exports to economic growth depends among other things on the extent of exports diversification. By definition, an economy is said to be diversified if its productive structure comprises a large number of activities differentiated by the nature of goods and services produced (Berthélemy, 2005). Authors such as Amurgo-Pacheco and Pierola (2007), Siope et al (2012) defined export diversification as the process of expanding exports to new products or new markets (extensive margin), as well as balancinga combination of existing products (intensive margin).

There is disagreement within the economic literature about the structural composition of exports and their effects on economic growth. On one hand, traditional approaches to international trade suggest the importance of specialization in production and marketing (Ricardo, 1817; Krugman P, 1981). On the other hand, modern theories of international trade argue that a country should not rely solely on particular industrial activities as indicated above, and should be more aware of the role of export diversification in insuring a competitive edge. Indeed, recent theories of international trade oppose specialization by arguing that diversification has a positive impact on productivity and economic growth (Grossman and Helpman, 1991; Boeri and Oliveira, 2002).

The economic growth and export diversification nexus has long been debated. Scholars have provided evidence to support impact of export diversification on economic growth. Indeed,Imbs and Wacziarz (2003) showed that diversification goes hand in hand with wealth in low per capita income countries. Export diversification could help stabilize long-term export earnings (Ghosh and Ostry 1994, Bleaney and Greenaway 2001). Moreover, Hesse, 2018argued that the effect of export diversification on growth is non-linear, with developing countries benefiting from the diversification of their exports, unlike the more advanced countries that obtain better results with export specialization.

In addition, the recent international trade literature shows that countries tend to diversify their production and exports as they develop. The successes of emerging countries are undoubtedly partly due to their significant progress towards diversification. This is the case of China, which has experienced very strong growth in foreign trade over the last twenty years, and its weight in world exports has quadrupled from less than 1% to more than 4% from 1980 to 2001. This expansion was underpinned by a rapid diversification of its supply of

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manufactured goods in world markets. Indeed, in addition to its strong comparative advantage in textiles, the Chinese share of world exports has exceeded 10% in watchmaking, home appliances, consumer electronics, electrical equipment, (Lemoine and Ünal-Kesenci, 2002). China has even become today one of the most diversified countries in the world, and experience has shown its great ability to withstand the consequences of fluctuations in the international market, despite its increasing economic openness (Berthelemy, 2005). Its diversification index, which was 0.45 in 1998, stood at 0.1 in 2016 (Statistique Canada, 2018).

Beyond China, countries like Malaysia and Thailand (to name a few) have seen a remarkable decline in the concentration of their exports over the past 40 years. In addition to exports of manufactured goods (clothing and electronics), Malaysia and Thailand also continued to develop their primary sectors (based on palm oil / rubber resources in Malaysia and agriculture / fish in Thailand) into high value-added products (Hesse, 2018). The diversification index for Malaysia went from 0.30 in 1960 to 0.08 in 2000, and that of Thailand from 0.17 in 1960 to 0.003 in 2000 (Feenstra et al., 2005). These two countries are ranked 24th and 27th in the world in terms of ease of Doing Business (World Bank, 2018).

In Côte d'Ivoire, like in many African countries, exports of primary products dominated the economy in the early days of independence (World Bank, 2012). The Export of these primary products led in Cote d'Ivoire to what was characterized as the Ivorian miracle. In 1964 and 1976, cocoa, coffee, banana and wood products accounted for 91% and 61% of Ivorian exports (Lafleur andGuihede,1983). The decline in the share of these products in total exports resulted from the fact that the Ivorian authorities initiateda diversification policy of agricultural production as a response to the deteriorating terms of trade.

In 1994, although a substantial revival of traditional and non-traditional exports was observed, both geographical and sectoral diversification of exports increased only slightly (Cogneau and Mesplé-Somps, 1999). More than half of the increase in the volume of exports between 1993 and 1997 was due to the rise in cocoa production, which in 1997 accounted for about 40% of export earnings (Cogneau and Mesplé-Somps, 2003). In general, between January 2000 and September 2008, the share of agricultural products accounted for 47.4% of total exports against 34% for petroleum products and 13% for manufactured products. More specifically, cocoa (crude and derived products) and oil (crude and derived products) alone accounted for 63.2% of total Ivorian exports (World Bank, 2012).

Since the end of the post-election crisis in 2012, significant progress has been made; with a greater increase in exports compared to imports. Indeed, the rate of coverage of imports went from 111.05% in 2012 to 121.99% in 2015 (Côte d'Ivoire, 2016). Notwithstanding this performance, the economy's reliance on the coffee-cocoa sector is a source of fragility. Cocoa is Côte d'Ivoire's main economic resource representing 40% of world production. The contribution of Coffee and cocoa to GDP growth stood around 20% and 50% respectively in export earnings. These two products are critical for the survival of about 4 million people, or 25% of the Ivorian population. The sector employs more than half of the country's labor force and accounts for more than 10 percent of tax revenues. It remains a major driver of the country's economic performance (AfDB, 2018).

From the above and despite the efforts initiated by political leaders towards diversification, the structure of Ivorian exports has not changed much since independence in August 1960. Ivorian exports are largely dependent on the primary sector. However, these primary goods are produced with very low added value and are subject to major risks resulting from the highly volatile market prices as well as the instability resulting from inelastic and unstable global demand. Indeed, this may discourage firms that are not willing to take risks to invest in the economy thereby increasing the uncertainty of the country's macroeconomic outlook, and undermining its long-run economic growth (Hesse, 2018). Moreover, these different risks are contributors ofexport earnings fluctuations which can hinder planning efforts, reduce the country's capacity to import and invest (Dawe, 1996).

As a result, a fall ofprices of these commodities could lead to a net loss for all the stakeholders i.e. a decrease in foreign exchange earnings, reduction of producers' incomes, a decline in economic growth and an increase in poverty. This was seen in 1979 when the collapse of coffee and cocoa prices largely contributed to the destabilization of the economy by reverting its growth to one of its lowest level. Indeed, the main macroeconomic and financial indicators deteriorated rapidly, plunging the country into a severe recession. As a result, Côte d'Ivoire recorded an average annual growth rate of 0.74% between 1980 and 2011 (World Bank, 2018). Between September 2016 and February 2017, the sharp drop in cocoa prices of around 35% weakened producers who saw the farm price of cocoadrop from CFAF 1100 to 700 per kilogram (World Bank, 2019). The aboveprovides an indication of how fragile is the country's economic base and the extent to which concentration of exports on few commodities could adversely impact the well-being of population in the event of a shock. Export diversification could be a solution for Côte d'Ivoire since it will enable the country hedge against the risks associated with external shocks and also stabilize export earnings over time.

In view of the above, it is important to consider whether export diversification could be a determining factor for economic growth in Côte d'Ivoire?

The main objective of this study is to contribute to a better understanding of the relationship between export diversification and Cote d'Ivoire's economic growth. The specific objectives are to:
•   Determine the impact of export diversification on economic growth in Côte d'Ivoire.
•   Determine, if there isa long run dynamic between export diversification and economic growth in Côte d'Ivoire.

Knowing that primary commodity-based economies are vulnerable to sectoral shocks, exports diversification could be a way of consolidating foreign exchange earnings thereby limiting risks of revenue loss. Significant revenue loss for a country in a given time period could trigger internal conflicts that could lead to political instability. Moreover, knowledge of the nexus between exports diversification and economic growth will likely provide insights for socioeconomic decision-making.

The original contribution of this work comes from the fact that to our knowledge no such work has been undertaken for Cote d'Ivoire.The rest of the paper is organized as follows: Sections II and III present stylized facts and a review of the literature respectively. Section IV presents the method of analysis and the data to be used for the study. The empirical results are presented and discussed in section V. Section VI concludes the paper and makes some recommendations.

Stylized facts
[Figure 1 here]
It is important to note that there are many statistical indexes that can be used to measure export diversification; however, in this paper we focus on the Herfindahl-Hirschman Index (HHI), which is used as an inverse measure of diversification. This is because of its ease of use, its popularity, its adaptability to various types of exports diversification and because it has most of the characteristics of a good concentration index. Figure 1 shows how growth rate of Gross Domestic Product (GDP) and exports diversification index evolved over the period ranging from 1995 to 2017. We considered three sub-periods. The first one started from 1995 to 2002, the second ranged from 2002 to 2011 and finally the third goes from 2011 to 2017.

In the first sub-period we observe a divergence of the two variables. Indeed, as the diversification index drops from 0.818 in 1995 to 0.776 in 1998 indicating an attempttowards diversification on the onset of the devaluation of the country's currency (the CFA F) in January 1994, per capita GDP increased from US$ 1,345 to 1,420 over the same period. We observe a gradual decline in the per capita GDP from 1999 to 2002 whereas the exports diversification registered a slight increase going from 0.776 to 0.816 over the same period.It is to be recalled that following the 1994 devaluation, Côte d'Ivoire embarked in a stringent economic recovery program that led to a growth rate of near 8% (the upward trend observed earlier). Notwithstanding the above, in 1999, the country registered a sharp decline in per capita GDP that could be attributed to the political turmoil that led to the country's first military coup. The fall in cocoa and coffee prices, coupled with the political unrestaffected potential investors who adopted a wait-and-see attitude whereby aggravating the already unfavorable economic environment (OECD, 2002).

In the second sub period ranging from 2002 to 2011, exports diversification and per capita GDP followed similar trends. Indeed, exports diversification index went from 0.720 in 2003 to 0.678 in 2011 (-5.8%) while per capita GDP went from US$ 1,230 in 2003 to US$ 1,131 in 2011 (During this period, there is a more pronounced downward trend in the diversification index with a lower peak in 2011 (-8%). The slight improvement in the level of exports diversification could be explained by an increase in the share of non-cocoa-coffee exports.

The last sub-period from 2011 to 2018we observe an upward sloping trend of both exports diversification index and per capita GDP up to 2015 where the diversification index starting to decline whereas economic performance continued with its momentum. Indeed, for seven years in a row, the growth rate of GDP exceeded 7%. This "spectacular" growth rate could be explained by the benefits of catch-up effects as well as favorable external conditions on the economy as a whole (World Bank, 2019a). Thedeclineof the exports diversification index in 2015 could be explained by the reforms implemented to structurally transform the agricultural sector (Conseil du Café-Cacao, 2017). In 2015-2016, the volume of processed beans was 491,495 tons, or 32% of the volumes exported, compared with 558,275 tons in 2014-2015, i.e. 31% of the volumes exported. Also the tonnage of processed coffee has changed significantly, from 17% in 2013 to 23% in 2015 (Conseil du Café-Cacao, 2017).

The trend analysis above does not allow for a clear relationship between exports diversification index and the country's economic performance. Unlike Côte d'Ivoire, some countries in East Asia, Latin America and Africa have achieved remarkable results in export diversification. These include Malaysia, Thailand, South Korea, China, Japan, Chile, Canada, Mauritius, Uganda, South Africa, Egypt and Morocco, to name a few.

In Malaysia, for example, the exports diversification index, which stood at 0.3 in 1960, fell sharply to less than 0.1 in 2000. Thailand also saw its diversification index fall from 0.16 percent in 1960 to less than 0.05 in 2000 (Hesse, 2018). Similarly, over the period 2007-2015 Japan's exports diversification index ranged

between 0.12 and 0.15. The success of the economic growth of these countries, as well as that of the East Asian countries in general, was mainly based on structural transformations, moving from the production and export of primary (low-yielding) products to high yielding export products, i.e. vertical diversification (Lwesya, 2018).

The example of South Korea is particularly edifying. Indeed, in the early 1960s, the economic situation in South Korea was similar to that of many developing countries, including Côte d'Ivoire. However, it made strong increases in productivity and economic prosperity through export-oriented strategies that enabled rapid access to technology and helped businesses take advantage of economies of scale. While being virtually with no natural resources, this country has managed to multiply by thirteen per capita GDP over the period 1980-2010. The contribution of the manufacturing sector to GNP increased from 14% in 1961 to 27.6% in 2010, while that of agriculture, forestry and fishing dropped from 37% to 2.7% (AfDB, 2013). Korea has significantly increased its revealed comparative advantage in machinery, as well as in textiles and fabrics.

China also struck a balance between an expansion focused on the promotion of sectors in which it had a strong comparative advantage i.e. clothing, textiles and fibers, and a booming electronics sector which was very sophisticated and strategic. Electronics, clothing, textiles, fabrics as well as cotton and rice are some of the product groups in which China significantly increased its global market share in the 1990s (AfDB, 2013). This country recorded a diversification index of 0.1 in 2016, (Statistique Canada, 2018).

Chile's export diversification index from 1960 to 2000 declined from 0.48 to 0.09 (Hesse, 2018). This country diversified its economic base to the point of exporting to 177 countries up to 3,800 products, including high value agro-food products such as wine, fruit and vegetables (Lwesya, 2018). Similarly, the Canadian exports diversification index has consistently been below 0.15 (StatistiqueCanada, 2018). Canada exported more than $ 500 billion worth of goods every year from 1988 to 2016. In 2016, its exports diversification index stood at 0.08.

The above examples provide if need be an illustration of the state of export diversification in developed and emerging economies. Unlike these countries, exports diversification index of Cote d'Ivoire has remained on average above 0.6.If we look at the African continent, we observe that some countries have outperformed their counterparts in terms of exports diversification in the past decades. Indeed, Mauritius, which was much less diversified than the average low-income and developing country in 1962, shifted from monoculture to an economy centered on manufacturing industry, before becoming a major financial center (IMF, 2017).

Uganda was one of the least diversified economy until the 1980s; period during which it experienced episodes of civil war, but in 2014, its level of diversification was equivalent to that of other emerging countries such as Brazil and Mexico, (IMF, 2017). The exports diversification index of this country went from 0.6 in 1960 to 0.24 in 2014 (IMF, 2017a).

South Africa has an exports diversification index equivalent to that of emerging countries such as Chile, Indonesia, Malaysia and Vietnam (IMF, 2017). Its exports diversification index remained relatively stable from 1980 to 2014 at a value of 0.25.Egypt, moved from being an exporter of mainly cotton, rice and fruit to exporting textiles, clothing, metal and chemical products (AfDB, 2013). Its exports diversification index, which was 0.4 in 1995, was around 0.23 in 2014, (IMF, 2017b). Morocco has gone from being an exporter of agricultural commodities and phosphates in 1970 to being an exporter of clothing, chemicals and electronics (AfDB, 2013). The index of exports diversification went from 0,38 in 1995 to 0,25 in 2014 (IMF, 2017b).

Although some progress was registered in selected African countries, a lot remains to be done and Côte d'Ivoire is far behind, this shows the efforts to be mounted by the country to diversify the base of its economy if it is to structurally transform

II. Review of literature

The question of economic diversification is not new, already in 1696 Davenant had already addressed the problem of the weak industrial base, which had led to the export of most products in their primary states. He argued that raw materials were not the only source of wealth available to a nation, and that a nation can create baskets of wealth through diversification. Davenant (1696) believed that an eclectic approach to trade, which should include agricultural production and the industrial revolution, could create more wealth. He argues that this approach to trade creates more sustained wealth than a mono (gold) economy. In the twentieth century, it reappeared in the 1930s with Laughlin's work, which sought to demonstrate that concentration of activities was at the root of crises. Since the 1930s, it has been considered an important issue for regional policies and national trade and industrial policies; it has also been a central theme in discussions on development policies (Berthelemy, 2005).

The lagging development of African countries has brought back the issue of economic diversification, due to weak economic performance of countries, especially those in sub-Saharan Africa (Romer 1990, Acemoglu and Zilobotti 1997, Stanley and Bunnag 2001). These scholars have cast serious doubt on the theoretical proposition of specialization as a key factor for growth, since developing countries exporting only raw materials have experienced a secular deterioration of their terms of trade in their economies which was

detrimental to their growth prospects. For them, the only way to get out of this trap was through diversification of the exports towards manufactured products. Prebisch (1962) and Singer (1950) were of the idea that, vertical diversification of exports could reduce the deterioration of the terms of trade for commodity-dependent countries. In other words, a diversification of exports to manufactured goods may be useful if there is a general trend of deterioration in the terms of trade of primary products (Athukurola 2000).

It is often argued that it is not only the level of exports that leads to growth, but also the degree of diversification of these exports or the export base. Advocates of this view have highlighted the strong impact that diversification has on growth. According to Romer (1990), diversification can be considered as a factor that contributes to improving the efficiency of other factors of production. Economic growth and structural changes depend on the types of products that are traded (Hausmann and Klinger, 2006). Thus, with exports diversification, an economy can progress towards the production and the export of more elaborate products, which can contribute strongly to its economic development.

Many scholars have shown the benefits of diversification in terms of risk mitigation. Acemoglu and Zilibotti (1997) have argued that through diversification, investment risks are spread across a broader portfolio of economic sectors, resulting in higher revenues. In addition, diversification helps countries protect themselves from the deterioration of the terms of trade by stabilizing export earnings. Export diversification could have positive spillover through new production techniques, new forms of organization, new management practices or more efficient marketing that could benefit other industries (Amin Gutierrez de Pineres and Ferrantino, 2000). For example, economies with a diversified export structure would benefit from these externalities and incentives for capital formation, which would lead to higher growth. Similarly, horizontal and vertical diversification of exports can positively affect overall production.Other advocates for exports diversification include Alwang and Siegel (1991), Ghosh and Ostry (1994), Imbs and Wacziarg (2003), Hammouda et al. (2006) and Agosin (2007).

The empirical literature on the relationship between export diversification and economic growth direct us to consider three types of relationships i.e. a positive linear, a negative linear and a nonlinear relationships.

Positive relationship between export diversification and economic growth

Economic growth, defined as the measure of a country's well-being or economic performance, has been and continues to be the focus of many debates. Indeed, several researchers have investigated the sources of economic growth, (N'Zué, 2003). Among these investigations the export variable is often used as an essential factor for economic growth (Balassa 1985, Ghatak 1997, etc.). During the 1980s and 1990s, four other areas of the literature highlighted the potential benefits of export expansion for economic development. One strand proposed that countries produce and export goods for which global demand is increasing, (Naudé and Rossouw, 2008). This literature is based on the belief that exports are good for economic growth and that export-led growth is the most appropriate development path for the developing world (N'Zué, 2003). For them, an expansion of exports leads to an increase in production, which has a multiplier effect to promote economic growth. As a result, several articles in the literature were undertaken to empirically verify whether such a mechanism exists in a country with respect to the relationship between export diversification and real income growth. Thus, using 30-year observations for the Chilean economy, Amin De Pineres and Ferrantino (1997) found that economic growth is achieved through export diversification and that diversifying agricultural exports played a particularly important role in long-term growth of Chile. Herzer and Nowak-Lehmann (2006) also tested the effects of export diversification on Chile's economic growth using a Cobb-Douglas production function. Their data covered the period ranging from 1962 to 2001. They used the multiple error correction model and dynamic ordinary least squares (DOLS) estimator. Their findings were similar to those of Amin DePineres and Ferrantino (1997) that supported the key role of export diversification in Chile's economic growth.

Sannassee and Lamport (2014) studied the relationship between export diversification and economic growth in Mauritius. The data used ranged from 1980 to 2010. Their study was done in dynamic time series setting. They found a positive relationship between export diversification and economic growth in both the short and long term. In the long run, a 1% increase in diversification would result in a 0.11% increase in real GDP.

Forghaet al. (2014) studied the relationship between export diversification and economic growth in Cameroon for the period 1980-2012. The authors used the Hirschman index to measure export diversification. They also used the autoregressive vector (VAR) and Granger causality tests to estimate the relationship between these two series. The results show that export diversification has a positive effect on per capita GDP in Cameroon.

Esu and Udonwa, (2015) investigated the relationship between export diversification and economic growth in Nigeria. Their study covers a period of about thirty-one years (1980 - 2011). Using an error-correction model, their results indicate that export diversification offers Nigeria the opportunity to achieve a strong, versatile and stable economy, if taken seriously and with determination.

Lotfi and Karim, (2017) investigated the relationship between diversification of exports and economic growth in Morocco over the period 1980-2015. They used (a) the Herfindahl-Hirschman index (HHI) and (b) the Theil index composed of intra and inter components. They also used a stationary autoregressive vector (VAR) model that analyzes the causality between selected variables and a vector error correction model (ECMV) for the analysis of short and long term relationships between export diversification and economic growth. They found that export diversification plays its full role in economic growth, in the case of the Moroccan economy only if it is oriented towards new markets or new goods.

Siddiqui, (2018) in his study of the relationship between export diversification and economic growth in Pakistan, used an ARDL model to assess whether export product diversification and geographical diversification have contributed to GDP growth. The data used ranged from 1972 to 2015. His results confirm a significant, albeit modest, positive relationship between export diversification and GDP growth. The author also found no significant positive relationship between geographical diversification of exports and GDP growth.

Lwesya (2018) conducted a study on the relationship between export diversification and poverty in Tanzania. The data used ranged from 1980 to 2015. The author used GDP per capita as an indicator of poverty, vertical diversification index, horizontal diversification index and inflation. Using Toda and Yamamoto's (1995) causality test, found the existence of a unidirectional causal relationship between horizontal diversification of exports and the growth of per capita income in Tanzania and argued that export diversification could contribute to poverty reduction initiatives in Tanzania especially if an integrated set of policies and strategies are put in place to spearhead horizontal and vertical diversification.

Nwosa and Ikechukwu, (2019) investigated the link between export diversification and economic growth in Nigeria from 1962 to 2016 in an ARDL setting. They found that export diversification has a positive but insignificant impact on economic growth in Nigeria. Based on this finding they argued that the oil sector still dominates the Nigerian economy and that government's effort to diversify into other sectors of the economy has not produced the expected outcome.

Negative relationship between export diversification and economic growth

Although the majority of studies have confirmed the hypothesis that an expansion and diversification of exports leads to an increase in output, this positive relationship is not always obtained in the literature. Indeed, Michaely (1977) found a significant positive relationship between exports and economic growth more often in developed countries than it is the case in least developed countries. He therefore argued that a minimum level of development was necessary for exports to have an effect on economic growth. Likewise, Chang et al. (2000) in a VAR setting examined the relationships between income, exports and imports in Taiwan from 1971 to 1995. They found that export diversification has a small negative effect on income and thus, the export-led growth assumption did not apply to Taiwan.

Studies by Amin De Piñeres and Ferrantino (2000) showed no evidence supporting the export diversification-led growth in Colombia and Chile. In the case of Chile's exports, diversification actually appears to be negatively correlated with growth.

Sharma and Panagiotidis (2005) sought to test the growth hypothesis driven by exports in the case of India over the period 1971-2001 using different approaches and their conclusions tended to reinforce the arguments invalidating the 'growth driven by exports.

Non-linear relationship between export diversification and economic growth

Although most early theories have predicted a monotonous relationship between export diversification and growth, other studies have shown the non-monotonic aspect of the relationship between these two factors. For example, Imbs and Wacziarg (2003) in their seminal article on the relationship between national sectoral concentration and per capita income in countries found a non-monotonous U-shaped relationship in which early-stage developing countries diversify their production and specialize at higher income levels. Thus, an increase in export diversification is positively correlated with per capita GDP up to a certain threshold of development. The turning point for countries moving from national diversification to specialization is quite robust, with a level of about US$ 9,000 per capita. This means that most developing countries are actually diversifying their economies. Lederman and Klinger (2006) got the same results as Imbs and Wacziarg, however they argued that the turning point is US$ 22,500.

Hesse (2018) used a dynamic growth panel model in a GMM setting to test the relationship between export diversification and GDP per capita growth. The author found a positive effect of export diversification on growth that is potentially non-linear.

Other scholars includingCadot et al., (2011), Naudé and Rossouw, (2011) andAgosin et al., (2012), have confirmedthe inverted U-shape relationship between diversification and wealth creation.

Aditya and Acharyya (2013) examine the relationship between exports and economic growth, taking into account both diversification and the composition of exports. The data used covered 65 countries and ranged

from 1965 to 2005 in a GMM setting. They found a threshold level of export concentration beyond which increased export specialization results in higher growth. Below this threshold, export diversification is important for GDP growth.

Gozgor and Can (2016) empirically investigated theeffects of export product diversification on revenues at different stages of economic development.Their work covered 158 countries. Using panel GMM they found that export diversification is positively related to real GDP per capita in low, and low- middle and upper-middle income countries. However, the relationship is negative in non-OECD and high-income OECD countries, i.e. the concentration of product exports favors real GDP per capita in these countries.

Overall, there are three groups of thoughts on the link between export diversification and economic development. First, there are those who show the positive effects of export diversification in the growth process of a country. They are the most numerous. The second group, while insignificant, presents studies that failed to confirm the positive relationship between export, export diversification and economic growth. The last group concerns studies that have obtained a nonlinear relationship; in fact, supporters of this group mostly used panel data with the GMM estimator.

III. Data and Method of Analysis

Drawing on studies by Hesse (2018), Siddiqui (2018), and many others, we will use Solow's neoclassical production function to study the growth process. In addition, Hesse (2018) argues that Solow's growth framework provides an intuitive and theoretical strategy for testing the relationship between export diversification and *GDP* per capita growth. Our neoclassical Cobb-Douglass growth model with technical progress is written as :

$$Y_t(K_t, L_t) = AK_t^{\alpha} L_t^{1-\alpha} \tag{1}$$

Where *Y, L* and *K* represent output, labour and capital stock respectively. *A* is total factor productivity or technological progress considered exogenous, *α* and *(1-α)* are the elasticities of *GDP with* respect to capital and labour, respectively. Like Hesse (2018), we assume that the effect of export diversification on economic growth can be captured through total factor productivity (A). We therefore assume that :

$$A = h(DIV_{EXP_t}) = A_0 e^{\theta DIV_{EXP_t}} \tag{2}$$

With DIV_{EXP_t} measuring export diversification; A_0 a constant. Combining the two equations (1 and 2) and taking the logarithms yield the following equation:

$$\ln Y_t = \ln A_0 + \alpha \ln K_t + (1 - \alpha) \ln L_t + \theta DIV_{EXP_t} \tag{3}$$

By replacing Y_t by GDP_{h_t}; $\ln A_0$ by δ ; α by β_1 ; $(1 - \alpha)$ by β_2 ; θ by β_3 ; K_t by $GFCF_t$ and L_t by Emp_t, we obtaain the following structural form of our basic empirical model:

$$\ln(GDP_{h_t}) = \beta_o + \beta_1 \ln(GFCF_t) + \beta_2 \ln(Emp_t) + \beta_3 DIV_{EXP_t} + \varepsilon_t \tag{4}$$

Where GDP_{h_t} is per capita Gross Domestic Product, $GFCF_t$ is Gross Fixed Capital Formation used as proxy for investment. It is in percentage of *GDP,* Emp_t isthe participation rate of working age population and used as proxy for the labor variable, DIV_{EXP_t} *is* the Herfindahl-Hirschman Index (*HHI*) used to measure export diversification. Low values of the *HHI* (values close to zero) indicate a more even distribution of exports across a range of products or a diversified set of export products, and vice versa. Since the variable in the diversification index is already small (between zero and one), it did not go through the logarithmic transformation. ε_t is the error term.

Given the time series nature of the data it is important to analyze its characteristics. It is the result of these analyses that will determine the approach to be used. The first step will be to analyse the stationarity of our variables. To do this, we use the Augmented Dickey-Fuller (*ADF*), Philip-Perron (*PP*) and Andrews and Zivot (*AZ*) unit root tests. This is important because a regression of non-stationary variables on other non-stationary variables results in what is called spurious regression. The *ADF* test has been shown to be effective in the presence of error autocorrelation, the *PP test* is recommended in the presence of heteroscedastic errors, and the *AZ test* is suitable for series that are subject to endogenously identified regime changes.

Following the results on the characteristics of the variables, whether *I(0)* or *I(1),* we will study the short- and long-term relationships between export diversification and the dependent variable using the *ARDL* approach. This is obtained by combining two types of dynamic models, namely autoregressive (*AR*) and distributed lag (*DL*) models. Another unique feature of this model is that it improves forecasting and policy effectiveness, unlike simple non-dynamic models (Harris and Sollis, 2003). The study of the existence of the long-run relationship is carried out using the Bounds test (Pesaran et al., 2001). To do this, we need to reformulate our model to show both short- and long-term dynamics. The *ARDL* (Autoregressive Distributed Lag) model allows us to do this. The generalized *ARDL(p, q)* model is presented below :

$$Y_t = \beta_o + \sum_{i=1}^{p} \beta_i Y_{t-i} + \sum_{j=0}^{q} \alpha_j X_{t-i} + \varepsilon_t \tag{5}$$

Where Y_t is the endogenous variable, X_t represents the explanatory variables, β_o is the constant, β and α are parameters to be estimated, and p and q are optimal lag orders and $\varepsilon_t \sim iid(0, \sigma^2)$ the error term. Using Akaike Information Criterion (*AIC*), we determine the optimal lag and following Pesaran and Shin(1999) and Pesaran et al. (2001) we respecify equation 5 as an unrestricted error-correction model or conditional *ECM* or conditional *ARDL (p, q)* presented below :

$$\Delta Y_t = \beta_o + \theta_i Y_{t-1} + \theta_j X_{t-1} + \sum_{i=1}^{p} \beta_i \Delta Y_{t-i} + \sum_{i=1}^{p} \alpha_j \Delta X_{t-J} + \varepsilon_t \qquad (6)$$

Applied to our study variables, we have the following error-correction model:

$$\Delta \ln(GDP_{h_t}) =$$

$$\beta_o + \theta_1 \ln(GDP_{t-1}) + \theta_2 \ln(GFCF_{t-1}) + \theta_3 \ln(Emp_{t-1}) + \theta_4 DIV_{EXP\,t-1} + + \sum_{l+1}^{p} \beta_{1i} \Delta \ln(GDP_{h\,t-i}) +$$

$$\sum_{j=1}^{q} \beta_{2j} \Delta \ln(GFCF_{t-j}) + \sum_{j=1}^{q} \beta_{3j} \Delta \ln(Emp_{t-j}) + \sum_{j=1}^{q} \beta_{4j} \Delta DIV_{EXP\,t-j} + \varepsilon_t \qquad (7)$$

Equation 7 captures both short run ($\beta_1\ to\ \beta_4$) and long run dynamics (θ_1 to θ_4). Cointegration is assessed by carrying out a Fisher test on the following hypothesis: $H_0 : \theta_1 = \theta_2 = \theta_3 = \theta_4\ vs\ H_1 : \theta_1 \neq \theta_2 \neq \theta_3 \neq \theta_4$. The test statistic obtained is compared to two critical thresholds: a lower band *LB* and an upper band *UB*, generated by Pesaran et al (2001). If the calculated F-Statistic is below the lower band, it is concluded that there is no long-term relationship between the variables, whereas if the statistic is above the upper band, the null hypothesis is rejected indicating the existence of a cointegrating relationship between the variables. When this is the case, the estimation of the *ARDL* model provides us with both the long term dynamics (level equation) and the short term dynamics (difference equation) between the variables. On the other hand, if the F statistic is between the two bounds, the Bounds Test is said to be inconclusive. In this case, other methods as alternatives to the *ARDL* model may be used such as ordinary least squares (OLS). The statistical Software used is STATA 14.2 (STATA, 2018). With the exception of the export diversification index, which is obtained from UNCTAD's Commodity Trade Statistics Database[1]; all data used are from the World Bank's World Development Indicators[2] database.

Empirical results and discussions

Let's discuss our empirical results. We begin with the descriptive statistics in Table 1. From this table, we observe that average per capita GDP stood at US$1,334.190 with a minimum at US$ 1,1331.445 registered in 2011, the year of the post-electoral crisis. The highest per capita GDP stood at US$ 1,692.544 and was registered in 2018.

[Table 1 here]

The export diversification index, on the other hand, did not change significantly over the period of analysis. The export diversification index stood on average at 0.747 with a minimum at 0.678 in 2011 and a maximum at 0.818. We observe also the low volatility of of the export diversification index which stood at 0.04. The level of investment proxied by Gross fixed capital formation stood on average at 13.584% of GDP. This relatively low compared to countries such as Ghana, South Africa, Mauritius, Malaysia and South Korea, which record an average level of 22.18; 18.95; 23.45; 26.26 and 31.96 respectively (World Bank, 2018).

The results of the stationary tests are presented in Table 2 below. The results showed that we have a mix of *I(1)* and *I(0)* series. That is, we cannot use the traditional approach of Granger and Johansen to test whether the series are cointegrated.

[Table 2 here]

The appropriate approach is to use the bounds test proposed by Pesaran et al (2001). The results of the AIC test indicate an optimal lag order of (2,4,4,4). The results of the bounds test are reported in Table 3 and indicate the existence of a cointegrating relationship between the variables.

[Table 3 here]

With the above result we move to estimate the short- and long-term dynamics. The results are presented in Table 4 below.

[Table 4 here]

The adjustment speed of the *ARDL* estimated is negative and statistically significant. This reflects the existence of a stable long-run relationship (cointegration) between the variables and the model corrects its short-term imbalance towards long-term equilibrium at an adjustment speed of 4.646. The majority of the variables are statistically significant except variable $D(DIV_{EXP\,t}(-3))$.

Since the index used is an inverse measure of diversification, therefore a negative coefficient indicates a positive relationship between export diversification and growth. It can therefore be argued that in the short

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term, export diversification has a positive effect on economic growth in Côte d'Ivoire. It is therefore called upon the country's authority to mount more efforts in export diversification. The country can thus, move gradually away from exporting mainly raw materials towards exporting new high value added products. Our resultsare consistent with those of Lotfi and Karim (2017) in Morocco and Esu and Udonwa (2015) in Nigeria. They found that greater export diversification would lead to a higher level of economic development.

Although in the short term, export diversification is recommended, in the long term, export diversification has a negative impact on economic growth. Indeed, a one-unit improvement in the level of diversification thus translates into a 75 per cent decline in GDP per capita, ceteris paribus. In the long term, therefore, it will be good for the country to specialize or concentrate its exports in sectors that have a pulling effect on the others (François Perroux's "poles of growth") in order to generate balanced growth thereafter through spillover and linkage effects.

These results are in line with studies by Imbs and Wacziarg (2003) and Hesse (2018). According to these studies, countries diversify first, in the sense that economic activity is more evenly distributed across sectors, but there is a relatively late stage in the development process when countries start to respecialize.

IV. Concluding remarks

The objective of this study was to empirically investigate the relationship between export diversification and economic growth in Côte d'Ivoire from 1995 to 2018. We analyzed the time series characteristics of the data and opted for an error-correction *ARDL(2,4,4,4)*model. The Bounds test used to assess whether there is a long run relationship among the variables was in support of cointegration. The results of the estimations of the *ARDL(2,4,4,4)* model show that in the short run export diversification has a positive effect on economic growth in Côte d'Ivoire. However, in the long run, specialization would be beneficial to the country's economic performance. Moreover, in the long run investment will positively impact growth whereas labour participation rate would have a negative impact on growth.

Based on the above results, we strongly encourage the country's authorities to embark effectively on the process of diversifying export products, as any progress in this area could stimulate growth and further strengthen resilience. In order to reap the full benefit of the effects of diversification on economic growth, structural transformation would be the ideal way forward. This would involve a shift from low to high productivity sectors (innovative sectors). The products to be targeted in the first instance are those that require only minimal modification of the existing production structure, as the country does not have all the financial capacity to undertake a radical shift of its production base. The study did not examine some other aspects of export diversification, such as vertical and horizontal dimensions of export diversification, as well as geographical diversification.

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Table 1. Descriptive statistics

Variables	Mean	Standard deviation	Min	Max	Obs
GDP_{h_t}	1,334.190	143.503	1,131.445	1,692.544	24
$FBCF_t$	13.584	4.157	4.704	20.711	24
Emp_t	62.865	3.139	58.213	67.104	24
DIV_{EXP_t}	0.747	0.041	0.678	0.818	24

Source: Author, based on data from UNCTAD (2018) and WDI (2018).

Table 2: Results of the ADF, PP and AZ unit roots tests

Variables	Level			First difference			Decision
	ADF	PP	AZ	ADF	PP	AZ	
$ln(GDP_{h_t})$	0.539	0.793	-1.625	-2.458	-2.387	-8.231	I(1)
	-1.605	-1.608	-4.607	-1.957**	-1.957**	-4.950*	
$ln(GFCF_t)$	-3.095	-3.139	-8.640	--	--	--	I(0)
	-2.998*	-2.998*	-4.949*	--	--	--	
$\ln(Emp_t)$	-5.995*	-7.088*	-4.865	--	--	--	I(0)
	-2.669*	-2.669*	-4.858**	--	--	--	
DIV_{EXP_t}	-2.282	-2.236	-2.893	-6.963	-6.963	-6.597	I(1)
	-3.753	-3.753	-3.86	-3.769*	-3.769*	-4.735*	

Source: Author, based on UNCTAD (2018) and WDI (2018) data.
Asterisks *, **, *** indicate significance at 1%, 5% and 10% respectively

Table 3. Bounds Test for cointegration among variables of interest for *ARDL(2,4,4,4)*

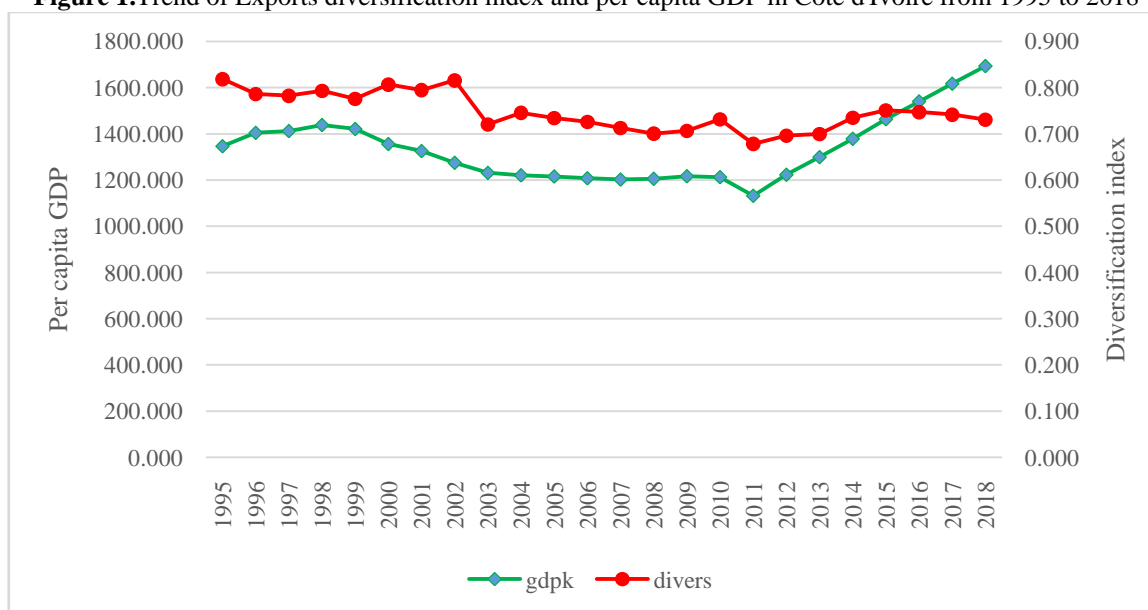| H_0➔ No levelsrelationship		
F-stat =	**F = 9.641**	
k=3	**[I(0)**	**I(1)]**
Critical value at 10%	[2.72	3.77]
Critical value at 5%	[3.23	4.35]
Critical value at 1%	[4.29	5.61]
Accept H₀ if F_stat< Critical Value for I(0)Regressors		
RejectH₀ if F_stat>Critical value for I(1)Regressors		

Author's calculation.

Table 4: Results of the estimated *ARDL*(2 4 4 4) model.

Variables	Dependent variable : Gross Domestic Product per capita	
	Coefficients	Probability
	Short-term dynamics	
$D(lnGDP_{h_t}(-1))$	1.524*	0.083
$D(lnGFCF_t)$	-0.400**	0.047
$D(lnGFCF_t(-1))$	-0.278**	0.047
$D(lnGFCF_t(-2))$	-0.130*	0.054
$D(lnGFCF_t(-3))$	-0.056*	0.061
$D(lnEmp_t)$	23.589*	0.060
$D(lnEmp_t(-1))$	28.649**	0.049
$D(lnEmp_t(-2))$	38.298*	0.058
$D(lnEmp_t(-3))$	48.967**	0.044
$D(DIV_{EXP_t}))$	-2.452**	0.046
$D(DIV_{EXP_t}(-1))$	-1.404**	0.044
$D(DIV_{EXP_t}(-2))$	-0.629*	0.063
$D(DIV_{EXP_t}(-3))$	-0.123	0.216
CointEq (-1)	-4.635**	0.045

	Long-term dynamics	
$\ln(FBCF_t)$	0.107***	0.009
$\ln(Emp_t)$	-1.920***	0.001
DIV_{EXP_t}	0.750***	0.001
C	27.691**	0.043
R-square➔ 0.995	***Adjusted Rsquare➔ 0.954***	
Autocorrelation test (Breusch – Godfrey)		
F-statistics =0.230	P-value F(18,3) = 0.715	
Heteroskedascticity Test (Breusch – Godfrey)		
F-statistics =0.347	P-value F(18,3) = 0.916	
Normality Test (Jarque Bera)➔Pvalue = 0.442		

Source: Author, based on UNCTAD and WDI data (2018). Asterisks *, **, *** indicate significance at 10%, 5% and 1% respectively

Figure 1. Trend of Exports diversification index and per capita GDP in Cote d'Ivoire from 1995 to 2018

Source: Author with data from the World Bank and UNCTAD