



COSTA RICA

SELECTED ISSUES AND ANALYTICAL NOTES

February 2015

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COSTA RICA

SELECTED ISSUES AND ANALYTICAL NOTES

January 13, 2015

Approved By
**The Western Hemisphere
Department**

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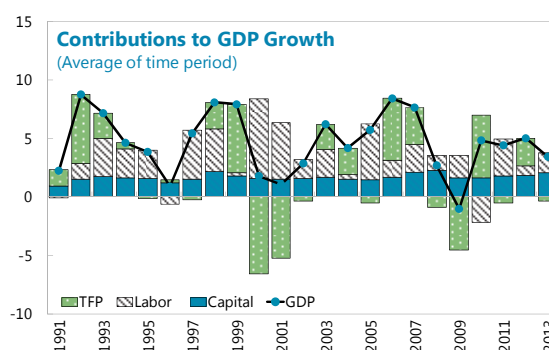
I. SELECTED REAL SECTOR ISSUES¹

This note examines several real sector issues, including estimates of potential output, the effect of Intel's withdrawal on GDP, labor market and inequality and electricity prices in Costa Rica. Estimates suggest that potential GDP growth is about 4.3 percent, the output gap is broadly closed and Intel's withdrawal will lower real GDP growth in about ½ percentage point. Significant wage premia are identified across public versus private sectors and some evidence of intergenerational inequality is also presented. Electricity tariffs are found to be regionally competitive albeit with inefficiencies in their determination.

A. Potential Output Estimates

1. **Staff analysis suggests that on average Costa Rica's potential output growth is about 4.3 percent and the output gap is closed.** Results are relatively robust across different

methodologies which include a production function approach, several well-known univariate time series filters, univariate Kalman filters and multivariate filters which take into account inflation and financial variables. For the period 1999–2008, before the financial crisis, Costa Rica's potential output grew at an average rate of 4.7 percent. The analogous estimate for the post-crisis period is, as expected, lower, at 4.1 percent but recovering moderately in recent years. The output gap was estimated to have broadly closed in 2013 (-0.3 percent) but it somewhat widened in 2014 to -0.6 percent.



Source: Fund staff estimates.
Note: Estimates from growth accounting exercise using production function approach.

2. **The production function approach shows that the main drivers of fluctuations in GDP growth are TFP and labor supply.** Results show that potential output grew at an average rate of 4.5 percent in 1999–2013, one of the highest in Central America. While contributions from capital remained relatively stable since 1991, most of the changes in GDP growth are driven by changes in productivity (TFP) and human capital weighted labor supply. Contrary to other countries in Central America, productivity growth in Costa Rica has been large and positive across several years with labor generating significant positive contributions during downturns when TFP contribution was negative.

3. **These results on TFP, however, should be interpreted with caution.** The TFP measure is by definition a residual—the difference between output growth and the growth in the quantity (and quality) of inputs. Thus, any measurement errors in the labor and capital series are automatically

¹ Prepared by Patrick Blagrove, Jorge Restrepo, Jose Pablo Valdes and Joyce Wong.

attributed to TFP. For instance, employment shifts from the formal to the informal sector, migration of skilled labor, changes in the quality of the capital and labor stocks which are not correctly accounted for, and changes in the level of capital utilization and the use of land would be reflected in TFP.

Table 1. Potential Output Growth and Output Gap Estimates

| | <i>Potential GDP growth rate</i> | | | <i>Output Gap</i> | |
|---|----------------------------------|----------------|-------------|-------------------|-------------|
| | 1999-2008 | 2009-13 | 2014 | 2013 | 2014 |
| <i>Production Function Approach</i> | 4.8 | 3.8 | 4.1 | 0.1 | -0.2 |
| Cycle Extraction Filters | <i>Potential GDP growth rate</i> | | | <i>Output Gap</i> | |
| | 1999-2008 | 2009-13 | 2014 | 2013 | 2014 |
| <i>Hodrick-Prescott</i> | 4.8 | 3.8 | 4.1 | 0.1 | -0.2 |
| <i>Butterworth</i> | 4.8 | 3.7 | 4.1 | 0.2 | -0.1 |
| <i>Christiano-Fitzgerald</i> | 4.9 | 3.3 | 4.5 | 1.2 | 0.5 |
| <i>Baxter-King</i> | 4.9 | 3.8 | 4.1 | -0.1 | -0.4 |
| Univariate Kalman Filters | <i>Potential GDP growth rate</i> | | | <i>Output Gap</i> | |
| | 1999-2008 | 2009-13 | 2014 | 2013 | 2014 |
| <i>Deterministic Drift</i> | 4.5 | 4.5 | 4.5 | 1.9 | 1.1 |
| <i>Mean Reversion</i> | 4.9 | 4.9 | 4.9 | -4.3 | -4.6 |
| Multivariate Filters | <i>Potential GDP growth rate</i> | | | <i>Output Gap</i> | |
| | 2001-08 | 2009-13 | 2014 | 2013 | 2014 |
| <i>With inflation</i> | 4.5 | 4.2 | 4.2 | -0.2 | -1.0 |
| <i>With inflation and financial vars.</i> | 4.8 | 3.7 | 4.1* | -2.0 | -- |
| Average of All Models | 4.7 | 4.0 | 4.3 | -0.3 | -0.6 |

Source: Fund staff estimates.

*/ Estimate for 2013.

4. **Estimates with cycle extraction filters and univariate Kalman filters suggest that potential output growth is 4.2 percent and 4.7, respectively.** Although cycle extraction filters have several shortcomings such as the inability to capture structure changes in the economy, and should be taken with caution, it is nevertheless reassuring that most of the methods point to an estimate for potential growth of about 4.1 percent in 2014. The CF filter, which allows for phase shifts (and is thus more flexible), deviates the most (4.5 percent). A similar effect takes place with the univariate Kalman filters where the model which allows for mean reversion (and is thus more flexible) estimates a higher potential output (4.9 versus 4.5 percent)

5. **Estimates using multivariate filters that include inflation and financial variables suggest that potential output growth is about 4.2 percent.** These multivariate filters consider the information in inflation (through a Phillips curve, for example), financial variables (e.g. stock prices, interest rates, exchange rates, credit levels) and government deficit to identify whether growth is

above potential.² For both the periods before and after the crisis, the results of these multivariate filters are within the range of the estimates examined above and in line with the overall average of all methods.

B. Estimating the Impact of Intel Exit

6. **Two different approaches were used to estimate the impact of Intel's exit on real GDP.**

This exercise presented some difficulties due to the fixed and outdated base year of the National Accounts (1991) used to derive GDP and its components. This meant that 1991 constant price weights are used to derive Intel's contribution to real GDP growth in 2014, greatly overestimating it. This approach would have implied a negative contribution to growth of 6.4 percent due to Intel's relocation, which is clearly overestimated in light of the significant drop in silicon chip prices in recent years and the fact that Intel's value added relative to GDP was estimated to be around only 0.5 percent in 2013. Staff instead used two other approaches to obtain more meaningful estimates.

7. **In the first approach, annualized short-term indicators and chain-linked volume measures generated an estimated Intel contribution to growth of 0.64 percent.** Using a large number of high frequency price indicators for all the industries (mostly monthly) staff derived a set of consistent annual price indices for 2013–14 in order to compute 2014 GDP at constant 2013 prices.³ These price series, combined with BCCR's estimates for GDP components and Intel's value-added in 2013 were then used to obtain corresponding forecasted values for each GDP component (and Intel) in 2014.

8. **The second approach employing the 2011 input-output table compiled by the BCCR produced a slightly higher estimate.** Using the input-output matrix, a Leontief demand model was used to estimate the effect of the change on final demand (through lower Intel exports) on total output of all industries, and thus GDP.⁴ Using this model, real GDP is estimated to be 0.74 percent lower after Intel's complete manufacturing withdrawal from Costa Rica. Thus, the two methods give similar estimates for the impact of Intel's relocation of its manufacturing activity on Costa Rica's real GDP. While the first method's accuracy depends on the number of estimates needed to complete

² While both of these methods estimate a level of "sustainable" output, they differ somewhat in their definitions of sustainability. In the first approach using only inflation, the level of potential output is defined as the level which does not trigger inflation (Okun's definition) and thus the most directly pertinent for the conduct of conventional inflation-targeting monetary policy. On the other hand, the second measure takes into account financial sector imbalances, making it more relevant for macro-prudential policy.

³ These were obtained from the CBRC's website and from the National Statistics Institute's website.

⁴ Mathematically, the input-output matrix represents a linear system of n unknowns and n equations, where n is the number of industries in the economy: $X_i = z_{i1} + z_{i2} + z_{i3} + \dots + z_{in} + Y_i$, where $i = 1, \dots, n$ and X_i represents the total output of industry i , z_{ij} represents industry j 's intermediate consumption of industry i 's output, and Y_i represent the total final demand of industry i 's output. The Leontief demand model then consists of expressing z_{ij} in terms of X_j such that $z_{ij} = a_{ij}X_j, \forall i, j = 1, \dots, n$ where a_{ij} are the Leontief coefficients. Using matrix notation, the model can be written as $X = (I - A)^{-1}Y$ where A is the $n \times n$ matrix with the Leontief coefficients and I is the identity matrix. The matrix $(I - A)^{-1}$ is the Leontief inverse.

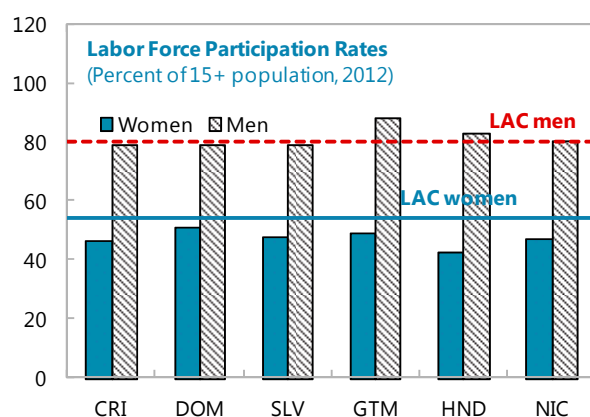
monthly prices data for year 2014, the second method's accuracy depends on the proximity of the reference year of the input-output table.

C. Labor Markets and Inequality

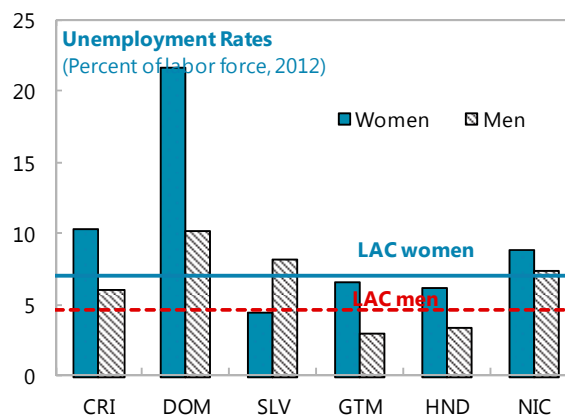
9. **Although Costa Rica's labor force is very well educated, there is significant labor market inequality along gender, age and education divides.** Participation rates among women are low, unemployment disproportionately affects the uneducated and the young, and there are significant gender and skill wage gaps. Furthermore, there is also evidence of a public sector wage premium, even after controlling for education and gender.

10. **While labor force participation (LFP) rates for men are on par with LAC, they lag severely behind for women.** With a female LFP rate of only 46 percent, Costa Rica lags behind not only the LAC average of 54 percent but it is the country in the region with the second lowest female LFP rate, ahead of only Honduras. In survey responses, nearly one-third of the women out of the labor force report child-care and elderly-care responsibilities as the main driver for their choice. According to ILO, women's work is a key poverty-reducing factor in developing economies. Higher female LFP can not only mitigate the impact of population aging, but has also been shown to contribute to overall development through improved intergenerational gender equity (e.g. higher school enrollment for girls).

11. **Overall unemployment rate is relatively high at 7.7 percent, although there are differences across gender and age.** Costa Rica has the third highest unemployment rate in the region after Dominican Republic (14.7 percent) and Nicaragua (8.0 percent). However, one should take care when interpreting unemployment statistics in the region, since countries like El Salvador, Guatemala and Honduras have large informal sectors (nearly two thirds of the labor force) which distort statistics. The informal sector is relatively small in Costa Rica, and is estimated to be about 30 percent, affecting mostly rural areas where 62 percent of those working informally live. Unemployment rates are also higher for women (similar to most of the region) and mostly affect the young and the less educated: over 60 percent of those unemployed are under the age of 30 while nearly 90 percent of those unemployed have less than 13 years of education.

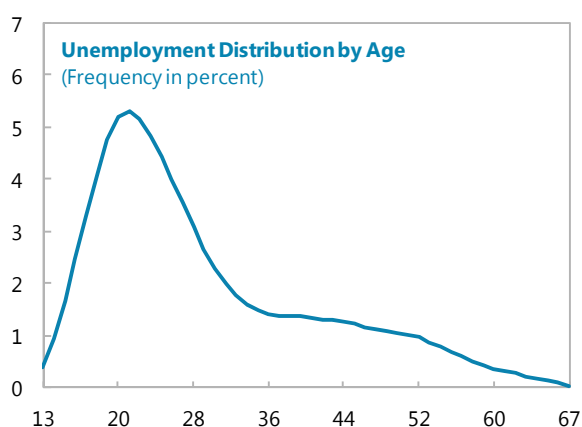


Sources: WDI, Household Surveys, and Fund Staff estimates.

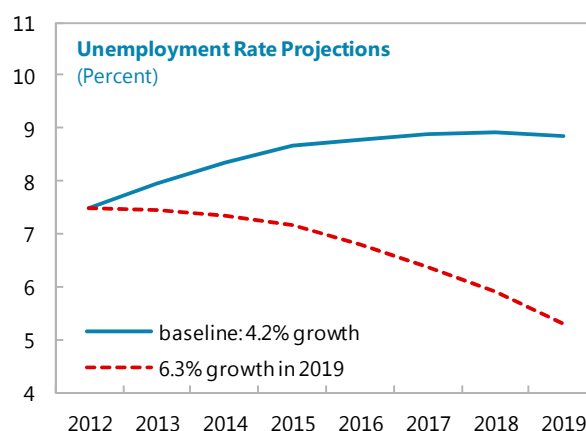


Sources: WDI, Household Surveys, and Fund Staff estimates.

12. **Costa Rica’s unemployment rate is estimated to increase in the future.** Two key determinants of the evolution of unemployment rates are (i) the elasticity of employment to GDP growth and (ii) population growth. Using a simple panel regression, staff estimated an employment to GDP elasticity of 0.46 for Costa Rica (similar to estimates for overall Latin America found in the literature) which although it is not as high as that of Dominican Republic (0.98) or Nicaragua (1.2), it is much higher than that of for example, El Salvador (0.13). Intuitively, this relatively high elasticity is in line with the production function decomposition in GDP growth which showed a relatively large contribution of labor to GDP growth. Using this estimated elasticity and under baseline growth projections, unemployment is estimated to reach 8.8 percent by 2019. Under an alternative scenario where growth would reach 6.3 percent in 2019, the unemployment rate would drop to 5.3 percent.



Sources: WDI, Household Surveys, and Fund Staff estimates.

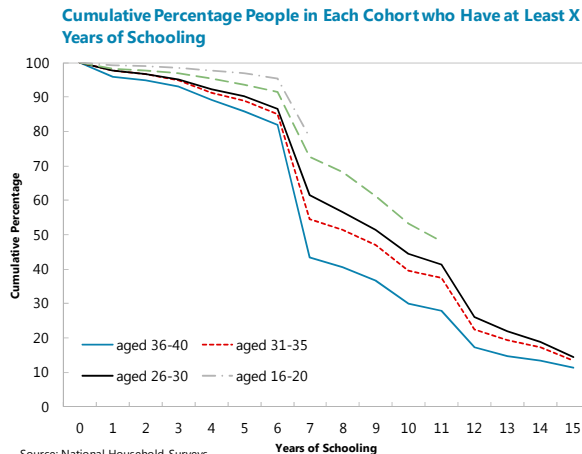
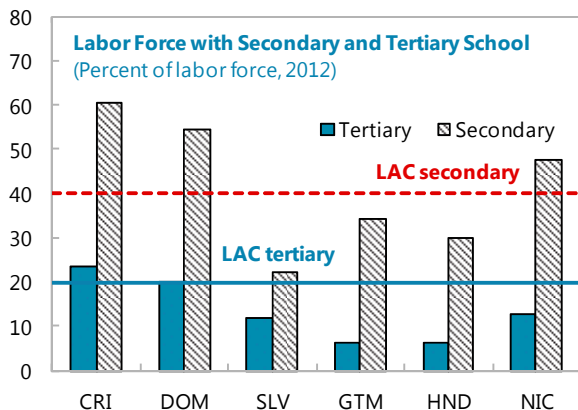


Sources: WDI, Household Surveys, and Fund Staff estimates.

13. **The labor force is comparatively well educated.** About 60 percent of Costa Rica’s labor force has at least secondary education, compared to the LAC average of 40 percent. Nearly one quarter of Costa Rica’s labor force has tertiary education, making it the only country in the region which exceeds the LAC average of 20 percent. Furthermore, education levels appear to have been increasing across cohorts. For example, in 2012, amongst those aged 36–40, only 30 percent had completed 10 years of education, compared to 53 percent of those in the cohort aged 21–25.

14. **However, wage inequality along schooling and gender lines is also large.** Costa Rica has a significant “skill premium”: the average labor income for those with more than 13 years of education is nearly double of those who have less than 13 years of schooling.⁵ This statistic is the same for both genders and in both the private and public sectors. This is relatively high compared to the skill premium observed, for example, in the US of about 80 percent. On the other hand, the ratio of female to male income in Costa Rica is similar to the one observed in advanced economies (0.66). This “gender gap” is much smaller in the public sector—where the ratio of women’s to men’s income is about 0.80—than the private, where the ratio is 0.64 after controlling for education.

⁵ Given the lack of data for hours worked, the comparison is done using total labor income and not hourly wages. Thus, some of this difference could be driven by the differences in hours worked which, if they are higher for those with higher education, could lead to an overestimation of the skill premium.

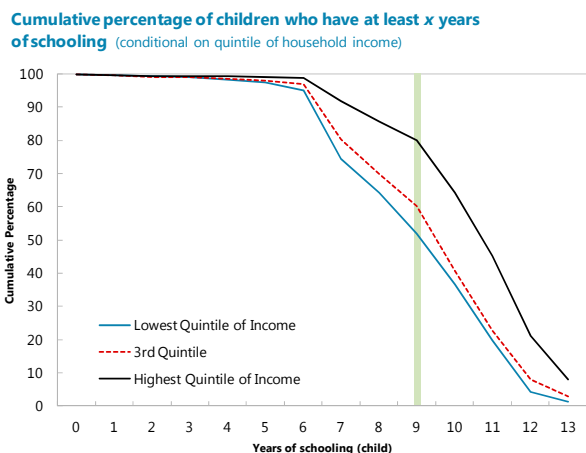


Sources: WDI, Household Surveys, and Fund Staff estimates.

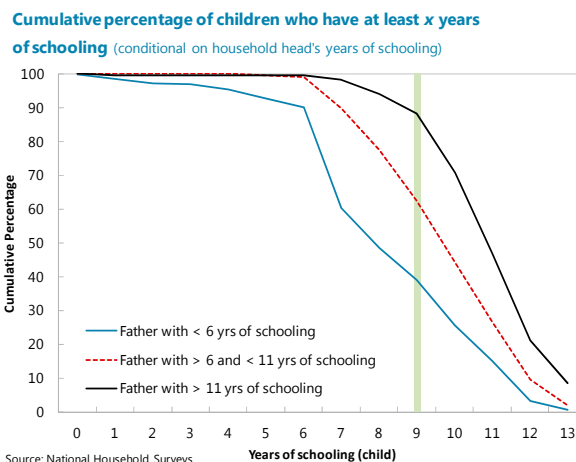
Source: National Household Surveys.

15. **The public sector wage premium is positive and very high in Costa Rica.** For those with less than 9 years of schooling, a man can earn about 60 percent more in the public sector (compared to private) while his female counterpart can earn most than twice as much in the public sector. For higher levels of education, these premia drop to about 50 percent for men and 80 percent for women, which are nevertheless very high. As a comparison, at the global level, public sector wages are about 20 percent lower than those of the private sector.

16. **There are also signs of persistent intergenerational inequality.** Children from wealthier households and with better educated fathers tend to have much higher levels of schooling. Examining across income levels, for example, while 80 percent of children from households in the top quintile of income complete at least 9th grade, only 52 percent of those in the lowest quintile household do. Furthermore, the schooling completion rates of children from the third quintile are closer to those of the bottom quintile, indicating a very different behavior at the top of the distribution. Across education levels of the household head, the difference is also striking: while nearly 90 percent of children of fathers with more than 11 years of schooling complete at least 9th grade, only 40 percent of those from households with less than 6 years of schooling do.



Source: National Household Surveys.



Source: National Household Surveys.

D. Electricity sector

17. **Compared to the region, Costa Rica has a relatively well performing electricity system.**

The service quality is high (nearly complete coverage, limited interruptions, low technical losses), prices are relatively competitive (industrial tariffs are the lowest in the region), and it has an adequate regulatory and policy framework. The generation matrix is the greenest in the region, with 66 percent coming from hydro, 12 percent from geothermal and wind and the rest coming from thermal energy. Although Costa Rica's hydro potential remains significant, it is estimated that, by 2040, its growth potential will be severely limited. There is also an immense potential for solar energy, which currently remains untapped in part owing to its significant variability.

18. **The Costa Rican Electricity Institute (ICE), a state-owned enterprise, largely controls generation, transmission and distribution.** ICE has a monopoly on electricity transmission and controls 79 percent of distribution, with co-ops and other small state-owned companies distributing the rest. Until 1990, ICE also had a monopoly in generation. Since then, the share of private sector participation in generation has been growing; private sector generation now stands at around 17 percent, and is expected to continue increasing as ICE faces capacity expansion constraints. The President has also declared that he is open to higher private sector participation if it leads to lower tariffs.

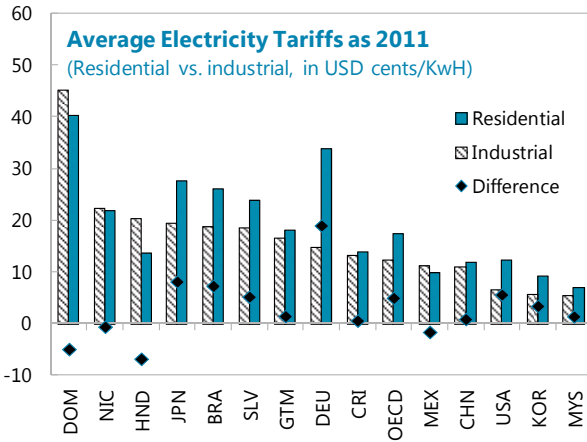
19. **Electricity tariffs, in real terms, have been steady over the last decade.** However, an increase of over 30 percent in 2013 (after 3 years with no increases) generated an outcry over electricity prices. This increase was due to a need to "catch-up" combined with other factors notably (i) increased demand, (ii) higher distribution costs and (iii) increased reliance on costly thermal generation due to seasonal fluctuations in rainfall. Owing to its large reliance on hydro, Costa Rica needs either significant excess capacity or more cost-efficient alternatives to thermal in order to safeguard generation during dry periods.⁶ ICE has recently made large capital investments (in particular in thermal generation) in order to ameliorate this situation but these have drawn criticism about excessive use of debt financing on unfavorable terms.⁷ In May 2013, ICE issued USD500 million of debt with 30 years maturity in order to improve its debt profile. Currently, only about one third of its debt comes due in the next 5 years.

20. **Although prices are regionally competitive, they are high relative to other competitors, and exhibit inefficiencies in their determination.** Malaysia, China, Japan, Korea and OECD countries all have more efficient systems with fewer technical losses. In terms of industrial tariffs, Malaysia, Korea, China and OECD countries also have lower rates owing to fiscal subsidies, which ICE does not receive. In addition, Costa Rica has relatively similar average residential and

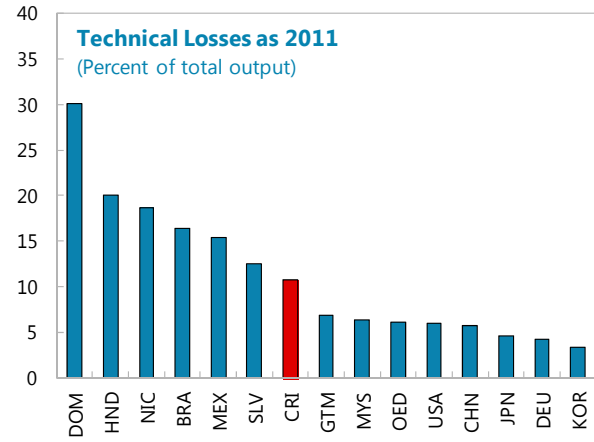
⁶ Maximum demand is around 1600 MW while installed capacity is 2731 MW, including 600 MW of thermal plants.

⁷ Most of ICE's recent investments have been financed through debt, and according to Fitch, the leverage ratio of ICE is relatively high and could deteriorate if projects like Reventazón do not begin operations in the short term or if tariffs are not further adjusted upwards.

industrial rates (although this is common in the region and reflects social equity concerns in Costa Rica), while OECD countries tend to have industrial rates which are lower than residential ones. Current tariff setting procedures also imply that fluctuations in costs may not be fully transferred to consumer prices.



Sources: OLADE and Fund staff estimates.



Sources: OLADE and Fund staff estimates.

Box 1. Methodologies for Potential Output Estimates

In the production function approach, potential output is modeled as a Cobb-Douglas function of labor and capital inputs, and TFP:

$$Y_t = A_t K_t^\alpha L_t^{1-\alpha}$$

where Y_t is output, K_t and L_t are capital and labor inputs, and A_t is the contribution of technology or TFP. Output elasticities sum up to one and α is set at 0.35. Labor force data up to 2010 comes from Penn World Table 7.1 (PWT) and is assumed to grow at the 2000-10 average annual rate thereafter. The capital stock series is constructed using a perpetual inventory method:

$$K_t = (1 - \delta)K_{t-1} + I_t$$

where the depreciation rate δ is set as 0.05, while the initial capital stock is computed as $K_0 = I^*/(g + \delta)$. I^* is the benchmark investment (average share of investment in GDP) and g is the average economic growth over 1991-2013. Finally, TFP is estimated as a residual, $A_t = Y_t/(K_t^\alpha L_t^{1-\alpha})$.

All univariate filters are based on separating a time series into trend and cyclical components.

Standard parameters are used for most of the filters but the restriction parameter for the HP filter merits discussion. This parameter trades off goodness of fit with smoothness and it is set at 6.25 for annual data, which is equivalent to 1600 for quarterly data (the value proposed by the authors).

Two univariate Kalman filters are used with increasing flexibility across specifications. The first one envisages a deterministic drift:

$$\begin{aligned} y_t &= y_t^p + \hat{y}_t \\ y_t^p &= \bar{\mu} + y_{t-1}^p \\ \hat{y}_t &= \rho_1 \hat{y}_{t-1} + \rho_2 \hat{y}_{t-2} + \epsilon_t \\ \epsilon_t &\sim N(0, \sigma^2) \end{aligned}$$

where y_t is output, y_t^p potential output, \hat{y}_t the output gap, $\bar{\mu}$ is the long-term steady state growth rate, and ϵ_t is a normally distributed error term. In this specification, potential output follows a random walk with deterministic drift (or trend) and the output gap is given by an AR(2).

The second specification allows for mean reversion in the drift with an adjustment coefficient $\beta \in (0,1)$. Intuitively, β measures the persistence of shocks to the potential output growth rate. The second equation thus becomes $y_t^p = \mu_t + y_{t-1}^p$, where $\mu_t = (1 - \beta)\bar{\mu} + \beta\mu_{t-1}$.

Two multivariate filters based on inflation only and inflation together with financial and fiscal variables are also employed. The first specification broadly follows Laxton et al. (2010) and is given by the following decomposition for GDP:

$$\begin{aligned} \log(GDP_t) &= \bar{Y}_t + Y_t \\ \bar{Y}_t &= \bar{Y}_{t-1} + G + \epsilon_t^Y \\ G_t &= \theta G^{SS} + (1 - \theta)G_{t-1} + \epsilon_t^G \\ Y_t &= \phi Y_{t-1} + \epsilon_t^Y \end{aligned}$$

Box 1. Methodologies for Potential Output Estimates (concluded)

which is augmented by a Phillips curve:

$$\pi_t = \lambda\pi_{t+1} + (1 - \lambda)\pi_{t-1} + \beta y_t + \epsilon_t^\pi$$

and inflation and growth expectations data, modeled as

$$\begin{aligned}\pi_{t+j}^c &= \pi_{t+j} + \epsilon_{t+j}^{\pi^c}, & j &= 0,1 \\ G_{t+j}^c &= G_{t+j} + \epsilon_{t+j}^{G^c}, & j &= 0,1\end{aligned}$$

The model is then estimated using Bayesian maximum likelihood with informative priors for some parameters. For shocks, priors which reflect more volatility in the cycle component are used – this is in line with what is observed for advanced economies.

The second specification is given by a measurement equation of GDP, $y_t = c_t + \tau_t + \epsilon_t$ with a cycle (c_t) and trend components (τ_t), together with a state equation:

$$\begin{bmatrix} c_t \\ \tau_t \\ \tau_{t-1} \end{bmatrix} = \begin{bmatrix} \theta & 0 & 0 \\ 0 & 2 & -1 \\ 0 & 1 & 0 \end{bmatrix} \begin{bmatrix} c_{t-1} \\ \tau_{t-1} \\ \tau_{t-2} \end{bmatrix} + \begin{bmatrix} \gamma_1 & \gamma_2 & \gamma_3 & \gamma_4 & \gamma_5 & \gamma_6 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix} w_t + \begin{bmatrix} \epsilon_t^c \\ \epsilon_t^\tau \\ 0 \end{bmatrix}$$

where $w_t = [r, rer, cred, fdef, stockpr, \pi_{core}]$. This can be thought of as an augmented HP filter where observed GDP is decomposed between trend and cycle using the variables in w_t , namely: real interest rate and exchange rate, log of credit to consumption, housing, services, and retail, the annual change in the central government's primary deficit, log of stock prices, and core inflation. All error terms are Gaussian and a ratio of variances between the error terms $\epsilon_t^c, \epsilon_t^\tau$ of 6 is also imposed.

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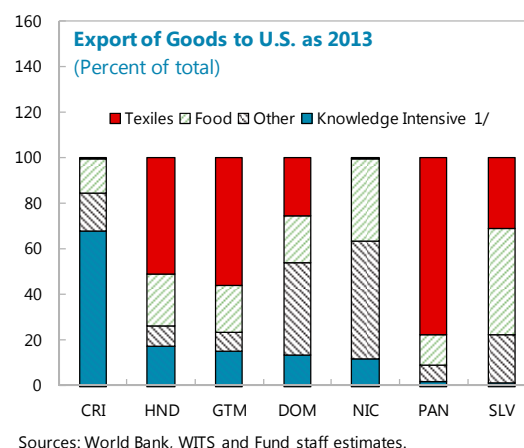
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II. CROSS-BORDER LINKAGES AND SPILLOVERS¹

Economic and financial integration opens new opportunities for Costa Rica but comes at a price of exposure to global shocks. This note assesses the potential spillovers to Costa Rica from growth, fiscal, financial, and monetary policy shocks originating abroad using five separate models. In regards to growth and fiscal spillovers, we find that Costa Rica is generally sensitive to external growth and fiscal shocks, in particular, those originating in the U.S. However, current fiscal plans as well as IMF recommended fiscal adjustments in the region for 2015–2016 are likely to have a limited impact on Costa Rica growth. In turn, growth spillovers from Costa Rica to other CAPDR countries due to the Intel closure are likely to be minimal. In regards to financial spillovers, we find that stress in international banks is likely to have a moderate impact on Costa Rica, but financial integration in the region plays an important role in the transmission of financial shocks. In regards to the impact of U.S. monetary policy normalization, the results indicate that substantial trade ties with the U.S. will help Costa Rica weather this global transition, at least in the short run. However, weak economic fundamentals, in particular, an unsustainable fiscal position, could amplify the negative financing shock if normalization is accompanied by bouts of market volatility.

A. Trade Linkages

1. **Costa Rica has substantial trade linkages, in particular, with the United States, and its exports are relatively more sophisticated than those of other CAPDR countries.**² In 2013, almost 40 percent of Costa Rica exports (or 9 percent of GDP) were destined to the United States and about 30 percent (or 6 percent of GDP) were headed to other countries in the Americas—the majority to the neighboring CAPDR countries. Exports to the EU were also notable, comprising almost 20 percent of the total (4 percent of GDP), and those to Asia largely accounted for the rest. Unlike other CAPDR countries, Costa Rica's exports, including those to the U.S. and Asia, are concentrated in knowledge-intensive products and in capital goods, attesting to its deeper integration into the global supply chains (Figure 1). Exports of food to the U.S., euro area, and other CAPDR countries are also somewhat important. The geographic distribution of imports is somewhat different. Imports from the U.S. are large—about one half of total imports (or 20 percent of GDP)—but those from Asia are also sizeable (close to 20 percent of the total or 7 percent of GDP). In



¹ Prepared by Patrick Blagrove, Eugenio Cerutti, Ewa Gradzka, Anna Ivanova, Rodrigo Mariscal, and Jaime Puig-Forné.

² CAPDR countries include Costa Rica, Nicaragua, Honduras, El Salvador, the Dominican Republic, Panama, and Guatemala.

contrast, imports from CAPDR, Mexico, other Latin American countries, and Europe are much less important (about 7 percent of total or 3 percent of GDP each).

B. Real Growth Spillovers

2. **Simple correlations reveal strong association between Costa Rica GDP growth and that of the United States as well as that of other CAPDR countries.** The correlation coefficients of Costa Rica annual GDP growth with that of the U.S. as well as that of other CAPDR countries are around 0.6 each for the period 1975–2013. In fact, correlation with the U.S. is stronger for Costa Rica than for other countries in the region though it has declined over time. Nonetheless, movements in U.S. GDP growth continue to be mirrored in the movements of Costa Rica’s exports and GDP growth. Co-movements with growth in other CAPDR countries, China and Mexico have strengthened over time while those with Europe, proxied by Germany, have weakened.

3. **A multi-country VAR model was used to assess the impact of growth spillovers in Costa Rica, while taking into account multilateral linkages.** The model described in Poirson and Weber (2011) assesses sensitivity of Costa Rica GDP growth to growth shocks originating in its main trading partners while taking into account growth spillovers between all countries in the sample. It employs a structural VAR with the following reduced form specification

$$B(L)y_t = D(L)x_t + e_t$$

where y is obtained by stacking each country’s GDP growth rate at time t $y_{i,t}$ in a vector $y_t = (y_{1,t}, \dots, y_{i,t}, \dots, y_{i,t})$ and the control vector x includes a dummy variable for global crises (oil crisis of 1979, Gulf war crisis of 1990, EMU crisis of 1991, and global financial crisis of 2008–09) as well as a constant term. The VAR was estimated on quarterly growth rates of real seasonally-adjusted GDP series for the period 1977Q1 to 2013Q4 in a sample of 6 countries/regions, namely, the United States, China, Germany, Mexico, a PPP-weighted average of 6 Central American countries (Guatemala, Nicaragua, the Dominican Republic, Panama, Honduras, and El Salvador) and Costa Rica. The VAR incorporates one lag—the optimal lag-length according to most lag-selection criteria, including the Akaike, Schwartz, and Hannan-Quinn information criteria.

4. **The model was identified through the Cholesky ordering of the countries.** This approach assumes that the growth rate of any country i does not depend contemporaneously on the growth rate of a country j ordered after country i . The ordering was chosen based on the results of the previous work on spillovers, including, Bayoumi and Swiston (2009) and Swiston (2010) with the U.S. ordered first and other countries’ according to their relative size, namely, China, Germany, Mexico, an average of 6 Central American countries and Costa Rica. For comparison the model was also estimated for Guatemala, El Salvador, and Honduras with the Central America averages being replaced accordingly to exclude the country of interest. We have experimented with other orderings but the results for Central America proved robust to ordering variations. The approach allows computing structural errors and coefficients that are used in the calculation of the impulse response functions. It also allows decomposing historical real GDP growth rate into the long-run, dynamic domestic and dynamic foreign components. The dynamic contributions were derived from the

moving average representation of the entire history of each country's growth rate and the structural errors, which allowed computing the contribution of the respective country's shocks to the quarterly growth rate of GDP of the country under consideration. The long-run growth component is estimated by the constant term.

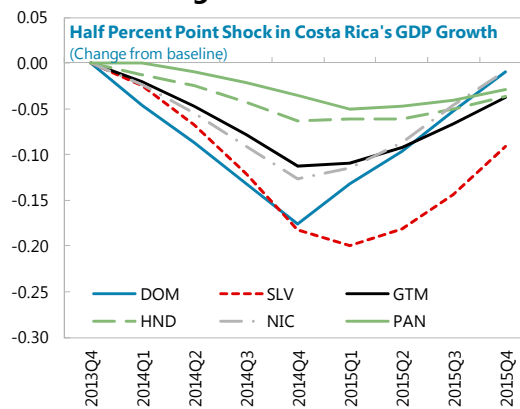
5. **Two types of data interpolations were used.** Since there were gaps in real GDP data for many Central American countries, we had to interpolate from annual to quarterly data to fill in those gaps. We employed two different interpolation methods to check the robustness of the results. First, we used a linear interpolation method, which involves linear projection between annual data points to substitute for the quarterly missing values. Second, we employed the method of Deeset et al. (2007), which utilizes the pattern of persistence derived from the available quarterly data to interpolate the annual series and thus generate the missing quarterly data.

6. **The results suggest that shocks originating in the U.S. and the rest of Central America have a pronounced impact on Costa Rica.** A 1 percentage point reduction in domestic demand growth in the U.S. over a year leads to a maximum reduction in growth in Costa Rica by 1.1 percentage points (Figure 2). Similarly, a 1 percentage point reduction in growth in other Central American countries over a year would lower Costa Rica growth by at most 0.9 percentage points. The shock to German and Chinese domestic demand growth would lower Costa Rica growth by at most $\frac{1}{2}$ percentage points. These results are generally in line with the export structure as well as simple bivariate correlations. However, in contrast to simple bivariate correlations, the VAR allows tracing the shocks down to their origin. Hence, the VAR results confirm the importance of shocks originating in the U.S. and CAPDR countries for Costa Rica growth. Finally, the results imply that the "external growth locomotive," captured by the dynamic foreign component, has slowed since the 2008 financial crisis and Costa Rica may have to rely more on domestic growth sources going forward.

7. **Costa Rica is generally more sensitive to external growth shocks than other countries in the region.** Figure 2 demonstrates the impact on Costa Rica and Guatemala of a 1 percent over a year (four quarter shock) to the dynamic domestic growth component in 2014 in the U.S., Germany, China and other CAPDR countries. Costa Rica is generally more sensitive to external growth shocks than Guatemala, particularly to the shocks originating from the U.S. with elasticity exceeding unity. Costa Rica appears also more sensitive to external shocks than Honduras or El Salvador (the results are not shown). While other countries in the region also have substantial trade ties with the U.S., Costa Rica's particular sensitivity to U.S. growth most likely reflects the composition of its exports. In particular, a large knowledge-intensive component of Costa Rica exports is likely to fluctuate more over the economic cycle as the demand for these goods is relatively more elastic than for basic staples that comprise a large share of the export baskets of other CAPDR countries.

8. **Spillovers from Costa Rica to other CAPDR countries owing to the Intel closure are likely to be limited.**

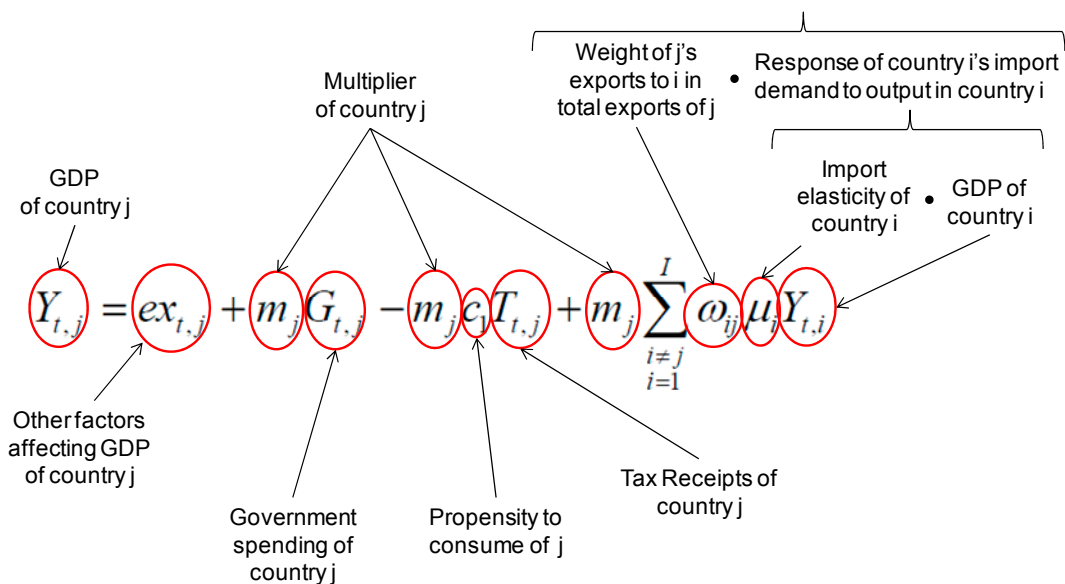
The VAR model above can also be used to assess outward spillovers from Costa Rica to other countries. With the estimated impact on Costa Rica GDP growth of about ½ percentage points in 2014–15 from the closure of Intel’s manufacturing plant, growth in the neighboring CAPDR countries is estimated to decline by at most 0.2 percentage points. The impact is the largest for El Salvador and to a lesser extent for the Dominican Republic, while it is estimated to be negligible for Panama and Honduras.



Source: Fund staff estimates.

C. Fiscal Spillovers

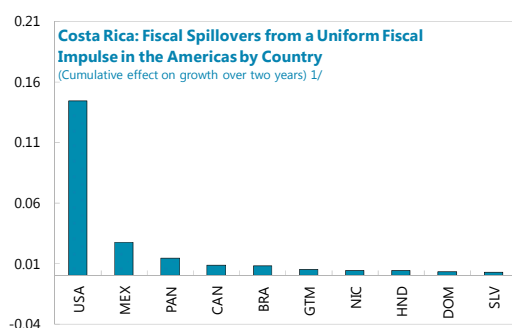
9. **To assess the impact of fiscal spillovers from other countries to Costa Rica, a multi-country demand model was employed.** The model described in Ivanova and Weber (2011) is based on the representation of the national accounts and behavioral assumptions for government spending, taxes, consumption, investment, exports and imports:



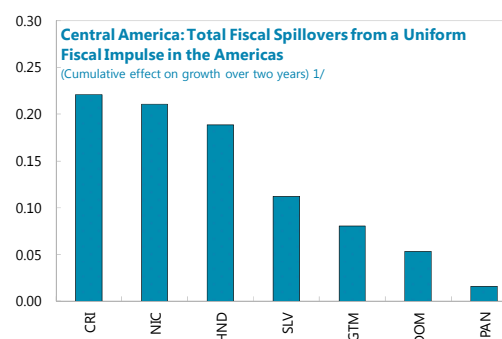
It allows simulating the impact on growth from domestic and foreign fiscal policy changes in a number of countries linked by trade. Consistent with empirical findings in the literature, fiscal measures are assumed to have an impact on GDP not only in the period, in which they are enacted, but also in the following period. The model was solved simultaneously for 20 countries, including

those in CAPDR, which together account for 70 percent of the world GDP.³ The solution reflects third-country linkages among the countries in the sample as well as feedback loops between foreign and domestic fiscal policies. The approach, however, quantifies only the direct demand impact and does not reflect credibility or other non-demand driven effects to the extent that they are not embedded in the underlying multiplier estimates. Moreover, it focuses on a short-term impact (two years) and may not fully capture the effects of exchange rate and price adjustments, which are likely to reduce fiscal spillovers in the longer-term.

10. Costa Rica is more sensitive to fiscal shocks in the Americas than most CAPDR countries, with U.S. fiscal policy having the largest impact. A uniform fiscal expenditure impulse of a 1 percentage point of GDP in all countries in the sample from the Americas (the U.S., CAPDR, Mexico, Canada and Brazil) would reduce Costa Rica growth by 0.2 percentage points over two years.⁴ This is higher than the impact of a similar shock on other CAPDR countries. Each percentage point of GDP reduction in government spending in the U.S. would reduce Costa Rica growth by about 0.15 percentage points over 2 years. Fiscal spillovers from other Central and Latin America countries would have only a marginal impact.



Sources: WEO, DOT, and Fund staff estimates.
1/ Fiscal impulse is an increase in expenditure of 1 percent of GDP in all Central American countries, the U.S., Canada, Mexico and Brazil.



Sources: WEO, DOT, and Fund staff estimates.
1/ Fiscal impulse is an increase in expenditure of 1 percent of GDP in all Central American countries, the U.S., Canada, Mexico and Brazil.

11. Fiscal policy under the WEO baseline or that recommended by the IMF staff for 2015–16 in the Americas would have limited impact on Costa Rica growth. Under the baseline WEO scenario, the impact of fiscal policy changes in other countries on Costa Rica growth in 2015–16 is small. A small domestic fiscal relaxation in Costa Rica in 2015 is partially offset by the negative fiscal spillover from trading partner countries. With almost no expected change in domestic fiscal policy in 2016 the growth impact under the baseline is minimal. An alternative scenario incorporates IMF staff advice in terms of the total deficit reduction for 2015–16 and features an

³ The full list of countries included the UK, Germany, France, Italy, Russia, Japan, China, India, South Korea, the U.S., Canada, Brazil, Mexico, Honduras, Guatemala, El Salvador, the Dominican Republic, Costa Rica, Nicaragua, and Panama.

⁴ The assumptions on fiscal multipliers for larger countries come from the empirical literature (see Ivanova and Weber 2011 for detail), for Central American countries multipliers were assumed in line with those for the U.S. with average revenue/expenditure multiplier in the first year of about 0.3.

average fiscal adjustment of about 0.75 percentage points of GDP in CAPDR countries, Mexico, and Canada and an adjustment of about 2 percentage points of GDP in Costa Rica over two years. To estimate the upper bound of fiscal spillovers all the adjustment is assumed to be made through expenditure reductions, which have larger fiscal multipliers. In this alternative scenario, growth in Costa Rica would be reduced by 1 percentage points in 2015–2016, largely on account of domestic consolidation while spillovers from other countries would remain limited.

| Fiscal Contribution to Growth Under the Baseline (In percentage points) | | | | | | | | |
|---|------------------------------|---------------------|-----------------|------------------|------------------------------|---------------------|-----------------|------------------|
| | 2015 | | | | 2016 | | | |
| | Change in the Fiscal Balance | Total Growth Impact | Of which: | | Change in the Fiscal Balance | Total Growth Impact | Of which: | |
| | | | Domestic Effect | Spillover Effect | | | Domestic Effect | Spillover Effect |
| Costa Rica | -0.2 | 0.1 | 0.2 | -0.1 | 0.0 | 0.0 | 0.2 | -0.2 |
| <i>of which:</i> | | | | | | | | |
| - current year | | -0.1 | 0.1 | -0.2 | | 0.0 | 0.1 | -0.1 |
| - carry over prev. year | | 0.2 | 0.1 | 0.1 | | 0.0 | 0.1 | -0.1 |
| PPP weighted average | 0.6 | -0.2 | -0.2 | -0.1 | 0.3 | -0.4 | -0.3 | -0.1 |
| Source: Fund staff estimates. | | | | | | | | |
| Fiscal Contribution to Growth Under the Recommended Fiscal Path (In percentage points) | | | | | | | | |
| | 2015 | | | | 2016 | | | |
| | Change in the Fiscal Balance | Total Growth Impact | Of which: | | Change in the Fiscal Balance | Total Growth Impact | Of which: | |
| | | | Domestic Effect | Spillover Effect | | | Domestic Effect | Spillover Effect |
| Costa Rica | 1.0 | -0.4 | -0.2 | -0.1 | 1.0 | -0.7 | -0.5 | -0.2 |
| <i>of which:</i> | | | | | | | | |
| - current year | | -0.5 | -0.4 | -0.2 | | -0.4 | -0.3 | -0.1 |
| - carry over prev. year | | 0.2 | 0.1 | 0.1 | | -0.3 | -0.2 | -0.1 |
| PPP weighted average | 0.6 | -0.2 | -0.2 | -0.1 | 0.4 | -0.4 | -0.3 | -0.1 |
| Source: Fund staff estimates. | | | | | | | | |

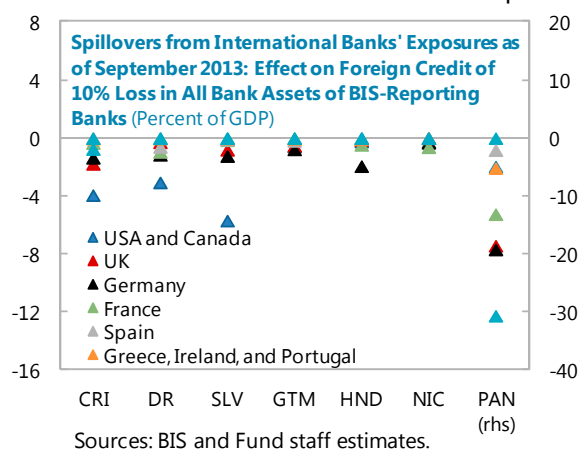
D. Financial Spillovers

12. **To assess the impact of financial spillovers to Costa Rica from stress in international banks, the IMF Bank Contagion Module was used.**⁵ This module, based on BIS banking statistics and bank-level data, estimates potential rollover risks for Costa Rica stemming from both foreign banks' affiliates operating in Costa Rica and foreign banks' direct cross-border lending to Costa Rica

⁵ For methodological details see Cerutti, Eugenio, Stijn Claessens, and Patrick McGuire, 2012, "Systemic Risks in Global Banking: What can Available Data Tell Us and What More Dare are Needed?" BIS Working Paper 376, Bank for International Settlements.

borrowers. Rollover risks were triggered in the scenarios analyzed here by assuming bank losses in the value of private and public sector assets in certain countries and/or regions. If the banks do not have sufficient capital buffers to cover the losses triggered in a given scenario, they have to deleverage (reduce their foreign and domestic assets) to restore their capital-to-asset ratios,⁶ thus squeezing credit lines to Costa Rica and other countries. The estimated impact on losses in cross-border credit availability for Costa Rica also incorporates the transmission of shocks through Panama, given its central financial role in the region. The assumption is that cross-border lending from Panama to Costa Rica declines proportionally to the decline in cross-border lending to Panama from the banking systems where the shocks originate.⁷

13. **Spillovers to Costa Rica from stress in international banks are moderate.** The impact on foreign credit availability in Costa Rica of the severe stress scenarios in asset values of BIS reporting banks, presented in the table below and in the text figure, is larger than in other countries in the region with the exception of Panama and El Salvador. For example, spillovers from a 10 percent shock to assets originating in the U.S. and Canada would reduce credit in Costa Rica by almost 4 percent of GDP (or 6 percent of total domestic and cross-border credit to the public and private sectors). In contrast, a similar shock would reduce credit in Guatemala by only 0.6 percent of GDP (or 1 percent of total). More generally, the level of upstream exposures of Costa Rica to international banks⁸ is moderate with the upper limit of rollover risks on external credit of about 13 percent of GDP (or 20 percent of total domestic and cross-border credit to the public and private sectors in Costa Rica).⁹ This upper limit would correspond to a worst case scenario without any replacement, either domestic or external, of the loss of credit by BIS reporting banks to Costa Rican borrowers.



14. **Spillovers from a shock originating in the U.S. assets only are even more moderate, but financial regional integration is important in the transmission of shocks.** Despite the large share of U.S. banks in total foreign bank claims on Costa Rica, the impact of U.S. asset losses in U.S.

⁶ Bank recapitalizations as well as other remedial policy actions (e.g., ring fencing, monetary policy, etc.) at the host and/or home country level are not assumed.

⁷ Panamanian banks have a more limited integration in the network analysis as they merely transmit the stress in international banks, rather than also being subjected to stress scenarios of losses in their asset values.

⁸ Based on consolidated claims on Costa Rica of BIS reporting banks—excluding domestic deposits of subsidiaries of these banks in Costa Rica.

⁹ Total credit to the non-bank sectors in Costa Rica is calculated by adding IFS local (both domestic and foreign owned) banks' claims on non-bank borrowers and BIS reporting banks' direct cross-border claims on non-bank sectors (BIS Locational Banking Statistics Table 6B).

and international banks on cross-border credit availability in Costa Rica—0.3 percent of GDP in response to a 10 percent loss in U.S. asset values—is limited. This effect has declined in recent years reflecting both the strengthening in international banks' capital buffers and the cross-border deleveraging of assets after the global financial crisis. As of September 2013, the most sizable impact on claims on Costa Rican borrowers would stem from shocks in Europe. A 10 percent loss on European assets would result in a reduction in credit availability to Costa Rica of about 4 percent of GDP. This result is also driven by the increasing importance of financial integration with other countries in the region. Indeed, almost one third of the estimated credit losses in Costa Rica resulting from a shock originating in Europe would be transmitted through cross-border lending from Panama, which is more dependent on European banks' funding.

Spillovers to Costa Rica from International Banks' Exposures as of September 2013^{1/}

| | Shock Originating From Magnitude 2/ | Impact on claims on CRI borrowers (percent of GDP) 3/ |
|-----------------------|--|--|
| USA | 10 | -0.29 |
| Canada | 10 | -3.48 |
| USA and Canada | 10 | -3.92 |
| UK | 10 | -1.77 |
| Switzerland | 10 | -0.13 |
| Germany | 10 | -1.35 |
| France | 10 | -0.33 |
| Spain | 10 | -0.09 |
| Spain | 30 | -0.09 |
| Netherlands | 10 | -0.33 |
| Italy | 10 | -0.04 |
| Italy | 30 | -0.05 |
| Greece | 10 | -0.07 |
| Portugal | 10 | -0.02 |
| GIP 4/ | 10 | -0.09 |
| GIP 4/ | 30 | -0.09 |
| Japan | 10 | -0.74 |
| Korea | 10 | 0.00 |
| Taiwan | 10 | 0.00 |
| European Countries 5/ | 10 | -4.04 |

Source: RES/MFU Bank Contagion Module based on BIS, ECB, and IFS data.

1/ In addition to BIS-reporting banks, Fund staff analyzed spillovers through Panama.

2/ Magnitude denotes the percent of on-balance sheet claims (all borrowing sectors) that default.

3/ Reduction in foreign banks credit to Guatemala due to the impact of the analyzed shock on their balance sheets, assuming a uniform deleveraging across domestic and external claims.

4/ Greece, Ireland, and Portugal.

5/ Greece, Ireland, Portugal, Italy, Spain, France, Germany, Netherlands, and UK.

E. Monetary Policy Spillovers (the Effect of U.S. Monetary Policy Normalization)

15. **The exit from U.S. unconventional monetary policy presents new challenges for Costa Rica.** While faster-than-expected growth in the U.S. would help stimulate exports, the withdrawal of the monetary stimulus by the Federal Reserve could lead to a faster tightening of global financial conditions and, possibly, higher market volatility as global risk appetite declines. Tighter financial conditions would imply higher financing costs for the government and the private sector with negative implications for domestic investment and consumption. These developments may be particularly relevant for Costa Rica due to its substantial economic ties with the U.S.

16. **The note employs two approaches to analyzing the impact of U.S. tapering on the economy of Costa Rica.** First, we use an empirical approach to assess the effect of changes in U.S. monetary policy on external government financing costs and GDP growth in Costa Rica. Second, we employ a system of general equilibrium models to simulate the impact of faster growth in the U.S., accompanied by tighter global financial conditions, on Costa Rica's GDP, inflation, current account and other macroeconomic variables under various scenarios.

1. Empirical Approach

EMBI Spreads Model

17. **A regression-based approach was used to assess the effects of U.S. tapering on external government financing costs.** The model was inspired by Evan Papageorgiou's work in Chapter 1 of the April 2013 Global Financial Stability Report. Specifically, a random effects panel regression model was estimated linking the spread between the yield on foreign currency government bonds and U.S. bonds (EMBI spread) to domestic and external conditions at monthly frequency in a sample of Latin American countries,¹⁰ namely,

$$EMBI_{it} = \alpha * INT_t^{US} + \beta * VULN_i + \gamma * INT_t^{US} * VULN_i + \eta * ICRG_{it} + \delta_i + \varepsilon_{it}$$

where $EMBI_{it}$ is EMBI spread of country i at time t , INT_t^{US} is the level of U.S. real interest rate (the yield on U.S. Treasury Inflation-Protected Securities, TIPS), which captures global financial conditions; $VULN_i$ is a time-invariant index of domestic vulnerabilities constructed by the team, which captures domestic economic fundamentals that are not changing substantially from month-to-month (see below); $ICRG_{it}$ is a time-varying index of domestic political, financial and economic risk from International Country Risk Guide (ICRG),¹¹ which captures short-term movements in domestic

¹⁰ The sample covers the period from January 2013 to January 2014 in eleven Latin American countries, including six from Central America (Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras and Panama), as well as Brazil, Chile, Colombia, Mexico, and Peru.

¹¹ The International Country Risk Guide (ICRG) database maintained by the PRS Group provides a monthly composite country risk index that summarizes political, financial and economic conditions in a range of developed and

(continued)

conditions. δ_i is a country's random effect, which is assumed to be uncorrelated with the other regressors. We have also analyzed the impact of U.S. "money" and "real" shocks separately using a structural VAR approach with sign restrictions described in IMF (2014), which includes the long-term bond yields and log of stock prices.

18. **A measure of domestic vulnerabilities is an important explanatory variable in the empirical model.** It is captured by a time-invariant index, the values of which are summarized below in the text table. The index is based on 21 economic indicators that were found important in predicting the risk of capital flow reversal as well as movements in asset prices.¹² The indicators were grouped in 7 major categories, including a measure of the size of the recent capital inflows, external balance and debt, the amount of local debt securities held by foreigners, reserve cushion, fiscal position as well as banking system and private sector leverage. Each indicator was compared to two thresholds, either found important in earlier studies or based on the standard deviations in the sample, to assign a score of 0, 1 or 2 with 0 capturing less vulnerability. Then the index was constructed based on the weighted average of these scores, with 55 percent weight put on indicators of external vulnerability, which have been found particularly important in the literature, 20 percent weight on the fiscal position, 15 percent weight on banking vulnerabilities, and 10 percent weight on the share of local debt securities held by foreigners.

| | Weight in total indicator | Central America | | | | | | | LA5 (PPP-weighted average) |
|--|---------------------------|-----------------|-----|-----|-----|-----|-----|-----|----------------------------|
| | | CRI | DR | GTM | HND | NIC | PAN | SLV | |
| Size of recent capital inflows | 0.10 | 1 | 1 | 0 | 1 | 2 | 2 | 0 | 0.8 |
| External balance | 0.15 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1.1 |
| External Debt | 0.10 | 1 | 0 | 0 | 0 | 1 | 2 | 1 | 0.4 |
| Debt securities held by foreigners | 0.10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.8 |
| Gross reserve cushion | 0.20 | 0 | 2 | 0 | 2 | 0 | 1 | 1 | 0.0 |
| Fiscal position | 0.20 | 2 | 1 | 0 | 2 | 0 | 0 | 2 | 0.8 |
| Banking system and private sector leverage | 0.15 | 1 | 0 | 1 | 1 | 0 | 2 | 1 | 0.6 |
| Overall | 1.00 | 0.9 | 0.9 | 0.3 | 1.2 | 0.6 | 1.1 | 1.0 | 0.6 |

19. **Costa Rica appears relatively more vulnerable compared to other Latin American countries due to both domestic and external vulnerabilities.** This reflects largely the high fiscal deficit and rapidly rising public debt. However, elevated portfolio inflows in 2012, elevated short-term external debt as well as a high current account deficit add somewhat to the scope of vulnerabilities, though the high share of FDI financing moderates external risks. The recent

emerging market countries. Sub-components of the index include GDP growth, inflation, fiscal and current account balances, external debt, official reserves, exchange rate volatility, as well as other measures of socioeconomic conditions, law and order, and democratic accountability.

¹² Milesi-Feretti and Razin (1996, 1997a, 1997b), Razin (1998), Barclays Research Note (2013), Bowman D., H. Londono, and H. Sapriza (2014).

expansion of private credit with an increased reliance on bank foreign funding is an additional source of vulnerability.

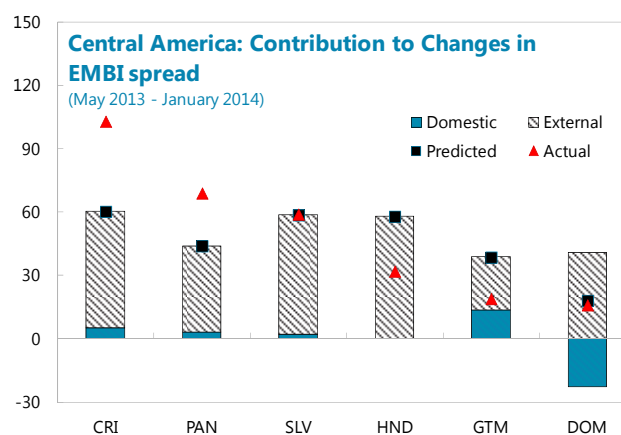
20. Empirical model estimates suggest that the response of Latin America bond spreads to the tightening of global financial conditions depends on the degree of domestic

vulnerabilities. The increase in the EMBI spread in response to an increase in the U.S. real interest rate is more pronounced for countries that are more vulnerable to capital flow reversal. In particular, an increase in U.S. real interest rates by 100 basis points is associated with an increase in EMBI spread of about 20 basis points in a country that exhibits low vulnerability (vulnerability index=0). A similar increase in the U.S. real rates in a highly vulnerable country (vulnerability index=2) would be associated with an increase in EMBI spread of about 75 basis points. In addition, domestic vulnerabilities directly contribute to the level of the EMBI spread, with highly vulnerable countries having a spread of about 430 basis points higher than countries with low vulnerability. Moreover, a reduction in domestic risks, captured by the ICRG index, might help reduce the EMBI spread, though this result was not robust across the different econometric specifications. The estimates from the model separating U.S. interest rate shock into “money” and “real” shocks also suggest a differential impact. “Money” shocks work to increase the EMBI spread, while “real” shocks work to decrease the spread.

| Dependent Variable= EMBI spread | Random effects | Fixed effects |
|------------------------------------|------------------------|---------------------|
| ICRG | -10.3340*** [-4.01] | -4.2176 [-1.47] |
| INT ^{US} | 0.1824** [2.23] | 0.2146*** [2.83] |
| INT ^{US} *VULN | 0.2882*** [2.99] | 0.2753*** [3.09] |
| VULN | 213.8781*** [5.88] | |
| Observations | 140 | 140 |
| Between R-squared | 0.75 | 0.68 |
| Number of countries | 11 | 11 |

21. Thus, Costa Rica’s relatively weak macroeconomic fundamentals, in particular, on the fiscal side, could amplify the transmission of the global shocks.

With the index of domestic vulnerability for Costa Rica estimated at 0.9 on a scale from 0 to 2, the increase in real U.S. interest rates by about 100 basis points that occurred between May 2013 and January 2014, is estimated to have contributed to a widening of Costa Rica EMBI spread by about 50 basis points. Overall, according to the model, Costa Rica’s EMBI spread should have increased by about 60 basis points, taking into account a small deterioration in the domestic vulnerability component since May



Source: Fund staff estimates

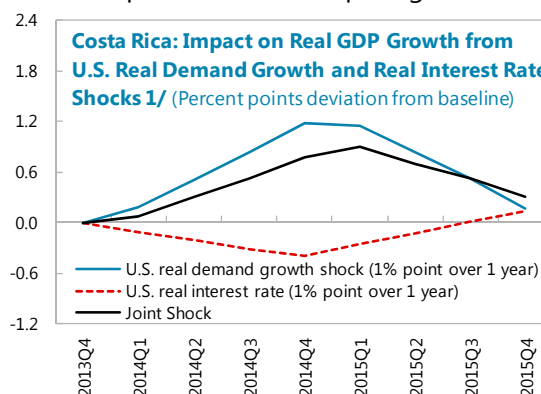
2013. In fact, Costa Rica’s EMBI spread widened even more during this period (by about 100 basis points) and the increase was larger than in other countries in the region, possibly reflecting a higher weight that investors put on the weaknesses in fiscal situation. In fact, Costa Rica’s EMBI spread remained elevated in H1 of 2014 when the increases in the spreads of other Latin America countries largely reverted to pre-tapering levels.

2. VAR Growth Model

22. Empirical estimates suggest that accelerated monetary policy tapering in the U.S. is likely to have a positive impact on GDP growth in Costa Rica. A VAR approach was used to analyze the impact of U.S. growth and real interest rate shocks on Costa Rica GDP growth. A VAR model described in the section B above was augmented with the U.S. real 10 year government bond yield as an endogenous variable. The results suggest that an increase in U.S. real demand growth by 1 percentage point over 4 quarters would raise Costa Rica GDP growth by at most 1.2 percentage points. An increase in U.S. real bond yield by 1 percentage points over 4 quarters would reduce Costa Rica GDP growth by 0.4 percentage points. Hence, on balance the impact is likely to be positive.

General Equilibrium Model Simulations

23. **A general equilibrium model was used to assess the impact of U.S. tapering on Costa Rica's GDP and other macroeconomic variables.** The full impact of the U.S. tapering on the Costa Rican economy was assessed using a module of the IMF's Flexible System of Global Models (FSGM). It comprises a system of multi-region, general equilibrium models combining micro-founded and reduced-form relationships for various economic sectors. The model has a fully articulated demand side, and some supply side features. International linkages are modeled in aggregate for each country/region. The level of public debt in each country and the resulting implications for national savings determine the global real interest rate in the long run. The parameters of the model, except those determining the cost of adjustment in investment, have been estimated from the data using a range of empirical techniques. Real GDP in the model is determined by the sum of the components of demand in the short run and the level of potential output in the long run. The households' consumption-savings decisions are explicitly micro founded as are firms' investment decisions. Government absorption is determined exogenously, while imports and exports are specified with reduced-form models.



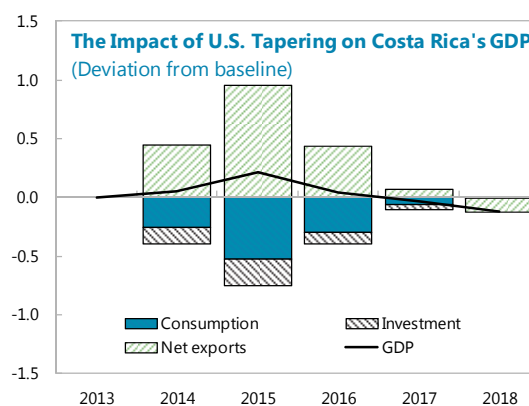
Source: Fund staff estimates.
1/ U.S. real interest rate used in VAR estimation is U.S. real 10 year government bond yield.

24. **The model incorporates endogenous rules governing the operation of fiscal and monetary policy.** In particular, the government sector, besides government absorption, encompasses additional spending by the fiscal authority in the form of lump-sum transfers to all households, or targeted exclusively to liquidity constrained households. The fiscal authority chooses a long-run level of debt relative to GDP. In order to meet its debt and deficit targets as well as spending obligations, the governments have recourse to the following tax instruments: consumption taxes, labor income taxes, corporate income taxes and lump-sum taxes. In the presence of shocks to the economy, all tax rates remain fixed and spending on general lump-sum transfers adjusts to ensure that the public debt-to-GDP ratio is maintained in the medium term. Monetary policy is

governed by an endogenous rule, which features interest rate smoothing and responds to the deviation of inflation from its target, the deviation of expected inflation from its target, as well as the output gap. Inflation is modeled via a reduced form Phillips' curve with inflation being a function of expected inflation (lag and model-consistent lead), as well as the output gap, and the change in the log of the real effective exchange rate. The exchange rate in the short run is determined via the uncovered interest parity, while in the long run it adjusts to ensure external stability given households desired holdings of net foreign assets.

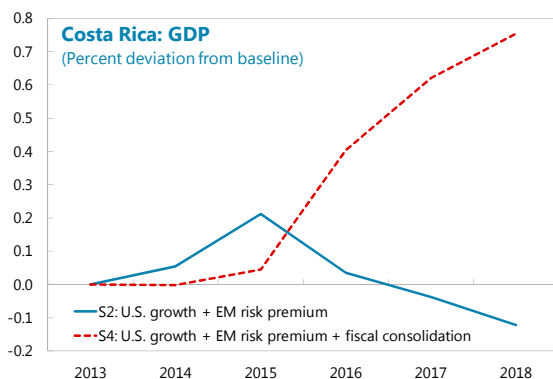
25. **The simulations included 4 scenarios.** Scenario 1 (S1) features a U.S. growth surprise of about 1 percent by 2015 relative to the baseline (Figures 1 and 2). Scenario 2 (S2) includes faster U.S. growth as in Scenario 1 with U.S. interest rates rising by about 80 basis points, but this is accompanied by an increase in the risk premium outside the U.S., with market interest rates rising by about 1 standard deviation in each Latin America country. The risk-premium shock for Costa Rica amounts to an increase of about 100 basis points. Scenario 3 (S3) incorporates, in addition to the assumptions in Scenario 2, an increase in the U.S. risk premium, with the rates rising by about 40 basis points at the peak. Finally, Scenario 4 (S4) incorporates, in addition to the assumptions in Scenario 2, a fiscal consolidation of about $\frac{1}{2}$ percentage points of GDP in the next six years through an increase in consumption taxes. Fiscal consolidation is assumed to essentially undo the increase in risk premium in Scenario 2.

26. **The results indicate that the impact of U.S. tapering on Costa Rica GDP is likely to be positive in the short run.** In Scenario 1, a U.S. growth surprise of about 1 percent by 2015 relative to the baseline (Figure 1, S1) results in higher GDP in Costa Rica by about 0.6 percent compared to the baseline (Figure 2, S1). Faster growth in the U.S. stimulates Costa Rica exports while domestic consumption remains largely unchanged. The decline in investment due to higher domestic interest rates, raised in response to output exceeding its potential, is also relatively small. In contrast, in Scenario 2 the acceleration of U.S. growth is accompanied by an increase in the risk premium, with a substantial increase in market interest rates for Costa Rica. In this scenario, Costa Rican GDP remains essentially unaffected—an increase of only 0.1 percent compared to the baseline—as stronger demand for Costa Rica exports from the U.S. is offset by weaker domestic investment and consumption due to tighter financial conditions (Figures 1 and 2, S2). Hence, even this rather severe scenario implies a relatively benign outcome for Costa Rica. Finally, in Scenario 3 with the perception of a more “hawkish” U.S. Fed, which is modeled through an increase in the U.S. risk premium and, consequently, a somewhat weaker U.S. growth, the positive impact on Costa Rican GDP is reduced further, albeit only slightly (Figure 2, S3). All 3 scenarios suggest that the longer-term effect could be slightly negative as lower investment due to tighter financing conditions will lead to a temporarily lower potential GDP in Costa Rica and the cyclical rise in U.S. imports dissipates as prices and exchange rates adjust and U.S. output returns to its potential.

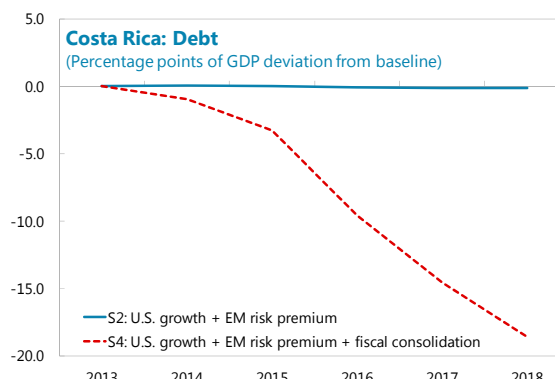


Sources: Fund staff estimates.

27. **In addition, the results suggest that Costa Rica’s fiscal sustainability objectives can be safely achieved in the context of U.S. tapering.** Specifically, in Scenario 4, with faster growth in the U.S. and accelerated monetary policy normalization accompanied by an increase in risk premium outside the U.S., while Costa Rica pursues a fiscal tightening of about 1 percentage points of GDP in the next three years, the country can lower the public debt-to-GDP ratio by close to 20 percentage points by 2018 compared to the baseline where the debt is expected to rise by about the same amount, without a significant negative impact on growth. In fact, growth accelerates as the risk premium is reduced substantially, thereby supporting investment, while savings from lower interest payments allow the government to raise transfers, thus supporting private consumption.



Source: Fund staff estimates

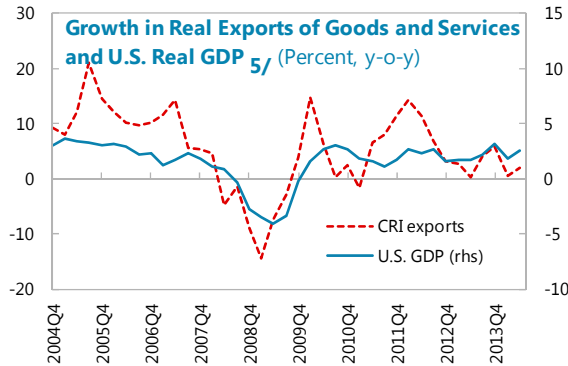
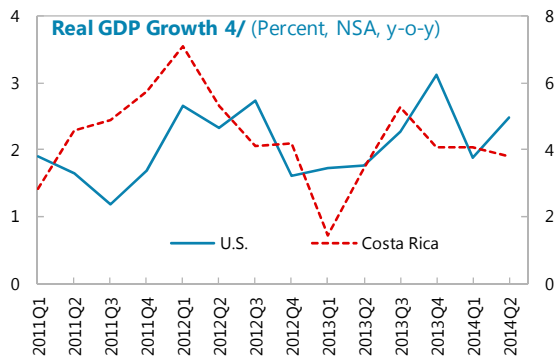
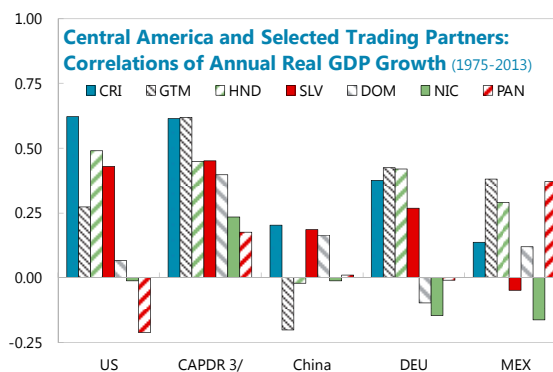
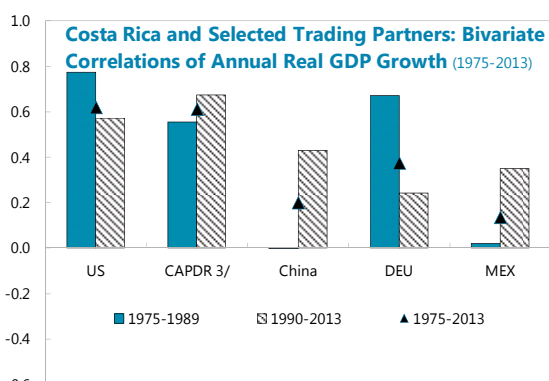
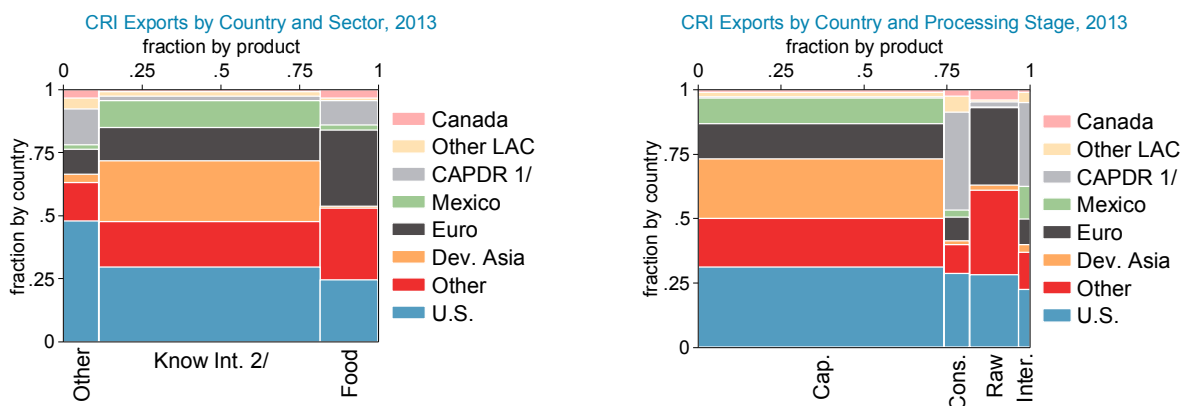


Source: Fund staff estimates

Table 1. Costa Rica: Vulnerability Indicators

| Category | Indicator | Period | Units | Thresholds | Less vulnerable if the indicator is |
|---|---|----------------------------|---------------|------------|-------------------------------------|
| Size of recent capital inflows | Cumulative capital inflows proxied by the balance on the financial account | 2010-12 | % of 2012 GDP | 14; 26 | Lower |
| | Cumulative portfolio and other investment flows | 2010-12 | % of 2012 GDP | 4:11 | Lower |
| External balance | Current account balance | 2012 | % of GDP | -3; +2 | Higher |
| | Change in the current account balance | 2007-12 | % of GDP | -3; 0 | Higher |
| | Current account balance plus FDI | 2012 | % of GDP | -3; +2 | Higher |
| External debt | External Debt | 2012 | % of GDP | 30; 70 | Lower |
| | Change in external debt | 2007-12 | % of GDP | 1; 9 | Lower |
| | Short-term external debt | 2012 | % of GDP | 5; 20 | Lower |
| | Change in short-term external debt | 2007-12 | % of GDP | 0; 5 | Lower |
| Local debt securities held by non-residents | Proportion of domestic government securities held by foreigners | 2012 | % | 20; 30 | Lower |
| Gross reserve cushion | Reserve as percent of metric | 2013 | % | 75; 100 | Higher |
| Fiscal position | Primary balance | 2012 | % of GDP | -3; -1 | Lower |
| | Government debt | 2012 | % of GDP | 35; 60 | Lower |
| | Change in government debt | 2007-12 | % of GDP | 0; 5 | Lower |
| | Expected change in government debt | 2012-18 | % of GDP | 0; 5 | Lower |
| Banking system and private sector leverage | Credit to the private sector | 2012 | % of GDP | 40; 65 | Lower |
| | Change in credit to the private sector | 2007-12 | % of GDP | 3; 18 | Lower |
| | Share of credit expansion financed by increase in bank liabilities to non-residents | January 2011 to April 2013 | % | 25; 50 | Lower |
| | Correlation of changes in private credit and foreign liabilities | 2010M1-2013M6 | Units | 0.7; 0.9 | Lower |
| | Loan-to-deposit ratio | 2012 | % | 80; 100 | Lower |
| | Change in loan-to-deposit ratio | 2007-12 | % | 0; 19 | Lower |

Figure 1. Costa Rica: Trade Linkages



Sources: WITS World Bank, UNSD Comtrade, WEO, and Fund staff estimates.

^{1/} Other CAPDR includes Costa Rica, Honduras, Nicaragua, El Salvador, Panama and the Dominican Republic.

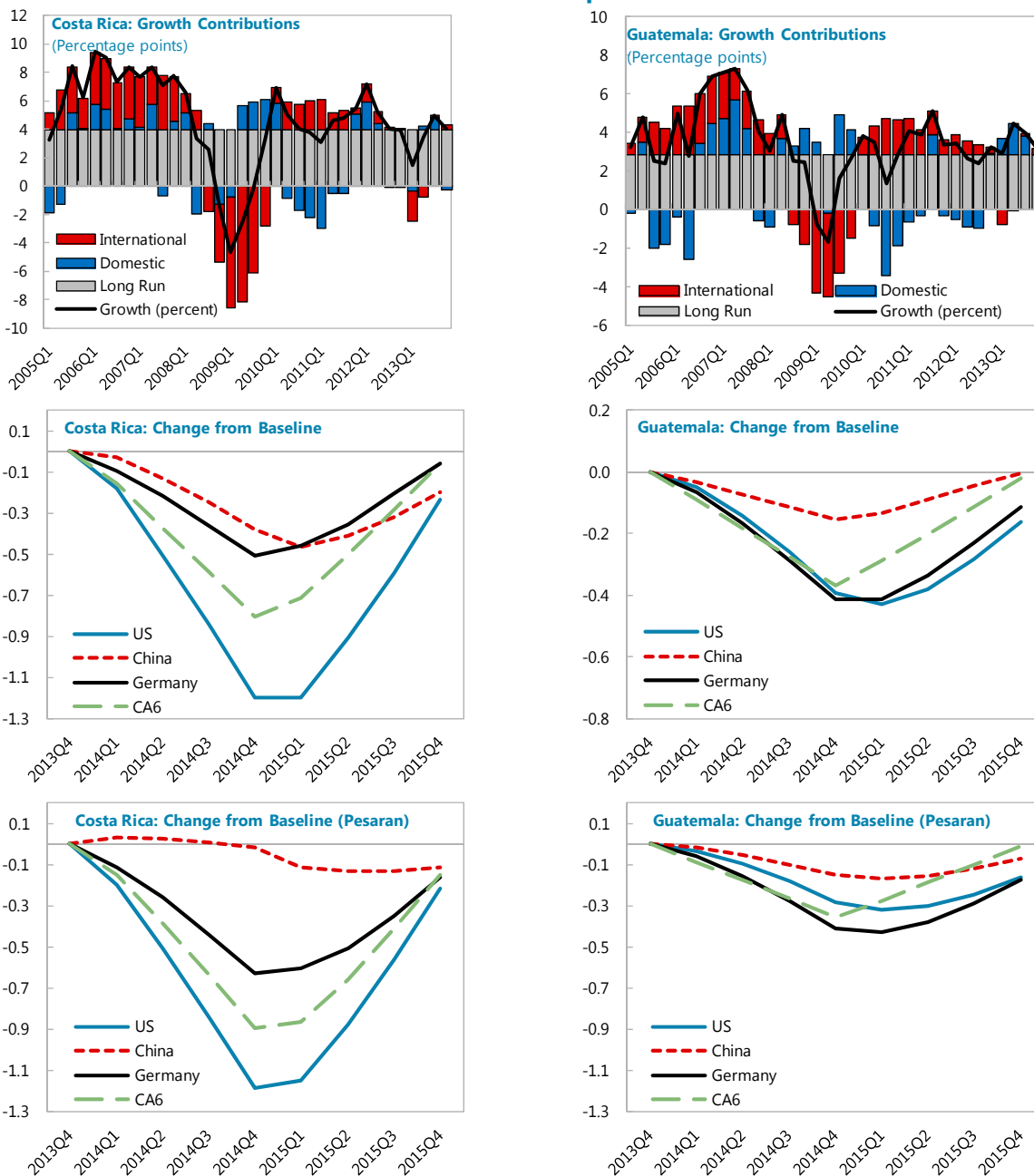
^{2/} Knowledge Intensive products include transport, electrical equipment, machinery and chemicals.

^{3/} PPP-weighted average.

^{4/} The slowdown in GDP growth in 2014 while US GDP is showing signs of recovery reflects the one-off effect of INTEL manufacturing plant withdrawal.

^{5/} The stages of processing include capital goods, consumer goods, intermediate goods and raw materials.

**Figure 2. Costa Rica and Selected Trading Partners:
Real Growth Spillovers**



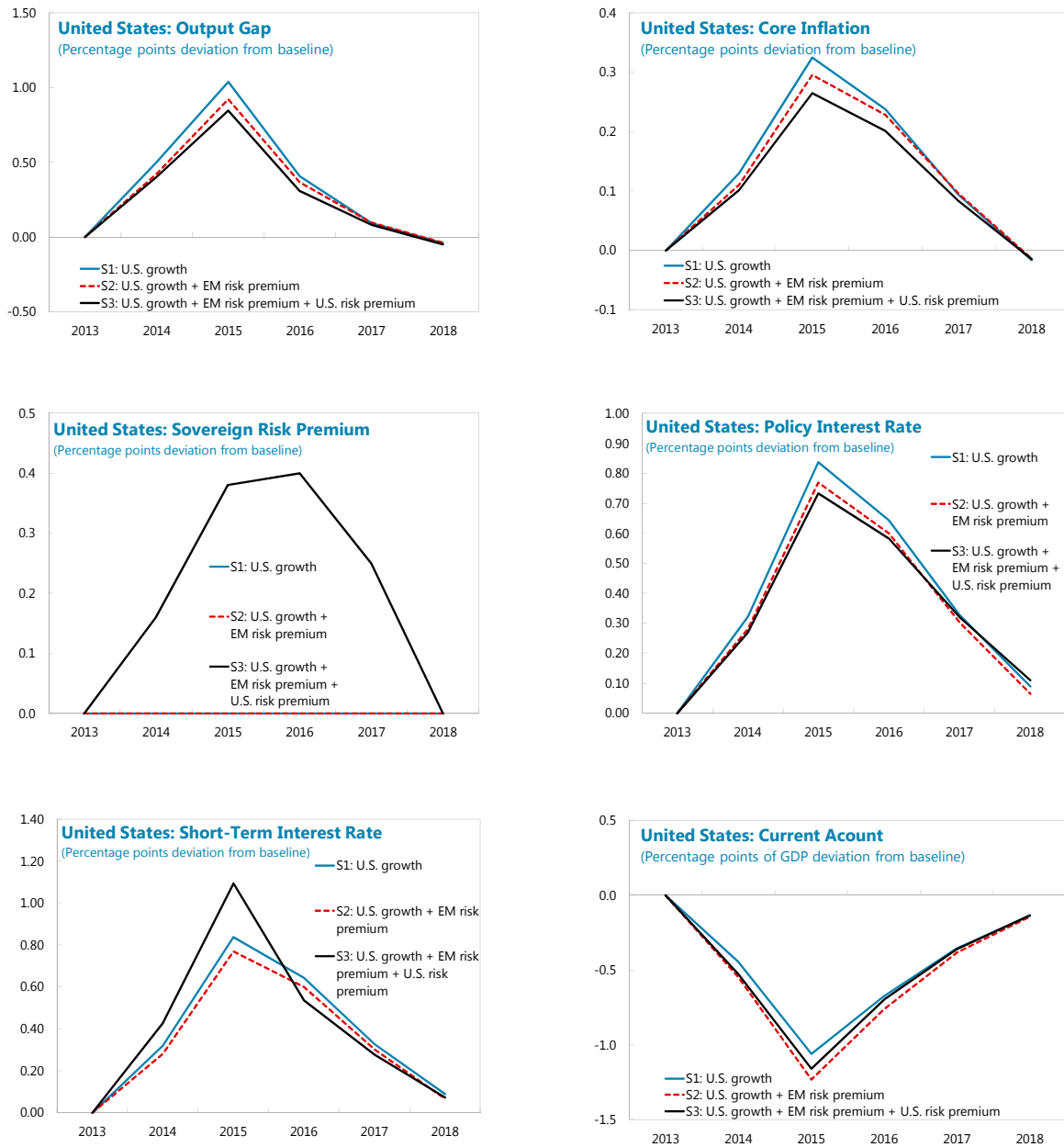
Source: Fund staff estimates.

Figure 3. United States: Three Scenarios of Tapering Off (FSGM simulations)



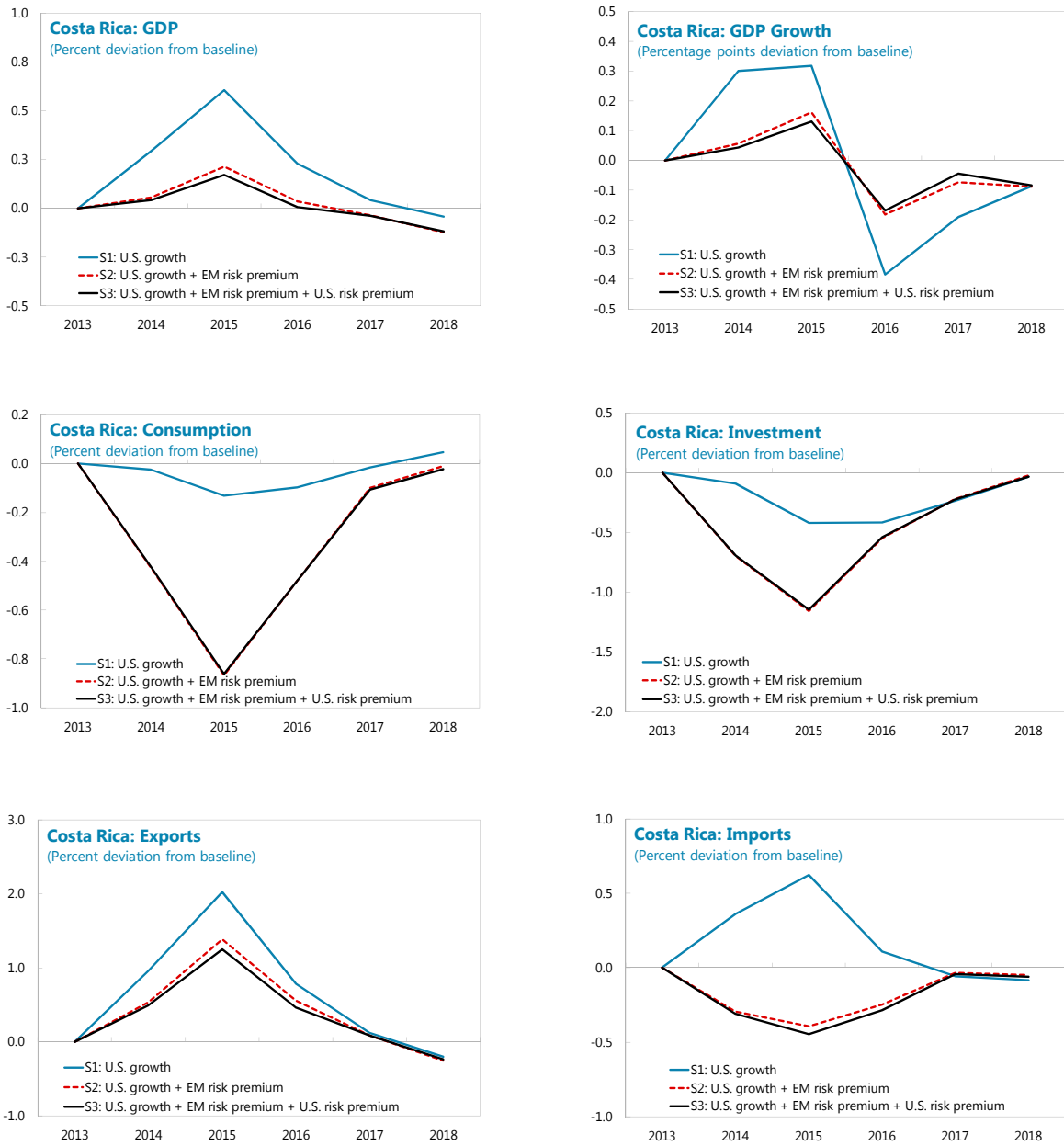
Source: Fund staff estimates.

Figure 3. United States: Three Scenarios of Tapering Off (FSGM simulations) (concluded)



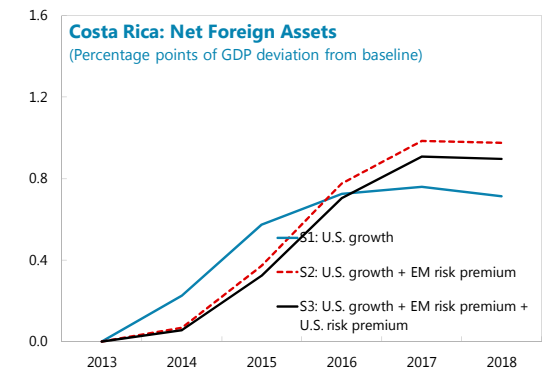
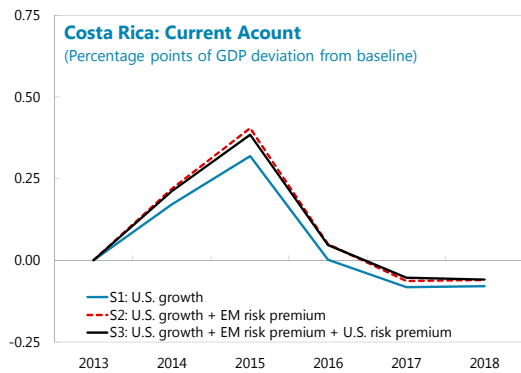
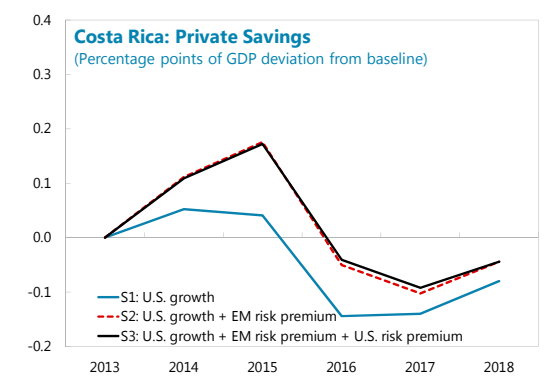
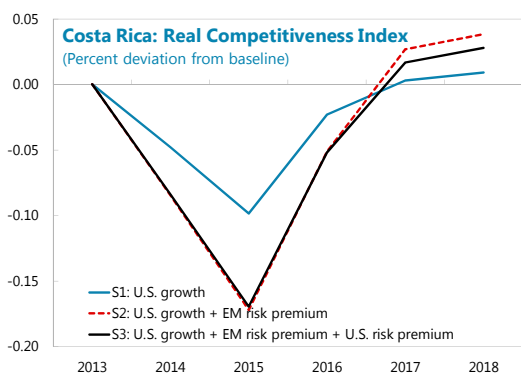
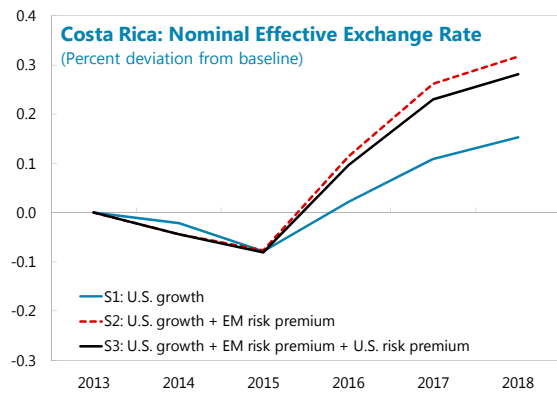
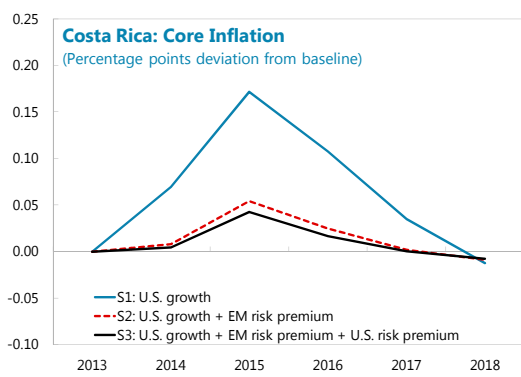
Source: Fund staff estimates.

Figure 4. Costa Rica: The Impact of U.S. Tapering Off (FSGM simulations)



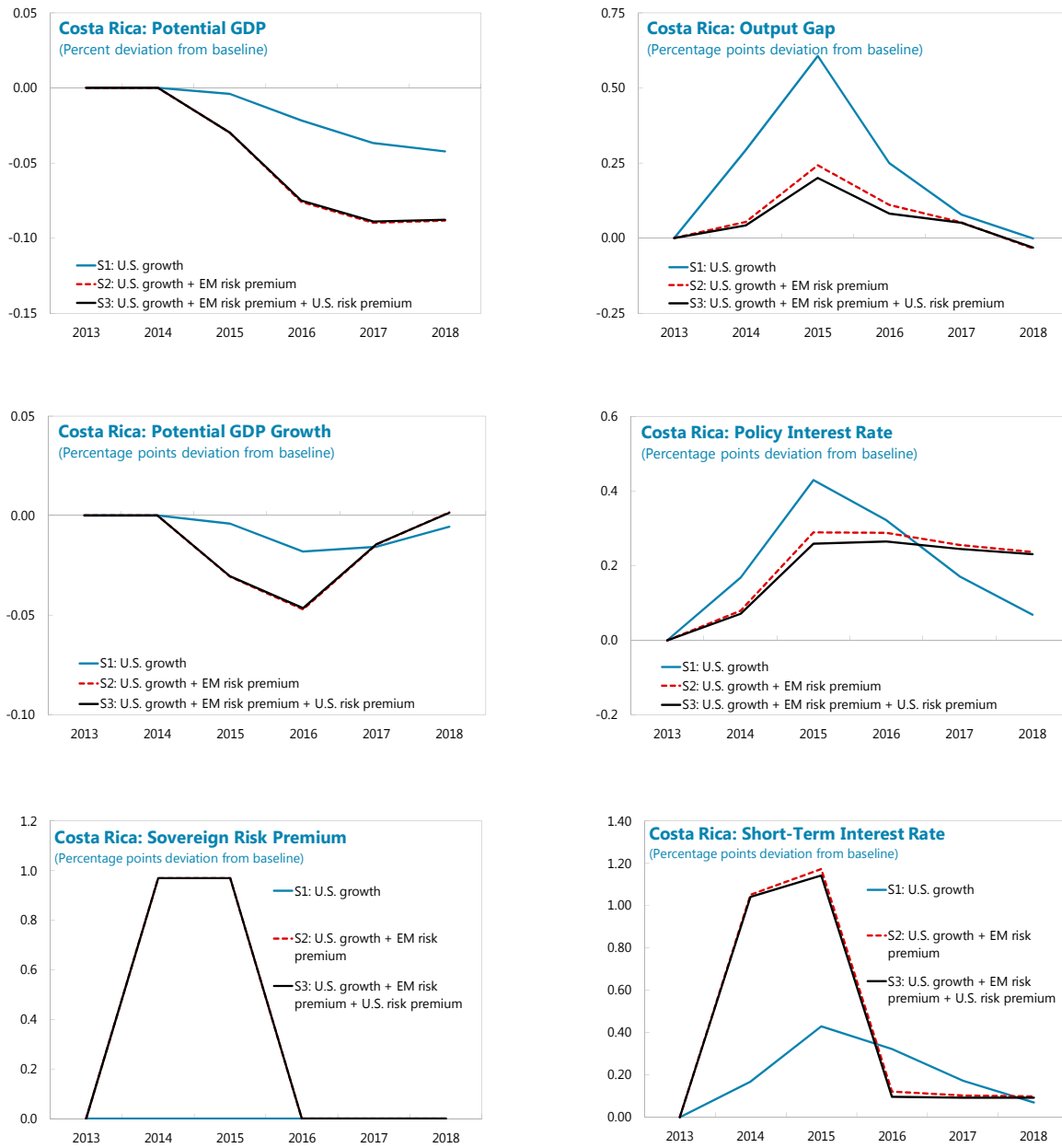
Source: Fund staff estimates.

Figure 4. Costa Rica: The Impact of U.S. Tapering Off (FSGM simulations), (continued)



Source: Fund staff estimates.

Figure 4. Costa Rica: The Impact of U.S. Tapering Off (FSGM simulations), (concluded)



Source: Fund staff estimates.

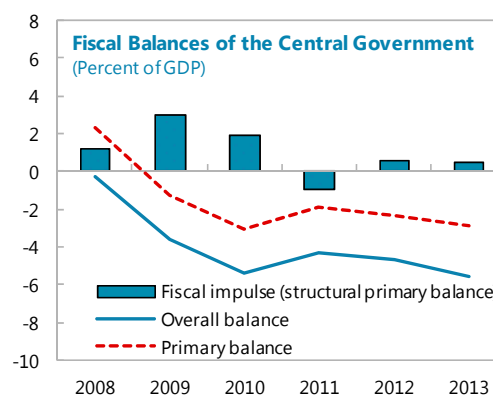
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III. ASSESSING FISCAL VULNERABILITY AND MEDIUM-TERM SUSTAINABILITY¹

This note presents Costa Rica's fiscal position and the outlook for the medium and long term, discusses the need for fiscal adjustment, and assesses the optimal pace of fiscal consolidation. The main conclusion is that the threat of unsustainable public debt dynamics calls for early corrective action. A moderately front-loaded adjustment would strike the appropriate balance between achieving fiscal sustainability and maintaining robust growth. Postponing fiscal consolidation further could endanger macroeconomic stability.

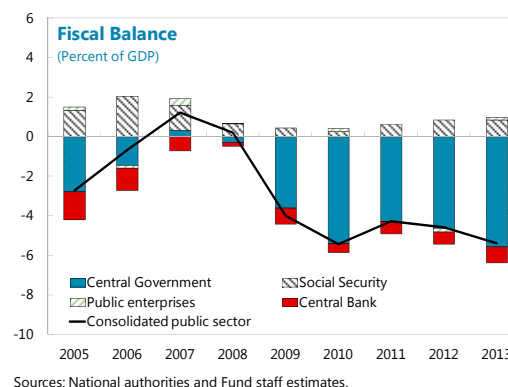
1. **The fiscal position of the central government has deteriorated sharply in recent years and attempts to correct it have been unsuccessful so far.** After posting a small surplus in 2008, the fiscal balance of the central government turned into a deficit of 5½ percent of GDP by 2010. The fiscal position worsened as a result of an endogenous fall in revenue (which was above trend in 2008) and a sharp increase in expenditure (mainly wages and transfers) on account of countercyclical policies implemented in response to the 2008–09 crisis. The efforts to restrain public spending in 2011 mainly through cuts in capital expenditure were undermined by rising transfers and interest bill in 2012–13. Meanwhile revenues stagnated as a tax reform aimed at placing the public sector balance on a sustainable path was voided by the Supreme Court in 2012 due to procedural irregularities with its approval by Congress. As a result, central government deficit returned to 5½ percent of GDP in 2013, well above debt stabilizing levels, and debt reached 36 percent of GDP (up from 25 percent of GDP in 2008) .



Sources: National authorities and Fund staff estimates.

¹ Prepared by Jaume Puig-Forné, Patrick Blagrove, Lennart Erickson, and Anna Ivanova.

2. **Trends in the other levels of government have been more stable.** The deterioration in the fiscal situation has been driven by developments at the central government level. The pay-as-you-go social security system (CCSS) currently has a small surplus—about 0.75 percent of GDP in 2013, while public sector enterprises have been broadly in balance since 2010. The central bank has a small deficit—of about 0.75 percent of GDP—as a result mainly of interest expenses on securities issued for liquidity management purposes (AN 4). The analysis of fiscal vulnerabilities, medium-term sustainability issues, and related adjustment needs in the remainder of this analytical note focuses on the central government, while also briefly discussing longer-term sustainability issues in the social security system.^{2,3}



3. **The new government acknowledges the need for fiscal consolidation, but the announced measures are insufficient to bring the debt to a sustainable path.** After the nullification of the 2012 tax reform, the previous administration prepared a fiscal consolidation plan with total adjustment of about 3½ to stabilize debt in the medium-term, broadly in line with previous staff recommendations.⁴ However, the plan was not implemented before the 2014 elections. The new administration, which took office in May 2014, has formulated a proposal to consolidate public finances by about 4 percent of GDP. The initial focus of the plan was on reducing tax evasion and exemptions, while also introducing some expenditure cuts. The staff's assessment of the measures at a more advanced stage of elaboration—including broadening of the VAT base to include services and basic goods at a preferential rate, cuts in transfers and partial hiring freeze in 2015, and a move to a global income tax—is that they are likely to yield about 2¼ percent of GDP.⁵ Under this baseline scenario of fiscal consolidation, the central government deficit would stay close to 6 percent of GDP and public debt would continue rising to about 51 percent of GDP by 2019.

² The analysis of debt sustainability at the central government level abstracts from the fact that the social security system holds a non-negligible part of this debt (about 16 percent), as maintaining the capacity of the central government to service and repay this debt is also important for the long-term sustainability of the social security system.

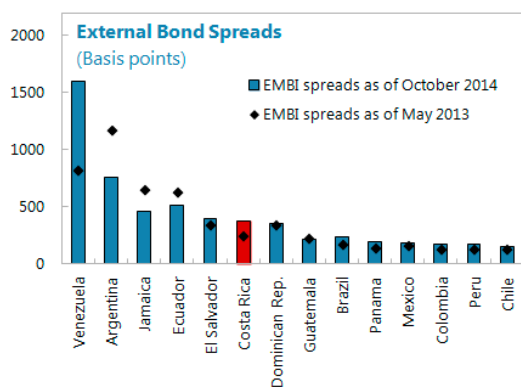
³ The DSA Annex to the staff report includes a DSA for the consolidated public sector. Resulting adjustment needs are lower than at the central government level, given lower primary deficits and lower average interest rates at the consolidated level.

⁴ The total adjustment was estimated as the difference between the projected primary deficit in 2019 absent fiscal consolidation measures, and a debt stabilizing primary balance of zero, assuming real interest rates in line with real growth in the medium term. The projections included increases in education expenditure broadly in line with constitutional requirement to raise these expenditures from 7.2 percent in 2013 to 8 percent of GDP.

⁵ The estimate of the additional income from the move from schedular to global approach for the income tax is based on the proposal in the previous administration's fiscal reform plan. The new administration has indicated the intention to introduce a more ambitious reform that would in the staff's view still require increases in marginal tax rates on higher income brackets, but details of the proposal still need to be fleshed out.

4. **Large gross financing needs make Costa Rica vulnerable to changes in market sentiment, although a stable domestic investor base mitigates risks.** Sustained high fiscal deficits and substantial amortizations coming due result in large projected gross financing needs of 10½ and 12 percent of GDP in 2014 and 2015 respectively.⁶ While these large financing needs expose Costa Rica’s public finances to changes in market sentiment, the existence of a stable domestic investor base mitigates risks. Notwithstanding increased Eurobond issuance in recent years, domestic debt still represents about 80 percent of total central government. Moreover, about 60 percent of domestic debt is held by local institutional investors, including the CCSS, nonfinancial public sector institutions, and banks.

5. **Sovereign credit risk perceptions are moderate but could intensify, especially after the recent loss of investment grade rating.** Spreads on Costa Rican external sovereign bonds are about 350 basis points, at the mid-point between the highest-rated countries in Latin America and lower rated countries like El Salvador, Ecuador, and Jamaica. Costa Rica is the only country in the region, together with Venezuela, where spreads are now noticeably higher than before the start of the U.S. tapering tantrum in May 2013. The country appears particularly vulnerable to renewed episodes of financial volatility related to U.S. monetary policy normalization, given its fiscal vulnerabilities (AN2). Costa Rica lost its only investment grade rating in September, with rating agencies lamenting continued weakness in the fiscal position and political obstacles to fiscal reform.⁷ The risk of a debt spiral with potentially non-linear increases in financing costs cannot be discarded if debt continues to rise unabated.



Sources: Bloomberg and Fund staff estimates.



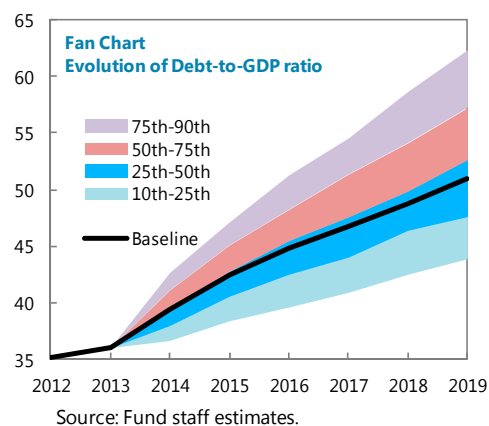
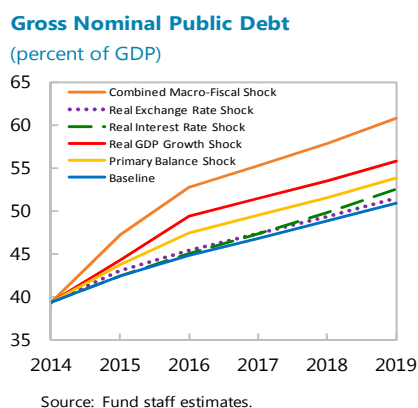
Source: WEO, Bloomberg and Fund staff estimates.

6. **There are substantial upside risks to the projected debt path.** A plausible macro-fiscal shock as defined in the Fund’s DSA framework for market access countries would result in central government debt reaching 61 percent of GDP by 2019, 10 percent above the level in the baseline

⁶ The average maturity of Costa Rica’s central government debt stands at about 6 years.

⁷ Costa Rica is the highest rated credit in Central America, after Panama. After the recent loss of its only investment grade rating by Moody’s, the sovereign is now rated one (Moody’s and Fitch) to two notches (S&P) below investment grade. Fitch also warned in September of downside risks to its current rating for the same reasons cited in Moody’s downgrade.

scenario (DSA Annex to the staff report).⁸ Debt dynamics are most sensitive to a growth shock, with an isolated one standard deviation shock to growth in 2015-16 resulting in an increase in central government debt of about 6 percent of GDP by 2019 relative to the baseline scenario.⁹ A fiscal shock equivalent to an additional 1¼ of GDP increase in the primary deficit in 2015-16 would increase debt by about 3 percent of GDP by 2019, while a sizeable shock of 200 basis points to the average real interest rate at which the government borrows would raise the debt-to-GDP ratio by less than 2 percentage points of GDP.¹⁰ The sensitivity of public debt to currency depreciation is limited, with a 15 percent depreciation in the nominal exchange rate having an impact on debt of less than 1 percent of GDP by 2019.¹¹ A stochastic simulation of the debt path also produces a median debt forecast slightly higher than in the baseline—about 53 percent of GDP—while the probability that debt rises to above the 60 percent of GDP projected in the combined macro-fiscal shock is greater than 10 percent according to the simulation.¹²



⁸ The combined macroeconomic shock incorporates the largest effect on relevant variables (growth, inflation, primary balance, exchange rate and interest rate) of standard individual shocks in the Fund's DSA for market access country including: a fiscal shock equivalent to 50 percent of planned cumulative adjustment or to half of a standard deviation of historical observations of the primary balance, whichever is greater; 1 standard deviation shock to real GDP growth for 2 consecutive years; a nominal interest rate increase by the difference between the maximum real interest rate over the last 10 years and the average real interest rate over the projection period, or a 200 basis point shock, whichever is larger; and a shock to the exchange rate equivalent to the correction of the Fund's estimate of real exchange rate overvaluation, or maximum historical depreciation of the exchange rate, whichever is the highest.

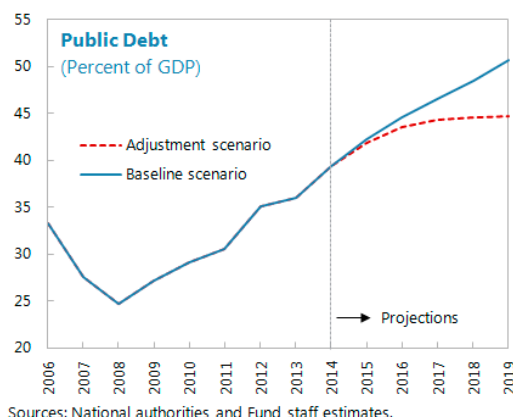
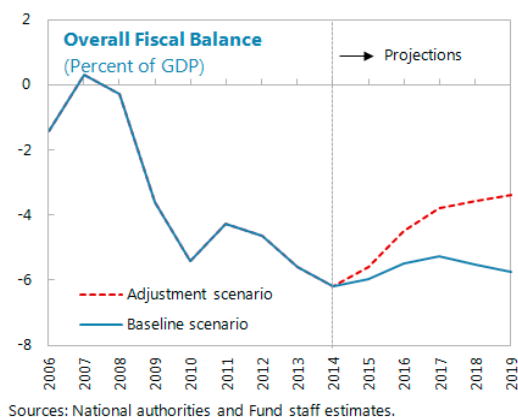
⁹ The growth shock would result in growth of 0.9 and 1.5 percent in 2015 and 2016 respectively, implying a less severe shock than the one-year economic contraction of 1 percent in 2009 in the context of the global financial crisis.

¹⁰ The fiscal shock is moderate compared to the increases in primary deficit over the last few years. The interest rate shock is double the peak 100 basis points widening in Costa Rica's external spreads following the taper tantrum of May 2013.

¹¹ This shock compares with actual peak depreciation of about 13 percent during the first few months of 2014. If sustained, the effect of the exchange rate shock on refinancing of external debt would be greater over the longer-term, given that Costa Rica's external debt is of a longer maturity than the standard DSA's 5-year horizon. The share of foreign-currency denominated debt in total central government debt stood at 31 percent at end-2013.

¹² The stochastic simulation of the public debt path is constructed by producing frequency distributions of debt paths under shocks to real GDP growth, effective real interest rate, primary balance and the change in real exchange rate based on historical variances.

7. **To ensure medium-term sustainability and build resilience to shocks, Costa Rica needs to pursue fiscal consolidation of at least 3¾ percent of GDP.** Frontloaded gradual adjustment of this magnitude would bring the central government deficit to about 3½ of GDP and stabilize debt just below 45 percent of GDP by 2019, about 2½ and 6 percentage points below the baseline, respectively.¹³



Sources: National authorities and Fund staff estimates.

Sources: National authorities and Fund staff estimates.

- *Projected continued deterioration in the primary deficit contributes to increase adjustment needs.* The primary deficit is projected to rise from 2.8 percent of GDP in 2013 to 3.1 and 3.6 percent of GDP in 2014 and 2015, respectively, in the passive scenario without fiscal consolidation.¹⁴ This reflects mostly a constitutional provision to raise expenditure on education, which increases the need for adjustment in other parts of the budget (Table 1).¹⁵

| Costa Rica. Fiscal Sustainability Gap (In percent of GDP, unless otherwise stated) | | |
|---|---------------------|-------------------|
| | Passive Scenario | |
| Medium-term primary balance 1/ (I) | -3.8 | |
| 2014, projected outturn | -3.1 | |
| 2015, projected change | -0.5 | |
| 2016-19, projected change | -0.2 | |
| | Adjustment Scenario | Baseline Scenario |
| Debt stabilizing primary balance (II) | 0.0 | 0.7 |
| 2019, real growth (in percent) | 4.4 | 4.3 |
| 2019, real interest rate (in percent) | 4.4 | 5.1 |
| 2019, debt | 43.8 | 50.6 |
| Fiscal Sustainability Gap (II - I) | 3.8 | 4.5 |

Source: Fund staff estimates.

1/ In passive scenario with no adjustment, the primary deficit is projected to reach 3.1 percent of GDP in 2014, and increase another 0.5 percent of GDP in 2015. Increase in primary deficit projected for 2016-19 is related to continued but partial progress toward Constitutional target of 8 percent of GDP for expenditure on education.

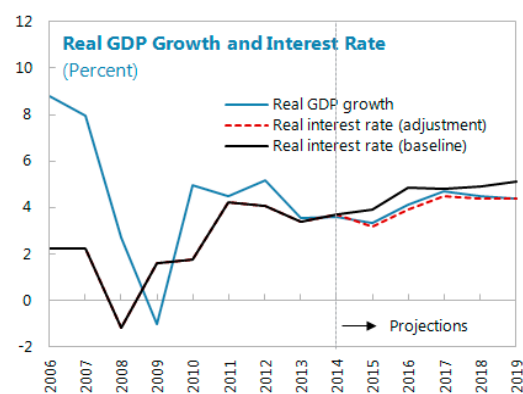
- *Stabilizing the debt-to-GDP ratio by 2019 requires reaching primary balance.* The adjustment scenario assumes that real interest rates converge to real GDP growth at potential over the medium-term, implying that

¹³ The optimal nature of a gradual frontloaded fiscal consolidation path is discussed further below.

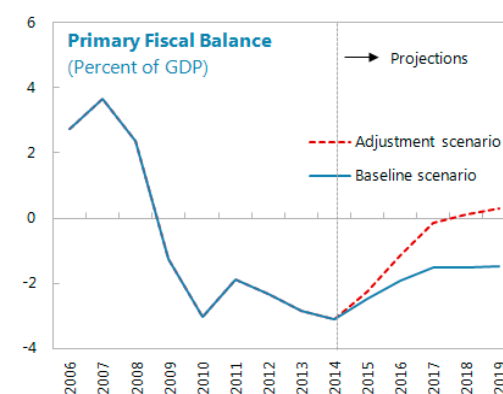
¹⁴ According to the draft 2015 budget submitted to Parliament.

¹⁵ Staff projections assume only partial fulfillment of commitment to raise education spending to 8 percent of GDP over the medium term, in line with advice from the World Bank to increase efficiency of spending on education (see below).

reaching primary balance by 2019 would suffice to stabilize debt. The underlying assumption is that increases in market rates induced by U.S. monetary policy normalization are mitigated by the authorities' commitment to a credible fiscal adjustment plan.¹⁶



Sources: National authorities and Fund staff estimates.



Sources: National authorities and Fund staff estimates.

- *Risks to the total adjustment needs are tilted to the upside.* The fiscal sustainability gap, defined as the difference between the primary balance in a passive scenario and the debt stabilizing primary balance is estimated at 3¾ percent of GDP. (Table 1) Shortfalls in the implementation of fiscal consolidation, as in the staff's baseline scenario with more limited and backloaded adjustment, would increase the size of the total adjustment needed, while also stabilizing the debt ratio at a higher level. The total adjustment eventually needed would also be larger if the authorities maintained the commitment to raise education expenditure to 8 percent, or if greater than expected market turbulence in context of U.S. policy normalization resulted in less favorable than assumed market reaction to consolidation plans.

8. **Gradual but frontloaded fiscal consolidation would strike an appropriate balance between lowering the sustainability gap and limiting the adverse impact on growth.**

- To gauge the optimal fiscal consolidation path, we resort to a model of quadratic preferences in which the authorities' relative preferences for closing the fiscal sustainability gap and the output gap are taken into account.¹⁷ The moderate output gap before the start of the adjustment period—½ percent of GDP negative gap projected for 2014—relative to the large sustainability gap implies that more than one third of the total adjustment should

¹⁶ Interest rate projections in the adjustment scenario assume some gradual tightening in spreads vis-à-vis U.S. rates. This compares favorably with the assumption in the baseline that spreads tend to also rise when U.S. rates rise, consistent with recent experience during the 2013 taper tantrum (AN 2).

¹⁷ Quadratic preferences imply that the pressure to act to reduce the output and sustainability gaps increases in a nonlinear fashion with the size of the gap. For the detailed methodology, see Kanda (2011).

be effected in 2015 according to the model even if the authorities have strong preferences for minimizing the effect on growth (Table 2).¹⁸

Costa Rica: Optimal Fiscal Consolidation Path Under Model of Quadratic Preferences 1/ 2/
(In percent of GDP, unless otherwise stated)

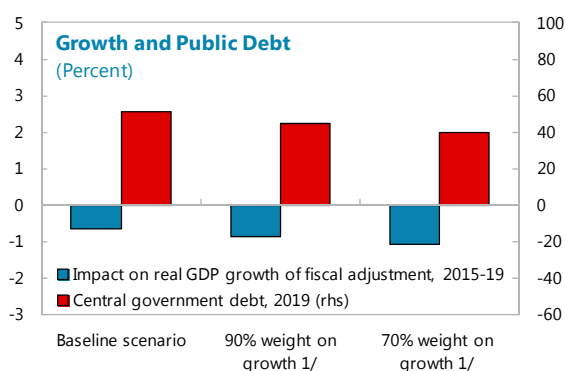
| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Discretionary fiscal adjustment | | 1.42 | 0.47 | 0.34 | 0.25 | 0.18 | 0.13 | 0.09 | 0.07 | 0.05 | 0.04 | 0.03 |
| Fiscal sustainability gap | 3.11 | 1.70 | 1.23 | 0.89 | 0.64 | 0.47 | 0.34 | 0.24 | 0.18 | 0.13 | 0.09 | 0.07 |
| Output gap (in percent of potential GDP) | -0.41 | -0.63 | -0.46 | -0.33 | -0.24 | -0.17 | -0.13 | -0.09 | -0.07 | -0.05 | -0.03 | -0.02 |

Source: Fund staff estimates.

1/ Assuming that the authorities place 90 percent weight on growth objective.

2/ See footnote 18 in main text for explanation of differences between these model results and actual adjustment path recommended in the staff report.

- A simple illustration of the cost-benefit of fiscal consolidation based on typical fiscal multipliers observed in the region shows that gradual frontloaded consolidation succeeds in substantially moderating the increase in debt¹⁹—more than 10 and 15 percentage points of GDP lower by 2019 in the baseline and adjustment scenarios relative to a passive scenario—at a relatively low cost in terms of foregone



Sources: National authorities and Fund staff estimates.

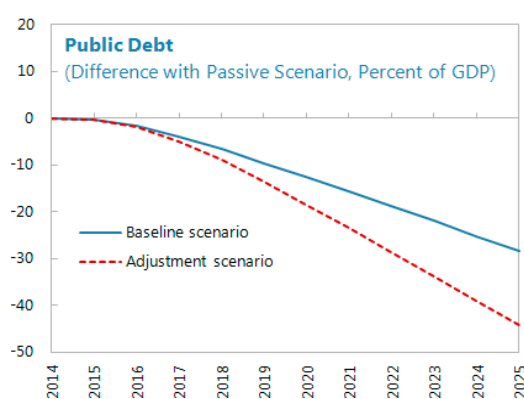
1/ Gradual adjustment scenarios based on model of fiscal adjustment based on authorities' preferences for growth and fiscal objectives.

¹⁸ The quadratic model is used to illustrate the desirability of a gradual but frontloaded adjustment to meet the dual but conflicting objectives of closing the sustainability and output gaps. The actual adjustment path recommended in the staff report (Table 4) is based on the results of the model (Table 2), but differs slightly from this in three ways. First, the fiscal sustainability gap driving the total recommended adjustment in the staff report is larger than in the quadratic model as it incorporates projected continued fiscal deterioration that would bring the medium-term sustainability gap to 3¾ percent of GDP under the passive scenario—due mostly to the increased expenditure on education. In contrast, the quadratic model estimates the sustainability gap based only on the fiscal situation before the start of the fiscal adjustment—i.e. the projected primary deficit of 3.1 percent of GDP in 2014—as fiscal projections are generated endogenously in the model after that. Second, the adjustment path in the staff report assumes that the full sustainability gap is closed by 2019, consistent with the objective of stabilizing debt by the end of the projection period. In contrast, the quadratic model by construction optimizes again in every period, and hence the adjustment is in principle spread over an infinite period albeit with smaller and eventually irrelevant adjustments over time. Third, the adjustment path in the staff report is adjusted relative to model results to take into account the potential sequencing of fiscal reforms given existing political constraints, such as the electoral commitment not to raise tax rates until 2016—hence implicitly allowing for a slightly lower preference for closing the sustainability gap than in the model simulation.

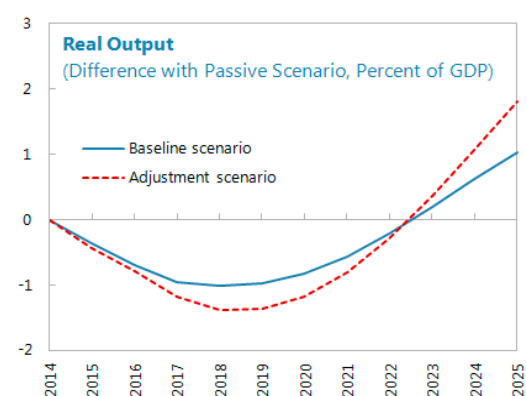
¹⁹ The estimated effect on growth is based on a fiscal multiplier of 0.3, which may be high for a consolidation package that relies mostly on revenue measures (see below): Estevao and Samake (2013) find that the medium-term effect of fiscal consolidation on output can be positive in most Central American countries, especially if it is based on increases in tax revenues or cuts in current spending. They estimate that the contemporaneous impact multiplier in the adjustment year ranges from 0 to 0.4 for spending cuts, while tax multiplier estimates are closer to zero and not statistically significant. The estimated output costs of ½ percentage points of GDP is also conservative in that it does not assume self-correction of the additional output gap that opens up as a result of consolidation.

output growth—about $\frac{1}{2}$ and $\frac{1}{4}$ percentage points of GDP of cumulative output loss by 2019.

- More sophisticated estimates using a general equilibrium model for Costa Rica yield similar results indicating a relatively small output cost of closing the sustainability gap over the medium term.²⁰ The model incorporates the mitigating effects of the monetary policy response to the small additional output gap that opens up as a result of the adjustment, as well as the benefits of assumed improvements in the sovereign-risk premium as market perceptions improve following the consolidation. The long-term effects of these favorable developments—especially the lower risk premium—imply that output would actually be higher over the longer term in the baseline and full adjustment scenarios, compared to a passive scenario.



Sources: Fund staff estimates.

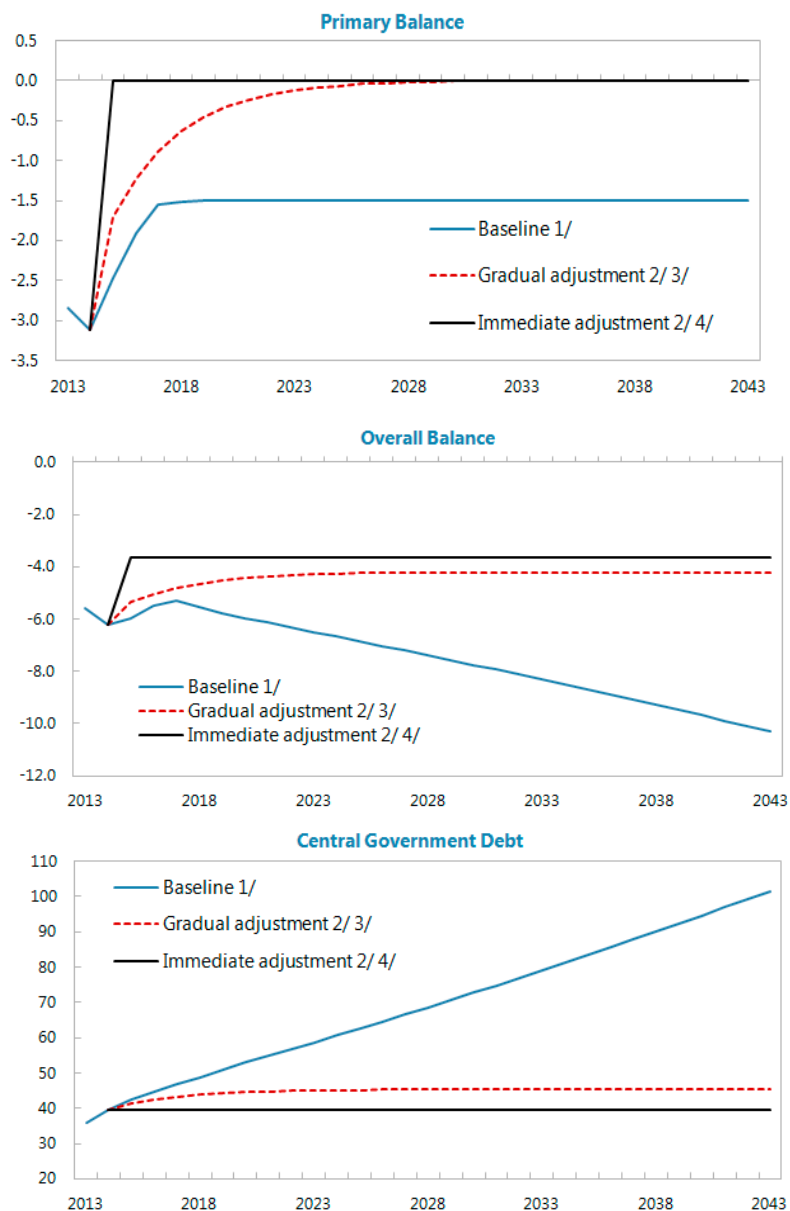


Sources: Fund staff estimates.

²⁰ See brief description of the general equilibrium model in AN 2.

Figure 1. Costa Rica: Long-Term Fiscal Sustainability

(Percent of GDP)



Source: Fund staff estimates and projections.

1/ This path is the baseline through 2019, with a constant primary balance thereafter.

2/ The immediate and gradual adjustment scenarios aim at closing the same initial sustainability gap with consolidation starting in 2015 in both scenarios. The debt stabilizing primary balance is calculated based on medium-term baseline projections of real interest and growth rates under the adjustment scenario; these are maintained constant over the projection period in line with the requirements of the optimization model. The gap is then measured relative to the 2014 projected fiscal outturn.

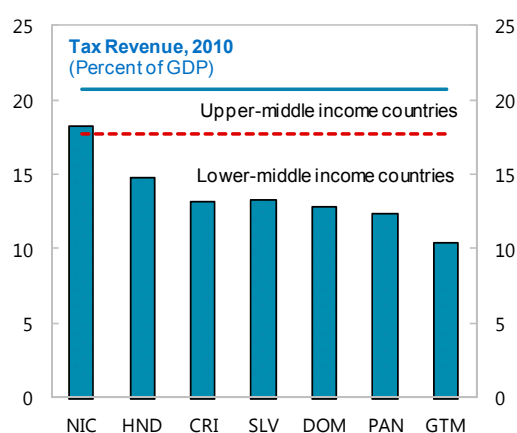
3/ The gradual scenario assumes that the authorities place 90 percent weight on growth objective. Impact of growth is based on fiscal multiplier of 0.3, with a self-correction parameter for the output gap of 0.5, implying that the effect on the output gap of a fiscal adjustment of 1 percent of GDP almost dissipates—is less than 0.1 percent of GDP—in the second year following the adjustment.

4/ The immediate adjustment scenario assumes that the full fiscal adjustment takes place in 2015 and has no impact on growth.

9. **The required fiscal adjustment rises by an additional 1½ percentage point of GDP if the actuarial deficit facing the public pension system is considered.** The largest program in Costa Rica’s pension system is a pay-as-you-go defined-benefit plan covering Old Age, Disability and Survivor Insurance (Invalidez, Vejez y Muerte –IVM) administered by the Social Security Fund (Caja Costarricense de Seguro Social—CCSS), an autonomous public sector institution.²¹ The system currently runs a cash surplus of ¾ percent of GDP, but is projected to turn a cash deficit over the medium and long term due to system maturation and population aging. Simulations indicate that, to achieve actuarial balance, pension reforms equivalent to about [1½] percent of GDP would be required in the form of higher contributions, reduced replacement rates, and/or an increase in the retirement age.

10. **Fiscal consolidation will require action on both revenue and expenditure sides.** The significant size of the required adjustment calls for a multipronged strategy, aimed at increasing revenue and restraining the pace of growth of expenditure (Table 3).

- *As in other Central American countries, revenue mobilization should be the cornerstone of fiscal consolidation.* Tax revenues are generally low in the region compared to other middle-income countries.²²
- While the authorities’ actions to strengthen tax compliance—including the draft anti-tax evasion law recently submitted to parliament—are welcome, international experience with such initiatives suggests that yields tend to be uncertain and far from immediate. The fact that tax evasion rates in Costa Rica are broadly in line with regional averages supports the assessment that tax evasion measures are unlikely to have higher yields than suggested by international experience.
- Therefore, it will be critical to approve planned measures to reduce sizeable tax expenditures, both in the VAT—extending coverage to services and selected basic goods and services—and in the income tax—with a move from schedular to global taxation system. Gradual increases in the VAT tax rate (from 13 to 15 percent) and in marginal income tax rates on higher income brackets as part of the move to global determination of the income

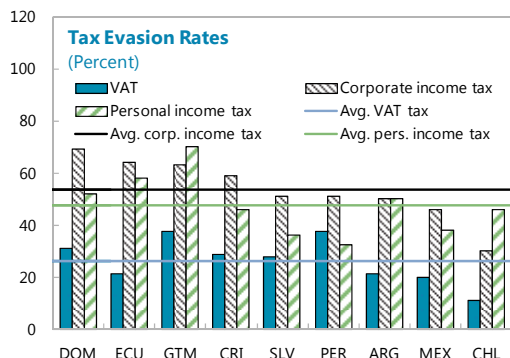


Sources: National authorities and Fund staff estimates.

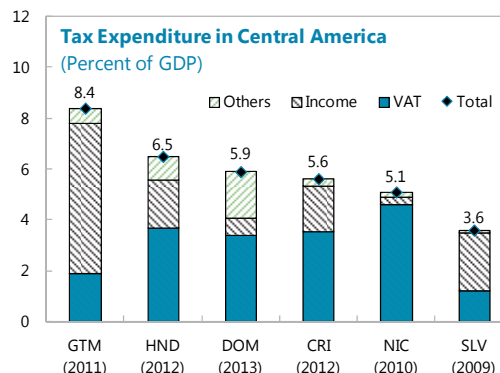
²¹ The IVM currently covers ⅔ of the labor force (approximately 1½ million workers) and has about 165,000 beneficiaries. In addition to the IVM, the judiciary and the teachers have their own social security plans.

²² For a more detailed discussion, see Garza, Morra and Simard (2012).

tax liability will also be needed in outer years of the adjustment program given large adjustment needs.^{23 24}

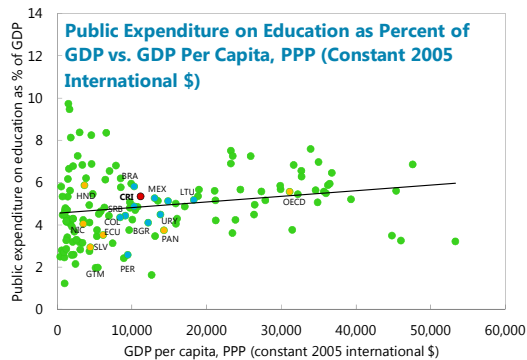


Sources: Corbacho, Fretes Cibils, and Lora (2013); CAF (2012); Cardoza (2012); Jiménez, Gómez Sabaini and Podestá (2010); Pecho, Peláez and Sánchez (2012); and Salim (2011).



Sources: WGTG; Sabatini, Pecho, Moran: 'Los gastos tributarios en Honduras, 2013; national authorities and Fund staff estimates.

- Substantial measures are also needed on the expenditure side, especially to reverse part of the increase in the wage bill as a share of GDP that was a big driver of the fiscal deterioration since 2008. Modifying indexation to prevent automatic real salary increases and a gradual reduction in government employment will be critical to contain the wage bill. Enforcing legal pension caps and increasing contribution rates in the special pension regimes for civil servants and teachers paid out of the budget could also contribute significantly to the consolidation package. The objective of raising expenditure on education to 8 percent of GDP could also be reconsidered, given that current expenditure levels are already in line with more advanced OECD countries, and there appears to be significant scope for increasing efficiency.²⁵ Over the medium term, reform of the private*



Source: World Bank and Fund staff estimates.

²³ A schedular income tax—where gross income, deductible expenses, and tax rates are determined separately for each type of income—is more likely to be exploited by taxpayers engaging in tax planning and restructuring, and is also less amenable to progressive taxation. Under a pure global income tax system, all income and expenses are considered together to arrive at a single net gain that is subject to tax.

²⁴ The average value-added tax rate in Latin America is about 14 percent. The increase in marginal income tax rates on higher-income brackets can help compensate for any distributionally regressive impact of hiking VAT rates

²⁵ A recent social sector expenditure review conducted by the World Bank found that efficiency of education expenditure is at the low end of the Latin America region. The education wage bill is high by international standards, including a substantial portion on administrative salaries, and learning outcomes are below those of other countries with comparable GDP per capita.

pension system to address its actuarial imbalance should also be considered—including larger contributions, lower replacement rates, and higher retirement age.

Costa Rica: Fiscal Consolidation Measures

(In percent of GDP)

| | Baseline scenario. Partial fiscal adjustment | | Full fiscal adjustment scenario | |
|----------------------------|--|---------------------|---------------------------------|------------------|
| | Authorities' plans | Staff assessment 1/ | Additional adjustment 2/ | Total adjustment |
| Total adjustment | 4.0 | 2.2 | 1.5 | 3.8 |
| Revenue | 3.1 | 1.5 | 1.0 | 2.5 |
| Administrative measures 3/ | 0.6 | 0.2 | - | 0.2 |
| Exemptions law 4/ | 0.5 | 0.3 | - | 0.3 |
| VAT 5/ | 1.0 | 0.7 | 0.8 | 1.5 |
| Income tax 6/ | 1.0 | 0.4 | 0.2 | 0.6 |
| Expenditure | -0.9 | -0.7 | -0.6 | -1.3 |
| Wages 7/ | -0.1 | -0.1 | -0.5 | -0.6 |
| Transfers 8/ | -0.8 | -0.6 | -0.1 | -0.7 |

Source: Fund staff estimates.

1/ The baseline scenario incorporates staff's assessment of measures in the authorities' fiscal plan that are at a more advanced stage of elaboration. Includes expenditure cuts equivalent to 0.3 percent of GDP, other cuts in transfers, a partial hiring freeze, broadening of the VAT base from the second half of 2015, a move towards global income tax, miscellaneous cuts in exemptions, and moderate gains from improvements in tax evasion.

2/ The full adjustment scenario includes additional measures in the authorities' plan that were at a less advanced stage of elaboration at the time of the Article IV mission. Includes measures as in the baseline scenario as well as measures to contain growth in the wage bill, and increases in the VAT rate and marginal income tax rates in outer years.

3/ Includes mainly effects of 2014 anti-tax evasion law.

4/ Includes measures envisaged in draft law that would reduce exemptions on income tax for cooperatives and public entities, as well as reinstate an excise on lottery sales.

5/ Baseline projection includes extending VAT coverage to services sector, with basic goods and private education and health taxed at preferential rate of 2 percent. Additional measures include gradual increase from 13 to 15 percent tax rate.

6/ Baseline projection includes move from schedular to global basis for income tax. Additional adjustment measures include gradual increase in marginal rates on higher income brackets.

7/ Baseline projection includes partial hiring freeze. Additional adjustment measures include freezing salaries in real terms.

8/ Baseline projection includes cuts in transfers in the 2015 budget. Additional measures include enforcement of the legal cap on pensions paid out of the budget.

| Costa Rica. Fiscal Consolidation Path | | | | | | |
|--|------|------|------|------|------|-------|
| <i>(In percent of GDP)</i> | | | | | | |
| | 2015 | 2016 | 2017 | 2018 | 2019 | Total |
| Total Adjustment | 1.3 | 1.2 | 0.9 | 0.2 | 0.1 | 3.8 |
| Baseline | 1.1 | 0.8 | 0.3 | - | - | 2.2 |
| Revenue | 0.4 | 0.8 | 0.3 | - | - | 1.5 |
| Expenditure | 0.7 | - | - | - | - | 0.7 |
| Additional adjustment | 0.2 | 0.5 | 0.6 | 0.2 | 0.1 | 1.5 |
| Revenue | - | 0.4 | 0.5 | 0.1 | - | 1.0 |
| Expenditure | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.6 |

References

Estevao, M., and Samake, I., 2013, "The Economic Effects of Fiscal Consolidation with Debt Feedback," IMF Working Paper 13/136 (Washington: International Monetary Fund).

Garza, M., Morra, P., and Simard, D., 2012, "The Fiscal Position: Prospects and Options for Adjustment," Central America, Panama and the Dominican Republic, Challenges Following the 2008–09 Global Crisis (Washington: International Monetary Fund).

Kanda, D., 2011, "Modeling Optimal Fiscal Consolidation Paths in a Selection of European Countries," IMF Working Paper 11/164 (Washington: International Monetary Fund).

IV. THE CENTRAL BANK NET'S WORTH¹

This note presents forecasts of the balance sheet of the Central Bank of Costa Rica (BCCR) under several scenarios: the simulations help forecast the quasi-fiscal deficit, and assess if the net worth will tend to improve or not. A persistent deterioration of the balance sheet could put at risk the inflation objectives of the central bank, in particular when public finances are under stress. Alternative scenarios are built by changing the most important assumptions included in the forecast, namely, GDP growth, base money growth, accumulation of foreign reserves, and interest rates.

A. Introduction

1. The purpose of this note is twofold: first, it covers the relevant task of forecasting the quasi-fiscal deficit of the Central Bank of Costa Rica; second, it analyzes the balance sheet to determine whether its structure fosters a growing net worth in the longer term or not.
2. **The BCCR has a negative net worth and a persistent deficit.** At end-2013, the balance sheet of BCCR shows a negative net worth of around 7.4 percent of GDP and a deficit of near 0.8 percent of GDP. This deficit is part of the fiscal position of the consolidated public sector and, in general, of the assessment of the sustainability of the fiscal sector. The deficit of the BCCR has persisted for years mostly as a result of past crises and quasi-fiscal activities, and in recent years as a result of the sterilization cost of the accumulation of foreign reserves.²
3. **Central banks do not go bankrupt but a large and increasing deficit could jeopardize price stability.** Central banks do not go bankrupt because they have the ability to print money to pay their debts. However, a large and increasing deficit could lead the central bank to abandon its inflation goals and generate inflation as a way of financing itself and reduce the real value of its debt.³ This scenario is even more likely in an economy where government finances are also under stress (fiscal dominance) and recapitalization of the central bank by the government is not possible. In other words, an undercapitalized central bank has incentives that contradict its main objective, which is to keep prices under control. Capitalizing the central bank strengthens its credibility and its autonomy. Indeed a capitalized central can make policy decisions focusing only on inflation, disregarding any effect they will have on its balance sheet (Buiter, 2007; Sims, 2006).

¹ Prepared by Jorge Restrepo (IMF) and Evelyn Muñoz (Central Bank of Costa Rica).

² As is well known, emerging economies pay high costs for the maintenance of their foreign reserves, given that those reserves are deposited in advanced economies earning less than the interest paid on the debt issued to finance the purchase of those reserves.

³ Kluch and Stella (2008) show that, in general, the performance of central banks regarding inflation is worse the lower the net worth of the central bank is. Ize (2006) shows that in central banks, lack of governance, lack of capital, and lack of independence usually go together.

B. Baseline Simulation Results

4. **The balance sheet is modeled using open market operations (OMAs), which are done with Monetary Stabilization Bonds (BEM), as the residual variable, so that any deficit is financed by issuing debt.** The amount of BEM issued depends on the flow of assets, (foreign reserves and credit), liabilities different from OMAs (money, foreign debt, and other liabilities), as well as on revenue and expenditures different from interest payments on OMAs. The payment of interest on OMAs is determined simultaneously with the flow of OMAs. Flow and stock accounting identities are respected (see Box 1).

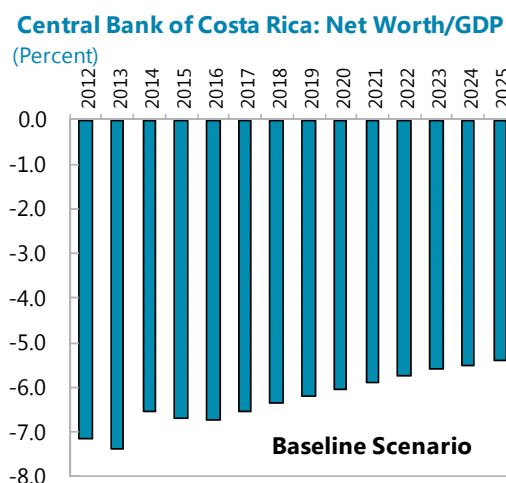
5. **As a key pre-requisite of our analysis, two money demand equations were estimated, both confirming that the elasticity of real money balances to real GDP is way below 1.** Vector error correction models were estimated using real money balances (M1/CPI), real GDP, and the nominal interest rate, as the opportunity cost of holding money.⁴ The results show that the elasticity of money to GDP is 0.45 and 0.62. The higher elasticity was obtained with the estimation of a VEC using the log of $(i/1+i)$ instead of the interest rate directly (Table).⁵

| Money Demand Estimation | | | |
|--|--------------------------------------|--|--------------------------------------|
| Vector Error Correction Estimates Date: 09/15/14 Time: 09:01 Sample (adjusted): 1992Q1 2013Q4 Included observations: 88 after adjustments Standard errors in () & t-statistics in [] | | Vector Error Correction Estimates Date: 09/15/14 Time: 10:33 Sample (adjusted): 1992Q1 2013Q4 Included observations: 88 after adjustments Standard errors in () & t-statistics in [] | |
| Cointegrating Eq: | | Cointegrating Eq: | |
| | CointEq1 | | CointEq1 |
| M1RSH(-1) | 1.000000 | M1RSH(-1) | 1.000000 |
| Y(-1) | -0.449362 (0.09116) [-4.92921] | Y(-1) | 0.616448 (0.35638) [1.72975] |
| TBPA(-1) | 0.033514 (0.00413) [8.12395] | I(-1) | 1.457917 (0.28213) [5.16754] |
| C | -3.741839 | C | -13.79765 |
| Error Correction: | | Error Correction: | |
| | D(M1RSH) | D(Y) | D(TBPA) |
| | D(M1RSH) | D(Y) | D(I) |
| CointEq1 | -0.117296 (0.05911) [-1.98434] | -0.043100 (0.02264) [-1.90341] | -11.25258 (2.72428) [-4.13048] |
| | 0.020758 (0.02245) [0.92462] | -0.002300 (0.00823) [-0.27948] | -0.234012 (0.05472) [-4.27681] |

⁴ The interest rate used was the rate paid on deposits (Tasa basica pasiva, TBP).

⁵ This model can be derived from the optimization of a household, including money in the utility function. The log specification incorporates nonlinearities of the money demand.

6. **The simulation baseline scenario indicates that the net worth of the BCCR will most likely remain negative for many years but will eventually improve (Figure).** In particular, results show that the net worth will stay near -6.5 percent of GDP until 2018, after which it will start to improve. Even though most central banks have the ability to generate sizable income through seigniorage, the BCCR revenues stagnated, as in many emerging economies. Indeed, revenues have been lower owing to: i) the lower interest rates earned on foreign reserves; and ii) paradoxically, the success in lowering inflation, since it hurt the collection of the inflation tax (Muñoz, 2012). At the same time, interest expenses increased because the central bank issued its own debt (Monetary Stabilization Bonds, BEM) to sterilize excess liquidity and compensate expansionary pressures from the accumulation of foreign reserves as well as to better control the interest rate.



7. **Nevertheless, the long-term improvement of the net worth in the baseline scenario hinges on several crucial assumptions.** The benchmark results show an eventual improvement of the balance sheet, which is conditional on the following assumptions: i) nominal base money grows at 0.62 times real GDP growth plus the inflation rate, as the estimated money demand indicates; 2) real GDP grows at the same rate as potential from 2016-2017 on; 3) the interest rates on BEMs increase with the normalization of monetary policy abroad as well as with local GDP growing again at potential; and 4) the ratio of foreign reserves to GDP stabilizes in around 14 percent in the long run (Table).

| Baseline Scenario | | | | | | | | | | |
|--|------|------|------|------|------|------|------|------|------|------|
| BASELINE ASSUMPTIONS (percent) | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | |
| Foreign Reserves / GDP | 15.1 | 14.8 | 14.4 | 16.8 | 16.8 | 16.8 | 16.8 | 16.8 | 16.8 | 16.8 |
| Implicit interest rate on BEM | 8.2 | 8.5 | 8.5 | 9.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Real GDP Growth | 5.1 | 3.5 | 3.6 | 3.4 | 4.2 | 4.5 | 4.4 | 4.3 | 4.3 | 4.3 |
| Base Money Growth | 16.9 | 10.2 | 7.8 | 6.6 | 6.6 | 6.8 | 6.7 | 6.7 | 6.7 | 6.7 |
| RESULTS (percent) | | | | | | | | | | |
| NET WORTH / GDP | -7.1 | -7.4 | -6.6 | -6.8 | -7.0 | -6.9 | -6.8 | -6.8 | -6.8 | -6.7 |
| Core Net worth: Net Worth plus Monetary base | 0.5 | 0.4 | 1.1 | 0.8 | 0.5 | 0.5 | 0.4 | 0.3 | 0.2 | 0.2 |
| Cuasi Fiscal Deficit No Currency Valuation Profits | -0.6 | -0.8 | -0.9 | -0.9 | -1.0 | -0.7 | -0.7 | -0.7 | -0.7 | -0.7 |
| Cuasi Fiscal Deficit | -0.6 | -0.8 | 0.2 | -0.7 | -0.7 | -0.5 | -0.5 | -0.5 | -0.5 | -0.5 |

8. **Our analysis indicates that some factors currently affecting negatively the balance sheet could persist for several years.** Even though the return on foreign reserves should increase with the normalization of monetary policy in advanced economies, the overall effect on the balance sheet will be limited given that the interest rate paid on the central bank debt should do the same. Most importantly, the collection of seigniorage should continue being smaller than in the past, if the central bank continues to meet its inflation target, and if money demand grows at a lower rate (as the estimated models point out). Results show that, in the baseline scenario, the quasi-fiscal deficit

could reach almost 0.9 percent of GDP in 2014 and 2015. According to the forecast, the deficit of the central bank will start declining substantially in 2018. Note that the core level of the net worth, i.e. excluding base money from the liabilities, is still positive in Costa Rica. In other words, the assets are enough to pay the liabilities other than base money, namely BEM and other obligations and thus, the central bank is solvent (Table above).⁶

C. Sensitivity Analysis

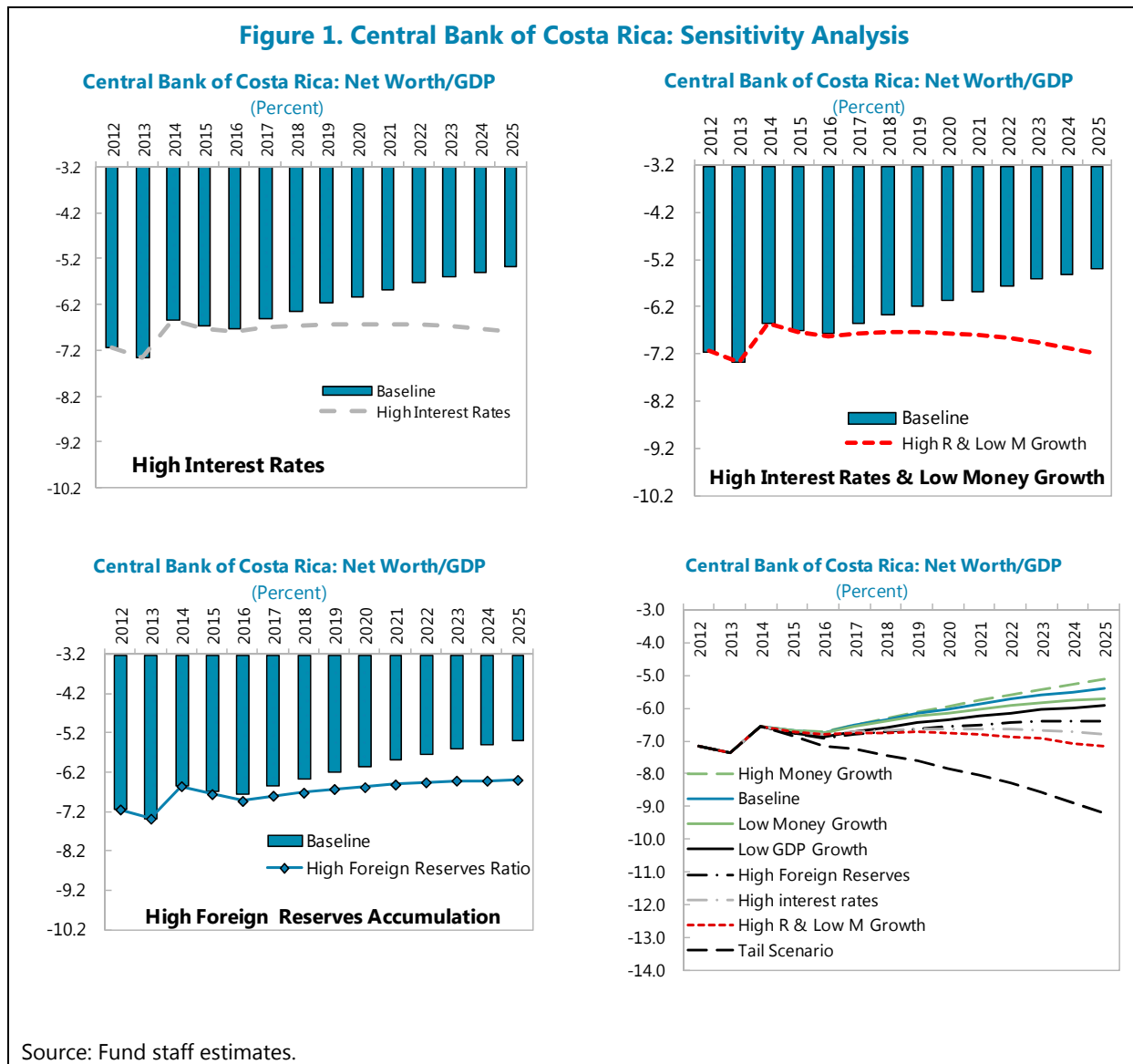
9. **Using alternative values for the main assumptions listed before, we found that the effect of most individual shocks on the BCCR net worth is limited, with the exception of some tail scenarios.**⁷ Besides the baseline scenario, results were obtained using feasible high and low rates of growth of money and real GDP; high and low interest rates on BEM; and finally a higher ratio of foreign reserves to GDP. In most cases, the net worth starts improving persistently in 2018.

The best scenarios are obtained with higher rates of GDP growth and base money growth. On the negative side, a scenario with interest rates on BEM increasing to 12 percent in the long run has a significant effect on the evolution of net worth. If money also grows slowly, as one would expect if interest rates are high then the negative effect would be larger. In the latter case, the net worth starts to deteriorate in 2015 to reach -7.2 in 2025. Therefore, low money growth and high interest rates on OMAS combined are enough to generate an increasingly negative path for the net worth. We also found that the maximum sustainable level of foreign reserves is 16.5 percent of GDP. Above that level, the net worth deteriorates persistently. Finally, a more explosive negative (tail) scenario was built by combining all bad realizations of the assumptions (Figure 1).

⁶ In a flexible exchange rate regime, no asset backs money. It is pure fiat currency and its value derives from the law and central bank credibility. Therefore, core capital excludes base money from liabilities because the central bank cannot be forced to give a real asset in exchange of currency.

⁷ Take into account that the shocks to the various assumptions in the sensitivity analysis are considered reasonable but are not comparable.

Figure 1. Central Bank of Costa Rica: Sensitivity Analysis



Source: Fund staff estimates.

10. **The net worth of the central bank might eventually tend to increase but the financial situation of the BCCR is yet fragile.** A combination of bad shocks could take the net worth from its long-run growing trajectory. However, the core level of the net worth, excluding base money from the liabilities is still positive in Costa Rica. In other words, the central bank is solvent since assets are enough to pay the liabilities other than base money, namely BEM and other obligations. The quasi-fiscal deficit is sizable, of almost 0.9 percent of GDP in 2014–2015, and provides additional insight on the position of the consolidated government.

Box 1. Balance Sheet Equations

The balance sheet is modeled using OMAS (BEM) as the residual variable. Any deficit is financed issuing debt (BEM). Profits finance the growth of central bank capital. Thus, for capital not to fall as a ratio of GDP, profits should be large enough to keep capital growing at least at, $(1+g)(1+\pi)$, the rate nominal GDP grows.

$$U = IRES - ID - NFC = \Delta K \geq K \ln[(1+g)(1+\pi)]$$

Where IRES is the return (I) on the investment abroad of foreign reserves (RES). ID corresponds to the interest (I) cost of the central bank debt (D); NFC is the non-financial cost of the central bank; g and π represent the real GDP growth rate and the inflation rate respectively.

The following equation assumes that the real exchange rate is stable over the long run. Thus, the return on foreign reserves includes the international interest rate abroad and the exchange rate depreciation, which in this case is the difference between inflation rates: $(1+\pi)/(1+\pi^*)$:

$$\begin{aligned} U &= \Delta K \\ &= \bar{RES} \cdot \ln \left[(1+r^*)(1+\pi^*) \frac{(1+\pi)}{(1+\pi^*)} \right] - \bar{D} \cdot \ln[(1+r)(1+\pi)] - CNF - DU \\ &= \bar{RES} \cdot \ln[(1+r^*)(1+\pi)] - \bar{D} \cdot \ln[(1+r)(1+\pi)] - CNF - DU \\ &= \bar{K} \cdot \ln[(1+g)(1+\pi)] \end{aligned}$$

After dividing by GDP and subtracting the effect of inflation on the value of capital $\pi \cdot K = \pi \cdot (res - b - d)$ from both sides one finds: $res \cdot r_{in}^* + b \cdot \pi_{in} - d \cdot r_{in} - cnf - du \geq k \cdot g_{in}$

Using the basic accounting identity again $k = res - b - d$. The following equation is derived:

$$b \cdot (\pi_{in} + g_{in}) \geq res \cdot (g_{in} - r_{in}^*) + d \cdot (r_{in} - g_{in}) + nfc$$

The last equation shows that for capital to grow or at least remain stable, as a ratio of GDP, money growth¹ should be enough to finance the accumulation of reserves, $res \cdot (g_{in} - r_{in}^*)$, part of the debt service, $d \cdot (r_{in} - g_{in})$, and the non financial costs, nfc .

Note that the central bank needs to buy $res \cdot g_{in}$ to keep the ratio of RES to GDP constant. However, since reserves are already growing, thanks to interest accrued on the investment of reserves, $res \cdot r_{in}^*$, the central bank needs to only buy $res \cdot (g_{in} - r_{in}^*)$.

¹ Which includes the inflation tax $b \cdot \pi$ plus money growth associated with real economic growth $b \cdot g$,

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V. MONETARY POLICY AND INFLATION¹

This note presents an empirical assessment of the monetary policy stance and the estimates of the exchange rate pass-through to inflation. We find that monetary policy is broadly neutral after the two consecutive policy rate increases in early 2014. Both monetary and financial conditions index as well as the estimates of the neutral monetary policy rate support this conclusion. The increase in inflation above the upper bound of the target range in 2014 can largely be explained by the pass-through from the nominal exchange rate depreciation to inflation. While depreciation pressures have now subsided, the risks that inflation may be higher than anticipated prevail. Hence, the central bank should remain vigilant.

1. **Inflation rose sharply and breached the upper limit of the target range in 2014.** Inflation stood at 5.9 percent in November, above the central bank's target range of 3–5 percent. Expectations remain stubbornly stuck at 6 percent—above the upper bound of the range. To contain the second-round effects from depreciation, the authorities have raised monetary policy rates twice since the beginning of the year (to 5.25 percent in May), undoing the interest rate reductions effected in the second half of 2013 (from 5 percent in May 2013).

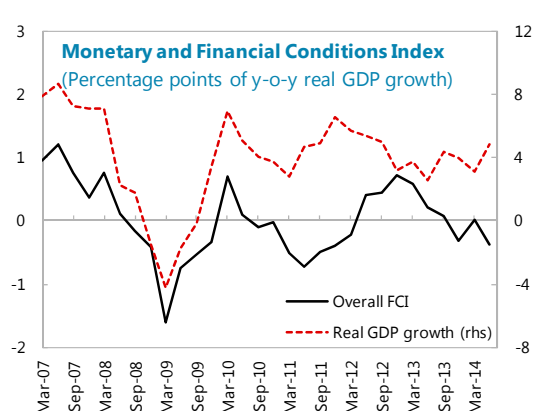
2. **The note employs a variety of empirical approaches to analyze current monetary policy stance and recent inflation developments.** First we construct the monetary and financial conditions index (FCI), which captures the effects of current financial conditions on real GDP growth. We then use three different models to estimate the neutral monetary policy interest rate to assess the adequacy of the current monetary policy stance. Finally, we estimate the pass-through from nominal exchange rate depreciation to inflation, using a linear regression model. The latter allows us to decompose the recent increase in inflation into the component related to exchange rate depreciation and other factors.

A. Monetary Policy Stance

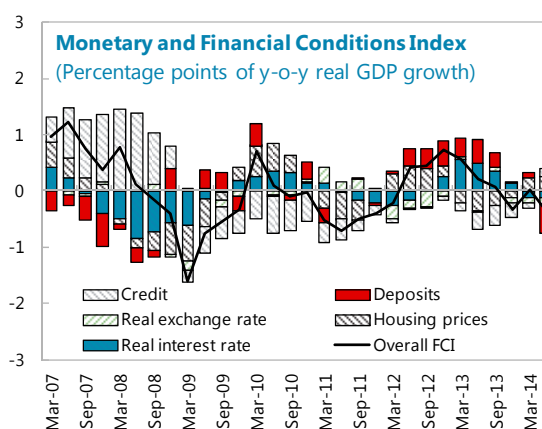
3. **The FCI summarizes information contained in key financial variables and captures the correlation with economic activity.** Hence, the FCI does not only capture the impact of monetary policy, but also broader interactions between financial and real variables. A VAR analysis was used to decompose the contribution of various financial indicators to real GDP growth. The FCI was built as the sum of the cumulative impulse responses of real GDP to each of the relevant financial variables. The financial variables included a summary measure of interest rates (the real interest rate of bank loans), the real effective exchange rate (REER), the real growth of deposits and of credit to the private sector, and a real housing price index (approximated by the housing component of the consumer price index). The model was estimated using quarterly data between 2001 and 2014.

¹ Prepared by Rodrigo Mariscal, Anna Ivanova, and Joyce Wong.

4. **The estimated FCI points to broadly neutral financial conditions in 2014.** The quarterly FCI shows that financial conditions were relatively easy between mid-2012 and mid-2013, mostly due to the increase in deposits and housing prices as well as lower real interest rates. These developments were likely related to easy global financial conditions, which led to notable capital inflows into Costa Rica. As the global financial conditions tightened after the beginning of the “tapering talk” by the U.S. Federal reserve in May 2013, the contribution of the FCI to real GDP growth declined to almost zero. Hence, the results indicate that monetary and financial conditions were neither propelling nor dragging GDP growth in the first quarter of 2014, even before the latest policy rate raise and tightened only slightly in Q2 2014.



Sources: National authorities and Fund staff estimates.



Sources: National authorities and Fund staff estimates.

5. **Another approach to assess the monetary policy stance is to estimate the neutral interest rate.** Following Magud and Tsounta (2012), these methodologies are used to estimate the neutral interest rate: the first takes advantage of the uncovered interest parity condition; the second uses a Taylor rule augmented for inflation expectations; and the third solves a general equilibrium model that focuses on aggregate demand-supply equilibrium.² The data used corresponds to the period between 2006 and 2014. Looking at the difference between the actual policy rate and the estimated neutral rate, an assessment of the monetary stance can be made taking into account the economy's current position in the cycle.

6. **The uncovered interest parity condition (UIPC) indicates the neutral nominal interest rate at 5.2 percent.** This value assumes an implicit annual nominal depreciation in line with the inflation differential with the U.S. to maintain the real exchange rate constant, and a country risk premium. The “model” comprises the following equations:

$$i_t = i_t^* + \hat{E} + \rho$$

$$\hat{E} = \bar{RER} + (\pi - \pi^*)$$

² For more methodological details see Magud, N., and E. Tsounta (2012).

where it is the neutral policy rate in Costa Rica, i_t^* is the current policy rate in the U.S., $\hat{\epsilon}$ is the expected nominal depreciation of the colon vis-à-vis the dollar, ρ is the risk premium as captured in the country's external bond spreads, RER is the real exchange rate, π is the inflation target in Costa Rica, and π^* is the current inflation projection in the U.S.³

7. The expected-inflation-augmented-Taylor-rule model estimates that the neutral nominal interest rate is around 4¼, depending on the time period used for the estimation. The model incorporates information from the yield curve and inflation expectations, in addition to the standard output gap and deviations from inflation target in standard Taylor rule models. The results show that the real neutral level for the monetary policy rate under this model is ¾, which corresponds to a neutral nominal interest rate of 4¼ percent with the staff's projected inflation of 5 percent at the end of Q1 of 2015.⁴ These results should be interpreted with caution, however, given that the model implicitly assumes a certain degree of sophistication of a country's financial markets. The model comprises the following equations:

$$r_t = r_t^* + \pi_t^e + \beta(\pi_{t+5}^e - \pi_t^*) + \theta \tilde{y}_{t+5} + \varepsilon_t^1$$

$$R_t = r_t^* + \alpha + \pi_t^e + \varepsilon_t^2$$

where r_t is the short-term rate (rate on the central bank's open-market operations), r_t^* is the neutral real policy rate, π_t^e is the end-of-year inflation expectation at time t , $\pi_{t+5}^e - \pi_t^*$ is the deviation of the end-of-year inflation expectation at time $t+5$ from the target, y_{t+5} is the output gap at five months ahead, R_t is the long-term rate (approximated by a long-term time deposit rate), and α is the term premium. All disturbance terms (ε_t^1 and ε_t^2) are assumed to be zero mean variables with constant variances.

8. The general equilibrium model puts the nominal neutral rate between 5.5 and 6 percent. The range of estimates arises from the different time samples used in the estimation. This model relies on an Investment-Savings (IS) equation—that relates the output gap to its own lags and lags of deviations of the monetary policy rate from neutral levels—and a Phillips curve that relates inflation to the output gap. This model depends less than the previous one on the structure of financial markets; however, it still assumes that the monetary transmission channel works efficiently. The model consists of the following equations:

³ The inflation differential with the U.S. is based on current inflation projections for the U.S. and on Costa Rica's inflation target (i.e. four percent), in line with the definition of the neutral rate in Costa Rica.

⁴ The estimated timeframe for the transmission from monetary policy rates to inflation is 5 to 6 months in Costa Rica.

$$(y_t - y_t^*) = \sum_{s=1}^S \alpha_s^y (y_{t-s} - y_{t-s}^*) + \sum_{v=1}^V \alpha_v^r (r_{t-v} - r_{t-v}^*) + x_{1,t}' \alpha + \varepsilon_t^y$$

$$\hat{\pi}_t = \sum_{p=1}^P \beta_p^\pi \hat{\pi}_{t-p} + \sum_{q=1}^Q \beta_q^y (y_{t-q} - y_{t-q}^*) + x_{2,t}' \beta + \varepsilon_t^\pi$$

where $y_t - y_t^*$ is the output gap, $r_t - r_t^*$ is the deviation of the nominal policy rate from the neutral policy rate, $\hat{\pi}_t$ is the deviation in core inflation from the inflation target, x_1 is the cyclical deviations of the oil prices and x_2 is a vector of two variables, the cyclical deviations of the food price index and the cyclical deviations of the real effective exchange rate. All disturbance terms (ε_t^y and ε_t^π) are assumed to be zero mean variables with constant variances.

| Neutral Interest Rate for Costa Rica. Latest Estimates. | | | |
|---|-----------------------------------|--------------------------------------|--------------------------------------|
| | | Expected Inflation Mar-2015 | 5.00 |
| | | Actual Monetary Policy Rate | 5.25 |
| Method 1/ | Neutral Real Interest Rate (NRIR) | Neutral Nominal Interest Rate (NNIR) | Nominal Monetary Policy GAP (bps) 2/ |
| Uncovered Interest Parity | 0.2 | 5.2 | -6 |
| Expected-Inflation Augmented Taylor Rule | | | |
| 2006-2014 sample | -0.8 | 4.2 | -106 |
| 2008-2014 sample | -0.7 | 4.3 | -98 |
| General Equilibrium Model | | | |
| 2006-2014 sample | 1.0 | 6.0 | 76 |
| 2008-2014 sample | 0.6 | 5.6 | 36 |
| Average | | | |
| 2006-2014 sample | 0.1 | 5.1 | -12 |
| 2008-2014 sample | 0.0 | 5.0 | -22 |

Sources: National authorities and Fund staff estimates.
Notes: 1/ All units expressed as percent points unless otherwise stated. 2/ (bps): Basis points

9. **To conclude, the monetary stance seems broadly adequate, however, vigilance is required going forward.** Based on the results of the three models above, the nominal neutral interest rate for Costa Rica ranges between 5.0 and 5.1 percent. The current nominal monetary policy interest rate of 5.25 percent is close to the estimated range, slightly above the estimated neutral monetary policy rate. Hence, with the output gap essentially closed and inflation projected to return to the target range by the end of Q1 of 2015, the monetary policy appears broadly neutral. This conclusion is also supported by the indications of neutral domestic financial conditions and by a moderating credit growth, which is generally consistent with financial deepening. The effect of nominal exchange rate depreciation has been largely passed through to prices. However, the risks to inflation are on the upside due to: (i) possible higher-than-estimated pass-through and second round effects from currency depreciation; (ii) potential for faster U.S. growth; (iii) upward food price pressures stemming from regional drought; and (iv) geopolitical threats to oil prices. Hence, the BCCR should remain vigilant and stand ready to raise interest rates if inflation does not decline as anticipated, particularly if it persists above the upper limit of the target range.

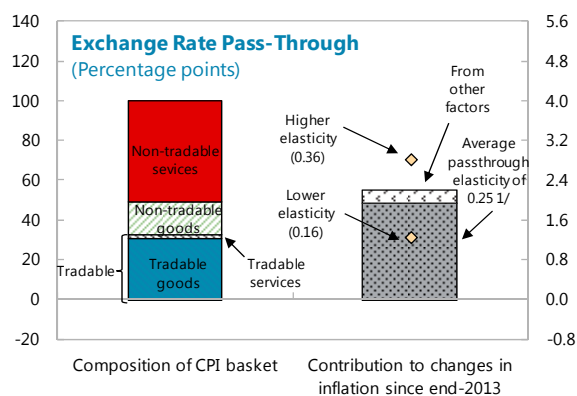
B. Pass-through from Exchange Rate Depreciation to Inflation

10. **To analyze the link between the recent rise in inflation and exchange rate depreciation, we employ an empirical model of pass-through.** A linear regression model of the year-on-year monthly inflation on the lag of change in the nominal exchange rate was estimated for the period 2000M1–2014M7. The model was then augmented to include a lag of the monetary policy gap computed as the difference between the neutral nominal interest rate (see section A) and the actual monetary policy rate 5 periods before. In addition, a specification including other controls such as the lag of change in oil prices, monetary policy gap, a dummy for high inflation (exceeding 10 percent) as well as the interaction of monetary policy gap and the dummy for high inflation with the change in the nominal exchange rate was estimated (Table 1).

| Dependent variable = Inflation (y-o-y, percent) | (1) | (2) | (3) |
|---|----------------------|-----------------------|-----------------------|
| Change in exchange rate (percent, lag) | 0.218*** (0.0455) | 0.356*** (0.0587) | 0.160*** (0.0494) |
| Change in oil prices (percent, lag 2) | | 0.0508*** (0.0112) | 0.00958* (0.00546) |
| Monetary policy gap (percent, lag 5) | | | 0.0704 (0.0953) |
| Change in exchange rate (percent, lag)*Monetary policy gap (percent, lag 5) | | | 0.0583*** (0.0183) |
| Dummy for high inflation (> 10 percent) | | | 6.705*** (0.411) |
| Change in exchange rate (percent, lag)*Dummy for high inflation (>10 percent) | | | 0.0522 (0.0886) |
| Constant | 7.077*** (0.317) | 6.335*** (0.287) | 5.443*** (0.234) |
| Observations | 96 | 95 | 92 |
| R-squared | 0.144 | 0.336 | 0.767 |
| Robust standard errors in parentheses | | | |
| *** p<0.01, ** p<0.05, * p<0.1 | | | |

These models were also estimated separately for food and non-food components of the CPI.

11. **The results suggest that the increase in inflation in 2014 can largely be explained by the pass-through from exchange rate depreciation.** The models presented above suggest a pass-through from nominal exchange rate changes to inflation ranging between 0.2 and 0.4 under current circumstances, in which the monetary policy gap is essentially closed and inflation is low by historical standards (below 10 percent). Using the average estimated elasticity of 0.25 we find that the exchange rate depreciation in early 2014 can explain 100 percent of the change in inflation between the end of 2013 and August 2014, leaving a slight negative residual from other factors. Separate regressions for food and non-food components of the CPI also suggest that both components are sensitive to exchange rate movements. The results also indicate that the nominal exchange rate pass-through is higher when monetary policy is relatively loose. This, perhaps, could explain the lower pass-through estimates we obtain, compared to those reported in the earlier literature, which estimated pass-through for the period preceding the global financial crisis, when monetary policy was relatively easy.⁵ A word of caution is, however, warranted. Given that exchange rate, prices, and interest rates are simultaneously determined, it may be difficult to disentangle the effects of



Sources: National authorities and Fund staff estimates.

1/ Average elasticity from three specifications, ranging from 0.16 to 0.36.

⁵ See, for example, Jorge Leon Murillo et al (2011).

depreciation on inflation as feedback loops are likely. Hence, the estimated pass-through is not a structural parameter but a reduced form coefficient, which may be changing over time. This concern was to some extent mitigated in our regression analysis by including the lags of variables on the right-hand side. Nonetheless, the uncertainty about the stability of pass-through estimates over time remains and the results should be interpreted with a grain of salt.

References

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- Murillo, J. L., A. P. Morera Martinelli, and W. Ramos Gonzales, 2001, "El Pass Through del Tipo de Cambio: Un Analisis Para la Economia Costarricense de 1991 al 2001," Banco Central de Costa Rica, Documento de Investigacion DEI-DM/11-2001-DI.

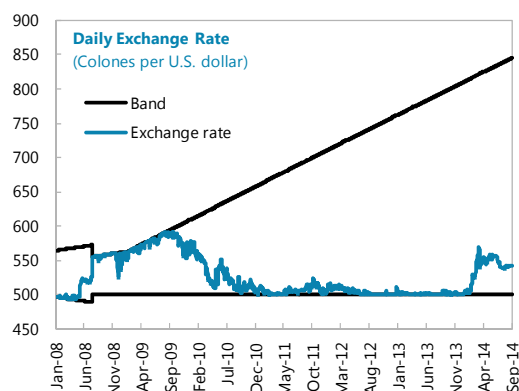
VI. TRANSITION TO A FLEXIBLE EXCHANGE RATE: LESSONS FROM PAST EXPERIENCE¹

This note considers the presence in Costa Rica of the basic pre-conditions for a smooth transition to greater exchange rate flexibility and inflation targeting. We conclude that Costa Rica would benefit from further exchange rate flexibility, which would help foster greater resilience to external shocks, and avoid the build-up of imbalances, in particular, in the face of a deteriorating fiscal position. The experience of other countries suggests that Costa Rica already has some important elements in place to support a successful transition, including a spot foreign exchange market, some components of inflation targeting, a basic prudential framework to monitor FX risks as well as a largely liberalized capital account. However, more could be done to prepare Costa Rica for a smooth exit, including developing foreign exchange derivative markets, strengthening the inflation targeting framework, as well as developing a coherent and transparent intervention strategy.

A. Background

1. The central feature of Costa Rica's current exchange rate regime has been its

fluctuation band.² Costa Rica has been following different variations of crawling pegs since the mid-80s in the context of an open capital account. The main focus of monetary policy was the real exchange rate with the goal of achieving external sustainability and growth. However, this policy had been accompanied by a persistent double-digit inflation. To combat high inflation, the Central Bank (CB) announced a gradual move towards Inflation Targeting (IT). The single rate crawling peg was replaced with a crawling band in 2006 and the band was widened twice in 2007. Open market operations were streamlined and the central bank established an overnight facility. A law to recapitalize the central bank was submitted to the legislature. But no specific date for IT introduction or a clear transition plan was announced. In 2008, the floor of the band was set flat and its width temporarily narrowed. However, in 2009 the width was increased and the ceiling was allowed to crawl at a higher rate. The lower bound is now fixed at C500.00 per U.S. dollar while the upper bound increases at a rate of C0.2 per U.S. dollar per business day. As a result, the band has progressively widened and currently comprises ± 25 percent around a theoretical mid-point.



or a clear transition plan was announced. In 2008, the floor of the band was set flat and its width temporarily narrowed. However, in 2009 the width was increased and the ceiling was allowed to crawl at a higher rate. The lower bound is now fixed at C500.00 per U.S. dollar while the upper bound increases at a rate of C0.2 per U.S. dollar per business day. As a result, the band has progressively widened and currently comprises ± 25 percent around a theoretical mid-point.

¹ Prepared by Lennart Erickson, Anna Ivanova and Jorge Restrepo. We gratefully acknowledge useful comments from Antonieta del Cid-Bonilla and Fernando Delgado. Rodrigo Mariscal provided excellent research assistance.

² The 2013 *Annual Report on Exchange Rate Arrangements and Exchange Rate Restrictions* classifies Costa Rica's exchange rate regime as "Stabilized Arrangement".

2. **The dynamics of the exchange rate within the band changed over time.** Initially, the exchange rate tracked the upper bound closely. However, with the onset of the global financial crisis it appreciated and remained at the lower bound with minor deviations during 2010–2013—the period of external inflows. In the wake of U.S. monetary policy normalization at end-2013, external inflows into Costa Rica slowed and domestic residents adjusted their portfolios, resulting in about 10 percent depreciation by March 2014 with partial reversal later in the year. The exchange rate stabilized away from the bottom of the band, but the upper bound still appears non-binding with a potential for depreciation of about 55 percent and one for appreciation of only 8 percent.

3. **As the exchange rate depreciated in 2014, the authorities intervened.** The Central Bank accumulated sizeable reserves since the beginning of the global financial crisis as capital inflows accelerated and the exchange rate remained at the bottom of the band. Reserves stood at US\$7.3 billion at end-2013, equivalent to 5.6 months of non-maquila imports. In the wake of sharp depreciation in 2014, the Central Bank intervened to stabilize the exchange rate, losing about 7 percent of its end-2013 reserve stock. There have been no official reserve sales since July 2014 and reserve coverage remains adequate. Amid the exchange rate volatility of early 2014, the CB announced changes in the intervention rule to allow for larger interventions. However, the parameters of the rule have not been disclosed.

4. **The greater exchange rate volatility comes in the context of rising external and domestic risks.** Growth faces headwinds from the withdrawal of Intel's manufacturing enterprise. The possibility of a growth slowdown in emerging and advanced economies as well as a surge in financial market volatility in the context of U.S. monetary policy normalization pose downside risks. Also, Costa Rica has a large fiscal deficit. The Central Government's overall deficit is expected to continue rising to 53/4 percent of GDP by 2019 with public debt reaching 51 percent of GDP.

B. Dangers of Exchange Rate Inflexibility and the Advantages of Flexibility

5. **There is no analytical consensus regarding the optimal exchange rate regime.** While as a general matter, the Fund tends to recommend greater exchange rate flexibility, this comes along with recognition that this advice may not be suitable for all countries at all times. Indeed, in as much as a consensus on optimal exchange rate regimes exists, it is that the optimal regime for any country at any given time depends on specific circumstances.

6. **However, there is agreement on the danger of a fixed exchange rate coupled with strong macro imbalances, most prominent of these being an unsustainable fiscal position.** Unsustainable fiscal deficits create a vicious cycle, as agents demand higher interest rates, which, in turn, worsen the fiscal position. As investor fears of either a monetization of public debt or default increase, pressures mount on the exchange rate. In a fixed exchange rate regime, these pressures can lead to a sharp drop in international reserves. Once reserves are exhausted, a sudden and severe depreciation results, usually along with an overall macroeconomic crisis. Different versions of this scenario played out during the Latin American debt crisis of the 1980s.

7. **The experience of Costa Rica during its crisis in the 1980s illustrates the point.** In the late 1970s, Costa Rica faced a decline in its terms of trade while higher world interest rates made external financing more expensive. Nonetheless, Costa Rica continued following expansionary policies, with the NFPS deficit rising to 11 percent and the current account deficit surging to 14 percent of GDP by 1980. With foreign financing drying up, the country suspended payments on its foreign debt service and abandoned the long-standing peg with exchange rate depreciating sharply. As the crisis unfolded, the real GDP fell by 5 percent, inflation surged to 65 percent and unemployment doubled to almost 9 percent.
8. **More generally, while a flexible exchange rate regime cannot correct for fiscal imbalances, it may help avert a crisis.** Flexible exchange rate regimes are no panacea in the face of fiscal sustainability problems. Indeed, allowing the exchange rate to depreciate could increase the cost of debt service, as FX debt becomes more expensive. However, allowing pressures on the external position to be absorbed by the exchange rate could help prevent a sudden drop in reserves and a disorderly and abrupt devaluation.
9. **In drawing lessons from the 1981 crisis, it is critical not to overstate the parallels to the current state of the Costa Rican economy.** The fiscal deficit in 1980 stood at 11.2 percent of GDP, compared to 5.4 in 2013. The external debt-to-GDP ratio alone stood at 56 percent, compared to 42 percent in 2013. The 2013 current account deficit of 5 percent of GDP was only about one third of the level in 1980. The current exchange rate regime also features a much greater degree of flexibility than in the run-up to the 1981 crisis. Nonetheless, both periods do have some commonality in the pairing of worsening fiscal imbalances coupled with less than fully flexible exchange rate regimes.
10. **Greater exchange rate flexibility could offer other advantages to Costa Rica.** Flexibility can allow for the better absorption of global shocks. With a flexible exchange rate, changes in world prices would be transmitted more directly to economic agents within the country, thereby aligning incentives to prevailing international conditions. Moreover, an expectation of flexibility would lead to the internalization of exchange rate risk by both creditors and debtors, which could facilitate de-dollarization of the financial system.

C. Moving Toward Exchange Rate Flexibility: Experiences and Lessons from Other Countries

Section 1. Orderly transitions³

Chile (1984–99)

11. **Chile's transition to a flexible exchange rate was gradual, lasting 15 years.** It occurred through a successive adjustment of the parameters of the band, including gradual step-by-step widening of the band, changes in the rate of crawl, as well as discrete adjustments to its central parity. The move towards flexibility was a response to changing economic conditions and an attempt to resolve conflicts among preserving external competitiveness versus anchoring inflation expectations, in particular, with a surge in capital inflows. The latter was tackled through imposition of capital controls, which were gradually lifted during transition to a float.
12. **Several elements facilitated a smooth exit:**
 - ***A relatively low degree of exchange rate pass-through.*** The pass-through from exchange rate to inflation was ex-post estimated at 0.2–0.3 though the pass-through was estimated as high as 0.6 during the transition due to the available earlier estimates. The estimates of pass-through for Chile are close to staff estimates for Costa Rica (see Analytical Note V).
 - ***Highly developed FX and financial markets*** minimized the negative effects and mitigated the fears of floating. Spot and forward markets developed over time as the authorities liberalized the regulations affecting arbitrage operations, authorized swap transactions, eased access to FX market, and allowed greater exchange rate flexibility. Capital markets were also well-developed, in part, due to the emergence of institutional investors (pension funds), which covered a large share of the demand for debt instruments.
 - ***A low level of dollarization and a prudent attitude of the private sector to exchange rate risk.*** The financial sector was more exposed than the corporate sector but the banks were also more familiar with risk management strategies and were able to hedge in offshore markets. The liberalization of the currency mismatch regulations was gradual. In the beginning, the banks were required to finish daily with a long cash position in their trading activities and FX operations while derivatives transactions were permitted only to support trade activities or investments abroad. Later the authorities introduced a framework for managing liquidity and interest rate risks and liberalized derivative transactions. Currency mismatches of debtors were incorporated in the credit evaluation of banks after XR was liberalized. Tight prudential rules and a well-functioning and liquid forward market helped manage FX risks in the private sector.

³ A summary based on Otker-Robe and others (2007).

- **Gradual capital account liberalization, which happened in parallel.** Controls on the outflows were removed first while retaining the market-based controls on inflows (unremunerated reserve requirements) till the end of the transition. Controls on derivative transactions were relaxed through the transition to facilitate handling of FX risks.
- **Implicit IT framework in place.** The changes in XR regime proceeded in parallel with the efforts to establish an alternative monetary policy framework. From 1990 a pre-announced inflation band target co-existed with the crawling band. Most of the IT elements were in place before the exit to a float, including autonomy of the central bank, well-developed and liquid financial markets, an effective capacity to conduct monetary operations, and a reasonable capacity to forecast inflation. A relatively good understanding of the transmission mechanism helped. Over the years, the CB gained credibility through the success in meeting the inflation targets and improved transparency through the publication of regular inflation reports and the release of the minutes of the policy meetings.

13. **A coherent and transparent intervention rule.** With the crawling band, the authorities intervened in the FX market on discretionary basis. After the adoption of the floating exchange rate the CB announced the possibility of intervening in exceptional situations. The interventions in the foreign exchange market were restricted to cases in which the real exchange rate was deemed to have deviated substantially from its equilibrium level, and the situation might prove damaging to the economy as a whole. Since the move to a floating exchange rate such interventions have taken place four times: in 2001, 2002, 2008, and 2011. The maximum amount and the specific period during which the CB could intervene were announced. However, no specific level of the exchange rate or any other measurable goals were targeted.

- **A well-developed and regulated financial sector.** By the time of the float the banking sector was sound with a large capital base, low level of dollarization, and relatively low non-performing loans. A strict regulatory and supervisory framework that limited exposure to credit and FX risk was also in place.
- **Prudent fiscal policy.** Fiscal authorities managed to maintain a fiscal surplus during the transition period, which facilitated lower inflation.

14. **The main challenge was to determine the timing of the introduction of the floating regime.** Assessing the state of preparedness was difficult. The fear of losses from currency mismatches and of the potential pass-through from exchange rate to inflation contributed to a delay in exit. The lack of the reliable and prompt information (outdated pass-through estimates, lack of information on household and corporate balance sheets, uncertainty about the level of derivatives market) contributed to the delay. The mismatches turned out to be less substantial and the availability of hedging better than had been assumed.

Israel (1985–2005)

15. **Israel's transition was more gradual than that of Chile, lasting 20 years.** Israel chose a gradual approach, in part as a result of an unsuccessful attempt for a sudden exit in 1977. The transition included: (i) an introduction of a hard peg to the USD, which helped reduce inflation from three-digit to two-digit level; (ii) a move towards a peg to a basket of currencies to smooth the volatility of bilateral rates to USD; (iii) an introduction of horizontal bands in response to persistent inflation differentials (iv) widening of the band in the wake of capital inflows; (v) replacing the horizontal band with the crawling band; (vi) the adoption of a crawling fan in the wake of capital inflows and increased sterilization costs; and finally, (vii) the abolishment of the band when it was essentially irrelevant.⁴

16. **Successful transition to a flexible exchange rate was supported by several elements:**

- **Development of foreign exchange and capital markets.** The FX market expanded with the entry of interbank brokers, foreign financial institutions, electronic trading, an increase in derivative products, spurred by increased exchange rate flexibility and, in some cases, due to the active involvement of the authorities. To address the fears of speculation with derivative products the authorities established safeguards such as maintaining documentation requirements for underlying transactions, allowing in stages forward transactions of longer maturities, and incorporating banks' direct and indirect exposures to FX risks associated with derivatives into prudential norms. Efforts were also made to develop the capital markets with the government increasing the issuance of standardized marketable securities.
- **Gradual capital account liberalization.** The restrictions on long-term flows were liberalized earlier than those on short-term flows and restrictions for non-residents were lifted before those for residents,
- **Coherent intervention policy.** With horizontal and crawling bands, interventions were often used as an ad hoc response to exchange rate developments. Regular interventions by the central bank at times tried to influence the path of the exchange rate to preserve competitiveness, and at times to keep it within an informal "inner band" to preserve its nominal anchor role. The central bank resisted stronger nominal depreciation than appreciation in light of hyperinflationary past, structural rigidities, and the strong pass-through effect to inflation. As markets gained confidence in the commitment and the ability of the central bank to keep exchange rate in a relatively narrow range, capital inflows ensued. The CB reduced and then fully ceased interventions with the move to the crawling fan—a policy maintained until the formal abolition of the fan 8 years later. The credibility of the regime was strengthened in the handling of contagion from the Russian debt crisis and the collapse of Long-Term Capital Management hedge fund, during which the CB did not

⁴The band was abandoned when its width reached 62.5 percent around a theoretical mid-point.

intervene despite the rapid and sizeable depreciation. The intervention policy became more transparent over time, moving from not announcing the central bank goals other than the formal bands to a policy of nonintervention, which gained considerable credibility. Since the global financial crisis, however, the CB has been intervening in the FX market, first at fixed amounts to increase the level of reserves, and later when sharp fluctuations were deemed not in line with macroeconomic fundamentals.

- **Efforts to ensure financial stability and capability to monitor FX risks.** Banks and supervisors gained the necessary capabilities to monitor and manage FX risks by the time of the exit, including explicit policies regarding management of direct and indirect FX exposures (e.g. charges against FX exposures, requirements of additional provisions against FX credit extended to borrowers with no FX income, maintenance of required minimum levels of FX liquidity). Banks' capital base had also been strengthened and modern market risk management techniques had been put in place.
- **Effective monetary policy and instruments.** The introduction of a de facto inflation targeting with a move to the crawling band laid out the foundation for an alternative nominal anchor before the float. Monetary policy instruments to support IT were developed at an early stage. Reserve requirements were reduced, short-term central bank bills were introduced, and the policy interest rate became the primary channel of monetary policy.

17. **The exit was also somewhat delayed.** The regime was maintained when the bands had already become irrelevant owing to: (i) the difficulty of ascertaining that the band had indeed become irrelevant, (ii) a belief that even if the band was not binding, its existence affected the behavior of the market, and that its abandonment would be destabilizing, (iii) the opposition to abandoning the band since it would give greater freedom of action to the central bank, even if only in principle.

Poland (1990–2000)

18. **Poland transition was gradual but faster than that of Chile or Israel, lasting 10 years.** The evolution of the exchange rate regime was largely in response to the introduction of the market economy principles, privatization and restructuring of enterprises, development of the financial system, and increasing openness. The XR regime evolved through 5 main stages: (i) a fixed peg initially vis-a-vis the dollar and then vis-à-vis a currency basket, which helped reduce inflation from four-digit to double-digit level; (ii) a preannounced crawling peg, (iii) a crawling band that was widened in several steps - a compromise between disinflationary and competitiveness goals; (iv) a de facto float with a formal wide crawling band while retaining an eclectic monetary policy framework focusing on both interest rates and exchange rate amidst capital inflows; and, (v) a free float, which was stimulated by the need for faster disinflation, high sterilization costs and as a result of the monetary policy regime change.

19. **Structural reforms strengthened sustainability and credibility of the transition:**

- **Development of monetary operations, FX, and financial markets.** The development of interbank deposit and Treasury bill markets facilitated banks' management of liquidity and monetary policy conduct. The CB contributed to the financial market development by creating infrastructure and institutions, setting standards, and creating incentives for market participants. The FX market was supported by increased exchange rate flexibility, with spot market being well-developed by the time the CB ceased interventions, while the derivative market developing gradually with the significant pick up only one year before the float.
- **Gradual capital account liberalization.** Capital account liberalization was based on careful sequencing. FDI was liberalized first while long-term portfolio and credit flows were liberalized after the significant reduction in interest rate differentials and increased exchange rate flexibility. Inflows were liberalized before outflows. Short-term capital movements and derivative transactions were liberalized only after the introduction of the float.
- **Coherent central bank communication strategy.** The intention to switch to a crawling band was announced in advance, which allowed time for banks and real economic agents to prepare for the new regime. Transparency associated with the exit from the crawling band to a free float was more complex. The intention to move towards IT was announced a few months in advance of the move to a float. However, transparency was more limited with respect to operational decisions (e.g. revaluations, crawling rate reductions), which were often announced one day in advance or not announced at all to avoid speculation.
- **Efforts to improve financial stability.** At the start of transition the banking sector was undercapitalized, poorly managed, and segmented, with underperforming loans being a threat to financial stability. The authorities took measures to recapitalize the banks, restructure bad loans, strengthen supervision, and introduce more restrictive standards, including tight limits on open FX positions. The result was improved credit quality, increased capital base, and modernized risk-management techniques. Specific capital requirements as well as close monitoring of FX risks were adopted only after the move to a float.
- **Coordination between the central bank and the ministry of finance.** It allowed reducing market volatility related to large-scale operations related to public sector debt management and privatizations.
- **Coherent and transparent intervention policy.** In the beginning, the CB conducted two types of FX interventions: "direct", performed by the CB dealers, and "indirect", the so-called fixing transactions with each domestic commercial bank conducting one FX transaction with the CB at the end of the day. The direct interventions were used to maintain an unofficial ("inner") intervention range within the band while "fixing" was intended to help small banks to close open positions in a segmented FX market (in practice large banks also used this facility). For two years the CB limited the flexibility of the exchange rate within the "inner" limits to resist strong appreciation pressures but the interventions became more reluctant

thereafter. The CB did not intervene in the wake of the 1998 Russian crisis when the currency depreciated sharply. Interventions became more transparent over time. The limits of the “inner” band were discretionary and not public. With the move towards greater flexibility, the CB ceased direct interventions and abolished the fixing arrangement. After the official floating the CB retained the right to intervene in the FX market, should it prove necessary for the achievement of IT. While there is no formal exchange rate goal, discretionary interventions are allowed. However, the CB abstained from interventions until April 2010, with only occasional interventions thereafter.

Section 2. Disorderly transitions include Brazil in 1999, the Czech Republic in 1997 and Uruguay in 2002⁵

20. **In disorderly exits the shift to greater exchange rate flexibility came in response to market pressures, which reflected underlying macroeconomic weaknesses.** In each of these countries, the catalyst of the disorderly exit was external contagion. For Brazil, the contagion came from the Russian crisis, for the Czech Republic from the Asian crisis, and for Uruguay from the Argentine crisis. The contagion was precipitated by the short-term capital inflows in the context of tight monetary coupled with expansionary fiscal policies. Downward pressures on exchange rates emerged as the flows reversed. In the case of Uruguay, the sudden shift in market confidence was exacerbated by a high degree of dollarization of the banking system.

21. **All three countries exited quickly, but the lack of supporting elements hampered credibility and prolonged the period of instability.** The exit happened within about six months from the onset of market pressures. FX derivative markets were absent or underdeveloped in all three countries. While Brazil and the Czech Republic had operational monetary policy instruments, the pass-through of interest rates to inflation was weak. In Uruguay basic elements of the effective monetary policy framework were lacking. All of the countries moved toward IT, though the speed of the exit and the lack of sufficient preparation hindered credibility of the policy targets. Partly as a result, all continued to intervene heavily the FX markets until market pressures abated. Nevertheless, the existence of some of the supporting factors helped minimize the negative impact of instability in Brazil and Czech Republic.

22. **In all of the cases of disorderly exit, the authorities continued interventions in the FX market, though the countries followed different approaches.** In Brazil, the central bank announced that interventions would be occasional and limited, but didn't specify a rule. Interventions subsequently picked up 2001–2002 in the wake of the Argentine crisis. In the Czech Republic, the central bank also did not adopt a rule, but did intervene in order to stabilize fluctuations, especially resulting from capital inflows. Intervention volumes were announced ex post. By contrast, immediately after floating Uruguay introduced daily FX auctions governed by a specific rule, namely that interventions were limited to fulfilling the central banks pre-announced FX liquidity

⁵ A summary based on Otker-Robe and others (2007).

needs. However, once the credibility of the new regime became better-grounded, the rule was dropped and interventions became less transparent.

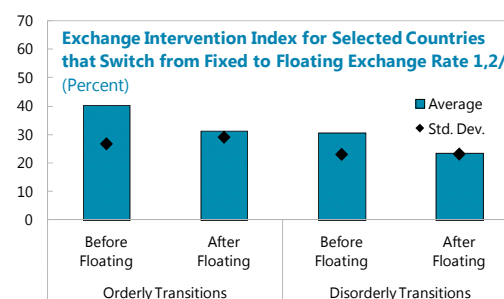
Section 3. Summary of the historical experiences and lessons from orderly and disorderly transitions

- **Greater flexibility was introduced when multiple monetary policy objectives became incompatible:** growing emphasis on reducing inflation, compared to other goals e.g., competitiveness. Exits were accelerated by the surge in capital inflows. In disorderly cases, the transitions were the result of market pressures highlighting weak fundamentals, in particular, fiscal imbalances, which could undermine the credibility of the monetary and exchange rate policies.
- Orderly transitions were gradual and lengthy (between 10 and 20 years) while disorderly transitions were quick (about 6 months).
- Slow transition process in the case of orderly exits allowed establishing elements that are needed to mitigate concerns about floating, namely, undermining policy credibility, loss of competitiveness, pass-through to inflation and the effects on the balance sheets.

The key ingredients for a successful transition to a float included:

- A deep and liquid foreign exchange market and financial markets supported by a stable financial system;
- Effective systems for reviewing and managing the exposure of both the public and private sectors to exchange rate risk;
- An appropriate alternative nominal anchor and, more generally, an effective monetary policy framework
- A coherent and transparent intervention strategy
- Advanced preparation paid off: having the main ingredients of flexibility in place before the transition as well as agreeing on the principles of the transition and characteristics of the new regime facilitated transitions.
- In orderly transitions, establishing the individual supporting elements was mutually reinforcing in that increased flexibility helped build the capacity for a float (e.g. the development of hedging instruments was stimulated by the introduction of the higher degree of flexibility). Hence, it is important to strike a balance: a premature introduction of exchange rate flexibility can be damaging, however, too much emphasis on meeting all preconditions may unduly prolong the move.

- Having good understanding of the transmission mechanism as well as the dynamics between the exchange rate and inflation could facilitate the transition.
- Consistent decision making and coordination between the central bank and the government is important. Policy reversals could be damaging to the credibility of the central bank with large costs to the economy.
- Both orderly and disorderly transitions were durable, i.e. no major reversals though in case of disorderly exits establishing monetary policy credibility turned out to be more difficult,
- Inflation and its volatility declined after both orderly and disorderly transitions (Figure 1). Nominal exchange rates became more volatile after orderly transitions, but the average annual depreciation declined in both cases. In both cases, the real effective exchange rate depreciated after transitions, thereby, improving competitiveness and reducing the current account deficits. FDI flows improved slightly while more risky portfolio flows declined. The degree of FX market intervention declined in both orderly and disorderly transitions.



Sources: WEO and Fund staff estimates.
 1/ Five-year window before and after the change in regime, excluding data from 2008 onwards.
 2/ The Exchange intervention index is calculated according to Barajas, A., L. Erickson and R. Steiner, 2008.

Section 4. Peru's recent experience with exchange rate flexibility (2002–14)

23. **Peru has undergone a slow transition towards more exchange rate flexibility.** After experiencing a hyperinflation during 1988–90, the economy went through a long period of stabilization, which started at the end of 1990. It took the authorities 10 years to bring inflation down to a level around the current long-run target of 2.0 percent. During the disinflation process, the central bank established targets for monetary aggregates. In the new low inflation environment, demand for base money became unstable and the central bank adopted IT in 2002 (with the interest rate as operational target), as a more efficient way of communicating the monetary policy stance to the public. IT is also seen as a way of credibly committing to price stability, which helps enhance the effectiveness of monetary policy and restore the use of the domestic currency to store value and reduce dollarization (Armas, Grippa 2005).

24. **Peru's IT regime departs from a pure IT framework, which, according to the central bank, is the consequence of the high degree of financial dollarization.** Such differences are related to the inflation target, the operational target, the inflation forecasting model, and the central bank's strategy to deal with the risks associated with dollarization.

- The target for inflation in Peru is lower than in any other Latin American country using IT. The low target was chosen because the domestic currency would be in better position to compete with the U.S. dollar.

- The use of the interbank interest rate as the operational target was particularly relevant for Peru: it reduced interest rate and macroeconomic volatility; enhanced the monetary policy transmission; contributed to build the yield curve in domestic currency working as the benchmark, thus helping the development of the local financial market and de-dollarization. The adoption of IT increased interest rate pass-through. However, the effect of the interest rate on the output gap is generally smaller in dollarized economies.
- The forecasting model, in particular the aggregate demand equation includes the real exchange rate, as well as both domestic and foreign interest rates, among other variables. Given that there is financial dollarization, changes in the interest rate in foreign currency affect consumption and investment. On the other hand, the parity condition implies inertia, meaning that due to dollarization, the central bank smoothes the trajectory of the exchange rate through interventions.
- The central bank has dealt with the risks associated with financial dollarization by emphasizing financial stability (macro-prudential policies) to avoid large swings in bank credit; promoting financial de-dollarization; inducing agents to internalize the risks of financial dollarization; and intervening in the foreign exchange market to reduce volatility and prevent balance sheet effects and accumulate enough foreign reserves to ensure the availability of liquidity in foreign currency.
- Inflation targeting in Peru is still very similar to how it is practiced in other countries. The central bank publically states that the inflation target should be perceived as the most important target for it to be credible. However, the authorities argue that this is not incompatible with foreign exchange interventions to avoid balance sheet effects of large exchange rate movements (Armas and Grippa, 2005).

25. **Several elements have facilitated increasing exchange rate flexibility:**

- **IT framework in place.** Establishing inflation targeting as the monetary policy framework sent the message to the public that the most important goal for the central bank is the level of inflation. This step enhanced credibility to the point that inflation expectations have been anchored around the inflation target for most years since 2002. This is crucial for the development of financial and capital markets in domestic currency.
- **A decreasing level of dollarization.** Various factors have fostered this process: 1) Inflation targeting contributed significantly to the de-dollarization process by stabilizing the inflation rate as well as the interest rate. Less volatility and more predictability of the real return of assets denominated in domestic currency facilitated the development of long-term financial instruments in local currency; 2) Allowing the exchange rate to fluctuate (not excessively) helped financial de-dollarization because agents internalize better the risks of dollarization. Less dollarization, in turn, reduces the risks of high exchange rate volatility; 3) Congress contributed to the de-dollarization trend with a 2004 law, according to which all prices should be listed in domestic currency. Credit and deposit dollarization has come down from

82 and 70 percent respectively in 2000 to 43 and 38 percent respectively in 2012 (Armas and Grippa 2005; Rossini et al., 2013).

- **Active use of macro prudential policies to guarantee financial stability.** Credit and liquidity risks associated to dollarization come from currency and maturity mismatches of financial intermediaries, in an environment where the central bank cannot issue foreign currency. To counteract these risks, the central bank accumulated a high level of foreign reserves so it can intervene and smooth excessive exchange rate volatility and act as lender of last resort in foreign currency should banks do not have enough of it. In addition, the authorities imposed prudential measures to prevent credit expansions (in particular in foreign currency) financed with sharp rises in capital inflows (Rossini, et al 2013). For instance, there is a higher level of reserve requirements on bank's foreign-currency liabilities, as well as limits to the long net foreign position for banks. Regulatory capital requirements are defined according to the type of credit and currency of the loan. Finally, there are limits to short and long positions as percentages of regulatory capital as well as net positions in financial products denominated in foreign currency. Also, there is a limit to long-term foreign liabilities of 2.2 times a bank's capital (Armas et al 2014; Choy and Chang, 2014; Rossini et al 2013).
- **Interventions.** Interventions are discretionary, daily, not pre-announced, and have the objective of reducing exchange rate volatility without committing to or signaling any desired level (ceiling/floor) of it. So, the authorities try to avoid one-sided bets by speculators. Interventions are carried out purchasing or selling dollars mostly in the spot market but also using swaps and reverse swaps to counteract pressures in the forward market. Interventions, specifically purchases of FX, were sterilized using to a great extent treasury deposits and reserve requirements, although the central bank also issues debt instruments. Authorities also introduced incentives for banks and pension funds to invest abroad (Rossini et al 2011, 2013).⁶
- **Prudent fiscal policy.** The fiscal authorities maintained fiscal surpluses for many years, which facilitated the handling of monetary policy. Gross public debt decreased from 47 percent of GDP in 2002 to 20 percent in 2012. The fiscal authorities have contributed significantly to sterilization of foreign exchange interventions by depositing substantial amounts of their financial surpluses at the central bank. In addition, the fiscal authorities have contributed to the development of a market for long-term financial instruments in domestic currency through the management of government liabilities aimed at building a yield curve. There is a high degree of policy coordination between the government and the central bank, even though the constitution guarantees independence to the central bank.

⁶ Tashu, M. (2014) analyzes the motives and effectiveness of foreign exchange interventions in Peru and states that the pattern of interventions suggests that 'leaning against the wind' could also be another objective of the intervention.

The central bank has the ability to establish its goals and instruments. The constitution also forbids the central bank to extend loans to the public sector or buy government securities (Rossini et al., 2012).

- **Capital account liberalization.** While there are no controls on capital outflows, there are high reserve requirements on foreign liabilities and even higher reserve requirements on foreign short term credit. There are also other mechanisms that reduce the return of foreign capital flowing into the country. For instance, there is a reserve requirement of 120 percent on deposits in local currency held by non-residents. There is a 4 percent fee on transfers of central bank instruments (sterilization certificates). There is a limit equivalent to 2.2 times a bank's capital to the long-term credit in foreign currency that it can obtain (Rossini et al., 2011, 2013).

D. Assessing Costa Rica's Preparedness to Float

26. **Costa Rica has a spot foreign exchange market, though rather thin, while the derivative and complementary markets are underdeveloped.** The main spot market is run on an electronic platform, with participation by both the BCCR and banks (daily turnover of about US\$95 million). A smaller spot market operates with participation from both banks and retail operations—mainly exchange houses—has a daily turnover of about US\$25 million. The central bank does not comprehensively collect information on spot transactions outside the MONEX platform, which captures only transactions among the banks. There is currently also no organized derivatives market. Banks do offer some forward contracts and interest-rate swaps on a limited basis. The derivatives market is unregulated. Hence, while there are no restrictions on derivatives transactions, it is not clear how the associated risks are assessed by the supervisor and how the derivatives market functions or could function. The prime constraint, however, appears to be a lack of interest by FX market participants in purchasing derivatives in the face of exchange rate stability. The interbank market is also underdeveloped, with banks' excess liquidity being absorbed by the BCCR. The securities market is largely limited to primary market in government securities, secondary market in repos of government securities, and a very thin stock market.

27. **The authorities would need to strengthen their capacity to monitor and contain exchange rate risk.** This is particularly important in light of the high dollarization of the Costa Rican banking system. While the prudential framework to control the overall FX risk exposure of the banks, including stress tests with FX shocks, as well as the measures to reduce FX risks is in place, it is somewhat obsolete. The BCCR also has a credit facility in foreign currency, but has expressed concerns about potential moral hazard, which could ensue from the existence of this facility. However, the private sector does not use derivatives to hedge their exposures on routine basis, and market participants are not accustomed to assessing the FX risks posed by regular market volatility. The authorities would need to continue strengthening the technical tools for tracking foreign exchange exposures and related credit risks, including the development of, forward-looking indicators of currency risk. In addition, measures to reduce FX risks, such as differential reserve requirements for FX deposits may help.

28. **The Costa Rican authorities would need to deepen their commitment to inflation as the sole nominal anchor.** While the BCCR already has a target range for inflation in place, nonetheless, inflation expectations are not well-anchored. The transmission mechanism from monetary policy is not well understood and the available estimates suggest a rather weak transmission. There are still some indexation mechanisms in place and the long-term domestic currency bond market remains underdeveloped. While the central bank has significantly improved its inflation forecasting methodologies, the models could be strengthened; particularly through the development of general equilibrium models. Monetary operations could also be streamlined by the establishment of weekly auctions and more vigorous intervention by the BCCR to fortify transmission from the policy interest rate to market interest rates. Clearer communication of the inflation targeting policy would be facilitated by establishing and announcing a regular schedule for monetary policy meetings, which are currently held on an ad-hoc basis, and monetary policy reports. Enhancing regulation and supervision of the financial sector would further fortify the monetary policy framework. Finally, addressing large fiscal deficits could help strengthen monetary policy credibility and reduce the potential for fiscal dominance.

29. **A policy for CB intervention would need to be developed and transparently communicated.** With the exchange rate currently fluctuating between the widening bands, the BCCR has announced that it is following an intervention rule to reduce volatility. However, the rule has not been disclosed publically. Given that many countries, including inflation targeters such as Peru, intervene in the foreign exchange markets after a move to a float, the CB in Costa Rica would presumably continue intervening as well, at least to some degree. To that end, it would be desirable to establish a transparent rule governing interventions. Such a rule should allow smoothing XR volatility but not counteracting established market trends.

30. **While capital account openness has been an issue in some countries' transitions to exchange rate flexibility, Costa Rica's capital account is already largely liberalized.** The country has no restrictions on short-term capital inflows or on capital outflows. As noted above, the lack of a developed foreign exchange derivatives market is largely due to the absence of market interest in such instruments rather than regulatory restraints. However, a recently adopted law empowers the executive, upon consultation with the Central Bank, to impose temporary restrictions on inflows of short-term capital through taxation and compulsory deposits with the Central Bank, though no measures have been imposed so far.

Costa Rica Table 1. Costa Rica: Extent of Preparedness for Transitioning to Greater Flexibility: Before the Full Float¹

| | Orderly Exits | | | Exits Under Pressure | | | Degree of preparedness |
|---|---------------------------------|------------------------------------|------------------------------------|-------------------------------|--------------------------------------|--------------------------------|----------------------------|
| | Chile (1984–99) ¹ | Israel (1985–2005) ¹ | Poland (1990–2000) ¹ | Brazil (1999) ¹ | Czech Rep. (1996–97) ¹ | Uruguay (2002) ¹ | Costa Rica (2014) |
| Ingredients of a Floating Regime | | | | | | | |
| I. FX Market Development | | | | | | | |
| Spots Markets | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ ⁸ |
| Derivative Markets/Hedging Instruments | ✓ | ✓ | ✓ ² | ✓ (futures) | ✓ ² | X | X ⁹ |
| Complementary Markets | | | | | | | |
| Interbank Money Market | ✓ | ✓ ³ | ✓ | ✓ | ✓ | X | ✓ ¹⁰ |
| Securities Market | ✓ | ✓ ³ | ✓ | ✓ | ✓ | ✓ ⁴ | ✓ ¹¹ |
| II. FX Risk Management Capacity | ✓ | ✓ | ✓ | X ⁵ | ✓ | X | ✓ ¹² |
| III. Alternative Monetary Policy Framework | ✓ | ✓ | ✓ | X | X | X | ✓ |
| Monetary Policy Implementation Capacity | ✓ | ✓ | ✓ | ✓ | ✓ | X | ✓ ¹³ |
| IV. Intervention Strategy for a Floating Regim | With the float | ✓ | With the float | With the float | ✓ | With the float | Discretionary intervention |
| Overall Preparedness | Well prepared | Well prepared | Well prepared | Reasonably well prepared | Reasonably well prepared | Not well prepared | Reasonably well prepared |
| <i>Memo: Capital Account Liberalization</i> | | | | | | | |
| Short-term Capital Inflows Liberalized | ✓ ⁶ | ✓ | ✓ ⁷ | ✓ ⁶ | ✓ ⁷ | ✓ | ✓ ¹⁴ |
| Capital Outflows Liberalized | ✓ ⁶ | ✓ | ✓ ⁷ | ✓ | ✓ ⁷ | ✓ | ✓ |
| Derivative Transactions Liberalized | ✓ | ✓ | ✓ ⁷ | ✓ | ✓ ⁷ | ✓ | ✓ |

Source: Otker-Robe and others (2007) and staff analysis

Note: FX = foreign exchange.

¹ The years in parentheses refer to the period of transition to a full float

² Major boom one year before the float.

³ Lagged behind compared to the foreign exchange markets.

⁴ For maturities less than 270 days.

⁵ The prudential framework was not in place to control the overall risk exposure of banks, with identified shortcomings mainly regarding the prudential regulation of banks' exposure to FX risk. Corporates in general (and banks) were making active use of the futures markets to hedge their exposures or to take speculative positions. Market participants were not accustomed to assessing, as a matter of routine, the FX risks posed by regular market volatility.

⁶ For Chile, all controls were removed shortly before or with the float. For Brazil, controls were liberalized gradually during the 1990s (inflow controls of 1993-96 liberalized by 1999), with further liberalization for nonresident investments after the float.

⁷ In the Czech Republic, most inflows and outflows had been liberalized by 1997, but certain inflow transactions (including financial derivatives) were liberalized in early 1999, following a transition period to phase out the remaining controls under the agreement with the Organization for Economic Cooperation and Development (OECD), with full liberalization taking place in 2002, until which time certain transactions (including some selective derivatives operations and short-term portfolio and deposit transactions) had remained controlled.

⁸ Spot market is relatively shallow and the central bank does not comprehensively collect information on spot transactions on regular basis.

⁹ Derivatives market is unregulated. Hence, while there are no restrictions on derivatives transactions, it is not clear how the associated risks are assessed by the supervisor and how the derivatives market functions in practice.

¹⁰ The interbank market is underdeveloped with low degree of market depth.

¹¹ The securities market is largely limited to primary market in government securities, secondary market in repos of government securities, and a very thin stock market.

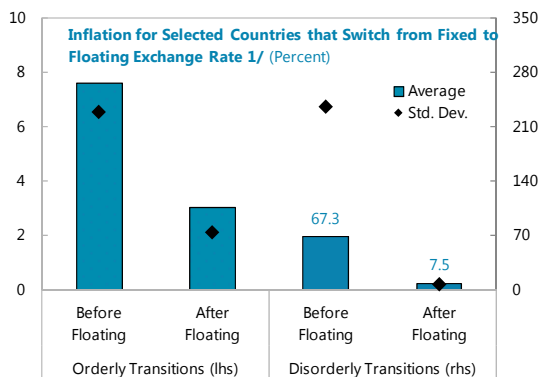
¹² While the prudential framework to control the overall FX risk exposure of the banks as well as the measures to reduce FX risks is in place, it is somewhat obsolete. The private sector does not use derivatives to hedge their exposures on routine basis and market participants in general are not accustomed to assessing the FX risks posed by regular market volatility. After the depreciation episode in 2014, the CB introduced some measures to smooth volatility in the FX market, including new requisitions for the buying/selling of FX by public sector entities. Specifically, before June 2014, the CB participated in the FX market in order to replenish NIR that was withdrawn by the public sector. Now, the CB can decide discretionally when and how to do this replenishment.

¹³ While monetary framework is largely in place, the transmission mechanism from policy rates to the market rates is rather weak.

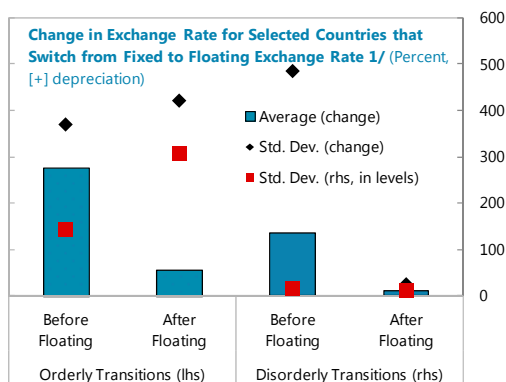
¹⁴ While there are no capital controls currently in place, a recently adopted law empowers the executive, upon consultation with the Central Bank, to impose temporary restrictions on inflows of short-term capital through taxation and compulsory deposits with the Central Bank.

Figure 1. Costa Rica: Historical Experiences with Transitions to Exchange Rate Flexibility

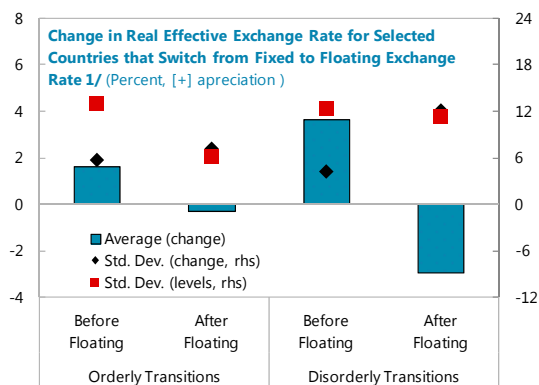
Inflation and its volatility declined after both orderly and disorderly transitions.



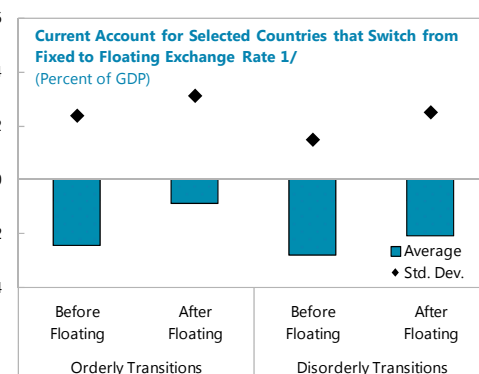
Nominal exchange rates became more volatile after orderly transitions, but in both cases the average annual depreciation declined.



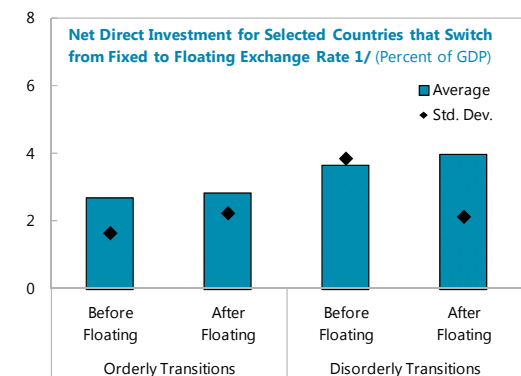
In both cases, real effective exchange rates depreciated after transitions, hence, competitiveness improved...



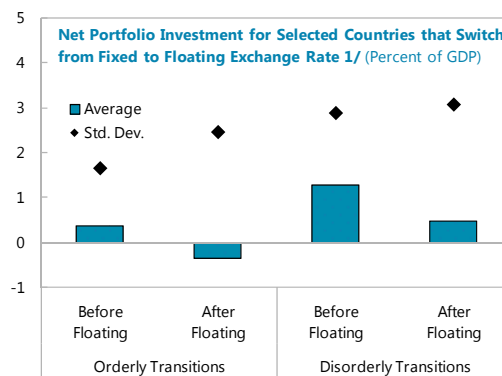
...leading to the declines in current account deficits on average.



At the same time, FDI somewhat strengthened...



...while more risky portfolio flows declined.



Source: Fund staff estimates.

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VII. FINANCIAL SECTOR ISSUES¹

This note assesses the stability of the financial system, with particular attention to the strength of the banking system and possible credit risks, particularly arising from borrowers with currency mismatches. The position of the banking system is analyzed by looking at the progress made in strengthening bank capital and liquidity, using the Basel III accord as a benchmark. Possible credit risks and related risks to financial stability are analyzed using a balance sheet approach which focuses on various types of mismatches in a country's sectoral balance sheets. The main conclusion is that the financial system appears sound, though dollarization continues to be a source of vulnerability.

A. Strengthening Bank Capital and Liquidity in Central America: The Road to Basel III²

Strengthening Bank Capital and Liquidity in Central America: the Road to Basel III

This section relies on a study of regulatory progress and growth implications in the transition from Basel I to Basel III in Central America,³ Panama, and the Dominican Republic (CAPDR) to draw implications on the strength of the banking system in Costa Rica. In particular, the study assesses the strengthening of bank capital and liquidity achieved by the CAPDR supervisory authorities, using the Basel III accord as a benchmark. It also estimates the impact of introducing Basel III capital requirements on short-term growth, and discusses challenges ahead and appropriate steps to be taken. The main conclusion for Costa Rica is that the financial system comfortably meets current regulatory norms and largely complies with Basel III requirements.

The Case for CAPDR countries to implement Basel III Standards

1. **The banking system in CAPDR is now more exposed to risk and competition.** During the last decade, the banking system in CAPDR increased their exposure to counterparty risk. In addition, a growing presence of foreign banks and increase in competition led to the introduction of new financial products, compression of profit margins, and higher risk-taking by local banks.

| CAPDR: Market Share of Foreign Banks 1/ (in percent of total assets, end-2011) | | | | | | |
|---|-----|-----|------|------|------|------|
| CRI | DOM | GTM | HND | NIC | PAN | SLV |
| 26.3 | 8.1 | 8.0 | 43.0 | 39.2 | 53.7 | 85.8 |

Source: Supervisory authorities.

1/ Excludes intra-regional banks.

¹ Prepared by Anna Ivanova, Jaume Puig-Forné and Jorge Restrepo.

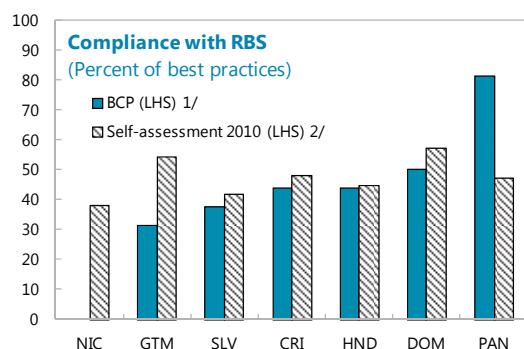
² This section presents the main findings in Basso, Oscar, Fernando Delgado and Mynor Meza, 2013. "Strengthening Bank Liquidity in Central America: the Road to Basel III." IMF Mimeo.

³ Guatemala (GTM), Honduras (HND), El Salvador (SLV), Nicaragua (NIC) and Costa Rica (CRI).

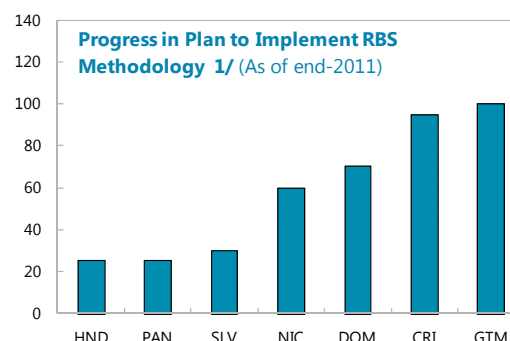
2. **Adopting Basel III will strengthen CAPDR financial systems.** CAPDR countries would benefit from promptly starting to gradually implement the higher prudential standards of Basel III. In particular, it would strengthen supervisor's skills and build up the regulatory and risk frameworks. It would also reduce profits associated with regulatory arbitrage and weaker supervisory capacity. Furthermore, it would strengthen the soundness of the regional financial system by anchoring the existing liquidity and capital buffers. Indeed, the current high levels of liquidity and capital buffers in the region could be largely explained by the slow recovery of domestic credit after the 2008-09 crises. An increase in loan demand could then lead to a quick drop in liquidity as well as in the risk weighted capital ratios below the minimum Basel III standards.

Compliance with Basel Framework in CAPDR

3. **CAPDR countries are in compliance with most of the Basel I framework and making progress in complying with core principles for banking supervision.**⁴ In terms of capital, most CAPDR countries have regulatory capital requirements above the minimum 8 percent of risk weighted assets (RWA). Furthermore, actual capital ratios are well above minimum regulatory requirements. In addition, Costa Rica, Nicaragua, and the Dominican Republic have instituted capital requirements for market risk, and Costa Rica has established requirements for operational risk. However, the use of credit risk models introduced by Basel II has not been implemented in the region. Regarding the capacity of supervision, progress has been made on the implementation of a Risk Based Supervision (RBS) approach, in which the assessment of capital soundness and risk management systems of financial institutions uses the "expert judgment" of the supervisor. Indeed, RBS techniques and broadening the supervisory perimeter have been the main priorities in banking supervision in most CAPDR countries in recent years (Delgado and Meza, 2011).



Source: IMF WP/11/299.
1/ Basel Core Principles compliance (last FSAP available). Not available for Nicaragua.
2/ Authorities' self-assessment, as of end-2010



Source: Supervisory authorities.
1/ Superintendencies' self-assessment on progress in the adoption of the RBS methodology.

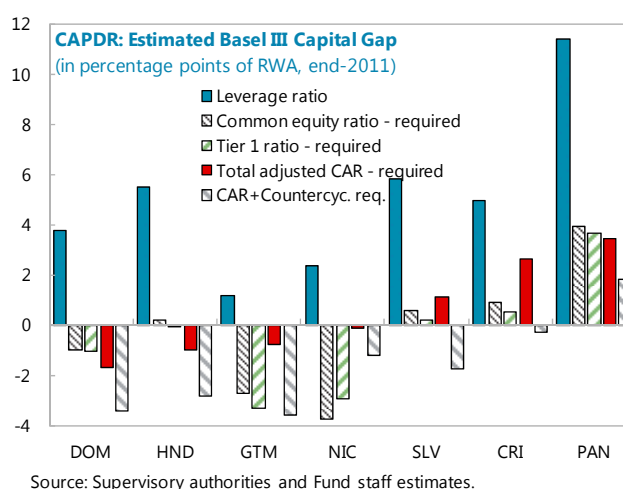
⁴ See Delgado and Meza (2011) for a previous assessment of compliance in the region.

4. **CAPDR countries are also adopting cross-border supervision.** Since 2006, CAPDR countries have been working to adopt a cross-border consolidated supervision scheme (CBCS) that identifies the risks assumed by financial conglomerates in the region, through the Council of Superintendents of Financial Institutions of CAPDR (CCSBSO). A methodology for effective consolidated supervision has been developed, with technical assistance from CAPTAC-DR,⁵ and common standards have been adopted in each country. Delgado and Meza (2011) estimate that the implementation of the core principles for effective banking supervision of the Basel Committee on Banking Supervision (BCBS) averages 67 percent.

CAPDR Basel III Capital and liquidity gaps

5. **The results show that when applying Basel III criteria, most countries in the region meet or exceed Basel III capital requirements for most categories.** Capital ratios decline

when adjusted by Basel III guidelines, due to adjustments in capital and RWA, but all countries in the region meet or are close to compliance with Basel III capital ratios. The exception is Guatemala, where all capital ratios (except leverage) are below Basel III minima. Several countries fall below the Basel II total capital adequacy requirement, but negative gaps are about or below 1 percent. Nonetheless, most banking systems in the region remain compliant with Basel III common equity and tier 1 capital requirements. Yet, in case supervisory authorities decide to implement a countercyclical buffer, a substantial strengthening of bank capital will be needed. In addition, there may be some heterogeneity, in particular in Costa Rica capital buffers overall appear lower in public banks, which also have weaker asset quality and earnings compared to private banks (Annex II). All of the banks in Costa Rica are in compliance with the leverage ratio though smaller private domestic banks appear more leveraged (Annex II).



6. **All the banking systems in the region meet or exceed Basel III minimum liquidity requirements.** Even after adjusting for the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR) methodologies, short-term liquidity exceeds more than double the Basel requirements in all countries, while long-term liquidity is particularly strong in Nicaragua and, to

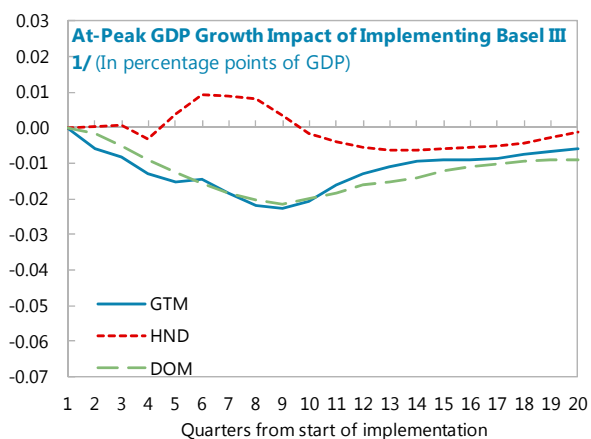
⁵ Regional Technical Assistance Center for Central America, Panama and the Dominican Republic.

a lesser extent, in Panama, Guatemala, and El Salvador.⁶ Nonetheless, in Costa Rica liquidity buffers are smaller in public banks (Annex II), in particular, in the two largest ones, possibly reflecting the implicit government guarantee and the explicit government guarantee on deposits.

Macroeconomic Impact of the Transition to Higher Capital Requirements

7. Implementing Basel III capital requirements will have a low impact on GDP growth.

Sensitivity analysis of GDP to shocks in CAR in CAPDR and estimates of the impact on GDP growth from increasing current CAR to meet Basel III minimum requirements show that the macroeconomic impact of the transition to Basel III total capital requirements is fairly low.⁷ Given the relatively low sensitivity of GDP growth to a CAR shock in the region and the high actual capital levels, the maximum at-peak impact will not exceed -0.02 percentage points of GDP growth (Guatemala). These results are in the low range of values for the macroeconomic impact of the transition to stronger capital and liquidity requirements for BIS countries compiled by the BIS Macroeconomic Analysis Group (MAG).



Sources: Supervisory authorities and Fund staff estimates.

1/ Costa Rica has no fiscal gap.

8. **The response of GDP growth is valid for any reason the capital ratio increases.** The econometric estimation of the impact on GDP growth of a CAR change does not hinge on the motivation for such change. Therefore, after any CAR increase is decided; for example, to match higher regulatory capital ratio levels for required buffers, or to comply with a leverage ratio requirement, one should observe an impact on GDP growth equal, on average, to the estimate obtained with the VAR approach.

Missing Steps for Basel III and Implementation Challenges

9. **CAPDR countries should continue the pragmatic approach they have followed in the implementation of Basel standards.** The transition from one Basel accord to another should not be understood as a linear process. Thus, CAPDR countries will continue to focus on the implementation of those elements of Basel III that are more relevant for their financial

⁶ Excess liquidity over Basel III requirements is estimated following Basel Committee on Banking Supervision (BCBS) instructions (BIS, 2010). See Delgado and Meza (2011) for a previous assessment of compliance in the region.

⁷ The VAR analysis used to estimate the effect of CAR hikes on GDP growth follows Lown and Morgan (2006), and Berrospide and Edge (2010).

markets. For instance, the implementation of Basel II.5 regarding positions in derivatives and portfolio securitization has not been a short term priority since they represent a small share of CAPDR banks' operations.

10. **The elements of Basel III implementation that are more relevant for CAPDR financial markets and should have the highest short-term priority are:** (i) adopt Basel III definitions of capital following standards of quality and transparency to allow a more meaningful comparison of the capital position of banks; (ii) implement a capital conservation buffer; (iii) introduce a leverage ratio; and (iv) incorporate market and operational risk capital requirements. The capital and leverage requirements will strengthen soundness and avoid excessive risk taking. In the medium-term, priority should be put on: (v) aligning liquidity requirements with Basel III; and (vi) strengthening the supervisory process (Pillar II) and market discipline and transparency (Pillar III). In the long term, other elements might become important, such as: (vii) considering macroprudential instruments; and (viii) implementing capital charges for SIFIs.

11. **There are several legal and industry-based challenges to Basel III implementation in CAPDR, yet they seem manageable.** Implementing most Basel III elements require regulations that fall largely under the purview of the region's supervisory authorities (with the exception of the Dominican Republic). At the industry level, the strong presence of large international financial groups in the region might lead to a "de facto" compliance with Basel III. However, supervisors are still concerned about the ability of some local and regional groups to adapt to the new regulatory framework because banks would need: (i) skilled staff; (ii) sound IT systems; and (iii) financial muscle to strengthen the capital base. In spite of high average capital buffers, supervisory authorities of five out of seven countries also consider increasing capital levels a challenge for the industry. This apparent paradox is explained because in some countries adjusted levels of tier 1 capital are relatively low (Guatemala), the adoption of specific capital charges for market and operational risk is a challenge (Honduras), and the authorities have a medium-term focus on the implementation of countercyclical capital buffer requirements (Nicaragua and Panama).

B. Balance Sheet Analysis⁸

This section of the financial sector issues note looks at risks to financial stability using balance sheet analysis of the Costa Rican economy. Particular attention is paid to the external position of the economy and currency mismatches that often play a key role in emerging market crises.⁹ The balance sheet of the aggregate economy has been weakened by the recent deterioration in the fiscal situation. The external position has also deteriorated, mostly as a result of increased reliance by commercial banks on external financing. However, external risks at the country level remain limited given the large stock of FDI liabilities relative to external debt as well as the sizeable official reserves relative to short-term debt. This study also finds that risks from currency and maturity mismatches are limited, concentrated in the non-financial public sector and financial sector respectively.

12. **The Balance Sheet Analysis (BSA) was developed as a useful framework to help better understand the financial crises of the late 1990s and early 2000s.** It was proposed by Allen et al. (2002) and has been applied to many emerging-market countries. The BSA studies the stocks of financial assets and liabilities and analyses the maturity and currency mismatches at the aggregate economy level and at each economic sector. It can highlight a country's vulnerabilities to liquidity or solvency problems and reveal potential spillovers across sectors that can transmit the impact of economic shocks.

13. **The main instrument for this analysis is the balance sheet matrix.** It typically depicts five sectors: (i) the central bank; (ii) the non-financial public sector which includes the central government, state and local governments, public non-financial firms, and social security; (iii) the financial sector including other depository corporations and other financial firms (nonbanks); (iv) the non-financial private sector which includes non financial corporations and other domestic resident sector (largely households); and (v) the rest of the world or nonresidents. Within each sector, assets and liabilities are decomposed into foreign currency or domestic currency and some estimates can be made of maturity structure. The matrix shows the inter-sectoral claims and liabilities between each domestic sector and versus nonresidents (see Annex I for the basic structure of the matrix).

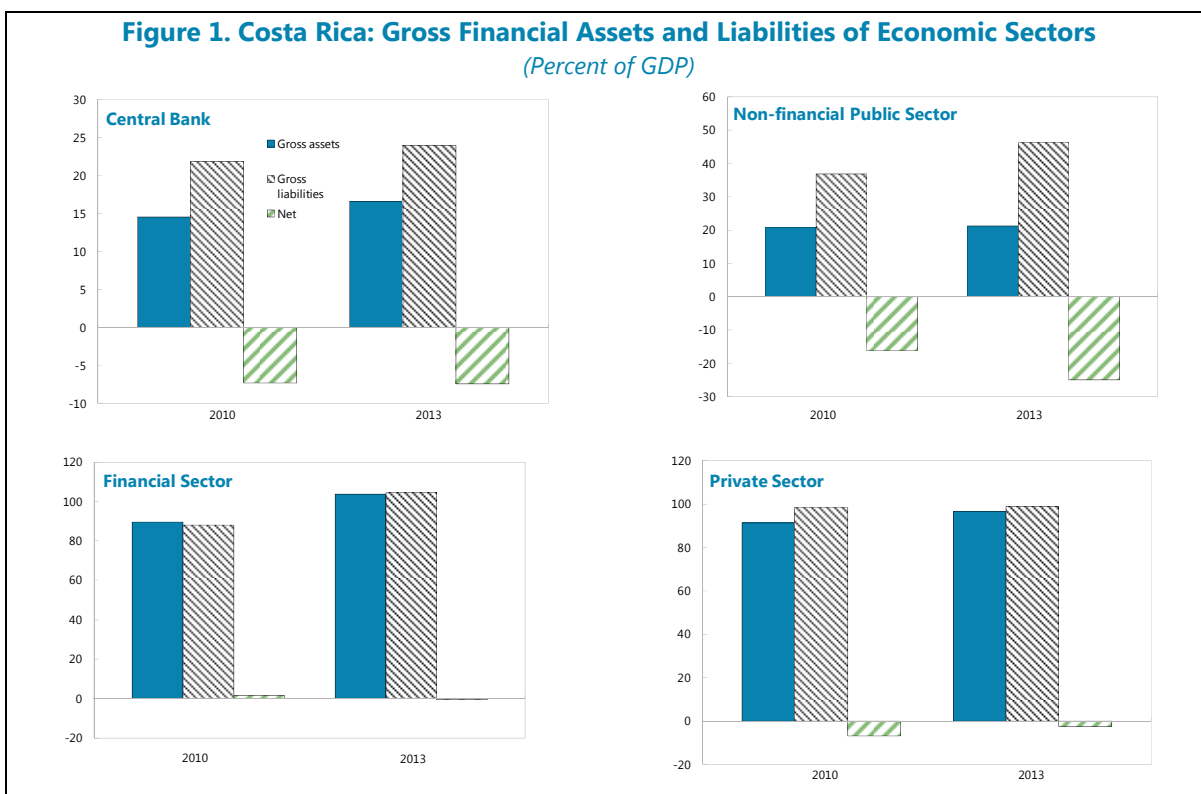
14. **The overall balance sheet positions of the domestic economic sectors have changed moderately since 2010.**¹⁰ The central bank remains a net debtor as the sterilization cost of the accumulation of foreign reserves continues to weigh on its balance sheet (Analytical Note IV). The non-financial public sector's net debtor position has increased driven by large fiscal deficits

⁸ Prepared by Jaume Puig-Forné

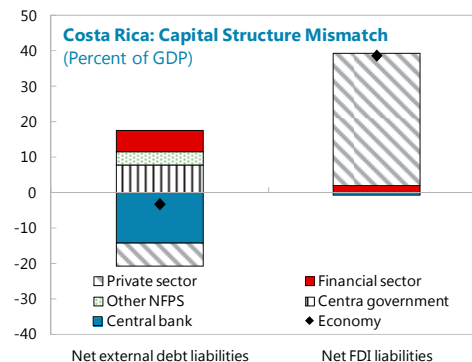
⁹ Allen, Rosenberg, Keller, Setser and Roubini (2002).

¹⁰ This is the first year when comprehensive BSA data are available from the central bank. The period since 2010 captures part of the recent period of worsening domestic fiscal situation, as well as the recent period of strong capital inflows into emerging markets.

of the central government (Analytical Note III). The financial sector’s net creditor position has switched from small creditor position to small debtor position following the increase in the sector’s external debt. Meanwhile, the private sector’s debtor position, which mainly reflects its large FDI liabilities, has declined somewhat reflecting continued increase in bank deposits and other savings instruments (Figure 1).



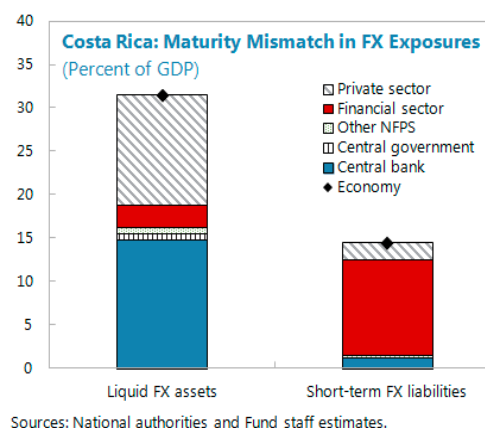
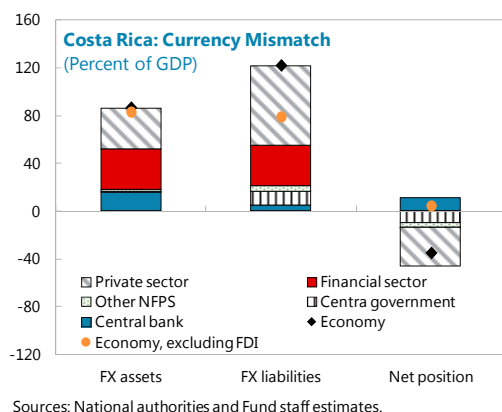
15. **External risks at the country level are limited given the dominance of FDI liabilities and the sizeable official reserves.** Costa Rica has a total net external debtor position of about 35 percent of GDP in 2013, but this largely reflects large FDI liabilities, which are a sign of a strong capital structure at the country level. Excluding FDI liabilities, the economy has a small net creditor position of about 4 percent of GDP, implying reduced risks of capital account crises (Table 1).¹¹ The economy as a whole also has limited



Sources: National authorities and Fund staff estimates.

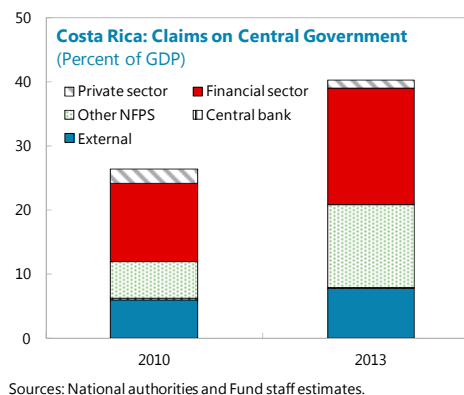
¹¹ A country’s capital structure is critical in determining its vulnerability to market volatility. Emerging markets that undergo capital account crises tend to have “inverted” capital structures that magnify a shock, with debt-service payments generally remaining unchanged or increasing—if denominated in FX or with floating rates—as payment capacity decreases during crises. In contrast, payments from equity are state contingent, with profits and dividends falling in bad times. (IMF, 2002).

vulnerability to currency risks, given its positive net FX debt position (Table 1).¹² The existing currency risks are concentrated in the non-financial public sector, which would suffer the largest losses in the event of an exchange rate shock—about 4 percent of GDP with a 30 percent depreciation shock (Table 2). Vulnerabilities arising from maturity mismatches in FX exposures are also limited at the country level, given sizeable official reserves and private sector liquid foreign assets relative to short-term FX liabilities concentrated in the financial sector (Table 1).¹³



16. The total public sector is exposed to risks from currency mismatches, although these have declined with the accumulation of official reserves.

The public sector has a net external creditor position of about 3½ percent of GDP, reflecting sizeable central bank reserves relative to external debt of the central government and public enterprises (Table 1). However, the public sector has a net FX debtor position once FX-denominated domestic debt of the central government and commercial banks' claims on central bank reserves—related to required reserves on FX deposits—are also taken into account. The public sector's net FX debtor position has declined from 6 to 3 percent of GDP from 2010 to 2013 reflecting mostly the accumulation of central bank reserves over this period. The weakening of the fiscal situation of the central government in recent years has not substantially increased the country's external vulnerabilities according to the BSA analysis, as the bulk of the increase in debt has been financed by the social security fund and the domestic financial sector.¹⁴ Maturity risks in FX exposures of the public sector are limited



¹² Again excluding FDI liabilities.

¹³ Analysis of maturity mismatches at the economy level focuses on short-term FX exposures, since short-term exposures in domestic currency vis-à-vis the rest of the world are virtually non-existent.

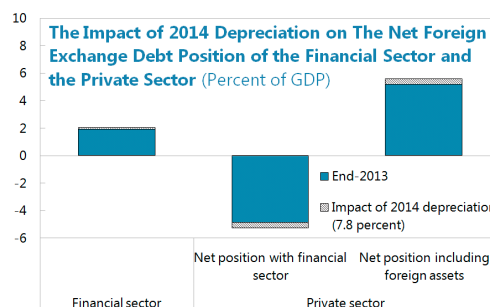
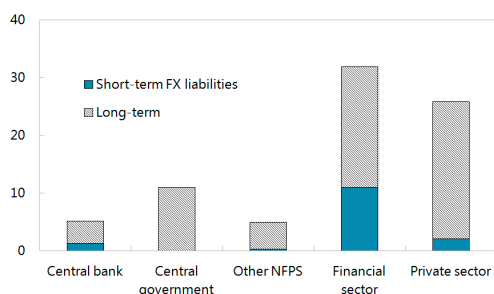
¹⁴ Notwithstanding recent large Eurobond issuance, the increase in domestic debt over the entire period of rising debt—since 2008—has been seven times as large as the increase in external debt.

given the large size of official reserves and the typically long maturities of public sector external debt.

17. **The financial sector maintains a net FX creditor position despite a significant increase in foreign borrowing.** The net external debtor position of the financial sector, excluding net FDI exposures, has increased from 1 to 6 percent of GDP from 2010 to 2013 as financial corporations have increased reliance on foreign bank borrowing and ramped up bond issuance in international markets. That said, the financial sector maintains a modest net foreign currency creditor position—excluding net FDI exposures—of about 2 percent of GDP, as the sector channeled the additional external financing into domestic credit in FX, avoiding direct currency mismatches in their balance sheets on aggregate (Tables 1 and 2). The financial sector is the sector of the economy with the greatest maturity mismatches in FX exposures, consistent with the typical maturity transformation function of the sector.¹⁵

18. **Vulnerabilities from currency risks in the non-financial private sector appear limited to positions vis-à-vis the banking sector.** The private sector has a net FX debtor position of 5 percent vis-à-vis the domestic banking sector, implying a risk that currency mismatches in these positions could translate into credit quality issues for the banking sector in the event of currency depreciation. For example, the depreciation experienced in 2014 has generated losses of about 0.5 percent in private sector positions with the domestic banking sector (Table 2), and a larger 30 percent depreciation shock would cause losses of about 1.5 percent of GDP. The private sector, however, has an overall net FX creditor position of 5 percent of GDP once foreign assets held by the sector are also taken into account (Table 2). This implies that the private sector in aggregate benefits from currency depreciation. Maturity risks in FX positions of the private sector are minimal, given that short-term FX bank deposits are significantly larger than short-term FX liabilities (Table 1).¹⁶

Costa Rica. Maturity Breakdown of FX debt liabilities
(Percent of GDP, 2013)



1/ Private sector net FX position with financial sector includes FX bank credit and deposits of non-financial corporations and households. Private sector net FX position also includes foreign assets of these sectors.

¹⁵ The strength of the capital structure of banks is analyzed in section C of this AN from a regulatory capital point of view.

¹⁶ Lack of detailed data on breakdown of private sector into nonfinancial corporations and households prevents the analysis of the strength of the capital structure of nonfinancial corporations.

Table 1. Costa Rica: External and Foreign Currency Positions

| | Non-financial | | | | | Economy |
|--------------------------------------|---------------------|---------------|---------------|------------------|----------------|---------|
| | Central Bank | Public Sector | Public Sector | Financial Sector | Private Sector | |
| End-2013 | (In percent of GDP) | | | | | |
| Gross External Assets | 16.0 | 0.7 | 16.7 | 4.2 | 13.7 | 34.5 |
| Gross External Liabilities | 1.0 | 12.2 | 13.2 | 12.3 | 44.4 | 69.8 |
| Net External Position | 15.0 | -11.5 | 3.5 | -8.1 | -30.7 | -35.3 |
| <i>Net External Debt Position 1/</i> | 15.0 | -11.5 | 3.5 | -6.0 | 6.6 | 4.0 |
| Gross FC Assets | 16.0 | 1.9 | 17.8 | 34.1 | 34.3 | 86.2 |
| Gross FC Liabilities | 5.1 | 15.8 | 20.9 | 34.3 | 66.4 | 121.6 |
| Net FC Position | 10.9 | -14.0 | -3.1 | -0.2 | -32.1 | -35.4 |
| <i>Net FX Debt Position 1/</i> | 10.9 | -14.0 | -3.1 | 1.9 | 5.2 | 4.0 |
| Gross ST FC Assets | 14.7 | 1.5 | 16.2 | 2.6 | 12.7 | 31.4 |
| Gross ST FC Liabilities | 1.2 | 0.3 | 1.5 | 11.0 | 2.0 | 14.4 |
| Net ST FC Position | 13.5 | 1.2 | 14.7 | -8.4 | 10.7 | 17.0 |
| End-2010 | | | | | | |
| Gross External Assets | 14.3 | 0.4 | 14.7 | 4.9 | 15.3 | 34.9 |
| Gross External Liabilities | 1.4 | 10.9 | 12.3 | 7.9 | 43.5 | 63.6 |
| Net External Position | 12.9 | -10.4 | 2.4 | -3.0 | -28.2 | -28.8 |
| <i>Net External Debt Position 1/</i> | 12.9 | -10.4 | 2.4 | -0.9 | 6.2 | 7.8 |
| Gross FC Assets | 14.2 | 2.7 | 16.9 | 34.0 | 39.9 | 90.8 |
| Gross FC Liabilities | 6.8 | 16.3 | 23.0 | 33.9 | 61.9 | 118.9 |
| Net FC Position | 7.4 | -13.5 | -6.1 | 0.1 | -22.1 | -28.1 |
| <i>Net FX Debt Position 1/</i> | 7.4 | -13.5 | -6.1 | 2.2 | 12.4 | 8.5 |
| Gross ST FC Assets | 12.7 | 2.2 | 14.9 | 2.3 | 13.5 | 30.7 |
| Gross ST FC Liabilities | 2.3 | 0.2 | 2.5 | 13.2 | 4.1 | 19.8 |
| Net ST FC Position | 10.4 | 2.0 | 12.4 | -10.9 | 9.4 | 10.9 |

Sources: Banco Central de Costa Rica, and Fund staff estimates.

1/ Excluding net FDI position.

Table 2. Costa Rica: Net Foreign Currency Debt Position and Exchange Rate Shocks

(In percent of GDP)

| | End-2013 | Loss/Gain | |
|-------------------------------|----------|------------------------|---|
| | | From 2014 depreciation | From large exchange rate shock (30 percent) |
| Central bank | 10.9 | 0.8 | 3.3 |
| Nonfinancial public sector | -14.0 | -1.1 | -4.2 |
| Financial sector | 1.9 | 0.1 | 0.6 |
| Private sector | | | |
| Vis-à-vis financial sector 1/ | -4.9 | -0.4 | -1.5 |
| Vis-à-vis all sectors 2/ | 5.2 | 0.4 | 1.6 |

1/ Includes FX bank credit and deposits.

2/ Includes FX bank credit and deposits, and net foreign assets of the private sector.

Annex I. Costa Rica: Net Intersectoral Asset and Liability Positions

Table A1. Net Intersectoral Asset and Liability Positions, 2010

(In percent of GDP)

| Issuer of liability (debtor) | Public sector | | | | | | | | | Financial Sector | | | | | | Nonfinancial Private Sector | | | Rest of the World | | |
|---------------------------------|---------------|-------------|----------|--------------------|-------------|----------|----------------------------------|-------------|----------|-------------------------------|-------------|----------|------------------------------|-------------|----------|---|-------------|----------|-------------------|-------------|----------|
| | Central bank | | | Central government | | | Public Nonfinancial Corporations | | | Other depository corporations | | | Other financial corporations | | | Includes non-financial corps and households | | | Nonresidents | | |
| | Claims | Liabilities | Net pos. | Claims | Liabilities | Net pos. | Claims | Liabilities | Net pos. | Claims | Liabilities | Net pos. | Claims | Liabilities | Net pos. | Claims | Liabilities | Net pos. | Claims | Liabilities | Net pos. |
| Central bank | | | | 2.3 | 0.3 | 2.0 | 1.1 | 0.0 | 1.1 | 10.3 | 0.0 | 10.3 | 2.2 | 0.0 | 2.1 | 4.6 | 0.0 | 4.6 | 1.4 | 14.3 | -12.9 |
| In domestic currency | | | | 0.6 | 0.3 | 0.3 | 1.0 | 0.0 | 1.0 | 6.9 | 0.0 | 6.9 | 2.1 | 0.0 | 2.1 | 4.4 | 0.0 | 4.4 | 0.0 | 0.1 | -0.1 |
| In foreign currency | | | | 1.7 | 0.0 | 1.7 | 0.0 | 0.0 | 0.0 | 3.5 | 0.0 | 3.5 | 0.1 | 0.0 | 0.1 | 0.1 | 0.0 | 0.1 | 1.4 | 14.2 | -12.8 |
| Central government | 0.3 | 2.3 | -2.0 | | | | 5.7 | 0.3 | 5.4 | 5.4 | 1.6 | 3.8 | 6.8 | 0.9 | 5.9 | 2.3 | 0.2 | 2.1 | 5.9 | 0.0 | 5.9 |
| In domestic currency | 0.3 | 0.6 | -0.3 | | | | 5.4 | 0.3 | 5.0 | 2.9 | 1.6 | 1.3 | 5.7 | 0.9 | 4.8 | 1.6 | 0.2 | 1.4 | 0.0 | 0.0 | 0.0 |
| In foreign currency | 0.0 | 1.7 | -1.7 | | | | 0.3 | 0.0 | 0.3 | 2.5 | 0.0 | 2.4 | 1.1 | 0.0 | 1.1 | 0.7 | 0.0 | 0.7 | 5.9 | 0.0 | 5.9 |
| Public Nonfinancial Corps. | 0.0 | 1.1 | -1.1 | 0.3 | 5.7 | -5.4 | | | | 0.3 | 2.1 | -1.7 | 1.2 | 0.2 | 1.0 | 3.6 | 5.9 | -2.3 | 5.0 | 0.4 | 4.6 |
| In domestic currency | 0.0 | 1.0 | -1.0 | 0.3 | 5.4 | -5.0 | | | | 0.1 | 1.9 | -1.8 | 0.4 | 0.1 | 0.3 | 3.6 | 5.9 | -2.3 | 0.2 | 0.0 | 0.2 |
| In foreign currency | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | -0.3 | | | | 0.2 | 0.1 | 0.1 | 0.8 | 0.0 | 0.8 | 0.0 | 0.0 | 0.0 | 4.8 | 0.4 | 4.4 |
| Other depository corporations | 0.0 | 10.3 | -10.3 | 1.6 | 5.4 | -3.8 | 2.1 | 0.3 | 1.7 | | | | 7.8 | 2.0 | 5.9 | 49.7 | 46.9 | 2.7 | 7.8 | 4.2 | 3.5 |
| In domestic currency | 0.0 | 6.9 | -6.9 | 1.6 | 2.9 | -1.3 | 1.9 | 0.1 | 1.8 | | | | 5.7 | 1.0 | 4.7 | 29.4 | 28.9 | 0.5 | 1.1 | 0.2 | 0.8 |
| In foreign currency | 0.0 | 3.5 | -3.5 | 0.0 | 2.5 | -2.4 | 0.1 | 0.2 | -0.1 | | | | 2.1 | 0.9 | 1.2 | 20.3 | 18.1 | 2.3 | 6.7 | 4.0 | 2.7 |
| Other financial corporations | 0.0 | 2.2 | -2.1 | 0.9 | 6.8 | -5.9 | 0.2 | 1.2 | -1.0 | 2.0 | 7.8 | -5.9 | | | | 16.0 | 1.8 | 14.2 | 0.1 | 0.7 | -0.5 |
| In domestic currency | 0.0 | 2.1 | -2.1 | 0.9 | 5.7 | -4.8 | 0.1 | 0.4 | -0.3 | 1.0 | 5.7 | -4.7 | | | | 12.4 | 1.4 | 11.1 | 0.0 | 0.2 | -0.2 |
| In foreign currency | 0.0 | 0.1 | -0.1 | 0.0 | 1.1 | -1.1 | 0.0 | 0.8 | -0.8 | 0.9 | 2.1 | -1.2 | | | | 3.5 | 0.4 | 3.1 | 0.1 | 0.4 | -0.3 |
| Nonfinancial private sector | 0.0 | 4.6 | -4.6 | 0.2 | 2.3 | -2.1 | 5.9 | 3.6 | 2.3 | 46.9 | 49.7 | -2.7 | 1.8 | 16.0 | -14.2 | | | | 43.5 | 15.3 | 28.2 |
| In domestic currency | 0.0 | 4.4 | -4.4 | 0.2 | 1.6 | -1.4 | 5.9 | 3.6 | 2.3 | 28.9 | 29.4 | -0.5 | 1.4 | 12.4 | -11.1 | | | | 0.0 | 0.0 | 0.0 |
| In foreign currency | 0.0 | 0.1 | -0.1 | 0.0 | 0.7 | -0.7 | 0.0 | 0.0 | 0.0 | 18.1 | 20.3 | -2.3 | 0.4 | 3.5 | -3.1 | | | | 43.5 | 15.3 | 28.2 |
| Rest of the world | 14.3 | 1.4 | 12.9 | 0.0 | 5.9 | -5.9 | 0.4 | 5.0 | -4.6 | 4.2 | 7.8 | -3.5 | 0.7 | 0.1 | 0.5 | 15.3 | 43.5 | -28.2 | | | |
| In domestic currency | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | -0.2 | 0.2 | 1.1 | -0.8 | 0.2 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | | | |
| In foreign currency | 14.2 | 1.4 | 12.8 | 0.0 | 5.9 | -5.9 | 0.4 | 4.8 | -4.4 | 4.0 | 6.7 | -2.7 | 0.4 | 0.1 | 0.3 | 15.3 | 43.5 | -28.2 | | | |
| Total | 14.6 | 21.8 | -7.3 | 5.4 | 26.4 | -21.0 | 15.3 | 10.4 | 4.9 | 69.2 | 69.0 | 0.2 | 20.4 | 19.1 | 1.3 | 91.3 | 98.3 | -6.9 | 63.6 | 34.9 | 28.8 |
| in domestic currency | 0.3 | 15.1 | -14.7 | 3.7 | 15.9 | -12.2 | 14.4 | 4.6 | 9.7 | 40.0 | 39.7 | 0.3 | 15.5 | 14.5 | 1.1 | 51.5 | 36.3 | 15.1 | 1.2 | 0.5 | 0.7 |
| in foreign currency | 14.2 | 6.8 | 7.4 | 1.7 | 10.4 | -8.7 | 1.0 | 5.8 | -4.8 | 29.1 | 29.3 | -0.1 | 4.9 | 4.6 | 0.2 | 39.9 | 61.9 | -22.1 | 62.4 | 34.3 | 28.1 |

Sources: Banco Central de Costa Rica, and staff estimates.

Table A2. Net Intersectoral Asset and Liability Positions, 2013
(In percent of GDP)

| Issuer of liability (debtor) | Public sector | | | | | | | | | Financial Sector | | | | | | Nonfinancial Private Sector | | | Rest of the World | | |
|---------------------------------|---------------|-------------|----------|--------------------|-------------|----------|----------------------------------|-------------|----------|-------------------------------|-------------|----------|------------------------------|-------------|----------|---|-------------|----------|-------------------|-------------|----------|
| | Central bank | | | Central government | | | Public Nonfinancial Corporations | | | Other depository corporations | | | Other financial corporations | | | Includes non-financial corps and households | | | Nonresidents | | |
| | Claims | Liabilities | Net pos. | Claims | Liabilities | Net pos. | Claims | Liabilities | Net pos. | Claims | Liabilities | Net pos. | Claims | Liabilities | Net pos. | Claims | Liabilities | Net pos. | Claims | Liabilities | Net pos. |
| Central bank | | | | 1.0 | 0.2 | 0.8 | 1.0 | 0.0 | 1.0 | 12.7 | 0.4 | 12.3 | 4.5 | 0.0 | 4.5 | 3.8 | 0.0 | 3.8 | 1.0 | 16.0 | -15.0 |
| In domestic currency | | | | 0.2 | 0.2 | 0.0 | 1.0 | 0.0 | 1.0 | 9.4 | 0.4 | 9.0 | 4.5 | 0.0 | 4.5 | 3.8 | 0.0 | 3.8 | 0.0 | 0.1 | 0.0 |
| In foreign currency | | | | 0.8 | 0.0 | 0.8 | 0.0 | 0.0 | 0.0 | 3.3 | 0.0 | 3.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 16.0 | -15.0 |
| Central government | 0.2 | 1.0 | -0.8 | | | | 12.8 | 0.0 | 12.8 | 5.5 | 0.6 | 4.8 | 12.8 | 1.6 | 11.1 | 1.2 | 0.7 | 0.5 | 7.7 | 0.0 | 7.7 |
| In domestic currency | 0.2 | 0.2 | 0.0 | | | | 12.5 | 0.0 | 12.5 | 4.0 | 0.6 | 3.4 | 12.3 | 1.6 | 10.7 | 0.1 | 0.7 | -0.6 | 0.0 | 0.0 | 0.0 |
| In foreign currency | 0.0 | 0.8 | -0.8 | | | | 0.3 | 0.0 | 0.3 | 1.4 | 0.0 | 1.4 | 0.5 | 0.0 | 0.5 | 1.1 | 0.0 | 1.1 | 7.7 | 0.0 | 7.7 |
| Public Nonfinancial Corps. | 0.0 | 1.0 | -1.0 | 0.0 | 12.8 | -12.8 | | | | 0.6 | 2.6 | -2.0 | 0.9 | 0.1 | 0.8 | 0.0 | 0.1 | -0.1 | 4.5 | 0.7 | 3.8 |
| In domestic currency | 0.0 | 1.0 | -1.0 | 0.0 | 12.5 | -12.5 | | | | 0.4 | 2.5 | -2.1 | 0.7 | 0.1 | 0.6 | 0.0 | 0.1 | -0.1 | 0.0 | 0.0 | 0.0 |
| In foreign currency | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | -0.3 | | | | 0.2 | 0.1 | 0.1 | 0.2 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 4.5 | 0.7 | 3.8 |
| Other depository corporations | 0.4 | 12.7 | -12.3 | 0.6 | 5.5 | -4.8 | 2.6 | 0.6 | 2.0 | | | | 8.0 | 1.0 | 7.0 | 52.2 | 51.7 | 0.4 | 12.1 | 3.4 | 8.7 |
| In domestic currency | 0.4 | 9.4 | -9.0 | 0.6 | 4.0 | -3.4 | 2.5 | 0.4 | 2.1 | | | | 5.8 | 0.7 | 5.1 | 35.6 | 30.2 | 5.3 | 0.2 | 0.1 | 0.1 |
| In foreign currency | 0.0 | 3.3 | -3.3 | 0.0 | 1.4 | -1.4 | 0.1 | 0.2 | -0.1 | | | | 2.2 | 0.3 | 1.8 | 16.6 | 21.5 | -4.9 | 11.9 | 3.3 | 8.6 |
| Other financial corporations | 0.0 | 4.5 | -4.5 | 1.6 | 12.8 | -11.1 | 0.1 | 0.9 | -0.8 | 1.0 | 8.0 | -7.0 | | | | 25.6 | 2.0 | 23.6 | 0.1 | 0.7 | -0.6 |
| In domestic currency | 0.0 | 4.5 | -4.5 | 1.6 | 12.3 | -10.7 | 0.1 | 0.7 | -0.6 | 0.7 | 5.8 | -5.1 | | | | 22.7 | 1.5 | 21.2 | 0.0 | 0.1 | -0.1 |
| In foreign currency | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | -0.5 | 0.0 | 0.2 | -0.2 | 0.3 | 2.2 | -1.8 | | | | 2.9 | 0.5 | 2.4 | 0.1 | 0.6 | -0.5 |
| Nonfinancial private sector | 0.0 | 3.8 | -3.8 | 0.7 | 1.2 | -0.5 | 0.1 | 0.0 | 0.1 | 51.7 | 52.2 | -0.4 | 2.0 | 25.6 | -23.6 | | | | 44.4 | 13.7 | 30.7 |
| In domestic currency | 0.0 | 3.8 | -3.8 | 0.7 | 0.1 | 0.6 | 0.1 | 0.0 | 0.1 | 30.2 | 35.6 | -5.3 | 1.5 | 22.7 | -21.2 | | | | 0.0 | 0.0 | 0.0 |
| In foreign currency | 0.0 | 0.0 | 0.0 | 0.0 | 1.1 | -1.1 | 0.0 | 0.0 | 0.0 | 21.5 | 16.6 | 4.9 | 0.5 | 2.9 | -2.4 | | | | 44.4 | 13.7 | 30.7 |
| Rest of the world | 16.0 | 1.0 | 15.0 | 0.0 | 7.7 | -7.7 | 0.7 | 4.5 | -3.8 | 3.4 | 12.1 | -8.7 | 0.7 | 0.1 | 0.6 | 13.7 | 44.4 | -30.7 | | | |
| In domestic currency | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | -0.1 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | | | |
| In foreign currency | 16.0 | 1.0 | 15.0 | 0.0 | 7.7 | -7.7 | 0.7 | 4.5 | -3.8 | 3.3 | 11.9 | -8.6 | 0.6 | 0.1 | 0.5 | 13.7 | 44.4 | -30.7 | | | |
| Total | 16.6 | 24.0 | -7.4 | 4.0 | 40.2 | -36.2 | 17.3 | 6.0 | 11.3 | 74.9 | 75.9 | -1.0 | 28.9 | 28.5 | 0.4 | 96.5 | 98.9 | -2.5 | 69.8 | 34.5 | 35.3 |
| in domestic currency | 0.6 | 18.9 | -18.3 | 3.2 | 29.2 | -26.0 | 16.2 | 1.1 | 15.1 | 44.8 | 45.0 | -0.2 | 24.9 | 25.1 | -0.1 | 62.2 | 32.6 | 29.6 | 0.2 | 0.3 | -0.1 |
| in foreign currency | 16.0 | 5.1 | 10.9 | 0.8 | 11.0 | -10.2 | 1.1 | 4.9 | -3.8 | 30.1 | 30.9 | -0.8 | 4.0 | 3.4 | 0.6 | 34.3 | 66.4 | -32.1 | 69.6 | 34.2 | 35.4 |

Sources: Banco Central de Costa Rica, and staff estimates.

Annex II. Costa Rica: Bank Heat Maps

Assets and Ownership of Costa Rican Banks

| Bank | Total Assets | | Ownership | |
|--------|---|--|-----------|----------|
| | (last available year, millions of USD) | | | |
| Bank A | 10,159 | | Public | Domestic |
| Bank B | 8,508 | | Public | Domestic |
| Bank C | 4,296 | | Mixed | Domestic |
| Bank D | 3,095 | | Private | Foreign |
| Bank E | 2,322 | | Private | Foreign |
| Bank F | 1,475 | | Private | Foreign |
| Bank G | 1,072 | | Public | Domestic |
| Bank H | 880 | | Private | Foreign |
| Bank I | 790 | | Private | Foreign |
| Bank J | 625 | | Private | Foreign |
| Bank K | 456 | | Private | Domestic |
| Bank L | 388 | | Private | Domestic |
| Bank M | 339 | | Private | Foreign |
| Bank N | 246 | | Private | Domestic |
| Bank O | 234 | | Private | Domestic |

Aggregate Bank Heat Maps¹

| | Overall | | | | | | | |
|---------------|---------|------|------|------|------|------|------|------|
| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
| Public Banks | 2.0 | -0.3 | -2.5 | -0.5 | -0.1 | -1.3 | -3.4 | -4.0 |
| Private Banks | -3.8 | -1.7 | -1.7 | 0.8 | 3.1 | 3.0 | 1.6 | 1.8 |

| | Capital Adequacy | | | | | | | |
|---------------|---|------|------|------|------|------|------|------|
| | Equity to RWA (inc. floor/cap per Basel II) | | | | | | | |
| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
| Public Banks | 0.2 | -0.5 | 0.2 | 1.1 | 0.1 | -1.5 | -1.4 | -1.3 |
| Private Banks | -1.0 | -1.0 | -0.1 | 1.0 | 1.5 | 1.0 | 0.4 | -0.2 |

| | Asset Quality | | | | | | | |
|---------------|-------------------------------|------|------|------|------|------|------|------|
| | Impaired Loans to Gross Loans | | | | | | | |
| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
| Public Banks | 0.1 | 0.0 | 1.9 | 1.4 | 1.0 | 0.8 | 0.9 | 0.6 |
| Private Banks | -0.9 | -0.5 | 0.1 | -0.4 | -1.2 | -1.2 | -1.0 | -0.9 |

| | Earnings | | | | | | | |
|---------------|--------------------------|------|------|------|------|------|------|------|
| | Return on Average Assets | | | | | | | |
| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
| Public Banks | 0.6 | -0.3 | -0.9 | -0.2 | 0.8 | 0.9 | -1.2 | -1.5 |
| Private Banks | -2.0 | 0.0 | -0.9 | -1.6 | -0.1 | 0.7 | 0.1 | 1.2 |

| | Liquidity | | | | | | | |
|---------------|---|------|------|------|------|------|------|------|
| | Liquid Assets to Deposits and Short-term Borrowings | | | | | | | |
| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
| Public Banks | -0.2 | -0.8 | -1.1 | -1.3 | -1.3 | -1.1 | -0.8 | -1.0 |
| Private Banks | -1.0 | -0.3 | 0.1 | 1.4 | 1.1 | 1.0 | 0.9 | 0.8 |

| | Leverage | | | | | | | |
|---------------|------------------------------------|------|------|------|------|------|------|------|
| | Tangible Equity to Tangible Assets | | | | | | | |
| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
| Public Banks | 1.5 | 1.2 | 1.1 | 1.3 | 1.3 | 1.0 | 0.8 | 0.3 |
| Private Banks | -0.7 | -0.9 | -0.8 | -0.4 | -0.7 | -0.9 | -0.9 | -0.9 |

¹ The Heat maps are based on the methodology from Jesakul, Kwoh, and Lian Ong (2013).

Individual Bank Heat Maps²

| Name | Asset Quality | | | | | | |
|---------|-------------------------------|------|------|------|------|------|------|
| | Impaired Loans to Gross Loans | | | | | | |
| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
| Bank 1 | -0.6 | -0.4 | 0.3 | 1.1 | 0.5 | -0.5 | -0.2 |
| Bank 2 | -1.1 | .. | -0.8 | -1.2 | -0.7 | -1.2 | .. |
| Bank 3 | .. | .. | .. | .. | -0.8 | -0.7 | -0.6 |
| Bank 4 | 2.9 | -0.4 | -0.6 | -0.2 | 0.1 | -0.5 | -0.3 |
| Bank 5 | .. | .. | .. | .. | .. | -0.5 | -0.3 |
| Bank 6 | 1.4 | 1.2 | 2.0 | 2.0 | 0.9 | 1.2 | -0.3 |
| Bank 7 | 0.4 | -0.1 | 0.0 | -0.3 | -0.3 | 0.3 | .. |
| Bank 8 | -0.7 | -0.8 | -0.8 | -1.1 | -1.1 | -0.9 | -0.6 |
| Bank 9 | -0.8 | -0.6 | -0.6 | -0.6 | -0.7 | -0.6 | -0.3 |
| Bank 10 | -0.7 | -0.4 | -0.4 | -0.5 | -0.4 | -0.2 | 0.1 |
| Bank 11 | -0.5 | -0.5 | -0.5 | -0.6 | -0.6 | -0.5 | 0.3 |
| Bank 12 | 0.0 | 1.3 | 1.8 | 1.4 | 0.8 | -0.5 | -0.5 |
| Bank 13 | 0.4 | 0.2 | -0.1 | .. | 0.1 | -0.6 | -0.7 |
| Bank 14 | .. | 0.9 | -0.6 | 1.7 | 1.7 | -0.3 | 0.0 |
| Bank 15 | .. | .. | .. | .. | -1.2 | -1.0 | -1.2 |

| Name | Overall | | | | | | |
|---------|---------|------|------|------|------|------|------|
| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
| Bank 1 | .. | .. | .. | .. | .. | .. | .. |
| Bank 2 | .. | .. | .. | .. | .. | .. | .. |
| Bank 3 | .. | .. | .. | .. | 3.7 | .. | .. |
| Bank 4 | .. | .. | .. | .. | .. | .. | .. |
| Bank 5 | .. | .. | .. | .. | .. | .. | .. |
| Bank 6 | .. | .. | .. | .. | .. | .. | .. |
| Bank 7 | .. | .. | .. | .. | .. | .. | .. |
| Bank 8 | 3.1 | 1.4 | 2.2 | 3.2 | 5.4 | 5.5 | .. |
| Bank 9 | -0.6 | -0.3 | -1.3 | -1.2 | -0.9 | -1.6 | -2.2 |
| Bank 10 | -1.9 | -1.1 | -2.2 | -2.0 | -0.4 | .. | .. |
| Bank 11 | -2.9 | -2.1 | 0.0 | -2.1 | -2.3 | -3.0 | .. |
| Bank 12 | .. | .. | .. | .. | .. | .. | .. |
| Bank 13 | .. | .. | .. | .. | .. | .. | .. |
| Bank 14 | .. | .. | .. | .. | .. | .. | .. |
| Bank 15 | .. | .. | .. | .. | 2.4 | 2.9 | 2.3 |

² The Heat maps are based on the methodology from Jesakul, Kwoh, and Lian Ong (2013).

| Name | Capital Adequacy | | | | | | |
|---------|---|------|------|------|------|------|------|
| | Equity to RWA (inc. floor/cap per Basel II) | | | | | | |
| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
| Bank 1 | .. | .. | .. | .. | .. | .. | .. |
| Bank 2 | .. | .. | .. | .. | .. | .. | .. |
| Bank 3 | .. | .. | .. | .. | 0.5 | .. | .. |
| Bank 4 | .. | .. | .. | .. | .. | .. | .. |
| Bank 5 | .. | .. | .. | .. | .. | .. | .. |
| Bank 6 | .. | .. | .. | .. | .. | .. | .. |
| Bank 7 | .. | .. | .. | .. | .. | .. | .. |
| Bank 8 | 0.2 | 0.2 | 1.3 | 2.0 | 1.7 | 1.1 | .. |
| Bank 9 | -0.1 | 0.1 | 0.2 | 0.2 | 0.0 | -0.1 | -0.3 |
| Bank 10 | -0.7 | -0.2 | -0.2 | -0.1 | -0.1 | .. | .. |
| Bank 11 | -1.2 | -1.1 | -1.1 | -1.6 | -1.6 | -1.7 | .. |
| Bank 12 | .. | .. | .. | .. | .. | .. | .. |
| Bank 13 | .. | .. | .. | .. | .. | .. | .. |
| Bank 14 | .. | .. | .. | .. | .. | .. | .. |
| Bank 15 | .. | .. | .. | .. | 1.0 | 0.0 | 0.3 |

| Name | Earnings | | | | | | |
|---------|--------------------------|------|------|------|------|------|------|
| | Return on Average Assets | | | | | | |
| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
| Bank 1 | -0.6 | -0.2 | -0.3 | -0.5 | -0.7 | -0.3 | -0.7 |
| Bank 2 | -0.6 | 0.0 | -0.2 | -0.4 | 0.5 | 0.8 | .. |
| Bank 3 | .. | 4.3 | -1.1 | -1.2 | -0.9 | -0.5 | -0.8 |
| Bank 4 | -0.7 | 0.4 | 0.7 | -0.1 | -0.3 | 0.2 | 0.2 |
| Bank 5 | .. | .. | .. | .. | .. | -0.8 | -1.2 |
| Bank 6 | -2.5 | -0.9 | -1.1 | -0.9 | -0.8 | -0.2 | -0.5 |
| Bank 7 | 0.5 | 0.9 | 0.4 | -0.1 | 2.2 | 1.9 | .. |
| Bank 8 | 1.1 | 0.3 | -0.1 | 0.5 | 2.6 | 1.9 | 1.0 |
| Bank 9 | -0.1 | -0.2 | -0.5 | -0.4 | 0.0 | 0.0 | -0.3 |
| Bank 10 | -0.1 | -0.3 | -0.5 | -0.4 | -0.4 | 0.3 | -0.8 |
| Bank 11 | -1.1 | -0.5 | -0.4 | -0.8 | -0.4 | -0.3 | -1.1 |
| Bank 12 | -1.5 | -0.7 | -1.1 | -0.8 | -0.9 | 0.2 | 0.1 |
| Bank 13 | -0.5 | 0.8 | -0.3 | -0.4 | 1.2 | 0.6 | 0.4 |
| Bank 14 | -0.7 | 0.0 | -0.8 | -0.4 | 0.2 | -0.3 | -1.0 |
| Bank 15 | .. | .. | .. | .. | -1.7 | 0.2 | 0.3 |

| Name | Liquidity | | | | | | |
|---------|---|------|------|------|------|------|------|
| | Liquid Assets to Deposits and Short-term Borrowings | | | | | | |
| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
| Bank 1 | -0.7 | -0.7 | 0.2 | -0.5 | -0.2 | -0.3 | -0.4 |
| Bank 2 | 0.1 | 0.7 | 1.0 | 0.2 | 0.3 | 0.2 | .. |
| Bank 3 | .. | .. | 3.4 | 0.6 | 2.8 | -1.2 | -1.1 |
| Bank 4 | 1.1 | -0.3 | -0.6 | -0.3 | -0.4 | -0.4 | -0.3 |
| Bank 5 | .. | .. | .. | .. | .. | 0.8 | 1.2 |
| Bank 6 | 0.0 | -0.1 | 0.5 | 0.4 | -0.2 | 0.1 | 0.1 |
| Bank 7 | 0.4 | 0.6 | 1.0 | 0.9 | 0.8 | 1.2 | .. |
| Bank 8 | -0.5 | -0.1 | 0.0 | -0.6 | -0.8 | -0.3 | -0.4 |
| Bank 9 | -1.1 | -0.6 | -1.3 | -1.3 | -1.2 | -1.6 | -1.4 |
| Bank 10 | -1.1 | -0.7 | -1.6 | -1.7 | 0.0 | -1.9 | -1.4 |
| Bank 11 | -0.4 | -0.7 | 1.4 | 0.1 | -0.1 | -0.1 | -0.1 |
| Bank 12 | 0.1 | -0.1 | 0.3 | 0.3 | 0.8 | 0.7 | 0.5 |
| Bank 13 | 0.1 | 0.2 | 0.2 | 0.3 | 0.2 | 0.1 | 0.2 |
| Bank 14 | 0.1 | 0.2 | 1.0 | -0.8 | -0.8 | -0.9 | 0.0 |
| Bank 15 | .. | .. | .. | .. | 1.0 | 1.2 | -0.5 |

| Name | Leverage | | | | | | |
|---------|------------------------------------|------|------|------|------|------|------|
| | Tangible Equity to Tangible Assets | | | | | | |
| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
| Bank 1 | -1.1 | -0.5 | -0.3 | -0.5 | -0.6 | -0.8 | -1.0 |
| Bank 2 | 0.4 | -0.2 | -0.2 | -0.3 | -0.1 | 0.0 | .. |
| Bank 3 | .. | 5.1 | 2.1 | 0.6 | 0.6 | 1.2 | 0.9 |
| Bank 4 | 2.0 | 2.3 | 0.5 | -0.1 | 0.0 | 0.0 | -0.6 |
| Bank 5 | .. | .. | .. | .. | .. | -0.5 | -1.4 |
| Bank 6 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | 0.0 | 0.1 |
| Bank 7 | -0.7 | -0.3 | -0.3 | -0.3 | -0.2 | -0.1 | .. |
| Bank 8 | 1.5 | 0.2 | 0.2 | 0.3 | 0.9 | 1.9 | 2.2 |
| Bank 9 | -0.1 | -0.2 | -0.3 | -0.3 | -0.4 | -0.5 | -0.6 |
| Bank 10 | -0.7 | -0.3 | -0.3 | -0.3 | -0.3 | -0.4 | -0.7 |
| Bank 11 | -0.7 | -0.3 | -0.4 | -0.5 | -0.8 | -1.4 | -1.0 |
| Bank 12 | -0.3 | -0.3 | -0.3 | -0.2 | -0.3 | 0.1 | 0.1 |
| Bank 13 | -0.6 | -0.4 | -0.4 | -0.4 | -0.5 | -0.6 | -0.6 |
| Bank 14 | -0.2 | -0.2 | -0.5 | -0.5 | -0.7 | -1.0 | -0.1 |
| Bank 15 | .. | .. | .. | .. | 0.9 | 0.5 | 1.1 |

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