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Exchange Rate Assessment in a Resource- Dependent Economy: The Case of Botswana

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African Department

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Abstract

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The paper combines various methodologies to assessing the level of the exchange rate in Botswana, explicitly taking into account the implications of its dependency on diamond exports. Real exchange rate estimation indicates that, after a period of overvaluation, Botswana's real effective exchange rate is now broadly in line with economic fundamentals. The projected current account path is also consistent with external sustainability, defined to ensure sufficient savings of diamond wealth in order to maintain a stable import and consumption path through 2050. Sustaining consumption over the longer term will however require to address obstacles to non-diamond exports' competitiveness.

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¹ This paper is based on a November 2007 Selected Issues Paper (SM/07/375) prepared by Corinne Deléchat and Matthew Gaertner in the context of the annual Article IV discussions with Botswana. The paper benefited from guidance and comments from Janet Stotsky, and suggestions received from colleagues during an African Departmental Seminar. Part of this analysis also draws on the methodology of calculating a sustainable non-mineral fiscal balance for Botswana provided by Jens Clausen.

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I. INTRODUCTION

Exchange rate assessments are at the core of Fund bilateral surveillance,² yet empirical analysis remains fraught with considerable uncertainty.³ Estimation challenges are even more acute in the case of developing countries, due to poor data, frequent structural breaks, market imperfections and high macroeconomic volatility (also see Di Bella, Lewis and Martin, 2007). In the case of Botswana, the dependence on diamond exports, an exhaustible natural resource, adds to the challenges involved. First, existing methodologies are ill-suited to assess the implications for external stability and the exchange rate of the exhaustion of a natural resource within a predictable time-frame. Second, current account volatility is particularly high in natural resource exporters because of commodity price fluctuations, which makes it difficult to separate underlying trends from temporary fluctuations. Third, in countries that experience both rapid growth and change as well as high volatility, past values of fundamentals are poor guides of appropriate future values consistent with external stability and exchange rate equilibrium.⁴

For these reasons, this paper combines various methodologies to assessing the level of the exchange rate in Botswana, explicitly taking into account the implications of its dependency on diamond exports. As discussed in IMF (2006), the use of a combination of methods can help strengthen the robustness of the assessment, and a number of recent papers successfully implement an eclectic approach.⁵ The external stability and exchange rate assessment for Botswana is thus based on the following:

- A description of balance of payments trends, vulnerabilities, and the evolution of a number of real effective exchange rate (REER) indices (CPI-based, productivity-based, and the internal terms of trade);
- An econometric estimation of the equilibrium real effective exchange rate (EREER), involving direct estimation of a reduced-form relationship between the real exchange rate and its fundamental determinants;⁶
- An assessment of the sustainability of the projected current account and net foreign assets (NFA) position that explicitly takes into account the exhaustibility of diamond receipts: it

² See the IMF's 2007 Bilateral Surveillance Decision, effective since June 15, 2007.

³ See IMF, 2006, for a discussion of the methodological difficulties and uncertainty inherent to exchange rate assessments.

⁴ Data limitations compound these problems.

⁵ See for example di Bella, Lewis and Martin (2007), Gutierrez (2007), Murgasova (2004) and Ramirez and Tsangarides (2007).

⁶ This updates and extends the analysis presented in Iimi (2006).

compares the projected current account path to a trajectory consistent with medium-term fiscal sustainability; and

- An assessment of competitiveness based on non-price indicators, such as external sector outcomes, production costs and the quality of the business environment.

Results indicate that, overall, Botswana's REER is close to its medium-term equilibrium value, based on past trends in fundamental determinants. However, a forward-looking assessment taking into account the need to accumulate savings to sustain imports and consumption beyond the horizon of diamond production suggests that larger current account surpluses may be needed. Alternative REER indices and structural competitiveness indicators also point to several areas that the government should continue to target: (i) declining labor productivity in tradables (except mining), particularly in manufacturing industries; (ii) high utility prices and inadequate information technology and communication infrastructure; (iii) a skills mismatch, compounded by difficulties in hiring expatriate skilled labor, and other labor market rigidities; and (iv) other competitiveness obstacles such as difficult access to land and the high cost of financing for small enterprises.

II. EXTERNAL SECTOR DEVELOPMENTS AND KEY VULNERABILITIES

A. Balance of payments

Current account developments and main vulnerabilities are closely linked to diamond exports (Figure 1). For 2006, diamond exports represented 74 percent of total goods exports and 32 percent of GDP. Historically, the 1980s were characterized by average current account deficits of about 8 percent of GDP, driven by large (though declining) imports and in the early 1980s a dip in diamond export receipts. The 1990s saw more stable diamond exports and a comfortable current account surplus, averaging about 8 percent of GDP between 1990 and 2006. Diamond and current account developments seem to have been driven by terms of trade movements (reflecting mainly changes in diamond prices).

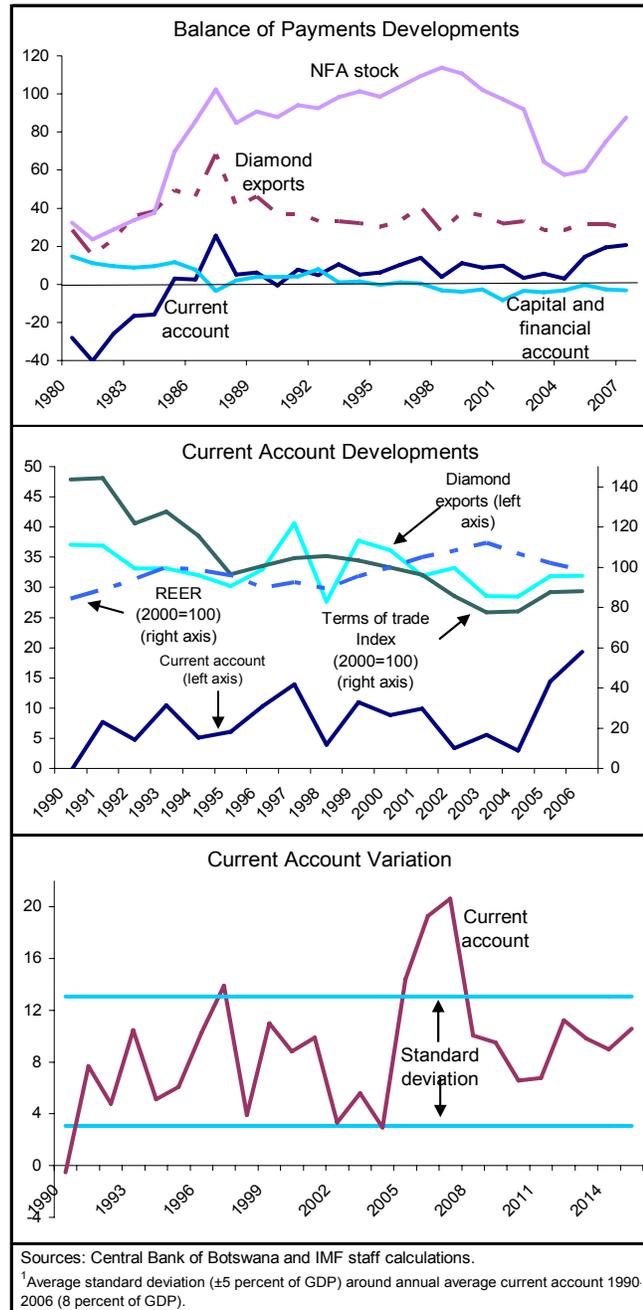
Current account volatility is high. The average annual standard deviation for the current account in the period 1990-2006 is 5 percent of GDP, and for terms of trade it is about 20 percentage points. Such volatility makes it difficult to retrieve some notion of "underlying current account." Nevertheless, aside from an above-average peak in 2005-2007 linked to the 2004-05 devaluations and the switch to a crawling peg (as well as to higher diamond production and minerals prices), the current account trajectory is expected to remain within historical standard deviations.

There seem to be no significant balance sheet vulnerabilities stemming from the capital and financial account. The capital and financial account surplus averaged about 7½ percent of GDP during the 1980s, with annual net foreign direct investment (FDI) flows accounting for about 4 percent of GDP and other capital inflows accounting for the rest. During the 1990s the capital and financial account surplus declined to about 1 percent of GDP on average: FDI and other flows were almost nonexistent. This account turned slightly negative starting in

1999, reflecting offshore investments by the rapidly growing pension funds, particularly after the Public Officers Pension Fund was set up in 2001. External debt at less than 3 percent of GDP is extremely low, and direct foreign exchange exposures of the financial sector are limited, so that exchange rate and liquidity risks are well contained. The recent financial sector assessment indicates that the banking sector could be mostly vulnerable to credit risk stemming from a global downturn that led to a fall in diamond revenues.⁷ The capital and financial account is projected to shift to net inflows of about 2 percent through 2015, thanks to temporarily higher FDI flows associated with mining and energy projects.

Reserve coverage is adequate. The current account surpluses have allowed for the accumulation of a significant stock of reserves, amounting to 75 percent of GDP at the end of 2006, of which 20 percent of GDP (about 6 months of imports) are liquid reserves and 55 percent (about 19 months of imports) represent the Pula Fund.⁸ The rate of growth of NFAs fell below that of nominal GDP in 1998, at which point NFAs as a percent of GDP started

Figure 1. Botswana: Balance of Payments Trends (Percent of GDP)



⁷ See Botswana—Financial Sector Stability Assessment, SM/07/367.

⁸ The Pula Fund is composed of the government's investment account, which reflects savings from accumulated fiscal surpluses held with the central bank, and the central bank's reserve accumulation above the target for liquid reserves. Pula Fund assets are invested in longer-term instruments, with the objective to ensure that national savings are deployed to contribute to sustainable economic development.

declining.⁹ However, the central bank explicitly targets 6 months of import cover for liquid reserves, and there are specific triggers for when Pula Fund assets could be accessed (e.g., in case of simultaneous adverse shocks, though the first line of defense would be corrective macroeconomic policies, or seeking external funding of development projects.) The current liquid reserve coverage is sufficient to withstand a two-standard-deviation adverse current account shock for two years.

B. Evolution of REER indices

All REER measures indicate that the real appreciation between 2000-2004 was more than offset by devaluations in 2004 and 2005 and the subsequent switch to a crawling peg exchange rate regime (Figure 2). Movements in the CPI- and productivity-based REER begin with a decade of relative stability starting in 1990, followed by a trend appreciation starting in about 2000, that was reversed by the devaluations and the switch to a crawling peg.¹⁰ Although both the CPI and the relative productivity-based REERs moved together between 1995 and 2000, the real appreciation and subsequent depreciation were more pronounced in the relative productivity-based REER. By the end of 2006, the annual CPI-based REER was 5 percent below its average annual value for 1995-2000, and the productivity-based REER was 10 percent below. Although the gap between the two has recently been narrowing, the bilateral real exchange rates of the main import (South Africa) and export (United States) trading partners have tended to move in opposite directions.

The availability of sectoral productivity data helps understand some of the potential sources of the real appreciation. The evolution of the components of the CPI-based REER shows that the appreciation was mainly caused by a trend increase in relative prices, while the nominal effective exchange rate started appreciating at a faster pace around 2000. From the productivity-based REER and the internal terms of trade measure (ITT¹¹), it appears that the relative price increase was linked to rapid productivity improvements in the diamond sector (which largely dominates tradables). Excluding mining, labor productivity in tradables versus nontradables in Botswana has been declining compared to trading partners. Mining wage increases may have led to wage and price increases in the nontradables sectors (a classic symptom of Dutch disease), as reflected in some increase in the relative price of nontradables versus tradables.

⁹ The government funded the privatization of pension funds through capital transfers, which lowered official reserve assets by about P13.5 billion between 2001 and 2005.

¹⁰ The productivity-based REER was calculated by computing a relative productivity index of Botswana's labor productivity in tradables versus non-tradables relative to trading partners. Data on Botswana's sectoral labor productivity were obtained from the Botswana National Productivity Centre. Data on trading partners' labor productivity (weighted using the same INS weights entering the REER calculations) were obtained from the IMF Research Department (CGER database).

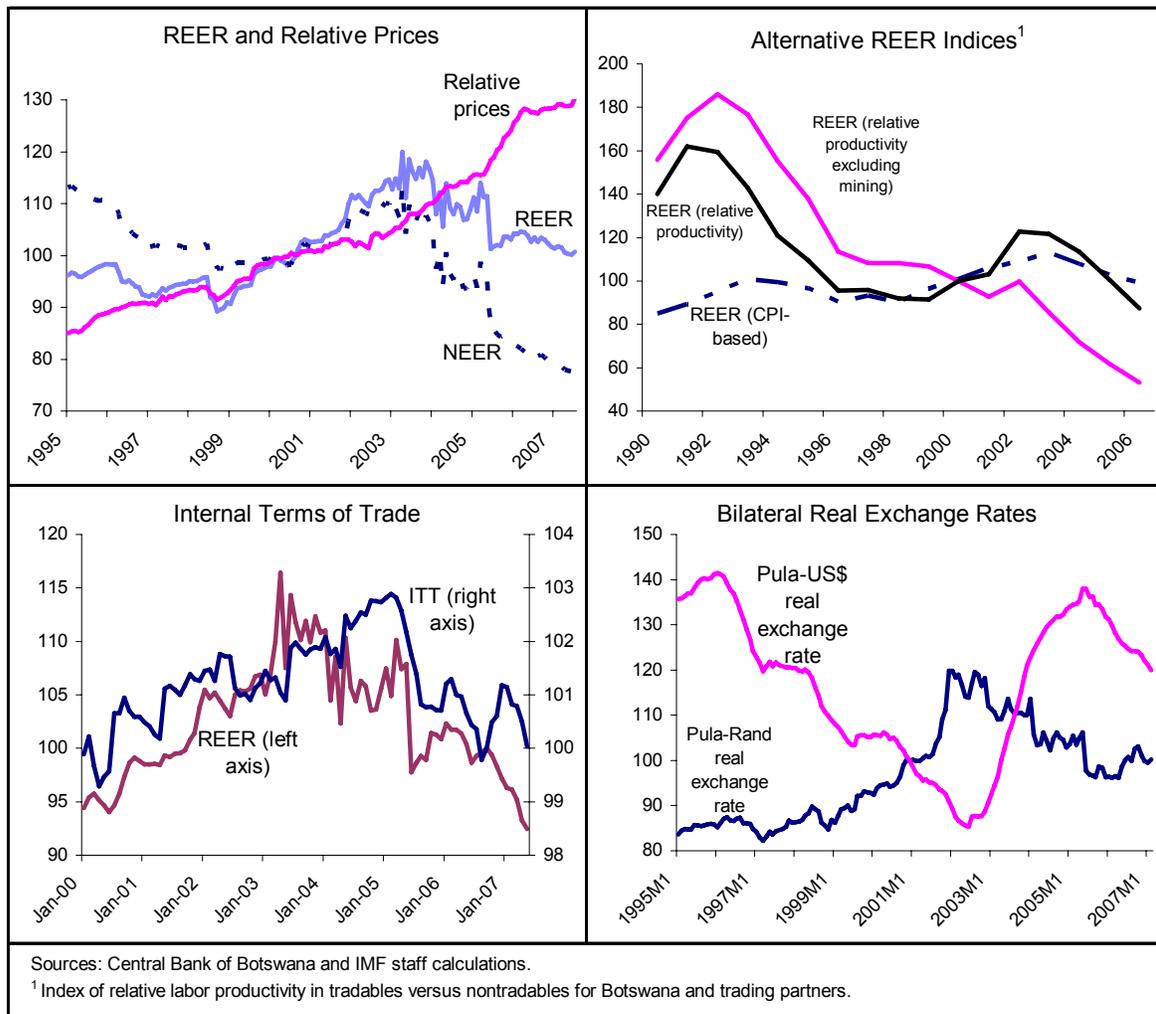
¹¹ The internal terms of trade measure is constructed here as the relative price of nontradables to tradables, based on price indices provided by the authorities. This measure follows closely the theoretical definition of the real exchange rate.

The nominal appreciation may have been due to strong foreign exchange inflows in the wake of an increase in diamond export and large current account surplus in 2000. Mannathoko (2008) also indicates the need to determine whether or not the nominal exchange rate appreciation was induced to some extent by the removal of exchange controls in 1999. That measure might have induced rand-denominated capital inflows that led to nominal effective exchange rate appreciation.¹²

The shift from a fixed to a crawling peg in 2005 appears to have resulted in greater stability of the REER. The CPI-based REER depreciated by 2 percent in the twelve months through August 2007, compared with average annual appreciation of 5 percent from 1999-2004. This leaves the REER roughly unchanged from mid-2005, with the depreciation of the NEER offsetting the relative price differential in Botswana against its main trading partners.

¹² However (although there may be reporting error), there is no strong evidence of an increase in foreign inflows in the financial account of the balance of payments.

Figure 2. Botswana: Real Effective Exchange Rate Indices (2000=100)



III. EQUILIBRIUM EXCHANGE RATE ESTIMATION

In this section, we estimate an equilibrium real exchange rate for Botswana to inform our assessment of exchange rate valuation. We use the behavioral equilibrium exchange rate model (BEER) to assess whether and the extent to which REER movements reflect either an equilibrium adjustment to changing fundamentals or a deviation from its equilibrium level. Our assessment extends the exchange rate analysis in Imi (2006).

A. Behavioral equilibrium exchange rate approach

This approach estimates the EREER by identifying structural determinants using an exchange rate model.¹³ The framework adopted in this paper is based on that proposed by

¹³ For a more extensive discussion of the theoretical approach underlying the BEER methodology and its application to Botswana see Imi (2006).

Clark and MacDonald (1999). The starting point is the real interest rate parity condition, where the change in the real exchange rate (q) is equal to the real interest rate (r) differential plus a risk premium (ρ). This parity condition can be expressed as:

$$q_t = q_{t+k}^e + (r_t - r_t^*) + \rho_t$$

where q_{t+k}^e is the expectation of the real exchange rate at period $t+k$. The future expected real exchange rate is then interpreted as the long-run component of the real exchange rate, which is assumed to be a function of macroeconomic fundamentals.

Iimi (2006) estimates a long-run equilibrium equation for Botswana that incorporates the real interest rate differential, terms of trade, NFA, the relative price of domestic nontradables to tradables, and a risk premium factor, defined as the difference between Botswana's fiscal deficit and the weighted average of the deficits of its trading partners. Because Botswana has a large fiscal surplus, almost no external debt, and very limited domestic capital markets, specifying a risk premium may not be relevant. Therefore, in line with the literature, we instead use the ratio of government spending to GDP as one of the fundamental determinants of the equilibrium exchange rate (IMF, 2006). Our initial specification also includes a measure of trade openness.¹⁴ Figure 3 plots the variables.

- **Terms of trade:** A positive terms of trade movement would either appreciate the nominal exchange rate or increase domestic demand through the wealth effect, leading to upward pressure on the relative price of nontradable goods and an REER appreciation.
- **Capital flows** (proxied by the NFA of the banking system relative to GDP): An increase in capital inflows would either appreciate the nominal exchange rate or increase domestic demand through the wealth effect, causing the REER to appreciate.
- **Relative productivity:** Less developed economies tend to experience productivity improvements in the tradable goods sector as they converge toward more advanced economies. As productivity increases, wages and prices of nontradable goods will tend to increase relative to those of trading partners, causing the domestic currency to appreciate in real terms. This captures the Balassa-Samuelson effect. Our estimation uses a relative productivity index¹⁵ to capture this effect, rather than the relative price of nontradables to tradables used in Iimi (2006).
- **Government spending:** The impact of government consumption on the REER would depend on the share of tradables in government spending. If the government spends

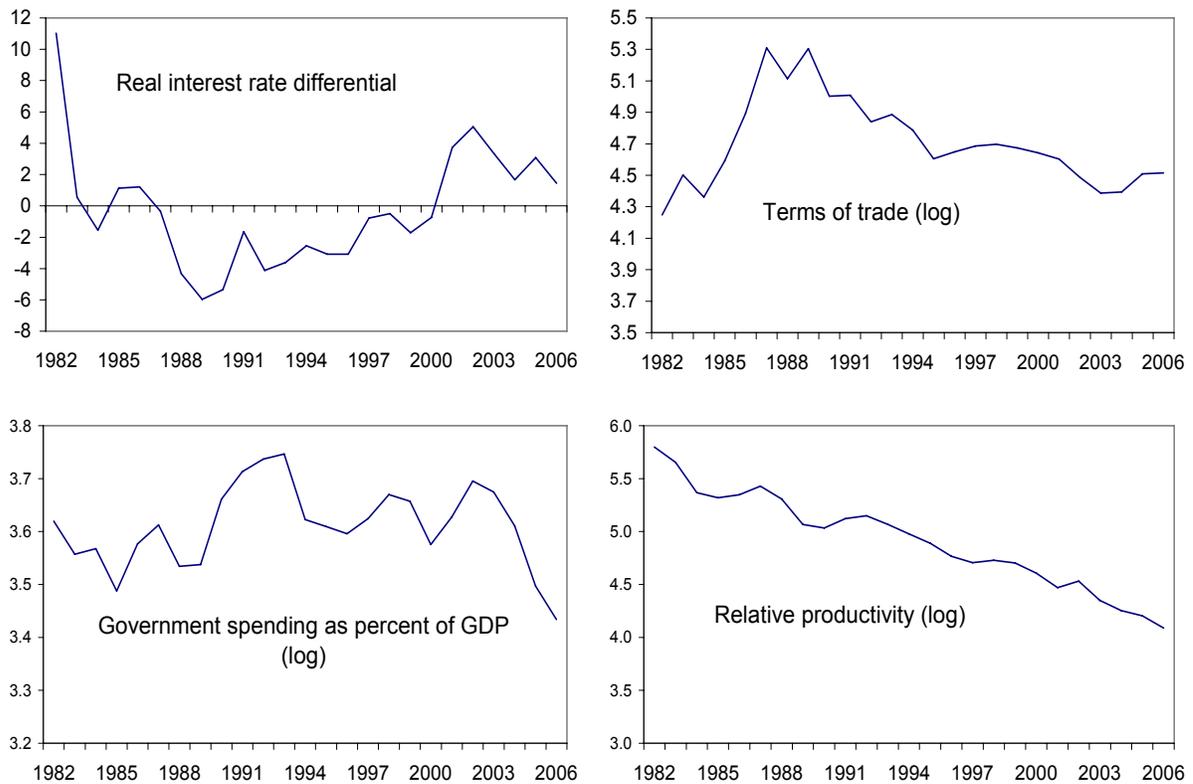
¹⁴ The weights attached to both the net foreign assets and the fiscal deficit differential are not statistically significant in Iimi's estimation.

¹⁵ This index is constructed as labor productivity in tradable/non-tradable goods in Botswana relative to the weighted average of labor productivity in tradable/non-tradable goods in its main trading partners. The tradable goods sector in Botswana excludes mining so as to reflect competitiveness in the nonmining economy, which is more sensitive to the level of the real exchange rate. This relative productivity measure appears to be a longer and more robust series than the relative price measure used by Iimi (2006).

relatively more on nontradables, an increase in consumption should lead to REER appreciation.

- **Trade openness** (proxied by the ratio of exports and imports of goods and services to GDP): A more open trade regime with fewer restrictions will tend to lower the domestic price of tradable goods, resulting in a depreciation of the REER.

Figure 3. Botswana: Determinants of the Real Effective Exchange Rate



B. Estimation results

Analysis of the order of integration of the REER and the variables in our empirical model indicates that they are integrated of order one, based on the augmented Dickey-Fuller tests (Appendix Table 1). We then estimate a vector error correction model (VECM), employing the Johansen methodology (1995) to identify a long-run (cointegration) relationship between the exchange rate and macroeconomic fundamentals.

We first determine the appropriate lag-length of the VAR. As the sample size is small, we start with a VAR with two lags, then estimate a VAR with one lag, and test whether the simplification from two to one lag is statistically valid using an F-test of the residuals. Here the F-statistic is strongly significant, indicating that the specification with two lags is the appropriate one (Appendix Table 2).

The Johansen procedure is then applied to test for the existence and the number of cointegrating equations; two are found in the initial set of dependent and explanatory variables. Because the sample size is small (1980-2006) and the presence of more than one

cointegrating equation complicates identification of the equilibrium relationship between the REER and its fundamental determinants, we look for a combination of explanatory variables, to include the key REER determinants, but with just one cointegrating vector.

Our preferred specification includes the real interest rate differential ($r-r^*$); the terms of trade ($ltot$); government consumption (lgc_gdp); and relative productivity ($lrelprod$). We found that the NFA and the indicator of trade openness were not significant determinants of the REER.¹⁶ Results from the Johansen trace and the maximum eigenvalue cointegration tests indicate that there is one cointegrating vector in the estimated system at the 95 percent level of confidence (Appendix Table 3); the coefficients of the cointegrating vector are plausible in magnitude and with the expected signs. All of the coefficients in this specification were determined to be statistically significant with the exception of the terms of trade (Appendix Table 4). The resulting long-run equilibrium equation is written as follows (t-statistics between brackets):

$$\ln REER = 0.034(r-r^*) + 0.042ltot + 0.338lgc_gdp + 0.052lrelprod + 2.946$$

$$\begin{array}{cccc} [13.02] & [1.42] & [3.53] & [4.11] \end{array}$$

Because structural breaks in the series would invalidate the cointegration results, tests for the stability of the estimation coefficients over the sample period were conducted. Breakpoint Chow tests indicate that the coefficients are stable over all sub-periods (Appendix Figure 1),¹⁷ and simple Chow tests (not shown) indicate no structural break in the system.¹⁸ Although residuals plots indicate some outliers (Appendix Figure 2), formal tests do not reject normality and no autocorrelation (Appendix Table 5).

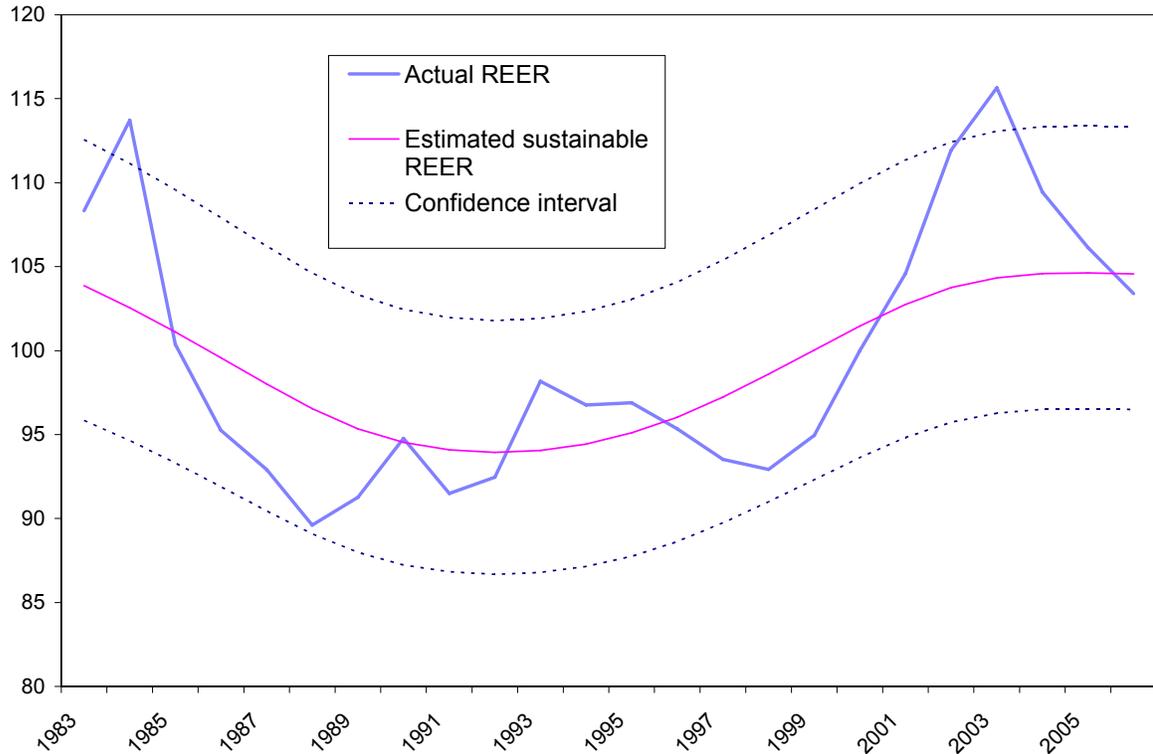
Using Hodrick-Prescott filters of these fundamental determinants of the REER as proxies for their equilibrium values, we then estimated the equilibrium long-run real exchange rate for Botswana, along with a 95 percent confidence interval around the equilibrium (Figure 4).

¹⁶ Net foreign assets were not found to have an important role in determining the exchange rate. This likely reflects the privatization of the public pension system, which resulted in a large decline in the ratio of net foreign assets to GDP from 2001 to 2005 as the government drew down its investment account with the central bank to transfer assets to domestic pension funds, only part of which were reinvested in foreign assets. At the same time there was an appreciation of the real exchange rate due to the depreciation of the rand. Although he included this in his final estimation, Iimi (2006) also determined that changes in net foreign assets did not have a significant role in determining the equilibrium exchange rate in Botswana.

¹⁷ In the appendix figure, values below 1 indicate stable coefficients.

¹⁸ An alternative would be to explicitly account for regime changes that may cause breaks in the series in the model. We estimated a modified model that included exogenous impulse time dummies covering the removal of exchange controls in 1999 and the devaluations and change of exchange rate regime in 2004-05. The coefficients on the dummy variables were not significant.

Figure 4. Botswana: Equilibrium Real Exchange Rate Estimation
Index, 2000 = 100



The results indicate that the real exchange rate was sharply overvalued prior to nominal devaluations in 2004 and 2005, and that the resulting real depreciation restored the REER roughly toward its equilibrium value during 2006. While the actual REER remained relatively close to the EREER for most of the 1990s, it started to diverge in about 2000-2001 as it appreciated faster than the EREER; by 2003 the estimated overvaluation was 10.8 percent. This broadly corresponds with the assessment in Iimi (2006), which concluded that the real exchange rate overvaluation during 2000-2003 appeared to have been corrected by the subsequent devaluations. Figure 4 does suggest that part of the real appreciation between 2000 and 2004 reflected an appreciation of the EREER, which appears to have stabilized around its 2006 value. In turn, this equilibrium appreciation possibly captured an improvement in the terms of trade and tight monetary policy, reflected in higher relative real interest rates compared to trading partners.

The most significant factors in the REER's movement back toward equilibrium appear to be the narrowing of the real interest rate differential since 2003, together with the downward trend in government spending over the same period. The sharp increase in these two variables above their equilibrium values during 2001-2003 seems to have been the primary cause of the divergence of the REER from its long-run equilibrium. Over the course of our sample period from 1980-2006, movements in the REER appear to have closely followed changes in the real interest rate differential.

Results of EREER estimation must, however, be interpreted with caution. As with all econometric methods, issues of data quality, limited time series (a particular problem in cointegration analysis), sensitivity of the results to sample period, choice of variables, and the smoothing method used to retrieve the fundamentals will influence the results derived from estimating a reduced-form equation for a single country. Equilibrium exchange rate estimation may not be robust to the choice of estimation method—single country versus panel—either (Chudik and Mongardini, 2006, Roudet, Saxegaard and Tsangarides, 2007). However, our results remain consistent with Iimi’s findings: the coefficients on the common variables are of similar magnitude and the coefficient on our productivity variable is more plausible, this for a longer sample and a different set of explanatory variables.

IV. EXTERNAL SUSTAINABILITY APPROACH

One of the three methodologies put forward by the IMF’s Consultative Group on Exchange Rate Issues (CGER), the external sustainability approach relies on the intertemporal budget constraint for the whole economy. It involves calculating the current account balance-to-GDP ratio that would stabilize the NFA position at some benchmark value. Unlike the EREER approach, this is not an econometric approach, and it is based on fairly straightforward assumptions about GDP growth and inflation. Assuming no capital gains, zero errors and omissions and no capital transfers, the current account that stabilizes NFAs at the benchmark level b^s is given by:

$$ca^s = \frac{g + \pi}{(1 + g)(1 + \pi)} \cdot b^s$$

Where g is the GDP growth rate and π is the inflation rate (IMF, 2006).

The main difficulty is to select a sensible benchmark value for the NFA position. The CGER methodology uses a backward-looking benchmark (latest actual value), to allow for cross-country comparisons. For exporters of exhaustible natural resources, however, the NFA benchmark consistent with external sustainability becomes a policy target and can be given a more forward-looking, normative content. Specifically, the sustainable current account or NFA position can be defined analogously and consistently with the requisites for medium-term fiscal sustainability. In the fiscal sustainability analysis, the sustainable overall fiscal balance is defined as the difference between total revenue (mineral and non-mineral) and permanent income (non-mineral revenue + annuity from projected stream of mineral revenue) or, more simply, the difference between mineral revenue and the annuity. In terms of external sustainability, this analysis implies that the sustainable current account position can be calculated as the difference between mineral exports and the annualized discounted value of the projected stream of mineral exports.¹⁹ The annuity is calculated here so as to

¹⁹ Sustainable current account calculations are based on the following assumptions: diamond resources would begin to decline abruptly in 2021, and the annuity is calculated between 2007 and 2050 to keep the analysis within a reasonable time frame. The analysis in this section draws on, and is consistent with, the methodology of calculating a sustainable non-mineral fiscal balance for Botswana presented in Clausen (2008).

remain a constant share of GDP through the period. While there are other ways to model the annuity (e.g. keeping it constant in real terms or as a share of per capita GDP), the method chosen here easily translates into the definition of a sustainable current account-to-GDP ratio.

This approach helps define a simple benchmark against which to assess the actual and projected current account trajectory, but it does not take into account different savings and investment preferences nor feedback effects on medium-term growth. In the external sustainability analysis, medium-term growth, inflation, and interest and discount rates are exogenously given. Sensitivity analysis can help assess the robustness of these assumptions (see below), but a fully specified model would be needed in order to capture different savings preferences, as well as the impact of current investment on future growth.²⁰ While the permanent income framework may be a good characterization of optimal policies in countries which have already reached a growth steady-state, it may be less accurate/useful for developing countries with substantial need for investment in physical and human capital. Furthermore, decisions on how much of the mineral revenue is saved or spent have monetary and exchange rate implications, and thus affect the level of the real effective exchange rate (Mannathoko, 2008).

²⁰ Olters (2007) calculates permanently sustainable non-oil primary deficits as a percent of non-oil GDP for sub-Saharan oil-producing countries, calibrating a formal model of permanent income and habit formation. Balassone, Takizawa and Zebregs (2006) discuss sustainable expenditure paths for Russia under permanent consumption rules that scale all variables by non-oil GDP as well as by overall GDP, under an alternative formulation of the permanent consumption rule. They show that this alternative formulation tends to generate more front-loaded expenditure paths.

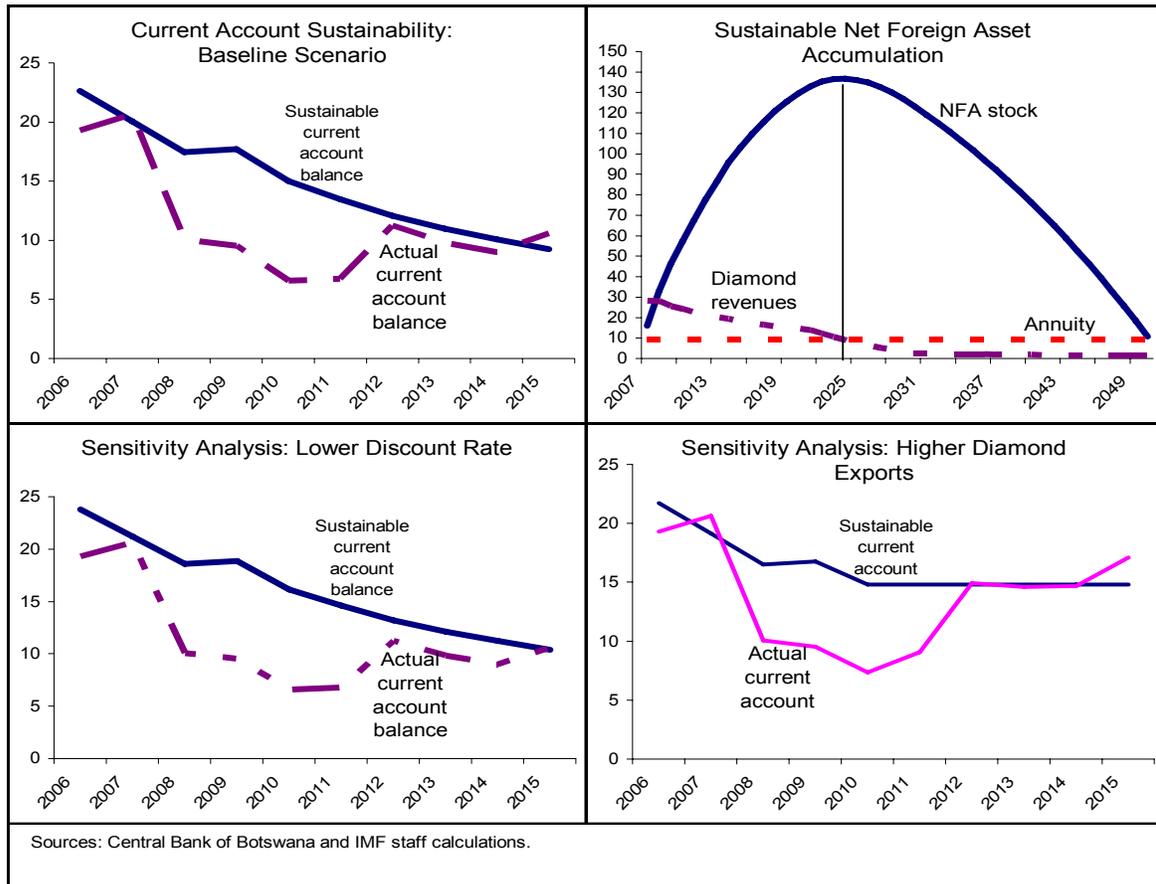
The sustainable current account path for Botswana may be somewhat above the projected path based on current policies (Figure 5). The assumptions used to calculate the baseline and alternative sustainable balance

Table 1. Assumptions (Percent)		
	Baseline	Alternative
Interest rate to discount revenue flows	9.3	7.8
Long-term inflation	4.7	4.7
Long-term real growth	4.4	4.4
Real rate of return	4.4	3

are summarized in Table 1. Based on these, the annuity value of diamond receipts is calculated to be about 9.2 percent of GDP. Over the projection period the actual current account path stays below the sustainable current account benchmark by an average of about 3½ percent of GDP (between 2007 and 2015 the average projected current account is about 10½ percent of GDP while the sustainable current account is at 14 percent of GDP). In contrast with the results of the equilibrium exchange rate analysis above, this would imply a slightly overvalued exchange rate. However, the projected lower surpluses for 2007-2013 are transitory: they reflect imports of capital goods linked to large mining and energy projects. As these projects are mostly financed by FDI inflows, and as long as their returns are higher than would be derived from the accumulated financial savings from diamond exports, such investment would be consistent with long-run current account sustainability.

Sensitivity analysis shows that a lower discount rate (see alternative scenario in Table 1), which would imply that greater value is attached to future imports and consumption, would lower the annuity value. This would lead to a continuing need for higher savings, and would further increase the gap between the actual and sustainable current account. On the other hand higher diamond revenue (assuming diamond exports stabilize at 25 percent of GDP between 2010 and 2015 instead of declining) would both allow for higher annual savings and improve the projected current account, thus narrowing of the gap between the sustainable and projected current account surplus.

Figure 5. Botswana: External Sustainability Assessment
(Percent of GDP)



Saving the difference between diamond export revenues and the annuity under the sustainable current account path also provides a sustainable benchmark path for NFAs. New NFA accumulation is driven each year by saving (and investing) the difference between diamond exports and the annuity, and the annuity is calculated so as to generate sufficient financial assets to sustain imports through 2050. However, this analysis abstracts from important additional considerations, namely (i) the starting stock of NFAs; (ii) the need for NFAs to include not only resource savings but also sufficient liquid reserves to help cushion external shocks; and (iii) significant movements in the capital and financial accounts.

- Taking into account the current stock of NFAs would allow for more flexibility in determining the sustainable current account path through 2050.²¹ At year-end 2006, NFAs amounted to 75 percent of GDP, and included both liquid reserves of about 6 months of imports (about 20 percent of GDP) and longer-term savings in the Pula Fund (another 55 percent of GDP). If one includes the Pula Fund (or some portion of it) as the starting

²¹ Alternatively it would allow to smooth imports over a longer period of time.

amount of savings, then either annual savings out of diamond export receipts can be smaller to sustain imports at the permanent level until 2050, or that level can be sustained for a longer period.

- In addition to allow to sustain a permanent level of import through the end of the period, reserves should provide a cushion against terms of trade and other shocks. If the Bank of Botswana was to maintain the current policy of keeping liquid reserves at about 6 months of imports, in addition to saving the annuity, then the NFA stock—even starting from the end-2006 NFA position—would be rapidly drawn down.
- Finally, the evolution of FDI and portfolio flows might be different depending on how the large energy and mining projects are financed.

Simple calculations using the above formula and the assumptions about long-run growth and inflation of table 1 illustrate the first two points. If one was to stabilize NFAs at the permanent consumption level, consisting of the sum of the annuity (9.2 percent of GDP) and average non-diamond exports (about 16 percent of GDP), then the current account surplus would have to be at about 20 percent of GDP, close to its current level. However, if one wanted to also maintain a liquid reserve coverage of about 6 months of imports (about 10 percent of GDP), then the sustainable current account surplus would have to be about 37 percent of GDP.

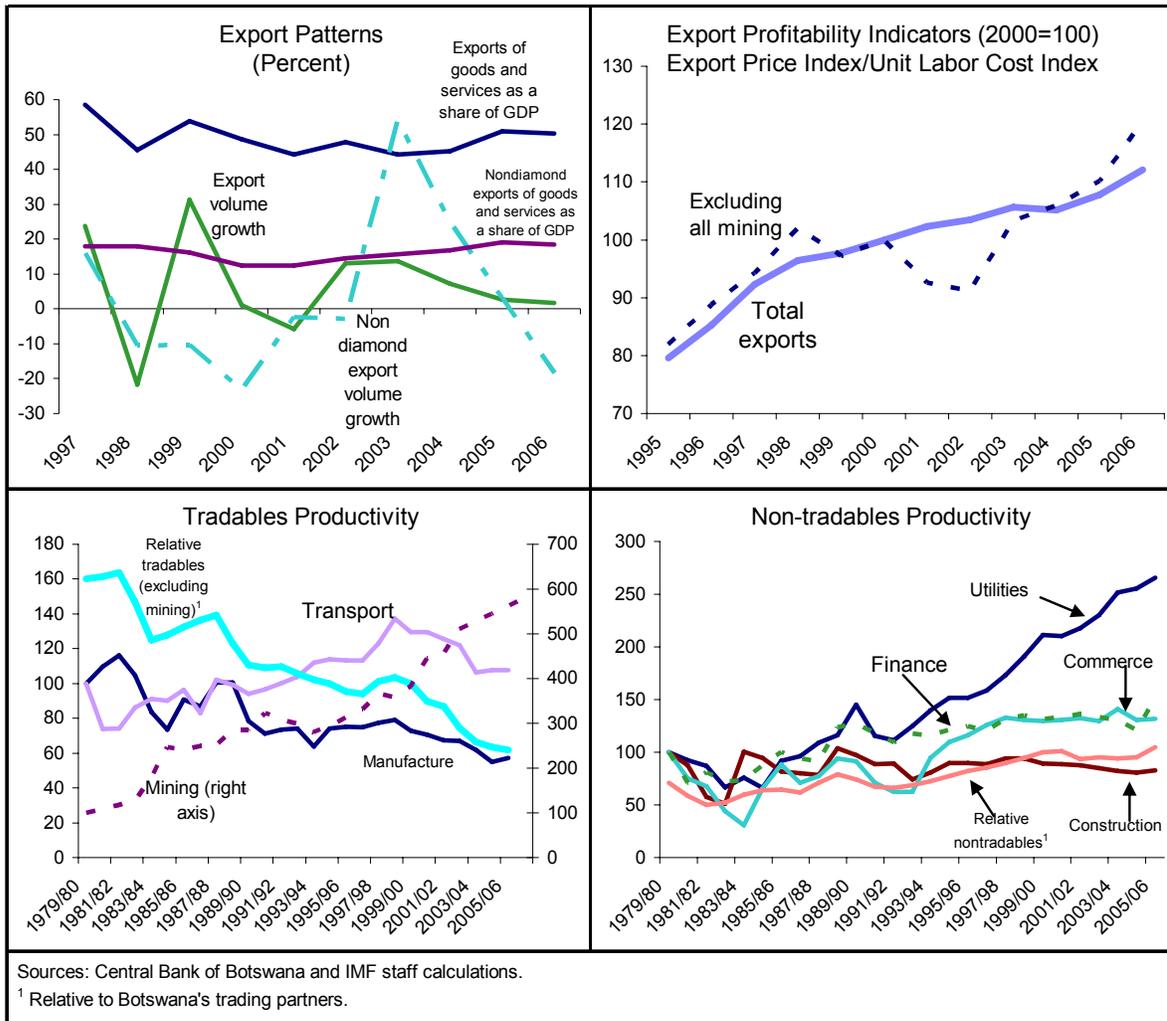
V. EXPORT PERFORMANCE AND NONPRICE COMPETITIVENESS INDICATORS

A. External sector outcomes

Export performance has been disappointing (Figure 6). The share of total exports in GDP has been roughly constant since 1997, and the share of non-mining exports in non-mining GDP actually declined by 10 percentage points between 1997 and 2006, from 18 to 8 percent. Growth in the volume of both diamond and other exports has declined in recent years. In terms of market shares, Botswana's exports do perform better than other SACU members (excluding South Africa) thanks to diamonds, but remain far behind South Africa. Botswana's share of world trade has also been stagnant in recent years. The recent improvement in export profitability is due to a combination of higher export prices following the devaluation and to modest improvements in productivity, mostly in mining activities.

Sectoral productivity trends show a worrying decline in labor productivity in tradables sectors other than mining. Productivity in transport and manufacturing has been declining since the late 1990s, though there appears to have been an uptick in the past two years. In nontradables, only utilities show a strong improvement in labor productivity.

Figure 6. Botswana: Export Performance Indicators



B. Nonprice indicators of competitiveness

Infrastructure costs

Infrastructure costs in Botswana have been higher than in other countries in the region (Table 2). Although airfreight costs to Europe appear competitive, except with respect to South Africa, sea freight costs to Europe are higher. Utility costs (water, electricity and telecommunications) are higher than in the region. Another issue is the high cost and deficiencies in information technology (IT) infrastructure, and the government monopoly on voice-over-internet-protocol (VOIP) services (BIDPA, World-Bank, 2005).

Table 2. Botswana: Comparative Costs of Infrastructure Services in the late 1990s (U.S. dollars)

	Botswana	Kenya	Mauritius	Mozambique	Namibia	South Africa	Zimbabwe
Airfreight to Europe(per kg)	1.84	1.70	2.57	2.18	2.33	1.17	2.22
Sea freight to Europe (per 20-foot container)	2.00	1.40	1.80	1.50	1.08	1.00	2.00
Electricity (per kwh)	0.10		0.08	0.04	0.04	0.06	0.05
Water (per m3)	1.02	0.35	0.52	0.35	0.67	0.30	0.34
Telecom to EU (per minute)	4.04	4.00	1.65	3.60	1.23	2.21	2.58

Source: Namibian Investors (1998-99), reproduced in UNCTAD (2003).

Survey-based measures of competitiveness

The results of recent competitiveness surveys are mixed, but indicate a somewhat worse performance for Botswana than for direct competitors in the region, notably South Africa. Competitiveness rankings across countries and over time must be interpreted with caution: underlying surveys may not be strictly comparable across countries, and the evolution of a country's ranking is influenced by the (varying) total number of countries included. Overall, Botswana tends to perform better than Lesotho and Swaziland in each year, but worse than the other upper middle-income countries in the group, in particular South Africa (Table 3).

Perceived impediments to doing business in Botswana are related to the labor force and the functioning of the labor market, an inefficient government bureaucracy, inadequate and high-cost infrastructure, as well as issues of access to and cost of finance, in particular for smaller firms.²² Labor market issues include a skills mismatch that leads to both high unemployment and shortages of skilled labor, compounded by difficulties in obtaining work/residence permits for expatriate skilled workers. The HIV/AIDS epidemic is also taking its toll on productivity of the workforce. Although access to financial services is available to a larger share of the population in Botswana than in other countries in the region, small and medium-sized businesses find it difficult or too costly to obtain loans.²³ A 2004 FIAS report on obstacles highlighted these issues and also focused on the need for Botswana to improve the regulatory environment and remove administrative barriers to investment. In particular, it encouraged the authorities to continue their efforts to improve operational efficiency of public service and administration.

²² According to annual competitiveness surveys conducted in Botswana by the World Economic Forum. See World Economic Forum, Global Competitiveness Reports, 2003-2007, and also the FIAS Report, 2004.

²³ A number of government initiatives and institutions attempt to provide subsidized financial services to small businesses, but their effectiveness in reaching the intended beneficiaries has been found to be limited. See Botswana—Financial System Stability Assessment, SM/07/367.

Table 3. Botswana: Competitiveness Rankings*

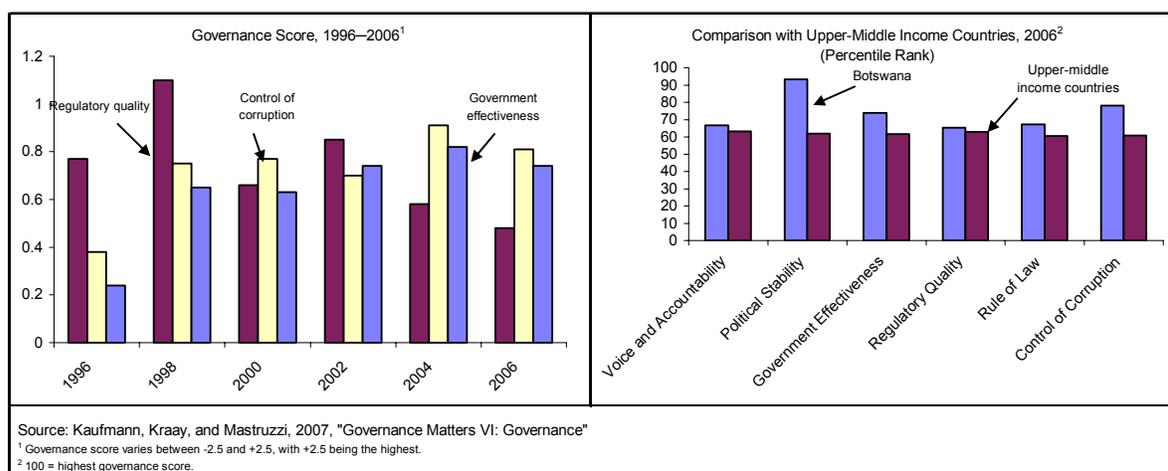
	2001	2002	2003	2004	2005	2006
Business Competitive Index (BCI) Ranking						
Argentina	52	65	68	72	61	78
Botswana	...	53	55	57	55	69
Chile	29	29	30	29	29	29
Colombia	59	56	58	62	60	59
Lesotho	...	...	...	...	...	115
Malaysia	37	25	24	23	23	20
Mauritius	46	49	45	51	50	48
Namibia	...	50	53	49	80	75
South Africa	28	30	28	28	30	33
Swaziland	...	...	...	...	...	...
<i>No. of Countries</i>	<i>74</i>	<i>79</i>	<i>97</i>	<i>100</i>	<i>113</i>	<i>121</i>
Global Competitiveness Index Ranking						
Argentina	...	...	...	...	54	69
Botswana	...	...	...	...	72	81
Chile	...	...	...	...	27	27
Colombia	...	...	...	...	58	65
Lesotho	...	...	...	...	...	112
Malaysia	...	...	...	...	25	26
Mauritius	...	...	...	...	55	55
Namibia	...	...	...	...	79	84
South Africa	...	...	...	...	40	45
Swaziland	...	...	...	...	...	...
<i>No. of Countries</i>	...	...	...	...	<i>117</i>	<i>125</i>
Ease of Doing Business Ranking						
Argentina	...	...	...	...	93	101
Botswana	...	...	...	...	44	48
Chile	...	...	...	...	24	28
Colombia	...	...	...	...	76	79
Lesotho	...	...	...	...	116	114
Malaysia	...	...	...	...	25	25
Mauritius	...	...	...	...	32	32
Namibia	...	...	...	...	39	42
South Africa	...	...	...	...	28	29
Swaziland	...	...	...	...	67	76
<i>No. of Countries</i>	...	...	...	...	<i>175</i>	<i>175</i>

Sources: World Economic Forum; World Bank, Doing Business.

* 1 = most competitive

Governance indicators, an area where Botswana's worldwide reputation is excellent, do show some deterioration in the regulatory quality dimension, which measures the ability of the government to formulate and implement sound policies and regulations that promote private sector development. There also appears to be a recent decline in government effectiveness (the quality of public services, of the civil service, and of government policies and implementation capacity) and in control of corruption, though both indicators remain above historical trends. However, Botswana's performance continues to compare favorably to other upper-middle income countries (Figure 7).

Figure 7. Botswana: Governance Indicators



VI. SUMMARY AND CONCLUSIONS

Using a combination of approaches, the paper finds that Botswana's REER is broadly in line with economic fundamentals and consistent with external sustainability. A *description of balance of payments and real effective exchange rate developments* indicates no immediate threat to external stability: current account volatility is high due to the dependence on diamond exports, but reserve coverage is adequate and there are no significant balance sheet vulnerabilities stemming from the capital and financial account. *REER measures* indicate that the 2004-2005 devaluations and the switch to a crawling peg regime have undone the previous overvaluation, which was linked to poor productivity in nontradables versus tradables relative to Botswana's trading partners, and restored REER stability. *Equilibrium exchange rate estimation* confirms that, after a period of overvaluation, Botswana's REER is now broadly consistent with economic fundamentals (though the small sample size limits the reliability of the results). Based on current policies, the projected current account path through 2015 is consistent with *external sustainability*, provided that the future return of investments in mining and energy is higher than that on accumulating financial assets.

Export performance and other indicators suggest a number of structural competitiveness obstacles that could explain the low labor productivity and poor export and export diversification outcomes. Being a small, landlocked, and partly arid country, Botswana faces a number of "natural" competitiveness obstacles that weigh on the ability to diversify the non-mineral part of the economy. The small size of the domestic market makes it unattractive to large foreign investors outside mining, and utilities costs are higher than in neighboring countries, raising production costs. The recent fall in nondiamond export volume growth and declining labor productivity in non-mining tradables are worrisome trends, and the authorities have rightly made productivity enhancements and export diversification national priorities. Competitiveness surveys suggest a number of priority areas:

- *Labor market and education reforms* aiming at easier access to work and residence permit for expatriate skilled workers, and adapting education and vocational training to the skill requirements of the economy;
- *Continuing efforts to improve the efficiency of the government and the regulatory environment.* Following the 2004 FIAS report, the government is following up on the recommendations to improve procedures such as company licensing, reducing the time it takes for new businesses to get connected to utilities; it is also revising the foreign investment code and setting up a new competition policy. Further and perhaps faster progress in these areas would go a long way to increase the attractiveness of Botswana as an investment destination.
- *Implementing an appropriate mix of fiscal and monetary/exchange rate policy that allows for lower real interest rates, and streamlining and/or privatizing publicly-subsidized financial services.* These measures would reduce the cost of, and enhance access to financing for small and medium-sized enterprises.

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APPENDIX

Data Sources

The REER is the multilateral CPI-based exchange rate of the pula, as calculated by the *IMF Effective Exchange Rate Facility*.

real interest rate differential ($r-r^*$): The Botswana real interest rate refers to the CPI-deflated prime lending rate; data on both CPI and the prime lending rate are taken from the IMF, *International Financial Statistics* (IFS). The foreign real interest rate is defined as the weighted average of long-term government bond yields, deflated by the CPI, for trading partner countries; data are taken from the IFS.

terms of trade ($Itot$): The terms of trade, defined as the relative price of exports to imports, are constructed based on trade data from the Central Statistics Office and the Bank of Botswana, and commodities prices from the IMF *World Economic Outlook* database.

government consumption (lgc_gdp): Defined as the ratio of government expenditure to GDP; based on data from the Ministry of Finance and Development Planning, the Central Statistics Office and the IFS.

relative productivity ($lrelprod$): Defined as relative labor productivity in tradable/non-tradable goods (excluding mining) in Botswana against the weighted average of labor productivity in tradable/non-tradable goods for trading partner countries. Data for Botswana are taken from the Botswana National Productivity Centre, *Botswana Productivity Statistics Update 2006*. Data for trading partner countries are taken from the IMF Research Department (CGER Database).

Appendix Table 1. Unit Root Tests (Augmented Dickey-Fuller)

Variable	ADF	P-Value	Conclusion
$\ln(REER)$	-3.16	0.037	I(1)
$(r-r^*)$	-3.43	0.019	I(1)
$\ln(tot)$	-5.50	0.000	I(1)
$\ln(gc_gdp)$	-3.91	0.007	I(1)
$\ln(relprod)$	-7.75	0.000	I(1)

Note: The augmented Dickey-Fuller statistic (ADF) tests the null hypothesis of a unit root in the series against the alternative of stationarity. The p-values indicate the significance of the statistic, and the last column shows the conclusion, with I(1) indicating that the null hypothesis of a unit root in the series in levels cannot be rejected.

Appendix Table 2. Test for Model Reduction

	Statistic	Value	p-value
VAR(2) to VAR(1)	F(25,38)	2.53	0.005

Note: The F statistic test the null hypothesis that it is appropriate to reduce the model by one lag.

Appendix Table 3. Cointegration Tests: Trace Test and Maximum Eigenvalue

Number of Hypothesized Cointegrating Equations	Trace		Max-Eigen	
	Statistic	P-value	Statistic	P-value
None *	92.30	0.00	56.52	0.00
At most 1	35.78	0.41	17.42	0.54
At most 2	18.36	0.54	11.28	0.62
At most 3	7.08	0.57	6.63	0.53
At most 4	0.45	0.50	0.45	0.50

Note: Both the trace and maximum eigenvalue statistics indicate the existence of one cointegrating relationship.

Appendix Table 4. Results of Cointegration Estimation¹

<u>Estimates of the cointegrating relationship</u>		
Real interest rate differential	-0.034	
	-0.003	
		[-13.024]
ln(terms of trade)	-0.042	
	-0.029	
		[-1.427]
ln(government consumption)	-0.338	
	-0.096	
		[-3.532]
ln(productivity)	-0.052	
	-0.013	
		[-4.110]
Constant	-2.946	
<u>Estimates of the short term coefficients</u>		
Dln(REER)	-0.376	
	-0.139	
		[-2.699]
D(Real interest rate differential)	44.841	
	-6.469	
		[6.932]
Dln(terms of trade)	-0.065	
	-0.526	
		[-0.124]
Dln(government consumption)	0.172	
	-0.234	
		[0.733]
Dln(productivity)	1.107	
	-0.206	
		[5.364]
R-squared	0.367	
Adj. R-squared	0.156	

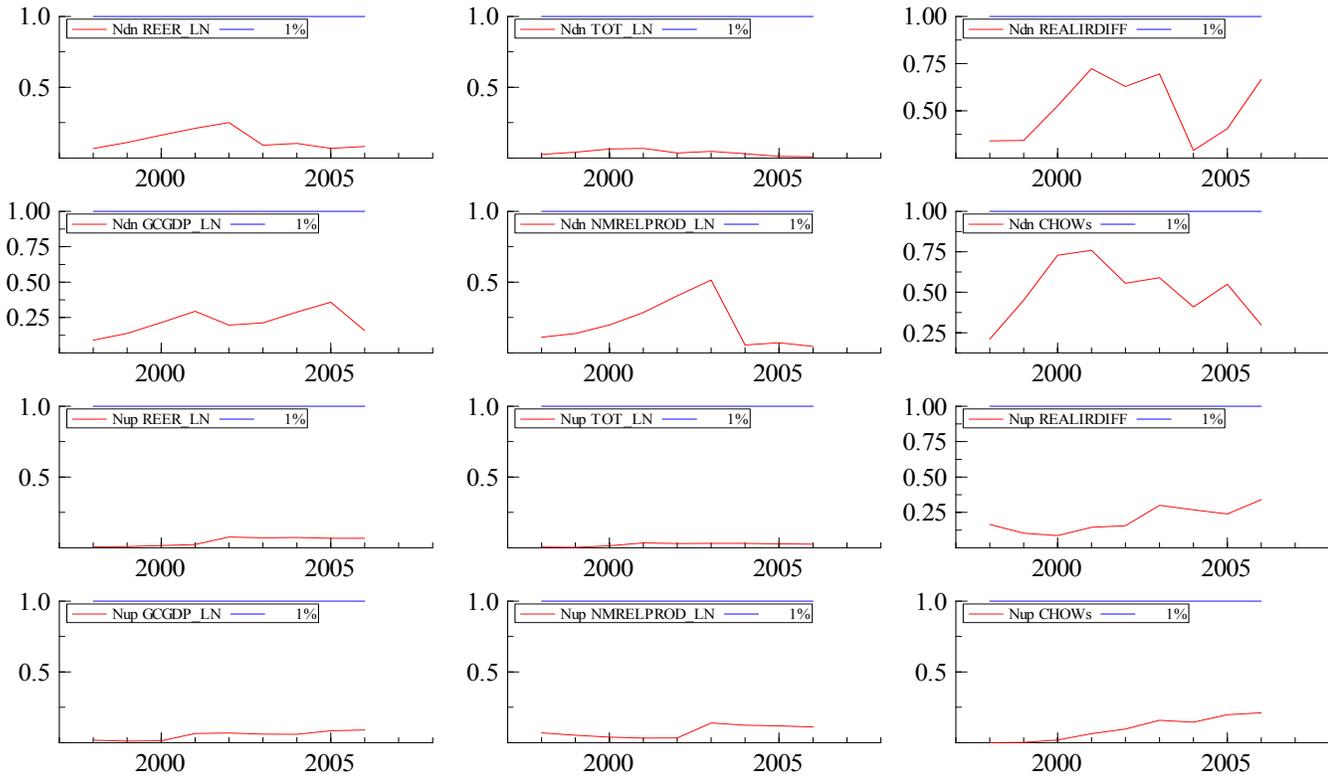
¹Variables in first differences. Standard errors below coefficient estimates, and t-statistics between brackets.

Appendix Table 5. Residuals Tests

Test	Value	P-value
Vector AR 1-1 test:	F(25,20) = 1.230	[0.321]
Vector Normality test:	Chi ² (10)= 6.0206	[0.814]

Note: the statistics test the null hypothesis of autocorrelation in the residuals, and of no normality, respectively.

Appendix Figure 1. Breakpoint Chow Tests



Note: Probability (in percent) that the coefficient on the indicated variable is stable. Values below 1 significant at the 1 percent level.

Appendix Figure 2. Equilibrium REER Estimation: Cointegration Residuals

