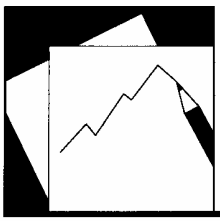
WP/06/140



IMF Working Paper

Exchange Rate Misalignment: An Application of the Behavioral Equilibrium Exchange Rate (BEER) to Botswana

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INTERNATIONAL MONETARY FUND

 WP/06/140

IMF Working Paper

African Department

Exchange Rate Misalignment: An Application of the Behavioral Equilibrium Exchange Rate (BEER) to Botswana

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June 2006

Abstract

Botswana's successive currency devaluations and recent move from a fixed to a crawling peg exchange rate regime raise the question of whether the exchange rate might be misaligned with economic fundamentals. This paper, applying the behavioral equilibrium exchange rate (BEER) approach, analyzes the behavior of the real exchange rate for the period 1985–2004. It finds that the pula was undervalued in the later 1980s but overvalued in recent years. Some policy lessons from experiences in other countries with crawling peg arrangements are therefore considered in the context of Botswana.

JEL Classification Numbers: F31, F32, F41

Keywords: real effective exchange rates; crawling peg

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[1] I am most grateful to Mr. Paul Heytens for his helpful suggestions throughout this research. I also thank my colleague, Mr. Patrick A. Akatu, for his insightful comments.

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I. INTRODUCTION

The recent successive devaluations of its national currency, the pula, and the move from a fixed to a crawling peg exchange rate regime suggest that Botswana's exchange rate might be misaligned with economic fundamentals. This paper uses the behavioral equilibrium exchange rate (BEER) approach to examine the extent to which the actual real exchange rate deviates from its sustainable equilibrium level.

While a large number of countries have moved toward more flexible exchange rate regimes since the collapse of the Smithsonian Agreement in 1973, IMF (2004) finds that more than half the countries in the world retain some inflexibility, such as soft pegs and bands covering conventional fixed and crawling pegs, as well as hard pegs (legal tender and currency boards). For that reason, determining the right nominal exchange rate is still one of the most important macroeconomic policy issues for many emerging and developing economies.

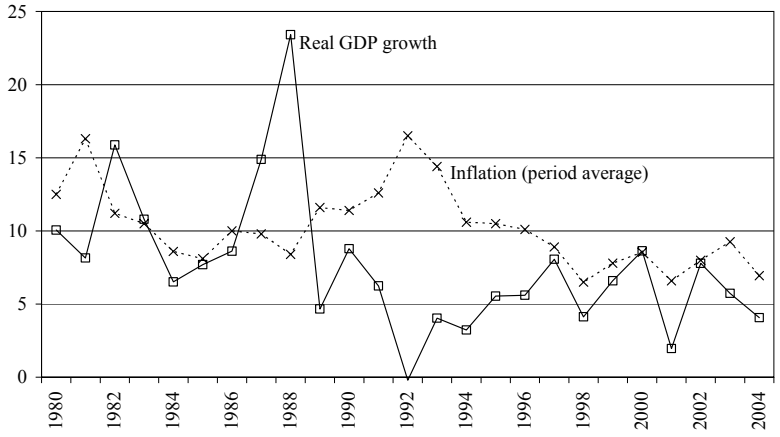
Botswana, which is one of the best performing economies in Africa, is no exception. The country had relied on a conventional fixed exchange rate pegged to a basket of currencies, and that regime, along with sound macroeconomic policies and a stable political environment, seems to have been a credible nominal anchor for the economy.[2] Real GDP growth in Botswana has averaged over 8 percent for two decades; inflation has been kept broadly to single digits except during the 1992–94 recession (Figure 1).[3] Per capita income in 2003 was estimated at over US$4,800. While the fiscal balance continued to be in surplus until 2000/01, the surplus on the external current account has remained sizable due to diamond exports, building foreign reserves to over US$5.5 billion, the equivalent of about 18½ months of imports (Figure 2).[4]

[2] The currency basket comprises the South African rand and the SDR, though the precise weights are not published.

[3] Botswana experienced a deep depression from 1992 to 1994. Real GDP declined by 0.1 percent, and formal sector employment fell by about 6 percent. The primary reason was low demand for diamonds due to economic recession in industrial countries, but because of the country's heavy dependence on the diamond sector, it triggered widespread suspension of building projects by the Botswana Housing Corporation and sluggish textile and apparel exports. In addition, it reflected some adjustment, because economic expansion in the second half of the 1980s seems to have been unsustainably high (Gaolathe, 1997).

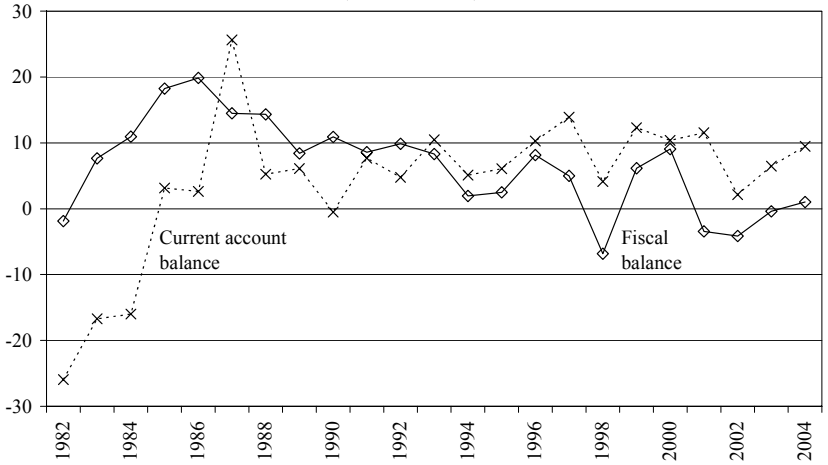
[4] The recent privatization of the public pension fund decreased foreign reserves to some extent.

Figure 1. Botswana: Real GDP Growth and Inflation, 1980–2004
(Percent)



Source: Botswana authorities.

Figure 2. Botswana: Fiscal and Current Account Balances, 1982–2004
(Percent of GDP)



Sources: Botswana authorities; and IMF estimates.

The Botswana economy is heavily dependent on diamonds: mining production, including diamonds, contributed 35–40 percent of GDP and 75 percent of total exports in recent years.[5] Naturally, though this certainly provides a foundation for strong growth, it raises the concern that large natural resource exports might cause overvaluation of the pula, which would in turn erode the external competitiveness of sectors other than natural resources (this is known as the "Dutch disease" syndrome; see Corden and Neary (1982), and Sachs and Warner

[5] Diamonds are obviously dominant in Botswana, but copper, nickel, soda ash, coal, and gold also make small but noticeable contribution to GDP.

(1995)). In addition, the rapid growth in tradables—mainly food and household goods mostly imported from South Africa—relative to nontradables is likely to lead to a larger appreciation of the external real exchange rate than Botswana's trading partners experience (the Balassa-Samuelson effect). Despite government efforts since the 1980s to encourage nonmining industries, such as tourism and livestock, diversifying its economy remains challenging for Botswana. The degree of its dependence on the diamond sector has not changed much over several decades.

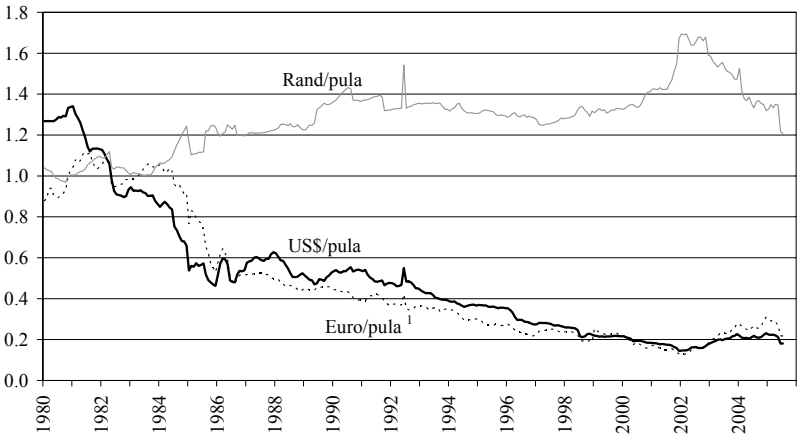
Although such external competitiveness issues are not easily addressed by changing the exchange rate level, it is possible that the observed value of the national currency, though satisfying a short-run equilibrium at any moment, would not achieve long-term sustainable equilibrium levels that are supported by economic fundamentals. Thus, realignment may be justifiable, especially since it does influence competitiveness at least in the short to medium term. The Bank of Botswana (BoB) has said clearly in its monetary policy statement that its objective of low inflation depends on domestic producers maintaining their international competitiveness and thus contributing to broader national economic growth.

In February 2004, the government of Botswana devalued the pula by 7.5 percent against the currency basket, and in May 2005, again devalued it by 12 percent, citing the need to maintain a stable and competitive real exchange rate. The government also announced that the exchange rate would be adjusted in a crawling peg arrangement rather than in discrete steps, and it widened the spread between the buy and sell rates of the pula from ±0.125 percent to ±0.5 percent to encourage further development of the interbank market for foreign exchange.

Nevertheless, it is worth noting that over the long term, the pula had depreciated greatly against both the U.S. dollar and the euro, but it appreciated against the South African rand (Figure 3). Before the February 2004 devaluation, the pula had depreciated by about 80 percent against the U.S. dollar and by 65 percent against the euro compared to the exchange rate level in 1980. On the other hand, during the same period it appreciated by over 20 percent against the rand.

In the short run, an unusually sharp appreciation of the rand against the U.S. dollar that started in 2001 and continued for three years led to a parallel hike of the Botswana pula against major currencies. In 2002–03 the value of the pula increased by about 50 percent against the U.S. dollar and doubled against the euro. The two devaluations that followed caused roughly a 20 percent decline by July 2005 in the value of the pula against not only the U.S. dollar and the euro but also the rand. Thus, at least in "nominal" and "observable" terms, the devaluations seem to have had a positive effect on external competitiveness.

Figure 3. Botswana: Bilateral Exchange Rates, 1980–2005



Source: *International Monetary Statistics* .

[1] The ECU was replaced with euro at a rate 1:1 in January 1999.

Our discussion of exchange rate misalignment in Botswana is organized as follows: Section II reviews earlier studies on exchange rate misalignment. Section III describes recent developments in Botswana by illustrating the real exchange rate in external and internal terms. Section IV elaborates on the empirical analysis. Section V presents the estimation results. Finally, Section VI discusses policy implications and lessons for exchange rate management in the future.

II. THE LITERATURE

How to realign the exchange rate for a country to recover its "real" external competitiveness "in equilibrium" is open to argument. Even using a conventional measurement, the real effective exchange rate (REER) for external competitiveness, there are many conceptual and calculation ambiguities (Montiel and Hinkle, 1999).[6] Much also depends on what the long-run equilibrium exchange rate is. Particularly for Botswana, the issue may be complicated by the country's unique trade patterns, which are characterized by high commodity concentration of exports and geographic concentration of imports (Leith, 1997).

A number of studies have investigated exchange rate equilibrium as well as misalignment. Subject to some ambiguity, [7] there are at least three approaches to determining the equilibrium exchange rate. The first is based on purchasing power parity (PPP), which relates

[6] For example, there are different concepts of underlying inflation (e.g., CPI, PPI, and GDP deflators), and different weights can be used for calculating the mean price index of trading partners. The mean calculation is per se debatable: it could be either arithmetic or geometric.

[7] See Montiel (1999).

the nominal exchange rate to price differentials between countries. For example, Johansen and Juselius (1992) estimate PPP for the United Kingdom by incorporating the uncovered interest rate parity (UIP) relation into their model. For the Japanese yen–U.S. dollar exchange rate, MacDonald and Nagayasu (1998) find some minor deviation of the observed data from the calculated medium to long-run equilibrium exchange rate based on the PPP and UIP.

The second approach concentrates on the exchange rate that supports sustainable internal and external macroeconomic balances over the medium to long term. This is often referred to as the fundamental equilibrium exchange rate (FEER) approach. Here the equilibrium exchange rate is essentially determined by the current account balance target, which depends on underlying sustainable equilibrium for international assets, as well as national income based on full employment. The current account targets should also be associated with desired levels of saving and investment. Williamson (1994), for instance, estimates the FEERs of the G-7 countries given desirable current account balances based on the potential output estimates for those countries calculated by the IMF and the OECD. He found that in the last quarter of 1989, the actual U.S. dollar was 14 percent overvalued, while the Japanese yen was 27 percent undervalued.

The FEER approach is based on macroeconomic identities; because it does not involve any theory of exchange rate determination (Clark and MacDonald, 1998), the equilibrium exchange rate calculated should not be viewed as normative. The equilibrium concept is largely meant to imply the desirability of the underlying internal and external balances rather than exchange rates per se (Bayoumi et al., 1994).

Finally, the behavioral equilibrium exchange rate (BEER) approach focuses on the dynamic behavior of the rate, including short-run movements and deviations and taking broader macroeconomic conditions into account. The choice of fundamentals may vary depending on the theoretical model used. Starting off with a model of risk-adjusted interest parity to construct an equilibrium real exchange rate equation, Clark and MacDonald (1998) include in their model as fundamentals terms of trade, the ratio of the domestic consumer price index to the producer price index and the stock of net foreign assets, as well as the relative supply of domestic to foreign government debt as a risk premium factor.[8]

Using a similar approach, Elbadawi (1994), relying on an identity for nominal domestic absorption, estimated the long-term equilibrium exchange rates for Chile, Ghana, and India. His fundamentals include terms of trade, resource balances, degree of openness of the economy, share of government expenditure in GDP, and a measure of excess money supply.

[8] Clark and MacDonald's estimate suggests that the actual U.S. exchange rate was overvalued by 35 percent in 1984, before the Plaza Agreement. They also estimate the BEERs for the Deutsch-mark and the Japanese yen for the period: 1960–96.

Baffes, Elbadawi, and O'Connell (1999) examine misalignment for Côte d'Ivoire and Burkina Faso using single-equation time series. They found that for Côte d'Ivoire the actual real exchange rate was overvalued by 34 percent on average during the period 1987–93, though Burkina Faso does not seem to have experienced any major overvaluation. In the panel context, on the other hand, Dufrenot and Yehoue (2005), analyzing the relationship between real exchange rates and economic fundamentals in 64 developing countries, found that exchange rate dynamics are less likely to be explained by fundamentals such as productivity, terms of trade, and trade openness for middle-income countries than for low-income countries.

This paper employs the third approach because it seems to be a more general method for calculating the real exchange rate consistent with the concept of economic equilibrium. More important, the analytical focus of the paper is equilibrium exchange rate behavior, including cyclical and transitory deviations, in connection with macroeconomic fundamentals.[9] For Botswana, the main factors that affect the equilibrium exchange rate may be the terms of trade, the Dutch disease syndrome, and the Balassa-Samuelson effect. Despite Botswana's past high credit rating,[10] another important emerging element that may influence exchange rate behavior and threaten to undermine the country's economic performance is growing fiscal pressures, mainly resulting from large HIV/AIDS-related expenditures and the possibility that diamond revenues will plateau.[11] In spite of the recently adopted fiscal rule to stabilize government expenditure, the fiscal position might worsen over the medium to long term unless the adjustment measures that have been more or less initiated are fully implemented, such as a major expansion of the nonmineral tax base and privatization of government services and state-owned enterprises.

Econometrically, this paper estimates a reduced-form single-equation model, using the vector error correction mechanism (VECM). Though simple this is methodologically attractive. MacDonald and Nagayasu (1998) show that applying the VECM to a simplified version of the real interest differential model is sufficient to explain fundamental movements of exchange rates in estimating the long-term Japanese yen–U.S. dollar equilibrium rate.

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[9] For that reason, this analysis, unlike the FEER-based literature, will pay less attention to the question of what the sustainable or long-term levels of economic fundamentals are.

[10] Moody's Investment Services has rated Botswana's sovereign bonds A1.

[11] A recent national survey, Botswana AIDS Impact Survey (2004), indicates that the overall HIV prevalence was estimated at 17.3 percent for the general population aged 18 months and older, 33 percent for age group 25-29 years, 40.7 percent for 30-34, and 36.9 percent for 35-39. On the other hand, UNAIDS estimated HIV/AIDS prevalence in Botswana at end-2003 at 37.3 percent of the adult population (15-49). The share of health expenditure in total government spending, not necessarily all HIV/AIDS-specific, increased from 4 percent to over 10 percent over the past decade.

III. Recent Developments in Exchange Rates in Botswana

The real exchange rate is generally defined in external terms across countries and in internal terms within a country (Hinkle and Nsengiyumva, 1999a). While the former captures the relative value of currencies by comparing the prices of a particular consumption basket in different countries (e.g., PPP), the latter measures the production advantage of the home economy.

A. External Real Effective Exchange Rate

One of the major indicators that represent a country's external competitiveness is the external real effective exchange rate (REER).[12] In terms of the conventional REER, the Botswana currency in recent years appears to have experienced a temporary appreciation. Figure 4 depicts the observed REER of the pula with weights based on trade in manufactured goods and primary commodities for the period 1978–80; the price level is measured by the consumer price index (CPI). The actual REER depreciated by about 15 percent in the 1980s, reflecting a continuous decline of the value of the pula against the U.S. dollar and major European currencies. From the late 1990s through 2004 (before the devaluations), however, the pula appreciated by approximately 25 percent. This is partly attributable to the appreciation of the South African rand that peaked in 2002. In February 2004, the Botswana authorities devalued the currency by 7.5 percent against the basket. The brief impact was estimated at 5.5 percent in real effective terms. The May 2005 devaluation decreased the REER further by 10.5 percent in a month.

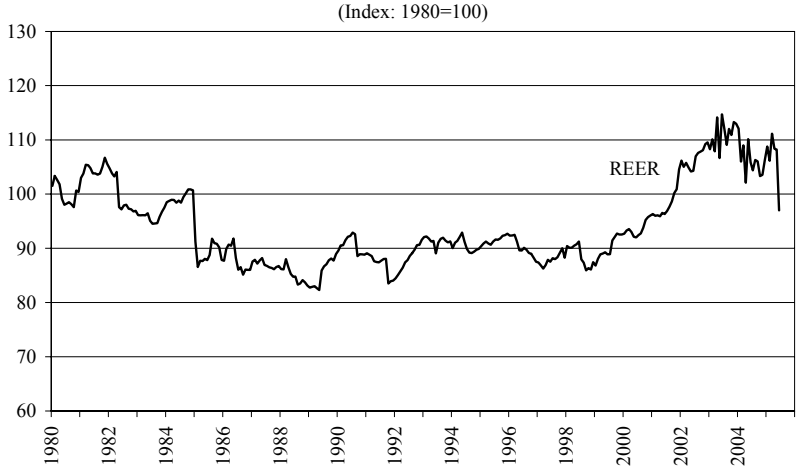
As is well known (see, e.g., Hinkle and Nsengiyumva, 1999a), one of the most important decompositions of the REER in considering the macroeconomic implications of devaluation is this:

$$REER_j = \left[\frac{P_j}{\exp(\sum_k w_k \ln P_k)} \right] \cdot NEER_j , \qquad (1)$$

[12] The REER for country *j* is usually calculated by $REER_j = \frac{P_j E_j}{\exp(\sum_k w_k \ln P_k E_k)} \cdot 100$. *P* is the price index, and *E* is the exchange rate defined as units of foreign currency per one unit of domestic currency. *k* represents the index of trading partner countries ($k = 1, \cdots, n$). The weight that domestic country *j* attaches to foreign country *k* is denoted by w_k. The equation means that the REER must of necessity depend on which variables are used for the price indices and the weights. Throughout this paper, all types of exchange rates are defined in foreign-currency terms, meaning that an increase in the exchange rate is an appreciation.

where $NEER_j$ is the nominal effective exchange rate (NEER) of home country j.[13] This means that the difference between the real and nominal effective exchange rates (in logarithmic terms) is the relative consumer prices of the home country in square brackets. Figure 5 shows Botswana's nominal and real exchange rates and its relative consumer prices. Evidently, the appreciation of the pula since the late 1990s has been attributable to Botswana's inflation being higher than that of trading partners. While its trading partners—mainly South Africa, the United States, and the United Kingdom—have recorded historically low inflation for recent years, the Botswana inflation rate has remained relatively high at 6-9½ percent, though mostly it has stayed in single digits (Figure 1). During the period 1998-2003, as a result of the 15 percent increase in Botswana's relative prices, its REER appreciated by 25 percent and the nominal rate increased by 10 percent.

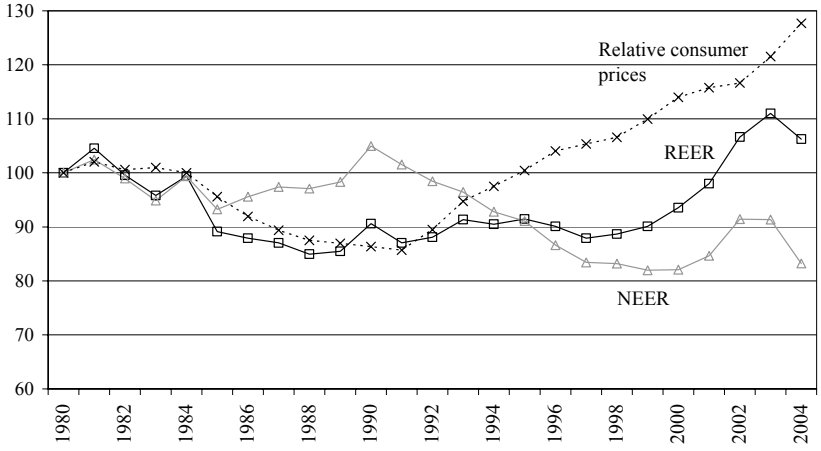
Figure 4. Botswana: Real Effective Exchange Rates (Monthly), 1980–2005
(Index: 1980=100)



Source: IMF Effective Exchange Rate Facility.

[13] The NEER index is defined by $NEER_j = \frac{E_j \cdot 100}{\exp(\sum_k w_k \ln E_k)}$.

Figure 5. Botswana: REER, NEER, and Relative Consumer Prices, 1980–2004
(Index: 1980=100)



Source: Computed from IMF Effective Exchange Rate Facility data.

B. Internal Exchange Rate and Terms of Trade

When particular attention is paid to a country's trade and domestic resource allocation incentives, the internal real exchange rate (IRER) is a useful measure for capturing the relative price advantage of domestic nontradables to tradables (exportables and importables) for the country. Letting P_T be the tradable and P_{NT} the nontradable price, the general domestic price level is $P = P_{NT}^{\alpha} P_T^{1-\alpha}$. For trading partner countries, similarly, the weighted average price index is $P^* = P_{NT}^{*\ a} P_T^{*1-a}$.

Under the law of one price for tradables, the REER of a home country can be written as:

$$REER = \frac{IRER^{\alpha}}{IRER^{*a}} \qquad (2)$$

where *IRER* is the foreign-currency internal exchange rate for the home country, i.e., $IRER = \frac{P_{NT}}{P_T}$, and $IRER^* = \frac{P_{NT}^*}{P_T^*}$. Equation (2) implies that the REER is a relative value of domestic to foreign IRER. In particular, this means that if productivity in the tradable sector relative to the nontradable sector for a country grows faster than its trading partners, the country's external REER would also appreciate (Balassa-Samuelson effect).[14]

[14] See, for instance, Hinkle and Nsengiyumva (1999b).

Extending this to the three-good model (nontradables, exportables, and importables) reveals the relationship between the IRER and the terms of trade (TOT).[15] Denoting general domestic prices by $P = P_{NT}^{\alpha} P_{IM}^{\beta} P_{EX}^{1-\alpha-\beta}$ and foreign prices by $P = P_{NT}^{*\ a} P_{IM}^{*\ b} P_{EX}^{*\ 1-a-b}$, the external REER is written as:

$$REER = \frac{IRERM^{\alpha}}{IRERM^{*a}} \cdot TOT^{1-\alpha-\beta-a-b} \qquad (3)$$

where $IRERM$ ($IRERM^{*}$) denotes the IRER for importables, i.e., $IRERM = \frac{P_{NT}}{P_{IM}}$. As usual, the terms of trade for the home country are defined by $TOT = \frac{P_{EX}}{P_{IM}}$. (For simplicity, taxes on imports and exports are ignored.) Provided that the IRER for foreign countries is stable, the external REER appreciation could be explained by some combination of IRER appreciation and TOT improvement.

Such an extension to the three-good model may be critical in the case of Botswana. The two-good framework implicitly assumes that the relative price of exportables and importables (the TOT) is held constant. However, it seems that the country's imports (mainly food and fuel) and exports (diamonds) tend to experience quite different price movements, and the TOT are therefore expected to vary significantly over time.

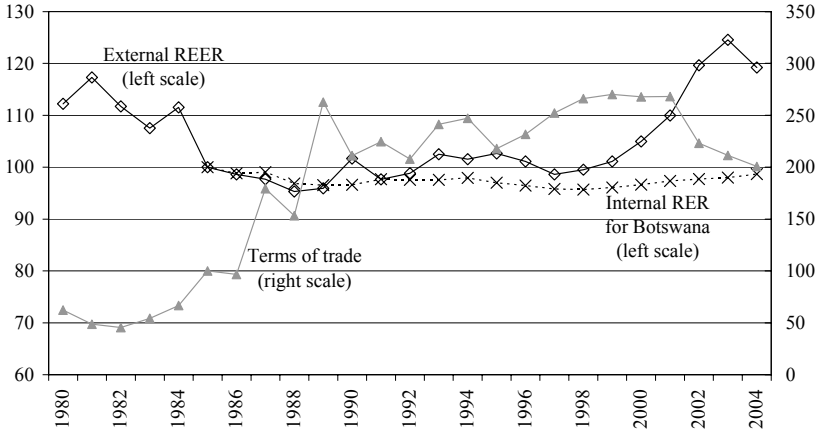
A marked feature of developments in Botswana's long-term exchange rate is that while the TOT seem to have a large influence on the equilibrium exchange rate, the Balassa-Samuelson effect may be limited. Figure 6 depicts the REER, IRER, and TOT for Botswana. The calculation of the IRER takes advantage of the country's rich price data for both nontradables and tradables. The figure reveals that the relative price index of nontradables to tradables appears to have been very stable for the last two decades, while significant changes in the TOT index were observed. The TOT index increased nearly fourfold between 1980 and 2000, mainly due to the long-term declining trend of international oil prices and some increase in world commodity prices, including diamonds, copper, and nickel.[16] On the other hand, the

[15] See Hinkle and Nsengiyumva (1999c).

[16] For example, diamond prices increased by 40 percent in the past two decades, according to the BoB's *Annual Report 2004*.

recent hike in fuel prices has caused the TOT to deteriorate with appreciation pressures on the external REER mitigated.[17]

Figure 6. Botswana: External and Internal Real Exchange Rates, and Terms of Trade,1980–2004
(Index: 1985=100)



Sources: Computed from Botswana authorities' data and IMF estimates.

IV. ANALYTICAL FRAMEWORK

A. Specifying an Empirical Model

While, as discussed, the movements in the Botswana currency are likely to be explained by macroeconomic variables like inflation, the TOT, and the relative productivity of home tradables, the main question that arises is whether the actual real exchange rate is over- or undervalued in comparison with sustainable equilibrium levels. To address this question, the behavioral equilibrium exchange rate (BEER) approach is applied to Botswana exchange rate movements in the period 1985-2004.

Following Clark and MacDonald (1998) and Baffes, Elbadawi and O'Connell (1999), a simple reduced-form equation is examined:

$$\ln REER_t = f(r_t - r_t^*, ltot_t, ltnt_t, nfa_t, \lambda_t) \qquad (4)$$

[17] Figure 6 does not include the IRER for importables for foreign countries, which should be accounted for in the theoretical decomposition, as shown in Equation (3). As the result, there is an unexplained inconsistency among movements of the variables.

where $r - r^*$ is the real interest differential, and *ltnt* represents the relative price of nontradables to tradables in logarithms, which should account for the potential Balassa-Samuelson effect. *nfa* represents net capital inflows to capture the effect of external resource balances on equilibrium. A typical proxy is net foreign assets in levels or differences (e.g., Edwards, 1994; Clark and MacDonald, 1999). λ represents a risk premium factor, which may disturb the actual exchange rate in the short run and be assumed to depend on government income and expenditure (Giorgianni, 1997; Dufrenot and Yehoue, 2005).

The underlying theoretical models for Equation (4) are: (i) risk-adjusted interest parity, which equalizes the nominal depreciation rate to the difference between home and foreign nominal interest rates with a risk premium, and (ii) the relative Fisher condition, which suggests that the nominal interest differential is the sum of the difference in inflation expectations and the real interest differential. Thus, the real exchange rate at time *t* can be decomposed as follows:

$$\ln REER_t = E_t[\ln REER_{t+k}] + (r_t - r_t^*) - \lambda_t \qquad (5)$$

where $E_t[\ln REER_{t+k}]$ is the expectation of the real exchange rate at period $t + k$. This yields Equation (4) on the assumption that the expected future exchange rate converges on the long-run equilibrium rate, which is assumed to be a function of $ltot_t$, $ltnt_t$ and nfa_t.

To conserve degrees of freedom, the fundamentals determining the behavior of equilibrium exchange rates are as few as possible. Perhaps one of the macroeconomic fundamentals that are presumably important in the Botswana context but are not in the model may be the degree of openness of the economy that trade captures. For simplicity, the analytical model in the previous section ignores tariffs and other trade restraints, though these factors may affect the prices of nontradables relative to tradables and perhaps should be included in the equilibrium equation (Hinkle and Nsengiyumva, 1999c).[18] Of particular note, Botswana maintains relatively few—by regional standards—but several nontariff trade barriers, such as import permit requirements for agricultural products particularly for animal disease control purposes. Nevertheless, because alternative specifications including trade openness defined by the conventional imports to GDP ratio have not produced more precise results than the model presented here, the variable is omitted from the model.

Empirically, to estimate the behavioral equilibrium of the real exchange rate in Equation (4), a unit-root econometric model, the vector error correction (VEC) technique, is used. Letting a

[18] Also see Edwards (1994), whose empirical model includes import tariffs as one of the fundamentals.

7×1 column vector containing variables in question be $z = (\ln REER, r - r^*, ltot, ltnt, nfa, \lambda, constant)'$, the general econometric model is specified as follows:

$$\Delta z_t = \alpha\beta' z_t + \left[\sum_{i=1}^{p-1} A_i \Delta z_{t-i} \right] + \mu + \varepsilon_t, \qquad (6)$$

where α and β are $n \times r$ matrices, and A_i is a $n \times n$ matrix. The vector process z_t is cointegrated with vectors β, whose rank is r. The rows of α give the weights with the individual elements in each equation. α can also be viewed as the speed of adjustment parameter. To avoid the dimensionality problem in the current case, the lag length, p, is set to one year.[19] This makes the second term in square brackets in Equation (6) disappear after all.[20]

B. Data

Table 1 summarizes the variables used in the analysis, most of which are defined in previous sections. The REER is the multilateral CPI-based exchange rate of the pula, as defined in footnote 12. The actual REER, which is calculated from IMF EER facility database, is shown in Figure 5. The terms of trade, defined as the relative price of exports to imports, are shown in Figure 6; data come from the IMF *World Economic Outlook* (WEO) database. The relative price of nontradables to tradables (*ltnt*) is the same value that is used in Figure 6. A variety of data sources are relied on for *ltnt*, such as the *Annual Reports* of the Bank of Botswana and the *Country Profile* published by the Botswana Central Statistics Office.

The home real interest rate is measured by the CPI-deflated prime lending rate, which is one of a few available long-time interest series and is related to the yields on central bank certificates—at least after 1991 when they were introduced.[21] The foreign real interest rate is defined as the weighted average of long-term government bond yields, deflated by CPI inflation, for trading partner countries. The same weights as described for the REER calculation are used. For external capital inflows, the rate of net foreign assets to GDP is

[19] The number of unknown parameters in the full joint distribution of z in this system increases overproportionally with the number of fundamentals and the lag length (the "curse of dimensionality").

[20] This seems very restrictive. However, longer lag length results in very few degrees of freedom, given the current annual data with 20 observations.

[21] The main instrument used by the BoB in influencing domestic monetary conditions is the 91-day Bank of Botswana Certificate (BoBC). The outstanding amount of BoBCs at end-2004 was P 9,755 million–equivalent to 23 percent of GDP. In addition, a 14-day BoBC was introduced in November 2004 to enhance liquidity at the short end of the domestic money market. At the longer end, the government in 2003 floated 2-, 5-, and 12-year bonds with a value of P 2.5 billion to build the domestic capital market. These bonds were listed on the Botswana Stock Exchange (BSE) in 2005.

taken as a proxy. Data on interest rates and net foreign assets comes from IMF's *International Financial Statistics*. The risk premium (λ) associated with government expenditure is defined as the difference between Botswana's fiscal deficit and the weighted average of the deficits of its trading partners, expressed as a ratio to GDP. This seems to be the best variable to proxy the recent concern that Botswana's fiscal situation might affect the equilibrium exchange rate.

Table 1. Summary Statistics

	Mean	Std. Dev.	Min	Max
lnREER	4.5	0.1	4.4	4.7
*r-r**	-0.9	3.3	-6.4	5.7
ltot	4.6	0.3	3.8	4.8
ltnt	0.006	0.012	-0.011	0.032
nfa	92.7	21.7	57.6	134.9
λ	-9.8	8.5	-24.8	4.8
Memorandum items:				
Actual REER	92.3	7.4	85.0	111.0
Fiscal deficit for Botswana	-6.4	7.5	6.8	-19.9
Fiscal deficit for trading partners	3.4	1.7	6.4	0.9

V. ESTIMATION RESULTS

To apply the VEC approach in Equation (6), first z_t must be integrated at order one so that Δz_t is stationary and the linear combinations given by $\beta' z_t$ are also stationary. Two well-known unit-root tests—the augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests—are used to confirm this. Table 2 shows the test results. Almost all variables used in the current analysis are characterized as nonstationary in levels but stationary after first differencing (i.e., $I(1)$).

The Johansen's Trace test for the cointegrating rank is then applied (Johansen, 1988) and one cointegrating relationship is found in the system. As shown in Table 3, the null hypothesis of no cointegration can be rejected at conventional significance levels, but the hypothesis of one cointegrating vector cannot be rejected at the 1 percent significance level.[22]

[22] The presence of multiple cointegrating vectors, though fortunately not a problem in the current analysis, makes it difficult to give an economic interpretation of estimated relationships. The basic solution may be to interpret them taking into account structural restrictions based on the original structural economic models (Johansen and Juselius, 1992; Dibooglu and Enders, 1995; Wickens, 1996; MacDonald and Nagayasu, 1998).

Table 2. Unit-Root Tests [1]

	ADF	ADF (with trend)	PP	PP (with trend)
lnREER	-0.741	-2.950	-1.111	-2.899
*r-r**	-1.363	-1.870	-1.491	-1.869
ltot	-3.721	-2.670	-4.416	-2.723
ltnt	-2.448	-1.551	-2.496	-1.639
nfa	-2.178	-1.024	-2.319	-1.277
λ	-1.559	-4.726	-1.247	-5.153
Δlq	-3.819	-4.878	-3.874	-4.873
*Δr-r**	-3.982	-3.950	-3.964	-3.802
Δltot	-6.185	-9.967	-5.887	-9.091
Δltnt	-3.528	-4.044	-3.538	-4.050
Δnfa	-3.381	-4.114	-3.353	-4.108
Δλ	-5.051	-4.915	-5.783	-5.559

[1] ADF and PP refer to augmented Dickey-Fuller and Phillips-Perron unit-root test statistics.

Table 3. Trace Test for Cointegrating Rank

Maximum rank	Trace statistics	1% critical value
0	132.86	103.18
1	74.02	76.07
2	44.78	54.46
3	22.93	35.65
4	12.05	20.04
5	4.72	6.65

Based on the estimated cointegrating vector β, the long-run equilibrium equation can be written as:

$$\underset{}{\ln REER} \underset{}{= 0.024(r - r^*)} \underset{(0.002)}{+ 0.289 ltot} \underset{(0.018)}{+ 1.348 ltnt} \underset{(0.397)}{- 0.0030 nfa} \underset{(0.0002)}{- 0.0013\lambda} \underset{(0.0007)}{- 3.4796} \quad (7)$$

where standard errors are shown in parentheses. Most coefficients are correctly signed based on economic theory. The equilibrium real exchange rate increases with the domestic real interest rate and decreases with foreign interest rates. Any TOT improvement increases the REER. This result is consistent with the earlier equilibrium exchange rate literature and may reflect a part of the Dutch-disease problem that has allegedly been a concern in Botswana. Nevertheless, it is important to note that the comovement of the REER and TOT variables is never sufficient to confirm a Dutch-disease problem. This relationship is generally expected

by construction (Equation (3)), and further comprehensive analyses modeling natural resources in an explicit way would be needed to draw a final conclusion.

An increase in the relative prices of nontradables to tradables results in a significant appreciation of the external real exchange rate. This can be interpreted as the conventional Balassa-Samuelson effect. In the case of Botswana, this effect may be generated from external factors, because the share of imported goods in total tradables is estimated at two-thirds in the current commodity basket of consumption in Botswana. Because its neighbor, South Africa, alone contributes about 75 percent of total imports,[23] not only stagnant efficiency growth in Botswana's domestic service sectors but also high productivity in South Africa's export industries tend to cause an increase in both internal and external exchange rates.

As expected, it seems that the risk premium associated with Botswana's relative fiscal deficit leads to depreciation of the currency. However, this effect is economically very small. This is reasonable in the sense that Botswana ran fiscal surpluses almost over the sample period and accumulated substantial savings, and thus the equilibrium exchange rate does not seem so sensitive to the fiscal risk premium. It may be interpreted to mean only that this potential risk factor is emerging for the country.

One unexpected result is a negative coefficient of net foreign assets, though the economic impact on the equilibrium exchange rate is marginal. In theory, more capital inflows should be associated with appreciation of a national currency. Botswana has been accumulating foreign reserves almost linearly over time because of the country's strong export performance. In terms of the ratio to GDP, however, privatization of the public pension system declined net foreign assets sharply between 2001 and 2004, while the observed REER significantly appreciated due to the rand's effect. The estimated coefficient of net foreign assets might capture this recent negative correlation.[24]

The alpha adjustment matrix (vector) shown in Table 4 indicates that the estimated eigenvector in Equation (7) is particularly important for the real interest differential and the TOT equations. That means that the most significant adjustments to real exchange rate

[23] In the commodity basket, the share of nontradables, mainly services, is about 30 percent; domestic and imported tradables amount to 70 percent.

[24] In the case of Botswana, in practice, changes in net foreign assets may be less likely to have an important role to play in determining the exchange rate because of such a strong external position. In addition the estimation result might be affected by a measurement error that the mining-related annual capital inflows/outflows have largely fluctuated by nature. Against these backgrounds, the equilibrium exchange rate equation has been re-estimated without ηfa. It has been found that the main estimation result in Equation (7) hold, though the statistical significance of some variables is changed.

disequilibria occur in the relative real interest rate and relative export to import price ratio equations. The weights attached to the net foreign assets and the fiscal deficit equations are large but not statistically significant.

Table 4. Alpha Adjustment Matrix

	Coef.	Std. Err.
lq	-0.093	0.193
*r-r**	31.820	9.642
ltot	2.813	0.997
ltnt	0.100	0.037
nfa	66.376	86.149
λ	20.001	34.182

To estimate the sustainable equilibrium real exchange rate, permanent values for the fundamentals are computed using a popular trend decomposition method, Holt-Winters filtering (Holt, 1957; Winters, 1960). This technique aims at smoothing a time series by modeling as a linear trend in which the intercept and the coefficient of time vary over time.[25] [26]

Table 5 presents the actual REER and the sustainable and fitted real exchange rates. The sustainable exchange rate is evaluated at the permanent levels of the fundamentals with the estimated long-run equilibrium relation β. Figure 7 depicts these real exchange rates. Table 5 shows that the pula seems to have experienced some misalignment, calculated by the deviation of the actual from the sustainable REER. While the currency was indeed undervalued in the later 1980s, the misalignment seems to have been quite marginal in the 1990s. By contrast, the observed real exchange rate seems to have been overvalued by 5 to 10 percent from 2000 to 2003. In 2004, the exchange rate was realigned, possibly due to the first devaluation in February. Therefore, there seems to have been some rationale for devaluing the currency given the recent misalignment.

The estimation result also indicates that the sustainable equilibrium exchange rate has appreciated in recent years, though it lags behind the observed REER. This appreciation could reflect improvements in economic fundamentals, possibly productivity growth in the

[25] For the variable of *nfa*, the five-year moving average is used instead for its sustainable levels, since there seems no convergence by the Holt-Winters method.

[26] Obviously, this treatment is not perfect but it is still attractive for avoiding ambiguities and complexities in estimating the counterfactual fundamentals in sustainable equilibrium. An alternative approach for detrending economic time series may be the Beveridge-Nelson decomposition (Beveridge and Nelson, 1981), as employed in Elbadawi (1994) and Baffes, Elbadawi and O'Connell (1999). Another alternative may be the Hodrick-Prescott (HP) filter (Hodrick and Prescott, 1997). In general, macroeconomic time series are viewed as the sum of transitory and permanent components, and the HP filter captures the smooth path of the trend component by minimizing the sum of the squares of its second difference.

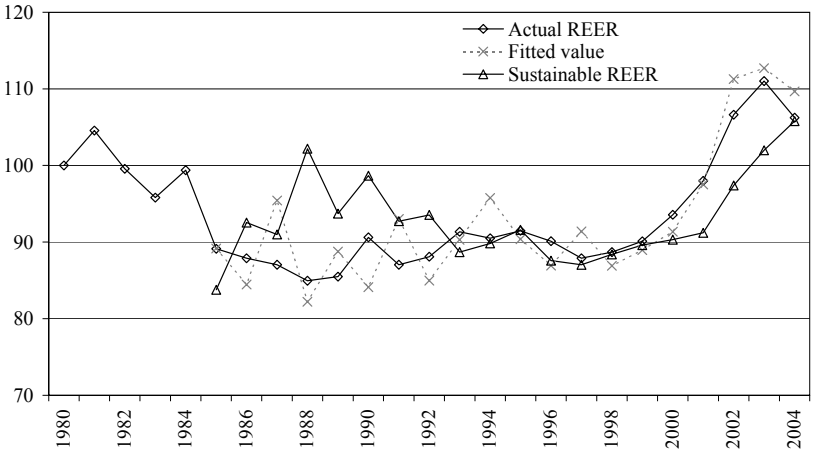
mining sector. If this is the case, a moderate appreciation of the exchange rate would be acceptable. However, note that the estimation result is also likely to be affected by a specification error or omitted variable bias.

Table 5. Estimated Equilibrium Exchange Rate and Misalignment

	Actual REER	Fitted REER	Sustainable level	Misalignment (Percent) [1]
1980	100.0			
1981	104.5			
1982	99.6			
1983	95.8			
1984	99.4			
1985	89.1	89.2	83.8	6.4
1986	87.9	84.5	92.5	-5.0
1987	87.0	95.4	91.0	-4.3
1988	85.0	82.2	102.2	-16.9
1989	85.5	88.8	93.7	-8.8
1990	90.6	84.1	98.7	-8.2
1991	87.0	93.0	92.7	-6.1
1992	88.1	85.0	93.5	-5.8
1993	91.4	90.3	88.7	3.0
1994	90.5	95.8	89.8	0.7
1995	91.5	90.4	91.6	-0.1
1996	90.1	86.9	87.6	2.9
1997	87.9	91.4	87.0	1.0
1998	88.7	86.9	88.4	0.3
1999	90.1	88.9	89.6	0.6
2000	93.5	91.4	90.3	3.6
2001	98.0	97.5	91.2	7.4
2002	106.6	111.3	97.4	9.5
2003	111.0	112.7	102.0	8.8
2004	106.3	109.7	105.8	0.4

[1] Positive values represent overvaluation of the national currency.

Figure 7. Botswana: Actual and Equilibrium Real Exchange Rates, 1980–2004
(Index: 1980=100)



Source: Author's estimation.

VI. DISCUSSION

The evidence indicates that the Botswana currency may have been overvalued in recent years. This would suggest that the new crawling peg arrangement adopted in May 2005 will adjust the exchange rate misalignment. Under the new regime, the value of the currency is to be adjusted against the basket continuously rather than in discrete steps. In general, both a well-designed operational framework for implementing the regime and coordination of fiscal, monetary, and structural policies are required to give the new regime credibility as a nominal anchor.

Given single-digit inflation over two decades, except for the 1992-94 recession, Botswana's economy seems to have benefited from having the fixed peg exchange rate regime as a credible nominal anchor. While one of the most important merits of fixed peg arrangements is that they firmly anchor inflation expectations and thus lower inflation, one of their disadvantages is high volatility in the presence of real shocks and nominal rigidities (Rogoff et al., 2003). Accordingly, fixed peg regimes may be more vulnerable to speculative attacks against currency.[27]

On the other hand, the main advantage of a crawling peg is that it can realign the exchange rate in line with shifts in economic fundamentals, which helps stabilize the exchange rate in the relatively short term. The disadvantage is that it provides no medium-term nominal anchor. The tendency usually observed is that the exchange rate is adjusted aggressively to keep inflation running at a high rate—galloping with each other rather than crawling (IMF, 2000).

To stabilize expectations and induce gradual disinflation requires an "active crawling peg" where the rate of crawl is announced for a year in advance and the authorities make a strong commitment to it.[28] However, if the economy is deeply involved in global capital markets and the market rate is always driven to the limit of the predetermined band, the country may suffer the same credibility problem as with standard peg regimes. Worse, in reality a crawling band may be regarded as a weaker policy commitment than a conventional hard peg (IMF, 2000). Consequently, the most crucial challenge in introducing a crawling peg is how to maintain the credibility of the preannouncement.

The performance of exchange rate regimes is mixed. For instance, on a simple average comparison basis, Rogoff et al. (2003) found that for the period 1970-1999 countries whose

[27] This is not likely in the case of Botswana, which has sufficient reserves and a sound banking system.

[28] Preannouncement will be key to stabilizing inflation expectations, while a "passive crawling peg," where the parity is adjusted for past inflation, would help to defend against a tendency for the real exchange rate to be misaligned with actual economic fundamentals (IMF, 2000).

exchange rates have "limited flexibility" tend to achieve lower inflation, higher per capita GDP growth, and less annual growth volatility than those with pegged regimes. However, in terms of vulnerability to currency crises, Bubula and Otker-Robe (2003) found that during the period 1990-2001, the crisis incidence rate was higher for countries with conventional fixed regimes pegged to a basket than for those using crawling pegs. In a statistical sense, proneness to crisis seems indifferent among different types of intermediate regimes, including fixed and crawling pegs. In terms of flexibility, the fixed regime seems disadvantageous. Ramcharan (2005) found that the exogenous shocks, such as windstorms, have a significant impact on developing countries with fixed regimes. A severe windstorm tends to lower the economic growth rate in developing countries that have no flexibility in exchange rates.

VII. CONCLUSION

Botswana's successive devaluations of its currency and recent move from a fixed to a crawling peg exchange rate regime suggest that the country's exchange rate might have been misaligned with its economic fundamentals. This paper, applying the BEER approach, has attempted to estimate the equilibrium behavioral equation of the real exchange rate for the period 1985–2004. Subject to some econometric limitations, it found that the Botswana pula seems to have been undervalued in the late 1980s and overvalued by 5 to 10 percent in recent years, though the misalignment in the 1990s seems to have been very marginal. These pieces of evidence provide a rationale for adjusting the recent exchange misalignment by devaluing the currency.

In comparison with other countries using crawling peg exchange rate regimes, Botswana has both advantages and disadvantage in implementing such an arrangement (see Appendix). While inflation is at least relatively low, minimizing the need of sterilized interventions, the fiscal position is expected to become tighter than before due to the country's HIV/AIDS and poverty problems and stubbornly high unemployment. That would limit the room Botswana has to contain internal market pressures by relying on fiscal policies and interest rates. Therefore, proceeding will require not only comprehensive monetary and fiscal adjustments but also acceleration of structural reforms to further stimulate domestic private business and tackle high interest and unemployment rates.

EXPERIENCES OF OTHER COUNTRIES ADOPTING CRAWLING PEG ARRANGEMENTS

Williamson (1996), investigating the cases of Chile, Colombia, and Israel, gives concise and practical recommendations for managing crawling peg regimes that are broadly consistent with those of other studies (e.g., Ugolini, 1996; IMF, 2000). According to Williamson, an important precondition for implementing a crawling peg is a mature interbank market for the national currency. Commercial banks need to hold large enough open positions in foreign exchange in the interbank market. Needless to say, the central bank should be given responsibility for implementing exchange rate policy because its primary duty of controlling inflation may need to be tempered by the need for economic stabilization and maintaining competitiveness. In Botswana, the central bank's role in achieving broader national objectives of sustainable growth and international competitiveness had been reiterated even before the new exchange rate system was adopted.[29]

Williamson (1996) also suggests that the rate band width should be between ±7 and ±10 percent. While too narrow a band is difficult to maintain, too wide a band is not practical for managing the exchange rate at least at first. Currently, Botswana's arrangement allows the exchange rate to move only within the range of ±0.5 percent, an increase from ±0.125 percent when the crawling peg regime began. As the interbank market develops, the band will need to be widened further. Provided that a country adopts an explicit inflation target, a rate of depreciating crawl for the following year should be set at the target for domestic inflation minus expected foreign inflation and estimated productivity differential.

As per Williamson (1996), in order to defend a set band, both interest rates and bank reserve requirements should be ready to change, though such actions may conflict with internal balance and efficient financial intermediation. If so, it may be possible to use fiscal policy for relieving conflicting pressures on monetary policy. Importantly, he also suggests that the exchange rate may be allowed to move outside the band under extreme pressure, adding that the central bank should have a strong commitment to push it back in the foreseeable future. Too ambitious an attempt to defend the band in the short run might induce further speculative attacks and thus threaten the credibility of the entire exchange rate regime.

Appendix Table 1 shows macroeconomic indicators for four countries that have introduced crawling peg regimes: Chile, Colombia, Israel, and Mexico. It is useful to review the experiences of other countries that have introduced a similar crawling peg exchange rate arrangement. The countries selected follows Williamson (1996) and the IMF (1998).[30] For

[29] The Monetary Policy Statement of the BoB says, "The principal objective of monetary policy in Botswana is to achieve and maintain a sustainable, low and predictable level of inflation that, along with other policies, will contribute towards broader national objective of durable economic growth. In particular, the Bank's objective of low inflation supports the maintenance of international competitiveness of domestic producers."

[30] These studies provide the detailed historical and macroeconomic information for each country.

analytical purposes, the table focuses on medium to long-term economic performance, ignoring short-run effects.

As far as preconditions are concerned, all four countries seem to have shared the same concerns about weak external competitiveness and high inflation. Botswana's competitiveness problem, partly resulting from its abundant natural resources, may be analogous to those of Chile and Colombia, whose economies are also heavily dependent on mineral and agricultural exports. Appendix Table 1 shows that after crawling peg arrangements were introduced, national currencies had a tendency to depreciate against the U.S. dollar, though the real exchange rates more or less stabilized, as intended. However, it took a considerable amount of time, five to ten years, for inflation to fall to single digits.[31] It seems that putting a high priority on external competitiveness created inflationary pressures and made it harder to lower inflation expectations. As inflation is contained, current account balances appear to have improved to sustainable levels.

Botswana may have some advantage in the sense that its inflation is much lower than the four countries selected, so here has been little need for sterilized interventions in implementing the crawling peg.[32] Nevertheless, it cannot be underestimated that the 12 percent devaluation of the pula that took place at the same time as the move to a crawling peg regime did push inflation outside the central bank's target range of 4-7 percent.[33] To restore credibility to the inflation objective, both monetary and fiscal policies may need to be tightened in the short to medium term.

The other advantage Botswana has is that it has a strong external position—a large current account surplus and an abundance of foreign reserves. It is not quite certain whether the market rate would continue to be devalued within the band as is the authorities' intention when a wider range of foreign exchange transactions is given to an interbank market. This all depends on inflation expectations in the market. To strengthen devaluation expectations, further discrete devaluations of the parity as the new regime may be needed, as Israel did.[34]

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[31] For Mexico, the peso crisis of 1994, which elevated inflation to above 30 percent in a moment, undermined the nominal anchor of the crawling peg it announced in 1989.

[32] Inflation increased to a range of 17–18 percent in January–March 2006, mainly due to the reintroduction of school fees as well as the devaluation.

[33] To account for the impact of devaluation, the central bank changed its inflation objective from 3-6 percent to 4-7 percent in August 2005.

[34] The Israeli band policy was modified after it was introduced in 1991. While the rate of crawl was adjusted downward, three discrete devaluations of parity were implemented between 1992 and 1995 (Williamson, 1996).

Concurrently, to maintain policy credibility, the government may need to actually defend the band under appreciation pressures in the market.[35]

Botswana's relative disadvantages in implementing a crawling exchange regime are the emerging fiscal difficulty,[36] which may become more complicated over the medium term because of the country's HIV/AIDS and poverty problems, and unemployment that is now over 20 percent. It appears that Botswana will not have much room to rely on fiscal policies and interest rates if it intervenes intensively for sterilization. Not surprisingly, to fully implement a new exchange rate regime, both monetary and fiscal adjustments as well as vigorous structure reforms to tackle high interest and unemployment rates would be necessary.

[35] A crawling band makes sense only if it represents an attempt to keep the exchange rate reasonable when the market pushes it elsewhere. The method of intervening may vary from country to country. While Colombia used intramarginal intervention solely to reduce volatility, Israel attempted to defend an inner band (Williamson, 1996).

[36] After three consecutive years of deficits, the fiscal balance returned to a surplus in 2004/05.

Appendix Table 1. Macroeconomic Developments Before and After Adoption of Crawling Peg Regimes

Botswana (May 2005) [1]	2002	2003	2004	2005			
GDP growth	7.8	5.7	4.0	3.5			
CPI	8.0	9.3	6.9	8.6			
Change in bilateral exchange rate against US$ (depreciation -)	27.7	23.1	3.8	-22.3			
Change in REER (depreciation -) [2]	4.7	3.1	-5.9	-9.5			
Current account balance	3.6	6.0	3.2	13.5			
Overall budget balance (including grants)	-4.1	-0.4	1.0	2.4			
Total reserves (in months of imports)	30.3	23.0	18.4	19.4			
Unemployment	23.8	n.a.	n.a.	n.a.			
Chile (September 1982) [3]	1979	1980	1981	1982	5-year average after adoption	6-to-10-year average after adoption	11-to-15-year average after adoption
GDP growth	8.7	8.1	4.7	-10.3	4.7	8.4	7.6
CPI	33.4	35.1	19.7	9.9	23.4	19.0	9.2
Change in bilateral exchange rate against US$ (depreciation -)	-15.0	-4.5	0.0	-23.4	-24.6	-9.5	-2.7
Change in REER (depreciation -) [2]	n.a.	n.a.	18.5	-9.8	-12.4	0.1	4.8
Current account balance	-5.7	-7.1	-14.5	-9.5	-7.1	-1.5	-4.1
Overall budget balance (including grants)	4.8	5.4	2.6	-1.0	-1.4	1.4	2.1
Total reserves (in months of imports)	5.4	5.9	4.5	4.1	5.3	6.6	8.4
Unemployment	n.a.	10.4	11.3	19.6	11.5	5.4	5.2
Colombia (November 1991)	1988	1989	1990	1991	5-year average after adoption	6-to-10-year average after adoption	
GDP growth	4.1	3.4	6.0	2.3	4.1	0.8	
CPI	28.1	25.8	29.1	30.4	22.9	13.0	
Change in bilateral exchange rate against US$ (depreciation -)	-18.9	-21.8	-23.8	-20.7	-9.2	-14.6	
Change in REER (depreciation -) [2]	-2.8	-4.2	-12.1	2.9	7.2	-2.1	
Current account balance	-0.6	-0.5	1.3	5.7	-3.2	-2.1	
Overall budget balance (including grants)	-1.3	-1.9	3.9	2.6	-2.0	-5.3	
Total reserves (in months of imports)	5.4	5.3	6.1	9.3	6.8	5.9	
Unemployment	10.1	8.9	10.2	9.8	9.1	16.5	
Israel (December 1991)	1988	1989	1990	1991	5-year average after adoption	6-to-10-year average after adoption	
GDP growth	2.0	0.9	6.8	7.7	6.1	3.1	
CPI	16.3	20.2	17.2	19.0	11.3	4.4	
Change in bilateral exchange rate against US$ (depreciation -)	-0.3	-16.6	-4.9	-11.5	-6.4	-5.3	
Change in REER (depreciation -) [2]	9.7	1.0	-2.3	1.9	0.8	1.6	
Current account balance	-1.9	0.5	0.3	-2.2	-4.0	-1.6	
Overall budget balance (including grants)	-8.4	-4.3	-5.3	-6.8	-3.7	-1.2	
Total reserves (in months of imports)	2.6	3.3	3.3	3.0	2.6	5.6	
Unemployment	6.4	8.9	9.6	10.6	8.5	8.6	
Mexico (January 1989)	1986	1987	1988	1989	5-year average after adoption	6-to-10-year average after adoption	
GDP growth	-3.8	1.9	1.2	4.2	3.9	2.9	
CPI	86.2	131.8	114.2	20.0	16.3	24.5	
Change in bilateral exchange rate against US$ (depreciation -)	-58.0	-55.6	-39.4	-7.7	-6.0	-16.9	
Change in REER (depreciation -) [2]	-30.2	-7.9	24.0	7.3	5.0	1.7	
Current account balance	-1.1	3.0	-1.3	-2.6	-5.4	-2.0	
Overall budget balance (including grants)	-13.0	-14.2	-8.9	-4.6	1.0	-1.0	
Total reserves (in months of imports)	2.6	5.0	1.7	1.5	2.3	2.2	
Unemployment	n.a.	n.a.	2.5	n.a.	3.4	3.7	

Source: *World Economic Indicators* , unless otherwise indicated.

[1] For Botswana, data comes from Botswana authorities and IMF staff estimates.

[2] Based on IMF EER facility.

[3] A band of ±0.5 percent was first introduced in August 1984.

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