



# Sterilization in Botswana: Cost, Sustainability and Efficiency

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## Abstract

While Botswana has had a good governance record, it has also had its fair share of challenges. This paper investigates why monetary policy in the country failed to contain inflation in the 2000s decade and explores corresponding concerns over the fiscal cost of monetary sterilization, low monetary policy autonomy and real exchange rate appreciation. The findings provide an explanation for Botswana's sub-optimal monetary policy outcomes that challenges the popular storyline. Accounting equations are used to estimate the net cost and sustainability of sterilization interventions and to compile a monetary policy autonomy index,

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while simultaneous equation estimation using two-stage least square regressions for a monetary policy reaction function and a capital flow equation provide measures of the extent of sterilization and of offsetting inflows prior to and after the great recession. The results show how a series of policy decisions from 1999 led (in the absence of appropriate countermeasures) to substantial loss of monetary policy autonomy, large offsetting inflows, unsustainable sterilization costs, high inflation, and real exchange rate appreciation. In the wake of the great recession, excess liquidity pressures have now abated, and offsetting inflows have tapered off, thus reducing the need for sterilization. Recent diamond import-linked (customs union) inward transfers to the current account have enabled reserve accumulation and recovery of monetary policy autonomy. However, these current conditions for enhancing monetary policy autonomy remain overly reliant on the diamond industry and may not be sustainable. A long-term solution is still needed as inflows from large trade surpluses may resume in the future.

## Introduction

Resource-rich mineral exporters face the challenge of managing large monetary inflows through the current account. For many resource-rich mineral-exporting developing countries, large inflows through the current account derive from a single sector. In such cases, the use of a managed exchange rate regime alongside sterilization interventions to avoid excessive inflation, excessive currency appreciation and loss of competitiveness is well established both in practice and in the Dutch Disease literature.<sup>2</sup>

By pegging or otherwise targeting the exchange rate through foreign exchange interventions, policy makers can help limit Dutch Disease tendencies and avoid placing upward (appreciation) pressure on the domestic currency, displacing domestic production with imports of tradable goods, and decreasing the competitiveness of domestic manufacturing (Corden and Neary, 1982; Corden, 1984; Wijnbergen, 1984). At the same time, sterilization interventions<sup>3</sup> ensure that large foreign exchange inflows

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2 The term "Dutch disease" originates from a crisis in the Netherlands in the 1960s that resulted from discoveries of vast natural gas deposits in the North Sea. The vast receipts from gas exports caused the Dutch Guilder to appreciate significantly, making exports of all its non-gas products uncompetitive on the world market. Relatively recent research on resource-rich economies (Aliyev, 2012) confirms findings in the earlier literature, showing that an exchange rate peg softens the negative effects of Dutch Disease and stabilizes the economy.

3 Sterilization refers to monetary operations that reverse monetary increases in the economy. It can take various forms, such as raising reserve requirements, shifting government deposits from commercial banks to the central bank, central bank borrowing from commercial banks, or the sale of debt instruments in open market operations.

have limited effect on the domestic monetary base. Without sterilization, large current account surpluses and capital inflows could generate enough excess liquidity in the banking system to accelerate the growth of credit, cause inflation and lead to loss of monetary control; or they could pressure the real exchange rate to appreciate, affecting macroeconomic variables in a way that hampers policy objectives such as price stability, exchange rate stability, and export promotion (Fernandez-Arias and Montiel, 1995).

This paper presents a particularly interesting story about sterilization and the monetary policy experience in Botswana, a country that is widely cited as an African success story and model for prudent governance. Botswana's good record, however, does not mean that the country has not had its fair share of policy challenges. The paper analyzes a period of adverse experience with monetary policy outcomes in a two-target two-instrument policy regime, providing useful lessons for Botswana and other resource-rich developing countries on the importance of well-defined transmission mechanisms and careful structuring and coordination of macroeconomic policy decisions. It also illustrates the significant influence that pension fund resources can have on monetary policy outcomes in a developing country and shows how the treatment of these resources matters to monetary policy.

## Objectives

This study is motivated by the need for a fuller understanding of Botswana's experience with sterilization during large current account surplus and large private inflow episodes, where, in addition to monetary policy's inability to meet its inflation objective, the rising intensity of sterilization over time produced fiscal cost, and sustainability and efficiency concerns. A broader understanding of this sterilization experience could help policy makers to better manage the monetary policy process in future, should large current account surpluses resume, and large private inflows happen.

The objective is to determine why Botswana's sterilization policy failed to contain inflation in the 2000s, how efficient the policy was, how the fiscal cost could be mitigated under similar conditions in future, and how sterilization can be improved. The study considers questions related to fiscal cost, and sustainability and efficiency of sterilization. What has the annual fiscal cost of sterilization been since 1991 when open market operations commenced and Bank of Botswana Certificates (BoBCs) were introduced as sterilization instruments? When was the fiscal cost highest and why? Was the cost sustainable? Was monetary policy autonomy affected? Did offsetting capital inflows to Botswana hamper the efficiency of sterilization interventions? Why were policy outcomes in the period prior to the great (global) recession of 2008-09 so different from those seen in the wake of the great recession?

To address these issues, the approach of this paper is to:

- (i) measure and track the net fiscal cost of sterilization over time both prior to and after the great recession of 2008-09, covering the period 1991 to 2014, and determine when sterilization was sustainable and when it was not;
- (ii) track the evolution of monetary policy autonomy (constructing an index) for the above period and consider its relationship to the real exchange rate - to consider the hypothesis that sterilization was constrained in preventing real currency appreciation over the medium term because monetary policy autonomy was short-lived; and
- (iii) investigate the relationship between sterilization, inflows, and monetary policy efficiency for the period 2002 to 2015, considering the sub-periods before and after the great recession. This will entail econometric estimation of the degree of sterilization (sterilization coefficient) and the offset coefficient from capital inflows.

## Potential contribution

As far as the author has been able to determine, the approach and methodologies adopted in this paper have not been used before in published studies of monetary policy and excess liquidity management in Botswana. Neither have other published studies provided this paper's interpretation of monetary policy outcomes in the country. In addition to measuring the net fiscal cost and sustainability of past sterilization, this study assesses the efficiency of the sterilization process alongside the impact it had on monetary policy autonomy. It measures the degree to which current account receipts and other inflows were sterilized and estimates the extent to which off-setting capital inflows may have restricted the ability of sterilization measures to remain effective. This is an important consideration because temporary impact would explain the failure to contain inflation; it would have necessitated repeated sterilization resulting in a larger fiscal cost and higher interest rates. The analysis will help to inform future sterilization measures in Botswana.

While most of the literature concentrates on sterilization necessitated by large capital inflows, this study also looks at sterilization of the mineral export receipts that fueled current account surpluses. It contributes to the debate on the cost and efficiency of sterilization by considering whether sterilized intervention can serve as a fully independent policy tool in an economy driven by large mining export receipts. It uses Botswana as a case study to analyze its experience in sterilizing mineral receipts through the current account and capital inflows, applying both accounting equations and econometric modelling to the sterilization question.

## Sterilization experience

Botswana has had sterilization interventions through open market operations for twenty-five years. With the liberalization in 1991 away from direct interest rate controls and use of the central bank's call account to absorb excess liquidity, monetary authorities adopted open market operations, using the Bank of Botswana Certificate (BoBC) sales to absorb excess liquidity in the banking system. As the authorities had chosen a pegged exchange rate regime, the large monetary injections from persistent large trade surpluses caused a structural surplus of liquidity in the banking system,<sup>4</sup> where liquidity more than absorptive capacity could push up inflation.

Botswana chose to use its mineral receipts to expand absorptive capacity and help establish a base for long-run growth. Nevertheless, achieving output diversification and a positive long-run growth path has remained an ongoing challenge. Over the period 1983/84 to 2012/13, most mineral receipts were spent (WAVES/ World Bank, 2014). Financial assets were only accumulated as a residual from budget surpluses, after spending decisions had been made. Part of the rationale behind leaving a residual and not spending everything related to limited domestic absorptive capacity and the potential for overheating of the economy. Government spending was supposed to observe a sustainable budgeting index, such that mineral revenues were allocated only to investment in physical and human capital. Mineral revenues were devoted to spending on infrastructure (44%), education (42%) and health (14%). Saved mineral receipts are captured in the Government Investment Account and in the revaluation, reserves held at the Bank of Botswana, both serving as the counterpart to foreign exchange reserves in the Bank of Botswana balance sheet.

There has been some deviation from the sustainable budgeting principle. However, foreign reserves have also been used to supplement operational costs. In this regard, net financial savings (net of debt) as a share of gross domestic product (GDP) dropped from 98% of GDP in 2002 to under 20% of GDP in 2005, reflecting drawdowns on mineral receipt savings to augment the public officers' pension fund. Foreign savings recovered to about 50% of GDP in 2008 prior to subsequent erosion to about 20% of GDP in 2012 in the wake of drawdowns made as a reaction to the global economic crisis and the great recession (WAVES/World Bank, 2014).

The residual from mineral export receipts after spending decisions drove the accumulation of foreign exchange reserves (assets on the central bank balance sheet). Figure 1 shows the central bank balance sheet, and how net domestic assets

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4 In most developed countries, the central bank has to deal with a structural deficit of liquidity in the market, such that the banking system's balance sheet is liability driven. The central bank lends money to commercial banks through open market operations to make up for the deficit.

serve as a counterpart to net foreign assets. For net domestic assets, in addition to holding government deposits, the central bank adopts sterilization interventions to offset the increase in foreign assets by issuing liabilities (Bank of Botswana Certificates, BoBCs). BoBCs are issued to commercial banks through open market operations (OMOs).<sup>5</sup> When government draws on foreign reserves, it deposits at the Bank of Botswana (represented in Figure 1 by “NDA excl. BoBCs”), and when it accumulates foreign reserves, its deposits grow. Beyond government deposits at the central bank, BoBC issuance together with reserve requirements and deposits by banks at the central bank add another layer of sterilization and to contain excess liquidity in the banking system.

Without the draining of excess liquidity from the system, the expectation was that surplus liquidity would lead to falling short-term interest rates with consequences for inflation. The banking system’s balance sheet was asset-driven, with the central bank essentially acting as depositor (rather than lender) of last resort, taking “deposits” from banks by selling them securities which then appeared as liquid assets on the banks’ balance sheets (banks generally had no need to borrow from the central bank). The central bank drew from the market the amount of liquidity consistent with a level of short-term interest rates that would affect demand conditions in the economy as desired (Bank of Botswana, 2015).

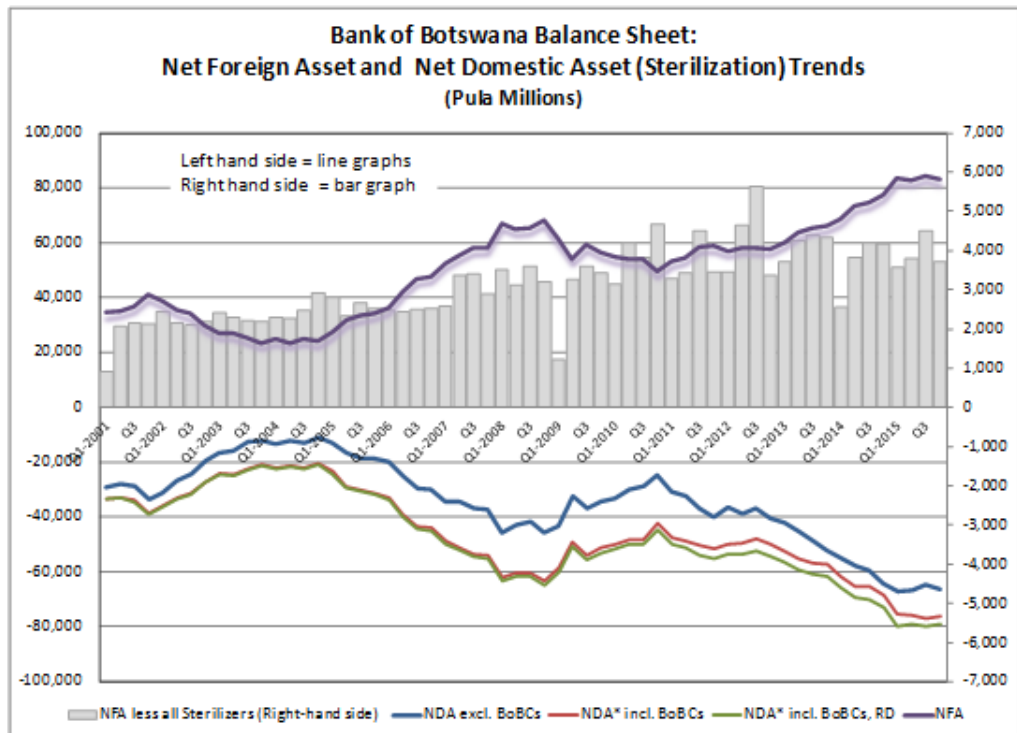
The purchase and sale of BoBCs influenced the cost and quantity of loanable funds. The Bank of Botswana’s main monetary policy tool was therefore its policy interest rate derived through sterilization interventions using BoBCs. With the BoBC rate being the Central Bank’s de facto policy rate, it informed the benchmark Bank Rate that signals commercial banks to reset their interest rates. Given this context, Botswana had both an active exchange rate policy and an active monetary policy (liquidity management and sterilization). The Bank of Botswana states that the managed exchange rate regime targeted a stable real effective exchange rate that would ensure that domestic producers of tradeable goods and services were competitive (Bank of Botswana, 2015). At the same time, the principal objective of monetary policy was

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5 Prior to the introduction of open market operations, the instruments of monetary policy were limited. Monetary policy was implemented through direct controls over commercial banks’ interest rates (until 1986), and subsequently through the Bank of Botswana’s call deposit rate. The call deposit rate had been introduced to absorb excess liquidity from the banking system and represented the marginal return on deposits accepted by the banks. The Bank Rate, on the other hand, had little direct monetary impact given the environment of excess liquidity in the banking system, which meant there was almost no lending to the banks. The Bank Rate therefore served more as a benchmark rate. Excess liquidity also meant that changes in reserve requirements were largely ineffective from a monetary policy perspective, as they would have had to be raised to very high levels to have a notable impact on the commercial banks’ ability to lend (Bank of Botswana, 2001).

articulated as promoting and maintaining price stability (Bank of Botswana, 2015).<sup>6</sup> Because there was already a pegged exchange rate, the Bank of Botswana's inflation objective and the real exchange rate target were pursued with both BoBCs (open market operations) and the exchange rate as instruments. This meant that the two objectives needed to be pursued in a consistent manner.<sup>7</sup>

**Figure 1: Bank of Botswana balance sheet**



Footnote on sterilizers:

- NDA excl. BoBCs: basically comprises government deposits at Bank of Botswana
- NDA\* incl. BoBCs: represents government deposits and Bank of Botswana certificate sales
- NDA\* incl. BoBCs, RD: "NDA\* incl. BoBCs" minus banks' reserves and free deposits at Bank of Botswana (RD)

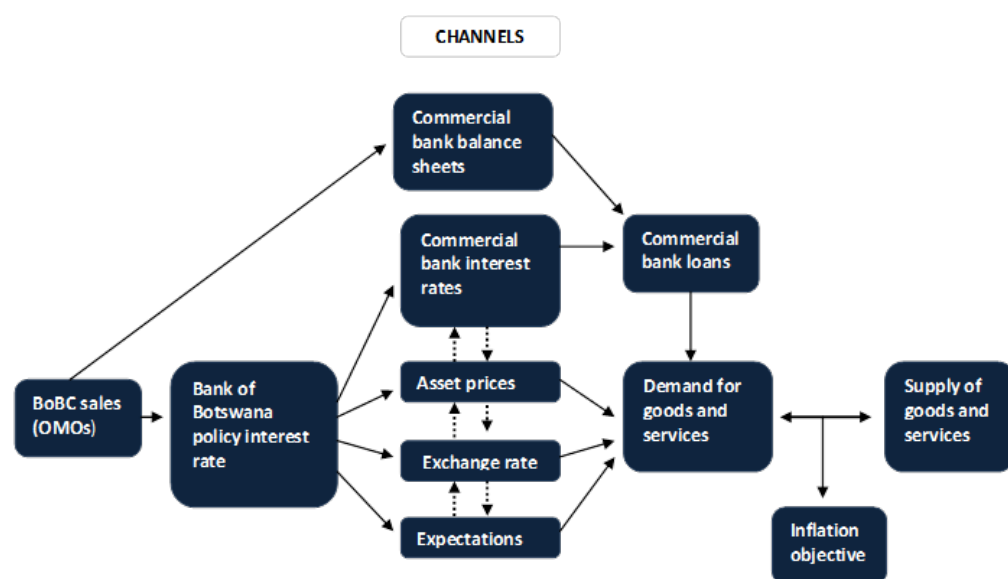
Figure 2 outlines the transmission channel for monetary policy, including its interaction with the exchange rate. As illustrated, it is expected that changes in the policy interest rate affect commercial bank interest rates, asset prices, demand for

6 The use of two instruments is common in systems with sterilization interventions. Authorities tend to rely purchases and sales of foreign exchange, and on open-market operations to neutralize effects on the policy interest rate (Benes et al., 2011).

7 The 2005 introduction of a crawling peg exchange rate regime meant that the local Pula currency was no longer completely fixed by the peg, nor did it automatically fully appreciate with sizeable inflows; instead the exchange rate is managed, foreign exchange reserves are accumulated and sterilization is used to curb the resultant excess liquidity in the banking sector.

Pula (which affects the nominal Pula exchange rate to the extent that it is allowed to adjust by the crawling peg exchange rate mechanism), and people's expectations of future interest rates, economic growth, and inflation, which in turn also affect asset prices and the demand for Pula (assets and securities).<sup>8</sup> Large BoBC sales are also likely to affect commercial bank balance sheets and banks' propensity to lend. While the Bank of Botswana reports tend to discuss the commercial bank interest rate channel, this study recognizes that the multiple channels in Figure 2 may impact aggregate demand pressures and inflation in varying degrees.

**Figure 2: Transmission channels for monetary policy (sterilization)**



Source: Adapted from Bank of England (1999), to Botswana

## Conclusions and policy implications

The evidence from this study provides a cohesive explanation for Botswana's sub-optimal monetary policy outcomes in the 2000s that challenges the popular storyline. The deterioration in monetary policy outcomes after 2000 followed major policy decisions relating to the lifting of exchange controls and the use of foreign exchange reserves, alongside a shift in the approach to implementing monetary policy which was inconsistent with these major policy decisions. The loss in monetary policy

<sup>8</sup> Current practice is that Bank of Botswana will tend to tighten monetary policy (sterilize more to reduce NDA) in response to the central bank's inflation forecasting system which generates equilibrium values for output, real exchange rates and real interest rates, that provide benchmarks for the description of a "neutral" monetary policy stance which does not contribute to changes in inflation (Phetwe, 2013).



effectiveness had little to do with administered prices, government levies or global food and oil price shocks, as often cited. The evidence clarifies why sterilization policy failed to contain inflation in the 2000s, and how the choices made eroded monetary policy autonomy and triggered offsetting inflows leading to an inefficient and ineffective monetary policy. The evidence also informs suggestions on how, under similar conditions in future, policy performance could be improved, and the fiscal cost of sterilization mitigated.

The sharp contrast seen in monetary policy performance in the 1990s compared to the 2000s is consistent with findings in other studies on monetary policy in Botswana. The study finds that compared to the 1990s, monetary policy autonomy and effectiveness deteriorated significantly in the first decade of the 2000s. Studies on policy performance in the 1990s (Kone, 1996; Masalila and Phetwe, 2001; Setlhare 2004), also found that monetary policy in Botswana was effective at that time. Setlhare (2013) found there was limited policy effectiveness in the 2000s. This study's findings suggest an explanation for this difference and for why policy outcomes changed in the 2000s. The results help to explain Setlhare's "unexplained findings"; why it was that while "shocks to monetary policy influenced inflation in the right direction,... the impact was not significant"; and why there was "an unexplained reversal of the impact on inflation (of monetary shocks) over the forecast horizon, and the counter-intuitive impact on output." This study shows that off-setting capital inflows in the 2000s would have accounted for the limited policy impact and for the reversal of the monetary policy impact on inflation during the 2000s. Similarly, BOPF inflows comprising inward investments (real estate acquisitions, development, etc) could have impacted economic activity positively given the ineffectiveness of contractionary monetary measures.

On monetary independence, comparison of monetary and exchange rate policy performance in the 1990s with that in the 2000s shows that significant monetary policy autonomy in the earlier decade enabled successful policy outcomes, while a sharp deterioration in monetary autonomy in the 2000s led to missed policy targets. The monetary autonomy index for the 1990s confirms that sterilized intervention can in fact serve as an adequately independent policy tool in an economy such as Botswana, driven by large mining export receipts. What matters is the combination of policies in play that influence sterilization outcomes; the right combination of policies can provide successful outcomes, while the wrong combination will hamper the independence and effectiveness of sterilization as a policy tool.

The monetary autonomy index constructed in the paper points to the importance of recognizing how reserve accumulation anchors monetary policy autonomy in this regime, and how important it is to track and preserve that monetary autonomy. The failure to meet stated objectives in the first 2000s decade was due in part to a shift in policy emphasis from the exchange rate as a price anchor towards relying more

on monetary operations to control inflation at a time when other policy choices were causing a dramatic weakening of monetary policy autonomy. In particular, the post-1999 abolition of exchange controls and the transfer of substantial foreign exchange reserves to private sector pension fund managers (responsible for public officers' pensions) eroded monetary policy autonomy and led to the subsequent large increase in private inflows that hindered the efficacy of sterilization. It is possible that the new policy approach adopted by the central bank at that time, which sought to give monetary policy a stronger role, in fact indexed both the nominal exchange rate and money supply to prices – in line with the warnings in Adams and Gros (2001). The new approach failed to plan counteractive measures for the additional inflows or to address the sharp erosion in monetary policy autonomy that rendered monetary policy through sterilization largely ineffective. This was in stark contrast to the 1990s when the focus on the pegged exchange rate regime (alongside some capital controls) and adequate reserve accumulation allowed for the significantly higher monetary policy autonomy seen in the 1990s. The findings also show how the harmony or complementarity between monetary, exchange rate, foreign reserves and public pension policy choices that was sustained through the 1990s was subsequently lost in the 2000s, pointing to the importance of consistency and proper coordination of macroeconomic policies.

The experience of some Asian economies such as Singapore, which is arguably one of the top performing development stories globally with regard to rapid growth, employment and improvements in social indicators such as education, life expectancy and housing has shown that intermediate (monetary and exchange rate) regimes can in fact be viable alternatives to the standard classical prescriptions of fixed or floating regimes, when coupled with consistent macroeconomic and microeconomic policies, and strong institutions (Robinson and Lee, 2004). The Botswana experience in the 1990s validated this view, while its experience in the 2000s illustrates the financial and economic costs when inconsistent policy choices are made in such a regime.

Monetary and exchange rate policies were not able to contain real exchange rate appreciation during this period of low monetary policy autonomy, high inflation and large inflows in the 2000s. During this episode, there was a higher likelihood that the Pula currency would become over-valued; this over-valuation was confirmed. While an attempt was made to correct for overvaluation in 2004-05, the correction was not sustained over time under the approach used by the monetary authorities, and it has continued to enable real Pula appreciation and erode price competitiveness over time. These findings confirm that monetary authorities should have acted on private sector concerns over the ineffectiveness of monetary policy in the early 2000s. Sterilization had been relatively efficient in the 1990s when monetary and exchange rate policies targeted monetary stability and a competitive real effective exchange rate, but this efficiency deteriorated in the 2000s. The regression results confirm that during the period 2001-2009, sterilization was inefficient. This inefficiency manifested as a

failure to achieve the objectives of monetary stability through low, stable inflation and a competitive and stable real effective exchange rate. The authorities had the opportunity to use the constructive criticism from the private sector at the time to review and correct their policy approach, but this did not happen. This failure to correct monetary policy outcomes during the decade of missed targets is an area deserving further analysis that would determine the reasons for the policy correction delays, helping to establish whether such delays were caused by technical, organizational, behavioural or political economy constraints, for example, and so informing the crafting of policy solutions in future.

Public concerns over the cost of sterilization in the 2000s were also justified. The net cost of sterilization rose sharply under the new policy approach introduced in the 2000s. The fiscal cost rose from an average 2.5% of non-mining GDP in the 1990s to an average 3.7% of non-mining GDP between 2000 and 2008, peaking at 4.5% of non-mining GDP in 2003. The beneficiaries of this fiscal transfer were foreign-owned banks. From 2003 to 2011, the central bank paid these commercial banks between Pula 1 billion and Pula 2.2 billion per annum interest on Bank of Botswana Certificates. Cost concerns were also justified because, for a period, the policy was unsustainable. The sustainability of sterilization policy becomes a concern as soon as the interest cost paid on sterilization instruments exceeds the interest earned on foreign exchange reserves. When this happens, the risk of a crisis is heightened. Sterilization policy was unsustainable for some years in the mid-2000s.

The results from both the accounting and econometric analyses point to the need for a re-think of sterilization policy to deal more effectively with large trade surpluses and capital inflows in future. Had better sterilization modalities been designed to handle the inflows caused by the transfer of the government pension fund to private management, the adverse outcomes seen in the 2000s could have been avoided or contained. More thoughtful treatment of public pension funds would have helped, such as keeping them as privately-run funds, but on the central bank balance sheet or preparing special long-term investment vehicles to better capture large inflows at lower cost, and re-directing the interest paid by government away from foreign entities that repatriate these funds, to entities that would retain the funds in-country, contributing to the development of Botswana. Rapid re-accumulation of reserves after the large draw-downs would also have helped. Even without such advance preparations, given the specific context of the inflows in Botswana, policy makers had enough information on magnitudes and timing of potential private inflows to predict and plan for the new inflows, but proper preparation for the additional inflows did not take place, leaving only BoBCs to absorb the additional inflows.

In the wake of the great recession, the collapse in excess liquidity pressures has provided monetary authorities with a brief respite; a period that can be used to design a more effective response to a future recovery in trade account receipts and

future capital inflows. A re-think of sterilization policy to deal more effectively with large current account surpluses and capital inflows is needed, where the monetary stability objective can be met without sacrificing competitiveness. It may also be worth re-examining whether or not the current real exchange rule implemented through the crawling peg is problematic. Similarly, the current reliance on official (diamond-import linked SACU) transfers to government, which have helped to maintain current account surpluses and enable the reserve accumulation that is boosting monetary policy autonomy, is risky. Thus, a long-term solution that is not overly reliant on the diamond industry is still needed.

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