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Domestic Demand and Export Performance in Gabon: The Issue of Cointegration

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Abstract It is well established that the substitution effect between domestic and foreign sales is more relevant in countries with a lower product concentration index as the industrialized countries. Thus the main aim here to know if this new export channel is not relevant for African countries with a less diversified exports. Since the empirical testing of this negative relationship between exports and domestic sales lies on the crucial assumption of a unitary foreign demand elasticity it is then straight forward to know if this relationship and this assumption hold for African countries as industrialized countries? This is the main question, here. To address this issue we relies on conditional Error Correction Model and cointegration tests for the Gabonese case between 1974 and 2021 in annual frequency. According to the results, the assumption is well assess and domestic demand impacts effectively negatively exports with a negative elasticity of around 65 % in Gabon.

Keywords Exports, domestic demand, foreign demand, conditional Error Correction Model, cointegration test, Africa

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1. Introduction

Background information

This paper investigates the relationship between domestic demand and exports from a macroeconomic perspective, building on the export market share (the difference between exports of goods and services and the foreign demand) equations. Then as standard in the literature, we assume a unit foreign demand elasticity. Hence, the focus is on the export market share performance. Since this assumption of a unit foreign demand elasticity is not rejected by the data in the case of seminal papers on industrialized countries (Blot and Clochard, 2008, pp. 70; Belke et al., 2013, pp. 7; Esteves and Rua, 2013, pp. 15; Bobeica et al., 2015, pp. 6) it is then straightforward to assess whether this assumption holds also in the case of African countries such the Gabonese case.

One notably study in times series modeling of this relationship between domestic sales and exports is Belke et al. (2014, 2013). Belke et al. (2014, 2013) relies on the assumption of a unit foreign demand elasticity but deviates from the exports market share equations, using nonlinear regression model. Belke et al. (2014, 2013) investigates this relationship for six countries, namely Spain, Portugal, Italy, France, Ireland and Greece. They find that there are several intuitive macroeconomic arguments that can explain a negative relationship between domestic demand and exports as capacity utilization¹. On this basis, the empirical results point out that for Spain, Portugal and Italy there is a strong substitution effect between domestic demand and exports, a less strong substitution effect is found for Ireland and Greece, whereas for France the evidence for this substitution effect is weak.

Main question

Esteves and Prades (2016) suggest that domestic demand developments are more relevant to explain exports in countries with a lower product concentration index (that is, more diversified exports). Then is this relationship holds for African counties where exports are more concentrated in some raw materials?

General Objective

Because the literature studying the determinants of exports performance remains focus on the export market share equation (Blot and Clochard, 2008, pp. 70; Esteves and Rua, 2013; Bobeica et al., 2015; Esteves and Prades, 2016; Kuikeu, 2024) the industrialized countries have been well assess on this basis in the past as well as in panel data (Blot and Clochard, 2008, pp. 70; Bobeica et al., 2015; Esteves and Prades, 2016) than times series modeling with the Portuguese experience (Esteves and Rua, 2013). Here for African countries with the Gabonese experience the aim of this study is twofold. In the one hand, to assess whether this assumption of a unit foreign demand elasticity is not rejected by the data even in times series modeling and in the second hand whether the negative relationship between export performance and domestic demand still holds in times series modeling as this have been done recently in panel data for African countries (Kuikeu, 2024).

General hypotheses

At the firm level the test of this relationship not requires the assumption of a unitary foreign demand elasticity. Then is the macro level evidence an reasonable assumption to test this relationship for African countries in times series as this have been done for industrialized countries as well as in panel data than times series modeling (Blot and Clochard, 2008, pp. 70; Esteves and Rua, 2013; Bobeica et al., 2015; Esteves and Prades, 2016) and recently in panel data for African countries (Kuikeu, 2024)?

Contribution to research

Since the panel data is the adequate framework for less developed countries to avoid the availability of the data in the one hand and in the second hand because this kind of study have yet been made for African countries in panel data (Kuikeu, 2024) this study therefore can be view as a comprehensive guide to investigate this kind of relationship with times series data for African countries.

Structure of the study

The remainder of this study will be organized as follows, in the next section (section 2) we revisit the literature around mainly the assumption of a unit foreign demand elasticity on which lies the empirical testing at the macro level of the negative relationship between domestic sales and exports, in section 3 we present the methodological approaches around the testing of this assumption of a unit foreign demand elasticity and the negative relationship between domestic sales and finally in section 5 we present a summary of the main results as concluding remarks.

¹ Defined as the capacity of firms to sold production in the foreign market depending on the demand pressure (Belke et al. (2014, pp. 4)) and this one can be measured at the macro level as the output gap (Belke et al. (2014, pp. 7)).

2. Literature review

The literature review is around mainly the assumption of a unitary foreign demand elasticity on which lies the empirical testing at the macro level of the negative relationship between domestic sales and exports. In fact, into the literature there is a debate on the treatment of Revenue variable in explaining export performance. In fact, as derived from the simplest economic reasoning that demand for any good in question is dependent on its own price and the purchasing power of the consumers these ones are considered as the traditional inputs of export performance. Then is Real Exchange Rate serves as proxy of prices there is a doubt on the proxy of Revenue. While some studies consider the foreign GDP as this proxy (Ogbonna, 2008) the others the foreign demand this one measured as the evolution of imports in the trade partners (Blot and Clochard, 2008, pp. 70; Belke et al., 2013; Esteves and Rua, 2013; Bobeica et al., 2015; Esteves and Prades, 2016; Kuikeu, 2024).

To explain this difference recall that a country can be exportator or importator comparatively to his trading partner. Then when a country cares about the competitiveness of his products the foreign demand serves as this proxy of Revenue. In fact, the evolution of imports in the trade partners that is used to proxy foreign demand and its relative evolution vis-à-vis exports measures the market share development then the country competitiveness compare to the foreign partner. Thus the assumption of a unitary foreign demand elasticity to make this comparison between the country's export and foreign demand more suitable. Taking this reasoning, when the foreign demand is use as a proxy of Revenue in an country's export equation this one is an exportator while the trading partners are importators.

Nevertheless in reality a country is at the same time exportator and importator. Then when these trading relations concern a differentiated product we state that this is intra industry trade while when the product differs for exports comparatively of imports we state that this is inter industry trade. To resume we then have this following Table 1 that recapitulates all of these statements about mainly the treatment of Revenue variable in the home economy's export equation and the relevance of foreign demand as one of this proxy.

Home economy Foreigner	Exportator	Importator
Exportator	Differentiated product : intra industry trade Different product : inter industry trade	Not concern by this study where the focus is on the determinants of home economy's export performance
Importator	Foreign demand	Differentiated product : intra industry trade Different product : inter industry trade

Table 1. The Revenue variable in the home economy's export equation

Source: Author based on Fontagne et al. (1998)

3. Methods

The starting point for the analysis of export performance behavior is the Empirical Model that stress the dynamics of export performance over time. The Methods and the variables selection are then presented in the following.

The Empirical Models

Since the assumption of a unit foreign demand elasticity pertains to describe a cointegrating relationship, to test the negative relationship between domestic sales and exports we remain focus on the export market share equation and we consider an conditional ² Error Correction Model (ECM) for annual time series data that embedded this cointegrating relationship. For this purpose, we follow a procedure in two steps.

In the first step, in light of the above discussion, let us first consider for the long-run relationship the case where the exports market share depends on the real exchange rate plus a trend. Introducing a time trend in export equation is an old tradition that serves to assess the effect of what is beyond the price/cost competitiveness indicator in explaining export performance (Blot and Clochard, 2008, pp. 70). Concerning the short-run dynamics, we consider the past changes of export market shares, the real exchange rate and also the domestic demand.

² We speak on terms of conditional ECM in the sense that we can factorise the ECM into two blocks: on the one hand, the marginal model that contains variables which are not influenced by the long-run relationship, in this case the short run determinants. On the other hand, the conditional model that contains variables which exhibit level feedback with respect to the long-run relationship, in this case only the export market share. Since the marginal model does not contain information about the long-run parameters we can obtain fully efficient estimates of the long-run parameters from the conditional model (Engle et al., 1983).

$$ect = \{(X_t - D_t) - \lambda \cdot REER_t - \alpha - \gamma t - \mu t^2\}$$
(1)

$$\Delta X_t - \Delta D_t = \alpha + \beta (\Delta X_{t-1} - \Delta D_{t-1}) + \sum_{l=0}^1 \omega_l \Delta D D_{t-l} + \sum_{k=0}^1 \varphi_k \Delta REER_{t-k} + \theta(ect_{t-1})$$
⁽²⁾

Where Δ is the first difference operator. The model considers all the variables except the trend measured in log allowing for a maximum of one lag. The interpretation of the time trend is not straightforward as it can capture the long-run effects of the so-called non-price competitiveness factors.

In a second step, we introduce non linearity by testing for the existence of an asymmetric relationship between domestic demand and exports. This is done by splitting domestic demand in two different variables, as this have been done into the literature (Esteves and Rua, 2013; Bobeica and al., 2015; Esteves and Prades, 2016) depending of its change being positive (ΔDD +) or negative (ΔDD -). The estimate equation becomes:

$$\Delta X_t - \Delta D_t = \alpha + \beta (\Delta X_{t-1} - \Delta D_{t-1}) + \sum_{k=0}^1 \varphi_k \Delta REER_{t-k} + \sum_{s=0}^1 \omega_s \Delta DD_{t-s}^+ + \sum_{p=0}^1 \omega_p \Delta DD_{t-p}^- + \theta(ect_{t-1})$$
(3)

The Estimation Method: the issue of cointegration

A two step approach is pursued for the estimation of the conditional Error Correction Model. This is performed by the second stage of the GMM estimator in order to address the robustness of the nonspherical error term of the first step³; based on the Hansen's J statistic (Hansen, 1982)⁴, we not reject the overall validity of the instruments at the standard level, this suggests the orthogonality conditions hold. Concerning the error correction term as *ect* is a stationary component has he relies on a cointegrating relationship based on the assumption of a unit foreign demand elasticity he (*ect*) can then pass an recovering of the parameters with the GMM estimator.

There are mainly two categories of cointegration tests in times series modeling that are available for the test of a unit foreign demand elasticity assumption. In the one hand, *The Residual Based Approach* of Engle and Granger (1987) considering as the pionnering study in this field – hencefore EG in the rest of the paper. In the second hand, *The Multivariate Approach* of Johansen and Juselius (1990). As an innovation to the literature, while the most recent study in this field (Belke et al. (1993, 1994)) relies on the *The Residual Based Approach* to test this assumption we will relies us on *The Multivariate Approach*.

Data set

The macroeconomic data set covers 1974 to 2021 in annual frequency thus 48 observations measured in real terms. Table 2 presents the variables used in the analysis.

Variables	Definition	Abreviation	Source
The exportations of goods and services	The value of all goods and other markets services provided to the rest of the world.	X	World Bank, WDI
The foreign demand	The imports of goods and services of the main trading partners. Foreign demand is computed as the geometric weighted average of the imports in real terms of goods and services of the main trading partners, where the weights correspond to the export shares of the Gabonese economy to the respective trading partner countries.	D	World Bank, WDI

Table 2. List of Variables

³ In the first step the errors terms must be autocorrelated so that there exists an endogeneity biais coming from the lag term of the endogenous variable among the explanotary.

⁴ This statistic is distributed as a Chi square (q-K) where q is the number of instruments and K the number of parameters to estimate. Here q = 11.

The real effective exchange rate	The price/cost competitiveness indicator of the home economy compare to the foreign partner. It's defined such as an increase represents an appreciation. The real exchange rates are based on the most commonly used price series, i.e. Consumer Price Index (CPI) against the top 30 trading partners for each country (narrow-based indices) using weights based on trade.	<i>REER</i> (base 100=2010)	Cepii, EQCHANGE⁵
The domestic demand	The final demand including private and public consumption and gross fixed capital formation ⁶	DD	World Bank, WDI

Source: Author

To permit the reproductibility of the results the instrument list used in the two step approach for the estimation of the conditional Error Correction Model and the error correction term (*ect*) includes a constant term, the lag of order 5 of the export market share of Gabonese economy, the lag of order 4 of the logarithmic first difference of export of Gabonese economy, the logarithmic first difference of foreign demand of Gabonese economy, the lag of order 5 of the logarithmic first difference of the Real Effective Exchange Rate of Gabonese economy, the lag of order 1 of the logarithmic first difference of the domestic demand of Gabonese economy, the lag of order 5 of the logarithmic first difference of domestic demand of Gabonese economy, the lag of order 5 of the Real Effective Exchange Rate of Gabonese economy, the lag of order 5 of the Real Effective Exchange Rate of Gabonese economy, the lag of order 5 of the Real Effective Exchange Rate of Gabonese economy, the lag of order 5 of the Real Effective Exchange Rate of Gabonese economy, the lag of order 5 of the Real Effective Exchange Rate of Gabonese economy, the lag of order 5 of the Real Effective Exchange Rate of Gabonese economy, the lag of order 2 of the domestic demand of Gabonese economy, the lag of order 5 of the Real Effective Exchange Rate of Gabonese economy, the lag of order 5 of the Real Effective Exchange Rate of Gabonese economy, the lag of order 3 of the logarithm of exports of Gabonese economy, the logarithm of foreign demand of Gabonese economy.

4. Results and Discussion

In the first time we present the testing of the assumption of a unit foreign demand elasticity and in the second the empirical testing of the negative relationship between exports and domestic sales.

4.1 Testing the assumption: the Gabonese case

From an theoretical point of view, as we state in the Literature review, the rationale of this assumption is that foreign demand elasticity refers to income elasticity in a demand function for goods and services. To test whether this assumption holds we relies on cointegration testing (Belke et al., 2013, pp. 6-7). Then for this purpose in the first time we present the unit root tests and finally the cointegration tests.

4.1.1 Unit Roots Tests

These are computed mainly for the set of variables *X*, *D*, *REER* and *DD*. We consider all the variables measured in log. We use the well-known unit root tests – *Dickey-Fuller (DF)*, *Augmented Dickey-Fuller (ADF)*, *KPSS* (Kwiatkowski et al., 1992). Contrarely to the former, the *KPSS* test have the alternative of unit root against the null of stationarity either around a constant term or a time trend. In each case, the null of stationarity is validated when the tabulated values not exceed the critical ones.

⁵Couharde et al. (2018).

⁶Esteves and Rua (2013, pp. 15).

Series		ADF Null hypothesis is unit root	KPSS Null hypothes	KPSS Null hypothesis is stationarity	
			Constant	Trend	
X	(1)	-2.24	0.92***	0.15**	
	(2)	-5.73***	0.09	0.07	
D	(1)	-1.75	1.29***	0.14***	
	(2)	-6,08***	0.13***	0.13**	
REER	(1)	-2.05	0.98	0.19**	
	(2)	-7,19***	0.12***	0.13*	
DD	(1)	-1.52	0.91***	0.26***	
	(2)	-7.37***	0.22	0.07	

Table 3. Unit Root tests

Notes: *** (**, *) null hypothesis is rejected at the 1% (5%, 10%) significance level. (1) = Level, (2) = First Difference.

An obvious result is that these are I (1) processes for which we can run cointegration tests.

4.1.2 The cointegration tests

The Residual Based Approach. The procedure is in two steps. In the first, we regress the exports on the others. In the second step we ensure that the residual coming from this first step is stationary at the conventional level to speak of them as a cointegrating relationship. When the deterministic part of the model is a constant term we speak of them as a deterministic cointegration and when the deterministic component is a trend we speak of them as a stochastic cointegration. Here we experiment the two approaches with the results in the following Tables 4 and 5 respectively.

Table 4. The deterministic cointegration of EG

X	Coefficients	T-Student	
D	0.09	2.23	
REER	-0.44	-2.85	
Constant	22.42	13.87	
Statistics			
Nobs	48[1974-2021]		
Adjusted R ²	0.62		
DW	0.40		
ADF	-3.63*		

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

At first glance the results look like there is cointegration with the *Adjusted* R² not very high meanwhile the Durbin Watson statistic is far from 2. In fact, the unit root test conducted in the residual term the main test of cointegration is that the null of unit root cannot be accepted at the standard level. Another piece of results is that the parameters have the correct signs and the one of foreign demand is so far from unity so that we cannot conclude that the assumption of a unit foreign demand elasticity is corrected.

X	Coefficients	T-Student
D	-0.63	-4.23
REER	-0.55	-4.32
Constant	37.77	11.31
t	0.05	4.99
Statistics		

Table 5. The stochastic cointegration of EG

Nobs	48[1974-2021]	
Adjusted R ²	0.75	
DW	0.64	
DF	-3.45	

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

At the first glance the result deteriorated. Firstly the foreign demand enters with a wrong sign and secondly we cannot reject the null hypothesis of unit root in the residual term.

The main caveat with these procedures is that we cannot compute directly a test of the assumption of a unit foreign demand elasticity in the cointegrating relationship. In fact, the parameters estimates relies on non-stationary variables such that the classical tests on parameters estimates are not correct asymptotically. To overcome this issue, Belke et al. (2013, pp. 7) undertake *The Residual Based Approach* with Break as the Gregory-Hansen cointegration test (Gregory and Hansen, 1996). In fact, in this case the OLS results or related as the fully modified least squares (which corrects the OLS estimator for endogeneity and serial correlation) would yield super-consistent estimates for the cointegrating parameters.

Here nevertheless following the graphical representation of the series (Figure 1) this issue is not relevant. In fact, as this have been done precedently with the Real exchange Rate (Kuikeu, 2011) for the same CEMAC⁷ members countries on a period (1980-2001) as this one of the currently study that covers the major event for these countries in 1994 with the *peg* devaluation, this kind of issue is relevant when the cointegrating relation is for the *REER*, otherwise when the *REER* is the endogenous. To explain this realize that the literature develops the idea according to which the mechanical chain of national exports stimulation from a depreciation of the real exchange rate seems unlikely to occur in the context of Sub-Saharan Africa (SSA) resulting from the price inelasticity of their imports concentrated in basic products (manufactured goods, capital goods, etc.) necessary for the manufacture of local inputs but few substitutable to local products due in particular to the content in technological progress of these imported products not yet acquired by these economies (Kamin, 1988; Rose, 1991; Ghei and Pritchett, 1999). An another piece of reasoning is that Gabonese economy was at this time full member of OPEC (The Organization of Petroleum Exporting Countries) so that the raise of it's exports around the period coinciding with the major event of 1994 with the *peg* devaluation is not necessary an result of this monetary arrangement. In fact, recall that OPEC is a dominant producer in the world crude oil where regulation of oil price affects world oil demand and supply.

⁷ CEMAC is the monetary union of the six central African countries (Cameroon, Central African Republic, Chad, Congo Republic, Equatorial Guinea and Gabon) which have in common the sharing of the CFA franc as a common currency, issued by BEAC (Bank of Central African States) and pegged by a fixed parity to the French franc, at the rate of 1 French franc per 100 CFA franc since the devaluation of 1994 or since 1st January 2002, with the advent of the euro, at the rate of 1 euro for 655.957 CFA francs, or 1 euro for 6.55957 French francs.





To conclude with this as an experimental exercise the Table 6 below presents some statistics associated to the Gregory – Hansen cointegration test (the conventional ADF statistic of the null of no cointegration against the alternative of cointegration and the Break point) following the method used to select the number of lags of the change in the residual used in computing the ADF statistic. The relevant point to observe is that firstly in each case the selected Break point is on the one hand so far from the main event in 1994 with the *peg* devaluation and on the other hand unreliable. Secondly there seems to be no cointegration.

	ADF statistic	Break point		
The maximum number of lags to consider as given by the sample				
С	-3.81	2003		
C/T	-4.51	1992		
C/S	-3.81	2003		
AIC				
С	-4.12	1999		
C/T	-4.61	1999		
C/S	-3.74	2001		
BIC				
С	-4.12	1999		
С/Т	-4.61	1999		
C/S	-3.74	2001		

Notes: *C* denotes Break in the constant term without trend, *C*/*T* Break in the constant term with trend, *C*/*S* Break in the constant term and the slopes without trend.

The Multivariate Approach of Johansen and Juselius. As usually we use the two famous statistics of Trace and Lambda max test to determine the cointegrating rank. The results are reported in the following Table 7. Each of these statistics tests the null hypothesis that the cointegrating rank is equal to r against the alternative hypothesis of p cointegrating vectors (where p is the dimension of long run parameters to estimate) for the Trace test and r +1 cointegrating vectors for the maximum eigen value test (Lambda max test). In each case we rejected the null hypothesis when the estimated likelihood ratio statistic is greater than the asymptotic critical value. However the asymptotic distribution of these statistics components of the ECM. Here we have choose to conduct these tests with an order of 6 lags and we assume that a time trend⁸ is restricted to belong into the cointegrating space.

Table7.	Cointegration	rank's test,	1980-2021
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Rank	Eigen values	Trace Test	Lambda max Test
0	0.54	54.66	32.77
		(0.00)***	(0.00)***
1	0.33	21.89	16.72
		(0.14)	(0.12)
2	0.11	5.17	5.17
		(0.58)	(0.58)

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

On the basis of this result we choose to work with the hypothesis of one cointegrating vector given by

$$X_{GAB} = {}^{0.49}_{(0.25)**} D_{GAB} - {}^{2.23}_{(0.27)***} REER_{GAB} - {}^{0.01}_{(0.02)} t$$

(.)=standard errors, *Nobs*=42[1980-2021], *** (**, *) null hypothesis is rejected at 1% (5%, 10%) significance level

Imposing the restriction of a unit foreign demand elasticity is a linear hypothesis on the cointegrating relation (Johansen and Juselius, 1992, pp.225). These linears restrictions on the cointegrating relations are Likelihood Ratio (LR) test where the test statistic is given by 2*(lu-lr) with lu is Unrestricted loglikelihood and lr is Restricted loglikelihood. This is distributed as a Chi square with (p-s)r degree of freedom where p is the dimension of long run parameters to estimate, s the number of linear restrictions and r the cointegrating rank.

For the restriction of a unit foreign demand elasticity here we have linear restrictions of the form $\begin{bmatrix} 1 & -1 & * \end{bmatrix}$ for the three set of endogenous respectively with asterisk to denote no restriction on the concerning variable (*REER*), lu = 176.183, lr = 174.66267, and the test statistic becomes 2*(176.183-174.66267)= 3,04066. With p=3, s=2 and r=1, this statistic is distributed as a Chi square(1) with significance level of 0.0812027. Then the assumption of a unit foreign demand elasticity cannot be rejected at the 5 % significance level and the new cointegrating vector becomes:

$$X_{GAB} - D_{GAB} = -\frac{10.16}{(1.79)^{***}} REER_{GAB} - \frac{0.28}{(0.04)^{***}} t$$

(.)=standard errors, *Nobs*=42[1980-2021], *** (**, *) null hypothesis is rejected at 1% (5%, 10%) significance level

Thus we have the evidence that *REER* appreciation hurts export performance in Gabon. As experiencing with industrialized countries the time trend is strongly significant evidencing a decline in exports market shares of Gabon beyond what could be explained by price/cost competitiveness.

In order to conclude with *The Multivariate Approach of Johansen and Juselius* to find evidence of no model misspecification three diagnostic tests based on residuals are conducted to ensure that the Model is well specified. These ones are in the one hand the (multivariate) normality test is that of Doornik and Hansen (1994); it is based on the skewness and kurtosis of the VAR residuals. In the other hand the autocorrelation and ARCH test are also by default multivariate; they are described in detail by Lütkepohl (2005). Both tests are of the Lagrange Multiplier (LM) type, although the autocorrelation test statistic is referred to a Rao F distribution (Rao, 1973). These tests may involve estimation of a large number of parameters, depending on the lag horizon chosen, and can fail for lack of degrees of freedom in small samples. All the results are reported in the following Table 8.

⁸ Introducing time trend in export equatiopn is an old tradition that serves to assess the effect of what is beyond the price/cost competitiveness indicator in explaining export performance (Blot and Clochard, 2008, pp. 70).

Autocorrelation Test Null is no autocorrelation				
	Rao F	Approx dist.	p value	
Lag 1	1.464	F(9, 51)	0.1868	
Lag 2	1.159	F(18, 51)	0.3282	
Lag 3	1.026	F(27, 44)	0.4596	
Lag 4	1.406	F(36, 36)	0.1554	
ARCH Test Null is no ARCH effect				
	LM	df	p value	
Lag 1	33.041	36	0.6101	
Lag 2	69.824	72	0.5507	
Lag 3	112.858	108	0.3553	
Lag 4	154.391	144	0.2620	
Normality Test Null is error is normally distributed				
	Chi square(6)			
Doornik-Hansen Test	3.07785		0.7990	

Table 8. Diagnostics Tests

At the first glance from these results in Table 8 the Model is well specified there is no evidence of autocorrelation, of ARCH effect and the errors are normally distributed.

4.2 Domestic Demand and Export performance in Gabon

Now we turn to our second goal to test whether the relationship between Domestic Demand and exports remains negative even in times series modeling. To this end, we focus on Gabonese economy comparatively of industrialized countries where this have been done in Portugal. We will first focus on the error correction term (equation 1), secondly on the symmetric relation (equation 2) and then on the asymmetric relation (equation 3). Given the annual periodicity of the data, as in Esteves and Prades (2016) it is assumed that the substitution effect between domestic and foreign markets sales occurs contemporaneously.

The Error correction term

The resulting estimated model for the whole sample period, running from the beginning in 1974 up to 2021 is given by

$X_t - D_t$	(1)
	Iterative GMM
REER _t	-1.17
	(0.21)***
Constant	11.87
	(1.34)***
t	-0.35
	(0.02)***
t^2	0.00
	(0.00)***
Statistics	
Nobs	37[1985-2021]
Sample	1974-2021
J Statistic	4.69
Chi square (7)	(0.69)

Table 9. The Error Correction Term

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

The real effective exchange rate appears with a negative sign in the long-run, that is, an appreciation hurts exports performance in Gabon.

The Symmetric relation

The resulting estimated model for the whole sample period, running from the beginning in 1974 up to 2021 is given by

Table 10. The Symmetric Relation

$\Delta X_t - \Delta D_t$	(2)	
	Iterative GMM	
Error Correction Term _{t-1}	-0.00	
	(0.00)***	
Short run parameters		
$\Delta X_{t-1} - \Delta D_{t-1}$	-0.56	
	(0.19)***	
ΔDD	-0.65	
	(0.31)**	
ΔREER	-0.55	
	(0.33)*	
Constant	-0.22	
	(0.04)***	
Statistics		
Nobs	37[1985-2021]	
Sample	1974-2021	
J Statistic	6.38	
Chi square (6)	(0.38)	

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

The coefficient of the Error Correction Term (i.e. the speed of adjustment) is a bit weak, which denotes some persistence concerning the evolution of exports towards its long-run path. Concerning the short-run dynamics, the one period lag of export market share change exhibit negative coefficients. The real effective exchange rates series appear to impact market share growth with a negative sign. Moreover, the results point towards an negative effect of domestic demand changes with a negative elasticity around 65 %.

The Asymmetric Relation

The resulting estimated model for the whole sample period, running from the beginning in 1974 up to 2021 is given by

Table 11. The Asymmetric Relation

$\Delta X_t - \Delta D_t$	(3) Iterative GMM	
Error Correction Term _{t-1}	-0.00	
	(0.00)***	
Short run parameters		
$\Delta X_{t-1} - \Delta D_{t-1}$	-0.58	
	(0.18)***	

ΔDD^{-}	-1.16
	(0.55)**
$\Delta REER$	-0.47
	(0.26)*
Constant	-0.25
	(0.05)***
Statistics	
Nobs	37[1985-2021]
Sample	1974-2021
J Statistic	7.77
Chi square (6)	(0.25)

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

The results are qualitatively unchanged than in the symmetric case. However, regarding the domestic demand variable, it appears that only the negative changes in domestic demand present a statistical significant negative effect on exports dynamics. This result is qualitatively the same from that of European economies where domestic demand in the asymmetric relationship continues to negatively impact export market share just in times of crisis.

5. Conclusion

Context of the study

It's well established that the substitution effect between domestic and foreign sales is more relevant in countries with a lower product concentration index as the industrialized countries (Esteves and Prades, 2016).

Objectives

Thus the main aim here to know if this new export channel is not relevant for African countries with a less diversified exports. Because the literature studying the determinants of exports performance remains focus on the export market share equation (Blot and Clochard, 2008, pp. 70; Esteves and Rua, 2013; Bobeica et al., 2015; Esteves and Prades, 2016; Kuikeu, 2024) and since the empirical testing of this negative relationship between exports and domestic sales lies on the crucial assumption of a unitary foreign demand elasticity here for African countries with the Gabonese experience the aim of this study is twofold. In the one hand, to assess whether this assumption of a unit foreign demand elasticity is not rejected by the data even in times series modeling and in the second hand whether the negative relationship between export performance and domestic demand still holds in times series modeling as this have been done recently in panel data for African countries (Kuikeu, 2024).

Hypotheses

At the firm level the test of this relationship not requires the assumption of a unitary foreign demand elasticity. Then is the macro level evidence an reasonable assumption to test this relationship for African countries in times series as this have been done for industrialized countries as well as in panel data than times series modeling (Blot and Clochard, 2008, pp. 70; Esteves and Rua, 2013; Bobeica et al., 2015; Esteves and Prades, 2016) and recently in panel data for African countries (Kuikeu, 2024)?

Methods used

Since the assumption of a unit foreign demand elasticity pertains to describe a cointegrating relationship, to test the negative relationship between domestic sales and exports we remain focus on the export market share equation and we consider an conditional Error Correction Model (ECM) for annual time series data that embedded this cointegrating relationship.

Main findings

Using a set of macroeconomic data we present the empirical results for African countries in time series modeling with the Gabonese experience of in the one hand the test of a unit foreign demand elasticity and in the other hand of the negative relationship between exports and domestic sales. According to the results, such link is prominent for African countries where the assumption of a unit foreign demand elasticity is well assess and domestic demand impacts effectively negatively exports with a negative elasticity of around 65 %.

Study's Major findings

Since the intra-community trade still remains very weak between the six CEMAC economies despite the fact that they have adopted the classic measures intended to increase intra-community trade such as the reduction (or elimination) of customs tariffs on either side of their common borders, the adoption of common protection or Common External Tariff, while they carry out the majority of their trade with the outside (Bikai and Afomongono, 2017, pp.7), he becomes interesting for the analysis to know if this new export channel given by the domestic demand operates in CEMAC countries. To this end, since Gabonese economy is an economic member of the CEMAC area with this result we can answer that if this channel holds. In fact, according to the Gabonese experience during times of crisis, an insufficient domestic demand relative to existing productive capacity would translate into increased efforts to export and willingness to pay the sunk costs associated to entering foreign markets. Having paid this sunk cost can explain why exports are not negatively affected by a rebound in domestic demand.

Limitation and Scope

Concerning these results, the speed of adjustment to the long run equilibrium is slower which denotes that the evidence of cointegration is at most few. Then for Robustness check we should model all variables with First difference models without the long-run relationship or the Error Correction Term (Esteves and Rua, 2013, pp. 22).

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Author Biography

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With a father working in the main manufacture of exploitation and transformation of the cotton in the septentrional region of Cameroon I have been rapidly interest with the questions of international trade such that the exportations, the distortions on the fair trade as the subventions. Coming in France in 2003 at the University of Pau my interest for this strand of the literature in economics growing up with my lectures on the need of industrialization, of exchange rate behavior to assess a kind of question such as the currency Misalignment an valuable instrument to analyze such an event as the CFA franc devaluation in 1994. In 2008, I get my final degree with honours in economics at University of Pau. Last but not least now my aim is to resume my point of view in an essay mainly for Africa an area corresponding to my lectures in international trade.

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