

Fiscal Rules

Coping with Revenue Volatility in Lesotho and Swaziland

*Jiro Honda, Fernando Im, Natalia
Koliadina, Murna Morgan, Manabu
Nose, Cesar Sosa Padilla, and Jose
Torres*

African Department

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**Jiro Honda, Fernando Im, Natalia Koliadina, Murna Morgan,
Manabu Nose, Cesar Sosa Padilla, and Jose Torres**

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Overview

Over the past decade, Lesotho and Swaziland have faced significant volatility in their fiscal revenues, owing to highly unstable Southern African Customs Union (SACU) receipts. Based on model analysis, this paper explores the advantages of implementing fiscal rules to deal with such volatility. It finds that the use of a structural balance target could smooth the growth impact from revenue shocks while helping preserve sufficient international reserves during bad times. From a long-term perspective, it suggests possible welfare gains from introducing fiscal rules. Last, it concludes that, based on experiences in other countries, developing strong institutions and improving public financial management are necessary steps to ease the transitions to a rules-based fiscal policy framework.

Introduction

Managing fiscal revenue volatility is a serious policy challenge for many countries. Over the past decade, Lesotho and Swaziland have faced significant revenue volatility, largely owing to highly unstable SACU receipts. A reduction in receipts typically leads to a fiscal adjustment and contraction in domestic absorption, weakening short-term economic growth, worsening fiscal and external balances, increasing government debt, and lowering international reserves.¹ Following the 2008–09 global financial crisis, for instance, SACU earnings for Lesotho and Swaziland declined from an average 25 percent of GDP in 2009/10 to 12 percent in 2010/11, followed by a sharp recovery in 2012/13 (to reach 24 percent). During this period, Swaziland experienced a fiscal crisis, while Lesotho faced significant balance of payment needs and called for IMF financial assistance under the Extended Credit Facility. These experiences highlight the importance of securing fiscal and external buffers (i.e., accumulation of international reserves or other type of precautionary savings), to help ensure fiscal sustainability, reduce the likelihood of boom-bust cycles (mitigating procyclicality), and support sustainable growth.

In light of such experiences, assuming no immediate changes in the revenue-sharing formula, this paper (1) explores if a fiscal rule can mitigate the short-term adverse effects of revenue volatility, (2) examines whether such rules are welfare enhancing over the long term, and (3) recommends a roadmap for transitioning to a rules-based fiscal framework based on lessons from other countries.

¹The existing SACU revenue-sharing formula also amplifies the procyclical nature of the fiscal transfers and its volatility, as the receipts are heavily dependent on South Africa's imports, which generate about 90 percent of the SACU revenue pool (Basdevant 2012).

CHAPTER

1

Policy Challenges and Constraints

Policy Challenges Associated with SACU Revenues

SACU revenues have been a sizable but volatile source of revenue for Lesotho and Swaziland (Table 1). Under the SACU agreement, customs duties on imports of member states (including reexports) and excise proceeds are pooled and shared among its members (Botswana, Lesotho, Namibia, South Africa, and Swaziland) according to a revenue-sharing formula. SACU revenues also represent an important source of foreign inflows and contribute to the stock of international reserves.

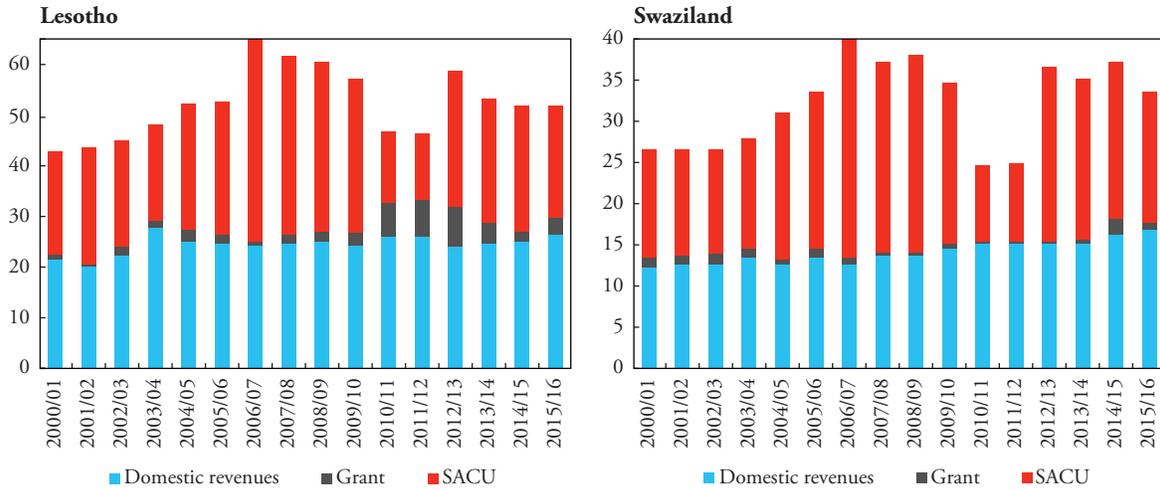
SACU revenues pose important challenges to fiscal policy, such as the following:

- *Volatility:* SACU receipts have been highly volatile over the past decade for these countries, with abrupt changes of more than 10 percentage points of GDP (Figure 1a) in a year. The volatility is due to (1) the performance of South Africa's economy, (2) the forecast-based revenue transfers and the adjustment mechanism (Appendix 1), and (3) the relatively large share of

	% of GDP	% of total revenues
Botswana	10	26
Namibia	11	34
Lesotho	26	47
Swaziland	19	54

Sources: the country authorities and staff estimates.

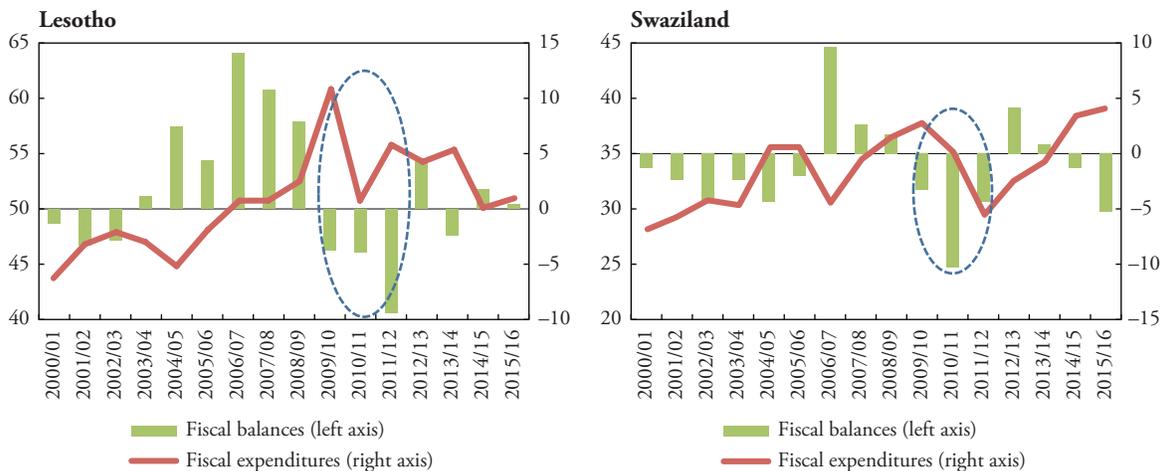
Figure 1a. Composition of Fiscal Revenues
(Percent of GDP)



Source: Country authorities; and IMF staff estimates.

SACU receipts derived from customs duties (as imports tend to be more volatile than output).¹ The volatility of SACU revenues have led to large swings in fiscal balances and/or increased expenditure volatility (Figure 1b),

Figure 1b. Fiscal Balances and Expenditures
(Percent of GDP)



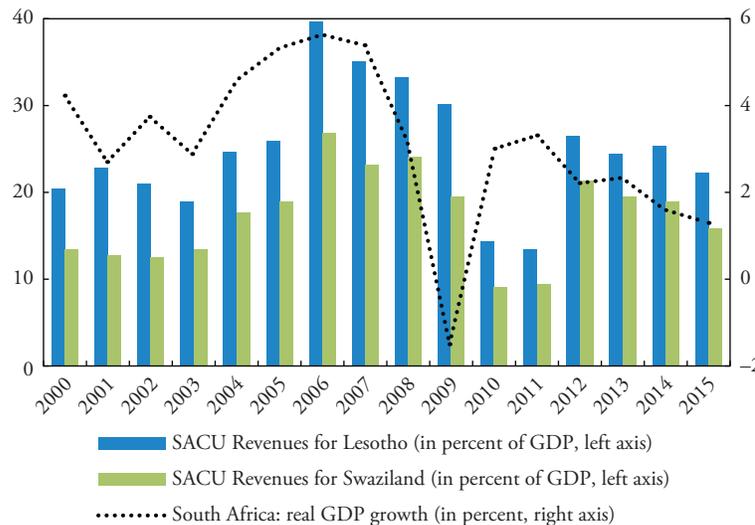
Source: Country authorities; and IMF staff estimates.

¹Changes in effective duty rates and exchange rate volatility could also affect SACU revenue. For details see Mongardini et al. (2013), p. 43.

leading to large fiscal deficits and a significant forced fiscal consolidation in the wake of the 2010 decline in SACU revenues. High spending volatility may undermine the achievement of medium-term fiscal objectives and adversely affect long-term growth (Box 1).

- *Procyclicality*: Both countries are highly susceptible to South Africa’s business cycle given its dominant size and regional influence. SACU revenues rapidly increased in the mid-2000s (Figure 2) owing to South Africa’s strong economic performance and a larger revenue pool under the revised revenue-sharing formula (in 2002). This revenue buildup—which preceded the 2008–09 global financial crisis—resulted in significant budget expansions in these countries, which further buoyed their robust growth with procyclical fiscal policies.
- *Uncertainty*: Under the current arrangement, annual transfers for the following year are agreed among member states at the council meeting at the end of the year based on revenue prospects. However, predicting SACU revenues is challenging, as evidenced by the large forecast errors of the South African Treasury in its budget documents (Figure 3).² Naturally, these deviations make budget planning difficult—particularly for Lesotho and Swaziland, which are highly dependent on such receipts. The prospects for SACU revenues remain uncertain, with expected secular declines in coming years (largely reflecting the slowdown in South Africa’s economy).³

Figure 2. SACU Revenues for Lesotho and Swaziland and South Africa’s GDP Growth

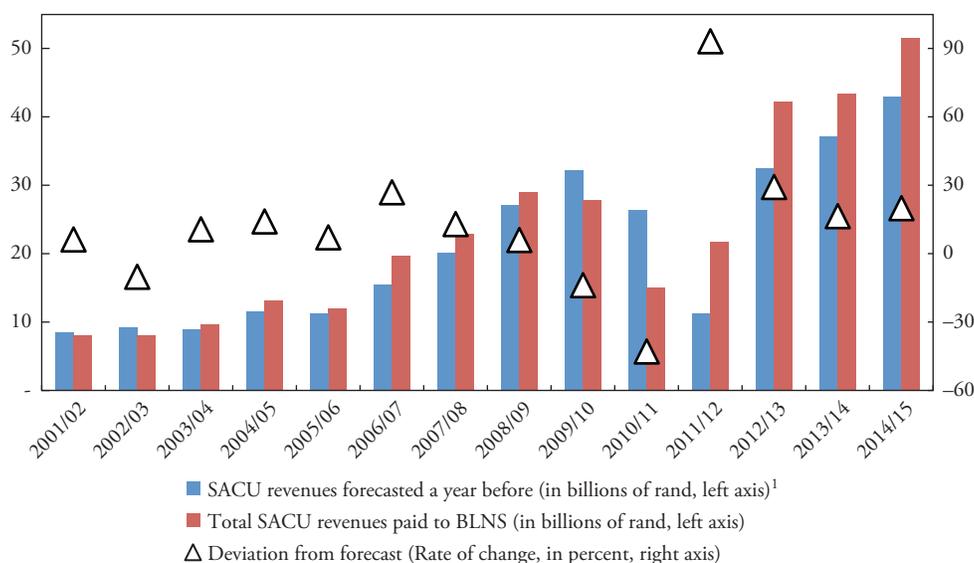


Source: Country authorities; and staff estimates.

²Payments from the SACU revenue pool for Botswana, Lesotho, Namibia, and Swaziland (BLNS) are projected in South Africa’s budget documents.

³Over the long term, a decline in SACU revenue could also result from (1) a reduction in the common external tariff rates owing to trade liberalization, (2) a change in the revenue-sharing agreement, and (3) low import growth of the South African economy (Basdevant and others 2011).

Figure 3. SACU Revenues for Botswana, Lesotho, Namibia, and Swaziland: Forecasts and Outturns



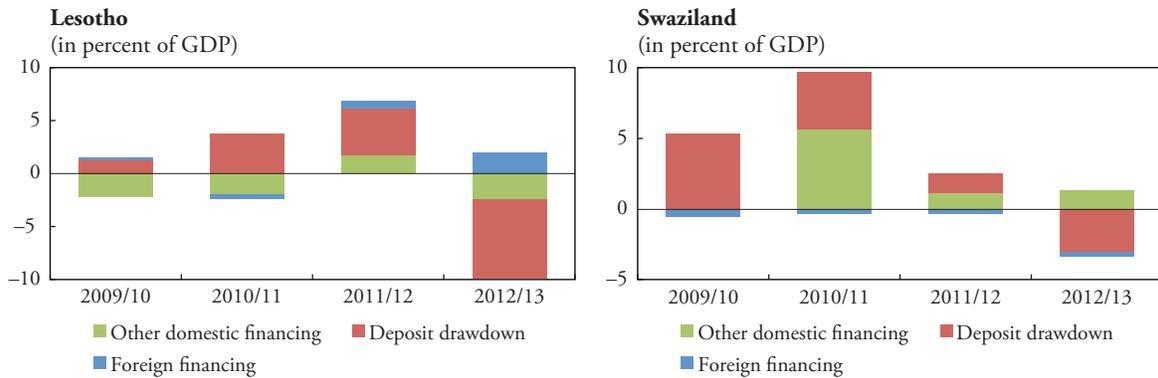
Source: Country authorities; and IMF staff estimates.
¹Based on the projections in the previous year's budget document.

Policy and Institutional Constraints

Addressing their fiscal challenges is critical for Lesotho and Swaziland in light of the following policy constraints:

- *Scope for exchange rate and monetary policies is limited under the exchange rate peg to the South African rand at parity* (under the Common Monetary Area arrangement). This arrangement has provided both countries with a nominal anchor and facilitated trade and capital flows, although it virtually eliminates their ability to use monetary and exchange rate policies to mitigate shocks.
- *External financing is scarce.* Both Lesotho and Swaziland have limited access to international financing, which further constrains their ability to mitigate shocks (Figure 4).
- *Insufficient international reserves provide a limited buffer to SACU shocks.* Countries without adequate savings (international reserves) would be forced to make greater adjustments in a shorter period in response to exogenous shocks. In Lesotho and Swaziland, despite the significant drawdown of their holdings of reserves after the 2010 decline of SACU revenues (Figure 4), large and rapid fiscal consolidation was required—which suggests that reserves were too low at the onset of the crisis because they did not provide sufficient buffer to the shock.

Figure 4. Financing Sources for Government Deficit



- *Dominant public sector and economic rigidities.* In Lesotho and Swaziland, the private sector is small and economic distortions limit market flexibility (e.g., restrictions on land sales and infrastructure bottlenecks in labor-intensive sectors). Institutional weaknesses in the financial sector also constrain access to finance for small and medium-sized enterprises. As a result, the response to a revenue shock relies primarily on the public sector.

In light of these policy and institutional constraints, the burden of fiscal adjustment falls primarily on fiscal policy. A decline in SACU revenues that is not offset by a proportional fiscal consolidation would worsen fiscal and external balances. For a temporary shock, financing sources could be explored, although Lesotho’s and Swaziland’s access to external financing has been limited (in the absence of access to international capital markets). In the meantime, while the SACU revenues for the following fiscal year are known by the end of each year, contemporaneous spending adjustment to fully offset significant SACU revenue fall is difficult owing to fiscal spending inertia. Thus, the 2010–11 revenue fall resulted in increases in public domestic debt and declines in international reserves. Despite these challenges, given the peg to the rand, in the absence of other policy adjustment mechanisms, the burden of adjustments falls primarily on fiscal policy, which should be consistent with maintaining adequate external balances while securing fiscal sustainability.

Addressing Fiscal Policy Volatility in Lesotho and Swaziland

Can Fiscal Rules Help?

This section explores possible impacts of fiscal rules to ensure fiscal and external stability in the short term and welfare benefits of fiscal rules over the long term. Many countries with volatile revenues have adopted fiscal rules to insulate the budget and the economy from revenue shocks, sometimes complemented by establishing a stabilization fund (Appendix II). The role of fiscal rules is analyzed based on two stand-alone models:

- A first model—focusing on short-term developments—explores if a rules-based fiscal policy could have stabilizing effects on growth and international reserves even in the presence of economic rigidities and limited policy instruments. It also examines options for mitigating the volatility and procyclicality of fiscal policy in an economy with limited market access.
- A second model highlights the welfare-enhancing role of fiscal rules over the long term, with a real business cycle model for a small open economy.
- The analysis suggests that fiscal rules could mitigate the volatility of economic growth and can be welfare enhancing, providing support for transitioning to a rules-based fiscal policy framework in Lesotho and Swaziland.

Managing SACU Revenue in a “Constrained” Economy

Fiscal rules, by imposing a permanent constraint on fiscal policy, can promote fiscal sustainability and credibility. As Ter-Minassian 2010 and Corbacho and Ter-Minassian 2013 suggest, a well-designed and effectively implemented fiscal rule may help to (1) alleviate time inconsistency in fiscal policy (in the run-up to elections), (2) mitigate a deficit bias, (3) increase policy credibility as a signaling device of commitment to fiscal sustainability, (4) prevent coordination failures, (5) mitigate the “common pool” problem, and (6) facilitate a countercyclical fiscal policy.

This section explores options for managing SACU revenue shocks to lower output volatility. The policy experiments are conducted with a dynamic equilibrium model developed by Berg and others (2010a).¹ It includes a set of short-term constraints, including the lack of access to financing and nominal price rigidities.² The model is designed for a small open economy, comprising (1) two types of firms producing traded and nontraded goods, (2) two types of households—savers and liquidity-constrained households, (3) a central bank in charge of accumulating international reserves, and (4) the government, which receives and manages SACU revenues. The nontraded sector faces monopolistic competition and nominal price rigidities.

The model also incorporates other characteristics of Lesotho and Swaziland. These characteristics include (1) a fixed exchange rate regime, (2) no access to international financial markets and limited scope for domestic borrowing, and (3) the absence of short-term domestic revenue measures to offset the decline in SACU revenues. The decision on the level of reserves rests with the fiscal authorities, and any increase in government deposits at the central bank automatically increases international reserves, with no implications for reserve money or private sector credit. SACU revenues (R_t^{sa}) are assumed to follow a deterministic path (two periods of positive shocks followed by two periods of negative shocks of the same magnitude, in light of the experiences in 2008–11 in Swaziland and Lesotho).³

Government deposits are accumulated when SACU revenues increase above their steady-state level \bar{R}^{sa} , as defined in Equation (1) below, and the speed of accumulation depends on the spending policy parameter σ . The

¹The model was developed to formulate country-specific aid scaling-up scenarios as part of the United Nations Millennium Development Goals Africa Steering and Working Groups, and has been applied for several African countries.

²For the detailed description of the model, see Berg and others 2010a, p. 7.

³Naturally, SACU revenues are volatile in the real world. However, the objective of the exercise is not to downplay this important feature but to highlight that a fiscal rule could help to better manage the surge and collapse of SACU revenues commonly experienced by these countries. Moreover, the second model introduces the randomness element, which is crucial for the welfare analysis.

fiscal authority adjusts the level of public spending according to this fiscal rule, which requires the government to deposit SACU surpluses at the central bank during good times (when SACU revenues exceed their steady-state level) and withdraw in bad times.⁴ If the spending policy parameter takes the value of 0, the government fully adjusts its spending to the cyclical increase/decrease in SACU revenues, which corresponds to a balanced budget rule (BBR). If the spending parameter is 1, expenditures do not respond to cyclical changes in SACU, which is essentially a structural surplus rule (SSR).⁵

$$d_t^g = \gamma(R_t^{sa} - \overline{R^{sa}}) \quad (1)$$

The central bank sets its reserves target at the steady-state levels of reserves (\overline{IR}) and nominal depreciation of the currency ($\overline{\pi^S}$), SACU transfers in excess of the steady-state level $\overline{R^{sa}}$, and the current account surplus (CA_t) in excess of the steady-state level (\overline{CA}) as defined in Equation (2). Under a fixed exchange rate regime, ω_S is set to a very large value—a prohibitive penalty for deviating from the targeted nominal exchange rate—to ensure that the exchange rate peg is maintained. The central bank is assumed to use SACU-related inflows to accumulate reserves without any absorption in the domestic market.

$$IR_t = \overline{IR} + (R_t^{sa} - \overline{R^{sa}}) + (CA_t - \overline{CA}) - \omega_S(\pi_t^S - \overline{\pi^S}) \quad (2)$$

The analysis is based on numerical simulations at the annual frequency calibrated for Lesotho and Swaziland using this micro-founded model.⁶ The initial steady-state ratios are calibrated based on 2013 data from national accounts and public sector balance sheets, when SACU revenues were close to their steady-state levels. International reserves in the initial steady state are set to cover five months of imports for both countries.⁷ Structural parameters are determined by microeconomic evidence and structural empirical estimates

⁴This model focuses on international reserves (rather than on public debt), in light of the short-term policy objective to secure sufficient international reserves under the Common Monetary Area (CMA) and the relatively large government deposits (the deposits reach about 27 percent of GDP for Lesotho and 9.5 percent for Swaziland in 2014). Neither country has access to international capital markets, although they could gain access over the long term.

⁵Under the assumption of no domestic or international borrowing, the change in government deposits maps into “above-the-line” fiscal operations. In this setup, no change in government deposits means a BBR.

⁶The equilibrium definition is available in Berg and others 2010a with modifications for the government deposit accumulation (Equation [(1)] and the international reserve accumulation (Equation [2]) as defined above.

⁷For both countries, this level of international reserves is adequate, based on IMF staff’s estimates (IMF 2015, 2016).

as in Basdevant and others 2011.⁸ The calibration captures the differences in economic structures of the two countries, specifically a greater public and private consumption in traded goods and bigger traded sector's share in terms of GDP in case of Lesotho, compared with Swaziland.

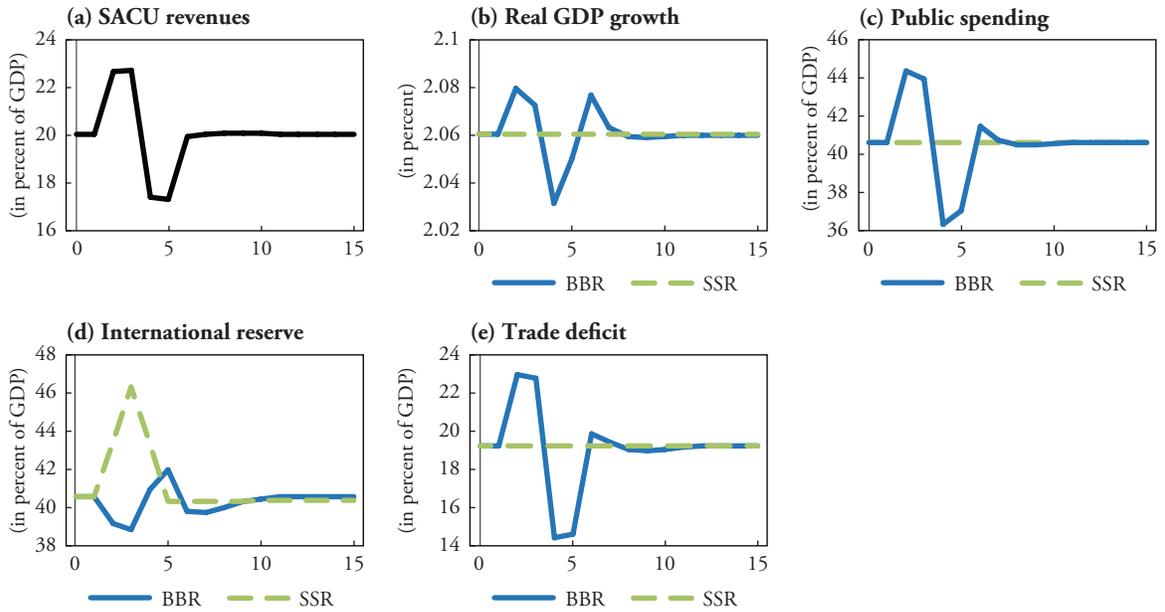
Under the baseline scenario, the spending policy parameter is assumed to be 0; thus, the government secures a fiscal balance at any time (a BBR rule). SACU revenues in excess of their steady-state level are used to finance higher government spending (bold lines in Figures 5a and 5b). Thus, government spending replicates revenue fluctuations. In the first two periods, when revenues exceed their long-term level, growth temporarily increases with the additional spending. The trade deficit widens because of the higher import demand and real exchange rate appreciation that results from the increase in the price of nontradables. However, Lesotho faces a greater trade deficit (Figure 5a panel [e]) because the initial increase in revenues creates a temporary boom in the tradables sector owing to the country's dependency on this sector.⁹ In the next two periods, all variables endure a similar shock with opposite sign, as revenues fall below their steady-state level. The boom-and-bust of domestic demand in tradables creates larger oscillations in international reserves for Lesotho, while they remain close to their steady-state level for Swaziland. The simulations demonstrate that, under a BBR, which closely resembles the behavior of fiscal policy in Lesotho and Swaziland in recent years, the volatility in revenues is fully transmitted to expenditures and, subsequently, to growth.

Under an alternative scenario, the spending parameter is assumed to be 1, which means the government achieves a structural fiscal balance (an SSR rule). Thus, SACU revenues in excess of their steady-state level are saved in the first two periods and withdrawn in the next two periods, to finance additional spending when SACU revenues fall below their steady-state level (dotted lines in Figures 5a and 5b). Thus, this scenario smooths public spending at its structural level, mitigating growth volatility. Fiscal policy alleviates the fluctuations in domestic demand, particularly for nontradable goods. The rule enables the government to increase its reserves from 40 percent to about 46 percent of GDP for Lesotho (from 25 percent to 33 percent for Swaziland) during the first two periods (good times), which are then used to stimulate the economy during bad times.

⁸See Appendixes 2 and 3 for the parameters in the baseline calibration.

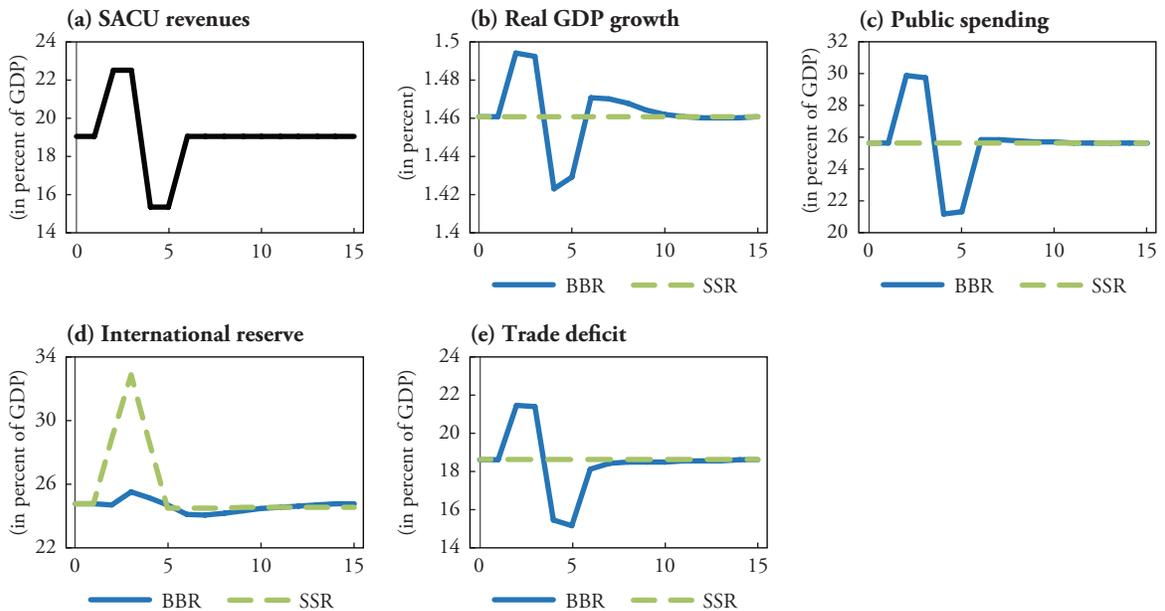
⁹The larger trade deficit in Lesotho also results from a "learning-by-doing" externality in the tradables sector that augments the productivity in the sector when production increases. As Lesotho relies more on the consumption of traded goods, this creates a temporary boom that widens the trade for a few periods until the externality vanishes.

Figure 5a. Policy Experiment: Impulse Responses to SACU Revenue Shocks
(Lesotho)



Source: IMF staff estimates.

Figure 5b. Policy Experiment: Impulse Responses to SACU Revenue Shocks
(Swaziland)



Source: IMF staff estimates.

The analysis confirms that the intertemporal expenditure smoothing of an SSR helps the government to avoid the boom-bust cycles induced by SACU revenue shocks. The large swings in SACU revenues are fully transmitted to expenditure and growth under a BBR. On the other hand, the adoption of an SSR would help to increase international reserves during good times while preserving macroeconomic stability, which could be used to sustain public spending during bad times.¹⁰ Building fiscal and external buffers through an SSR would contribute to ensuring fiscal sustainability, reducing the likelihood of boom-bust cycles, and supporting sustainable growth.

Although this analysis suggests more favorable outcomes with an SSR, it would involve operational challenges in estimating the steady-state level of SACU revenues. Few attempts have been made to estimate the steady-state level of SACU revenues, although we could draw from the experiences of a price-based fiscal rule in resource-rich countries (in which the reference/benchmark commodity price is set). Similar to this exercise, a formula to estimate steady-state SACU revenues can be explored based on long-term trends as suggested by Cuevas and others 2012. Specifically, given that the SACU revenues for a member state depend on the total SACU revenue pool and the member state's share, steady-state revenues could be estimated based on the historical trend of the total SACU revenue pool and the country's share. Alternatively, the use of a historical average of the revenue-to-GDP ratio could also be explored. Either way, a formula to estimate steady-state revenues should be cautiously considered in view of downside risks for SACU revenues (in light of the recent weakening of the South African economy and the expected revision to the revenue-sharing formula) and evaluated over time.

Welfare-Enhancing Role of Fiscal Rules¹¹

While the above analysis demonstrates the short-term stabilizing effects of fiscal rules on growth and international reserves, it is also important to examine if such rules could be welfare enhancing for Lesotho and Swaziland over the long term. Existing studies (that use models with non-Ricardian features) suggest that a structural surplus rule can be welfare enhancing (Kumhoff and Laxton 2009, 2013; Bi and Kumhoff 2011; Garcia, Restrepo, and Tanner 2011). In these models, fiscal rules help to strengthen fiscal discipline and improve government credibility, as well as reduce the effects of economic shocks on agents with a limited borrowing

¹⁰Offering specific advice on the detailed design of fiscal rules is beyond the scope of this paper, in particular because the fiscal rules have to be tailored to specific objectives and economic characteristics of countries, the country's institutional and legal framework, and its macroeconomic conditions.

¹¹Based on Im, Sosa-Padilla, and Torres 2015.

capacity. In particular, a structural surplus rule, consistent with accumulating precautionary buffers, could help the government to mitigate the welfare effects of shocks. Kumhoff and Laxton (2013), for instance, find that a structural surplus rule can be welfare improving, compared with a balanced budget rule. Similarly, Garcia and others (2011) report that the implementation of a structural surplus rule improves the welfare of liquidity-constrained households.

Rules-based fiscal policy helps mitigate the volatility of consumption by liquidity-constrained consumers. Although the overall aggregate impact on welfare is positive, a structural surplus rule could reduce the welfare of agents with access to finance, as government borrowing at the time of shock could affect financing costs (Garcia, Restrepo and Tanner 2011; Im, Sosa-Padilla, and Torres 2015). Under a structural surplus or a countercyclical rule, the volatility of consumption of liquidity-constrained households is greatly reduced because the government borrows to smooth consumption of liquidity-constrained agents. Thus, the welfare analysis would ultimately reflect a trade-off between rich agents (with access to finance), which have sufficient assets to endure a temporary reduction in income without lowering their consumption, and poor agents (with no access to finance), which are forced to immediately adjust their consumption after a bad shock. Fiscal policy can smooth the consumption of poor agents, but depending on the instruments used, the resulting distortions in the economy could affect the welfare of rich consumers, which did not need the government's intervention in the first place, as they are capable of smoothing their consumption without the government's interference.

In this section a stochastic real business cycle model for a small open economy, with shocks to SACU revenue, is used to illustrate the possible welfare implications of fiscal rules for Swaziland and Lesotho.¹²

The model showcases the potential role of fiscal policy in an economy with a significant share of liquidity-constrained agents that cannot smooth their consumption intertemporally. The model has three sectors: households, firms producing final goods, and the government. Two types of households have identical preferences but different borrowing constraints: (1) Ricardian households have access to both domestic and international financial markets and accumulate physical capital over time, and (2) liquidity-constrained households have no access to finance and cannot accumulate physical capital.

This second model is designed to analyze welfare in the long term. The main differences are that the first (short-term) model (1) is deterministic (to keep the results more tractable), (2) incorporates price rigidities such that government spending has a short-term effect on GDP growth, (3) does not

¹²See Im, Sosa-Padilla, and Torres 2015 for a full description of the model.

have public debt because it highlights the role of international reserves, (4) includes a nontradables sector, and (5) incorporates an exchange rate peg. However, the second model allows for a richer analysis of fiscal rules and instruments while exploring the implications of public debt. Over the long term, it is assumed that both countries would achieve adequate international reserves and have access to capital markets; thus, public debt would be the most important policy variable (rather than the level of reserves). Thus, the two models are complementary, as they allow the analysis of both stabilization (short-term) and welfare (long-term) considerations.

The government follows a structural rule according to the following equation:

$$\frac{S_t}{Y_t} = \bar{s} + d^{tax} \left(\frac{T_t - \bar{T}}{Y_t} \right) + d^{SACU} \left(\frac{R_t^{SA} - \bar{R}^{SA}}{Y_t} \right) + d^{debt} \left(\frac{B_t}{Y_t} - \bar{B} \right) \quad (3)$$

where S_t is the fiscal surplus, Y_t is GDP, and \bar{s} is the structural surplus target (expressed as a fraction of output). \bar{T} , \bar{R}^{SA} , and \bar{B} are the steady-state levels of total tax revenues, SACU revenues, and government debt-to-output ratio, respectively. d^i for $i = \{tax, SACU, debt\}$ are feedback coefficients for the respective “gaps” in the rule (either taxes or spending, SACU transfers, or debt). Parameter values for feedback coefficients determine whether the structural rule corresponds to a BBR, an SSR, or a countercyclical rule (CCR). Tax or SACU revenue feedback coefficients (d^{tax} ; d^{SACU}) of 0, 1, or greater than 1 imply a BBR, SSR, or CCR, respectively. The government does not borrow under a BBR, similar to a situation of no market access.

The following are the major welfare implications of the three fiscal rules:

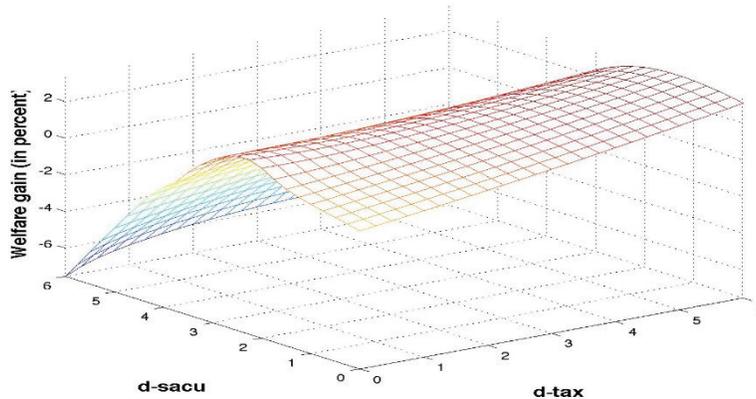
- *BBR* ($d^{tax} = 0$; $d^{SACU} = 0$) targets a balanced budget in good and bad times. It requires an instantaneous adjustment to shocks by cutting expenditures, with no possible changes in public debt or international reserves, leading to extreme procyclicality. A decline in SACU revenues, resulting from a negative shock, would require an identical reduction in spending on household transfers, government’s consumption, or investment, amplifying income volatility and severely affecting the consumption of liquidity-constrained households (reducing their welfare).
- *SSR* ($d^{tax} = 1$; $d^{SACU} = 1$) targets a long-term fiscal surplus/balance. A shortfall in revenue, after a negative SACU shock, is offset by borrowing (increasing debt) or drawing down government savings (international reserves). The SSR provides more time for adjustment than the BBR, by allowing expenditure to remain unchanged in the short term, and thus alleviating procyclicality. Over the medium term, as SACU revenues return

to their long-term value, the rule requires restoring the pre-shock structural surplus by reducing expenditures (and indebtedness).

- *CCR* ($d^{tax} > 1$ $d^{SACU} > 1$) also targets a long-term fiscal balance but allows for even greater smoothing of private consumption compared to an *SSR* rule. After a negative shock to *SACU* revenues, the government increases its spending financed by borrowing in excess of the size of the shock, to further smooth private consumption. Because a *CCR* is more effective than an *SSR* in stabilizing the consumption of liquidity-constrained households, a countercyclical fiscal policy is welfare enhancing. A *CCR*, however, requires greater debt accumulation during the adjustment period than an *SSR*.¹³

The optimal coefficients in the fiscal rule is determined by comparing the expected present discounted value of utility, evaluated at optimal levels of consumption and labor for Ricardian and liquidity-constrained households. This allows us to compute a compensating variation welfare metric for different regimes and household types. Figure 6 presents welfare gains for different values of feedback coefficients (d^{tax}, d^{SACU}) relative to the *BBR* benchmark. A positive value indicates that households in this economy prefer a pair of (d^{tax}, d^{SACU}) compared to the benchmark. The graph suggests that agents prefer to live in an economy where a structural rule responds as much as pos-

Figure 6. Consumption Compensation
(Percentage)



Note: A positive number means that agents prefer the j^{th} coefficient combination to the benchmark's ($d^{tax} = d^{SACU} = 0$).

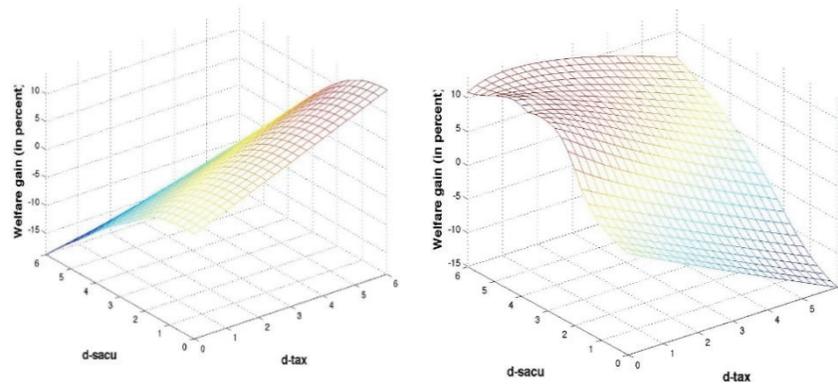
¹³The first model does not explore a *CCR* rule because of its focus on international reserves. At present, securing/maintaining adequate international reserves is a policy priority for both countries, and increasing the government's reserve holdings by more than the cyclical increase in *SACU* revenues (during good times) would not be realistic in the short term.

sible to deviations in tax and SACU revenues. The optimal combination of coefficients ($d^{tax} = 6, d^{SACU} = 1.25$) entails a strongly countercyclical fiscal rule to yield the largest welfare gains (relative to the benchmark economy).

Figure 7 illustrates that the results are mainly driven by liquidity-constrained agents, who prefer a very aggressive countercyclical fiscal policy. This policy makes greater use of debt—if a negative shock takes revenues below their steady-state value, the surplus would be reduced by more than the size of the shock because $d^{tax} > 1$, implying an increase in transfers financed by borrowing. Ricardian agents faced with lower than average tax revenues would instead prefer a reduction in transfers, not additional government borrowing, which leads to higher financing costs and, perhaps, and a possible increase in tax rates in the medium term. Liquidity-constrained agents, on the other hand, prefer high levels of transfers to help them smooth their consumption.

The model therefore suggests that fiscal rules can reduce consumption volatility and improve the welfare of liquidity-constrained, and usually vulnerable, households. Thus, the average agent in the economy prefers a structural rule that is highly countercyclical in both SACU revenue and fiscal spending. This, however, comes at a cost for Ricardian agents, with access to finance, that instead would prefer the lowest possible response to the shock. However, a CCR leads to higher welfare for the population as a whole, because the gains of liquidity-constrained agents more than offset the losses of Ricardian agents.

Figure 7. Consumption Compensation by Type of Household
(Percentage)



Note: A positive number means that agents prefer the j^{th} coefficient combination to the benchmark's ($d^{tax} = d^{SACU} = 0$). Left panel is for liquidity-constrained agents. Right panel is for Ricardian agents.

From Discretionary to a Rules-Based Fiscal Policy Framework

Groundwork for Successful Fiscal Rules

The experiences of countries with fiscal rules suggest that their success depends on their design, and on legislative and institutional arrangements. Best practices in designing and implementing fiscal rules include (1) clearly defined fiscal objectives to be addressed by the fiscal rule, (2) a fiscal variable to be targeted with a clear link between the numerical target and fiscal objective, (3) a mechanism for dealing with exceptional circumstances and ex post deviations, and (4) a clear statutory basis with effective monitoring and accountability arrangements. Countries with sound Public Financial Management (PFM) tend to have a strong record of complying with their own fiscal rules (e.g., Chile, Botswana).

- Chile's fiscal rule is supported by a solid institutional arrangement with a financial responsibility law (FRL) and a strong political commitment. The FRL (1) provides a clear definition and coverage of the structural surplus that is targeted by the fiscal rule, and (2) emphasizes monitoring and transparency, with the structural balance computed annually by independent experts.¹ The rationale and methodology of the structural surplus rule are laid out in policy papers of the Budget Directorate (Daban Sanchez 2011).
- Botswana has been exercising rules-based fiscal policies that are grounded in strong public financial management and supported by an adequate regulatory framework and good institutions. The 2013 Public Expenditure and

¹The implementation of the structural balance rule is aided by two independent panels of experts to determine potential output and the long-term price of copper (IMF 2009, p. 41).

Financial Accountability (PEFA) assessment noted greater credibility of the budget, as “key budget formulation and execution processes, from expenditure forecasting to expenditure management and control, were working better than previously” (Republic of Botswana 2013, 15).

- The strengths of Botswana’s PFM also include comprehensive and publicly available budget documentation and procurement information, reliable multiyear and annual forecasts in the National Development Plan and the budget, and sound cash management and internal controls of both salary and non-salary expenditure (Republic of Botswana 2013, 17).

Fiscal rules require adequate PFM systems. A clear statutory basis and monitoring mechanisms, transparency and accountability provisions, and enforcement procedures are mandatory (Republic of Botswana 2013, 6). The most important required PFM elements include (1) a top-down budgeting process with a comprehensive budget reporting system, (2) a medium-term budget framework that clearly outlines medium-term fiscal priorities, (3) effective budget execution systems—commitment controls and cash management, (4) reliable data and technical forecasting capacity (to minimize forecasting errors), (5) effective internal and external audit systems (to ensure accountability), and (6) regular publication of fiscal data (to ensure transparency) (Kopits and Symansky 1998, 7; IMF 2009, 11). Fiscal rules are often included in FRLs and monitored by independent institutions, like fiscal councils, to ensure implementation consistency and credibility. It is more difficult to reverse/amend FRLs if they are enacted through constitutions, although only a few countries—France, Germany, Poland, Spain—have constitutional fiscal rules; most are enacted through statutory norms (Schaechter, and others 2012, 23–24; IMF 2009, 32).

Steps Toward a Rules-Based Policy

To successfully implement a rules-based fiscal policy framework in Lesotho and Swaziland, sufficient groundwork would be needed—strengthening the credibility of fiscal policy and of revenue management and expenditure controls, while building institutional and legislative frameworks. Immediate budgetary objectives—alleviating the impact of volatile SACU revenues—need to be rooted in medium-term fiscal plans. Thus, the impact could be mitigated by saving windfalls resulting from positive adjustments of SACU revenues and internalizing the downward adjustments when SACU transfer falls below the steady-state level. Developing a rules-based fiscal framework requires a government commitment to saving SACU revenue windfalls and prudent government spending in good times. This would require broad support of stakeholders amid political pressure. Greater savings

of SACU revenues could be generated, if stakeholders perceive mitigating the volatility of output as welfare enhancing.

Furthermore, enhanced efforts to strengthen PFM systems are also called for. In the recent past, PFM marginally improved and provided scope for discretionary fiscal policy. Annual budgets in Lesotho and Swaziland often deviate from the medium-term fiscal frameworks, resulting from strong expenditure pressures, particularly if revenue is strong. Budget execution is often undermined by inadequate cash management and commitment control.

- PFM reforms remain critical for Swaziland. Reform measures include preparing a coherent medium-term fiscal framework and improving cash management and commitment control. The authority's capacity in undertaking cash flow forecasting or management is limited. A credible annual and medium-term fiscal framework also needs to be developed to move toward a rules-based fiscal policy over the medium term. The enactment of the Public Financial Management Bill is critical to increase the transparency of the budgetary process and to ensure that all expenditures are channeled through the appropriate budgetary procedures.
- PFM reforms are also needed in Lesotho to strengthen budget execution and monitoring. With technical assistance from development partners, renewed efforts have been taken to strengthen PFM (e.g., elevating the steering committee to the ministerial level). However, progress has been limited in strengthening cash management, reconciling government's bank accounts, and improving public investment management. As in Swaziland, medium-term budgeting needs to be strengthened to consider a rules-based fiscal policy.

Budget formulation and execution need to be strengthened to avoid deviations from budget targets. Budget preparation needs to be strengthened to make the overall budget envelope and line ministries' ceilings credible and binding. This could be achieved by setting annual budgetary targets in the context of the medium-term fiscal objectives formulated in the medium-term expenditure framework. Comprehensive and publicly available budget documentation, sound cash management, and internal expenditure controls would help strengthen the fiscal discipline of budgetary agencies.

Strengthening the checks and balances of the budgetary process would improve the credibility of fiscal objectives. The implementation of fiscal objectives and their credibility require political commitment and the transparency of budget formulation and execution. Timely, accurate, and comprehensive reports on budget execution are important for transparency and credibility. These institutional arrangements would need to be enshrined in legislation, like FRL.

Regardless of whether SACU revenues are high or low, there is never a perfect time to commence a rules-based fiscal framework, but the discussions (preparation) toward such a framework could be initiated at any point. Introducing fiscal targets when SACU revenues are high could meet political resistance to savings. When SACU revenues are low, an envisaged countercyclical policy under such a framework could never be introduced if sufficient policy buffers are yet to be built. Ideally a rules-based framework should be introduced when a country has secured sufficient policy buffers (e.g., debt sustainability, adequate international reserves). Although such policy buffers may not have been fully secured in Swaziland and Lesotho, discussions for a rules-based framework could be initiated at any point, as they would require time to implement sufficient groundwork before the introduction of the framework (Box 2).

Conclusion

Under the current SACU arrangement, Lesotho and Swaziland have faced significant volatility in their revenues, largely owing to highly volatile SACU receipts. A significant decline in these revenues, as experienced in 2010–11, would pose serious policy challenges for their heavy reliance on SACU revenues.

To address such policy challenges, it is important to save more in good times to better prepare for bad times. To this end, this paper demonstrated the advantages of fiscal rules in managing volatile SACU transfers. A first model analyzed the short-term impact of fiscal rules on other macroeconomic variables (growth and international reserves, in particular). The analytical results are in line with intuition; a BBR would ensure a fiscal balance without adversely affecting external balances, although it could require sizable fiscal adjustments in response to large negative SACU revenue shocks. Thus, it results in a high volatility of output in the short term. An SSR, on the other hand, saves resources in good times to prepare for bad times. If the rule were to be implemented in good times to build international reserves beyond the steady-state level, sufficient reserves would be secured to endure bad times.

The paper further analyzed the long-term welfare implications of different fiscal rules—BBR, SSR, and CCR—assuming that, over time, both countries would achieve adequate international reserves and eventually have access to international capital markets. The results indicate that welfare is higher with a CCR than with an SSR, but welfare under an SSR exceeds that under the BBR. Because a CCR is more effective than an SSR in stabilizing the consumption of liquidity-constrained households, a counter-cyclical fiscal policy is better in terms of welfare. A CCR, however, requires

greater debt accumulation during the adjustment period than an SSR; thus, it might not be easy to implement.

The appropriate fiscal rules for Lesotho and Swaziland should address the need for medium-term fiscal and macroeconomic sustainability while managing short-term volatility, bearing in mind country-specific circumstances. This includes fiscal rules that allow for the generation of savings in the periods when SACU revenues exceed projections, similar to the case of a number of resource-rich countries that establish stabilization funds for such savings. These resources could be used to help address infrastructure gaps in these countries.

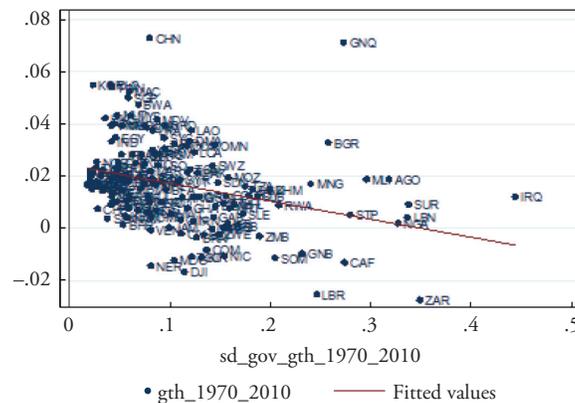
The success of a fiscal rule depends on its design and legislative and institutional arrangements, while an adequate PFM system is essential. Particularly for Lesotho and Swaziland, these steps—improving the PFM and stepping up institution building—would help to develop a sound foundation for introducing fiscal rules over the medium term.

Box 1. Volatility, Government Expenditure, and Long-Term Growth

Several empirical studies have documented a negative relationship between fiscal policy volatility and long-term growth—Aizenman and Marion 1993; Lensink, Bo, and Sterken 1999; and Afonso and Furceri (2008). Fatas and Mihov (2003) show that the volatility of output caused by discretionary changes in fiscal policy lowers economic growth by more than 0.8 percentage point for every percentage point increase in volatility. Higher output volatility is generally found to be negatively associated with long-term economic growth (Ramey and Ramey 1995). Hnatkowska and Loayza (2004) suggest that the negative relationship is exacerbated in countries that have weak institutions or are unable to conduct countercyclical fiscal policies.

Using a cross-country panel from 1970 to 2000, Furceri (2007) finds that countries with higher government expenditure business-cycle volatility have lower growth. Fiscal policy volatility may in some instances reinforce output volatility or add additional uncertainty for economic planning and investment. The correlation between long-term growth and government expenditure volatility is found to be negative and significant.

Long-Term Growth and Fiscal Policy Volatility



Source: Penn World Tables Version 7.1

Note: This box is based on analysis found in Im 2015.

Box 2. Lesotho and Swaziland: Groundwork for Successful Fiscal Rules

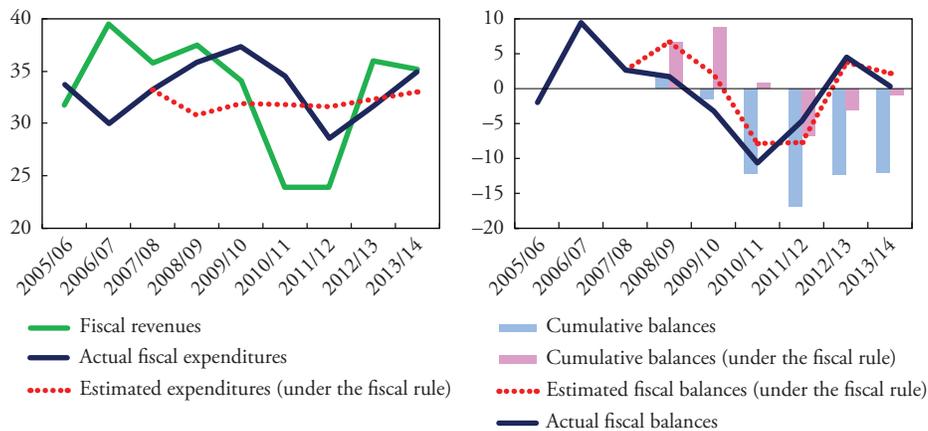
A fiscal rule in Lesotho and Swaziland should aim at insulating the budget from the volatility of SACU revenues by setting a revenue rule—a ceiling on annual spending of SACU revenues—or a target on a balance excluding a volatile portion of SACU revenues.

In the case of Swaziland, preliminary analysis suggests that, compared with the status quo, a fiscal rule that targets a structural fiscal deficit with a steady-state SACU revenues, if implemented effectively, may improve fiscal and external sustainability. The stabilization fund could be a vehicle for accumulating SACU revenues in excess of the steady-state level and then be used to complement fiscal revenue if SACU revenues were to fall below the steady-state level. To support countercyclical fiscal policy, withdrawals from the stabilization fund could vary, depending on whether the economy is operating at/above potential, or below potential, and whether it is securing sufficient international reserves.

Swaziland: Hypothetical Simulation for Fiscal Balances

If a non-SACU deficit target of 17 percent of GDP had been introduced in 2008/09, expenditures would have been more stable...

...leading to additional saving before the crisis and allowing higher spending during the crisis. Cumulative fiscal imbalances would be mitigated over the medium term.



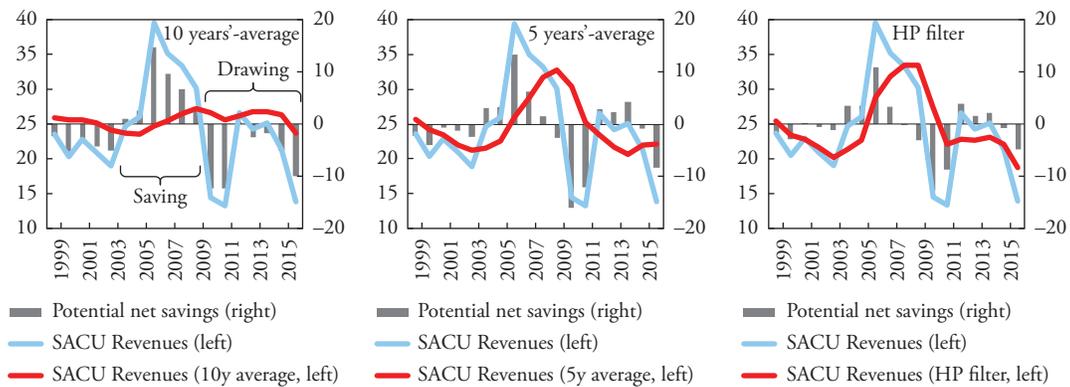
Source: Country authorities and IMF staff calculation.

In exploring the steady-state SACU revenues, there is an intrinsic trade-off associated with the degree of smoothing. A formula with a short backward-looking horizon (little smoothing) would better track changes in actual SACU revenues and be less affected by structural shocks, but at the cost of more volatile steady-state revenues that could fuel procyclical policies. In contrast, budgets that rely on rules with long backward-looking

Box 2. Lesotho and Swaziland: Groundwork for Successful Fiscal Rules (continued)

formulas (high degree of smoothing) would result in more stable steady-state revenues but would make the estimation vulnerable to possible structural shocks. Moreover, with significant smoothing, a period of saving or drawing the fund could be prolonged (despite significant needs for social and infrastructure expenditures), with a saving cycles of about six or seven years, possibly making it politically and socially untenable. Staff estimates suggest that a five-year moving average would have lowered the historical volatility of SACU revenues by 40 percent on average, with a saving cycle of three or four years.

Lesotho: Estimated Steady-State SACU Revenues
(Percent of GDP, illustrative)



Source: Penn World Tables Version 7.1. and country a

Furthermore, strengthening PFM systems is a prerequisite for successful implementation of fiscal rules. Based on experiences in other countries, the formal introduction of a fiscal rule requires (1) reliable data with a minimum technical forecasting capacity (to predict budgetary aggregates with sufficient accuracy), (2) comprehensive budget reporting systems (to produce in-year and timely end-year reports), (3) effective internal and external audit systems (to ensure that public resource utilization is fully accounted for), and (4) publication of fiscal data (to allow external monitoring of the rule). The stabilization fund—which may be a convenient way to set aside windfall revenues—would also call for strong PFM. In particular, it is important to (1) create the fund within the budget, (2) ensure its full transparency and accountability, and (3) implement strict regulation/rule for its use.

Appendix I. SACU and SACU Revenues

The Southern African Customs Union (SACU), the oldest customs union in the world, was established in 1910.¹ It aims to (1) facilitate trade between SACU members, (2) generate trade benefits for all member states, (3) promote fair competition and open investment opportunities, and (4) promote economic development and competitiveness through integration into the global economy. All customs and excise revenues collected in the member states are pooled into the Common Revenue Pool (with South Africa as custodian) and shared among the members according to a revenue-sharing formula (RSF) that was last revised in 2002.² The revenues are comprised of the following three components:

- The customs revenues are allocated according to members' share in intra-SACU trade.
- The excise component, 85 percent of the total excise pool, is allocated based on members' share in SACU's GDP.
- The development component, fixed at 15 percent of the total excise pool, is distributed to all SACU members according to the inverse of each country's per capita GDP.

¹This appendix is based on Im 2015 and Centre for International Economics 2011.

²The initial RSF established under the 1910 agreement was revised in 1969 and 2002. The 1969 revision included excise duties in the pool and provided for a multiplier that enhanced revenues by 42 percent annually. It also linked the customs revenues to not only extra-SACU imports but also intra-SACU imports. The 2002 revisions defined customs revenues in relation to intra-SACU imports, separated the excise pool into the excise and development components, and agreed on the administrative institutional structure of the RSF.

Pooled SACU revenues are shared according to the following formula:

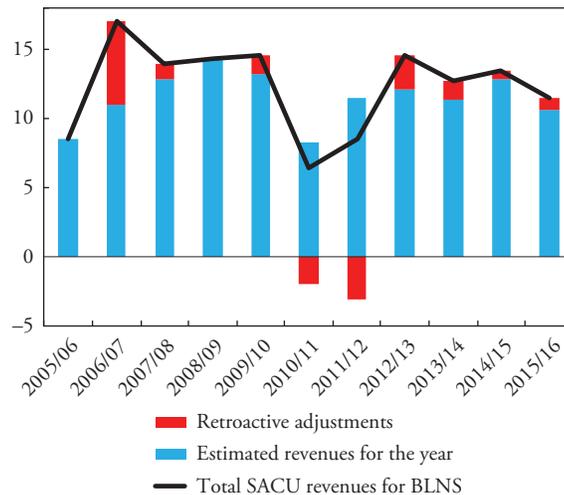
$$R_i = \frac{M_i^{int}}{\sum_i M_i^{int}} \times C + \frac{GDP_i}{\sum_i GDP_i} \times E \times 0.85 + \left[1 - \frac{GDP_i^{PC}}{\sum_i GDP_i^{PC} \times \frac{1}{5}} \right] \times \frac{1}{5} E \times 0.15$$

where R_i is the total revenue received by country i , C , and E are total customs and excise revenue, GDP_i is country i 's GDP, and GDP_i^{PC} is country's i GDP per capita.

The customs revenue base tends to move procyclically and display wider swings than output. Moreover, a high share of the customs pool comprises duties on imported vehicles, which tend to be even more volatile than overall imports. Ex ante revenues are estimated based on projected imports and excise collections, and are adjusted ex post with a two-year lag to reflect actual collections. As suggested by Figure A1, a shock could impart sizable changes in the SACU pool, including through retroactive adjustments. In 2010–11 Lesotho and Swaziland were hit twice: (1) by a lower forecast of current SACU revenues, and (2) by the downward adjustment of past SACU revenues. The size of adjustment was particularly significant for Lesotho and Swaziland—two countries with high dependency in SACU revenues.

As Cuevas 2015 points out, the revenue transfer and adjustment mechanism embedded in the current SACU revenue sharing agreement can augment the variability of actual SACU transfers (forecast amount plus adjustment) in the

Figure A1. Retroactive Adjustments for SACU Revenues for Botswana, Lesotho, Namibia, and Swaziland (BLNS)
(Percent of GDP)



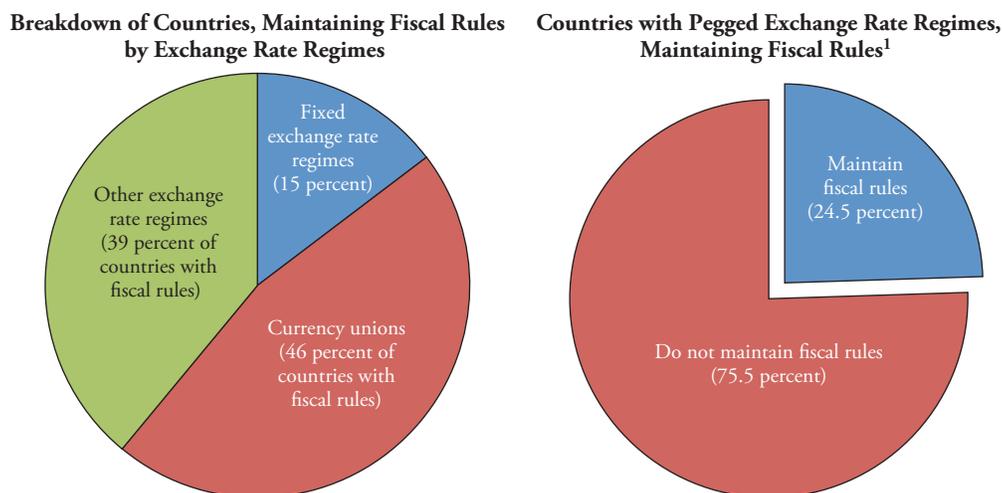
presence of serial correlation in revenues that feed into the SACU Common Revenue Pool, with the variance of SACU transfers estimated to be 38 percent higher than the variance of the actual revenues that Botswana, Lesotho, Namibia, and Swaziland are entitled to receive.

Appendix II. Fiscal Rules: International Experience

Over the past two decades, a significant number of countries have adopted fiscal rules to deal with uncertain and highly volatile fiscal revenues. Emerging market and developing economies comprised close to two-thirds of countries maintaining fiscal rules (Schaechter and others 2012). The most prevalent fiscal rules are expenditure rules (ERs), albeit with differences in features between those in advanced and developing/low-income economies. The ERs tend to be combined with balance budget and/or debt rules to provide a stronger anchor for debt sustainability. This appendix summarizes the experiences of countries relevant for Swaziland and Lesotho.

- *Resource-rich countries* often adopt fiscal rules to mitigate revenue volatility caused by commodity price fluctuations and to ensure intergenerational equity. These countries often target nonresource fiscal balances and choose price-based fiscal rules as fiscal policy anchors to mitigate boom-bust cycles and Dutch disease, and to address long-term vulnerabilities. These anchors allow the governments to smooth expenditures by delinking them from volatile revenues, helping to avoid procyclical policies. IMF 2012b points out that a price-based fiscal rule can mitigate the transmission of commodity price volatility in selected resource-rich countries.
- *Countries under pegged exchange rate regimes* also have adopted fiscal rules to ensure fiscal discipline, given the limited role of monetary policy in these countries. All members of currency unions (and about one-quarter of countries with no separate legal tender), currency boards, and fixed exchange rate regimes maintain fiscal rules, compared with only 17 percent of countries with more flexible exchange regimes (Figure A2). Countries under fixed exchange rate regimes need ample reserves to maintain the credibility of their peg. Furthermore, countries with limited or no access to international financial markets need even higher reserves to avoid abrupt

Figure A2. Fiscal Rules and Exchange Rate Regimes



Source: IMF, 2013 Fiscal Rule Dataset and staff estimates.

¹Including countries with no separate legal tender, currency boards, and conventional pegs.

and costly adjustment during bad times. Several countries—Kosovo, Hong Kong SAR, Lithuania, and Cabo Verde—used rules-based fiscal policy to maintain external stability, including through adequate international reserves. The implementation of fiscal rules in countries with fixed exchange rate regimes has been uneven.¹ Hong Kong SAR, for instance, has been compliant with its fiscal rule, while Ecuador, Kosovo and Cabo Verde often deviated from them, as the rules were unclear and/or frequently modified. Countries with a stronger track record in implementing fiscal rules seem to have greater market access, more efficient markets, and stronger Personal Financial Management.²

Many countries with volatile fiscal revenues established nonrenewable resource funds that complement fiscal rules. Often these are stabilization funds, used as a mechanism for insulating the budget and the economy from revenue shocks. Experience to date has been mixed. Stabilization funds have contributed to enhancing the effectiveness of fiscal policy by making budget expenditure less driven by revenue availability and reducing fiscal policy procyclicality (Fasano 2000, 19). However, in some cases—Venezuela and

¹Strong legal basis ensured the compliance of fiscal rules in Hong Kong SAR. Hong Kong SAR has been maintaining a balanced budget rule since 2002. The authorities have maintained countercyclical fiscal policy and actual performance exceeded the budget in most years.

²The legal basis for fiscal rules ranges from political commitment to coalition agreement, guidelines, statutory norms, national law, and the constitution. Often the special legislation, particularly in Organisation for Economic Co-operation and Development (OECD) countries, includes stringent procedural rules on accountability, transparency, and fiscal stability.

Oman—stabilization funds were less successful owing to frequent changes in the funds’ rules and deviations from their intended purposes. While nonrenewable resource funds might enhance political acceptance for saving windfalls, they cannot substitute for sound fiscal management and may give rise to spending pressures (Davis and others 2001, 27).

A stabilization fund or a special account may be needed to operationalize a fiscal rule. The fund needs to be carefully designed to strengthen government incentives to save/invest windfall revenues, and to prevent excessive spending. Some key features of a well-designed fund include (1) effective integration with the budget, (2) an appropriate asset-management strategy, and (3) mechanisms to ensure transparency and accountability (Davis and others 2001, 28). An independent civil service and political stability may contribute to the success of a stabilization fund (Bagattini 2011).

Stabilization funds—if properly designed and implemented—can facilitate fiscal objectives and support the implementation of fiscal rules. Fiscal rules often determine the pace of accumulation of stabilization funds. For example, the replenishment of the Economic and Social Stabilization Fund in Chile is directly linked to budget performance. Similarly, the fiscal rule in Panama is consistent with the rate of resource accumulation in the Savings Fund. In Ecuador, the ceiling on government spending is supposed to secure resources for a partial transfer of oil revenues into the Oil Stabilization Fund, although this link is not direct. Some countries, like Costa Rica, do not have a stabilization fund because the fiscal rule (balanced budget rule) limits borrowing, without building a buffer.

Table A1. Countries with Fiscal Rules and Managed Exchange Rate Regimes

No separate legal tender (12)	Currency Board (7)	Currency unions (40)	Conventional peg (30)	Managed by central banks (52) ¹
Ecuador	Hong Kong SAR	Eastern Caribbean Currency Union (8)	Maldives	Croatia (sub-national)
Kosovo	Bulgaria	West African Economic and Monetary Union (8)	Cabo Verde	Jamaica
Panama	Estonia	Central African Economic and Monetary Community (6)	Denmark	Sri Lanka
	Lithuania	Euro zone (18)	Latvia	Botswana
			Namibia	Costa Rica
				Liberia
				Singapore
				Nigeria
				Malaysia

Note. Numbers in parentheses indicate the number of countries maintaining a certain exchange rate regime.

¹ Managed by central banks with different degrees of flexibility.

Source: IMF, 2013 Fiscal Rule Dataset and staff estimates

Appendix III. Baseline Calibration: Parameter Setting

Structural Parameters		Value
<i>Preference</i>		
Degree of home bias	φ	0.54
Elasticity of substitution between traded and nontraded goods	χ	1.5
Elasticity of substitution between variety	θ	12
Elasticity of substitution between consumption and money demand	η	8.5
Frisch labor supply elasticity	ψ	2.5
<i>Production</i>		
Labor income share	α_T, α_N	0.7
Investment adjustment cost	κ_T, κ_N	25
Productivity of traded sector in the steady state	\bar{z}^T	1 (normalization)
Persistence of learning-by-doing (LBD) externality	ρ_Z	0.03
Depreciation of private capital	δ	0.015
Depreciation of public capital	δ_g	0.02

Steady-State Parameters		Lesotho	Swaziland
SACU revenue (in % GDP)	\bar{A}^*	27.4	18.4
Share of public investment (out of total public spending)	μ_s	35.7	17.4
Capital mobility	v	500	500
Private consumption (in % GDP)		80	80.5
Private investment (in % GDP)		17	5
Public consumption (in % GDP)		28.1	21.1
Public investment (in % GDP)		12.6	4.5
Export (in % GDP)		42.2	56.1
International reserve (in % GDP; equivalent to five months of imports)		40.5	29.1

Note: Parameter setting follows the Gleneagles model established by Berg and others 2010.

Appendix IV. Baseline Calibration: Policy Parameters

Policy Parameters		Balanced Budget Rule (BBR)	Structural Surplus Rule (SSR)
<i>Fiscal policy</i>			
Spending policy (deposit accumulation)	γ	0 (no saving)	1 (full saving)
Efficiency of public spending	s	0.4	0.4
Efficiency of aid-financed public spending	A	0.4	0.4
<i>Monetary/Exchange rate policy</i>			
Degree of sterilization	g	0	0
Inflation targeting coefficient	ϕ_{π}	1.5	1.5

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