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Fiscal Sustainability Analysis: The Case of PALOP Economies*

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ABSTRACT

The Global Financial Crisis has typically led to a significant widening of fiscal positions (i.e., higher budget deficits and public debt). We address the sustainability of public finances in Portuguese-speaking African countries (PALOP), through adequate econometric testing. Our findings for the period 1975-2015 suggest that most of the PALOP have compromised the sustainability of their corresponding fiscal positions, leading these economies to be set on unsustainable public finance trajectories.

Keywords: Debt Sustainability, Global Financial Crisis, Fiscal Policy, PALOP

JEL: C22, E62, H62

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1. INTRODUCTION

We examine the sustainability of fiscal policies in Portuguese-speaking African countries (here after PALOP's[1]), by conducting econometric sustainability testing on macroeconomic data associated with these economies. In fact, this is a pressing problem for these economies, as there is some prior indication that fiscal policies in PALOP economies might presently be set on unsustainable trajectories.

The research question critically analyses whether fiscal policy trajectories might be deemed unsustainable for these PALOP economies, using publicly available central bank data. Therefore, this article contributes to the literature by filling an important gap pertaining to potential fiscal sustainability issues in African economies, a clear source of concern for policy makers.

The emergence of a post-crisis literature addressing the sustainability of fiscal policies – and the subsequent need for strengthening corresponding fiscal discipline in fiscally overburdened economies – has been mainly focused on the state of public finances in advanced economies.

Moreover, the 2011-2012 Euro Area Sovereign Debt Crisis has revealed how pressing this global research topic has become in the aftermath of the Global Financial Crisis (GFC). For example, Afonso and Jalles (2012) observe that the sustainability of public finances might be compromised in a wide sample of 18 OECD countries, most especially in the immediate aftermath of the GFC; while Afonso and Jalles (2013) suggest that the implementation of disciplined and stricter fiscal policy rules might contribute to strengthen economic growth in economies overwhelmed by profligate fiscal policies.

The fiscal sustainability and discipline in African economies in a post-GFC environment constitutes an important source of concern, notwithstanding the fact that it has been largely overlooked by the academic literature. It therefore constitutes a relevant avenue of research, as tighter global financial conditions and the marked fall in commodity prices have drawn heightened attention to the need to redress recent fiscal policy trajectories in African economies (in order to create conditions for solid economic growth in the said economies). For example, Ncube and Brixiová (2015) observe that, notwithstanding the somewhat relative stability of the fiscal sustainability and discipline outlooks for African economies, there are some upward risks associated with the recent increase in public debt levels, especially in the context of rising interest

[1] This community comprises the following African economies: Angola, Cape Verde, Guinea-Bissau, Mozambique, and Sao Tome and Príncipe. Our sample thus comprises these five PALOP economies.

rates; while Lopes da Veiga, *et al.* (2016) observe that: (i) public debt and economic growth pertaining to Sub-Saharian economies in the context of a pre-crisis environment are negatively related throughout the 1950 – 2012 period; and (ii) economic growth rates are optimal in these economies when the corresponding public debt-to-GDP ratios are comprised in the 30%–60% interval. The present article focuses on fiscal sustainability issues in PALOP economies, which collectively encompass more that 56 million citizens.

Our key findings, for the period 1975-2015, suggest that fiscal policies in PALOP economies are following an unsustainable path, and that the capacity to fiscally accommodate future economic or financial shocks might be seriously compromised.

2. METHODOLOGY AND DATA

The framework for the sustainability of public finances in PALOP economies is based on the assessment of whether the corresponding intertemporal budget constraints are satisfied. Following Afonso (2005), complying with the intertemporal budget constraint requires that the present value of future government surpluses might be sufficient to pay the existing stock of public debt. Accordingly, this can be represented as follows:

$$D_{t-1} = \sum_{s=0}^{\infty} \frac{1}{(1+i)^{s+1}} (R_{t+s} - E_{t+s}) + \lim_{s\to\infty} \frac{D_{t+s}}{(1+i)^{s+1}} \quad (\mathbf{1}),$$

where D is public debt; R represent public revenues; E public expenditures and i – interest rate.

We implement our analysis via a two-step approach in order to address fiscal policy sustainability in PALOP economies. The first step entails the application of stationarity tests to our set of PALOP economies involving the following variable: external public debt as a percentage of GDP, as suggested by Trehan and Walsh (1991). Specifically, the article uses the Augmented Dick Fuller (ADF) unit root testing procedure across the sample. In order to caution against the potential existence of structural breaks in the underlying time series, the Zivot & Andrew testing procedure is also applied. These two separate tests are described as follows:

I) Augmented Dickey-Fuller (ADF):

$$\Delta Y_t = \mu + \rho_b Y_{t-1} + \sum_{i=1}^{k} \Delta Y_{t-i} + v_t, (\mathbf{2})$$

II) Zivot & Andrews:

$$Y_t = \hat{\mu} + \hat{\theta} DU_t(\widehat{T_b}) + \hat{\beta}_t + \hat{\gamma} DT_t(\widehat{T_b}) + \hat{\alpha} Y_{t-1} + \sum_{j=1}^{k} \widehat{c_j} \Delta Y_{t-j} + \widehat{e_t}, (\mathbf{3})$$

Where Yt is a time series; *DU* is a dummy variable that captures structural breaks in levels; *DT* is a second dummy variable that represents the breaks in the trend that occurred during time frame *Tb*, and where DUt=1 if t > Tb (and/or zero otherwise), and/or equal to (t-Tb) if (t > Tb) (and/or zero otherwise).

The second step entails the application of cointegration tests between public expenditures and public revenues (as a percentage of GDP). The latter tests are implemented according to the Johansen and Engle-Granger procedures. Prior to applying the latter tests, the integration orders of each series have to be ascertained, so that the second step is only applied when both series are deemed non-stationary (e.g., integrated of order one I(1), or higher). Accordingly, the following cointegration regression is estimated:

$$R_t = c + bE_t + u_t (\mathbf{4}),$$

where R and E represent public revenues and public expenditures respectively.

The data set that we use comes from three sources: i) the International Monetary Fund's *World Economic Outlook*; ii) the World Bank's *World Development Indicator*; and iii) São Tomé and Príncipe's Ministry of Finance. The time span of the data generically covers the 1975-2015 period, although country-specific testing is quite idiosyncratic, depending on available data for each country comprised in our PALOP set.

3. EMPIRICAL FINDINGS

In the first step, we initially applied stationarity tests to external public debt as a percentage of GDP. Accordingly, we used the Augmented Dick Fuller and the Zivot & Andrew tests in order to caution against the presence of structural breaks in the corresponding series.

According to Table 1, our findings suggest that the series are nonstationary, which further posits that the solvency condition that warrants the sustainability of public finances is not adequately met. Our sample's time series pertaining to external public debt-to-GDP ratios are I(1), thus allowing for the rejection of the null of a unit root in the majority of the countries comprised in the sample, with the exception of Angola where stationarity is confirmed by ADF testing. Similar results have been obtained using the stationarity testing procedures, as suggested by Zivot & Andrew, and Perron's testing procedures.

Table 1 – Unit root tests for external public debt as a percentage of GDP

		ADF				*PP*			*Zivot And Andrews*				*Perron*			
Country	Period	*Lag*	*T Statistic*	*P-Value*	*stationarity*	*(Z) T Statistic*	*P-Value*	*stationarity*	Break Date	ADF Break Point Test	P-value	*stationarity*	lag	*Break Date*	*ADF Break Point Test*	P-value	*stationarity*
ANG	1989-2014	5	-8,843	0	yes	-1,71	0,412	no	2000	-6,243	0,004	yes	5	2001	-12,02	0	yes
CV	1981-2014	8	-1,145	0,685	no	-1,934	0,313	no	1990	-2,452	0,446	no	8	2011	-3,06	0,645	no
GB	1975-2014	9	-1,296	0,621	no	-1,331	0,605	no	2000	-3,035	0,004	no	9	1998	-2,73	0,81	no
MZ	1984-2014	7	-1,22	0,652	no	-1,37	0,583	no	1996	-3,335	0,002	no	7	1996	-6,43	0,01	no
STP	1980-2014	8	-1,156	0,681	no	-1,506	0,518	no	2005	-3,018	0,004	no	8	1996	-4,15	0,1	no

Note: ANG = Angola; CV = Cape Verde; GB = Guinea-Bissau; MZ = Mozambique; STP = Sao-Tome and Principe.

In the second step, we followed the approach suggested by Hakkio and Rush (1991), who apply cointegration testing between public revenues and expenditures (as a percentage of GDP). Accordingly, the Engle Granger and Johansen tests have been duly applied in order to determine whether there is a long-term relationship between the two variables. Prior to applying cointegration testing, we have assessed the stationarity (ADF and PP) of the underlying time series. In Table 2 most country series are nonstationary in levels.[2] These findings were confirmed by performing stationarity tests that address the potential existence of structural breaks (Zivot & Andrews and Perron) in the time series.

[2] There are, however, a few exceptions where test results do not indicate the rejection of the null indicating that the series are I(0)

The existence of breaks might be explained by two types of determinants: i) external (e.g. debt reliefs, which occurred in Guinea-Bissau, Mozambique, and Sao Tome and Principe around certain corresponding break dates); and ii) internal (e.g., inflationary pressures that eroded public debt-to-GDP ratios, as was the case with Sao Tome and Principe in 1996). These idiosyncratic determinants merit further scrutiny on a country-by-country basis.

Table 2 - Unit root tests for revenue and expenditures as a percentage of GDP

				ADF			*PP*			*Zivot And Andrews*					*Perron*		
Country	Depedent variable	*Lag*	Period	*T Statistic*	*P-Value*	*statio narity*	*(Z) T Statistic*	*P-Value*	*station arity*	*Break Date*	*ADF Break Point Test*	*P-value*	*statio narity*	lag	*Break Date*	*ADF Break Point Test*	*p-value*	*statio narity*
ANG	R	4	1996-2015	-2,374	0,161	no	-2,488	0,13	no	2005	-3,024	0,0299	no	4	2014	-3,504	0,384	no
	E	4	1996-2015	-2,855	0,069	no	-2,855	0,07	no	2008	-4,013	0,005	no	4	2004	-3,142	0,6	no
CV	R	4	1994-2015	-2,984	0,052	no	-3,064	0,05	no	2011	-4,186	0,211	no	4	2003	-4,279	0,078	no
	E	4	1994-2015	-2,83	0,071	no	-2,915	0,06	no	2009	-4,627	0,013	no	4	2003	-3,182	0,576	no
GB	R	5	1991-2015	-4,503	0,002	yes	-2,948	0,05	no	2008	-4,011	0,042	no	5	2004	-4,522	0,04	no
	E	5	1991-2015	-3,429	0,021	no	-4,743	0,01	yes	2011	-4,562	0,0017	no	5	2004	-3,876	0,202	no
MZ	R	9	1980-2015	-1,706	0,419	no	-1,772	0,39	no	1995	-3,658	0,006	no	9	2005	-3,277	0,518	no
	E	9	1980-2015	-2,256	0,191	no	-2,362	0,16	no	2009	-4,577	0,0071	no	9	2008	-4,655	0,028	no
STP	R	3	1989-2015	-4,934	0,005	yes	-4,934	0,01	yes	2009	-6,13	0,017	yes	3	2008	-11,04	0,001	yes
	E	6	1989-2015	-1,722	0,408	no	-1,67	0,43	no	2001	-3,79	0,052	no	6	2000	-3,672	0,295	no

Non Stacionary at 5% of confidence lavel
Non Stacionary at 1% of confidence lavel

To confirm the order of integration of revenue- and expenditures-to-GDP ratios, we conducted stationarity testing in first differences. The test results presented in Table 3 suggest that the series associated with revenues and expenditures are stationary in first differences, with the exception of public expenditures in Guinea–Bissau. This further indicates that the series are I(1) in levels, given that the original series are I(0) in first differences.[3]

[3] These tests confirm that the series for Sao Tomé and Principe are also I (1) in level.

Table 3 - Unit root tests for revenue and expenditures as a percentage of GDP (first differences)

				ADF			*PP*		
Country	Dependent Variable	*Lag*	Period	*T Statistic*	*P-Value*	*stationarity*	*(Z) T Statistic*	*P-Value*	*stationarity*
ANG	R	4	1996-2015	-4,451	0,003	yes	-4,597	0,0022	yes
	E	4	1996-2015	-5,165	0,0007	yes	-6,985	0	yes
CV	R	4	1994-2015	-6,25	0,0001	yes	-6,231	0,0001	yes
	E	4	1994-2015	-6,628	0	yes	-7,105	0	yes
GB	R	5	1991-2015	-6,773	0	yes	-7,979	0	yes
	E	5	1991-2015	-2,213	0,207	no	-9,088	0	yes
MZ	R	9	1980-2015	-5,41	0,0001	yes	-6,398	0	yes
	E	9	1980-2015	-6,169	0	yes	-7,008	0	yes
STP	R	6	1989-2015	-9,193	0	yes	-16,198	0,0001	yes
	E	6	1989-2015	-5,297	0,002	yes	-6,111	0	yes

Therefore, the Engle-Granger and the Johansen tests were only applied to Angola, Cape Vert, Mozambique and e Sao Tome and Principe indicating the same order of integration (1). Our findings in Table 4 thus suggest that, in Cape Verde, in Mozambique and in Sao Tome and Príncipe, the revenues and expenditures time series are not cointegrated, as opposed to the case of Angola.

Table 4 - Cointegration test revenue and expenditure as a percent of GDP

			Engle-Granger		*Johansen*	
Country	Dependent Variable	Period	*P-value*	*Cointegration*	*P-value*	*Cointegration*
ANG	R	1996-2015	0	yes	0,0005	yes
	E	1996-2015	0			
CV	R	1994-2015	0,144	no	0,003	yes
	E	1994-2015	0,136			
GB	R	1991-2015				
	E	1991-2015				
MZ	R	1980-2015	0,138	no	0,23	no
	E	1980-2015	0,054			
STP	R	1989-2015	0,589	no	0,41	no
	E	1989-2015	0,0007			

4. CONCLUSION

We have addressed the critical issue of the sustainability of public finances in PALOP economies, a global pressing question in the post-crisis environment. The article applies econometric testing procedures to the time series associated with the major public finance variables in connection with this specific sub-set of African economies (the PALOP's).

Notwithstanding some data limitations, the findings suggest that, taking into consideration the sample as a whole, the sustainability of public finances in PALOP economies might present an issue, with unsustainable debt trajectories. This is because the corresponding economies' intertemporal budget constraints are not adequately respected in most of the PALOP countries encompassed by our sample. Notwithstanding, Angola is the sole PALOP economy that survives both stationarity and cointegration testing procedures, most likely due to the latter economy's structural role as a major oil exporter to global energy markets.

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