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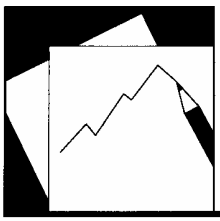

IMF Working Paper

Fiscal Surveillance in a Petro Zone: The Case of the CEMAC

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Fiscal Surveillance in a Petro Zone: The Case of the CEMAC

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Abstract

This paper discusses fiscal surveillance criteria for the countries of the Central African Monetary and Economic Union (CEMAC), most of which depend heavily on oil exports. At present, the CEMAC's macroeconomic surveillance exercise sets as fiscal target a floor on the basic budgetary balance. This appears inadequate, for at least two reasons. First, fluctuations in oil prices and, hence, oil receipts obscure the underlying fiscal stance. Second, oil resources are limited, which suggests that some of today's oil receipts should be saved to finance future consumption. The paper develops easy-to-calculate indicators that take both aspects into account. A retrospective analysis based on these alternative indicators reveals that in recent years, the CEMAC's surveillance exercise has tended to accommodate stances of fiscal policy that are at odds with sound management of oil wealth.

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I. INTRODUCTION: FISCAL POLICY SURVEILLANCE IN THE CEMAC ZONE

The Central African Economic and Monetary Union (CEMAC) [2] consists of six countries: Cameroon, the Central African Republic, Chad, the Republic of Congo, Equatorial Guinea, and Gabon. From its foundation in the 1960s until 1999, the CEMAC maintained a fixed exchange rate between its currency, the CFA franc, and the French franc. In 1999, this arrangement was replaced by a peg to the euro. The French treasury guarantees the currency peg in principle, but regional central bank, the Bank of Central African States (BEAC)[3], and the CEMAC's Executive Secretariat pursue and promote policies to sustain the peg. Central bank actions aim at modest inflation, in line with the euro area, and at sufficient foreign reserve coverage. This is complemented by an annual macroeconomic surveillance exercise, which attempts to ensure that the member states' economic policies do not undermine the central bank's objectives. Following a reform of the surveillance exercise in 2002, the CEMAC's Executive Secretariat evaluates annually the member countries' policies relative to the following targets:

- A nonnegative basic fiscal balance (i.e., the overall balance excluding grants and foreign financed investment);
- a level of domestic and foreign debt of no more than 70 percent of GDP;
- non-accumulation of domestic and/or external arrears; and
- an annual inflation rate of no more than 3 percent.

A full analysis of the surveillance exercise is beyond the scope of this study. Instead, the paper discusses the only fiscal target, in light of the fact that governments in five CEMAC countries—Cameroon, the Republic of Congo, Equatorial Guinea, and Gabon, and, since the end of 2003, Chad—receive a large part of their revenue from oil exports. Two issues arise in this context. First, oil receipts depend on the level of petroleum prices, which are volatile and cannot be affected by domestic policies (the CEMAC countries are price takers in global petroleum markets). In a year when oil prices rise (fall) relative to the previous year, the fiscal balance improves (deteriorates) by the exogenous positive (negative) windfall in oil receipts. Clearly, this renders the headline balance inadequate as an indicator of the underlying fiscal stance.

[2] Abbreviation from the French name: *Communauté Economique et Monétaire de l'Afrique Centrale*.
[3] Abbreviation from the French name: *Banque des Etats de l'Afrique Centrale*.

Table 1. The Importance of Oil for Selected CEMAC Countries

	1998	1999	2000	2001	2002 (Prov.)
Oil GDP as percentage of total nominal GDP					
Cameroon	7.2	10.3	14.9	13.2	10.9
Republic of Congo	36.5	53.4	65.5	56.7	53.6
Equatorial Guinea	75.3	74.2	85.3	88.0	89.9
Gabon	28.1	38.5	48.7	42.1	41.8
Oil receipts as percentage of fiscal revenue					
Cameroon[1/]	20.0	23.7	31.5	29.7	25.2
Republic of Congo	53.1	71.7	76.6	68.2	69.1
Equatorial Guinea	61.2	76.9	83.8	82.2	91.7
Gabon	54.6	45.3	67.5	64.1	55.8

Sources: National authorities; and IMF staff estimates. "Prov." indicates that figures are provisional.

1/ Cameroon's fiscal year runs from July through June. Fiscal aggregates corresponding to a calendar year *t* are approximated by averaging the aggregates for the (*t-1*, *t*) and (*t*, *t+1*) fiscal years.

Table 2 suggests that for the CEMAC's oil exporters, oil prices do indeed blur the picture. It displays the basic balance between 1994 and 2002 (some 2002 Figures are preliminary). Years with a negative basic balance—i.e., years in which a country did not comply with the surveillance target—are in italics. In 2000, a year with record oil prices, no country recorded a negative basic balance, while in 1998, a year with low petroleum prices, all did.

The second issue relates to the fact that oil reserves are limited and will be exhausted at some point. Intertemporal efficiency and equity considerations suggest that a country should save part of today's oil receipts to finance future consumption, in particular for countries where oil receipts are projected to decline in the near-to-medium-term future. One could argue that a fiscal surveillance target should reflect that by raising the "crude" fiscal target by the same amount as oil receipts ought to be saved. [4]

[4] Another potential difficulty is that criteria focusing on the overall fiscal balance may accommodate procyclical fiscal policies by allowing countries to spend windfalls in oil receipts (see Davis et al. (2001), appendix II). To check whether this is a matter of concern in the CEMAC, the elasticity of the non-oil basic balance with respect to the CFA franc oil price—a simple measure of pro-cyclicality—was calculated, and its behavior traced over time. It turns out that for the period 1994/95 to 2000/01, no significant procyclicality is found (for any of the oil-producing CEMAC countries). Large short-term changes in the non-oil balance seem to be more closely aligned with political events than with oil price movements. For example, Gabon's non-oil balance deteriorated significantly before elections were held in 1998.

The paper suggests alternative fiscal surveillance criteria that address the above-mentioned issues and carries out a retrospective analysis to examine surveillance outcomes had these alternative criteria been applied in the past. Section II of the paper develops and tests the proposed analytical framework. Section III discusses an alternative surveillance target that controls for the volatility in petroleum prices. Section IV extends the analysis to account for the long-term path of petroleum production. Both targets are based on simple computations and are designed to be applicable in the practice of macroeconomic surveillance. Section V discusses the results, and Section VI concludes.

The paper is part of a wider, ongoing debate about fiscal policy in oil producing countries that has attracted considerable interest outside and inside the IMF. A survey of the recent literature and a summary of basic principles is given in a recent paper by Barnett and Ossowski (2002; thereafter referred to as BO). The fiscal criteria suggested here resemble BO's closely, but they are not identical. Most importantly, and for reasons elaborated in Section IV, BO suggest basing fiscal surveillance on the primary budgetary balance, whereas this paper focuses on adjustments to the basic balance in order to avoid deviating too much from the CEMAC's current practice.

Table 2. CEMAC: Basic Fiscal Balances, 1994-2002
(in percent of GDP)

	1994	1995	1996	1997	1998	1999	2000	2001	2002 (Prel.)
Cameroon	***-5.3***	***-2.1***	***-0.9***	***-0.2***	***-0.6***	0.6	2.7	2.6	2.1
Republic of Congo	***-12.4***	***-7.1***	***-6.9***	***-5.9***	***-15.9***	***-0.6***	7.2	8.9	***-0.8***
Equatorial Guinea	***-2.1***	***-5.1***	***-5.3***	3.0	***-0.5***	3.7	9.0	14.6	14.6
Gabon	1.8	6.5	6.2	11.1	***-1.3***	4.3	13.9	7.7	7.0
WEO oil price (in U.S. dollars per barrel)	15.9	17.2	20.4	19.3	13.1	18.0	28.2	24.3	25.0

Sources: National authorities, IMF staff estimates, and IMF, *World Economic Outlook* (WEO), July 2003.
Note: Years in which the CEMAC's fiscal surveillance target was not met are in ***italics***.

II. THE ANALYTICAL FRAMEWORK

In general terms, a surveillance target for the fiscal balance can be written as

$$B_t \equiv R_t - E_t \geq x, \tag{1}$$

where R is some revenue concept, E some expenditure concept, x a numerical floor on the budgetary balance B, and t some time period (typically a year). In the case of the CEMAC's exercise, x is zero and B is the basic balance, i.e., revenue excluding grants minus expenditure excluding foreign-financed investment. In the following, the CEMAC's target is taken as a given, hence, neither the appropriateness of the fiscal balance concept nor the specific value of x will be discussed.[5] The paper will then be confined to discussing the fiscal target and its interaction with oil revenue. Even though it would be appealing on theoretical grounds, no analysis of the government's entire net asset-liability position is conducted either – in the CEMAC's surveillance exercise, debt sustainability is, in principle, addressed by the separate ceiling on government indebtedness.

Fiscal revenue consists of oil and non-oil revenue, $R_t = R_{Ot} + R_{Nt}$. Oil revenue may be written as

$$R_{Ot} = \varphi_t O_t, \tag{2}$$

where O is (nominal) oil GDP, and φ is the share of oil GDP received by the government.

An obvious way to prevent oil revenue from obscuring the analysis of fiscal policy is to base the fiscal surveillance target on the non-oil rather than the overall fiscal balance. In this case, the surveillance target is

$$B_{Nt} \equiv R_{Nt} - E_t \geq y. \tag{3}$$

y reflects the level of oil receipts that the government can expect to receive "on average" or "in the medium to long term", to respect "over the medium-to long-term" the objective of a non-negative total basic balance. In Sections III and IV, two options for y will be discussed:

(a) the annual flow of oil receipts, based on a medium-term oil price projection rather than the current-year petroleum price (Section III); and

(b) an annuity from the net present value of future fiscal oil receipts (Section IV).

[5] A zero deficit target is strict for countries with access to concessional external financing and/or resources from HIPC debt relief. For arguments in favor of the primary rather than the basic balance, see the aforementioned BO paper or section IV.

The difference between (a) and (b) is that (b) takes not only into account expected future oil prices, but also the future path of petroleum *production*, and therefore the fact that oil reserves are limited.

Whichever option is chosen, a fiscal surveillance target can sensibly be based on the non-oil balance only if the *non*-oil balance does not vary systematically with oil receipts, where "*systematically*" means "*for reasons outside the government's control*". This seems unproblematic for the expenditure component. For revenue, however, one could easily think of cases where this is not the case. For example, oil receipts could, possibly with a lag, generate income outside the oil sector, which could translate into higher non-oil tax revenue. Or, an increase in oil GDP could crowd out domestic non-oil production (the so called "Dutch disease"), thus reducing the tax base. If either of these effects was large, a fiscal target based on (3) would be inadequate, as the exclusion of $\varphi_t O_t$ would control only partially for the revenue volatility induced by changes in oil prices.

Whether such effects exist is an empirical question and requires testing. The remainder of this section develops a simple empirical model to search for oil price-induced non-oil revenue volatility in the data. Write period-*t* non-oil revenue (excluding grants) as

$$R_{Nt} = \gamma_t N_t , \tag{4}$$

where *N* is nominal non-oil-GDP, and γ is the non-oil revenue collection ratio. *Both N* and γ could be affected by developments in the oil-sector, and will be considered in sequence.

Focusing on *N* first, suppose non-oil GDP relates to oil GDP *O* as

$$N_t = \widetilde{N}_t + \ddot{N}_t(O) . \tag{5}$$
$$\text{with } \ddot{N}_t(O) = \vartheta_0 O_t + \vartheta_1 O_{t-1}$$

$\widetilde{N}$ is the "pure" non-oil economy, which is unaffected by changes in GDP. But $\ddot{N}_t(O)$, even though it is registered as "non-oil economy" in the national accounts, fluctuates with current and/or past levels of oil GDP. This could be the result of either the trickle-down or the Dutch disease effects mentioned above. For estimation, (5) is transformed into

$$\Delta N_{it} = \alpha_i + \vartheta_0 \Delta O_{it} + \vartheta_1 \Delta O_{it-1} + u_{it} , \tag{5a}$$

where Δ is the difference operator employed to detrend the GDP-variables, so as to avoid spurious regression bias.[6]

[6] The time-series component of the panel data set employed here is too short to allow for a full cointegration analysis.

Equation (5a) is estimated with a panel of the CEMAC's current oil-producing countries (Cameroon, Gabon, the Republic of Congo, and Equatorial Guinea) for the period between 1994 and 2001 (i.e., the years following the CFA-franc devaluation in 1993/94)[7], using national accounts data. α is a country-specific effect, which allows changes in the size of the "pure" non-oil economy to differ between countries, and u the error term. The estimation can be carried out with either a random-effects or a fixed-effects estimator. The former grants more statistical precision, but relies on the assumption that the country-specific effects α are uncorrelated with the regressors. A Hausman test confirms that this assumption is warranted.

The results are reported in Table 3. Column 1 displays the preferred estimates: estimation in differences, random effects, one lag of oil GDP included. The resulting picture is somewhat inconclusive. ϑ_1 is positive and significantly different from zero at the 1-percent level, which would indicate a positive trickle-down effect of oil GDP on non-oil GDP, operating with a lag of one year. The *joint* effect of ϑ_0 and ϑ_1, however – arguably the more important statistic – is significant at the 20 percent level only. Moreover, adding another lag (column 3) wipes out the significance of ϑ_1, although the extra lag itself is insignificant. Thus, the joint effect of ϑ_0 and ϑ_1 reported in column 1 should be seen as an *upper band* for the correlation between oil and non-oil GDP, not as a dependable point estimate.

Next, the case is considered in which oil GDP affects the non-oil revenue collection ratio γ. Note that two very different types of mechanisms could be at work. First, changes in oil GDP (and hence oil revenue) could affect the government's revenue collection behavior: for example, a government benefiting from a windfall in oil receipts could try less hard to collect non-oil taxes. If this was the case, it would *not* question the usefulness of a criterion based on equation (3), however, as the revenue collection effort is within the government's control.

The second effect is contingent on the case where windfalls in oil GDP do generate non-oil GDP: the additional, oil-induced non-oil GDP could be created in sectors that are harder (or easier) to tax than the "pure" non-oil economy. This, in turn, would affect the observed non-oil revenue collection ratio, which is a weighted average of the revenue collection ratio in the "pure" and "oil induced" non-oil sectors. Formally,

$$\gamma_t = \tilde{\gamma}\frac{\tilde{N}_t}{N_t} + \gamma_o \frac{\ddot{N}_t(O)}{N_t}, \qquad (6)$$

where $\tilde{\gamma}$ is the revenue collection ratio on "pure" non-oil GDP, and γ_O is the collection ratio on "oil-induced" non-oil GDP. If $\gamma_O \neq \tilde{\gamma}$, changes in oil GDP would effect overall γ.

[7] The year 2002 was excluded as, at the time when the paper was written, some of the GDP figures were still preliminary.

Table 3. Correlation Between Oil and Non-Oil GDP

	In First Differences			In Levels
	One Lag		Two Lags	One Lag
	Random Effects (1)	Fixed Effects (2)	Random Effects (3)	Random Effects (4)
ϑ_0	-.051 (.402)	-.045 (.444)	-.199 (.215)	.100 (.584)
ϑ_1	.181 (.007)	.188 (.009)	.147 (.180)	.440 (.218)
ϑ_2	…	…	-.215 (.388)	…
Test on $\sum\vartheta=0$ 1/	1.71 (.190)	2.28 (.148)	.042 (.518)	2.98 (.084)
R-squared	.118	.115	.203	.019
Observations	24	24	20	24 2/

Note: P-values in parentheses

1/ Chi-squared test for random effects, F-test for fixed effects.

2/ 2001 observations dropped to preserve comparability with column (1).

Equation (6) can be transformed into a regression equation that can be estimated. To this end, the two components of (6) are calculated as follows:

$$\hat{\ddot{N}}_t(O) = \hat{\vartheta}_0 O_t + \hat{\vartheta}_1 O_{t-1} \quad \text{and}$$
$$\hat{\tilde{N}}_t = N_t - \hat{\ddot{N}}_t(O). \qquad (7),$$

using the parameter estimates for ϑ_0 and ϑ_1 in Table 3 (column 1):

First differencing and applying simple ordinary least squares (OLS) yields unweighted means of both ratios ($\tilde{\gamma}$ and γ_O) across countries. For $\tilde{\gamma}$, a point estimate of 0.233 (standard error: 0.042) is obtained. γ_O is estimated as 0.205 (0.111). An F-test fails to reject equality of both

coefficients at any commonly used significance level. Hence, no mechanical effect of oil GDP on the non-oil revenue collection ratio is found. [8]

Summarizing the findings, oil GDP has no effect on the non-oil revenue collection ratio, but there is some evidence that it impacts (positively) on non-oil GDP as measured in the national accounts with a lag of one year. To illustrate the magnitude of this effect, Table 4 shows (i) the actual basic non-oil balance at end-2001, and (ii) the basic non-oil balance had oil GDP in 2000 been 10 percent higher than it actually was, using the estimates in Table 3 column 1. For all four countries, the effect is marginal. Hence, basing a fiscal surveillance target on the non-oil balance seems warranted.

Table 4. Maximum Effect of a 10 Percent Increase in Oil GDP on the Basic Non-Oil Balance *(in billions of CFA francs)*

	Cameroon	Gabon	Republic of Congo	Equatorial Guinea
Actual balance in 2001	169	266	183	192
Balance with oil GDP 10 percent higher	171	269	186	199

III. Controlling for the Volatility in Petroleum Prices

In this and the following section, fiscal targets for the non-oil basic balance will be developed that address the weaknesses of the CEMAC's criterion. This section develops a target that controls for oil price volatility, and hence removes spurious effects of oil prices on the fiscal balance. There are two (trivial) reasons why the domestic oil price can fluctuate. First, the oil price, denominated in U.S. dollars, swings (Figure 1). Second, there are changes in the exchange rate of the CFA franc against the U.S. dollar (Figure 2).

[8] It should be noted that the estimate for γ_o is not very robust to the sampling period, presumably because of small sample size and low statistical power (as predicted values for ϑ_0 and ϑ_1 are used to compute $\tilde{\gamma}$ and γ_O). Whatever sampling period is chosen, however, the difference between $\tilde{\gamma}$ and γ_O remains insignificant.

As mentioned above, holding the budget balanced over the medium term requires a non-oil deficit not exceeding oil receipts that can be earned with an average, "equilibrium", CFA franc-denominated oil price. Formally:

$$y = -R_O(\bar{p}), \quad \text{with}$$
$$R_O(\bar{p}) = \hat{\varphi}_t O(\bar{p}) = \hat{\varphi}_t \bar{p}_t \bar{e}_t Q_t, \tag{8}$$

where $\hat{\varphi}$ is the projected oil revenue collection ratio, $\bar{p}$ a "medium-term" U.S. dollar price per barrel of domestic oil, $\bar{e}$ a "medium-term" CFA franc/U.S. dollar exchange rate, and Q annual petroleum production (in barrels).[9] No medium-term projections exist for the prices of Cameroonian, Congolese, or Gabonese oil. Hence, in equation (8), p, the domestic petroleum price, is substituted for the Brent petroleum price p_{Brent}. This yields

$$R_O(\bar{p}) = \hat{\phi}_t \bar{p}_{t,Brent} \bar{e}_t Q_t, \tag{9}$$

where ϕ, the Brent-based oil revenue collection ratio, is $\phi_t = \varphi_t (p / p_{Brent})$.

Some remarks on the use of an "equilibrium" oil price are in order. The notion may raise objections, as the evidence on the statistical properties of petroleum prices is mixed and points at best towards very slow mean-reversion.[10] As shown in Daniel (2002), however, *futures prices* for oil do mean-revert, and they do so over relatively short periods of two to three years. Hence, markets use averages of past prices as forecasts for future oil prices. There is little reason why governments, as major players in these markets, should project oil prices very differently. The concept of an "equilibrium" oil price should be seen in this context, i.e., reflecting some average expectation.

Two different concepts are used to proxy expected future oil prices. The first is the *World Economic Outlook*'s (WEO) July 2003 medium-term Brent price projection of U.S. dollar 21.5 per barrel. The WEO projection suggests itself, as it is a widely consulted source for commodity prices, easily accessible, and derived from futures prices.

[9] The analysis could easily be extended toward smoothing the time path of petroleum production. To keep the calculations simple, no such attempt is undertaken here.

[10] See, for example, Pindyck (1999) and the literature discussed in Engel and Valdés (2000).

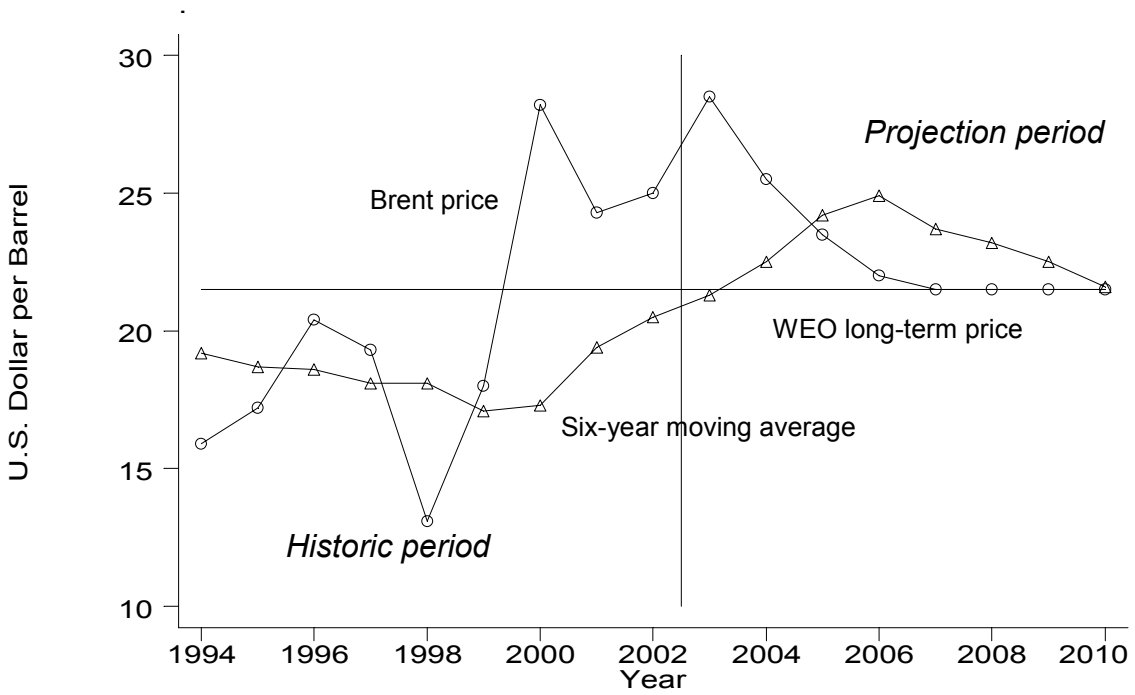

Figure 1. Brent Petroleum Price

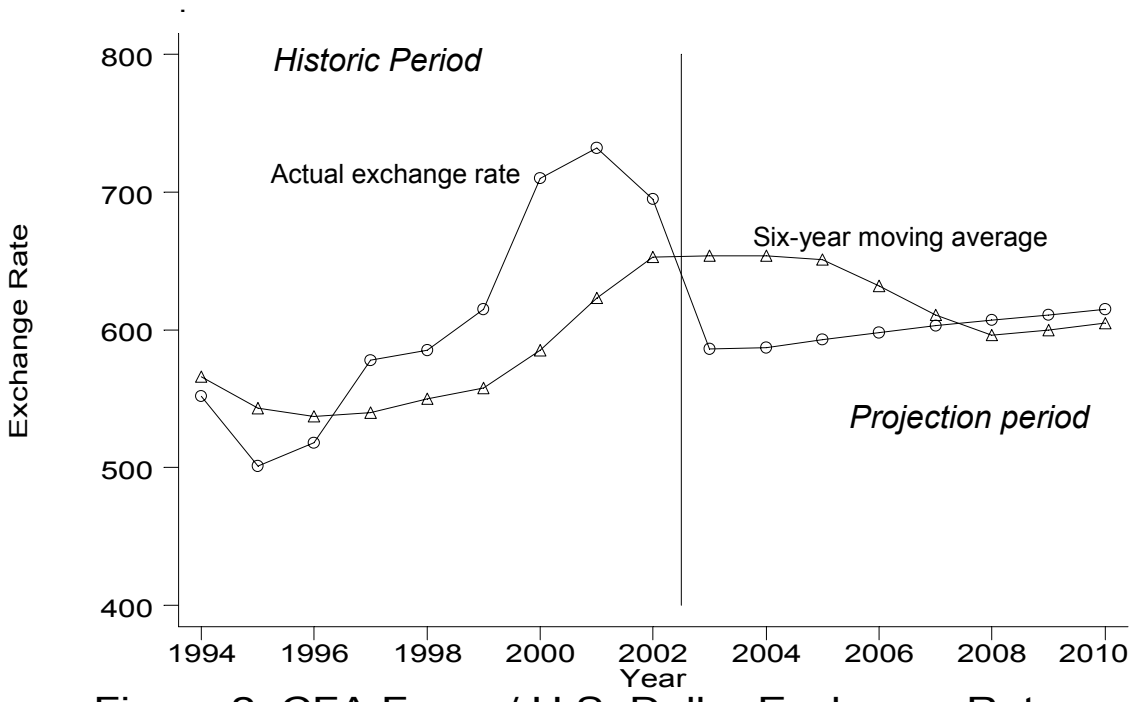

Figure 2. CFA Franc / U.S. Dollar Exchange Rate

The July 2003 projection exceeds earlier WEO projections by a substantial margin, however – high oil prices between 2000 and 2002 had pushed expectations on future prices upwards. This renders the July 2003 projection a problematic reference for assessing fiscal policies in, say, 1997 or 1998: had a government at that time calculated its future oil receipts with a Brent price of 21.5 dollars, it would have been considered unreasonably optimistic. Hence, an alternative, time-varying oil price projection is used, which is a six-year moving average of past oil prices. As Figure 1 illustrates, for the period between 1994 and 2001 this second concept leads to substantially lower oil price projections that hover around 18 to 20 U.S. dollars per barrel. Only in 2002 does the moving-average oil price projection approach the WEO July 2003 forecast.

No fixed numerical WEO projection exists for the CFA franc/U.S. dollar exchange rate.[11] Thus, the "medium-term" exchange rate is again approximated by a backwards-looking six-year moving average.[12]

Note that calculating oil receipts with a projected medium-term price as opposed to current prices can make a huge difference. In 2000, for example, a year with both record international oil prices and a very strong U.S. dollar, the actual CFA-franc value of a barrel of Brent was almost twice as high as a synthetic "average" value based on a six-year moving averages for both oil prices and the exchange rate.

Equations (8) and (9) use a pre-determined estimate also for the oil revenue collection ratio ϕ/φ. This is done for two reasons. First, the actual oil revenue collection ratio fluctuates widely over time (Figure 3) and would introduce noise into the calculation. Second, the actual oil revenue collection ratio can be manipulated by governments, with undesirable consequences for policy surveillance. In years with high spending pressures, for example, a government could ask petroleum companies for advance payments, which would drive φ upwards and hence accommodate a higher non-oil deficit.

As a consequence, the following attempts to establish simple parametric projections for country-specific non-oil price revenue collection ratios. As a starting point, Figure 3 displays the historic development of both the Brent-based and the actual oil revenue collection ratio from 1994. It also shows projections for the period between 2003 and 2010[13]

In terms of statistical analysis, there is clearly a limit as to what one can do with the short time series at hand. A simple linear trend was fitted to all countries' oil revenue collection

[11] The July 2003 WEO projections assume a persistent small appreciation of the euro (and hence the CFA franc) vis-à-vis the U.S. dollar.

[12] A correction was made for the devaluation in 1993/94.

[13] The projections are based on official national accounts data. Note that in Cameroon, where the actual oil revenue collection ratio extends the Brent-based revenue collection ratio, the price for domestic oil exceeds the Brent price. In the other countries, the opposite is the case.

ratios, allowing for structural breaks between the historic and the projection period and wherever else visual inspection suggests them (such as in Chad in 2009 and in Equatorial Guinea in 2007). This yields the specifications reported in Table 5.

Obviously, the estimates in Table 5 are not cast in stone. If employed in the practice of fiscal policy surveillance, they would need to be reviewed periodically.

Table 5 and Figure 3 deserve some discussion. First, the oil revenue collection ratio in Cameroon, Gabon, and Congo, countries that have been producing petroleum for decades, is substantially higher than in the "young" or prospective oil producing economies Equatorial Guinea (which started producing substantial amounts in 1997, see Table 4 below) and Chad (which will start producing in late 2003).

A natural explanation is that in the "mature" oil economies, investments in oil extraction have largely been written off, leaving higher cash incomes for both oil companies and governments. Consistent with this story, Equatorial Guinea's oil revenue collection ratio increased markedly between 2000 and 2002, and is projected to reach 50 percent of Brent-based oil GDP (or 60 percent of actual oil GDP) in 2007. In Chad, the government's share in oil GDP is expected to increase from 2009 onwards, and to attain 40-50 percent by 2014 (the outer years are not shown in Figure 3).

Nonetheless, even within the "mature" oil producing economies, there are large differences in the effectiveness of oil revenue collection, pointing to different contractual arrangements between the government and oil companies. The Cameroonian government, for example, receives more than 40 percent of oil GDP as fiscal receipts, while in the Republic of Congo, the government's share is only about 25 percent. Also, in some countries the historic and the projected oil revenue collection pattern differ markedly. In Cameroon and Gabon, where oil production is falling (see the next section), the government's share in oil receipts is projected to crumble as well. In Congo, and, to a lesser extent, Gabon, the government expects to receive higher oil prices in the future than in the past, as the differential between the actual and the Brent-price based revenue collection ratio is projected to narrow.

Analyzing these trends and projections in detail could be a rewarding area for further research.

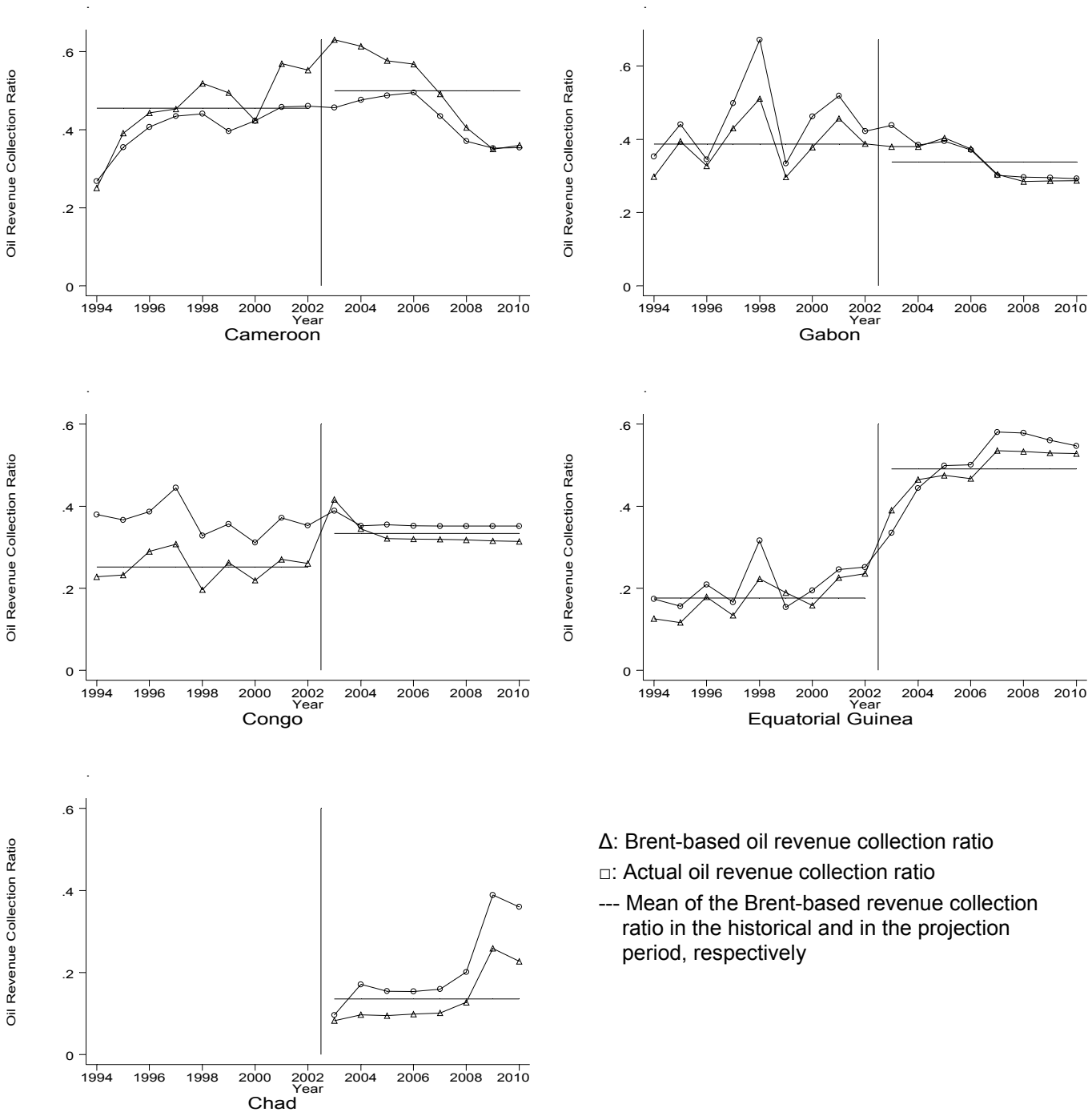

Figure 3. Oil-Revenue-Collection Ratios

Table 5. Specifications for Brent-Based Oil Revenue Collection Ratio ϕ

	Estimate		Specification for Fiscal Rule	
Cameroon	.454 + .029* $year^*$ (.020) (.007)	if year < 2003	.45 + .03* $year^*$	if year < 2003
	.499 - .045* $year^*$ (.010) (.005)	if year ≥ 2003	.50 - .04* $year^*$	if year ≥ 2003
Gabon	.386 (.024)	if year < 2003	.38	if year < 2003
	.338 - .018* $year^*$ (.009) (.004)	if year ≥ 2003	.34 - .02* $year^*$	if year ≥ 2003
Republic of Congo	.252 (.012)	if year < 2003	.25	if year < 2003
	.334 - .010* $year^*$ (.009) (.004)	if year ≥ 2003	.33 - .01* $year^*$	if year ≥ 2003
Equatorial Guinea	.176 + .013* $year^*$ (.010) (.004)	if year < 2003	.18 + .01* $year^*$	if year < 2003
	.450 + .024* $year^*$ (.030) (.013)	if year ≥ 2003 & year < 2007	.45 + .02* $year^*$	if year ≥ 2003 & year < 2007
	.532 (.112)	if year ≥ 2007	.53	if year ≥ 2007
Chad	.104 (.006)	if year ≥ 2003 & year < 2009	.10	if year ≥ 2003 & year < 2009
	.243 (.016)	if year ≥ 2009	.24	if year ≥ 2009

Notes: $year^* = year - \overline{year}$. Standard errors in parentheses.

IV. SAVING OIL WEALTH FOR FUTURE GENERATIONS

Projections of future oil production differ a lot between the CEMAC countries. As Figure 4 shows, Equatorial Guinea's oil boom has just begun, and production is expected to increase continuously until reaching a maximum in 2010. Congo expects to stabilize oil production at a high level. Chad anticipates a relatively short-lived oil boom between 2004 and 2009 and declining production thereafter. Cameroon and, in particular, Gabon, have already seen the heydays of petroleum production and need to manage rapidly dwindling reserves.

While a far-sighted fiscal policy would take the projected evolution of petroleum production into account, it less clear that this needs to be integrated into the CEMAC's surveillance exercise. The exercise's main objective is to thwart inflationary pressure from overly expansionary fiscal policies, which could undermine the currency arrangement and harm the zone's external competitiveness. To this end, large changes in public demand triggered by temporary swings in oil prices should be clearly avoided, which provides a strong argument for adjusting the fiscal target along the lines discussed in the previous section.

Macroeconomic stability need not be put at risk, however, by myopic governments' tendency to *persistently* overspend – as long as they pay the price later and reduce expenditures in line with (falling) oil receipts. Whether the suggested approach should be adopted depends therefore on the objectives of the surveillance exercise: whether it focuses on medium term macroeconomic stability only, or whether it also addresses long-term sustainability.

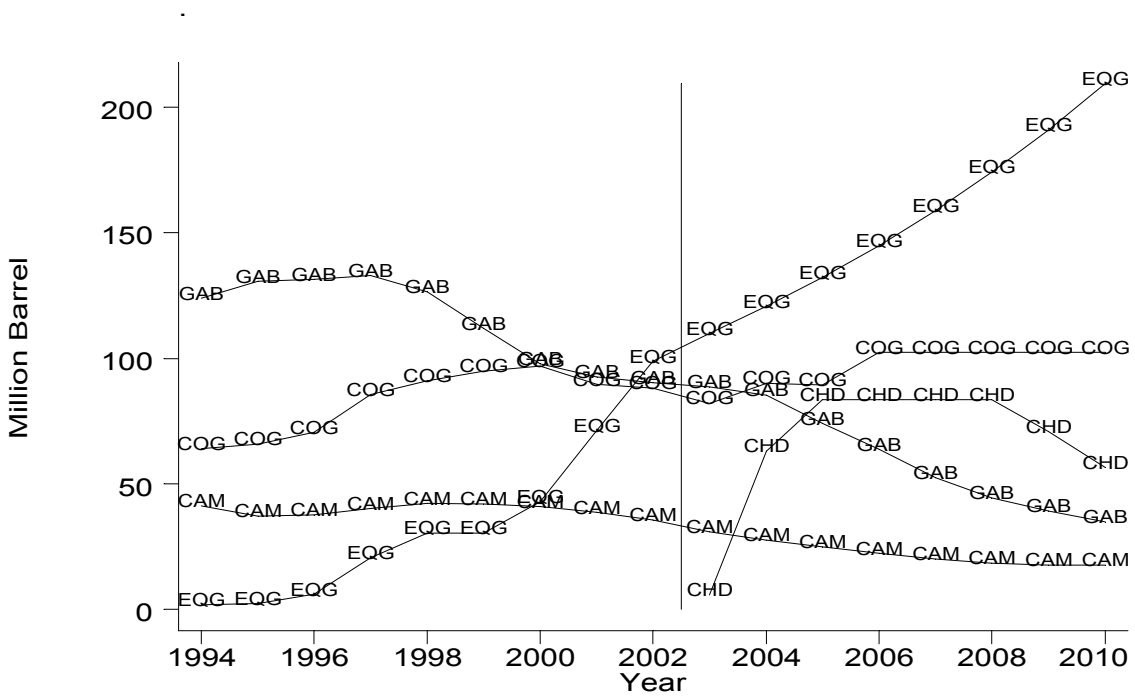

Figure 4: Evolution of Petroleum Production

Define "oil wealth" as the net present value of current and future fiscal oil receipts:

$$NPV_t = \sum_{i=t}^{\infty} \frac{R_{Oi}}{\left[(1+\partial)(1+\pi)\right]^{i-t}}, \tag{10}$$

where ∂ is the socially optimal real discount rate and π is long-term inflation. Distributing oil wealth equitably over present and future populations yields:

$$y = -\widetilde{R}_{Ot} = -N_t \sum_{i=t}^{\infty} \frac{R_{Oi}}{\left[(1+\partial)(1+\pi)\right]^{i-t}} \Bigg/ \left(\sum_{i=t}^{\infty} \frac{N_i}{(1+\partial)^{i-t}} \right) \tag{11}$$

where N is population size.[14] Expression (11) may be called "sustainable" oil consumption: the economy can afford to consume $\widetilde{R}_{Ot}$ while holding real oil wealth per capita constant.[15]

Several assumptions are needed to calculate (11), some of them being somewhat arbitrary. First, the path of future petroleum production (and prices) is hard to project. The fact that Equatorial Guinea's boom is expected to last at least 16 years (until 2010, when production is projected to fall), while Chad's boom is anticipated to ebb off after 6 years only, points probably to cautious forecasters in Chad rather than established facts. Second, the socially optimal discount rate is known to be a problematic concept and intrinsically difficult to quantify.

It is important to note that equation (11) does not warrant fiscal sustainability in a wider sense, but just places a condition on the sustainable management of oil wealth. As mentioned in section II, the latter would require to analyze the government's entire net asset-liability position.[16] In the context of the CEMAC's surveillance exercise, sustainability concerns beyond oil are, at least in principle, taken care of by a separate debt criterion.

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[14] The criterion follows also from intertemporal optimization of a perfectly altruistic agent. For a more detailed derivation see Cuc (2002a).

[15] One could argue that the government can decide not only over oil wealth consumption, but also over the rate of petroleum extraction, which is treated as exogenous here. The latter may be a fairly realistic assumption, however. At least in the short- to medium term, production is determined by past investment decisions and contractual arrangements with oil companies. In contrast to oil wealth consumption, production can therefore adjust only incompletely and with delay to changes in oil prices and/or revisions in estimates of oil reserves. On a more theoretical level, in equilibrium the real price of petroleum rises at a rate equal to the real interest rate, which renders extraction and consumption/savings decisions perfectly substitutable (Hotelling, 1931).

[16] See, for example, Ntamatungiro (2002), Engel and Valdés (2000), Chalk (1998), and Liuskila et al. (1994) for approaches of that kind.

A comment on the deficit concept is in order. The basic fiscal balance is not ideal for tracking sustainable oil wealth management, as it includes net interest payments (see BO). To the extent that oil production exceeds oil wealth consumption – as it should be the case during the early phase of production – the government would accumulate financial assets. The interest received on these assets would exert a positive (= deficit compressing) effect on the basic balance. The effect would be reverted once the government would draw these assets down. Consuming oil wealth at a constant rate therefore implies a constant (real) *primary*, not basic balance. This section sticks to the basic balance nonetheless, for two reasons. First, as mentioned earlier, the paper aims at not deviating too much from the CEMAC's practice. Second, switching to the primary balance, as suggested by BO, would overshoot the objective, as one would include interest payments on *all* financial assets and liabilities, not only on those related to oil wealth.

In any case, in the case of the CEMAC the "BO-effect" is likely to be small. The CEMAC's foreign exchange regulations prevent governments from investing oil receipts outside the zone, and remuneration on the main domestic alternative – the BEAC's "Fund for future generations" – is very low (close to zero in real terms). Also, the calculations in the next section assume that governments start adhering to rule (11) in the very year of observation. Obviously, in the *first* year of sustainable oil management the BO-effect does not apply, as no oil-wealth related financial assets have yet been accumulated.

V. Evaluating Fiscal Surveillance in the CEMAC Zone

This section evaluates the fiscal performance of CEMAC countries the relative to the modified targets developed in the previous section. Table 6 lists floors for the non-oil balance for 1994 through 2002, calculated according to:

A. The CEMAC's current fiscal surveillance target, where the ceiling on the non-oil deficit is just current-year oil revenue;

B. The medium-term stability criterion (9), using: (i) Table 5's specifications for the Brent-based oil revenue collection ratio, (ii) a medium-term Brent price of U.S. dollar 21.5, and (iii) the backward-looking 6-year moving average for the CFA franc/U.S. dollar exchange rate displayed in Figure 1;

C. The medium-term stability criterion (9), calculated as in [B.] but replacing the WEO July 2003 Brent price projection with a backward-looking 6-year moving average as displayed in Figure 2; and

D. The long-term sustainability criterion (11), using (i) a real discount rate of 5 percent, (ii) a long-term inflation rate of 2 percent (consistent with the peg of the CFA franc to the euro), and (iii) future petroleum receipts and population sizes as projected by national governments. [17]

As expected, the medium-term targets allow for larger non-oil deficits in years with low oil prices (such as 1994 or 1998) than the CEMAC's target, and recommend a tighter fiscal stance in years with high oil prices (in particular 2000-2002). The long-run sustainability target recommends much smaller non-oil deficits than the three other criteria, at least for the "mature" oil producing economies Cameroon, Congo and Gabon. Note that it matters when a country starts saving. Gabon could have afforded a deficit of about 6 percent of GDP had it begun stabilizing oil wealth in 1994. Eight years later, it can afford a deficit of less than half that size.

For Chad and Equatorial Guinea before 2001, the long-term criterion recommends to borrow against future oil wealth.[18] This is generally considered a bad practice, however, as the CEMAC-countries can typically borrow at competitive rates by collaterizing loans with future oil receipts only. This has often led to overborrowing and is at odds with lending conditions of most development agencies. [19] Thus, where the long-term criterion is more lenient than the medium-term criterion, one may prefer the medium-term criterion instead.

As mentioned before, the criteria in Table 6 have been computed on the basis of several deliberate and debatable assumptions. Hence, it is important to assess how robust the targets are to changes in key parameter, notably of the long-run oil prices and future oil production. The answer is straightforward for the *medium-term targets*: both are linear in the projected oil price and the oil revenue collection ratio. Thus, a downward revision of either parameter by 10 percent triggers a tightening of the recommended non-oil deficit by another 10 percent.

[17] Note that equation (11) needs to be read "had the country begun managing oil wealth sustainably in year *t*, this would have required a non-oil balance of x percent of GDP". The sustainable non-oil balance does not remain constant as a percentage of GDP, however, as GDP and expression (11) typically grow at different rates..

[18] Note that the long-term target is more lenient than the CEMAC's target (which, in the case of Chad, is a basic balance of zero). Equatorial Guinea's extremely high long-term deficit targets prior to 2000 are due to the fact that current-year GDP was small relative to future oil receipts.

[19] See Cuc (2002b) for an illustration for the Republic of Congo.

Table 6. CEMAC: Alternative Targets for Non-Oil Balance *(in percent of GDP)*

	1994	1995	1996	1997	1998	1999	2000	2001	2002
Cameroon									
CEMAC target	-2.4	-2.9	-3.7	-4.0	-3.2	-4.1	-6.3	-6.1	-4.8
Medium-term stability (21.5 USD)	-4.4	-3.8	-3.6	-3.8	-4.1	-4.2	-4.1	-4.1	-4.0
Medium-term stability (Mov. Av.)	-4.0	-3.3	-3.1	-3.2	-3.5	-3.4	-3.3	-3.7	-3.8
Long-term sustainability	-1.7	-1.5	-1.4	-1.3	-1.2	-1.2	-1.0	-0.9	-0.8
Congo									
CEMAC	-14.1	-12.4	-16.4	-21.9	-12.0	-19.0	-20.4	-21.1	-18.9
Medium-term stability (21.5 USD)	-20.1	-18.9	-15.8	-18.3	-23.0	-19.4	-12.7	-13.8	-14.0
Medium-term stability (Mov. Av.)	-18.0	-16.5	-13.7	-15.4	-19.3	-15.4	-10.2	-12.3	-13.4
Long-term sustainability	-12.3	-11.9	-10.1	-10.0	-11.9	-9.9	-6.4	-7.1	-6.9
Equatorial Guinea									
CEMAC	-3.0	-2.8	-8.7	-10.7	-19.4	-11.8	-16.6	-21.7	-22.6
Medium-term stability (21.5 USD)	-4.8	-5.1	-8.7	-14.0	-23.5	-12.7	-11.5	-14.2	-16.3
Medium-term stability (Mov. Av.)	-4.3	-4.4	-7.5	-11.8	-19.8	-10.1	-9.2	-12.8	-15.5
Long-term sustainability	-210.5	-176.6	-116.7	-56.9	-65.4	-34.8	-22.0	-15.7	-11.9
Gabon									
CEMAC	-14.0	-17.9	-15.4	-20.7	-18.8	-12.8	-22.5	-21.8	-17.7
Medium-term stability (21.5 USD)	-24.9	-24.4	-20.0	-18.8	-21.1	-17.6	-12.4	-12.8	-13.3
Medium-term stability (Mov. Av.)	-22.3	-21.2	-17.3	-15.8	-17.8	-14.0	-10.0	-11.6	-12.7
Long-term sustainability	-6.0	-5.6	-4.7	-4.3	-4.6	-4.1	-3.2	-2.9	-2.4
Chad									
Long-term sustainability	-2.3	-2.4	-2.5	-2.6	-2.6	-2.7	-2.9	-2.9	-2.8
WEO oil price	15.9	17.2	20.4	19.3	13.1	18.0	28.2	24.3	25.0

The *long-run target* is also linear in projected petroleum production and prices, but it is not linear in the discount rate. To illustrate the impact of the latter, Table 7 displays long-term targets with different discount rates for the Republic of Congo. [20] With a real discount rate of 3 percent – which, given population growth of 2.6 percent, places almost the same weight on future as on current per capita consumption – the recommended fiscal stance is much tighter than the baseline scenario. With a real discount rate of 8 percent, however, the long-term target is only modestly more restrictive than the medium-targets.

Finally, Table 8 displays performance relative to the targets in Table 6. Years in which a country failed to meet a target are set in italic.

Evaluation relative to the CEMAC's target suggests that in most countries, fiscal discipline strengthened continuously. From about 1999, large and persistent excess deficits gave way to generally strong fiscal positions. Occasional small slippages are recorded only for Congo (as well as for non-oil producing Chad).

This impression requires at least partial correction when the medium-term targets are used. In this case, Gabon's fiscal stance *deteriorated* for most of the period between 1995 and 2001. In 2001, both medium-term targets were violated (the WEO price based target for the first time), followed by a modest recovery in 2002. Note that in the CEMAC's exercise, these developments are entirely masked by oil price movements. Congo's fiscal position was too loose throughout, with the exception of 2001. Also Cameroon failed to meet the (more conservative) moving-average based target until 2000, even though the CEMAC's target signals compliance with the surveillance exercise since 1999.

Table 7. Republic of Congo: Long-Term Sustainability Target
with Different Real Discount Rates

	1994	1995	1996	1997	1998	1999	2000	2001	2002 (prel.)
Baseline case (5 percent)	-12.3	-11.9	-10.1	-10.0	-11.9	-9.9	-6.4	-7.1	-6.9
3 percent	-4.3	-4.1	-3.4	-3.4	-4.0	-3.3	-2.1	-2.3	-2.3
8 percent	-19.5	-19.2	-16.5	-16.5	-19.8	-16.7	-10.9	-12.0	-11.7

[20] Factors affecting the discount rate include the government's (or the population's) time preference rate, the expected real rate of return on financial and real assets in which the government could invest (for example, public investment projects), and the reduction in the risk premium that results from smoothing the revenue path. Most of these factors are unobserved and/or hard to estimate, hence, no attempt to quantify the discount rate is made. Instead, it is viewed as a choice variable for the government.

Table 8. CEMAC: Fiscal Performance Relative to Alternative Targets

	1994	1995	1996	1997	1998	1999	2000	2001	2002
Cameroon									
CEMAC target	***-5.3***	***-2.1***	***-0.9***	***-0.2***	***-0.6***	0.6	2.7	2.6	1.9
Medium-term stability (21.5 USD)	***-3.3***	***-1.2***	***-1.0***	***-0.4***	0.4	0.8	0.6	0.6	0.8
Medium-term stability (Mov. Av.)	***-3.8***	***-1.7***	***-1.5***	***-1.0***	***-0.3***	***-0.1***	***-0.2***	0.2	0.7
Long-term sustainability	***-6.1***	***-3.5***	***-3.2***	***-2.9***	***-2.6***	***-2.3***	***-2.5***	***-2.6***	***-2.4***
Congo									
CEMAC	***-12.4***	***-7.1***	***-6.9***	***-5.9***	***-15.9***	***-0.6***	7.2	8.9	***-0.8***
Medium-term stability (21.5 USD)	***-6.5***	***-0.6***	***-7.5***	***-9.6***	***-4.9***	***-0.3***	***-0.5***	1.6	***-5.7***
Medium-term stability (Mov. Av.)	***-8.6***	***-3.1***	***-9.6***	***-12.4***	***-8.5***	***-4.2***	***-3.0***	0.3	***-6.3***
Long-term sustainability	***-14.3***	***-7.6***	***-13.2***	***-17.8***	***-15.9***	***-9.8***	***-6.8***	***-5.1***	***-12.8***
Equatorial Guinea									
CEMAC	***-2.8***	***-5.1***	***-5.3***	3.0	***-0.5***	3.7	9.0	14.6	14.6
Medium-term stability (21.5 USD)	***-1.0***	***-2.8***	***-5.3***	6.3	3.7	4.5	3.9	7.1	8.2
Medium-term stability (Mov. Av.)	***-1.5***	***-3.5***	***-6.5***	4.1	0.0	1.9	1.7	5.7	7.5
Long-term sustainability	204.7	168.9	102.8	49.2	45.6	26.6	14.4	8.6	3.9
Gabon									
CEMAC	1.8	6.5	6.2	11.1	***-1.3***	4.3	13.9	7.7	7.0
Medium-term stability (21.5 USD)	12.7	13.0	10.8	9.2	0.9	9.1	3.8	***-1.3***	2.7
Medium-term stability (Mov. Av.)	10.1	9.8	8.0	6.2	***-2.4***	5.5	1.4	***-2.6***	2.1
Long-term sustainability	***-6.2***	***-5.8***	***-4.6***	***-5.3***	***-15.5***	***-4.5***	***-5.4***	***-11.3***	***-8.2***
Chad									
CEMAC (= medium-term targets)	***-4.9***	***-2.8***	***-1.5***	***-1.2***	***-0.3***	***-2.3***	***-3.6***	***-3.3***	***-4.5***
Long-term Sustainability	***-2.6***	***-0.4***	1.0	1.4	2.3	0.5	***-0.7***	***-0.4***	***-1.7***

Notes: Years in which a target was not met are in *italic*. Whenever the long-term target is less stringent than the medium-term target, suggesting a country should borrow against future oil receipts, the figure is in brackets.

As regards long-term sustainability, the picture is bleak. Governments of the mature oil economies Cameroon, Congo, and Gabon failed to save a sufficient amount of petroleum receipts in every year of observation.[21] The exception is Equatorial Guinea (as well as Chad between 1996 and 1999), where growth in government expenditures has not yet kept pace with exploration of the country's enormous oil wealth.

The extent to which the choice of the fiscal target affects the assessment is illustrated dramatically in the cases of Gabon and Congo in 2000/01. In both years, either country met the CEMAC's target easily. Oil prices were high and the U.S. dollar strong, however, yielding unusually high oil receipts. Once this factor is eliminated, fiscal performance looks rather mixed (adherence to the target in one year, but failure in the other). When long-run sustainability concerns are added in as well, it turns out that both countries failed to meet the respective target by a wide margin (Gabon by more than 11 percentage points of GDP in 2001).

VI. Summary and Conclusion

This paper has discussed the adequacy of the CEMAC's fiscal surveillance target in view of the fact that oil receipts form a substantial part of government revenue in five of the six CEMAC countries. Two issues emerge in this context. First, the volatility of oil prices can obscure a country's underlying fiscal policy stance. Second, the fact that their oil resources will be exhausted at some date suggests that it may be desirable for these countries to save some of today's receipts to finance future consumption, which could be reflected in the formulation of the surveillance target.

The paper developed simple alternative targets based on the non-oil balance that take these issues into account. It then measured the fiscal stance of CEMAC's oil producing countries between 1994 and 2002 against these modified targets. It turns out that for 2000 to 2002, a period of high oil prices, the CEMAC's surveillance exercise gives an excessively optimistic picture of the countries' fiscal performance. If, in addition, the need for sustainable long-term management of oil wealth is considered, governments in the CEMAC zone are generally found to be spending too much and saving too little (with the exception of Equatorial Guinea). The most dramatic example is Gabon, where in 2001 the CEMAC's criterion indicates *over*performance to the tune of 8 percentage points of GDP while the fiscal balance remained 11 percent *below* the level necessary to ensure sustainable management of Gabon's oil wealth.

[21] One may argue, though, that Cameroon's performance does not look that bad relative to a less stringent (but nonetheless defensible) deficit criterion (of, say, 2 or 3 percent of GDP).

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