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Abstract. *Since the classical theory of comparative advantage costs have been well assess with productivity's firms level evidence considering the lack of data's about this productivity's firm level evidence on Sub-Saharan Africa Region the main aim of this study is to give rationality of this classical theory of comparative advantage costs even with macro level evidence on this Region. In the idea that the player's added value is an unpreceding indicator to predict on the final result of an tournament this international trade's comparative advantage cost can be used as an related evidence of the achievement of the final AFCON with winning country heavily desserved with players of world great team. To assess on the rationale of this macro level evidence the assessment lied on the one hand on the stochastic growth model with evidence of this scheme giving by panel data Bayesian estimates and shrinkage estimates and on the other hand on the Balassa Samuelson Effect with a evidence of them realized by the panel cointegrating technique. Globally speaking, the obtained results with a subset of countries in Africa Region the namely Economic Community of Central African States are supportive of the macro level evidence for the classical theory of comparative advantage costs and a good predictor of the final issue of an tournament as the AFCON.*

Keywords: *comparative advantage, productivity, Bayesian estimates, Shrinkage estimates, panel cointegration, ECCAS, AFCON*
Jel classification Codes: C23, C33, O47

1. Introduction

The recent Totalenergies AFCON Cameroon 2021 have showed that the added value produce by each players contribute to the final result of the game. In fact, this tournament have seen the consecration of teams with the most improving added value of players with mainly Senegal who have Sadio Mane, Egypt with Mo Salah and Cameroun with an players as Samuel Etoo. To resume an invaluable meaning to appreciate on the added value of players lied on the ability of these laters to play or to be member of great world teams. In fact, this is the case for those enumerated precedently. Thus an interesting question is to know if the ability of a country to export his players is an good meaning to infer on the final result of the game. This is the main problematic of this study that can be achieved with the old theory of comparative advantage cost of international trade. In fact, this states on an twin interrogation to know if a World where all firms exports can be done easily with just the amount of output per worker? Commonly named as productivity or labor productivity. Indeed, this is a simplest

and easier mechanism as well stressed by the infant industry argument's of Krugman (1984) statement following which the closing of the local market gives to agents or national firms the incentive to exports just because now these one's make increasing returns to scale coming just from the increasing level of production that allow this elevating barriers toward the local market. The recent trend into Africa region have the main interest that is give in using technological process for economic transformation of his members. Concerning money for example at this time we speak on framework as the Mobile Money (Pénicaud 2012) this kind of operation that permits to facilitate transfert, sending and receipt of money across the continent worldwide. Another strand of debate that is relate to technology in Africa Region concern the process of digitalization of the economy with this ability to realize the main task of an economic process with just a smartphone. These are few example s to demonstrate that at this time the Region looks technology as an real weapon to address the economic development into the Region. In this paper, we have not the aim of demonstrate this but to address the concern of technology with external trade.

The theory of international trade abounds in theoretical models, some of them complementary, others conflicting. Alternatives approaches towards explaining the causes of international specialization are followed, for example, by classical economists on the one hand and by Heckscher and Ohlin on the other. While the hypothesis advanced by the former presupposes the existence of inter-country differences in production function, the latter assumes identical production functions and qualitatively identical factors of productions in the trading countries and attribute international specialization to differences in factors endowment. The empirical testing of Heckscher-Ohlin hypothesis by Wood and Mayer (2001) led to conclusive results about the composition of exports between raw and process materials. In the present paper, we will not attempt to test the Heckscher-Ohlin hypothesis, but will rather inquire into the validity of the classical models.

The preceding founding on the testing of the H-O formulation is that it is robust to explain the structure of export even for Africa Region. The main interest of an approach as those of Wood and Mayer (2001) for this subset of countries is that this give an simple intutition of the logical issue behind international specialization that endowment of countries in human capital than natural ressources is the main factor that explain composition of export so that countries with high endowment in human capital relatively to natural ressources would justify high tendency of exports in process materials and inversely. An another interest associated to this approach is the possibility that we can test the effect of an desire commercial policy toward sustain structural composition of export. In particular with the

main characteristic to have his currencies peg to an anchor one's the namely cfa franc zone this approach of Wood and Mayer (2001) helps to indentify the meaning by which policies toward sustaining exchange rate variabilities as measured by Misalignment or Volatility can cancel with the exhibit of these countrie's exports of high dependence toward raw materials. As well as another set of suitable commercial policies orientation as for example the role of foreign direct investment into the composition of exports. But in this paper the challenge is one that cannot be investigate by this approach the meaning by which difference in technology explains international specialization or relative performance in exports. In fact, recall that the H-O is build on the assumption of identical production functions and qualitatively identical factors of productions in the trading countries so that international specialization is attribute to differences in factors endowment.

The reminder of the paper is organized as follows, in the subsequent section (section 2) we present the classical models of international trade, in section 3 we goes on the development of the association between export performance and productivity at the macro level, in section 4 we goes on the test of the classical models on macro level evidence, in section 5 we give rationale to the macro level evidence, and finally section 6 gives some concluding remarks.

2. The classical theory of comparative costs

According to the classical theory of comparative costs, when based on a labour theory of value and assuming two countries, each will export those goods for which the ratio of its output per worker to that of the others exceeds the ratio of its money wage-rate to that of the other. According to the original formulation of the classical theory, comparative advantage based on relative productivity differentials determine international specialization. It has subsequently been realized that inter-country differences in the wage structure and in the capital-labor ratios of various industries may compensate for productivity differentials; a country possessing a relative productivity advantage in a particular industry may still import the commodity in question if it paid relatively higher wages and/or had higher capital costs per unit of output in that industry. Still the defenders of classical theory among the others expressed the opinion that the later factors are not sufficiently important to warrant significant changes in trade pattern as determines by relative differences in productivity. Then the demand for good k makes by the two countries i and j can be written as:

$$E_i^k/E_j^k = g_k\left(p_i^k/p_j^k\right) \; ; g_k < 0 \qquad (1)$$ where E represents the exports of good k by the country.

We know that in classical theory the technical coefficient a is so that:

$a_i^k = \frac{L_i^k}{Y_i^k}$, $a_j^k = \frac{L_j^k}{Y_j^k}$. Then $p_i^k = w_i a_i^k$ and $p_j^k = w_j a_j^k$. Thus if we assume that the demand of good is comparable to the demand of exports we can rewrite:

$$E_i^k/E_j^k = g_k\left[\left(q_i^k/q_j^k\right)\left(w_i/w_j\right)\right] \; ; g_k < 0 \qquad (2)$$ where q is the productivity measured as net output per worker.

This test have been undertake by MacDougall (1951) and Balassa (1963) with firm level evidence for American and British manufacturing industries in cross section. MacDougall (1951) compared relative export volume and relative productivity differences and found that in 20 out of the 25 industries examined, where Amercian ourput per worker was more than twice the British, the United States had inn general, the bulk of export market, while for product where it was less than twice as high the bulk of the market was held by Britain. The paper of Balassa (1963) can be regarded as a continuation of MacDougall's work with differences in choice of data and in methodology. Also Balasa (1963) fitted the data with the complementary question whether the explanation of exports can be improved upon if we considered not only productivity differentials but also wage ratios as the determinants of exports shares.

3. Productivity and Export

Without disaggregate data or firm level evidence concerning survey data on firms exports and productivity there is a Rationale of using macro level data on productivity and exports for testing classical theory of comparative costs? The logical issue is the following: we know that since Edwards (1989) the dynamics and movements in the Real Exchange Rate (*RER*) are governed by macroeconomic factors in general called "Fundamentals". Among them the Balassa-Samuelson Effect (Balassa 1964; Samuelson 1964) who states that differences in productivity between the home and foreign country goes into an appreciation of the *RER* in general take as the declining in the international competitiveness of the home country. The logical issue is the following: because the factors of production in particular the Labor is remunerated at his own productivity (marginal productivity) then an increasing productivity will increase the wages until that the country experiments

an Real Exchange Rate appreciation coming from the increasing labor cost so that the production of tradables becomes more irrelevant compare to the production of non tradables.

Therefore, from an theoretical point of view the use of data on aggregate exports and aggregate productivity seems reasonable in the sense that this convey for testing the main argument toward rejection of the purchasing power parity to know the Balassa-Samuelson Effect. In fact, recall that the Real Exchange Rate is the relative price of tradable goods compare to those of commercial partner. Then we can rewrite (1) as follows:

$E_i/E_j = g(RER_{i/j})$; $g < 0$ where $RER_{i/j}$ is the bilateral Real Exchange Rate between *i* and *j*.

Following a large strand into the literature the Balassa-Samuelson Effect is measured as the productivity differential between the home and foreign country. Then we get the following formulation:

$$E_i/E_j = g(q_i/q_j) \ ; g < 0 \qquad (3)$$

Therefore we have get an suspect relationship between export performance and relative productivity between the home and foreign country but contrary to the evidence of MacDougall (1951) and Balassa (1963) this relation is inverse. Indeed if it's well established that the effect of Real Exchange Rate on external trade is undetermined (Côté 1986), thus as an attempt of assessment to the Rationale of using aggregate data on exports and productivity as an first approximation without the availability of data on firm level, we readily follow the prediction of the classical theory on comparative costs. First we must have g > 0 and secondly the elasticity of substitution between the two country exports must be greater than unity since elasticity substitution equal or less than unity would lead to inconclusive results.

4. Empirical assessment

Our empirical assessment have at his heart a set of countries to know the ECCAS members who share the same comparative advantage in natural resources so that constructing a framework where technology is the main task for compete in foreign markets is relevant. We have choose to compare the Cameroonian economy to others economies in ECCAS in assessing the association between export performance and productivity. The estimate lies on equation (3). In this case, estimate is make with

OLS. The data on productivity measured as output per worker coming from World development indicators (WDI) on the sample between 1960 and 2020 in annual frequency. The obtained results are the following in table 1:

Table 1: equation of export performance

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
Constant	-0.27 (0.02)*	-0.73 (0.22)**	0.38 (0.07)*	0.78 (0.15)*	3.88 (0.08)*	-2.18 (0.27)*	1.05 (0.03)*	2.77 (0.32)*
$ln(q_i/q_j)$	0.34 (0.01)*	-0.43 (0.15)**	-0.42 (0.03)*	-0.70 (0.21)*	1.27 (0.05)*	5.09 (0.14)*	0.60 (0.01)*	2.02 (0.28)*
Statistics								
NT	140	45	45	45	69	52	118	40
Adjusted R square	0.62	0.17	0.20	0.10	0.42	0.96	0.60	0.60

Notes: * (**, ***) null hypothesis is rejected at 1% (5%, 10%) significance level. (.) standard errors. q is productivity, (A) relative total exports, (B) relative manufactures exports, (C) relative agricultural exports, (D) relative Or and metal exports, (E) relative services export, (F) relative food export, (G) relative exports as capacity to import, (H) relative fuel exports.

With these results we found some rationale to the classical theory of comparative advantage in the sense that for some raw products the elasticity of substitution between the two country exports is significantly positive and greater than unity with a great emphasis on foods and fuel exports. Therefore this result is an support of macro level evidence for the classical theory of comparative costs.

5. The Rationale for Macro level evidence

We know that the export performance and technology relationship is build on the idea that countries differs across technology so that there exist difference in productivity between countries that account much more for his openness to the international trade. Concerning the macro level evidence of this relationship is that we can realize assessment of this relationship with an estimate of the country‘s level of productivity. Therefore, in order to investigate on the Rationale of this macro level evidence we will thus address on the estimate of the macro level of country’s productivity.

Concerning the macro level estimate of the country’s productivity the rationale for macro level evidence about the export performance and productivity relationship can be found in Solow-Swan neoclassical growth model where the starting point is the aggregate function of production. In fact, with this reasoning the studies reach to a economic formulation that imbedded the macro productivity level of the country. This have been well done since studies as Mankiw, Romer and Weil (1992) that takes Solow-Swan growth models seriously. Concerning the economic formulation linked to this

reasoning Lee, Pesaran and Smith (1996) distinguish three cases: The first is that the steady state for the logarithm of per capita output may be identical (unconditional convergence with the same growth rate), parallel straight lines (conditional convergence with the same growth rate), unrelated (conditional convergence with different growth rates).

The first two cases (identical and parallel straight lines) have been well assess into the literature with the fact that the second case must to be a consequence of the first case the identical case when this not hold. Therefore considering the aim of this study, that is to investigate the relationship between the export performance and productivity, the third case remains at the cornerstone of our examining on the robustness of the macro level evidence. In fact, in examining the suppose positive relationship between export performance and productivity recall that the theoretical foundation is fashioned by the theory that countries differ in terms of technology so that the recovering in the estimate of different level of productivity across countries is proof to the building theory on which the export performance and productivity relationship is constructed and then of the macro level evidence of this relationship that assumes the existence of a macro level country's productivity that is different from one country to another one. Nevertheless based on Islam (1995) studies as Bouoiyour, Hanchane and Mouhoud (2009) relies on the country effect in general call the individual fixed effects as estimate of the macro level of the country's productivity.

Therefore the main aim attached to this section is to find proof to Lee, Pesaran and Smith (1996)'s stochastic growth model. In fact, among the theory of cross country economic growth that is the one who asserts that there exist difference in growth rates among them in productivity in concordance with the classical theory of comparative costs on which the positive relationship between export performance and productivity is build. We then organizes the current section as follows: in a first time (5.1) we give the economic formulation to the stochastic growth models. While in a second time (5.2) we proceed to the empirical assessment of the parameters in order to judge on the convenience for the analysis of different productivity growth rates across countries. Indeed this is proof to the building theory on which the export performance and productivity relationship is constructed and then of the macro level evidence of this relationship that assumes the existence of a macro level country's productivity that is different from one country to another one.

Finally, we states about the Balassa Samuelson Effect (5.3). In fact, the preceding developments is on establishing the rationale on the convenience for using macro level data by the reasoning that

thre exist advocates of the estimates of aggregate productivity at the country's scale. With the evidence of Balassa Samuelson Effect the aim is to establish the coherence of the Results by examining why for relative manufactures exports, agricultural exports and Or and Metals exports the association between export performance and productivity is negative. The main reason could be the Balassa Samuelson Effect that we want to investigate therefore.

5.1. Economic formulation

The Lee, Pesaran and Smith (1996)'s stochastic growth models implies that the rate of growth for the technology and the rate of convergence to the steady state income per capita differ across countries that is:

$$y_{it} = \mu_i + \theta_i t + \beta_i y_{tt-1} + \varepsilon_{it} \text{ avec } \theta_i = (1-\beta_i) g_i \quad (4)$$

Where the notation is standard: y is output per person, β the rate of convergence, g the rate of growth of technology.

The preceding Lee, Pesaran et Smith (1996)'s relationship of the steady state income per capita is comparable to a panel data dynamic random coefficients models which the following general formulation:

$$y_{it} = \gamma_i y_{it-1} + x'_{it}\beta_i + \varepsilon_{it},\ i = 1,2,...,N \text{ and } t = 1,2,...,T \text{ with } \varepsilon_{it} \sim N(0 \quad \sigma_i^2) \quad (5)$$

If we let $\beta_i = \beta + v_i$ and $\gamma_i = \gamma + \upsilon_i$, under the assumptions that $v_i \sim N(0 \quad \sigma_v^2)$ and $\upsilon_i \sim N(0 \quad \sigma_\upsilon^2)$, we get:

$$\mu_i \sim N[\mu \quad \Sigma] \text{ with } \mu = \begin{bmatrix} \gamma \\ \beta \end{bmatrix} \text{ and } \Sigma = E\left(\begin{pmatrix} v_i \\ \upsilon_i \end{pmatrix}(v_i \quad \upsilon_i)\right) \quad (6)$$

In the sense that (6) express a priori on the Likelihood of parameters μ_i therefore the statiscal induction can ve done with the bayesian school. In this framework, the statistical inference will have the main aim to assess how the available observations change this a priori in order to get the distribution *a posteriori* that means the conditional probability of μ_i considering the realization of sample $\{y_{it} \quad \tilde{u}_{it}\}$ with $\tilde{u}_{it} = (y_{it-1} \quad x'_{it})'$, $i = 1,2,...,N$ et $t = 1,2,...,T$. For this fact, we must to formulate

some *a priori* on hyper – parameters μ, Σ et σ_i^2; under the assumption of Wishart distribution for Σ^{-1} and inverse distribution of independent χ^2 for the σ_i^2, Smith (1973)[1] reach to the following estimates s_i^2, Σ^* et μ_i^* for parameters σ_i^2, Σ and μ_i.

$$s_i^2 = (1/T+2)\cdot\left[y_i - \tilde{u}_i\mu_i^*\right]'\left[y_i - \tilde{u}_i\mu_i^*\right] \tag{7}$$

$$\Sigma^* = (1/N-K-1)\cdot\sum_{i=1}^{n}\left[\mu_i^* - \mu^*\right]\left[\mu_i^* - \mu^*\right]' \tag{8}$$

$$\mu_i^* = \left[\left(1/s_i^2\right)\cdot\tilde{u}_i'\tilde{u}_i + \Sigma^{*-1}\right]^{-1}\left[\left(1/s_i^2\right)\cdot\tilde{u}_i'\tilde{u}_i\hat{\mu}_i + \Sigma^{*-1}\mu^*\right] \tag{9}$$

Where $\hat{\mu}_i$ is the OLS estimate of μ_i.

Once more, when we assume an non informative *a priori* distribution for μ and we set therefore:

$$\mu^* = \frac{1}{N}\sum_{i=1}^{N}\mu_i^* \tag{10}$$

The estimate appears as a shrink estimates. This idea of shrinkage is in general use for estimate of dynamic random coefficients models.

The Stein's shrink estimate is the following:

$$\mu_i^* = (1-c/F)\hat{\mu}_i + (c/F)\hat{\mu} \text{ with } c = \left[(N-1)k-2\right]/(NT-Nk+2) \tag{11}$$

Where $\hat{\mu}$ is the panel data pooled estimate, F the value of F statistic under the null hypothesis of coefficients homogeneity, k the number of explanatory.

5.2. The results

We use data on real per capita GDP as measured of income per capita. The data spans the period between 1980 and 2020 in annual frequency. The data are coming from the World Development Indicators the online Database of the World Bank.

The obtained results are contained in the following table 2:

[1] To done this we use the two steps procedure of Li, Maddala and Trost (1996) where the first step is on the parameter estimates with OLS.

Table 2: the stochastic growth model

	Unit by Unit OLS	Stein	Bayesian estimation
$ln(y_{it-1})$	0.85 (0.02)*	0.86 (0.00)*	0.87 (0.00)*
t	0.003 (0.00)**	0.003 (0.00)*	0.003 (0.00)*
Constant	0.60 (0.22)*	0.59 (0.03)*	0.55 (0.03)*
Statistics			
Adjusted R square	0.90	0.91	0.91
NT	240	240	240

Notes: * (**, ***) null hypothesis is rejected at the 1% (5%, 10%) significance level. (.) standard errors.

Because these estimates are supportive to the stochastic growth models therefore we gave get proof on the Robustness of the macro level evidence concerning the positive relationship between the export performance and productivity in fact with these results we have evidence of the existing of differencing technology among countries because there are macro level estimates of productivity that differs across countries in accordance to the Stochastic growth modeling.

5.3. Balassa Samuelson Effect

One of the reason for which we have stress that it is relevant on using macro level evidence for testing the classical theory of comparative costs is that this issue give inside in testing the Balassa Samuelson Effect the main reason toward rejection of the purchasing power parity. Therefore, we investigate on the association between the bilateral *RER* and relative productivity of home compare to the foreign country. Since our interest is on an area of countries who share the same currency the bilateral *RER* is computed as the relative consumer price index (cpi) of home comparatively to the foreign country. The data on cpi are coming from WDI. The data spans the period comprises between 1998 and 2020 in annual frequency. Following Sallenave (2010), who investigates the Balassa-Samuelson Effect with an accordance measure, the econometric methodology used is based on panel unit root and cointegration tests. In ***Annex*** to have an first view of the data we have represented for each country the *RER* the Real Exchange Rate and q the productivity.

First, we test for unit root in various series. The results of these tests were grouped in the following table 3 for the components in level and table 4 for the components in first difference. So if *I*(*d*) represents the order of integration, with these results we concluded in favor of *I*(1) for all series. Thus, conditions for the existence of cointegrating relationships are already satisfied.

Table 3: unit root tests for variables in level

	BM			LL			Mod. LL			IPS		
	none	Constant	Trend	none	Constant	trend	none	constant	trend	none	constant	trend
LRER	3.36	1.09	4.37	-4.44**	-2.95**	-0.861		1.41	1.50		-1.43	-1.41
Lq	-1.01	-1.02	-2.38**	-3.86**	-0.96	-0.38		3.43	0.85		0.53	1.41

Notes: * (**, ***) null hypothesis is rejected at the 1% (5%, 10%) significance level. L is the natural logarithm. *RER* the Real Exchange Rate, *q* the productivity. BM = Breitung and Meyer (1994), LL = Levin and Lin (1993), mod. LL = Levin and Lin modifié, IPS = Im, Pesaran and Shin (1997).

Table 4: unit root tests for variables in first difference

	BM			LL			Mod. LL			IPS		
	none	constant	trend	none	Constant	trend	None	constant	trend	None	constant	trend
ΔLRER	-22.74**	-2.80**	-2.78**	-7.04**	-3.62**	-2.37**		-6.98**	-8.18**		-5.58**	-5.76**
ΔLq	-1.81**	-1.72**	-1.90**	-5.34**	-1.56	-1.51		-2.68**	-5.23**		-2.76**	-3.99**

Notes: * (**, ***) null hypothesis is rejected at the 1% (5%, 10%) significance level. L is the natural logarithm, *RER* the Real Exchange Rate, *q* the productivity.Δ the first difference operator. BM = Breitung and Meyer (1994), LL = Levin and Lin (1993), mod. LL = modified Levin and Lin, IPS = Im, Pesaran and Shin (1997).

Second, we test for cointegration between the real effective exchange rate and the conforming measure of Balassa Samuelson Effect. To test for cointegration between *RER* and the fundamental give as a measure of Balassa Samuelson Effect we follow the methodology proposed by Pedroni (1995, 1999). We use the pooled within dimension tests (*panel v-stat*, *panel rho-stat*, *panel pp-stat*, *panel adfstat*) and the group between dimension tests (*group rho-stat*, *group pp-stat*, *group adf-stat*) of Pedroni (1995, 1999). All of these statistics are distributed $N(0,1)$ under the null of unit root. For the *panel v-stat* the right tail of the normal distribution is used to rejected the null hypothesis and, for this statistic, large positive value imply that the null of no cointegration is rejected, concerning the other six statistics, it is the left tail of the normal distribution who is used to rejected the null hypothesis, and, for these other six statistics, large negative value imply that the null of no cointegration is rejected. In this study we have made the choice to conduct these tests with heterogeneous trend. The results of these tests are presented in the following table 5:

Table 5: Pedroni's cointegration test

	Statistics
Pooled within dimension tests	
panel v-stat	1.97328
panel rho-stat	-1.17109
, *panel pp-stat*	-2.68141**
panel adfstat	-2.36838**
Group mean between dimension tests	
group rho-stat	-0.39600
group pp-stat	-2.55736**
group adf-stat	-2.64883**

Notes: * (**, ***) null hypothesis is rejected at the 1% (5%, 10%) significance level.

Finally, we investigate the long run parameters. Table 6 below presents the FMOLS estimates of the long-run relationship. We assume this linear in logarithm.

Table 6: cointegrating relation – FMOLS estimate

$ln(cpi_i/cpi_j)$	Coefficient	t-student
$ln(q_i/q_j)$	0.05	2.196*
Statistics		
NT	110	

Notes: * (**, ***) null hypothesis is rejected at the 1% (5%, 10%) significance level. L is natural logarithm. *cpi* is the consumer price index, *q* the productivity.

Then if the Balassa Samuelson Effect holds this appears as the main reasoning why the association between export performance and relative productivity is negative for relative manufactures exports (B) and relative agricultural exports (C) in accordance to the results contained in table 1. The relevance on assessing Balassa Samuelson Effect in ECCAS area is that his member States are one's of which the central government State have principally his main resources from raw materials products as oil or petroleum an kind of product who makes volatility in prices and declining on price competitiveness (Kuikeu 2019, Rey 2018) such that economy is caractherized by the Dutch Disease with volatility in prices and declining on price competitiveness as the sign of occurrence that such disease makes.

6. Conclusion

In general countries in the same geographical region think in terms of intra-regional trade. The main characteristics associated with the intra-regional trade for geographic areas in Africa as ECCAS is that his level is already very slow despite the amount of progress made in order to foster this area of regional integration as seen with the realization of convergence. One of the main argument to explain

this low level of intra-regional trade is that these countries share the same comparative advantage so that there is no need to trade between us. Therefore, this study is relevant for a policymaker who want to reverse this negative trend. In fact, he find if technology is an valuable source of competition into foreign market so that by regarding this an weapon African countries can take the opportunity to foster his regional integration an improve in the level of intra-regional trade. The study is based on the classical theory of international trade who asserts that there is positive association between the productivity and the performance in performance.

One of the main challenge concerning export performance in Africa as well as for the subset of ECCAS countries is the building of strategies in generally mentioned as industrialization strategy in order to increase the level or the share of manufactures in total exports. Nevertheless this sudy appears much as one investigating in a world where all firms exports. In fact, this have been done by the wythat technology is the main ingredient without which all the process of production rest unavailable as well as in the local market as the foreign markets. An approach similar to the classical theory of comparative advantage costs is the Krugman's (1984) theory on infant industry argument. In fact, infant industry means those firms who can have increasing level in their productivity realized in this context by the protection of the local market. Considering the current study we can identify where are the sectors who can build his strategies on increasing productivity with proximity to the infant industry perception. Globally speaking, in ECCAS area all the sectors could be one of such that the infant industry argument holds. Indeed for the one's that the association is negative in particular manufactures and agricultures this is the sign of Dutch disease not an rejection of the classical theory of comparative advantage costs on which we have build this study in order to address on the need or the vision of a world where all of firms export (Greenaway and Kneller 2005).

Then because the theory of comparative advantage cost is well asserted we have thus the proof that the added value of player sin an improving indicator to predict the final issue of a tournament as the AFCON. Mainly an forward think to judge of the player's added value lies on the export performance of the home country's team. In fact, with the obtained result the reasons on the agreement toward added value measured by export performance is demonstrated which the sector of services in which lies the sportive activity while the demonstration is well asserted by the consideration of the international trade comparative advantage cost.

7. References

Balassa B. (1964) "The Purchasing-Power Parity Doctrine: A Reappraisal", *Journal of Political Economy*, vol. 72, n° 6 (Dec. 1964), pp. 584-596.

Balassa B. (1963) "An empirical demonstration of classical comparative Cost Theory", *Review of Economic and Statistics*, vol. 40, n° 3, pp. 231-238.

Bouoiyour J., Hanchane H. and Mouhoud E.M. (2009) « Investissements directs étranger et Productivité : Quelles interactions dans le cas des pays du nord et du Moyen Orient », *Revue économique*, vol. 60, n° 1, pp. 109-132.

Breitung J. and Meyer W. (1994) "Testing for Unit Roots in Panel Data: Are wages on different bargaining levels cointegrated?" *Applied Economics*, vol. 26, pp. 353-361.

Côté A. (1986) « Les effets de la variabilité des taux de change sur le commerce international. Une analyse pour le Canada », *L'Actualité économique*, vol. 62, n° 4, pp. 501-520.

Edwards S. (1989) *Real exchange rate, Devaluation and adjustment: Exchange rate policy in developing countries*, MIT Press, Cambridge: Massachussetts.

Im K.S., Pesaran M.H. and Shin Y. (1997) "Testing for Unit Roots in Heterogenous Panels", University of Cambridge, revised version of the DAE Working Paper No 9526.

Islam N. (1995) "Growth Empirics: A Panel Data Approach", *The Quarterly Journal of Economics*, vol. 110, n° 4, pp. 1127-70.

Greenaway D. and Kneller R. (2005) "Exporting and productivity: Theory, Evidence and Future Research", *The Singapore Economic Review*, vol. 50, Special Issue, pp. 303-12.

Kuikeu O. (2019) « Le syndrome hollandaise en zone CEMAC : une approche par la modélisation VAR structurelle », *MPRA_Paper* n° 96813, University of Munich Library, Germany.

Lee K., Pesaran M.H. and Smith R. (1997) "Growth and convergence in a Multi-country Empirical stochastic Solow Model", *Journal of Applied Econometrics*, vol. 12, n° 4, pp. 357-92.

Krugman P.R. (1984) "Import Protection as Export Promotion: International Competition in the Presence of Oligopoly and Economies of Scale". in Kierzkowski (ed.) *Monopolistic Competition in International Trade.*

Levin A. and Lin C.-F. (1993) "Unit Root Tests in Panel Data: Asymptotic and Finite-Sample Properties", University of California San Diego, Unpublished Working Paper (revised).

Li H., Maddala G.S. and Trost R.P. (1996) « Estimation des élasticités de court et de long termes de la demande d'électricité sur données de panel à partir des estimateurs à rétrécisseurs », *Economie et Prévision*, n° 126, pp. 127-41.

Mankiw N.G., Romer D. and Weil D.N. (1992) "A contribution to the empirics of economic growth", *Quarterly Journal of Economics*, vol. 107, n° 2, pp. 407-37.

MacDougall G.D.A. (1951) "British and American Exports: A study suggested by the theory of comparative costs, part 1", *Economic Journal*, vol. 61, n° 244, pp. 697-724.

Pedroni, P. (1995) "Panel Cointegration : Asymptotic and Finite Sample Properties of Pooled Time Series Tests with an Application to the PPP Hypothesis" *Indiana University Working Papers in Economics,* n° 95-013.

Pedroni P. (1999) "Critical Values for Cointegration Tests in Heterogeneous Panels with Multiple Regressors", *Oxford Bulletin of Economics and Statistics*, vol. 61, pp 653-70.

Pénicaud C. (2012) "State of the industry: Results from the 2012 Global Mobile Money Adoption Survey", GSMA-Mobile Money for the unbanked.

Rey S. (2018) « La vulnérabilité des pays méditerranéens au choc des prix des matières premières », hal-01880357.

Sallenave A. (2010) "Real Exchange Rate Misalignments and economic performance for the G20 countries", *International Economics*, vol. 1, n° 121, pp. 59-80.

Samuelson P.A. (1964) "Theoretical Notes on Trade Problems", *The Review of Economics and Statistics*, vol. 46, n° 2 (May, 1964), pp. 145-154.

Smith A.F.M. (1973) "A general Bayesian linear model", *Journal of the Royal Statistical Society* (*Series B*), vol. 35, n° 1, pp. 67-75.

Wood A. et Mayer J. (2001) "Africa's export structure in a comparative perspective", *Cambridge Journal of Economics*, vol. 25, n° 3, pp. 369-394.

ANNEX

Figure 1: Balassa Effect in Congo

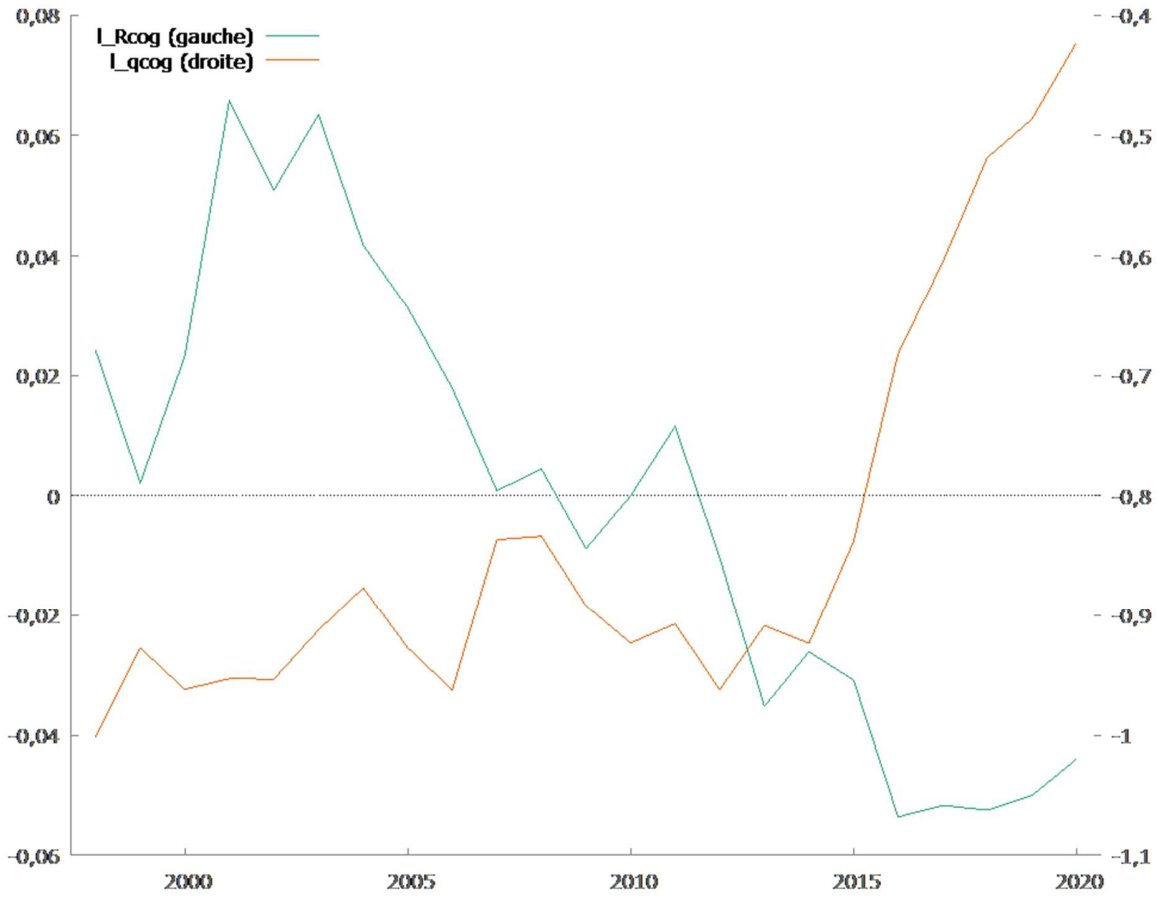

Figure 2: Balassa Effect in Gabon


l_Rgab (gauche)
l_qgab (droite)
0,04
0,02
0
-0,02
-0,04
-0,06
-0,08
-0,1
-2
-2,1
-2,2
-2,3
-2,4
-2,5
-2,6
-2,7
-2,8
-2,9
2000
2005
2010
2015
2020

Figure 3: Balassa Effect in Equatorial Guinea

Figure 4: Balassa Effect in central African Republic

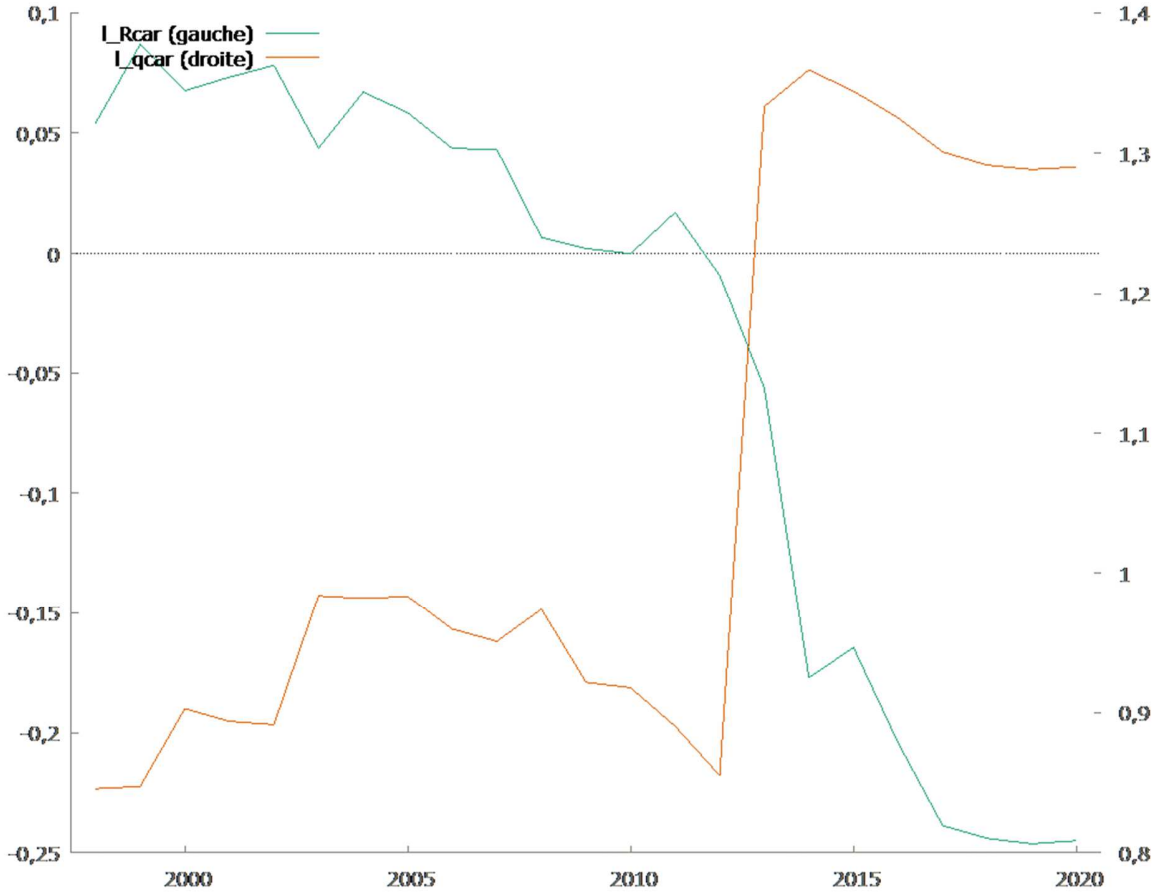

Figure 5: Balassa Effect Chad