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Is Foreign Debt Management in Gabon Efficient?

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Abstract: The objective of this paper is to show whether external debt management in Gabon is effective. Our study period is from 1989 to 2019 and we use error correction modeling. The significance and positive sign of the recall force shows that short-term imbalances do not correct in the long run, implying that debt management is inefficient as exchange rate fluctuations create changes in the shares of debt denominated in U.S. dollars, Japanese yen, and special drawing rights in both the short and long run. It is difficult for the debt manager to balance his portfolio. The originality of the article is to show that the management of the debt, in particular the external debt, is difficult to be seen inefficient by taking the example of a small economy opened on the outside. It is then a question of rethinking public policies and especially of carrying out structural reforms in the economy in order to minimize the consequences of a high external debt. In this context, the literature recommends either dollarizing all of its debt or allowing the development of a domestic bond market to protect against (or at least minimize) the effects of exchange rate fluctuations on external debt. While we find the latter proposal relevant, we believe that the former is not. Furthermore, we would add that Gabon should implement reforms to boost its industrial sector in order to improve its integration into international trade. The goal is to counter (even partially) the effects of currency fluctuations through export gains.

Keywords: debt portfolio; exchange rate; external debt management; foreign currency denominated debt; Original sin.

Introduction

The increase in external debt servicing in developing countries (Kondrat et al., 2019), on the one hand, and the problems associated with public debt management when a significant portion of it is denominated in hard currency (Mello (de) et al., 2001), on the other hand, have renewed the problem of the efficiency of managing such a portfolio.

The main issue at stake in such a problem was to reveal the difficulties of effectively managing public debt in a situation marked by foreign currency debts whose evolution is subject to exchange rate variations. Such difficulties, by constituting obstacles, are theoretically identified in the form of constraints. From this point of view, the main debates have identified two categories of constraints, namely monetary constraints, on the one hand, and non-monetary constraints, on the other. With regards to monetary constraints on public debt management, two types of constraints have been broadly identified, namely those related to the currencies in which external debt is denominated (Mello (de) et al., 2001; Eichengreen et al., 2007), and those related to the low value of the domestic currency of developing countries.

The constraint related to the currencies of denomination of external debt can be understood through the phenomenon of original sin, i.e., the inability of developing countries to borrow abroad in their own currency (Eichengreen et al., 2007; Haussman et al., 2011). Such a situation is characterized by external debt denominated in multiple foreign currencies, making repayment of external debt service difficult.The explanation lies in the fact that a state is likely to experience difficulties in managing its debt because an appreciation of the currency increases the burden of external debt (Prat, 2007; Eichengreen et al., 2007) and consequently worsens its fiscal position.

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Thus, such a constraint is coupled with a difficulty in obtaining long-term financing (Eichengreen, Haussmann, & Panizza, 2003, 2005). Indeed, in order to service foreign currency debt, the country must generate foreign currency resources over a long period. However, the refinancing of foreign currency debt imposes a liquidity constraint that links confidence in the currency to a judgement about the solvency of the government: an investor will only lend if he has a positive judgement about the government's capacity to repay its debts in the long term and have the foreign currency to service its foreign currency debt.

In this case, external debt management is then constrained by the low value of the domestic currency (second constraint), which makes the fiscal instrument irrelevant. Indeed, if a country's external debt is not denominated in local currency, the amount needed to cover international obligations without resorting to a "Ponzi scheme" (i.e., without creating new debt) can only be generated in the presence of a current account surplus. This means that the net external debt is always a debt that must be repaid internationally through tradable goods and services. With regards to non-monetary constraints, analyses focus on the problem of the virtual absence of domestic financial markets in developing countries (Christensen, 2004).

Indeed, the virtual absence of domestic financial markets in these countries limits the activity of external debt managers. This constraint is manifested mainly by the impossibility of using a wide range of hedging instruments offered by financial markets. Moreover, by constituting alternative modes of financing for governments, the limited development of such markets reduces the possibility of borrowing in domestic currency in order to reduce the exchange rate risk associated with foreign currency borrowing (Cabrillac & Rocher, 2009). In fact, public authorities face a set of constraints in the presence of currency mismatches, the consideration of which complicates the management of the external debt portfolio (Mello (de) et al., 2001).

Empirically, several studies have focused on the influence of debt, particularly on growth (Omodero et al., 2019; Yasar, 2021). Mengue (2018) demonstrates that public over-indebtedness has a negative impact on economic activity in developing countries in this case Gabon. Based on an estimation by the method of generalized moments in system of the relationship between economic growth and the outstanding public debt on the data of the Gabonese economy, he finds that an increase in public debt in this country, causes a slowdown in economic activity, reflecting a scissor effect between the evolution of public debt and that of economic growth.

Akhmadeev et al. (2018) analyze macro indicators affecting the external debt burden of BRICS. It has been proved that it is necessary to design development scenarios in the medium-term planning by forming a numerical estimation plan, taking into account the expectations of the behavior of economic variables and other factors, which would stabilize the debt burden and other indicators at reasonable levels.

Turan et al. (2020) study the effect of total, public and private external debt stock on the growth rate as well as total, public and private investment using data from a large sample of developing countries. They find a significant and negative effect on the growth of total external debt stock, which proves the debt overhang argument. Moreover, their results provide important evidence that external debt reduces growth only in countries with ethnically divided and inefficient governments.

Mohsin et al. (2021) analyze the relationship between external debt and economic growth in the South Asian region using ordinary least squares (OLS) regression, quantile fixed effect regression, and robust output regression to analyze World Bank data from 2000 to 2018. The South Asian countries of Afghanistan, Bangladesh, Bhutan, India, Pakistan, Sri Lanka, Maldives, and Nepal were included in the assessment. The analysis shows that while external debt has a negative impact, the stock of external debt has a positive impact on economic growth. The robust regression analysis corroborated the impact of total external debt and external debt service by 39 percent and 31 percent, respectively. Furthermore, compared to domestic debt, the threshold analysis reveals that

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external debt becomes a drag on growth and has a larger negative effect than domestic debt. Thus, the study serves as a basis for policymakers and government officials to stimulate economic growth while reducing the external debt of the economy. Even in the presence of high borrowing costs, better institutional quality can help mitigate the negative impact of external borrowing on growth.

While most studies present the relationship between debt and growth, only Mello (de) et al. (2001) analyze external debt in the same terms. These authors show, moreover, that external debt portfolio management in developing and emerging countries is inefficient because changes in international currency exchange rates promote changes in the shares of debt denominated in those currencies. In fact, debt managers are not able to keep the debt portfolio stable regardless of exchange rate fluctuations.

Consequently, this paper proposes to test, following Mello (de) et al. (2001), whether external debt portfolio management is inefficient by taking Gabon as a geospatial framework of analysis. The rest of the paper is organized as follows. The first part outlines the model, the second is composed of the empirical verification and estimation results, while the third part highlights the conclusions.

Research design

The model

Building on the model of Mello (de) and Hussein (2001), we consider a small open economy where the total external debt at period *t* is denominated in *n* foreign currencies. Assuming that the currency is taken as numeraire, the exchange rates $(e_i, i = 1, \dots, n-1)$, are defined under uncertainty as the value of the currency per unit of currency *n*.

The government's objective is to minimize the value of the liabilities in its portfolio C, defined as$C_t(A_t; D_{it})$, where A_t denotes all foreign assets and D_{it} denotes debt denominated in currency *i*. Assets and liabilities are additively separated.
Let's put $C_i < 0$ and $C_{ii} > 0$, where:

$C_i = \frac{\partial C_t}{\partial D_{it}}$ and $C_{ii} = \frac{\partial^2 C_t}{\partial^2 D_{it}}$, such as C_t admits a minimum en D_{it}.

In addition, there is uncertainty about the exchange rate, such that the value of the foreign debt denominated in the currency *n* is affected by unanticipated exchange rate fluctuations. The government's program can be formalized as follows:

$$(P): \begin{cases} Min_{D_{it}} C_t(A_t; D_{it}) \\ S/C \\ D_t = \sum_{i=1}^{n} \frac{D_{it}}{E_t e_{it}} \end{cases}$$

with E_t is the expectation operator.

Solving the government program leads us to use the Lagrange method, defined by the following function:

$$L(D_{it}, \lambda_t) = C_t(A_t; D_{it}) + \lambda_t(D_t - \sum_{i=1}^{n} \frac{D_{it}}{E_t e_{it}}) \quad (1)$$

With L(.), the Lagrange function and λ_t the Lagrangian or Lagrange multiplier.

The first order conditions (FOC) are as follows:

$$\begin{cases} \frac{\partial L}{\partial D_{it}} = 0 & \Rightarrow \frac{\partial C_t}{\partial D_{it}} - \frac{\lambda_t}{E_t e_{it}} = 0 \\ \frac{\partial L}{\partial \lambda_t} = 0 & \Rightarrow D_t - \sum_{i=1}^{n} \frac{D_{it}}{E_t e_{it}} = 0 \end{cases} \quad (2)$$

we have:

$$\frac{\partial C_t}{\partial D_{it}} = \frac{\lambda_t}{E_t e_{it}} \Leftrightarrow \lambda_t = \frac{\partial C_t}{\partial D_{it}} E_t e_{it}$$

and, $\frac{\partial C_t}{\partial D_{it}} = C_i$
thus, $\lambda_t = C_1 E_t e_{it}$ (3)

Therefore, $\lambda_t = C_1 E_t e_{it} = \cdots = C_n$ (4)

Equation (4) yields the following equality:
$\frac{C_1}{C_n} = \frac{1}{E_t e_{1t}}, \ldots, \frac{C_{n-1}}{C_n} = \frac{1}{E_t e_{n-1t}}$ (5)

In particular, if the currency appreciates relative to currency *n* ($E_t e_{1t}$ falls), the impact of the currency i value of the debt on the portfolio *C* rises relative to *n*. Because $C_i < 0$, the share of debt denominated in currency *i*, D_{it}, falls. The result is that the appreciation of a given currency (relative to currency *n*) implies a decrease in the total share of debt denominated in a given currency *i* (relative to currency *n*).

Let's put, $C_t = \frac{1}{2}\left[A_t + \sum_{i=1}^{n} (\frac{D_{it}}{e_{it}})^2\right]$ and assuming $E_t e_{it} = e_{it}$, it follows from equation (4) that $\frac{D_{it}}{D_{it}} = e_{it}$.

Thus, an appreciation of the currency *i* relative to the currency *n* (e_{it} *falls)*, favors a reduction in the share of debt denominated in currency *i* relative to the share of debt denominated in currency *n*.

This result shows that, in order to maintain an optimal portfolio over time, i.e., to make external debt management efficient[1], *an appreciation of currency i relative to currency n must reduce the share of debt denominated in currency i relative to the share of debt denominated in currency n* (Mello (de) et al., 2001, p. 6-7).

In Gabon, which uses the CFA franc, for a portfolio composed of debt denominated in euros and U.S. dollars, an appreciation of the U.S. dollar against the CFA franc leads to a decline in the proportion of debt denominated in U.S. dollars. In this case, optimal portfolio management requires that the volume of dollar-denominated debt be reduced to offset the impact of the appreciation of the US dollar.

Such a substitution effect shows that the CFA franc value of the dollar-denominated portion of the debt would not be affected by an appreciation of the U.S. dollar relative to the franc. Therefore, debt portfolio management is effective if managers are able to maintain the portfolio constant over time regardless of exchange rate changes.

[1] The authors first assume that the initial external debt portfolio is optimal. Efficient external debt management then consists in maintaining this optimality over time.

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Empirical verification

This is to verify the hypothesis highlighted by Mello (de) et al. (2001). The invalidation of such a hypothesis. However, unlike these authors, who focus on emerging and transition countries, we place ourselves in the context of Gabon, a small developing country as mentioned above.

We would like to proceed to the confirmation or denial of the hypothesis according to which the management of the debt portfolio in the countries of the zone is inefficient because the variations of the exchange rates entail modifications in the relative countries of the debts.

The specified model takes the following linear form:

$$D_t = \alpha_1 + +\alpha_2 e_t + \alpha_3 import_t + \alpha_4 infl_t + \alpha_5 quality_t + \varepsilon_t \quad (6)$$

Where D_{it}, the currency debt ; e_t the exchange rates of the current country; *import*, imports; *infl* the level of inflation and *quality*, the quality of institutions ; ε_t, the error term, iid which follows a normal distribution$(0, \sigma_\varepsilon^2)$; α_i, i=2,..,5, being the coefficients associated with the explanatory variables of the model, α_1, the constant of the model and t the time.

Presentation of the variables

These are, on the one hand, the explained variable and, on the other hand, the explanatory variables.

Explained variable

The explained variable considered is the debt denominated in currency i, i.e., in US dollars (dus), Japanese yen (dy) and special drawing rights (dts). This is therefore a set of foreign currency-denominated debts that make up a large part of the external debt portfolio in the CEMAC. Thus, in addition to the CFA franc, we consider four international currencies[2], namely the US dollar, the Yen and the SDR.

Explanatory variables

Following Mello (de), we focus on the nominal exchange rates of the CFA franc against the US Dollar (tcn_us), the Japanese Yen (tcn_jpn) and the SDR (tcn_dts) as the main explanatory variables.

The absence of quotations in international financial markets between the CFA franc and the Japanese yen led us to calculate the cross rate from the CFA franc/US dollar and yen/US dollar relationships.

The other explanatory variables are imports relative to GDP (*import*), the level of inflation (*infl*) measured by the evolution of the consumer price index, and the quality of institutions (*quality*) approximated by a corruption index.

According to the literature, these variables are relevant to explain foreign currency indebtedness.

First, the growth of imports requires obtaining the foreign currency needed to pay for them (Kondrat et al., 2019). Second, the level of inflation, which determines the credibility of the monetary authorities, influences foreign currency borrowing decisions because of the crisis of confidence of international lenders in the quality of the domestic currency (Eichengreen et al., 2003). Finally, for Mehmood et al., (2021), the quality of institutions strongly determines foreign currency borrowing.

[2] The Euro has not yet been taken into account because of the existing fixity relationship with the CFA franc.

Preliminary tests and model estimation

The model is estimated using eviews software version 10 and the analysis covers the period 1989-2019. Indeed, during this period, Gabon's debt has gone through three phases:

A first phase of increase between 1989 and 1999 during which the debt ratio rose from 20.4% of GDP to 46.7% of GDP mainly due to the devaluation of the CFA franc in 1994.

A second phase from 1999 to 2008 marked by a significant decline in the level of debt, from 46.7% to 21.2%. This phase corresponds to the period during which the country was placed under structural adjustment by the Bretton Woods institutions.

A third phase between 2008 and 2019, in which the debt ratio increased sharply, mainly due to the financialization of a large part of the external debt, on the one hand, and to the effects of currency fluctuations in which the external debt is denominated, on the other.

In addition, the data is taken from the World Bank database for the series on foreign currency debt, imports and inflation. The exchange rate series are taken from the Federal Reserve Economic Data (FRED) and the Bank of Central African States (BCAS) databases, while the corruption index is taken from the International Country Risk Guide (ICRG) database.

Thus, we perform two preliminary tests on time series, namely, the stationarity tests of Dickey and Fuller augmented (ADF), and the cointegration test of Johansen (1988), before estimating the model.

The stationarity test

The unit root tests allow us to verify under the null hypothesis that a stochastic process admits a unit root, against the hypothesis that the process has only a deterministic trend (thus against the hypothesis that it is stationary around a deterministic trend).

The choice of the Dickey-Fuller (1981) test (Augmented Dickey-Fuller or ADF) in this article lies in the fact that it is a test that allows for the autocorrelation of residuals. To this end, the ADF test lies on the study of the significance of the coefficients of the following models:

Model with constant:

$$\Delta x_t = c + \rho x_{t-1} + \sum_{j=1}^{p} \varphi_j x_{t-j} + \varepsilon_t \quad (7)$$

Model with constant and trend:

$$\Delta x_t = c + bt + \rho x_{t-1} + \sum_{j=1}^{p} \varphi_j x_{t-j} + \varepsilon_t \quad (8)$$

Autoregressive model without trend and constant:

$$\Delta x_t = \rho x_{t-1} + \sum_{j=1}^{p} \varphi_j x_{t-j} + \varepsilon_t \quad (9)$$

Estimating the coefficients and standard deviations of the model by ordinary least squares provides the ADF t-statistic. If $t_{calculed} \geq t_{tabuled}$ then we accept the null hypothesis H0: There is a unit root, so the process is not stationary

Table 1 shows that the majority of the variables in the model are stationary in first difference, i.e., integrated of order 1. The *infl* variable is stationary in level.

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Table 1. ADF stationarity test

Variables	Level			First difference			Conclusion
	Intercept	Intercept and trend	None	Intercept	Intercept and trend	None	
Dus	-0,7373 (0,8221)	-3,0750 (0,1302)	0,6947 (0,8602)	-5,8770 (0,0000)	-5,7711 (0,0003)	-5.5984 (0,0000)	I(1)
Ddts	-2.7470 (0,0782)	-2,5725 (0,2943)	-1,2753 (0,1818)	-6,7563 (0,0000)	-4,3448 (0,0095)	-6,8723 (0,0000)	I(1)
Djpn	-0.4996 (0,8779)	-2,5764 (0,2927)	-1,1961 (0,2067)	-6,4630 (0,0000)	-6,4975 (0,0000)	-6,2713 (0,0000)	I(1)
Tcn_us	-2,220(0,2032)	-2,5429(0,3069)	-0,3273(0,5583)	-3,3954(0,0195)	-3,3556(0,0774)	-3,4551(0,0012)	I(1)
Tcn_dts	-1,9675(0,2986)	-2,3855(0,4985)	-0,3034(0,5676)	-3,5750(0,0128)	-3,5399(0,0536)	-3,6060(0,0007)	I(1)
Tcn_jpn	-2,2534(0,1929)	-2,1503(0,4985)	-0,2939(0,5714)	-5,1960(0,0002)	-5,1525(0,0013)	-5,2913(0,0000)	I(1)
Import	-2,0704 (0,2573)	-2,8866 (0,1806)	-0.6300 (0,4359)	-5.7027 (0,0001)	-5,6420 (0,0004)	-5,7939 (0,0000)	I(1)
Infl	-4.6639 (0,0008)	-4.5941 (0,0049)	-3,9350 (0,0003)	-6,9759 (0,0000)	-6,8345 (0,0000)	-7,1062 (0,0000)	I(0)
Quality	-1,1437 (0,6849)	-2,1331 (0,5075)	-0.0070 (0,6724)	-5,7904 (0,0000)	-6,0775 (0,0001)	-5.9122 (0,0000)	I(1)

I(0): Level integration ; I(1): First order integration; the data in brackets represent the probabilities

Source: Author's own elaboration

The cointegration test

The cointegration test will allow us to verify whether there is a long-run relationship between the variations in the various debts and the fluctuations in the explanatory variables, in this case the nominal exchange rates.

In fact, the concept of cointegration was introduced by Engel and Granger in order to test for the existence of a long-run relationship between non-stationary variables and thus to avoid "spurious regressions". Such an analysis makes it possible to clearly identify the true relationship between the variables, to search for a cointegrating vector to eliminate its effect, if necessary.

We prefer the Johansen (1988) cointegration test, which allows us to verify the existence of a long-term relationship when the number of variables exceeds two (2).

The results of the test are summarized below[3].

Table 2. Johansen (1988) cointegration tests

Series: DUS TCN_US IMPORT INFL QUALITY					
Data Trend:	None	None	Linear	Linear	Quadratic
Test Type	No Intercept No Trend	Intercept No Trend	Intercept No Trend	Intercept Trend	Intercept Trend
Trace	2	3	3	3	5
Max-Eig	3	3	4	3	3
Series: DDTS TCN_DTS IMPORT INFL QUALITY					
Data Trend:	None	None	Linear	Linear Quadratic	
Test Type	No Intercept No Trend	Intercept No Trend	Intercept No Trend	Intercept Trend	Intercept Trend
Trace	1	1	2	1	2
Max-Eig	1	1	1	1	1
Series: DJPN TCN_JPN IMPORT INFL QUALITY					
Data Trend:	None	None	Linear	Linear	Quadratic
Test Type	No Intercept	Intercept	Intercept	Intercept	Intercept
	No Trend	No Trend	No Trend	Trend	Trend
Trace	0	0	1	1	2
Max-Eig	0	0	0	1	1

Lags interval: 1 to 1

Source: Author's own elaboration

Thus, we observe that there is at least a cointegrating relationship between changes in exchange rates and changes in currency-denominated debt. This means, for example, that an appreciation of the U.S. dollar increases the value in CFA francs of debt denominated in U.S. dollars. One can then assume, as Mello (de) and Hussein (2001) do, that the management of Gabon's external debt portfolio may be inefficient since, in the long run, exchange rate fluctuations always lead to variations in the various debts. Such results lead to the use of a correction mechanism that takes the following form[4]:

[3] We have chosen a threshold of 5% and a lag variant in equation (6): k=1, which is the best adapted solution. Indeed, increasing the number of lags makes co-integration more difficult and also raises problems of small sample bias. This is why Johansen (1995) recommends not to exceed two if it does not impose. We then chose the default number of lags proposed by the software.

[4] We prefer the one-step method *à la* Hendry.

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$$\Delta D_t = \alpha_1 + \alpha_2 \Delta e_t + \alpha_3 \Delta import_t + \alpha_4 \Delta infl_t + \alpha_5 \Delta qualité_t + \delta D_{t-1} + \beta_2 e_{t-1} + \beta_3 import_{t-1} + \beta_4 infl_{t-1} + \beta_5 qualité_{t-1} + \varepsilon_t \quad (10)$$

with α_i, (i=1,...,5), the short-term coefficients; δ, the error correction coefficient; β_i, the long-term coefficients.

In the context of our study, in order to support the conclusion drawn from the cointegration test, and thus to show the inefficiency of Gabon's external debt portfolio management, the error correction coefficient (δ) should be positive and significant. Such a situation would show that short-run imbalances are not corrected in the long run, indicating that exchange rate fluctuations drive both short- and long-run variations in debts denominated in US dollars, Japanese Yen and special drawing rights.

Examination of the results

The model was estimated by the ordinary least square method using an error correction specification. Table 3 below shows that the estimated equations have satisfactory explanatory power since the coefficients of determination (R_squared) are (0.92), (0.68), and (0.94) respectively.

Since one of the explanatory variables is the lagged explained variable, we use Durbin's h-statistic to check the autocorrelation of the model errors. These values (-0.23), (-0.80) and (-0.26) less than 1.96 in absolute value show that the errors are uncorrelated in the relationships studied.

Moreover, the Fisher-Snedecor probabilities, being lower than the 5% threshold, indicate an effective significance of each model as a whole.

Thus, in the light of the results, we observe that the different recall forces (0.90), (0.67) and (0.60) are positive and significant (their t-statistics being greater than two).

Such results confirm our initial hypothesis. Indeed, external debt portfolio management is inefficient in Gabon. Changes in exchange rates lead to changes in the respective shares of debt. Efficient management would make debts stable regardless of exchange rate fluctuations of the different international currencies that make up the portfolio.

Thus, in an environment where debt management is constrained by the weakness of the domestic financial market, Gabon's external debt manager is subject to a strong external constraint because he cannot manage fluctuations in the value of international currencies (in this case the U.S. dollar, the Yen and the Special Drawing Rights). Such difficulties are amplified by the weakness of the value of the domestic currency (the CFA franc). It is well known that this problem reduces the room for manoeuvre of developing countries, particularly in repaying foreign currency debt.

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Table 3. Summary of estimation results

Explained variable: dus							
Short-term				**Long-term**			
Δ(tcn_us)	Δ(import)	Δ(infl)	Δ(quality)	tcn_us(t-1)	import(t-1)	infl(t-1)	quality(t-1)
0,089(1,999)	-0,568(-1,346)	-0,072(-0,346)	-0,636(-0,089)	-0,023(-0.822)	-0,729(-1,640)	0,047(-0,172)	-4,156(-0,699)
R_squared: 0,919; prob (F-stat): 0,000; h de Durbin: -0,23; Error correction coefficient: 0,908 (6,442)							
Explained variable: ddts							
Short-term				**Long-term**			
Δ(tcn_dts)	Δ(import)	Δ(infl)	Δ(quality)	tcn_dts(t-1)	import(t-1)	infl(t-1)	quality(t-1)
-0,0003(-0,7521)	-0,0025(-0,9410)	0,0053(3,8087)	-0,0336(-0,7979)	5,18E-05(0,2418)	-0,0003(-0,1024)	0,0040(2,1125)	-0,0109(-0,3876)
R_squared: 0,6811 prob (F-stat): 0,0018 h de Durbin: -0,80 Error correction coefficient: 0,6680 (4,0961)							
Explained variable: djpn							
Short-term				**Long-term**			
Δ(tcn_jpn)	Δ(import)	Δ(infl)	Δ(quality)	tcn_jpn(-1)	import(t-1)	infl(t-1)	quality(t-1)
-0,0005 (1,8075)	0,0047 (0,8148)	-1,68E-05(-0,0057)	-0,0523(-0,4933)	-0,0007 (-1,4116)	0,0113(1,8923)	-0,0018(-0,4894)	-0,2346(-2,5602)
R_squared: 0,941 prob (F-stat): 0,000 h de Durbin: -0,26 Error correction coefficient: 0,6007 (4,4762)							

Numbers in parentheses denote Student's t.

Source: Author's own elaboration

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Conclusion

The purpose of this paper was to verify, using an error correction model, whether external debt management in Gabon is inefficient. The estimates carried out allowed us to answer it in an affirmative way. Indeed, the results of the cointegration test and the sign of the error correction coefficient show that exchange rate variations lead to fluctuations in the shares of debt denominated in US dollars, Japanese Yen and special drawing rights. In fact, in effective management, the debt shares should be stable regardless of exchange rate fluctuations.

The presence of foreign currency debt thus constitutes an obstacle for Gabon's external debt managers. To this end, the literature proposes two options to overcome the problem, namely the total dollarization of liabilities (Krugman, 1999; Calvo & Reinhart, 2002), on the one hand, and the development of a domestic bond market to promote domestic debt (Burger et al., 2012), on the other hand, with the aim of overcoming the difficulties associated with exchange rate fluctuations on external debt. However, in the context of Gabon, a small and poor country open to the outside world, it would be difficult to turn such recommendations into practice. Gabon would have to implement reforms to boost its industrial sector in order to increase its export volume and improve its integration into international trade. The goal is to counter the effects of exchange rates on foreign currency debt by increasing market share.

Therefore, even when the domestic financial market is underdeveloped, the question of hedging exchange rate risk remains, particularly through the role of exports. Exports are in fact a way of managing debt in certain situations (the literature speaks of natural hedging). This is the subject of one of our studies[5], but it also confirms the difficulties of managing the external debt of developing countries, since we find that the valuation effect of debt denominated in US dollars, for example, is not neutralized by export earnings in the EMCCAS zone[6].

It should be noted that external debt portfolio management is a sound debt management strategy that must be articulated with other policies, including a sound fiscal policy and a monetary policy capable of keeping inflation low, stable, and predictable, as well as an efficient financial system (Hodula & Melecky, 2020). The study of the interaction between fiscal and monetary policy is therefore relevant, especially since Gabon is a country belonging to a heterogeneous monetary union composed of poor countries (the Economic and Monetary Community of Central African States, EMCCAS) in which monetary policy is bequeathed to a supranational institution that is the Bank of Central African States (BCAS).

Notice that this work has at least two limitations, namely the one related to the methodology and the one related to the treated problem. With regards to methodology, it would have been appropriate to look at a much larger sample of developing countries, as in previous work, in order to rigorously validate our hypothesis. As for the problem addressed, the main limitation is that the subject we are dealing with is strictly the liability side of the balance sheet, i.e., debts. However, there is a vast literature that uses both liabilities and assets to analyze the issue of public debt management through what is called "currency mismatches".

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[5] Original Sin and Natural Hedge.
[6] As a reminder, the Economic and Monetary Community of Central Africa (EMCCA) is a monetary union made up of six (6) countries, namely Gabon, Cameroon, Congo, Equatorial Guinea, Chad and Central Africa (CAF).

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