

African Department

Cyclical Behavior of Fiscal Policy among Sub-Saharan African Countries

*Tetsuya Konuki and
Mauricio Villafuerte*



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Contents

Overview.....	vi
Chapter 1. Introduction.....	1
Chapter 2. How to Measure the Degree of Fiscal Procyclicality.....	3
Chapter 3. To What Extent Has the Fiscal Policy Been Procyclical among Sub-Saharan African Countries?.....	7
The Business Cycle in Sub-Saharan Africa.....	7
The Fiscal Policy Stance.....	8
Fiscal Policy Procyclicality.....	9
Chapter 4. What Explains the Degree of Fiscal Policy Procyclicality among Sub-Saharan African Countries?.....	15
Chapter 5. Country Case Studies.....	21
Nigeria.....	21
Botswana.....	22
Chile.....	23
Chapter 6. Conclusion.....	25
Appendix I. Data Sources and Definition of Variables.....	27
Appendix II. Endogeneity Concern: Do Output Shocks Drive Fiscal Policy, or Do Fiscal Policy Shocks Cause Output Shocks?.....	29
References.....	31

Figures

Figure 1. GDP Growth Rates by Country Groups, 2000–14.....	7
Figure 2. Output Gaps by Country Groups, 2000–14.....	8
Figure 3a. Oil Exporters: Fiscal Impulses and Nonresource Output Gaps, 2005–08.....	13
Figure 3b. Oil Exporters: Fiscal Impulses and Nonresource Output Gaps, 2009.....	13
Figure 3c. Oil Exporters: Fiscal Impulses and Nonresource Output Gaps, 2010–14.....	13
Figure 4. Nigeria: Fiscal Stance	22

Tables

Table 1. Expansionary Fiscal Stance by Period and Country Group.....	9
Table 2. Median Contribution of Public Investment to the Fiscal Stance.....	9
Table 3a. Sensitivity of Cyclically Adjusted (Nonresource) Primary Balance to (Nonresource) Output Gap.....	10
Table 3b. Sensitivity of (Nonresource) Primary Balance to (Nonresource) Growth.....	11
Table 4a. Sensitivity of Cyclically Adjusted (Nonresource) Primary Balance to (Nonresource) Output Gap with Interaction Terms.....	11
Table 4b. Sensitivity of (Nonresource) Primary Balance to (Nonresource) Growth with Interaction Terms.....	12
Table 5. Cyclicalities of Fiscal Policy for Oil Exporters in Sub-Saharan Africa.....	14
Table 6. Cyclicalities of Fiscal Policy for Mineral Exporters in Sub-Saharan Africa.....	14
Table 7. Cross-country GMM to Identify Determinants of Degree of Procyclicality (Dependent Variable: Degree of Fiscal Cyclicity Measured As The Sensitivity of Cyclically Adjusted Primary Balance to Output Gap).....	17
Table 8. Cross-country GMM to Identify Determinants of Degree of Procyclicality (Dependent Variable: Degree of Fiscal Cyclicity Measured As the Sensitivity of Primary Balance to Real GDP Growth).....	18
Table A1. Panel GMM Estimates.....	30
Table A2. Pairwise Panel Causality Tests.....	30

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Overview

Excessively procyclical fiscal policy can be harmful. This paper investigates to what extent the fiscal policies of sub-Saharan African countries were procyclical in recent years and the reasons for the degree of fiscal procyclicality among these countries. It finds that a tendency for procyclical fiscal policy was particularly pronounced among oil exporters and after the global financial crisis. It also finds a statistically significant causal link running from deeper financial markets and higher reserves coverage to lower fiscal policy procyclicality. Fiscal rules supported by strong political commitment and institutions seem to be key to facilitating progress for deeper financial markets and stronger reserves coverage.

1

Introduction

The cyclical behavior of fiscal policy affects sub-Saharan African countries because many of them depend on commodity exports or have been gaining access to international capital markets in recent years, and those markets tend to be highly volatile. If sub-Saharan African countries were to follow highly procyclical fiscal policy patterns—spending too much in good times and then forced to cut back at other times—they would amplify booms and exacerbate busts in line with global commodity prices and capital flows. By contrast, lower procyclicality of fiscal policies could boost medium-term growth prospects (IMF 2015b).

Existing studies find that while advanced economies have tended to pursue countercyclical or acyclical fiscal policy, the majority of emerging market economies have pursued procyclical fiscal policies, thus exacerbating the underlying business cycle. For instance, Gavin and Perotti (1997); Villafuerte, Lopez-Murphy, and Ossowski (2010); and Frankel (2011) point out that procyclical fiscal policy has especially plagued Latin American commodity exporters. Meanwhile, Kaminsky, Reinhart, and Vegh (2004) find that periods of capital inflows are associated with expansionary macroeconomic policies, and periods of capital outflows with contractionary macroeconomic policies in emerging markets. Going further, Frankel, Vegh, and Vuletin (2013) provide a systematic empirical analysis on the difference in cyclical behavior of fiscal policy among countries. They find that the quality of institutions is a key determinant of a country's ability to reduce the procyclicality of fiscal policy; even after controlling for the endogeneity and other likely determinants of fiscal procyclicality, there is a causal link running from stronger institutions to less procyclical fiscal policy. However, the majority of sub-Saharan African countries are not included in the sample of existing studies.

This paper contributes to the literature on the cyclical behavior of fiscal policy by focusing on a specific but large set of countries that has not been systematically examined before. While it is likely that sub-Saharan African countries in general have run procyclical fiscal policy in line with the findings of existing studies, this paper seeks further validation of the procyclical bias in particular for resource-rich countries and the role of institutional quality.¹ In this context, it attempts to answer three sets of questions:

¹ Institutional quality would comprise the presence and effectiveness of fiscal institutions (that is, public financial management systems, fiscal rules, Sovereign Wealth Funds [SWFs]). On the latter, it is worth noting that only 20 SSA countries have a fiscal rule or SWF in place, with the majority of those corresponding to general supranational convergence criteria (IMF Fiscal Affairs Department's Fiscal Rules and Fiscal Councils Database).

1. How expansionary or contractionary was fiscal policy in sub-Saharan African countries in recent years, and to what extent was the policy of these countries procyclical or countercyclical?
2. What factors explain the different degrees of fiscal procyclicality among sub-Saharan African countries?
3. What policy lessons can be applied to sub-Saharan African countries to run less procyclical fiscal policy?

To address the first question, this paper follows Villafuerte, Lopez-Murphy, and Ossowski (2010) in using an approach to measure the degree of fiscal procyclicality that is simpler and more reliable than other approaches used in many existing studies. This paper finds that, while sub-Saharan African countries have run procyclical fiscal policies in general, oil exporters' policies tended to be more procyclical than those of other countries. To tackle the second question, regressions were conducted similar to those presented by Frankel, Vegh, and Vuletin (2013). They find that financial depth and international reserves buffers appear to play a significant role in reducing the fiscal policy procyclicality among sub-Saharan African countries, even after controlling for endogeneity and other explanatory variables. Designing and implementing fiscal rules and institutions with the goal of saving revenue windfalls during booms so that they are available in bad times would facilitate progress in deepening financial markets and build up reserves buffers in sub-Saharan African countries. This would go a long way to alleviate the curse of procyclical fiscal policy. While some resource-rich sub-Saharan African countries recently adopted fiscal rules or resource funds—referred to as special fiscal institutions (SFIs) in the literature—in an attempt to limit the procyclical bias in spending, existing studies point out that SFIs can help achieve such policy objectives only if they are supported by strong institutions (such as enhanced transparency and accountability) and political commitment. To address the third question, the paper summarizes the experience of three countries in establishing fiscal frameworks aimed at saving for rainy days: Botswana, Chile, and Nigeria.

The rest of the paper is organized as follows. Chapter 2 explains the methodology for measuring the degree of fiscal policy procyclicality in this paper. Chapter 3 examines to what extent the fiscal policy has been procyclical in recent years among sub-Saharan African countries, splitting the sample countries into oil- and mineral-exporting ones and others, and sample periods into commodity upturns and downturns. Chapter 4 runs regressions to analyze the factors behind the degree of fiscal policy cyclicity among sub-Saharan African countries, controlling for various explanatory factors and addressing endogeneity concerns. It discusses policy implications of the empirical findings. Chapter 5 reviews the country case studies mentioned above. Chapter 6 presents concluding remarks.

2

How to Measure the Degree of Fiscal Procyclicality

The focus of this paper is to analyze the link between the fiscal policy stance and economic activity in sub-Saharan Africa between 2000 and 2014, a period marked by relatively high rates of growth, a substantial reduction in inflation rates, and positive and negative terms-of-trade shocks in most countries. The specific objective of this analysis is to determine whether fiscal policy in the region has been expansionary or contractionary in good and bad times; that is, whether it has helped to dampen business cycle fluctuations (a countercyclical fiscal policy stance) or, on the contrary, has exacerbated them (a procyclical fiscal policy stance). Importantly, the previous statements are based on the assumption that output shocks drive fiscal policy, which is the standard precept of the literature on the cyclical behavior of fiscal policy.²

The standard indicator to assess the fiscal policy stance in terms of its impact on domestic demand is the ratio of dynamics of primary balance to GDP. However, that indicator is not well suited for some resource-rich countries for several reasons (see Villafuerte, Lopez-Murphy, and Ossowski 2010). First, fiscal resource-related revenues (mostly from oil and mineral sectors, because other sectors like agriculture typically do not generate large rents that can in turn be appropriated by the government) largely originate from abroad (via export proceeds) and are therefore akin to a “helicopter drop” in that they do not reallocate income from the private sector to the government. Thus, changes in the primary balance arising from fluctuations in these revenues (before they are spent) should be expected to have limited effects on domestic demand (through “wealth effects”). Second, resource prices can have major effects on the observed ratios of fiscal variables to GDP because the resource and nonresource GDP deflators can and often do deviate markedly, making nominal GDP quite volatile. Changes in resource prices can therefore drive large changes in conventional fiscal policy indicators, which make their interpretation difficult.³ In this context, the sample countries are divided into resource-rich (oil-exporting and mineral-exporting) countries and

² Some authors (for example, Rigobon 2004) claim, by contrast, that fiscal policy shocks drive output and not the other way around. This reverse causality consideration might be particularly relevant in countries where (nonresource) economic activity is dominated by government spending. By contrast, other authors (for example, Ilzetzki and Vegh 2008) claim that causality goes in both directions and that the evidence on the cyclicity of fiscal policy is robust to endogeneity considerations. Appendix II provides empirical evidence to support the validity of the assumption that output shocks drive fiscal policy.

³ For instance, a lower nonresource deficit in nominal terms might come hand in hand with a higher nonresource deficit-to-GDP ratio if, as a result of a decline in international resource prices, nominal GDP falls more proportionally than the nonresource deficit.

other countries. This classification is based on the fact that basically only the oil and mineral sectors generate large rents that can be appropriated by the government, in contrast to agriculture, for example, which tends to generate limited fiscal revenues.⁴

Following a methodology proposed elsewhere (Medas and Zakharova 2009; Villafuerte, Lopez-Murphy, and Ossowski 2010), this paper assesses the fiscal policy stance through (1) the cyclically adjusted nonresource primary balance measured in percent of nonresource GDP for resource-rich countries in sub-Saharan Africa; and (2) the ratio of cyclically adjusted standard primary balance to GDP for all other countries. The idea behind this adjustment is that part of the observed changes in the (nonresource) primary balances would be not the result of intentional policy actions but rather the result of exogenous changes in economic conditions. To remove that effect, the economic cycle can be estimated by quantifying the output gap. Ideally, the production function approach should be used to estimate potential output and the associated output gap. However, estimates of the cycle based on this method require the availability of reliable data on the use of labor and capital stocks, a daunting task for many sub-Saharan African countries. This is particularly more problematic for resource-rich countries, where the relevant output gap pertains to the nonresource GDP since the latter is a better proxy of the tax basis for nonresource fiscal revenue.⁵ Similarly, data limitations make it difficult to apply other sophisticated output gap estimation methods, such as the multivariate Kalman filter approach. Therefore, and as a second-best approach, this paper applies the Hodrick-Prescott (H-P) filter to the annual time series of (total or nonresource) GDP in real terms.⁶

Following the standard methodology to compute cyclically adjusted balances (Fedelino, Ivanova, and Horton 2009), the cyclically adjusted (nonresource) primary balance for each country during 2000–14 is estimated using the following formula:

$$capb = (R^*(Y^p/Y) - G) / Y$$

where *capb* is the cyclically adjusted (nonresource) primary balance measured in percent of (nonresource) GDP, *R* is (nonresource) revenues excluding grants, *Y* is the (nonresource) GDP, Y^p/Y is the ratio of potential (nonresource) output to actual output, and *G* is the primary expenditure. It is assumed that the elasticity of (nonresource) revenues is equal to one and primary expenditure

⁴ For the purpose of this paper, resource-rich countries are the ones for which resource revenue accounted for at least 10 percent of total fiscal revenue (excluding grants). Oil-exporting countries include Angola, Cameroon, Chad, Republic of Congo, Equatorial Guinea, Gabon, and Nigeria. Mineral-exporting countries include Botswana, Guinea, Mali, Namibia, Niger, Sierra Leone, and Zambia.

⁵ The behavior of the (capital-intensive) resource sector's real output should be driven by fully exogenous factors, including the resource project's life cycle, making it awkward to mix it with nonresource output in determining a "business cycle." Furthermore, the literature (for example, Husain, Tazhibayeva, and Ter-Martirosyan 2008 and IMF 2015b) suggests the importance of resource prices (not volumes) on economic activity through government spending.

⁶ The Hodrick-Prescott (H-P) filter was chosen because it is simple, is transparent, and continues to be the most commonly used filter in empirical studies and policy analysis. To address the endpoint problem of the H-P filter, GDP annual time series projections up to 2019 were based on the IMF's WEO.

elasticity is equal to zero for all countries, following existing studies (see Villafuerte, Lopez-Murphy, and Ossowski 2010).

This paper defines fiscal policy as expansionary when changes in the cyclically adjusted (nonresource) primary balance are negative, and contractionary when changes in that variable are positive. The term “fiscal impulse” can be used in this analysis, defined as an expansionary fiscal policy ($\Delta capb < 0$).

Finally, to assess whether fiscal policy is countercyclical or procyclical, the link between the stance of fiscal policy and the economic situation needs to be determined. To that effect, the next section links the changes in the (nonresource) output gap and the changes in the cyclically adjusted (nonresource) primary balance. If the change in the (nonresource) output gap is negative (positive), then expansionary (contractionary) fiscal policy entails a countercyclical fiscal stance. Expansionary (contractionary) fiscal policy in the face of a positive (negative) change in the (nonresource) output gap implies a procyclical fiscal policy.⁷

To check for robustness in the analysis, this paper also uses the unadjusted (nonresource) primary balance to measure the fiscal stance, linking the changes in the real (nonresource) GDP growth rate to the changes in the (nonresource) primary balance to determine whether fiscal policy was pro- or countercyclical.

As implied from the discussion above, the previous approach would be the preferred one as it uses a theoretically more sophisticated and appealing methodology. However, the measurement of the output gap and of the related cyclical adjustments is tricky in many sub-Saharan African countries given the large volatility of growth. Hence, the analysis is complemented with the second approach.

⁷ This paper follows Fedelino, Ivanova, and Horton (2009) in linking the change in the cyclically adjusted (nonresource) primary balance (that is, the fiscal impulse) to *changes* in the (nonresource) output gap to assess the cyclicity of the fiscal response. In contrast, Alberola and Montero (2006) study the link between fiscal impulses and the *level* of the output gap. The authors of this paper find the former approach more appealing, in part because the estimation of the direction of changes in output gaps is arguably more reliable than the estimation of the specific level of the output gap.

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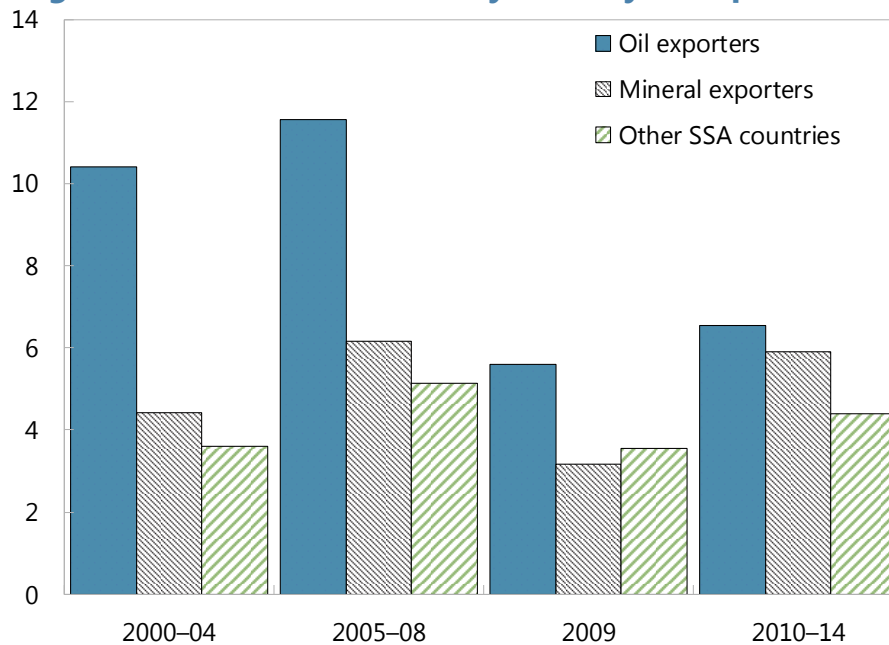
3

To What Extent Has the Fiscal Policy Been Procyclical among Sub-Saharan African Countries?

The Business Cycle in Sub-Saharan Africa

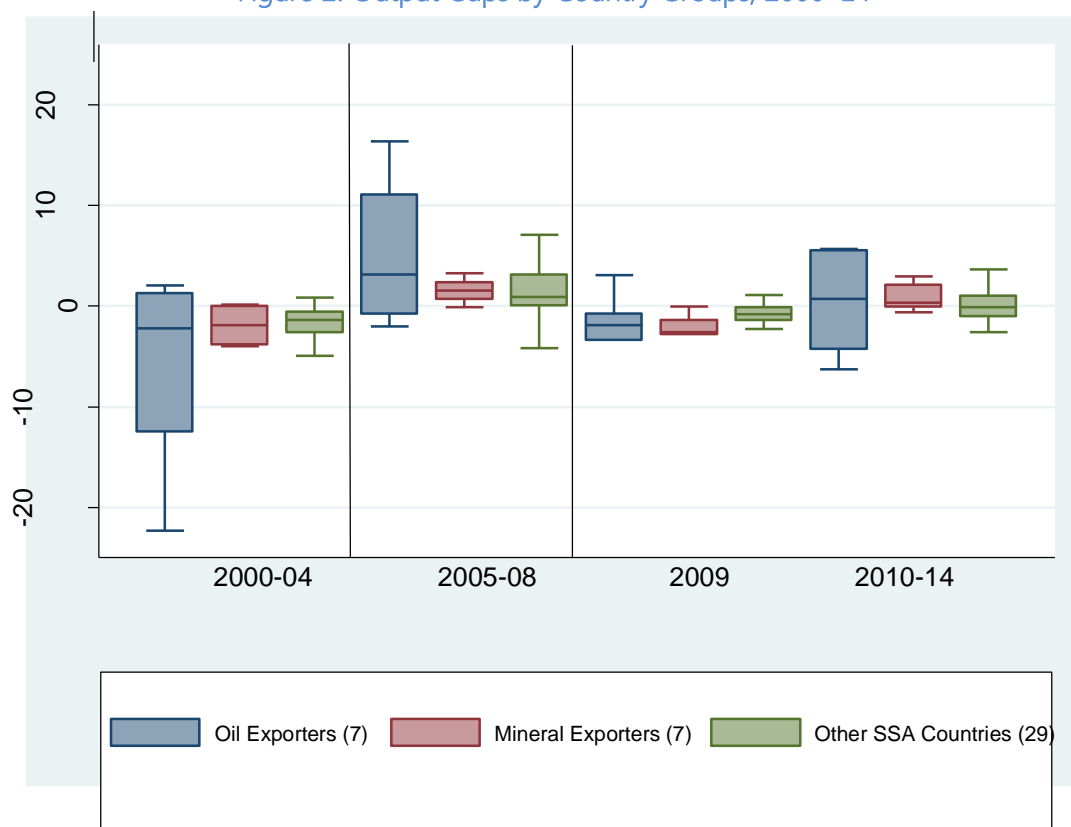
First, this chapter illustrates the stylized facts of the business cycle dynamics among sub-Saharan African countries in recent years. While average economic growth rates increased over 2000–14 relative to past periods, four different subperiods can be identified on the basis of growth dynamics (Figure 1): 2000–04; 2005–08, with an acceleration in growth; 2009, with a sharp fall in growth rates following the global financial crisis; and 2010–14, with a recovery in economic growth rates even if not to the levels of 2005–08. These dynamics are more or less replicated in all country groups.

Figure 1. GDP Growth Rates by Country Groups, 2000-14



As shown in Figure 2, the upturn and downturn patterns from Figure 1 are replicated when looking at output gaps derived from the use of the H-P filter. Output gaps were on average positive for the periods 2005–08 and 2010–14 and on average negative during 2000–04 and 2009. Again, such a dynamic is replicated along all country groupings. Oil-exporting countries experienced more extreme trends, in terms of both average gaps and their relative dispersion, compared with mineral exporters and other countries whose output gaps centered near zero throughout the period.

Figure 2. Output Gaps by Country Groups, 2000–14



Note: The boxes represent the interquartile range between the 25th and the 75th percentiles. The horizontal lines represent the median. The vertical lines extend to the minimum and maximum values. The number of countries in each group is in parentheses.

The Fiscal Policy Stance

Before undertaking an analysis of the procyclicality (or not) of fiscal policy in sub-Saharan Africa over the period 2000–14, Table 1 provides a summary snapshot of the fiscal impulse across country groups and subperiods. To that effect, the fiscal impulse by period is computed by adding up the annual changes in the fiscal stance indicator (the cyclically adjusted [nonresource] primary balance in this case) over each subperiod. The data suggest the following:

- Most of the oil-exporting countries in sub-Saharan Africa ran an expansionary fiscal policy between 2005 and 2008, once the recovery in oil prices of the early 2000s solidified.
- All mineral-exporting countries had an expansionary fiscal stance immediately after the global financial crisis (2009).
- There is no evidence of a clear bias or pattern across other country groups in any of the subperiods.

Table 1. Expansionary Fiscal Stance by Period and Country Group

(Percent of total countries)

	2000-04	2005-08	2009	2010-14
Oil-exporting countries	20	83	50	50
Mineral-exporting countries	33	40	100	60
Other countries	50	50	65	40
SSA countries	45	56	69	46

Source: Authors' calculations.

While the focus of this paper's analysis is on the overall fiscal stance, it is worth noting the important role played by public investment as a driver of the fiscal stance in sub-Saharan Africa, particularly for oil-exporting countries. Table 2 summarizes the median contribution of changes in public investment to the changes in the fiscal stance indicator. It shows that public investment in oil-exporting countries had a large and increasing role in determining the fiscal stance in those countries (and eventually its degree of procyclicality). By contrast, the dynamics of public investment had a relatively limited contribution to the fiscal stance in nonresource-rich countries in sub-Saharan Africa.

Table 2. Median Contribution of Public Investment to the Fiscal Stance

(Percent of total changes in fiscal stance)

	2000-04	2005-08	2010-14
Oil-exporting countries	16.2	58.1	66.7
Mineral-exporting countries	37.0	97.9	46.5
Other SSA countries	43.2	41.6	0.5

Source: Authors' calculations.

Fiscal Policy Procyclicality

An assessment of the link between the fiscal policy stance and the economic cycle in sub-Saharan Africa based on the two methodologies described above finds some evidence of procyclicality. Two sets of panel ordinary least squares (OLS) regressions are run for each subperiod:

- a. With cyclically adjusted (nonresource) primary balance in percent of (nonresource) GDP used as a dependent variable and (nonresource) output gap and constant as independent variables
- b. With (nonresource) primary balance in percent of (nonresource) GDP used as a dependent variable and (nonresource) real GDP growth and constant as independent variables⁸

The estimated value of the coefficient on output gap (growth) represents the degree of fiscal procyclicality⁹: the lower (higher) this coefficient, the more (less) procyclical the fiscal policy is over the business cycle. A negative coefficient means that the fiscal stance is loosened/tightened during economic upturns/downturns (procyclical policy), while a positive coefficient means that the fiscal stance is tightened/loosened during economic upturns/downturns (countercyclical policy) (see, for example, IMF 2015b). Approach (a) above follows the methodology suggested by Villafuerte, Lopez-Murphy, and Ossowski (2010) while approach (b) follows the methodology used in IMF (2015b). Tables 3a and 3b report the results of the panel regressions (a) and (b), respectively. The coefficient on (nonresource) output gap is negative (except for the subperiod of 2005–08) but not statistically significant (Table 3a) in any period. In contrast, the coefficient on (nonresource) real GDP growth is significantly negative during the whole sample period and all of the subsample periods (Table 3b). The estimated negative value of the coefficient increases over time. This suggests that all sub-Saharan African countries ran procyclical fiscal policies during 2000–14 and that the degree of procyclicality increased over time, particularly after the global financial crisis.

Table 3a. Sensitivity of Cyclically Adjusted (Nonresource) Primary Balance to (Nonresource) Output Gap

	2000-14	2000-04	2005-08	2010-14
Output Gap	-0.16 (1.01)	-0.66 (0.41)	1.81 (1.88)	-2.9 (2.77)
Constant	-19.62*** (2.84)	-11.22*** (1.45)	-18.34*** (4.47)	-27.18*** (6.89)
Observations	604	191	160	212
R-squared	0.001	0.013	0.006	0.005

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Source: Authors' estimations.

⁸ As in the previous section, the nonresource primary balance and output measures are used for mineral-resource-rich countries while overall primary balance and output measures are used for other countries.

⁹ This paper follows the literature on the cyclical behavior of fiscal policy, which implicitly assumes that output shocks drive fiscal policy, but fiscal policy shocks could potentially drive output. Appendix II provides empirical evidence to support the validity of that implicit assumption.

Table 3b. Sensitivity of (Nonresource) Primary Balance to (Nonresource) Growth

	2000-14	2000-04	2005-08	2010-14
Real GDP Growth	-2.03***	-0.84***	-2.17***	-3.84**
	(0.56)	(0.15)	(0.8)	(1.64)
Constant	-9.33**	-6.15***	-4.48	-8.10
	(4.16)	(1.23)	(6.74)	(10.61)
Observations	604	191	160	212
R-squared	0.022	0.161	0.042	0.025

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Source: Authors' estimations.

To see whether there is a significant difference in the degree of procyclicality among resource-rich countries and others, interaction terms are included between output gap and dummies for oil- and mineral-exporting countries (Table 4a), and interaction terms between real GDP growth and dummies for oil- and mineral-exporting countries (Table 4b), respectively, as independent variables. In Table 4a, coefficients are not significant, except for the significantly (at the 1 percent level) negative value for the interaction term for oil exporters for the subperiod of 2010–14. In Table 4b, the interaction term for oil exporters is significantly negative in all periods and the estimated negative value of the coefficient increases over time. This may reflect some oil exporters' expansionary fiscal stance during the oil price upturn after the global crisis and their fiscal tightening in response to the oil price decline that started in 2014 (see Chapter 5). Meanwhile, significantly positive coefficients on real GDP growth in the full sample period and during the subperiod of 2005–08 would indicate that the other sub-Saharan African countries ran countercyclical fiscal policies, particularly during the upturn before the global crisis. These results indicate that a procyclicality bias was particularly strong among oil exporters, especially after the global crisis.

Table 4a. Sensitivity of Cyclically Adjusted (Nonresource) Primary Balance to (Nonresource) Output Gap with Interaction Terms

	<i>(Standard errors in parentheses)</i>			
	2000-14	2000-04	2005-08	2010-14
Output Gap	-0.16	-0.20	0.32	0.10
	(1.27)	(0.51)	(3.20)	(2.87)
Output Gap * Oil Exporters Dummy	-1.45	-1.44	2.55	-38.10***
	(2.26)	(0.92)	(4.13)	(10.15)
Output Gap * Mineral Exporters Dummy	-0.13	-0.80	0.46	-0.31
	(6.06)	(3.00)	(9.18)	(15.10)
Constant	-20.18***	-11.31***	-18.82***	-27.24***
	(2.97)	(1.52)	(4.81)	(6.79)
Observations	604	191	160	212
R-squared	0.001	0.026	0.008	0.068

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Source: Authors' estimations.

Table 4b. Sensitivity of (Nonresource) Primary Balance to (Nonresource) Growth with Interaction Terms

(Standard errors in parentheses)

	2000-14	2000-04	2005-08	2010-14
Real GDP Growth	1.44*	-0.08	2.67*	0.35
	(0.76)	(0.21)	(1.38)	(1.60)
Real GDP Growth * Oil Exporters Dummy	-5.86***	-1.24***	-5.63***	-17.70***
	(0.86)	(0.25)	(1.30)	(2.30)
Real GDP Growth * Mineral Exporters Dummy	-0.18	-0.44	-0.62	-0.52
	(1.58)	(0.65)	(2.31)	(2.81)
Constant	-19.04***	-7.69***	-24.08***	-9.77
	(4.34)	(1.24)	(7.94)	(9.49)
Observations	566	153	160	212
R-squared	0.100	0.281	0.149	0.249

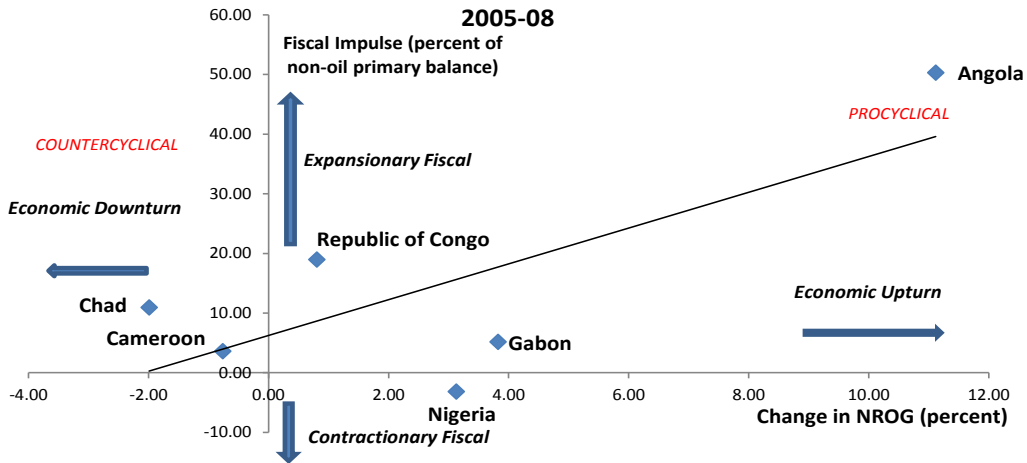
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Source: Authors' estimations.

A less formal assessment based on mapping the linkages across the two dimensions would reinforce the evidence in terms of a predominance of a procyclical fiscal policy bias for oil-exporting countries. Figure 3 showed the change in the non-oil output gap and the fiscal impulse in each oil-exporting country during the periods of 2005–08, 2009, and 2010–14, and the associated regression lines. Table 5 summarizes the results for oil exporters, while Table 6 summarizes those for mineral-exporting countries.¹⁰

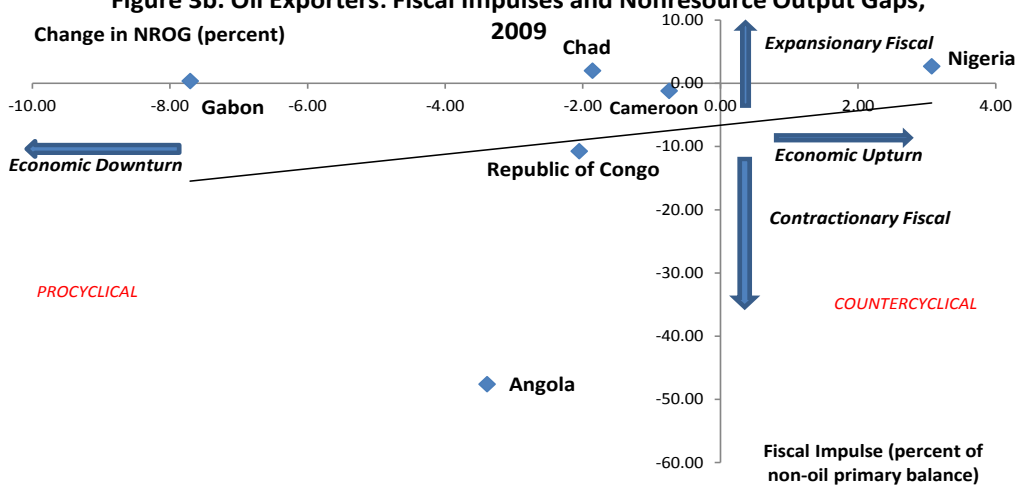
¹⁰ The seemingly countercyclical fiscal policy for Chad since 2005 is explained by an expansionary fiscal policy stance between 2005 and 2009 while economic growth was lagging due to civil conflict first and the global financial crisis later. A subsequent gradual tightening of fiscal policy coincided with an acceleration in economic growth. In Angola, the countercyclical stance between 2010 and 2014 was the result of a continued and gradual fiscal tightening following the global financial crisis together with a recovery in economic activity.

Figure 3a. Oil Exporters: Fiscal Impulses and Nonresource Output Gaps, 2005-08



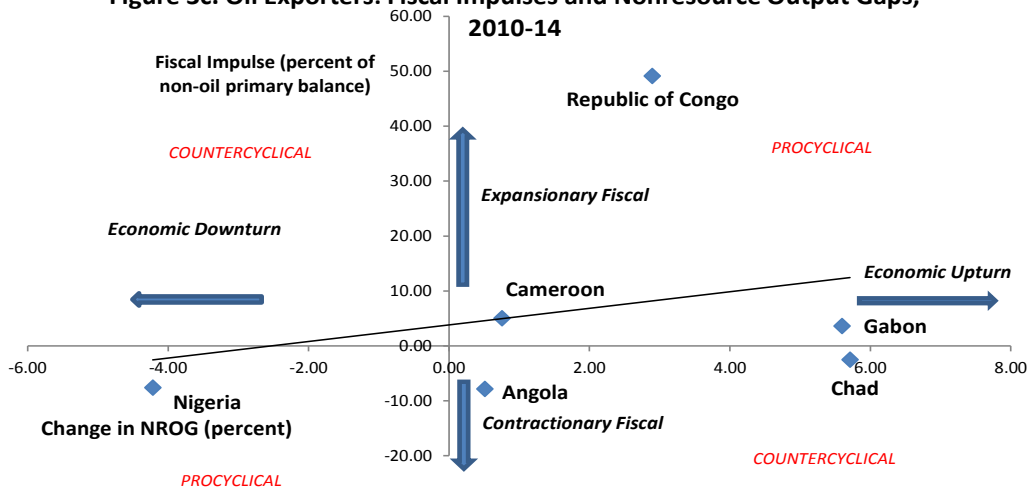
Source: Authors' estimations.

Figure 3b. Oil Exporters: Fiscal Impulses and Nonresource Output Gaps, 2009



Source: Authors' estimations.

Figure 3c. Oil Exporters: Fiscal Impulses and Nonresource Output Gaps, 2010-14



Source: Authors' estimations.

Note: NROG stands for non-resource output gap.

Table 5. Cyclicity of Fiscal Policy for Oil Exporters in Sub-Saharan Africa

Oil Exporters	2000–2004	2005–2008	2009	2010–2014
Procyclical	Angola Cameroon Gabon Nigeria Equatorial Guinea	Angola Congo, Republic of Gabon	Angola Cameroon Congo, Republic of Nigeria	Cameroon Congo, Republic of Gabon Nigeria Equatorial Guinea
Countercyclical	Congo, Republic of	Cameroon Chad Nigeria Equatorial Guinea	Chad Gabon Equatorial Guinea	Angola Chad

Source: Authors' estimations.

Table 6. Cyclicity of Fiscal Policy for Mineral Exporters in Sub-Saharan Africa

Mineral Exporters	2000–2004	2005–2008	2009	2010–2014
Procyclical	Botswana Mali	Mali		Zambia Niger Mali
Countercyclical	Congo, Democratic Republic of	Congo, Democratic Republic of Guinea Botswana	Mali Guinea Congo, Democratic Republic of Botswana Niger	Burkina Faso Batswana

Source: Authors' estimations.

4

What Explains the Degree of Fiscal Policy Procyclicality among Sub-Saharan African Countries?

This chapter examines factors that may influence the way fiscal policy has been conducted over the business cycle—that is, the degree of fiscal policy procyclicality—in each of the sample sub-Saharan African countries.¹¹ As for the measure of the degree of fiscal procyclicality (dependent variable) of each sample country during 2001–14, two sets of country-by-country OLS regressions are run, similar to the panel regressions in the previous chapter:

- a. With cyclically adjusted (nonresource) primary balance in percent of (nonresource) GDP as the dependent variable and (nonresource) output gap and constant as explanatory variables
- b. With (nonresource) primary balance in percent of (nonresource) GDP as a dependent variable and (nonresource) real GDP growth and constant as explanatory ones¹²

As discussed in the previous chapter, the estimated value of the coefficient on output gap (growth) represents the degree of fiscal procyclicality: the lower (higher) this coefficient is, the more (less) procyclical the fiscal policy has been over the business cycle.

Following Frankel, Vegh, and Vuletin (2013), this analysis looks into four sets of explanatory variables aimed at capturing alternative theories regarding the cyclicity of fiscal policy.

First, it includes institutional quality (IQ) of each country in the set of explanatory variables. Many researchers have pointed to the importance of IQ in determining various aspects of fiscal policy. Frankel, Vegh, and Vuletin (2013) find that IQ plays a key role in explaining the cyclical behavior of fiscal policy among advanced and emerging market countries. An index of IQ is constructed by calculating the average of six normalized variables from the World Bank's Worldwide Governance Indicators: voice and accountability, political stability and absence of violence/terrorism, government effectiveness, regulatory quality, rule of law, and control of corruption. The IQ index

¹¹ See Appendix I for a detailed explanation of the data sources and how dependent, independent, and instrumental variables are calculated.

¹² As was done in the previous chapter, nonresource primary balance and output measures are used for mineral-resource-rich countries while overall primary balance and output measures are used for other countries.

ranges between -2.5 (lowest institutional quality) and $+2.5$ (highest institutional quality). Period average of IQ index during 2002–12 for each sample country is used as one of the explanatory variables.

Second, the analysis controls for the degree of financial depth and openness. Lack of access to credit markets in bad times would inevitably leave governments with no choice but to cut spending and/or raise taxes. Caballero and Krishnamurthy (2004) have argued that lack of financial depth could limit a country's ability to borrow domestically and run countercyclical fiscal policies. They provide empirical support for this viewpoint using data of advanced and emerging market economies. In the same spirit, many researchers, including Gavin and Perotti (1997), have pointed out that limited access to international capital markets, particularly during bad times, may limit the ability of government to conduct countercyclical macroeconomic policies. Financial depth is measured here using the ratio of credit to private sector to GDP (average during 2001–13)¹³ following Caballero and Krishnamurthy (2004), and financial openness using the Chin-Ito (2006) financial openness index (average during 2001–11) following Frankel, Vegh, and Vuletin (2013).

Third, the analysis control for the volatility of tax revenue, proxied by output volatility. Talvi and Vegh (2005) argue that the larger the revenue volatility, the more procyclical fiscal policy will be, as policymakers try to reduce fiscal surpluses in good times in the presence of political distortions. Output volatility is measured here by using the variance of the cyclical component of (nonresource) real GDP during 2001–13.¹⁴

Fourth, two economic vulnerability indicators are also included: the public-debt-to-GDP ratio¹⁵ and gross international reserves (GIR) in months of imports of goods and services (average during 2001–13). As Frankel, Vegh, and Vuletin (2013) point out, low debt-to-GDP ratios and ample GIR may contribute to reduce a country's default risk and provide room to run countercyclical fiscal policy.

This analysis addresses potential endogeneity problems in all of the explanatory variables. Countercyclical (procyclical) fiscal policies that tend to stabilize (destabilize) the economy might improve (worsen) institutional quality; the causality may run from cyclical behavior of fiscal policy (dependent variable) to IQ (independent variable).¹⁶ Similar arguments could be made regarding the endogeneity of other explanatory variables; for example, procyclical policies could raise the debt-to-GDP ratio and lower the GIR import coverage. These endogeneity concerns are addressed by instrumenting all of the explanatory variables. Except for output volatility, instrumenting is done by lagged values IQ by its average during 1996–2000, financial depth by its value at 2000, financial openness by its average during 1991–2000, debt-to-GDP ratio by its value at 2000, and GIR import coverage by its value at 2000. As for the output volatility, it is instrumented by each country's terms-of-trade volatility during 2001–13 and its trading partners' output volatility during 2001–13 and during 1991–2000, following Ilzetzki and Vegh (2008).

¹³ Total GDP is used for all countries for the denominator of the ratio of private credit to GDP.

¹⁴ Nonresource real GDP is used for resource-rich countries while overall real GDP is used for other countries.

¹⁵ Total GDP is used for all countries for the denominator of the ratio of public debt to GDP.

¹⁶ As argued in Frankel, Vegh, and Vuletin (2013), procyclical fiscal policies could increase the chances of debt crises during busts. Turmoil typically associated with debt crises could exacerbate corruption, thus weakening the foundations of an efficient public administration.

Cross-country Generalized Method of Moments (GMM) regressions are run with two alternative measures of the degree of fiscal policy procyclicality as the dependent, and a set of explanatory and instrumental variables explained above. Tables 7 and 8 report the results, with the sensitivity of cyclically adjusted (nonresource) primary balance in percent of (nonresource) GDP to (nonresource) output gap used as the dependent variable in Table 7, and the sensitivity of (nonresource) primary balance in percent of (nonresource) GDP to (nonresource) real GDP growth as the dependent variable in Table 8. In both tables, the Hansen's over-identification test cannot reject the null hypothesis that instruments are valid at a conventional significance level. After properly correcting for endogeneity of all explanatory variables, the coefficient on financial depth is positive (expected sign) and significant at the 5 percent level in Table 7, while the coefficient on GIR import coverage is positive (expected sign) and significant at the 1 percent level in Table 8. All other variables are not significant at a conventional significance level in these tables.

**Table 7. Cross-Country GMM to Identify Determinants of Degree of Procyclicality
(Dependent Variable: Degree of Fiscal Cyclicity Measured As The Sensitivity
of Cyclically Adjusted Primary Balance to Output Gap)**

Variable	Coefficient	t-statistics
Constant	-1.258	-1.394
IQ average during 2001-2013	-1.079	-1.489
Financial depth during 2001-2013	0.031	2.043 **
Financial openness during 2001-2013	0.042	0.214
Output volatility during 2001-2013 1/	-0.010	-0.596
Debt-GDP ratio during 2001-2013	-0.003	-0.797
Foreign reserves coverage during 2001-2013	-0.014	-0.228
Statistics		
Hansen's J-statistics (p-value in brackets)	4.522	[0.104]
Number of countries	43	

Source: Authors' estimation.

Notes: *, **, and *** indicate statistically significant at 10 percent, 5 percent, and 1 percent levels, respectively. Instruments: IQ average during 1996-2000; Financial depth at 2000; Financial openness at 2000; Variance of Terms-of-Trade during 2001-2013; Trading partners' real GDP variance during 1991-2000; Trading partners' real GDP variance during 2001-2013; Debt-GDP ratio at 2000; and Foreign reserves coverage at 2000.

1/ Volatility of nonresource GDP for resource-rich countries, volatility of total GDP for others.

**Table 8. Cross-Country GMM to Identify Determinants of Degree of Procyclicality
(Dependent Variable: Degree of Fiscal Cyclicity Measured As The Sensitivity
of Primary Balance to Real GDP Growth)**

Variable	Coefficient	t-statistics
Constant	-0.458	-1.178
IQ average during 2001-2013	0.019	0.079
Financial depth during 2001-2013	0.007	0.835
Financial openness during 2001-2013	0.060	0.666
Output volatility during 2001-2013 1/	0.006	0.495
Debt-GDP ratio during 2001-2013	-0.001	-0.454
Foreign reserves coverage during 2001-2013	0.063	2.738 ***
Statistics		
Hansen's J-statistics (p-value in brackets)	1.085	[0.581]
Number of countries	43	

Source: Authors' estimation.

Notes: *, **, and *** indicate statistically significant at 10 percent, 5 percent, and 1 percent levels, respectively. Instruments: Same as those in Table 7.

1/ Volatility of nonresource GDP for resource-rich countries, volatility of total GDP for others.

Three points are worth noting. First, more financial depth significantly helps reduce the degree of fiscal policy procyclicality among sub-Saharan African countries: there is a causal link running from deeper financial markets to less procyclical fiscal policy. In other words, lack of financial depth constrains a country to follow the standard Keynesian prescription to pursue expansionary fiscal policies during downturns. This is consistent with the empirical findings by Caballero and Krishnamurthy (2004) with advanced and emerging market economies. Second, ample GIR holdings significantly help reduce the degree of fiscal policy procyclicality. Third, contrary to the findings by Frankel, Vegh, and Vuletin (2013) with advanced and emerging markets, the difference in institutional quality would not play a significant role in explaining the difference in the cyclical behavior of fiscal policy among sub-Saharan African countries. This is likely due to the fact that there is little difference in the value of the IQ index among most of the sub-Saharan African countries.¹⁷

¹⁷ The statistical insignificance of the IQ index does not seem to be caused by multicollinearity among the explanatory variables. The Variance Inflation Factor (VIF) of each explanatory variable, which is a commonly used measure of the degree of multicollinearity (a higher VIF means a more serious problem), does not reveal any serious multicollinearity problem in the regressions in Tables 7 and 8; the maximum value of VIF among all explanatory variables is 2.52, well below the widely used threshold of 5 (or 10). Pair-wise correlations among the explanatory variables show that no explanatory variables are strongly correlated with each other; only IQ and financial depth are moderately correlated ($r = 0.67$). However, when regressions similar to Tables 7 and 8 are run with the financial depth dropped from the explanatory variables, the IQ index remains statistically insignificant; its t -ratios are far from the 10 percent significance level.

Some policy implications for sub-Saharan African countries could be derived from the first two points discussed above:

- Progress in deepening financial markets could help countries enhance macroeconomic stability—allowing for less procyclical fiscal policies to mitigate boom–bust cycles—as well as enhance medium-term growth prospects.
- Ample international reserves coverage may reduce default risks of sub-Saharan African countries and allow them to run less procyclical fiscal policies (that is, with no need for abrupt and massive fiscal consolidation in downturns). This is consistent with the textbook policy recommendation to build up reserves buffers to reduce vulnerabilities.
- At the same time, to promote financial depth and build up reserves buffers, countries should accumulate financial savings for rainy days (through overall fiscal surpluses) on the basis of part of revenue windfalls in good times.
- Although the regressions above fail to find a statistically significant role of institutional quality in reducing the cyclicity of fiscal policy, existing literature and the country case studies in the following chapter would suggest that strong institutions and political commitment help successfully implement fiscal policy aimed at smoothing spending and saving for rainy days.

The next chapter looks into three country case studies regarding the authorities' efforts to establish and implement fiscal frameworks to save for rainy days, in light of the policy implications derived from the empirical analysis above.

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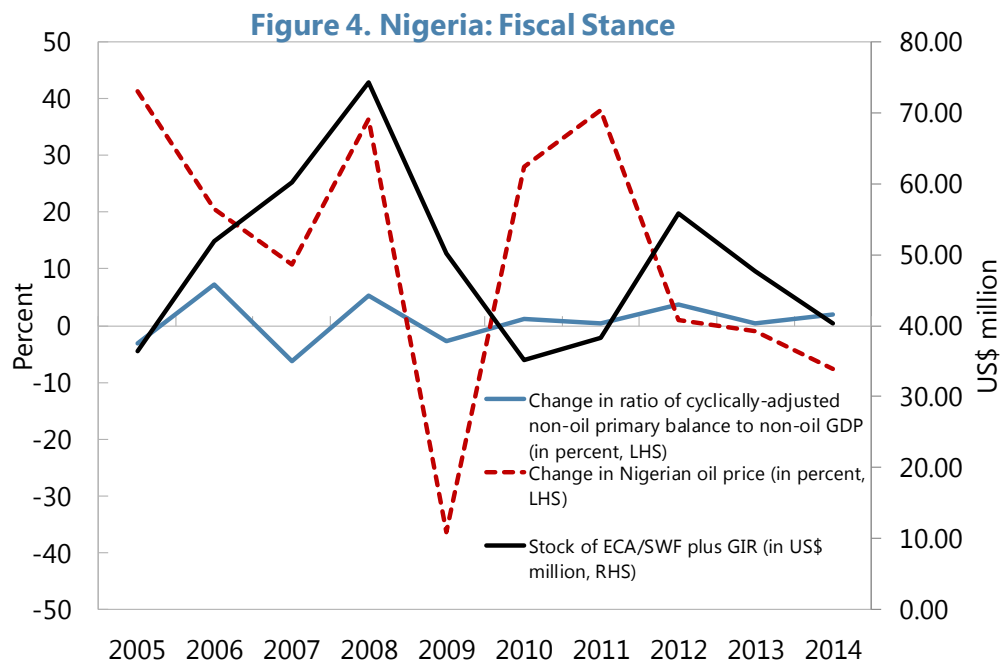
5

Country Case Studies

This chapter examines the experience of three countries to establish and implement fiscal frameworks aimed at generating financial savings for rainy days: Nigeria, Botswana, and Chile.

Nigeria

Nigeria's attempts to smooth expenditures in the face of volatile oil revenues and high oil revenue sharing with subnational governments has had mixed results. Its fiscal framework, which has been in place since 2004, consists of a budget reference oil price and an Excess Crude Account (ECA) that receives excess oil revenue or funds any revenue shortfall relative to the benchmark. This arrangement was relatively successful up to 2009: excess oil revenue during 2004–08 went into the ECA and the resulting buffers allowed the country (particularly subnational governments) to run an expansionary fiscal policy stance in the face of the negative oil price shock of 2009 (Figure 4). However, the oil price rule and the ECA have lost traction since 2010 (IMF 2012). Spending pressures resurged because of rebounding oil prices and the electoral cycle, which resulted in a procyclical expansionary fiscal stance during 2010–12 under higher oil prices and strong economic growth. Many discretionary, ad hoc withdrawals from the ECA took place during that period, and financial buffers in the ECA/Sovereign Wealth Fund (SWF) (and in international reserves) declined by end-2013 despite the oil price boom. Back-to-back negative shocks in oil production in 2013 and in oil prices in late 2014 depleted the ECA/SWF and international reserves considerably by the end of 2014 (IMF 2015c). The government needed to undertake a contractionary fiscal stance in 2015 amid deepening downward pressures in oil prices.



Sources: Central Bank of Nigeria; IMF staff calculations.
 Note: ECA/SWF stands for Excess Crude Account/Sovereign Wealth Fund.

Several papers have pointed out that some weaknesses in the fiscal framework prevented Nigeria from building up buffers during the 2010–12 oil boom (see IMF 2012 and 2013b). In particular, (1) the budget reference price is not formally instituted, but rather decided by bargaining between the government and legislature; (2) ECA is based on a political agreement among three layers (federal, state, and local) of government and subject to many discretionary withdrawals; and (3) fiscal responsibility laws do not cover the state and local governments, which receive more than half of total oil revenues.

Botswana

Despite being highly dependent on mineral revenues, which account for over 35 percent of government revenue, the empirical evidence suggests that Botswana put in place countercyclical (or at least cyclically neutral) fiscal policies over the past decade (Table 6). Foreign reserves and fiscal cushions have been built during boom periods, which have been in turn been used during bust periods (specifically in 2009) to sustain aggregate demand and economic activity, while avoiding debt accumulation.¹⁸

Botswana’s prudent management of mineral fiscal revenues has been supported by several normative principles and guidelines complemented by the operation of the Pula Fund. Those guidelines have been implemented flexibly over time, which would suggest an institutional “bias” for prudent fiscal management rather than “foolproof” fiscal policy principles. A sustainable budget index principle seeks to ensure that current spending is financed only with nonmineral revenue;

¹⁸ See the IMF’s recent Botswana country report (IMF 2016).

resource revenues should then be used to finance investment or saved in the Pula Fund managed by the central bank. At the same time, there is a cap on total expenditures as a ratio to GDP set at 40 percent, which would have been met if the mineral revenue cycle is taken into account, as well as debt ceilings on domestic and foreign debt (at 20 percent of GDP each), which have not been binding because public and publicly guaranteed debt has been under 25 percent of GDP. The Pula Fund, intended to hold financial assets for future generations, has been also used to help stabilize spending in the short term.

Chile

Chile, where copper represents about half of goods exports, has a well-earned track record of fiscal policy management that has become a model for other commodity-exporting countries (even though, admittedly, the level of fiscal dependency is much lower than in many resource-rich countries). Key features of Chile's fiscal rule, formalized since 2001, are (1) that the budget target is formulated in terms of a structural balance linking total level of spending to cyclically adjusted levels of copper and noncopper revenue, (2) the existence of established rules for accumulating and managing fiscal resources within two SWFs, and (3) that the values of potential GDP and long-term copper prices (key inputs for fiscal targets) are determined by independent expert committees.

Chile's comprehensive fiscal rule has helped shield the budget from volatility in copper prices, while allowing for a flexible response when warranted. During the copper boom of 2003–08, Chile ran substantial fiscal surpluses and saved part of them in the SWFs. Those financial savings allowed the government to increase spending sharply in 2009, when the copper price dropped significantly, and to ease the recession. During subsequent upturns in copper prices, the government clawed back much of the stimulus injected in 2009, which again allowed it to implement a strong fiscal stimulus in 2015 when the country was hit hard by a new copper price decline.¹⁹ Saving for rainy days made it possible to inject large fiscal stimulus when it was most sorely needed.

The country case studies discussed here and existing empirical studies point to the following lessons to successfully implement a fiscal framework aimed at saving for rainy days. First, although adoption of well-designed fiscal rules or resource funds, more generally defined as special fiscal institutions, may help enhance saving in good times, it does not lead to reduced procyclicality by itself.²⁰ The existence of SFIs does not necessarily indicate a de facto compliance with the rule, as shown by Nigeria's mixed experience. Second, while the regression in the previous chapter did not find a significant role of institutional quality, which may be due to the small difference in IQ among sub-Saharan African countries, SFIs need to be supported by strong political commitments and institutions (such as enhanced transparency and accountability) to implement saving for rainy days. Frankel, Vegh, and Vuletin (2013) find that IQ plays a key role in reducing procyclicality, using data from advanced and emerging market economies. Bova, Medas, and Poghosyan (2016) point out

¹⁹ See IMF country reports on Chile (IMF 2013a and 2015a).

²⁰ Ossowski and others (2008) and Bova, Medas, and Poghosyan (2016) find that adoption of SFIs does not seem to reduce procyclicality in a significant way, but the quality of political institutions does matter.

that the quality of institutions in resource-rich countries that have been successful in limiting the negative impact of commodity price volatility (namely Botswana, Chile, and Norway) is significantly higher than that of their peers. Third, Chile's fiscal institutions may provide valuable lessons for many sub-Saharan African countries. An important element of the Chile's framework is that it is holistic, in the sense that spending levels are set in line with "smoothed" revenue estimates and an SWF is properly integrated with the fiscal policy anchor (savings come from budget surpluses) and the budget (for example, no extra-budgetary spending authority).

6

Conclusions

Sub-Saharan African countries have in general run procyclical fiscal policies since 2000. This is not surprising in light of the fact that the majority of them are low-income and/or resource-dependent economies; existing literature finds that the fiscal policies of the majority of emerging market countries are still procyclical and that procyclicality is pronounced among resource-rich countries. The procyclicality of fiscal policy was exacerbated after the global financial crisis in 2009, particularly among sub-Saharan African oil exporters. This is somewhat worrying, given that these countries may have to face a prolonged period of low international commodity prices with depleted policy buffers in coming years.

This paper examined what explains the degree of fiscal policy procyclicality among sub-Saharan African countries. The results suggest that, even when correcting for endogeneity and other possible determinants, deep domestic financial markets and ample international reserves coverage could help countries run less procyclical fiscal policies. For instance, a lack of financial depth and reserves buffers would constrain a country to take expansionary fiscal policies during downturns. At the same time, to promote financial depth and build up reserves buffers, which would make it possible to avoid massive fiscal tightening in bad times, a country should accumulate financial savings (through overall fiscal surpluses) based on part of revenue windfalls in good times.

Although the regressions in this paper fail to find a statistically significant role for institutional strength in reducing the procyclicality of fiscal policy, the country case studies here and existing literature suggest that special fiscal institutions—fiscal rules and stabilization/saving funds—supported by strong political commitment and institutions should help build savings for rainy days. The experiences of Botswana and Chile may offer useful lessons for many sub-Saharan African countries.

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Appendix I

Data Sources and Definition of Variables

The data source for the analysis is the IMF's 2015 Spring *World Economic Outlook* database, except for institutional quality and trading partners' output volatility. The country sample comprises 43 sub-Saharan African countries: all sub-Saharan African countries excluding South Sudan and Zimbabwe. The sample period extends from 2000 to 2014 for all countries, except for Cabo Verde (2002–14), Chad (2004–14), Malawi (2002–14), Niger (2006–14), and São Tomé and Príncipe (2001–14).

Gross domestic product (GDP): Series Nominal Gross Domestic Products (NGDP) is used for countries other than resource-rich countries. See footnote 4 for the definition of resource-rich countries and which countries are classified in that category.

Nonresource GDP: GDP excluding value added of the commodity sector is used for resource-rich countries.

Output gap: Difference between actual real GDP and potential real GDP in percent of potential GDP. NGDP is deflated by the GDP deflator to calculate real GDP. Potential real GDP is the trend of real GDP calculated by the Hodrick-Prescott filter. See footnote 6.

Nonresource output gap: Difference between actual real nonresource GDP and potential nonresource real GDP in percent of nonresource potential GDP. Nominal nonresource GDP is deflated by the nonresource GDP deflator to calculate real nonresource GDP. Potential real nonresource GDP is the trend of real GDP calculated by the Hodrick-Prescott filter.

Primary fiscal balance: Measured as government revenue excluding grants minus primary expenditure. Primary expenditure is total expenditure and net lending minus interest payments by the government.

Nonresource primary fiscal balance: Measured as government revenue excluding grants, and commodity revenue minus primary expenditure.

Institutional quality (IQ): The World Bank's Worldwide Governance Indicators for the period of 1996–2012 are the data source. Chapter 4 explains how the index of IQ for each country is calculated.

Financial depth: Measured as credit to the private sector in percent of GDP. See Chapter 4.

Financial openness: Measured with the Chinn-Ito financial openness index (Chinn and Ito 2006), which measures a country's degree of capital account openness. The data cover the period 2001–11.²¹

Debt-to-GDP ratio: Measured as total general government debt in percent of GDP at the end of year.

Foreign reserves coverage: Measured as the holdings of foreign exchange under the control of monetary policy (gross international reserves) at the end of the year in months of imports of goods and services in the current year.

Terms-of-trade volatility: Measured as the variance of series TT (terms of trade, goods, and services) from 2015 Spring *World Economic Outlook* database during the period of 2001–13.

Trading partners' output volatility: Measured as the variance of an index of real GDP growth of each of the country's five biggest trading partners, following Ilzetki and Vegh (2008). Trade partners' growth was weighted by the share of the country's total exports to each of its trading partners, taken from the IMF's *Direction of Trade Statistics*. Finally, each country's weighted-trade-partner growth was deflated by the country's average ratio of exports to GDP over the sample period to calculate the index of the real GDP growth of trading partners' growth.

²¹ Database of Chin-Ito index was updated in 2013 is used for this paper.

Appendix II

Endogeneity Concern: Do Output Shocks Drive Fiscal Policy, or Do Fiscal Policy Shocks Drive Output Shocks?

Following Ilzetzki and Vegh (2008), this paper relies on a few econometric tests to show supporting evidence for the notion that output shocks drive fiscal policy among sub-Saharan African countries.

First, a panel GMM estimation is run to see whether the behavior of fiscal policy in sub-Saharan African countries is reacting to output shocks or causality is running from the opposite side in a following specification:

$$g_{it} = \alpha_i + \beta y_{it} + \varepsilon_{it}$$

where y_{it} is the cyclical component of real output of country i in year t , g_{it} is the cyclical component of real primary government spending, and β is the parameter of interest, which reflects the cyclicity of primary spending, the fiscal policy instrument of the government. Cyclical components of output and primary spending are measured as the percentage deviation from the trend calculated by Hodrick-Prescott filter. If the coefficient β turns out to be significantly positive even after properly instrumented, it will indicate that fiscal policies in sub-Saharan African countries are procyclical. The instrument for this GMM estimation is the weighted real output growth of each country's trading partners, change in each country's terms of trade (TOT), and change in real interest rate on six-month U.S. Treasury bills (proxy for the global liquidity condition).²²

Table A1 reports the result of this panel GMM estimation. An over-identification test does not reject the null that the instruments are valid at a conventional significance level. The coefficient on the cyclical component of real output is positive and significant at the 5 percent level. This implies that output shocks are causing fiscal policy shocks among sub-Saharan African countries even after properly instrumented.

Second, a Granger causality test of the cyclical components of real output and real primary fiscal spending is conducted. Table A2 reports the results. At the 5 percent significance level, the null that output shock does not Granger-cause fiscal primary spending shock can be rejected. Meanwhile, the null that fiscal primary spending shock does not Granger-cause output shock cannot be rejected at a conventional significance level.

²² Choice of this set of instrumental variables follows Ilzetzki and Vegh (2008).

Those econometric tests provide evidence supporting the implicit assumption used in this paper: output shocks drive fiscal policy among sub-Saharan African countries.

Table A1. Panel GMM Estimates

Variable	Coefficient	t-statistics
Constant	-0.194	-0.879
Real GDP cycle	1.857	2.227 **

Statistics

Hansen's J-statistics (p-value in brackets)	3.512 [0.173]
Number of observations (unbalanced panel)	826
Number of countries	43

Source: Authors' estimation.

Notes: Estimations are performed using panel GMM with country-fixed effects.

*, **, and *** indicate statistically significant at 10 percent, 5 percent, and 1 percent levels, respectively. Dependent Variable: Cyclical components of real government primary spending. Instrumented Variable: Cyclical components of real GDP.

Instruments: Weighted average of real GDP growth of trading partners; Change in TOT; Change in real interest rate on 6-month U.S. Treasuries.

Table A2. Pairwise Panel Causality Tests

Null hypothesis	Zbar statistics	p-value
Real government primary spending cycle does not Granger-cause real GDP cycle	-0.762	0.446
Real GDP cycle does not Granger-cause real government primary spending cycle	2.054	0.040 **
Number of observations		860

Source: Authors' estimation.

Notes: Tests are performed using Dumitrescu-Hurlin (2012) approach.

*, **, and *** indicate statistically significant at 10%, 5%, and 1% levels, respectively.

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