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Domestic Demand and Export Performance in CEMAC : Investigating from the Point of View of Capacity Constraints

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Abstract Based on the unitary foreing demand assumption the literature builds on exports markets share equation to analyze the relationship between exports and domestic sales. The main caveat with this strategy for African countries such CEMAC area is that the foreign demand series is scare. Then because the role of capacity constraints in explaining this relationship have an alternative explanation to the domestic demand given by the output gap which is more available then the empirical strategy that implyng is relevant for assessing on this relationship. Using dynamic panel data modeling, in CEMAC area between 1974 and 2021 the outgap gap impacts effectively negatively exports with a negative unitary elasticity confirming thus the robustness of specification used from the point of view of capacity constraints as explained by the capacity of the economy to satisfy on exports markets with the domestic production when a country cares about the capacity constraints.

ined exports, foreign demand, domestic demand, output gap, dynamic panel data model

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1. Introduction

Background Information

Building on exports market share quations (the difference between exports and foreign demand) from a macroeconomic perspective, the literature highlights a substitution effects between domestic sales and exports that is robust against data from industrialized countries (Blot and Cochard, 2008, p. 70 ; Esteves and Rua, 2013 ; Bobeica et al., 2015 ; Esteves and Prades, 2016) than developing countries especially Africa (Kuikeu, 2024 ; Kuikeu, 2025a ; Kuikeu, 2025b).

Generally, it is argued that increases in export demand cannot be satisfied in the short-run when capacity utilisation is high and when production is sold mainly on the domestic market. Conversely, during a domestic recession, firms will be able to shift more resources to export activities. In these periods, firms strive to compensate for the decline in domestic sales through increased efforts to export in order to stay in or enter the export market. That is the role of capacity constraints in this substitution effect between exports and domestic sales (Belke, 2014, p.4).

The disadvantage of the old literature about the substitution effect between domestic sales and exports building on export market share equations is that the foreign demand variable is at the same time costly (in time) to compute and scare so that for the CEMAC[1] area one country have at itself more than a half a total observations the Gabonese economy and for this purpose since the literature (Bobeica et al. 2015 ; Esteves and Prades, 2016) reveals that the results in assessing this relationship are country's sensitive Kuikeu (2025b) made a comparison between an CEMAC area at 5 without Gabonese economy and those in the literature with the full members States (Kuikeu, 2024) to have an idea of the bias coming from this particular panel data stucture in CEMAC. While he founds (Kuikeu, 2025b) that there is already a susbtitution effect in an CEMAC area at 5 as already found in Kuikeu (2024) with the full members States there is nevertheless the need to develop an alternative explanation to this substitution effect as the times series approach cannot be made just with the Gabonese case. Then the relevance of this investigating from the point of view of capacity constraints.

General Objectives

The role of capacity constraints is not the unique road in explaining this substituion effect between exports and domestic markets sales. The main reason and road on which is derived the exports markets shares equation from a macroeconomic perspectice comes from the traditional determinants of exports widely discussed into the literature (Kuikeu, 2024, p.125), which are the evolution of imports among trading partners and an indicator of price competitiveness taken as the real exchange rate generally. Then the aim of this paper is to assert the investigation from the parallel view of capacity constraints which is more in line with on the one hand the novel empirical strategy as in Belke (2014) using nonlinear regression than the conventional one's in which lies the traditional explanation of this substitution effect to known the panel data or the times series modeling and on the other hand–the products/services sectorial component of the economy and the country context. For example, according to Belke et al. (2014, p.14) the finding that in Ireland only recessions but not periods of booms lead to a substitutive relationship between domestic and export sales may be explained by the higher flexibility of the Irish economy compared to its Southern European counterparts. Flexible prices and immigration may have made capacity constraints less binding.

Contribution to Reseach

We assess the sensitivity of the results to the domestic demand variable. The domestic demand variable considered so far includes private and public consumption as well as investment. In practice, the capacity utilisation is defined as the capacity of firms to sold production in the foreign market depending on the demand pressure (Belke et al. (2014, p. 4)) and this one can be measured at the macro level as the output gap (Belke et al. (2014, p. 7)). Hence, it may be reasonable to argue that a more relevant concept of domestic demand pressure in the case of exports would reflect the developments of domestic demand by capacity constraints is output gap. Therefore, we consider an alternative measure of domestic demand, namely the output gap.

General Hypotheses

The assumption made on explaining this substitution effect may implie a given specification or empirical strategy. With the one's issues on the traditional determinants of exports we have the exports markets share equations and the assumption of a unitary foreign demand elasticity (Kuikeu, 2025a). Then with the alternative explanation of the

[1] 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.

domestic demand as given by the output gap that come from the role of capacity constraints are the specifications as well as the empirical strategy the same as in the standard case ?

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 alternative explanation of the domestic demand as given by the output gap that comes from the role of capacity constraints and the implications for specifications as well as the empirical strategy comparatively to the standard case who lies on the exports markets share equations and the assumption of a unitary foreign demand elasticity as empirical strategy at the macro level. In section 3, we present the methodological approaches around the testing of this substitution effect between the alternative explanation of the domestic demand as given by the output gap, in section 4 the results and finally in section 5 we present a summary of the main results as concluding remarks.

2. Literature Review

This literature review is around mainly the implications in terms of specifications and empirical strategy that comes from the alternative explanation of the domestic demand as given by the output gap with the role of capacity constraints in explaining this substitution effect. To explain this difference recall that when a country cares about it's international competitivenes comparatively to his trading partner this is usual to use as specfifcation in investigating this substutition effect the export market share equation defines as the difference between the country's exports and the foreign demand or the imports of the country's main trading partners. But when a country cares about the capacity consraints as the literature on usual economic textbook tells us the country now cares on the capacity of existing production to satisfy exports or foreign markets sales. For this purpose the correct specification in investigating this susbtitution effect is the "production potential" defines as the difference between the home economy's exports and the domestic production. An increasing of this quantity means that the domestic expôrts is above the domestic production and the economy should be out of the imaginary situation where the domestic production is above it's potential level. Then as in the standard case we assume a unitary elasticity between domestic exports and home production to make this comparison more suitable. Taking into account the home characteristic in explaining the home economy's export performance is common in the literature (Forte and Carvalho, 2024) and as given by the gravity equation (Vechui and Kuikeu, 2009).

Of course that the traditional determinant of exports mainly the indicator of price competitiveness taken as the real exchange rate generally continued to play as an determinants of the "production potential". In fact, an appreciaton (respectively an depreciation) of the real exchange rate means that the exports price increase (respectiveley decreases) and the import prices decreases (respectively increases) and then as in the stantard case an appreciation of the real exchange rate hurts "production potential".

3. Methods

The starting point is the econometric model that stress the dynamics of export performance over time. The methods and the variables selection are then presented in the following.

Empirical Model

Builiding on "production potential" specification we assess the role of capacity constraints in explaining this substitution effect by the alternative explanation of domestic demand as given by the output gap. As in the standard case, we assume that "production potential" (the difference between exports of goods and service X and production Y) follows both short run and long-run determinants. For the long-run dynamics, we consider the Real effective exchange rate $REER_{it}$ a price/cost competitiveness indicator defined such as an increase represents an appreciation. For the short-run behavior, the "production potential" is explained by its own evolution in the previous year, and the present and past developments of the real exchange rate $REER_{it}$ and the domestic demand as given by the output gap $YGAP$:

$$\Delta X_{it} - \Delta Y_{it} = \alpha_i + \beta(\Delta X_{it-1} - \Delta Y_{it-1}) + \sum_{k=0}^{1} \varphi_k \Delta REER_{it-k} + \sum_{l=0}^{1} \omega_l YGAP_{it-l} + \theta(X_{t-1} - Y_{t-1}) + \lambda REER_{t-1} + \varphi t \quad (1)$$

where Δ is the first difference operator. The model considers all the variables except the trend and the output gap 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.

It is important to assess whether the substitution effect between domestic sales and exports is an effect which appears only during economic dowturns or during growth periods. In order to investigate this, we introduce non linearity by testing for the existence of an Asymmetric relationship between exports and output gap. This is done by splitting output gap in two different variables, as this have been done into the literature for the domestic demand (Esteves and Rua, 2013 ; Bobeica et al., 2015 ; Esteves and Prades, 2016) depending of its change being positive ($YGAP+$) or negative ($YGAP-$). The estimate equation becomes:

$$\Delta X_{it} - \Delta Y_{it} = \alpha_i + \beta(\Delta X_{it-1} - \Delta Y_{it-1}) + \sum_{k=0}^{1} \varphi_k \Delta REER_{it-k} + \sum_{s=0}^{1} \omega_s YGAP^{+}_{it-s} + \sum_{p=0}^{1} \omega_p YGAP^{-}_{it-p} + \lambda REER_{t-1} + \theta(X_{t-1} - D_{t-1}) + \varphi t \quad (2)$$

Estimaton Method : the Issue of Endogeneity

Since this agenda raises questions about the potential omitted variables problems and the presence of the lagged endogenous these might suggest the use of instrumental variables ; based on the Hansen's J statistic (Hansen, 1982), we not reject the overall validity of the instruments at the standard level this suggests the orthogonality conditions hold. The panel data structure in CEMAC is such that the number of periods is large and the cross-section is small indicating the use of the usual fixed effects estimator. The presence of the lagged endogenous variable might suggest the use of the Arellano and Bond (1991) procedure. However, this method has been developed for panels with a short time dimension and a very large number of cross-section observations. When the number of periods is large and the cross section is small, the use of this alternative estimator may lead to a loss of efficiency, while the fixed effects estimator becomes consistent (see Nickell (1981) and Alvarez and Arellano (2003)). So 2SLS is probably also a good idea assuming that we trust the instruments (see the developments in Wooldridge (2002, pp.118-120) on the endogeneity tests).

Data Set

The macroeconomic data set covers 1974 to 2021 in annual frequency thus 48 observations measured in real terms. Table 1 presents the variables used in the analysis.

Table 1. List of Variables

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 real gross domestic product	The home production for CEMAC countries	Y	World Bank, WDI
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.	$REER$ (Base 100=2010)	Cepii, EQCHANGE[2]
The GDP gap as percent of potential GDP	The output gap computed using the Hodrick-Prescott[3] filter with the smoothing parameter set to 100	$YGAP$	World Bank's, WDI

Source: Author

4. Results and Discussion

As we assume implicitly an unitary elasticity between exports and real gross domestic product as defined in the specification of "production potential" in equation (1) as prelimilary to our results we test this assumption. For this purpose we regress exports on real exchange rate and real gross domestic product plus a trend and we test the linear restriction that the real gross domestic product elasticity is at unity. This is done in the following Table 2 :

[2] Couharde et al. (2018).
[3] Hodrick and Prescott (1997).

Table 2. Test of a unitary elasticity for real gross domestic product

	X OLS
Constant	6.60 (1.81)***
REER	−0.40 (0.22)*
Y	0.74 (0.07)***
t	0.00 (0.00)*
Statistics	
Nobs	189
Sample	1974-2021
N	6
Adjusted R^2	0.47
Restriction b[*Y*] = 1	12.34 **(0.00)**

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

At first glance from these results the conclusions seem satisfactory. In fact, the parameters estimates have the corrected sign and are significantly different from 0. Nevertheless the linear restriction test cannot approve the null of unitary elasticity for the real gross dommestic product.

Nevertheless we wil go forward with investigating the relationship between exports and output gap. We will first focus on the symmetric relation (equation 1) and then on the asymmetric relation (equation 2), all of them assumes a unitary elasticity for the real gross domestic product. 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 results are presented in the following Tables 3 and 4 respectively.

Table 3. The Symmetric Relation

$\Delta X_t - \Delta Y_t$	(1) 2SLS
Error Correction Term	
$X_{t-1} - Y_{t-1}$	−0.04 (0.01)***
Long run parameters	
$REER_{t-1}$	−0.92 (0.18)***
t	0.00 (0.00)***
Short run parameters	
Constant	3.93 (0.82)***
$\Delta X_{t-1} - \Delta Y_{t-1}$	−0.28 (0.10)***
$\Delta REER$	−0.71 (0.39)*
$YGAP_t$	−1.00

	(0.33)***
Statistics	
Nobs	82
Sample	1974-2021
N	6
Adjusted R^2	0.09
J Statistic ***Chi square* (8)**	19.64 **(0.01)**

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

The coefficients are clearly significant and their sign is as expected from the theory. As obtained with the exports market share the existence of a correction mechanism towards the long run equilibrium is confirmed by the statistically significant and negative error correction term suggesting thus that the endogeneity of "production potential" is well established and this term is not sizeable. The real effective exchange rate appears with a negative sign in the long-run, that is, an appreciation hurts exports performance. The time trend is strongly significant, evidencing an increase in "production potential" of CEMAC countries with what could not be explained by the real effective exchange rate itself. Concerning the short-run dynamics, the real effective exchange rates series appear to impact "production potential" with a negative sign. The one period lag of "production potential" change exhibit negative coefficients. Over the traditional export determinants, output gap appears to significantly influence "production potential" on the short-run with a negative unitary elasticity that means from the point of view of capacity constraints that the country cares effectively on the capacity of existing production to satisfy exports confirming thus the robustness of specification used to explain this substibution effect between exports and domestic sales from the point of view of capacity constraints as the literature on usual economic text book tells us.

Table 4. The Asymmetric Relation

$\Delta X_t - \Delta Y_t$	(2) 2SLS
Error Correction Term	
$X_{t-1} - Y_{t-1}$	−0,05 (0.03)*
Long run parameters	
$REER_{t-1}$	−0.93 (0.17)***
t	0.00 (0.00)***
Short run parameters	
Constant	3.96 (0.77)***
$\Delta X_{t-1} - \Delta Y_{t-1}$	−0.24 (0.10)**
$\Delta REER$	−1.45 (0.70)**
$YGAP_t^-$	−1.39 (0.56)**
Statistics	
Nobs	82
Sample	1974-2021
N	6
Adjusted R^2	0.07

J Statistic ***Chi square* (6)**	13.65 **(0.03)**

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

The results are qualitatively unchanged than in the symmetric case. However, concerning domestic demand variable, it appears that a negative changes in output gap presents a statistical significant negative effect on exports dynamics, conforming to a negative relationship between exports and domestic sales.

5. Conclusion

Context of the Study

At the macro level in contrast to the firm level evidence, the crucial assumption on which lies the empirical testing of the negative relationship between exports and domestic sales is the one of a unit foreign demand elasticity.

Objectives

Confronting empirical literature in CEMAC in investigating the substitution effcet between exports and domestic sales (panel data and times series modeling) on this basis of unitarity foreign demand elasticity assumption revealed that there is a serious bias in panel data modeling. In fact, Gabonese economy account for itself for more than a half of total observations concerning CEMAC in investigating this relationship. Therefore there is a need for taking into account of this particular structure in panel data modeling of this relationshing between exports and domestic sales concerning CEMAC. This is the aim of this study.

General Hypotheses

The assumption made on explaining this substitution effect may implie a given specification or empirical strategy. With the one's issues on the traditional determinants of exports who states the crucial assumption of a unitary foreign demand elasticity we have the exports markets share equations (Kuikeu, 2025a). Then with the alternative explanation of the domestic demand as given by the output gap that comes from the role of capacity constraints are the specifications as well as the empirical strategy the same as in the standard case ?

Method Used

We define the "production potential" as the diffrence between exports and production to state that taking into account the role of capacity constraint the country cares about the capacity of the economy to satisfy the foreign demand sales as given by the exports with the domestic production. Then we rich to an alternative measure to the domestic demand that is the output gap.

Main Findings

The traditional measure of domestic demand and the alternative one's as given by the output gap interplays as determinants of exports. In fact, using dynamic panel data model with an error correction mechanism we show that the relation between exports and output gap is negative as with domestic demand and the evidence of cointegration is well asserted despite the fact that is not even strong suggesting thus that the role of capacity constraints in explaining CEMAC's export performance is equivalent to the one of domestic demand.

Limitations and Scope

Since the result revealed that the issue of cointegration is not even strong in the case of the use of "production potential" than export markets share in explaining the substitution effect between domestic and foreign sales it is then straightforward to look on times series modeling for the individual series of CEMAC with the main advantage that the alternative measure given by the output gap is more available for countries in this area. This is the prospect of our future study on this subject.

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