IMF Working Paper

Competitiveness and the Equilibrium Exchange Rate in Costa Rica

Claudio Paiva

INTERNATIONAL MONETARY FUND

IMF Working Paper

Western Hemisphere Department

Competitiveness and the Equilibrium Exchange Rate in Costa Rica

Prepared by Claudio Paiva[1]

Authorized for distribution by Robert Rennhack

February 20001

Abstract

The views expressed in this Working Paper are those of the author(s) and do not necessarily represent those of the IMF or IMF policy. Working Papers describe research in progress by the author(s) and are published to elicit comments and to further debate.

This paper evaluates several indicators of external vulnerability and estimates the equilibrium real exchange rate for Costa Rica. While current indicators are mostly positive, declining market shares of domestic exports, the expected decline in foreign direct investment, and the desirability of strengthening the reserve position recommend an improvement in the current account. Costa Rica's equilibrium real exchange rate is then estimated using the CGER and the FEER methodologies. The overall conclusion is that while there are no signs of serious external vulnerability, the real exchange rate appears to be somewhat overvalued, a situation that would be best addressed through increased fiscal discipline.

<div align="center">Contents   Page</div>

Figures

I. INTRODUCTION

The purpose of this paper is to evaluate aspects of current account sustainability and the appropriateness of the present level of the real exchange rate in Costa Rica. Costa Rica's current account balance has fluctuated widely in the 1990s and is expected to deteriorate again in the year 2000. The recent performance of domestic exports, the expected decline in FDI associated with the completion of major projects by computer giant Intel, and the desirability of strengthening the country's reserve position are among the factors which justify a closer analysis of recent trends and perspectives for external performance.

Preliminary data indicate that Costa Rica's current account balance deteriorated again in 2000, after improving in 1999 (Figure 1). The improvement in 1999 interrupted three successive years of deteriorating balances. An estimated cyclically adjusted current account balance suggests that the deterioration observed between 1996–97 appears even more severe when placed against the background of the negative output gap estimated for the period (Figures 2a and 2b). Data for 1999 show the observed deficit declining to about 4.6 percent of GDP and the cyclically adjusted deficit improving more substantially to 3.3 percent of GDP, since the current account upturn took place while real GDP growth surpassed 8 percent. However, the progress in terms of GDP growth and current account balance that year was largely dependent on the performance of the *Export Processing Zone* (EPZ), more specifically the computer multinational Intel (Figure 3).[2] In fact, as the initial impact of Intel operations subsided, growth decelerated and the current account deficit increased again in 2000.

Looking ahead, it is important to assess whether (1) current trends and policies will maintain the current account deficit within sustainable levels or (2) there is a latent problem of competitiveness, notably for non-EPZ exports, that should be addressed in order to keep the current account within sustainable levels in the medium term.[3] In an attempt to address these issues, the following section will analyze in more detail the trends in Costa Rica's competitiveness and current account sustainability indicators. Estimates of the equilibrium real exchange rate will be carried out using two alternative methodologies and discussed in

---

[2] It is estimated that Intel was responsible for about 38 percent of Costa Rica's total exports of goods in 1999, and that real GDP growth excluding Intel was about 3½ percent. The quantification of Intel's contribution to GDP growth and current account net receipts is subject to considerable uncertainty.

[3] One should bear in mind the possibility that a "Dutch disease" type of problem may arise in Costa Rica as the increased export earnings brought about by Intel could lead to a real exchange rate appreciation and consequent loss of competitiveness for other export activities. There is evidence in the economic literature that current account deficits are more likely to become unsustainable in countries which have a less diversified export base (for example, see Ghosh and Ostry (1994)).

Figure 1. Costa Rica: External Current Account
(In percent of GDP)
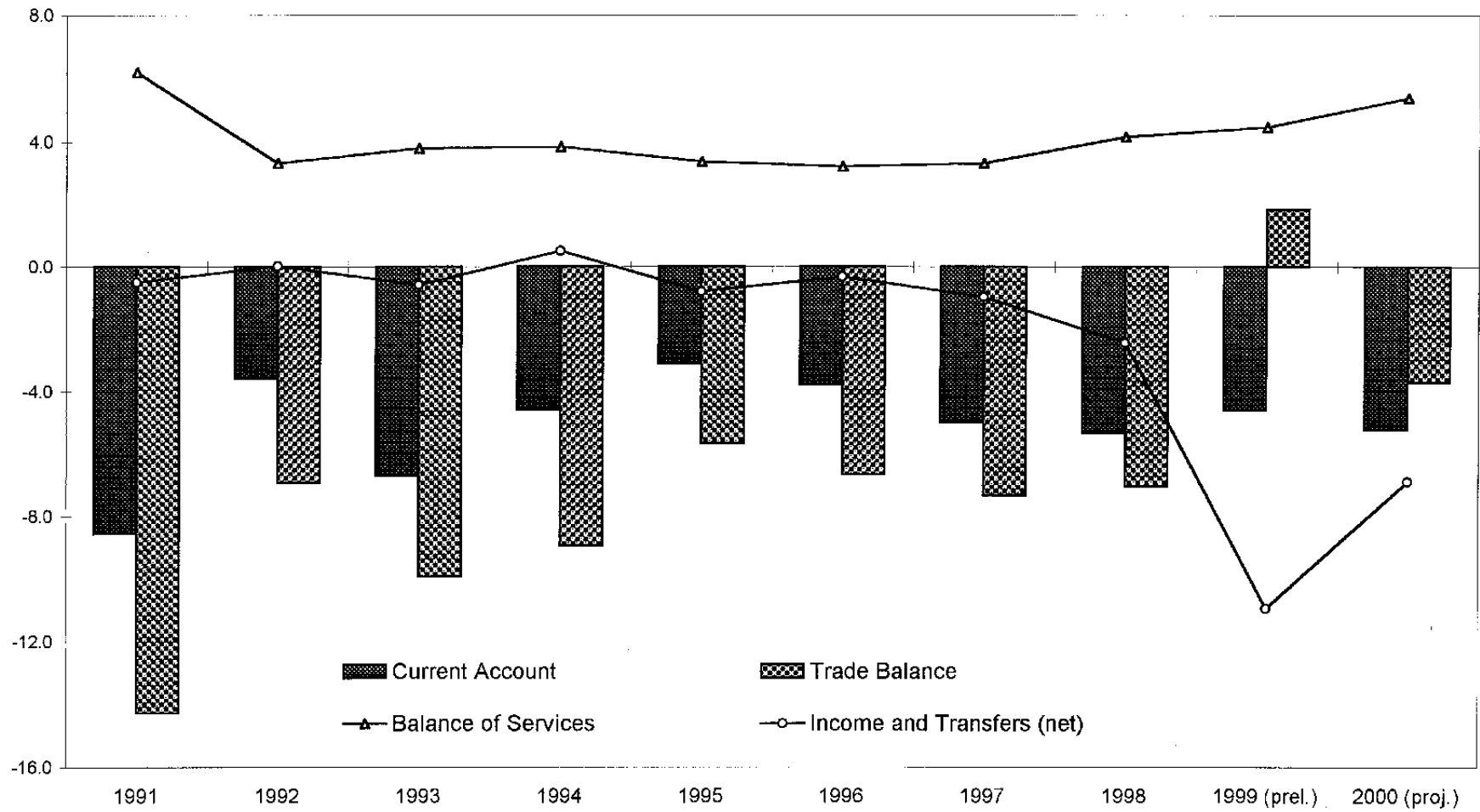
Sources: Central Bank of Costa Rica; and Fund staff projections.

Figure 2a. Costa Rica: The Cyclically-Adjusted External Current Account Balance
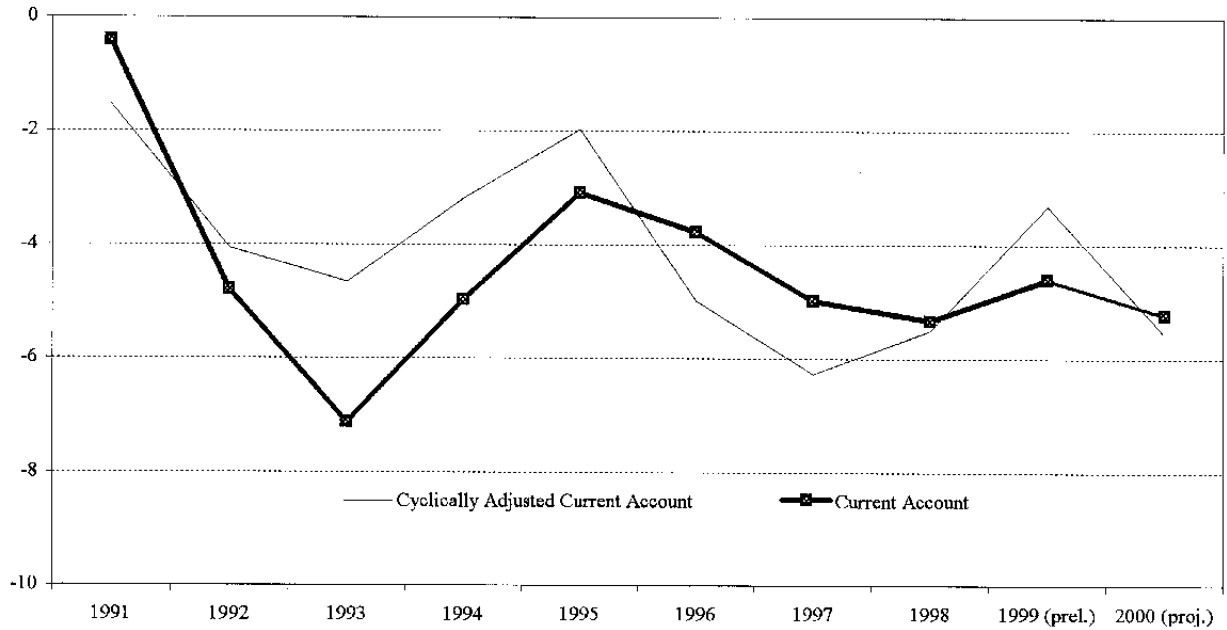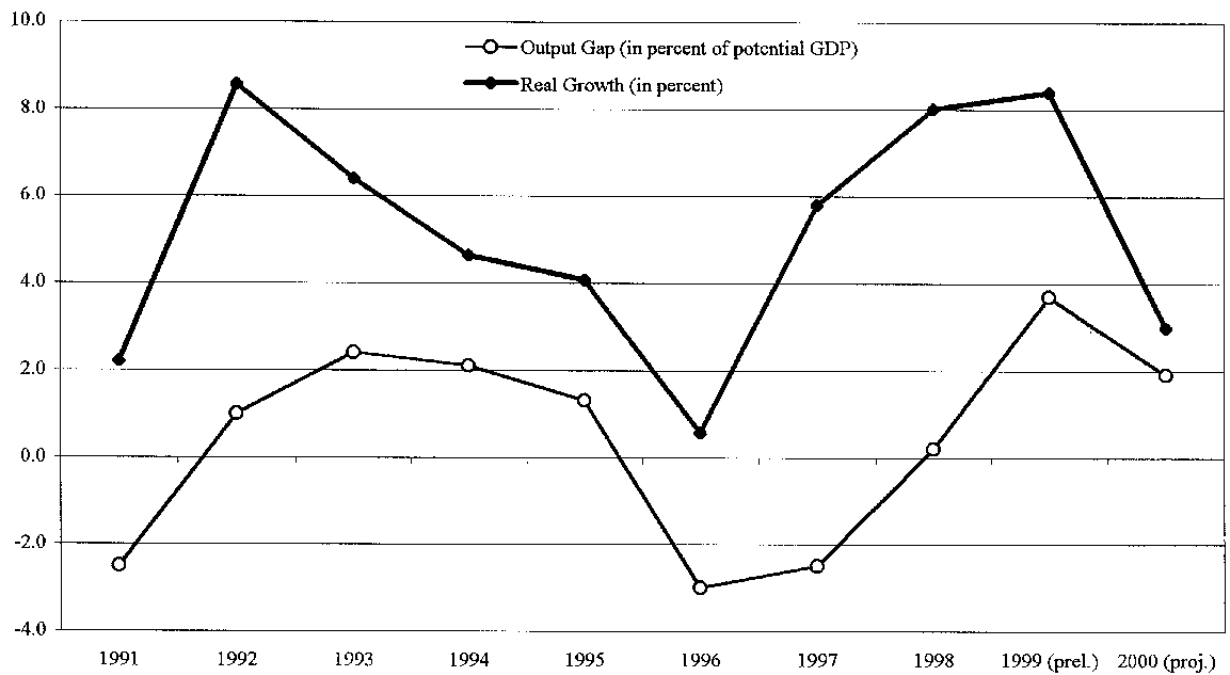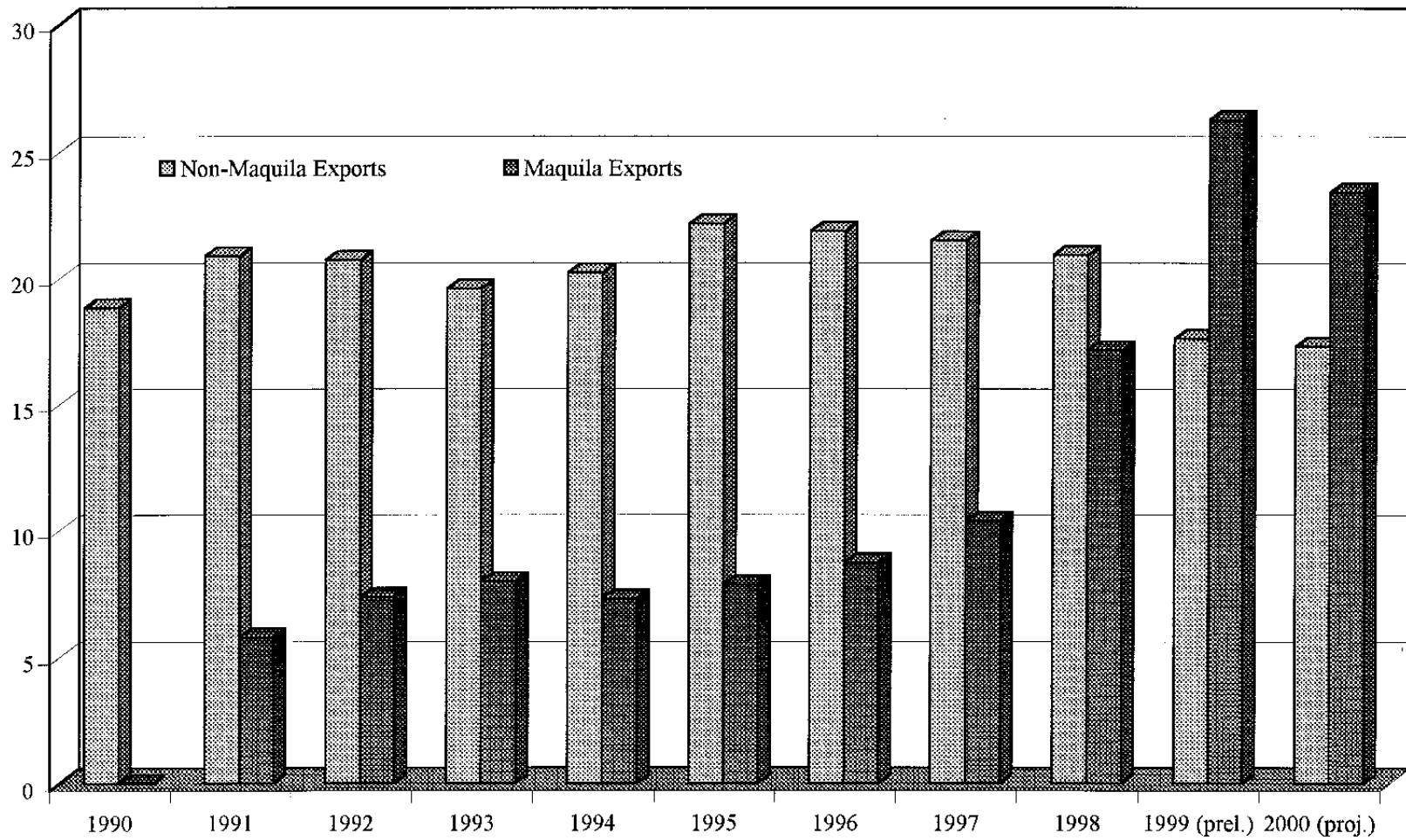**(In percent of GDP)**

Figure 2b. Costa Rica: Output Gap and Real GDP Growth

Sources: Central Bank of Costa Rica; and Fund staff projections.

Figure 3. Costa Rica: Export Composition
(In percent of GDP)

☒ Non-Maquila Exports ☒ Maquila Exports

Source: Central Bank of Costa Rica.

Sections III and IV. Section V will summarize the results. The overall conclusion is that while there are no significant signs of external financial vulnerability, the country's real exchange rate appears to be somewhat overvalued, a situation that would be best addressed through increased fiscal discipline.

II. SUSTAINABILITY AND COMPETITIVENESS INDICATORS

In order to make a general assessment of the robustness of Costa Rica's external position, this section will discuss the behavior of several indicators of competitiveness and sustainability. Although the literature indicates that no clear-cut conclusions can be drawn from sustainability indicators, international comparisons can be used to suggest whether a particular indicator is performing favorably or is a cause for concern. The choice of sustainability indicators used here is based on the works of Milesi-Ferreti and Razin (1996), Berg and Pattillo (1998), and Calvo (1996).[4]

On the positive side, Costa Rica's **external public debt** to GDP ratio is relatively low, having decreased from about 42 percent in 1990 to about 21 percent in 2000 (Figure 4a).[5] This path reflected the public sector's lower access to external financing and the increase in nondebt financing of the current account through higher inflows of **foreign direct investment** during the second half of the decade (Figure 4b).[6] Between 1997–99, FDI inflows financed about 85 percent of the current account deficit. Although preliminary data shows that FDI inflows decreased substantially in 2000, they are still expected to finance a little more than half of the current account deficit.

Following the debt dynamics and the growth of the EPZ, **interest payments** on foreign debt dropped from about 12½ percent of exports of goods and nonfactor services (XGNFS) in 1990 to an estimated 2½ percent in 2000 (Figure 4c). Interest payments on foreign debt were equivalent to about 1½ percent of GDP in 2000. For the sake of comparison, a study of 10 episodes of external crisis or abrupt policy reversals show that, in the years preceding these episodes, the average external debt to GDP ratio was 40½ percent, net FDI inflows covered only about 33 percent of the current account deficit, and interest payments on external debt averaged 3.4 percent of GDP.[7]

---

[4] For a detailed discussion of the competitiveness indicators used here, see Lipschitz and McDonald (1992).

[5] Comprehensive data on private external debt is not available.

[6] A counterpart of the lower access to public external financing was the increase in the government domestic debt from about 13 percent of GDP in 1991 to about 24 percent of GDP in 1999.

[7] Calculated from Milesi-Ferretti and Razin (1996).

Figure 4a. Costa Rica: External Public Debt
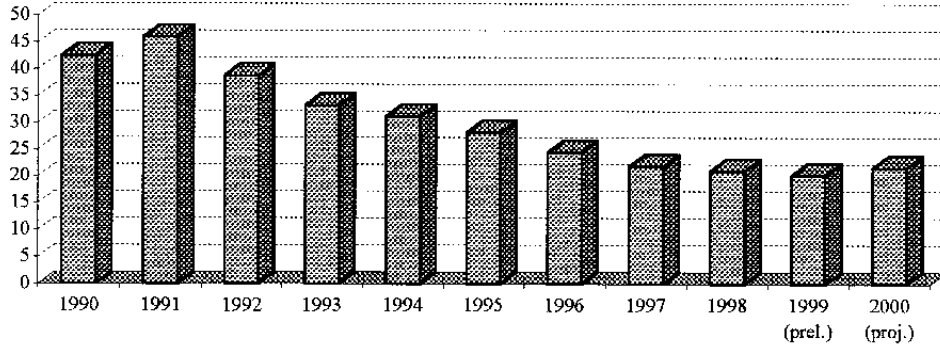**(In percent of GDP)**

Figure 4b. Costa Rica: Foreign Direct Investment
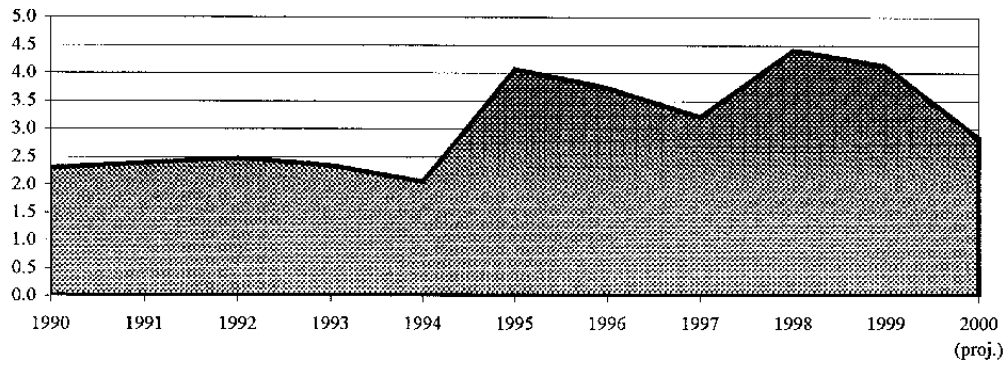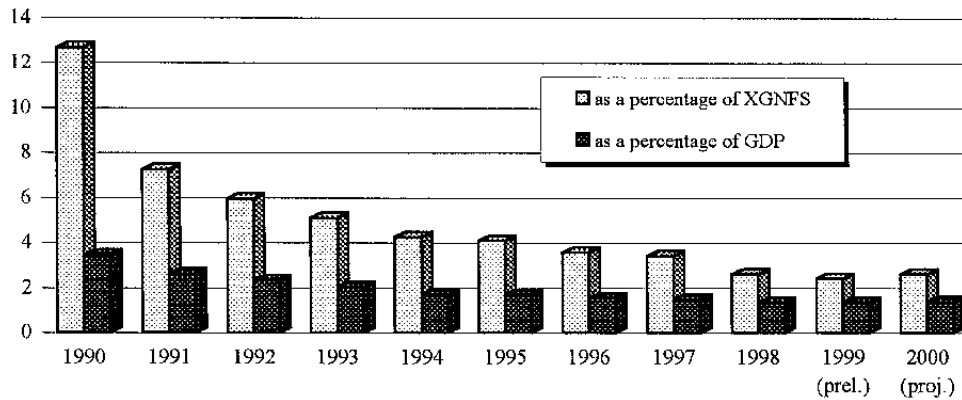**(In percent of GDP)**

Figure 4c. Costa Rica: Interest Payments on External Debt

Sources: Central Bank of Costa Rica; and Fund staff projections.

After rebounding from lower levels in 1998, **net international reserves** (NIR) at the end of
2000 were equivalent to about 2½ months of imports of goods and services and 40½ percent
of the total stock of external debt (Figure 5a). This last ratio is above the average of
30 percent observed for the aforementioned 10 episodes of external crisis or abrupt policy
reversals, but compares poorly with other developing countries, which showed an average
ratio of reserves to official debt of about 72 percent in 1999. Moreover, part of the recent
strengthening of the reserve position can be attributed to relatively high **real interest rates** in
Costa Rica, which at mid-2000 were still above the levels prevailing before the aggravation
of the international crisis in 1998 (Figure 5b). The **ratio of NIR to quasi money** has been
somewhat unstable in the second half of the 1990s, and its decrease in 1998 to about
18 percent raised concerns regarding the vulnerability of the stock of reserves to negative
market expectations and/or a decrease in the demand for domestic currency (Figure 5c). As
argued by Calvo (1996), the ratio of NIR to quasi money in Mexico was 20 percent at the
beginning of 1994 and played an important role in the crisis that the country faced a few
months later.[8] The improvement in the NIR-to-M2 ratio to about 26 percent in 1999 and to an
estimated 25 percent in 2000 alleviates somewhat these concerns, although further
strengthening in the reserve position is still desirable.[9]

Turning to the nature of the current account imbalances, it can be observed that the
improvement in the current account in 1999 was associated with a significant reduction in
investment from the record level observed in 1998, which more than offset the decline in
domestic savings (Figure 6). It is likely that at least the level of investment during 1999 will
be necessary to place the economy on its potential growth path once the extraordinary impact
of the beginning of operations by Intel subsides.[10] In order to sustain such investment levels
while avoiding potentially higher current account balances, as well as to strengthen Costa
Rica's credibility among investors and reduce the costs of both domestic and external
financing, it is therefore important to increase **domestic savings**. In this regard, Costa Rica
would benefit from reversing the deterioration of the public sector's fiscal position, since
public savings decreased from about 2½ percent of GDP in 1998 to 0.8 percent of GDP in
1999 and are estimated to have decreased further in 2000.

Export performance during the last decade was favorable overall. The ratio of exports of
goods and nonfactor services to GDP more than doubled between 1990 and 2000 (Figure 7a).
The **qualitative transformation** of the export base was also remarkable, with strong growth

---

[8] Calvo (1996) argues that the instability of this ratio, not only its level, is an important
causality factor in currency and external crisis.

[9] The ratio of NIR relative to quasi money plus short-term domestic debt in 1999 returned to
16.4 (approximately the same level of 1997), after falling to 12.3 in 1998.

[10] Judging from the 3½ percent real GDP growth (excluding Intel) observed in 1999 and
assuming a potential real GDP growth of about 4 percent or 4½ percent a year.

Figure 5a. Costa Rica: Net International Reserves

Legend:
- in millions of US$ (left scale)
- in months of imports (right scale)

X-axis: 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999 (prel.), 2000 (proj.)
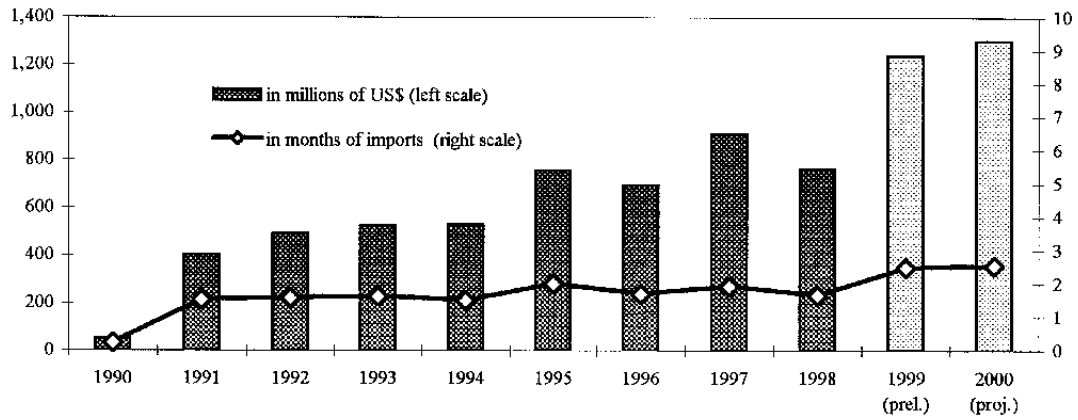
Figure 5b. Costa Rica: Real Interest Rates (on 6-month stabilization bonds)

X-axis: June 1994, Dec., June 1995, Dec., June 1996, Dec., June 1997, Dec., June 1998, Dec., June 1999, Dec., June 2000
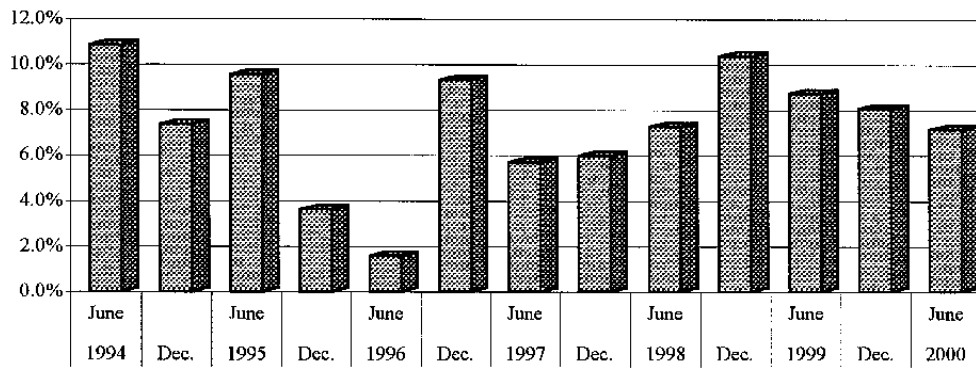
Figure 5c. Costa Rica: Net International Reserves
(Relative to M2)

X-axis: 1993, 1994, 1995, 1996, 1997, 1998, 1999 (prel.), 2000 (proj.)
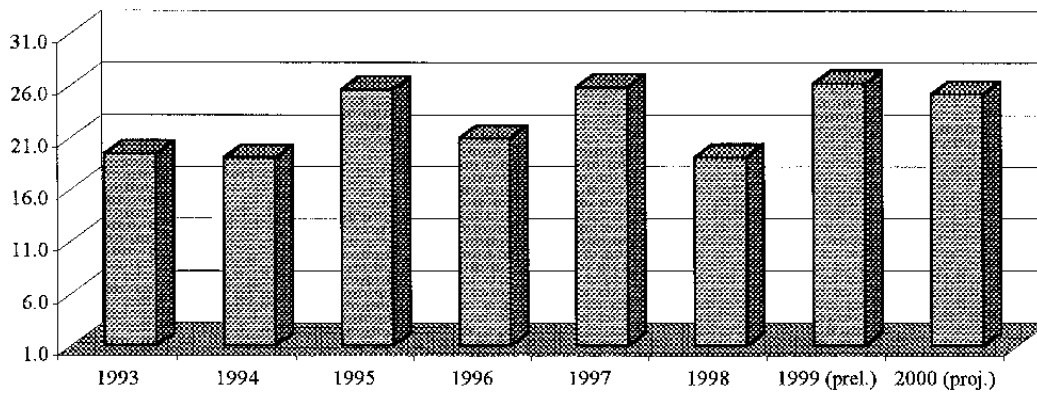
Sources: Central Bank of Costa Rica; and Fund staff estimates.

Figure 6. Costa Rica: Savings and Investment
(In percent of GDP)
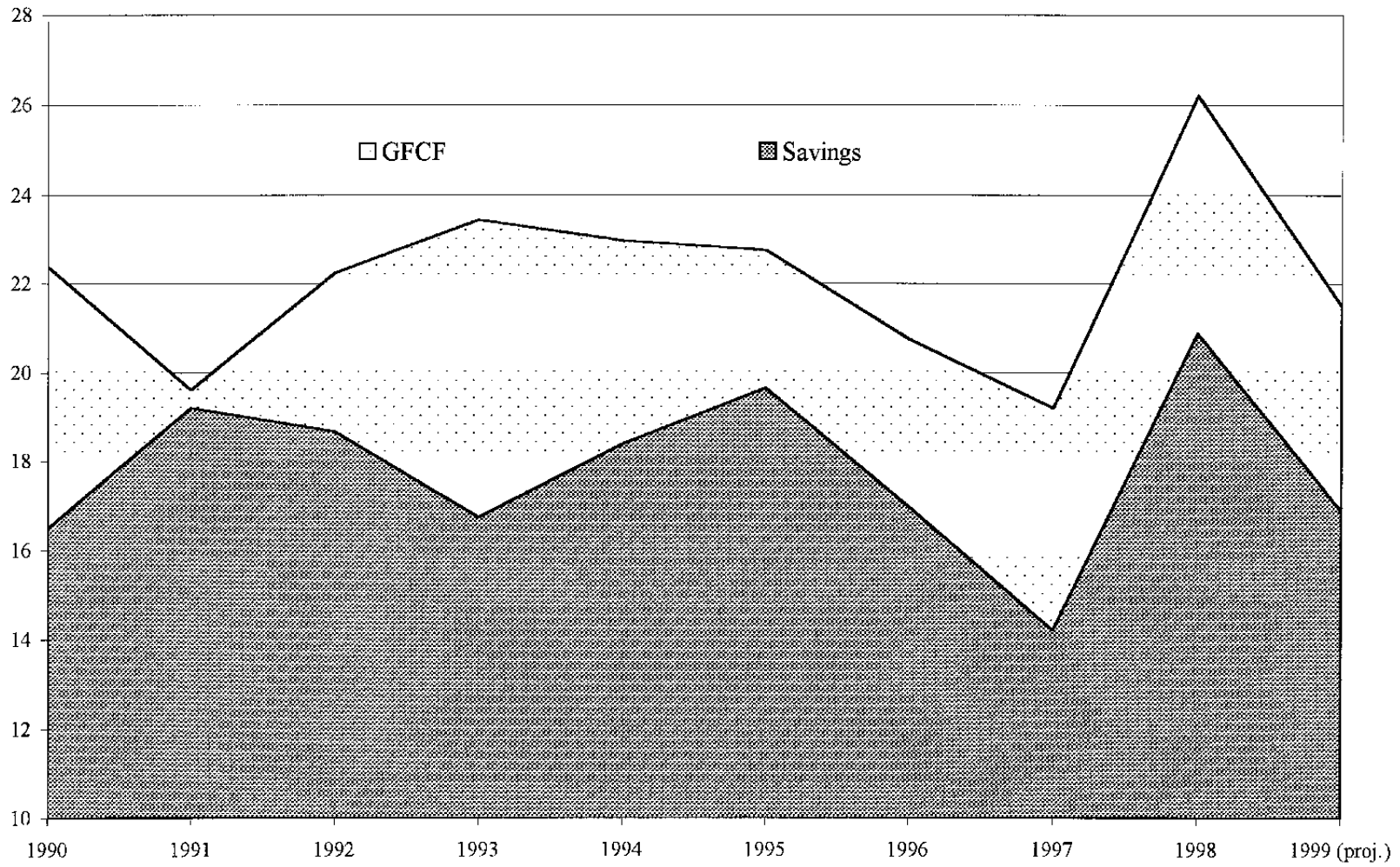
Sources: Central Bank of Costa Rica; and Fund staff estimates.

Figure 7a. Costa Rica: Imports and Exports of Goods and Nonfactor Services
(In percent of GDP)
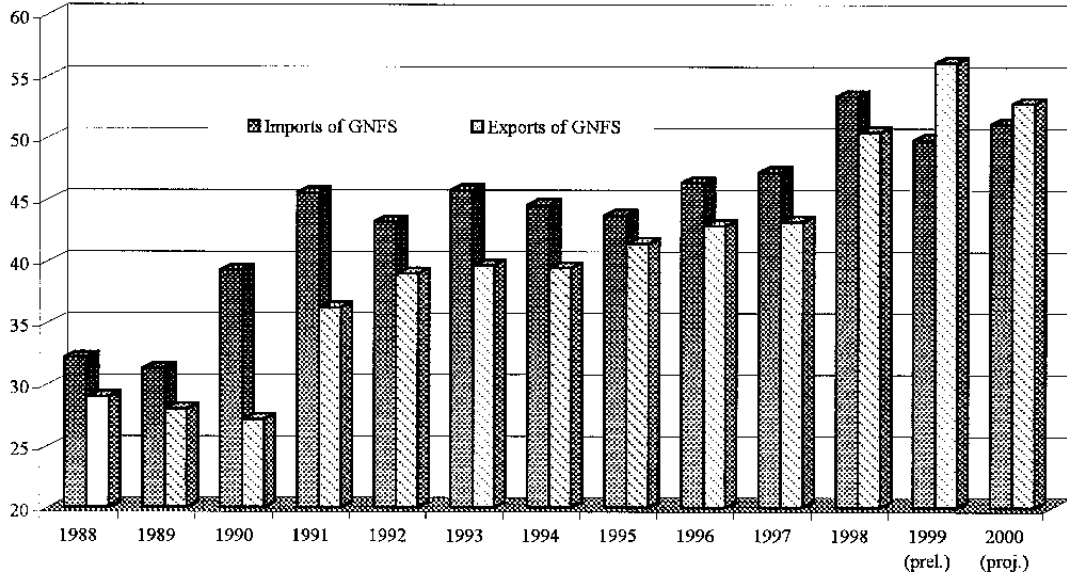
Figure 7b. Costa Rica: Export Composition
(In percent of nonmaquila exports)
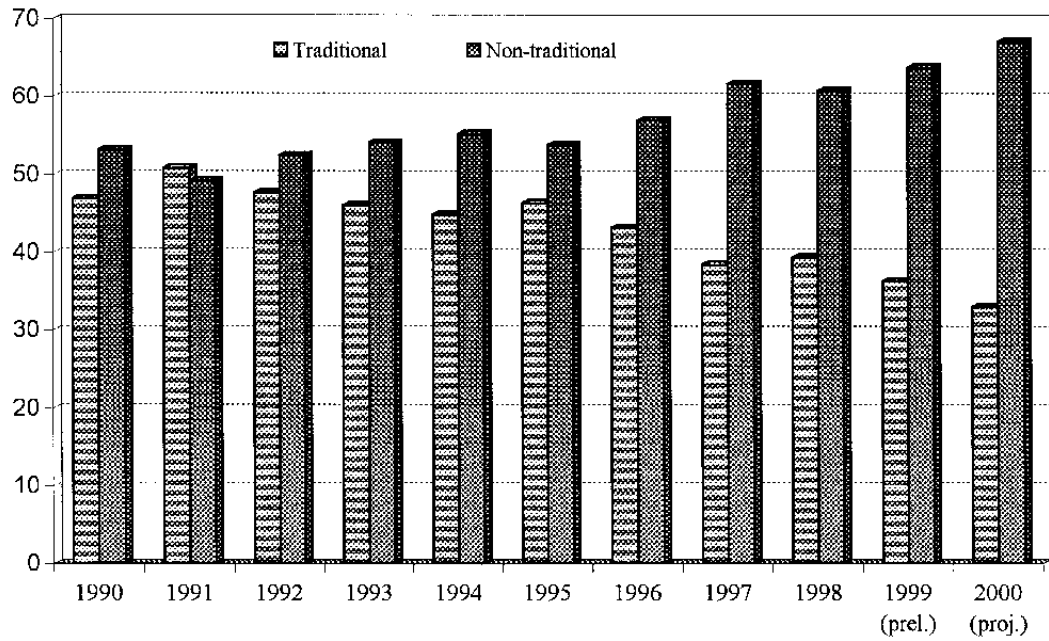
Sources: Central Bank of Costa Rica; and Fund staff estimates.

in tourism receipts and greater participation of nontraditional exports in total exports (Figure 7b). The structural transformation of export activities reflected on the rise in Costa Rica's overall **export market shares** of both goods and services during the 1990s (Figure 8a). During the latter half of the 1990s, however, market shares of **domestic exports** decreased, suggesting some loss of competitiveness. Moreover, total exports declined in 2000.

The structural changes and export diversification mentioned above were accompanied by an appreciation of the **real effective exchange rate (REER)** and higher **relative unit labor costs (RULC)** after 1992 (Figures 8b and 8c). The strong performance of total exports and the general improvement in the trade and current account balances from the levels observed in 1993 suggest that such appreciation of the currency was, to some extent, an equilibrium phenomenon.[11] Above-average productivity gains in tradable sectors may have also contributed to the temporary maintenance of export dynamism in the presence of economy-wide cost pressures. However, the persistence of the REER appreciation and RULC trends may have eventually begun to hurt the competitiveness of Costa Rica's economy, as indicated by the loss in export market shares of domestic goods and the increase in import penetration observed after 1995 (Figures 8a and 9b).

In summary, Costa Rica's external position benefits from a relatively low external debt burden and important inflows of foreign direct investment. The increase in investment and the acceleration of GDP growth observed until 1999 also improved the prospects of intertemporal solvency. Nonetheless, the current external environment, the expected reduction in FDI inflows, and the desirability to strengthen the reserve position while reducing real interest rates recommend a reduction in the current account deficit. The decline in market shares of non-EPZ exports and the greater coefficient of import penetration observed in the second half of the 1990s, and the recent decrease in total exports highlight the importance of analyzing the appropriateness of the current level of the real exchange rate, which is done in the following sections.

---

[11] Besides the modernization of the export base, an equilibrium appreciation of the exchange rate may have been induced by higher capital inflows and broadly improved terms of trade (Figure 9a). This issue will be treated in more detail in the following sections of this paper.

Figure 8a. Costa Rica: Export Market Shares 1/

■■■■ Domestic Goods (relative to imports of main partners)   ▨▨▨ Domestic Goods (relative to world imports)

—△— Goods and Services (relative to world imports)
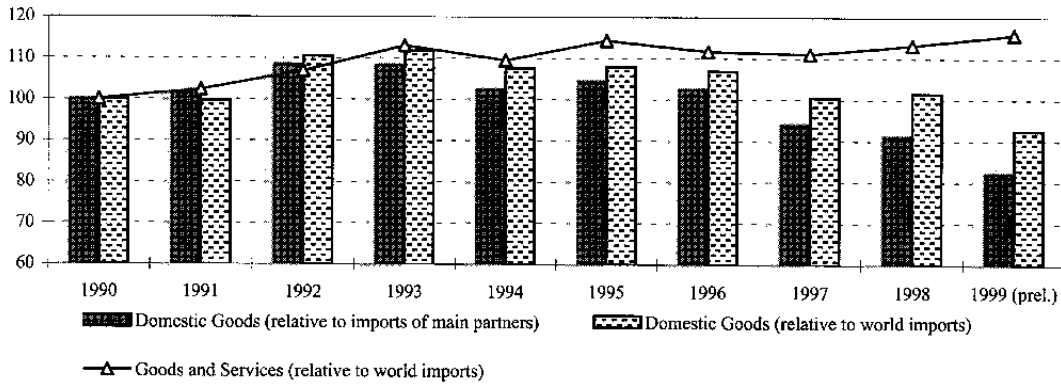
Figure 8b. Costa Rica: Real Effective Exchange Rate
(1990 = 100)
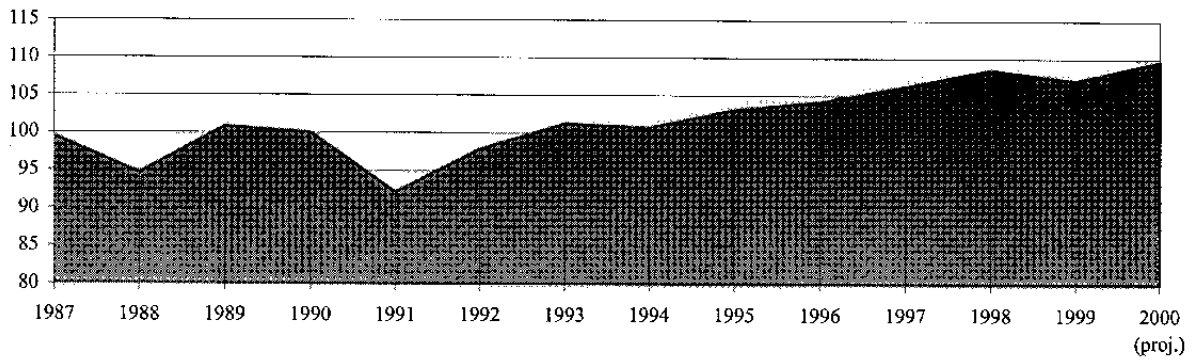
Figure 8c. Costa Rica: Relative Unit Labor Costs 2/
(1990 = 100)
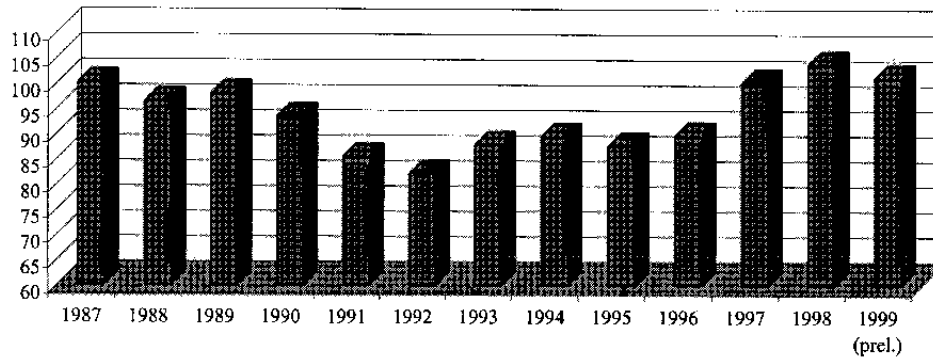
Sources: Central Bank of Costa Rica; and Fund staff estimates.

1/ Defined as the change in Costa Rica's export volumes relative to the change in partner countries' import volumes.

2/ Defined as the domestic ULC relative to the average ULC of main industrialized trading partners.

Figure 9a. Costa Rica: Terms of Trade
(1990 = 100)
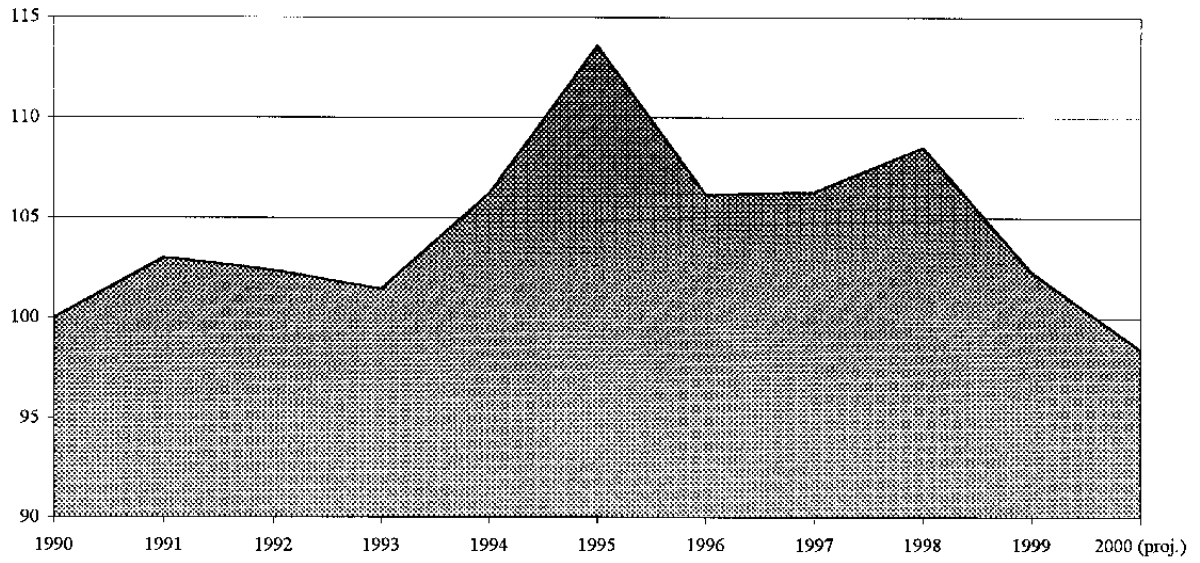
Figure 9b. Costa Rica: Non-oil, Nonmaquila Imports
(In percent of GDP)
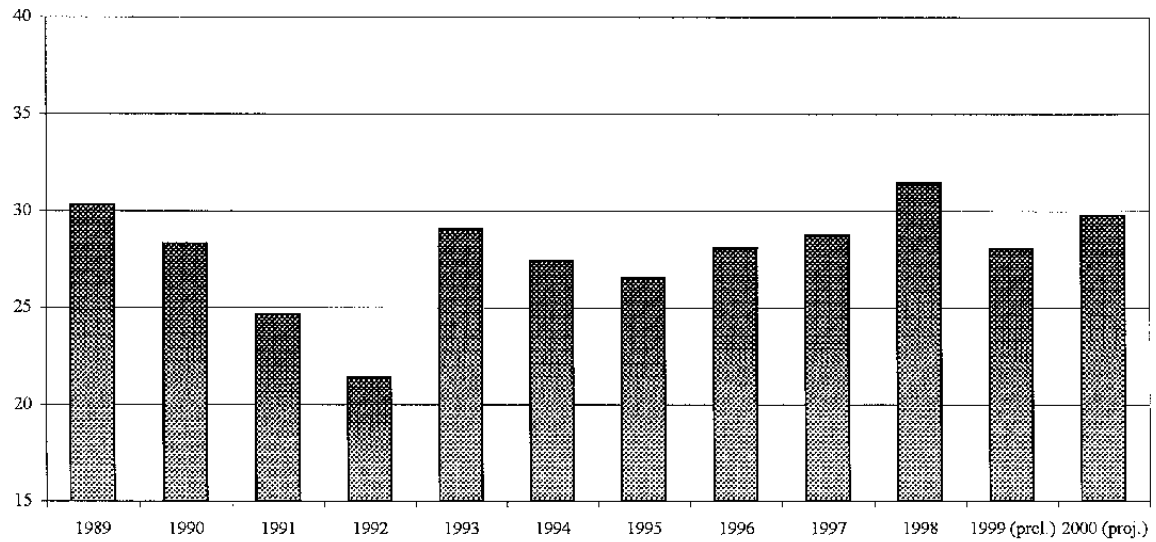
Sources: Central Bank of Costa Rica; and Fund staff estimates.

III.   ESTIMATING COSTA RICA'S EQUILIBRIUM RATE: THE CGER METHODOLOGY

This section estimates Costa Rica's equilibrium real effective exchange rate (EREER) based on a macroeconomic balance framework that focuses on the requirements for simultaneously achieving internal and external balance.[12] The methodology builds on the national income accounting identity that relates the external current account balance (CA) to the excess of domestic savings (S) over investment (I)

$$CA \equiv S - I$$

It basically defines the EREER as the exchange rate that will equate the current account to the structural savings/investment balance in the medium term. The estimation process involves three main steps: (1) estimate the current account that is likely to emerge in the medium term under prevailing exchange rates and assuming domestic and foreign outputs at their potential levels (the *underlying* current account); (2) estimate the medium-term domestic savings and investment relation based on economic fundamentals and assuming full employment (the *equilibrium* current account); (3) calculate the exchange rate that would bring the underlying current account to the level of the structural current account. In the calculations reported below, it was assumed that the adjustment toward medium-term positions takes place over a three-year period.

The **underlying current account** is calculated by adjusting the actual current account for existing output gaps in Costa Rica and abroad and for the effects of lagged real exchange rate movements during the three preceding years. Import and export elasticities to output gaps are both assumed to be 1.5, while the exchange rate elasticity of exports and imports are assumed be 0.53 and -0.69, respectively. These elasticities were taken from the IMF's CGER and MULTIMOD models.[13]

Having defined the long-run elasticity values, the next step was to follow the CGER assumption that the full impact of an exchange rate change on trade (and service) volumes is spread over three years, with 60 percent of the long-run effect occurring during the first year, a further 25 percent during the second year, and the remaining 15 percent in the third year. It

---

[12]This framework was developed by the IMF's Coordinating Group on Exchange Rate Issues (CGER) and is regularly used to estimate equilibrium exchange rates for industrialized countries. See International Monetary Fund (1997).

[13]Gaba (1993) and Villanueva (1993) estimate trade elasticities for Costa Rica which are broadly in line with the CGER and MULTIMOD elasticities used here. Using those elasticities specifically estimated for Costa Rica yields very similar results which show the robustness of the estimates to reasonable variations in the trade elasticities assumed. The results obtained under different elasticities are thus omitted for simplicity.

is also assumed that import prices respond fully and with no lags to exchange rate variations, while export prices (measured in colones) are not directly influenced by exchange rates.

The output gaps of industrialized countries used here are IMF estimates from the World Economic Outlook exercise, whereas the output gaps for Costa Rica and developing partners were estimated as deviations from trend GDP obtained through Hodrick-Prescott filtering. Weights used in the averaging of output gaps and exchange rate movements correspond to each country's share in Costa Rica's exports of goods and tourism (the latter proxied by the composition of visitor arrivals). These estimates and assumptions, together with the current account deficit of 5.2 percent of GDP expected for the year 2000, lead to **an estimated underlying current account deficit of about 5.6 percent of GDP**. This means that at potential levels of output (domestic and foreign), and after factoring in the lagged effects of recent exchange rate fluctuations, Costa Rica's current account deficit in 2000 would be equivalent to about 5.6 percent of GDP.[14]

The **equilibrium, or structural, current account balance** is derived from a model of equilibrium saving-investment balances which relates investment and saving flows (and thus the current account) to their medium-term structural determinants, notably the fiscal position, demographic variables, and relative country size.[15] The following cross-sectional model was estimated by Debelle and Faruqee (1996) using data for 32 developing economies:

$$CA = 0.26*SUR - 0.02*DEM - 0.30*YPPP + 0.01*(YPPP)^2 + 0.34*K/L -0.02*(K/L)^2 - 2.56 \quad (1)$$

where $CA \equiv$ the structural current account as a percentage of GDP;
$SUR \equiv$ the general structural government balance as a percentage of GDP;
$DEM \equiv$ the dependency ratio, defined as the ratio of population 65 and older or 19 and younger to population aged 20-64;
$YPPP \equiv$ the per capita potential GDP (PPP-adjusted) as a percentage of the U.S. level; and
$K/L \equiv$ the estimated capital per worker ratio.

The equation captures the idea that high public savings and low population dependency ratios contribute to domestic savings and thus a lower current account deficit, whereas the terms

---

[14] Most of the adjustment from the observed to the underlying current account deficit stemmed from closing the positive output gap in the United States, which would reduce Costa Rica's exports. Since Costa Rica's REER fluctuated moderately in the last three years, the impact of lagged effects of the real exchange rate on the underlying current account is less significant than that of the relative business cycles.

[15] See Debelle and Faruqee (1996), and International Monetary Fund (1997) for details.

associated with the capital-labor ratio and income per capita are proxies for the return on capital and thus the level of investment and the current account.[16]

According to these parameters, and assuming a debt-stabilizing fiscal deficit of 2½ percent of GDP in the medium term, **Costa Rica's structural current account deficit is equivalent to about 3⅓ percent of GDP.**[17] This means that the model's structural determinants of savings (the fiscal balance and the dependency ratio) and investment (per capita income and capital-labor ratio) in Costa Rica currently predict a need for supplemental foreign savings of the order of 3⅓ percent of GDP in order for the economy to operate at its potential level.[18]

The comparison between estimated underlying and structural current account deficits suggests that **the Costa Rica colón appears to be somewhat overvalued in real terms**. The calculations place the degree of real overvaluation at around 12 percent. These figures imply that a 12 percent real devaluation of the REER would be required to bring the underlying current account deficit from 5.6 percent of GDP to the structural target of 3⅓ percent of GDP.

It must be noted, however, that the CGER methodology, with its several assumptions and parameters estimated through different models, does not allow for the estimated exchange rate misalignment to be placed within narrow confidence bands.[19] Therefore, in order to complement the analysis and shed additional light on the possible sources of the exchange rate misalignment, the next section estimates Costa Rica's (fundamental) equilibrium exchange rate using an alternative methodology which is also based on the macroeconomic balance framework. Such methodology has the additional advantage of identifying the main

---

[16] Debelle and Faruqee (1996) explain the negative sign on per capita income as possibly capturing the constrained access of poor countries to international capital markets, which would force them to maintain stronger current account positions. I view another possibility in that low income per capita might be associated with lower education levels and thus (ceteris paribus) lower returns on investment, lower investment levels, and a better current account balance.

[17] Given the public sector debt to GDP ratio of about 42 percent, an average real interest rate of about 9⅓ percent, and a potential real GDP growth rate of 4½ percent, the primary surplus necessary to stabilize the debt to GDP ratio is approximately 2 percent. The overall deficit associated with this primary surplus is equivalent to about 2½ percent of GDP.

[18] A study on current account sustainability published by the Central Bank of Costa Rica indicates that current account deficits in the range between 2.7 percent and 3.7 percent of GDP are sustainable under realistic assumptions. For details see Zuñiga at al. (1997).

[19] In fact, CGER studies at the IMF have carefully highlighted that this type of analysis is primarily geared at identifying "badly misaligned exchange rates."

sources behind equilibrium exchange rate movements, thus providing further input for policy evaluation and design.

IV. ESTIMATING COSTA RICA'S EQUILIBRIUM RATE: THE FEER METHODOLOGY

The terminology "fundamental equilibrium exchange rate" (FEER) was introduced by Williamson (1985) to designate the concept that the equilibrium exchange rate is driven by economic fundamentals and can therefore deviate substantially from the path of purchasing power parity. In accordance with the FEER framework, Edwards (1989) defines the equilibrium exchange rate as the one which, "for given sustainable values of other variables such as taxes, international terms of trade, commercial policy, capital and aid flows and technology, results in the simultaneous attainment of internal and external equilibrium" (p.16). Simultaneous internal and external equilibrium refers to the situation in which present and future current account balances at full employment are compatible with the level of long-term sustainable capital flows.

A number of theoretical models and empirical applications originated from this concept of equilibrium. This section will build on the procedure developed by Elbadawi (1994) and estimate the behavior of the FEER in Costa Rica by (1) estimating an error-correction model for the real exchange rate and (2) plugging "sustainable" or trend values of the explanatory variables into the estimated cointegrating equation, thus obtaining a series which represents the estimated path of the FEER.

I estimated several models for Costa Rica's REER using different explanatory variables which capture fundamentals such as the fiscal stance, degree of economic openness, international terms of trade, and net capital flows in the period 1970–99. Standard model selection techniques[20] favored the following specification:

$$REER_t = 0.98*GC_t + 0.75*TOT_t - 0.24*OPEN_t + 0.07*FDI_t - 0.04T + 0.45\,D_t + E_t \qquad (2)$$
$$\quad\;\; (0.27) \qquad\quad (0.17) \qquad\; (0.16) \qquad\quad (0.03) \qquad (0.01) \quad (0.10)$$

for which
R-squared = 0.87
Adjusted R-squared = 0.84
DW Statistic = 1.56

and where
GC ≡ Central government's current expenditures as a percentage of GDP
TOT ≡ an index of international terms of trade

---

[20] Model selection was based on R-squared, adjusted R-squared, Schwarz criterion, and autocorrelation and normality tests on residuals.

OPEN $\equiv$ total trade as a proportion of GDP[21]

FDI $\equiv$ net foreign direct investment as a percentage of GDP[22]

T $\equiv$ a time trend

D $\equiv$ a dummy variable with value 1 after 1991 (to adjust for the significant revisions in the national accounts and possibly also the effects of the growth of EPZ activities in the economy)

E $\equiv$ is a vector of residuals

Data is annual and all variables are expressed in natural logarithms, except FDI. Standard errors of the estimated coefficients are in parenthesis. The model specification performed well in the tests for autocorrelation, normality of residuals, and parameter stability.[23] Augmented Dickey-Fuller and Phillips-Perron tests show that REER and all explanatory variables are nonstationary in levels and stationary in first differences at 5 percent critical values (i.e., the series are integrated of order one). The residuals of equation (2) are also stationary at 5 percent critical value, indicating that the variables are cointegrated and thus supporting the interpretation that the specification in (2) represents a long-run equilibrium for the real exchange rate.

The coefficients in equation (2) have the expected signs, and are significant at conventional levels with exception of OPEN. Indeed, higher consumption by the government leads to an appreciation of the real exchange rate through an increase in the price of nontradables; deteriorating terms of trade and trade liberalization call for a compensating depreciation of the exchange rate; and greater inflows of capital (FDI) tend to strengthen the domestic currency.[24] The negative trend coefficient may be capturing a number of additional effects on

---

[21] A similar variable was used by Elbadawi to proxy the degree of economic oneness in Chile, India, and Ghana, with satisfactory results.

[22] This variable is a proxy for "sustainable" net capital flows. Choosing the variable which best represents sustainable or long-run capital flows has been a controversial issue in the literature. Here we follow Manteu and Mello (1992) in using net foreign direct investment for this purpose.

[23] The Ljung-Box Q-statistics for residuals and squared residuals up to 10 lags are not significant at the 5 percent significance level; the Breusch-Godfrey LM statistic (with 2 lags) of 2.96 is not significant; the Jarque-Bera statistic of 2.2 is not significant; and the CUSUM and CUSUM of squares tast statistics stay within the 5 percent significance lines throughout the sample period.

[24] While the impact of changes in government consumption and terms of trade on the equilibrium exchange rate cannot be determined by theoretical models *a priori*, empirical studies usually indicate that higher government consumption leads to an appreciation of the exchange rate (probably reflecting a higher ratio of nontradables to tradables in the government consumption bundle vis-à-vis the private sector's) and that an improvement in

the exchange rate, but one important possibility is that Costa Rica's relative productivity growth in tradables versus nontradable sectors may have lagged behind that of its main trading partners.

While the relations above drive the behavior of the real exchange rate in the long-run (thus being considered the equilibrium REER), the short-run dynamics of the system is given by the error-correction specification:

$$\Delta REER_t = 0.33 * \Delta NER_t - 0.57 * \Delta OPEN_t - 0.41 * E_{t-1} + 0.03 + U_t \qquad (3)$$
$$ (0.07) \qquad (0.13) \qquad (0.15) \qquad (0.01)$$

for which
R-squared = 0.80
Adjusted R-squared = 0.78
DW statistic = 1.63

and where
Δ ≡ indicates first differencing of a variable
NER ≡ (natural logarithm of) nominal exchange rate
U ≡ is an error term

Standard errors of the estimates are shown in parenthesis. The model specification performed well in the tests for autocorrelation, normality of residuals, and parameter stability.[25] The coefficient of the error-correction term (E_{t-1}) is negative, significant, and has an absolute value smaller than one, indicating the gradual convergence of the system toward long-run equilibrium values. It indicates that when the fundamentals in the previous period call for a lower (higher) REER than observed, i.e., the term E_{t-1} is positive (negative), the REER in the current period will tend to depreciate (appreciate) toward the equilibrium level predicted by the fundamentals in equation (2). The speed of adjustment for Costa Rica's REER, determined by the absolute value of the coefficient on E_{t-1} (0.41), falls within the range of values estimated by Edwards (1989) and Elbadawi (1994) for other developing countries. The coefficient on NER also has the expected sign and is highly significant, which supports

---

the terms of trade also leads to an appreciation of the exchange rate, implying that the income effect of the change in relative prices dominates the substitution effect. See Elbadawi (1994).

[25] The Ljung-Box Q-statistics for residuals and squared residuals up to 10 lags are not significant at the 5 percent significance level; the Breusch-Godfrey LM statistic (with 2 lags) of 1.44 is not significant; the Jarque-Bera statistic of 0.6 is not significant; the CUSUM test statistic stay within the 5 percent significance lines throughout the sample period; and the CUSUM of squares test statistic stay within the 5 percent significance lines in all but four observations following the major currency devaluation which took place in 1981.

the interpretation that nominal and discretionary devaluations of the currency may lead to a more depreciated REER in the short run but will be unsustainable if not supported by a change in fundamentals (since the error-correction term would place the REER again on the path to equilibrium).[26] The coefficients on the degree of openness has the expected sign and is highly significant, suggesting that trade fluctuations or the degree of openness has an immediate impact on the real exchange rate. The variables capturing the short-term impact of fiscal stance, foreign direct investment, and terms of trade were not significant and were dropped from the final regression.[27]

In order to further explore the exchange rate response to changes in the fundamentals, equation (2) is used to build an index for the equilibrium exchange rate (EER) in which the values of the explanatory variables are 5-year moving averages of observed values.[28] Figure 10a shows the behavior of this index compared to the observed REER. It suggests that the real effective appreciation of the colón in 1994-98 was mostly an equilibrium phenomenon, given that the REER and the EER move roughly in the same direction during that period.[29] More specifically, the rising trend displayed by the EER between 1994 and 1998 reflects the impact of higher public consumption, larger inflows of foreign direct investment, and improved terms of trade, which more than offset the need for a lower exchange rate to counteract the removal of trade barriers. In 1999, however, the EER depreciates reflecting worse terms of trade, lower FDI inflows, and a slight reduction in government current expenditures (Figure 10b).

---

[26] As in other models of FEER, the nominal exchange rate is excluded *a priori* from the cointegrating equation due to the very nature of the theory, which argues that the exchange rate is driven only by fundamentals in the long run.

[27] A variable introducing the impact of expansionary credit policies did not reach minimum levels of significance and was also excluded from the final regression. However, when I estimated a simple dynamic model in first differences out of the cointegration/error-correction framework, expansionary (contractionary) credit policies appeared as a significant cause for REER appreciation (depreciation).

[28] Using moving averages is suggested by Elbadawi as a way to capture trend movements and smooth away temporary shocks; the choice of the averaging period is based on the fact that, given the error-correction coefficient, about 95 percent of an exogenous shock to the system will have been eliminated after 5 years. The constructed index was normalized so that the EER equals the REER in 1995; this year was chosen because both the observed and the underlying current account deficit were around sustainable levels (as defined in the previous section) and because the REER fluctuated moderately in 1994–96.

[29] The depreciating EER in 1991–93, on the other hand, reflected mainly the increase in trade openess and an improvement in the fiscal position.

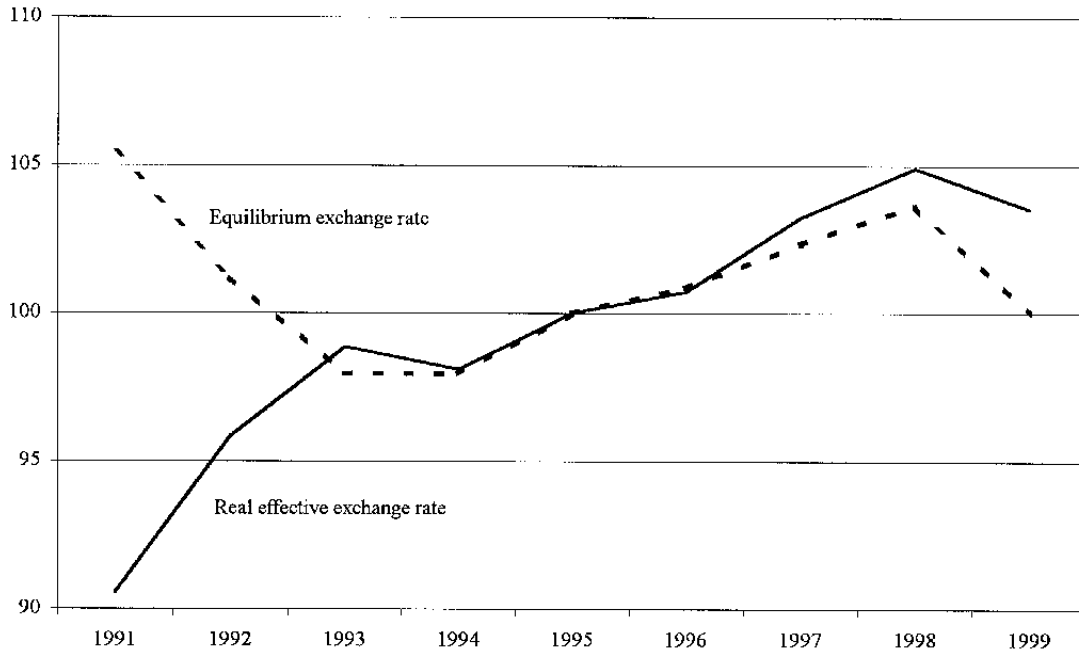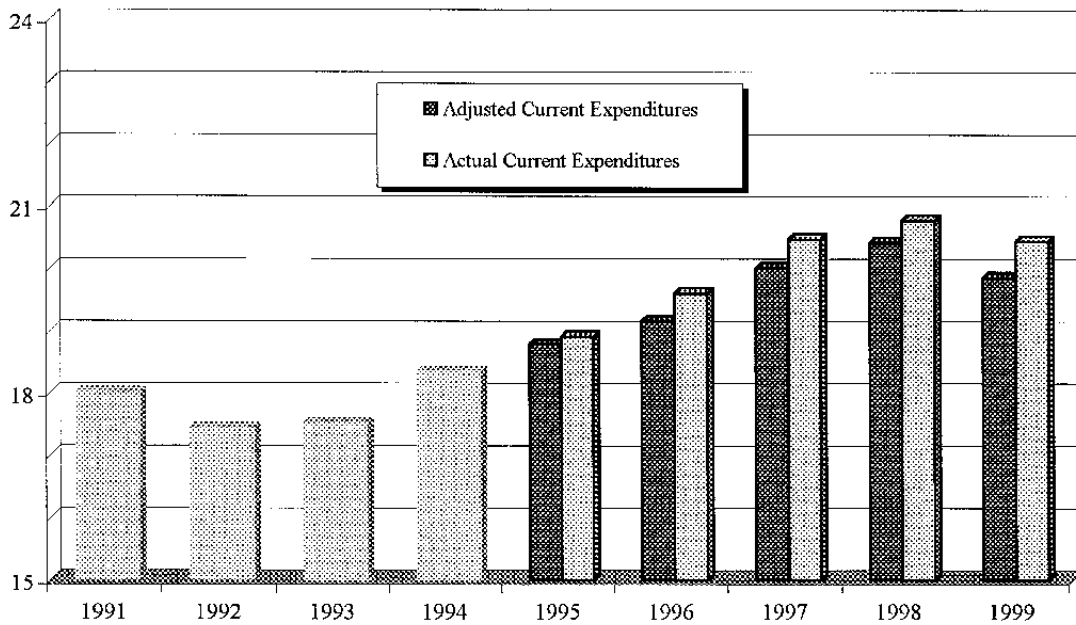**Figure 10a. Costa Rica: Exchange Rate Developments**
(1990 = 100)

Figure 10b. Costa Rica: Consolidated Central Government
Current Expenditures as a percentage of GDP (5-year moving average)

Sources: Central Bank of Costa Rica; and Fund staff estimates.

Even though the EER index reflects a cointegrating relation between the fundamentals and the exchange rate, thus being called equilibrium, Williamson (1994) points out the curious nature of this definition since it allows for *unsustainable* values of fundamentals to determine the *equilibrium* exchange rate. He then suggests that a *sustainable* path of fiscal policy be used to indicate what the exchange rate should be in a *sustainable equilibrium*. Accordingly, I calculate an index for the **Fundamental Equilibrium Exchange Rate (FEER)** which is generally similar to the EER index but where the actual values of government current expenditures are replaced by adjusted values compatible with the debt-stabilizing balance derived in the previous section (Figure 10b).[30] Figure 11 compares the behavior of the estimated FEER to the REER and indicates that **the real exchange rate in Costa Rica was overvalued by approximately 7 percent at the end of 1999**. This means that the real exchange rate was about 7 percent stronger than the one which should have prevailed under a debt-stabilizing fiscal stance and other existing fundamentals. The degree of overvaluation is likely to have increased during 2000, since preliminary data suggest that foreign direct investment decreased and the terms of trade deteriorated (which would contribute to a depreciation of the FEER) while the REER appreciated.

Figure 11. Costa Rica: The FEER and the REER 1/
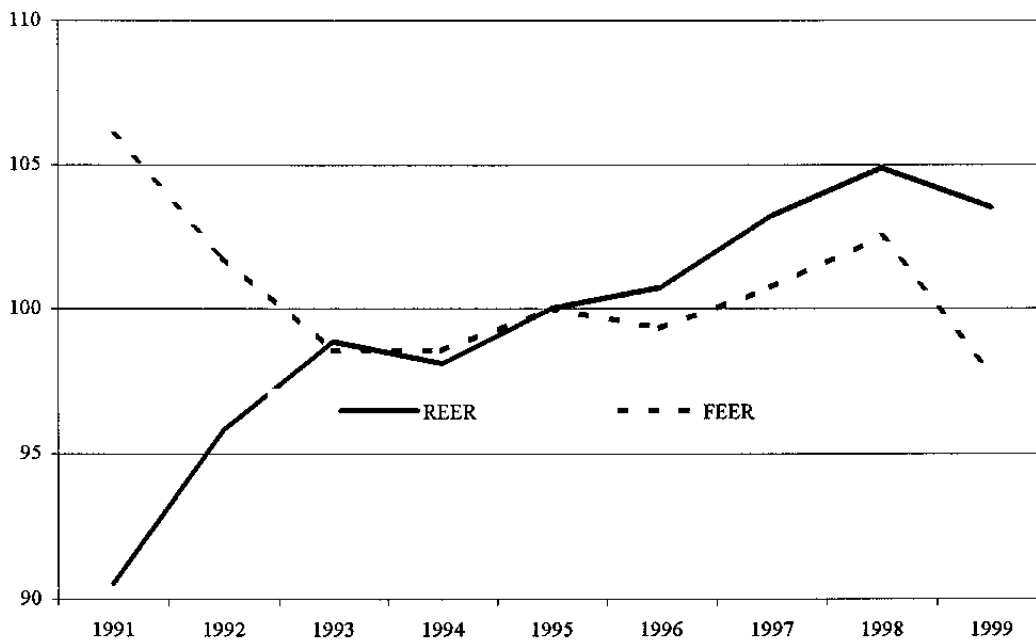
Sources: Central Bank of Costa Rica; and Fund staff estimates.
1/ FEER refers to Fundamental Equilibrium Exchange Rate.

---

[30] It is assumed that the adjustment from the actual to the debt-stabilizing deficit is achieved through a reduction in current expenditures.

V. CONCLUDING REMARKS

Costa Rica's export base underwent a significant diversification and modernization process in the early 1990s, which reflected favorably in higher export market shares and improved trade balances. The country's external position also benefited from a low external debt burden and substantial inflows of foreign direct investment through the second half of the decade. The levels of GFCF and the strong GDP growth observed in 1997–99 contributed to improve the prospects of intertemporal solvency. Nonetheless, the recent deterioration of the external environment, the deceleration of GDP growth, the reduction in FDI inflows, and the desirability to strengthen the reserve position while further reducing real interest rates recommend an increase in domestic savings and an improvement in the current account deficit. In this context, the loss of dynamism of non-EPZ exports and the greater coefficient of import penetration observed in the latter half of the 1990s, and the decline in total exports observed in 2000 suggest that achieving a lower real exchange rate may be advisable.

The equilibrium exchange rate for Costa Rica was estimated using two alternative methodologies. Notwithstanding the fact that individual estimates cannot be placed within narrow confidence intervals, these estimates gain significance when used in conjunction and supported by a broader analysis. The CGER methodology suggests that given Costa Rica's demographic structure and stage of development, and assuming the implementation of a debt-stabilizing fiscal position, the achievement of potential levels of GDP growth would require external savings (or a current account deficit) of about 3⅓ percent of GDP. Income and price elasticities of trade indicate that the real exchange rate compatible with such current account deficit in the medium term is below the current level of the REER. The degree of overvaluation is presently estimated at around 12 percent.

The FEER methodology explains the long-term equilibrium behavior of the exchange rate by the evolution of economic fundamentals such as the fiscal stance, net capital flows, the degree of economic openness, and the terms of trade. This model estimates that the colón was overvalued by approximately 7 percent in 1999 and suggests that the degree of overvaluation probably increased during 2000, supporting the main conclusion of the CGER estimation. The FEER methodology also illustrates the contradiction in trying to achieve a lower real exchange rate via nominal devaluations while pursuing an expansionary fiscal policy: increased government expenditures place an appreciating pressure on the real exchange rate, requiring that nominal devaluations be neutralized for the equilibrium to be reestablished in the system, which tends to be achieved through an increase in the price of nontradables or generalized inflation.

In summary, the advisable real depreciation of the exchange rate can only be sustained and would be best achieved through fiscal consolidation. The strengthening of the public finances would represent a major step in achieving internal and external equilibrium by reducing

internal demand pressures and therefore containing price and wage inflation, by allowing for a real depreciation of the real exchange rate and consequent increase in the competitiveness of domestic products, and by allowing for lower interest rates and higher domestic investment while increasing credibility and the prospects for external capital inflows.

References

Berg, Andrew, and Catherine Pattillo, "Are Currency Crisis Predictable? A Test," IMF Working Paper No. 98/154, November 1998.

Calvo, Guillermo, "Capital Flows and Macroeconomic Management: Tequila Lessons," *International Journal of Finance & Economics*, Vol. 1, pp. 207-23, 1996.

Cuthbertson, Keith, Stephen Hall, and Mark Taylor, *Applied Econometric Techniques*, University of Michigan Press, Michigan, 1992.

Debelle, Guy, and Hamid Faruqee, "What Determines the Current Account? A Cross-Sectional and Panel Approach," IMF Working Paper No. 96/58, June 1996.

Elbadawi, Ibrahim, "Estimating Long-Run Equilibrium Real Exchange Rates," in John Williamson (editor), *Estimating Equilibrium Exchange Rates*, Institute for International Economics, Washington, DC, September 1994.

Gaba, Ernesto, "Determinantes de las Exportaciones Globales de Costa Rica," Banco Central de Costa Rica, Serie Comentarios Sobre Assunton Economicos, No. 111, June 1993

Ghosh, Atish, and Jonathan Ostry, "Export Instability and the External Balance in Developing Countries," IMF Staff Papers 41, No. 2, June 1994.

Greene, William, *Econometric Analysis*, Macmillan Publishing Company, New York, 1990.

Hamilton, James, *Time Series Analysis*, Princeton University Press, New Jersey, 1994.

International Monetary Fund, SM/97/252, 10/6/97, "A Methodology for Exchange Rate Assessments and its Application in Fund Surveillance over Major Industrial Countries."

Ito, Takatoshi, Peter Isard, Steven Symansky, and Tamin Bayoumi, "Exchange Rate Movements and Their Impact on Trade and Investment in the APEC Region," IMF Occasional Paper No. 145, December 1996.

Lipschitz, Leslie, and Donogh McDonald, "Real Exchange Rates and Competitiveness: a Clarification of Concepts, and Some Measurements for Europe," *Empirica*, Vol. 19, March 1992.

Manteu, Cristina, and Ana Silvia Mello, "Taxa de Cambio de Equilibrio Fundamental," Bank of Portugal, *Quarterly Bulletin*, December 1992.

Milesi-Ferretti, Gian, and Assaf Razin, "Current Account Sustainability: Selected East Asian and Latin American Experiences," IMF Working Paper No. 96/110, October 1996.

Milesi-Ferretti, Gian, and Assaf Razin, "Current Account Reversals and Currency Crisis: Empirical Regularities," IMF Working Paper No. 98/89, June 1998.

Villanueva, Delano, "Exports and Economic Development," IMF Working Paper No. 93/41, May 1993.

Williamson, John (editor), *Estimating Equilibrium Exchange Rates*, Institute for International Economics, Washington, DC, September 1994.

Zuñiga, Norberto, Ana G. Azofeifa, and Ana C. Kikut, "Sostenabilidad del Deficit en Cuenta Corriente de la Balanza de Pagos de Costa Rica," Banco Central de Costa Rica, DE-DIE-PI-04-97/R, November 1997.