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COSTA RICA

SELECTED ISSUES AND ANALYTICAL NOTES

May 2016

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April 25, 2016

Approved By:
Western Hemisphere Department

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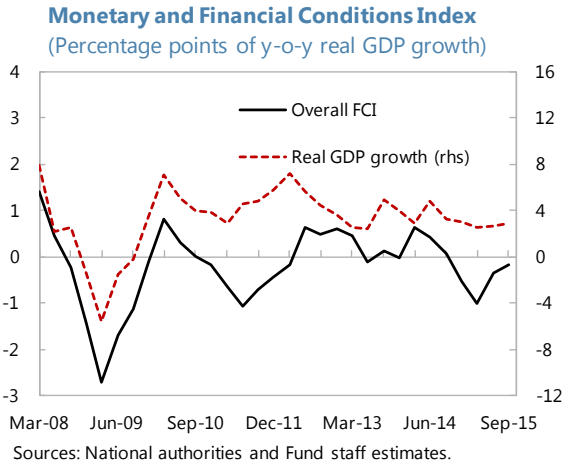
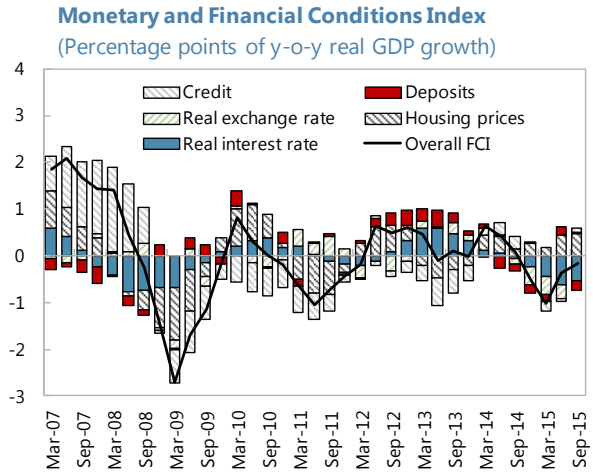
MACRO-FINANCIAL LINKAGES[1]

This note looks at the linkages between the Costa Rican real economy and financial sector. To do so, we first construct the monetary and financial conditions index (FCI), which captures the effects of current financial conditions on real GDP growth. We then simulate the effect of financial variables on the real economy through the IMF Flexible System of Global Models. Finally, we test the consistency of our baseline credit growth and macro projections against historical distributions for emerging countries, and analyze how macro-financial risks and conditions have changed over the past year. Results suggest that financial conditions are moderately tight but, if fully passed through to the economy the monetary stimulus injected in 2015 could considerably increase GDP, and so would enhanced competition in the banking sector, while a FX shock could take a toll on growth through increased NPLs and market risk premia. However, baseline projections show no evidence of macro-financial risk buildup, and credit growth remains supportive of macroeconomic activity.

A. Financial Conditions Index

1. **The FCI summarizes the information contained in key financial variables and captures the correlation with economic activity.** The financial variables included: (i) the real interest rate of bank loans; (ii) the real effective exchange rate (REER); (iii) the real growth of deposits and credit to the private sector; and (iv) a real housing price index (approximated by the housing component of the consumer price index). Hence, the FCI captures not only the impact of monetary policy, but also broader interactions between financial and real variables. We used VAR analysis to decompose the contribution of various financial indicators to real GDP growth, and built the FCI as the sum of the cumulative impulse responses of real GDP to each of the relevant financial variables. The model was estimated using Ordinary Least Squares based on quarterly data from 2001 to 2015.





[1] Prepared by Valentina Flamini.

2. **The estimated FCI points to relatively tight financial conditions in 2015.** The quarterly FCI shows that financial conditions turned tighter between mid-2014 and end-2015, mostly due to an increase in real interest and exchange rates, which more than offset the boost from faster deposit growth and higher housing prices. The increase in real interest and exchange rates is related to declining inflation and inflation expectations in 2015, on the back of decreasing nominal interest rates and a relatively stable nominal FX rate, while global financial conditions remained favorable to capital inflows into Costa Rica. Hence, the results indicate that monetary and financial conditions were dragging GDP growth in during 2015, despite the latest policy rate cuts, and opposite to the propelling cycle registered in 2012–13, culminated with the neutral financial conditions that characterized the first half of 2014.

B. General Equilibrium Model Simulations

3. **We used the IMF's Flexible System of Global Models (FSGM) to simulate the effect of various financial shocks on macroeconomic variables.** The model was developed by the Economic Modeling Division of the IMF's Research department for policy analysis (Andrle and others, 2015). 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 the supply side features is pinned down by Cobb-Douglas production technology. 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 largely estimated from the data using a range of empirical techniques. Real GDP 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. The OLG formulation of the consumption block gives the model important non-Ricardian properties, whereby national savings are endogenously determined given the level of government debt. Government absorption is determined exogenously, while imports and exports are specified with reduced-form models.

4. **Transmission of financial shocks to the real economy takes place through changes in interest rates and risk premia.** All interest rates are related to the risk-free interest rate, whose closest parallel is the monetary policy rate, from which they deviate because of risk premia or different maturities. The model includes several risk premia: one for the sovereign (which applies to the entire domestic economy), one that applies to both domestic households and firms, one that applies only to firms, and for the currency (or country). The expectation theory of the term structure determines the 10-year interest rates and there is an additional risk premium. Interest rates related to consumption, investment, and holding of government debt and net foreign assets are weighted averages of the 1- and 10-year nominal interest rates. The exchange rate in the short run is determined via the uncovered interest parity condition, while in the long run it adjusts to ensure external stability given households desired holdings of net foreign assets.

5. **We simulate 4 scenarios which model shocks to monetary policy, the exchange rate and market premia, lending margins, and collateral requirements.** The first (S1) simulates an

expansionary monetary policy shock, modeled as a 100 basis points cut in the monetary policy rate, both under full pass-through and under a slower, but more persistent transmission to lending rates (Panel 1 in figure below); the second (S2) looks at currency depreciations of 5 and 20 percent that include a non-linear reaction in market risk premia of 25 and 300 basis points (bp) respectively (Panel 2); the third (S3) considers a reduction in bank lending margins resulting in a reduction in market risk premia of 100 basis points (panel 3); and the fourth (S4) is a decrease in collateral requirements yielding to higher credit growth that is partially financed by higher foreign borrowing. Aside from nonlinearities that can arise owing to the zero lower bound on nominal interest rates, the model is symmetric and roughly linear; therefore, the simulated shocks can be scaled up or down to consider scenarios of different magnitudes.

6. **Results indicate that the recent 350 basis points cut in the monetary policy rate could increase GDP substantially.** Specifically, if fully passed through to domestic lending rates, the monetary impulse provided by the BCCR from mid-2015 to early 2016 could increase GDP in 2016 by almost one percent relative to the baseline. In Scenario 1, a one-year 100 basis points decrease in the monetary policy rate results in a 0.2 percent GDP increase on impact under a full pass-through scenario compared to the baseline, due to both higher domestic absorption and export demand. The latter effect is induced by a depreciation of the colon following lower real interest rates compared to foreign rates. However, the transmission to lending rates of the monetary stimuli implemented over the last year has proven to be partial. Under a slower pass-through scenario, where only 1/3 of the impulse is passed to lending rates, the resulting increase in GDP in 2016 would be halved.

7. **Conversely, a large currency depreciation could decrease output by up to 1.5 percent in the short and medium term, through its effect on NPL and decreased risk appetite.** In scenario 2, a depreciation of the colon triggers an increase in market premia due to higher NPL in the context of high dollarized credit to un-hedged borrowers. The risk premium reaction to the depreciation is modeled as nonlinear, as defaulting loans—and with them banks' risk aversion—are likely to increase more than proportionally with the extent of the depreciation. Hence, under a 5 percent depreciation/20 bp increase in risk premia, exports increase[2] sufficiently to offset the adverse impact on domestic demand from the rise in risk premium, resulting in a slight increase in GDP on impact. Conversely, under a 20 percent depreciation/300 bp increase in risk premia, the latter prevails inducing a GDP decline of 1.5 percent one year after the shock, as the decreases in household consumption and private investment more than offset the boost from higher exports.

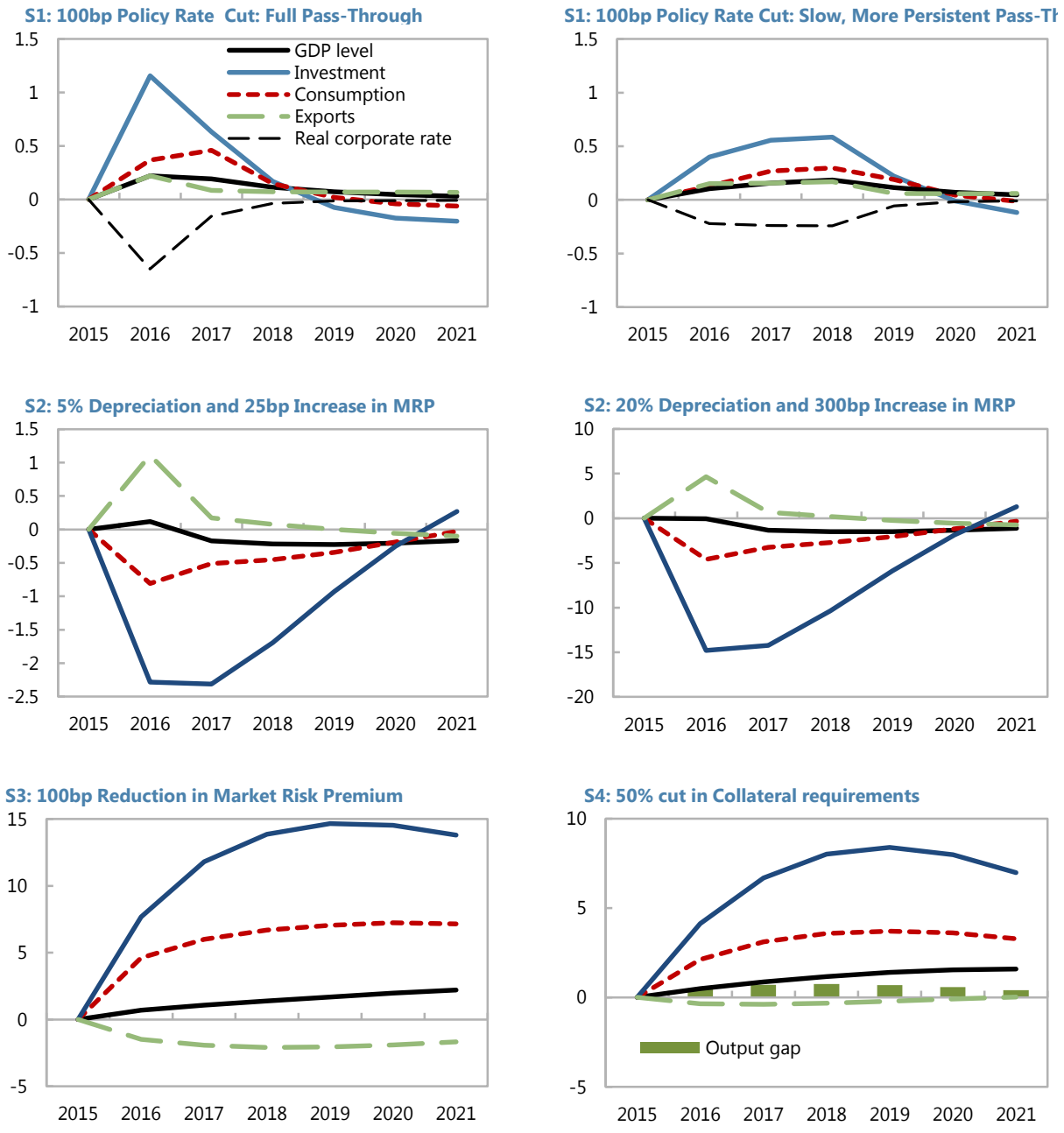
8. **Increasing efficiency and competition in the banking sector could spur GDP by up to 2 percent in the medium term.** At about 12 percent, banks spreads are exceptionally high in Costa Rica, which greatly constraints widespread access to credit. In scenario 3, we simulate a decrease in banks' net interest rate spreads which translates in a 100bp permanent reduction in market risk premia. Lower rates increase both private investment and household consumption expenditure, fostering domestic absorption. The resulting increase in inflation triggers a policy rate increase that

[2] A 0.58 price elasticity of exports is assumed in the simulations.

produces in an appreciation of the colon and lower exports. The net effect on GDP is positive and persistent, with the increase ranging from less than 1 percent in the first year to more than 2 percent after five years.

Figure 1. Costa Rica: FSGM Model Simulations

(Percent difference from baseline)



Source: Staff estimates based on IMF/RES FSGM provided by Benjamin Hunt and Keiko Honjo (RES).

Note: All variables are expressed in real terms.

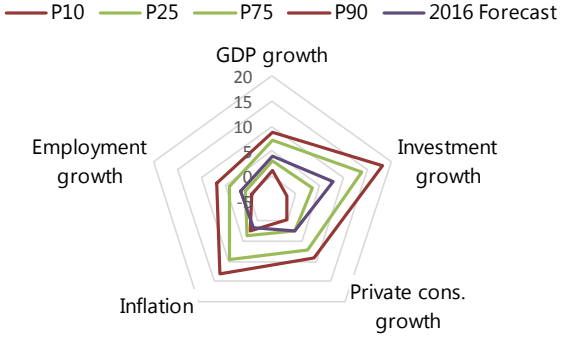
9. **Reducing collateral requirements would yield a medium term boost to GDP similar to improvements in bank efficiency.** With effective collateral-to-loan ratios hovering over 250 percent as of 2010, collateral requirements are also prohibitively high and non-conducive to efficient financial inclusion in Costa Rica. In scenario 4, permanently halving collateral requirements is assumed to bring about an 8 percent of GDP increase in domestic credit, about half of which would be financed by domestic excess liquidity and the remaining by an increase in foreign liabilities. Similarly to the effect of lower margins, this would increase domestic absorption while slightly depressing exports. The increase in private investment would also accumulate into a higher stock of private capital, which contributes to a persistent increase in both actual and potential output. As the latter adjusts more gradually, output rises above potential and a moderate positive output gap opens up. The overall medium term increase in GDP ranges from ½ percent in the first year to over 1 ½ percent in the sixth.

C. Macro-Financial Baseline Projections and Risks

10. **Baseline macro projections are consistent with accelerating credit growth in the short term.** Based on the historical distribution of macro outcomes conditional on financial outturns in emerging markets, the team's 2016 macroeconomic projections are consistent with credit growth accelerating to 14 percent in 2016. In particular, our projections for real GDP, investment, private consumption, and employment growth fall within the 25th and 75th percentile of the respective 2014 conditional distributions. Our inflation forecast, conversely, is lower than what would be implied by the projected credit growth, based on historical patterns, but this is due to the positive terms of trade shock induced by the protracted drop in international oil and commodity prices.

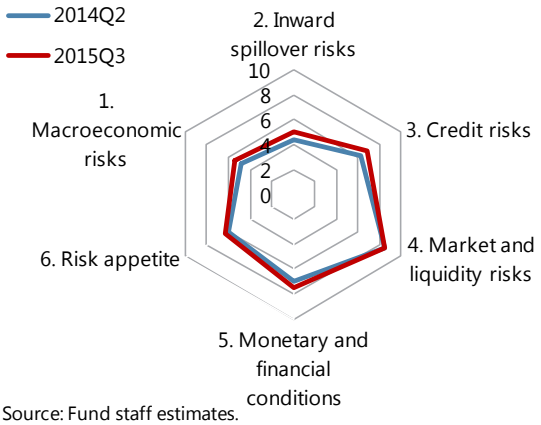
11. **There is no evidence of macro-financial risks buildup**. A broad selection of macro-financial conditions, including spillover risks from external sources, does not point to significant increased vulnerability compared to 2014. Market and liquidity conditions and, to a lesser extent, monetary and financial conditions, continue to pose the most significant risk to the system due to high gross foreign liabilities of the banking sector and dollarization of domestic credit. While high and increasing government deficit and debt deserve close scrutiny, the related risks are diluted by otherwise stable financial conditions, thus explaining relatively low overall macroeconomic risks.

Distribution of Macro Outcomes Conditional on Real Private Sector Credit Growth



Source: IMF staff estimates based on RES Macro Financial Forecast Consistency Check

Costa Rica: Financial Stability Map



Source: Fund staff estimates.

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Andrle, M., P. Blagrave, P. Espaillat, K. Honjo, B. Hunt, M. Kortelainen, R. Lalonde, D. Laxton, E. Mavroeidi, D. Muir, S. Mursula, and S. Snudden, 2015, "The Flexible System of Global Models – FSGM," IMF Working Paper 15/64 (Washington D.C., International Monetary Fund).

FINANCIAL SECTOR VULNERABILITIES[1]

This note looks at the composition of the Costa Rican financial system and its vulnerabilities. We first study the level and evolution of a set of indicators of financial vulnerability to detect any sign of rising systemic risks. We then zoom in the soundness of the banking sector, which is dominant in the provision of credit to the economy, and report results from bank-level stress testing and contagion analysis. We finally assess the potential impact of inwards financial spillovers from stress in international banks. Results show that the financial sector is sound and could absorb a range of shocks, although low bank profitability and high FX exposure intensifies the system's vulnerability to external shocks. Accordingly, spillovers from a severe stress scenario in international banks could have a significant impact on foreign credit availability in Costa Rica.

A. Financial System Structure and Trends

1. **Although increasingly diversified, the Costa Rican financial system is centered on banking intermediation.** The Costa Rica Financial system is composed by a total of 52 supervised institutions, of which 15 banks (4 state-owned, 3 private domestics, and 8 private foreign), 28 savings and loan cooperatives, and 9 other non-bank financial entities, including finance companies and mutual funds. Total gross asset and liabilities of the system amount to 90 and 86 percent of GDP respectively, with loans and deposits representing the lion share of the asset and liability portfolios. As the banking sector retains about 80 percent of the market share, the Costa Rican financial system is still highly concentrated.

Table 1. Costa Rica: Structure of the Financial Sector

		Total Assests		Market Share	Total Liabilities		Deposit		
	#	Billions of Colones	Percent of GDP	Percent	Billions of Colones	Percent of GDP	Percent of GDP	Domestic Currency (Percent of Total)	Foreign Currency (Percent of Total)
Banks	15	20,803	75	83	20,803	75	67	51	49
State Owned	4	13,133	48	53	13,133	48	42	63	37
Domestic Private	3	749	3	3	749	3	2	23	77
Foreign	8	6,921	25	28	6,921	25	22	31	69
Non-Bank Financial Institutions	38	4,150	15	17	3,031	11	...	...	...
Total	53	24,953	90	100	23,834	86	...	...	...

Source: SUGEF.

2. **The banking system is highly segmented and heavily dollarized**. The public sector has a pervasive presence in the banking system, with public banks accounting for about half of both total assets and liabilities. About half of total deposits is denominated in foreign currency, mostly with private domestic and foreign banks, while state owned banks account for about 80 percent of deposits in national currency, not least due to the explicit unlimited state guarantee on all public

[1] Prepared by Valentina Flamini.

bank deposit. The last is only one aspect of a broadly uneven regulatory and tax treatment across state owned and private banks which, along with a crowding out of colon credit by domestic public debt, has yielded high intermediation spreads, high market segmentation, and weakened monetary policy transmission.

3. **Credit growth continues supporting economic activity with limited intensification of systemic risk, stemming from dollarization of loans and funding.** Credit growth in both national and foreign currency has exceeded GDP growth over the past decade, lifting credit from 35 percent of GDP in 2005 to 60 percent in 2015. Staff project growth to accelerate to 12 percent in 2016 from 11 percent in 2015, consistent with the return of GDP to its potential. The heavy dollarization of credit in Costa Rica has amplified credit growth volatility due to the pass-through on exchange rate changes, like during the significant depreciation of the first half of 2014. Overall, staff considers that the recent trend is in line with healthy financial deepening, and projects credit growth to remain supportive of macroeconomic activity in the short and medium term (¶19). However, the widespread dollarization of both loans and deposits remains a persistent vulnerability.

Table 2. Costa Rica: Financial Soundness Indicator Map

Costa Rica	2013Q2	2013Q3	2013Q4	2014Q1	2014Q2	2014Q3	2014Q4	2015Q1	2015Q2	2015Q3
Overall Financial Sector Rating	L	L	L	M	M	M	M	L	L	L
Credit cycle	L	L	L	H	H	M	M	L	L	L
Change in credit / GDP ratio (pp, annual)	1.3	1.6	1.9	5.1	5.2	4.7	4.3	1.5	1.7	2.8
Growth of credit / GDP (%, annual)	2.7	3.3	3.9	10.5	10.6	9.6	8.4	2.7	3.1	5.2
Credit-to-GDP gap (st. dev)	1.2	1.2	1.4	1.7	1.2	0.8	0.6	-0.1	-0.4	0.6
Balance Sheet Soundness	L	L	L	L	L	L	L	L	L	L
Balance Sheet Structural Risk	M	M	M	M	M	M	M	M	M	M
Deposit-to-loan ratio	113.7	110.8	107.5	105.0	101.7	101.5	100.7	97.2	97.7	95.3
FX liabilities % (of total liabilities)	36.7	35.4	33.2	36.6	36.9	35.9	34.5	34.6	35.1	33.8
FX loans % (of total loans)	37.3	37.7	37.9	38.7	38.0	37.5	37.0	36.7	37.0	37.2
Balance Sheet Buffers	L	L	L	L	L	L	L	L	L	L
Leverage	L	L	L	L	L	L	L	L	L	L
Leverage ratio (%)	10.1	10.0	9.7	9.8	9.7	9.7	9.7	10.0	9.7	9.9
Profitability	L	L	L	L	L	L	L	L	L	L
ROA	1.3	1.1	1.2	1.5	1.3	1.2	1.1	1.1	1.0	1.0
ROE	8.6	7.5	7.9	10.7	9.5	8.4	7.6	8.0	7.4	7.4
Asset quality	L	L	L	L	L	L	L	L	L	L
NPL ratio	1.9	1.9	1.7	1.6	1.6	1.7	1.6	1.6	1.6	1.7
NPL ratio change (%, annual)	1.2	4.3	0.2	-10.6	-14.9	-12.0	-11.2	-2.0	0.7	1.6
Memo items:	**2013Q2**	**2013Q3**	**2013Q4**	**2014Q1**	**2014Q2**	**2014Q3**	**2014Q4**	**2015Q1**	**2015Q2**	**2015Q3**
Credit-to-GDP (%)	48.7	49.4	50.8	53.4	53.8	54.1	55.1	54.9	55.5	56.7
Credit-to-GDP gap (%; HP filter)	-1.9	-1.6	-0.6	1.5	1.4	1.1	1.6	0.9	1.0	n.a.
Credit growth (%; annual)	11.1	11.3	12.2	19.0	19.8	18.7	17.5	11.8	11.4	12.2
CAR (in %)	17.2	17.2	16.6	16.0	16.3	16.2	16.6	16.6	16.4	16.6
Tier 1 CAR (in %)	13.7	13.5	13.0	12.9	12.7	12.6	12.7	12.9	12.6	12.8

Sources: BIS; FSIs; IMF IFS; and national authorities.

B. Bank-level Stress Test and Contagion Analysis

4. **FSIs depict an overall well capitalized, liquid banking system with good asset quality, but low profitability and high dollarization increase vulnerabilities to shocks.** Capital is well above regulatory requirements, liquidity indicators are robust, and NPLs are low, although unevenly distributed. In particular, state-owned banks have comparatively higher NPLs and lower provisions than private banks, and the tourism sectors records comparatively higher NPLs than the other main economic sectors. With return on assets and equity hovering below 1 and 6 percent respectively, profitability remains low by international peer comparison. High net foreign exposures of private banks—68 and 64 percent of capital respectively—increase the vulnerability of the whole system to rollover risk.

5. **The financial sector seems well prepared to absorb a range of shocks.** Staff carried out several stress tests to assess the likely impact of credit, interest, FX, liquidity, and interbank contagion shocks. Credit risk shocks included: (i) an aggregate NPL shock equivalent to 8 percent of currently performing loans; and (ii) a sectoral shock equivalent to 6 and 10 percent of currently performing loans to the construction and trade sectors respectively, which together account for more than 40 percent of total loans.[2] The interest risk shocks included: (i) the flow impact from the gap between interest sensitive assets and liabilities; and (ii) the stock impact from bond repricing following a nominal interest rate increase of 3.5 percentage points (similar to the cumulative cut in the policy interest rate in 2015). The FX risk shock shows: (i) the direct exchange rate risk shock; and (ii) the indirect effect on credit quality following a 10 percent nominal depreciation, assuming that 60 percent (the share of FX loans to un-hedged borrowers) of currently performing FX loans would become non-performing following a 100 percent[3] depreciation. All shocks, except those to the interest rate, are calibrated as two standard deviations above the historical mean since the 90s. The liquidity stress test models: a simple liquidity drain on all banks of a 10 and 8 percent per day withdrawal of demand deposits in domestic and foreign currency respectively; and a 5 and 3 percent per day withdrawal of time deposit in domestic and foreign currency respectively. The interbank contagion scenario uses banks exposure data to illustrate the second round effect of the modeled macro shocks. Finally, we perform a reverse test to determine what would have to be the NPL increase for: (i) the system-wide CAR to decline below the regulatory 10 percent threshold; (ii) at least 8 banks (about half of total) to fall below the regulatory CAR; and (iii) 50 percent of total bank market share to decline below the same threshold.

6. **The impact of the single shocks, as well as the combination of them, is moderate and could be absorbed by existing capital buffers.** The exercise shows that the system-wide post

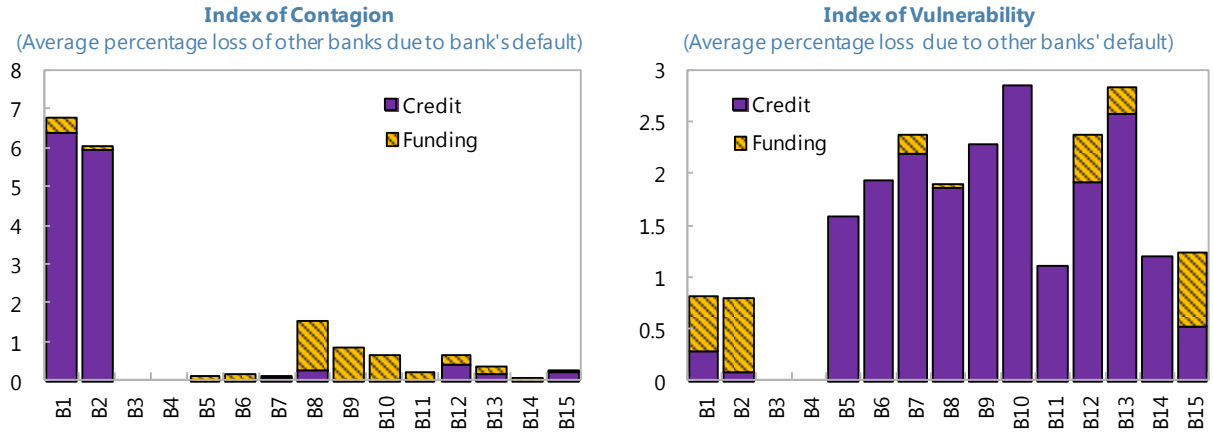
[2] A 75 percent haircut on collateral, and a 25 and 50 percent provisioning rate on new NPLs in domestic and foreign currency respectively are assumed.

[3] The 100 percent depreciation is a benchmark used to calibrate the sensitivity. Hence, the assumed 10 percent depreciation would yield to 6 percent of FX performing loans becoming non-performing.

shock CAR remains above 10 percent even after an extremely negative combined shock which includes an aggregate credit shock, an increase in interest rates, and a FX depreciation[4], and the system could withstand a liquidity drain for 5 days. The combined shock does not trigger any bank failure, although the CAR of nine banks falls below the regulatory threshold, which would require some balance-sheet adjustment. Given low historical profitability, profits would provide limited buffers and post-shock CAR would be only marginally higher when profits are used as a buffer for "defense". The net effect of the interest rate shock is marginal, as the positive flow impact on interest sensitive assets partially offsets the negative repricing impact on the stock of bonds. The indirect FX shock through increased credit risk of un-hedged borrowers proves to be the most significant and could reduce the CAR of five privately owned and foreign banks below the regulatory threshold, given the higher exposure of these banks to dollarized loans. However, the market share of the affected banks is relatively small, and a set of reverse stress tests shows that the credit shock necessary to push the system-wide CAR, or half of it, below the regulatory threshold would be extreme and highly unlikely.

7. **Interbank exposures are limited, and there are not second round contagion effects.** With the exception of the deposits that private banks have to keep with the two public banks that manage the fund for development loans (Sistema de Banca para el Desarollo), and some funding in colones by public to private banks, the interbank market is thin as banks are mostly funded through deposits. As a consequence, both the direct vulnerability and contagion levels from both credit and funding shocks across banks are limited and there are not domino effects triggered by interbank obligations.

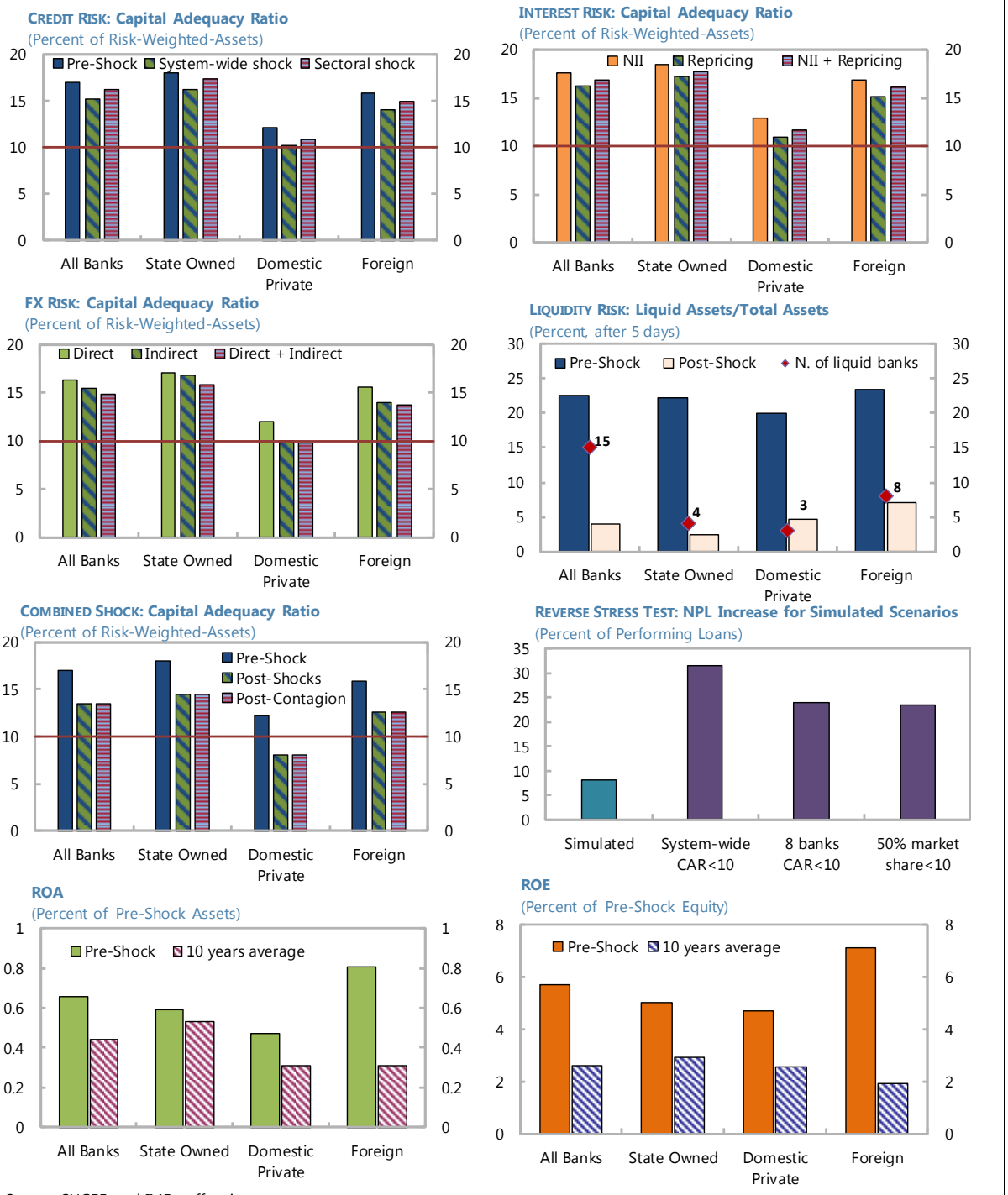
Figure 1. Costa Rica: Interbank Network Analysis



Sources: SUGEF; and staff estimates.
Note: Calculations assume 100% of loss given default and funding shortfall, and 35 percent of lost funding being non-replaceable.

[4] The components of the combined shock are calibrated in the same way as the individual shocks described in paragraph 5.

Figure 2. Costa Rica: Stress Test Results



Source: SUGEF, and IMF staff estimates.

Note: The *Credit Risk* Shock assumes an increase in NPLs of 8 percent of performing loans; and a 25 percent provisioning rate. The *Interest Rate* Shock assumes a 3.5 percentage points nominal interest rate increase. The *FX Shock* assumes a 14 percent depreciation of the FX rate, leading to 6 percent of FX loans becoming NPL, and a 50 percent provisioning rate. The *Liquidity Shock* assumes a 10 and 8 percent per day withdrawal of demand deposits in domestic and foreign currency respectively; and a 5 and 3 percent per day withdrawal of time deposits in domestic and foreign currency respectively.

Table 3. Costa Rica: Banking Sector Financial Soundness Indicators

	All Banks	State Owned	Domestic Private	Foreign
Selected Banking Sector Ratios (Percent)				
Capital Adequacy				
Total capital / RWA (CAR)	17.0	18.0	12.2	15.9
Asset Quality				
NPLs/ total loans	1.8	2.4	0.7	1.0
FX loans/total loans	65.5	51.8	98.9	85.1
Profitability				
ROA (after-tax)	0.7	0.6	0.5	0.8
ROE (after-tax)	5.7	5.0	4.7	7.1
Liquidity				
Liquid assets/total assets	22.6	22.3	19.9	23.4
Liquid assets/short-term liabilities	69.9	63.5	80.7	84.2
Sensitivity to Market Risk				
Net FX exposure / capital	23.5	0.4	68.3	64.4
Sectoral structure of lending				
Total loans (Percent of GDP)	50	30	2	18
Agriculture (Percent of Total Loans)	3	5	5	1
Manufacturing	4	5	10	3
Construction	31	30	29	33
Trade	11	7	28	17
Tourism	2	3	2	1
Non-bank financial institutions	2	2	4	1
Other	45	48	22	43
Basic Ratio Analysis: Ratings 1/				
Overall	2	2	2	2
Capital Adequacy				
Total capital / RWA (CAR)	1	1	2	1
Asset Quality				
NPLs (gross)/ total loans	1	1	1	1
Provisions/NPLs	1	1	1	1
(NPLs-provisions)/capital	1	1	1	1
FX loans/total loans	3	3	4	4
RWA/total assets	3	3	4	3
Profitability				
ROA (after-tax)	3	3	3	3
ROE (after-tax)	3	3	3	3
Liquidity				
Liquid assets/total assets	2	2	2	2
Liquid assets/short-term liabilities	1	1	1	1
Sensitivity to Market Risk				
Net FX exposure / capital	2	1	3	3

Source: SUGEF.

1/ 1=Low risk, 2=Increased risk, 3=High risk, 4=Very high risk.

Table 4. Costa Rica: Stress Test Results

	All Banks	State Owned	Domestic Private	Foreign
Asset Quality				
Non performing loans (NPLs, Percent of Total Loans))	1.8	2.3	0.7	0.9
Capital adequacy ratio (CAR) pre-shock	17.0	18.0	12.2	15.9
Credit Risk Stress Test 1/				
1. "Proportional increase in NPLs"				
Post-shock CAR (Percent)	15.2	16.2	10.2	14.0
CAR change (Pct Points)	-1.7	-1.7	-1.6	-1.8
2. "Sectoral shocks to NPLs"				
Post-shock CAR (Percent)	16.2	17.4	10.9	15.0
CAR change (Pct Points)	-0.6	-0.5	-0.9	-0.8
Interest Rate Risk Stress Test 2/				
1. Net interest income impact				
Post-shock CAR (Percent)	17.7	18.5	12.9	16.9
CAR change (Pct Points)	0.7	0.5	0.7	1.0
2. Repricing impact				
Post-shock CAR (Percent)	16.9	17.7	11.7	16.2
CAR change (Pct Points)	-0.8	-0.8	-1.2	-0.7
Overall change in CAR (NII and Repricing)	-0.1	-0.3	-0.5	0.3
FX Risk Stress Test 3/				
1. Direct Foreign Exchange Risk				
Post-shock CAR (Percent)	16.4	17.1	12.0	15.6
CAR change (Pct Points)	-0.7	-0.9	-0.2	-0.3
2. Indirect Foreign Exchange Risk				
Post-shock CAR (Percent)	14.9	15.9	9.8	13.7
CAR change (Pct Points)	-1.5	-1.2	-2.2	-1.9
Overall change in CAR (Direct and Indirect)	-2.2	-2.2	-2.4	-2.2
Interbank Stress Test				
CAR (after the macroshocks)	13.5	14.5	8.1	12.6
CAR after the first iteration	13.5	14.5	8.1	12.6
Liquidity Stress Test (# of liquid banks after 5 days) 4/				
Simple liquidity test (run on all banks, fire-sale of assets)	15	4	3	8

Source: SUGEF; and IMF staff estimates.

1/ Assumes an increase in NLP of 8 percent of performing loans; and a 25 percent provisioning rate. The sectoral shock to NLP assumes that 6 and 10 percent of the loan portfolio to the construction and trade sectors respectively become non-performing.

2/ Assumes a 3.5 percentage points nominal interest rate increase.

3/ Assumes a 14 percent depreciation of the FX rate, leading to 6 percent of FX loans becoming non-performing, and a 50 percent provisioning rate.

4/ Assumes a 10 and 8 percent per day withdrawal of demand deposits in domestic and foreign currency respectively; and a 5 and 3 percent per day withdrawal of time deposit in domestic and foreign currency respectively.

Table 5. Costa Rica: Summary of Stress Test Results

	All Banks	State Owned	Domestic Private	Foreign
Summary of Results				
Solvency				
Pre-shock CAR	17.0	18.0	12.2	15.9
Impact of (percentage points of the original RWA)				
Increase in NPLs 1/	-1.7	-1.7	-1.6	-1.8
Increase in interest rates 2/	-0.1	-0.3	-0.5	0.3
Exchange rate depreciation 3/	-2.2	-2.2	-2.4	-2.2
Post-shock CAR (percent of post-shock RWA)	13.1	13.9	7.8	12.2
Change in CAR (all fundamental shocks)	-4.0	-4.1	-4.4	-3.7
Impact of interbank contagion	0.0	0.0	0.0	0.0
Post-contagion CAR	13.1	13.9	7.8	12.2
Liquidity 4/				
Liquid assets/total assets				
Pre-shock	22.6	22.3	19.9	23.4
Post-shock (after 5 days)	4.0	2.4	4.8	7.1
Liquid assets/short-term liabilities				
Pre-shock	69.9	63.5	80.7	84.2
Post-shock (after 5 days)	36.3	16.7	106.9	117.1
Profits (10-year average)/pre-shock RWA	0.4	0.5	0.3	0.3
Post-Shock Banking Ratios				
Capital Adequacy				
Total capital / RWA (CAR) if profit used for defense	13.5	14.5	8.1	12.6
Asset Quality				
NPLs (gross)/ total loans	9.7	10.2	8.7	8.9
Provisions/NPLs	39.5	38.9	38.8	40.6
(NPLs-provisions)/capital	34.6	34.8	37.7	34.1
FX loans/total loans	65.5	51.8	98.9	85.1
RWA/total assets	68.2	65.3	83.8	71.9
Liquidity				
Liquid assets/total assets	4.0	2.4	4.8	7.1
Liquid assets/short-term liabilities	36.3	16.7	106.9	117.1
Post-Shock Ratings				
Overall	2	3	3	3
Capital Adequacy				
Total capital / RWA (CAR)	2	2	1	2
Asset Quality				
NPLs (gross)/ total loans	2	2	2	2
Provisions/NPLs	3	3	3	3
(NPLs-provisions)/capital	2	2	2	2
FX loans/total loans	3	4	3	4
RWA/total assets	3	3	3	3
Profitability				
ROA (after-tax)	3	3	3	3
ROE (after-tax)	3	3	3	3
Liquidity				
Liquid assets/total assets	4	4	4	4
Liquid assets/short-term liabilities	3	4	3	1
Sensitivity to Market Risk				
Net FX exposure / capital	2	1	3	3

Source: SUGEF; and IMF staff estimates.

1/ Assumes an increase in NPLs of 8 percent of performing loans; and a 25 percent provisioning rate. The sectoral shock to NLP assumes that 6 and 10 percent of the loan portfolio to the construction and trade sectors respectively become non-performing.

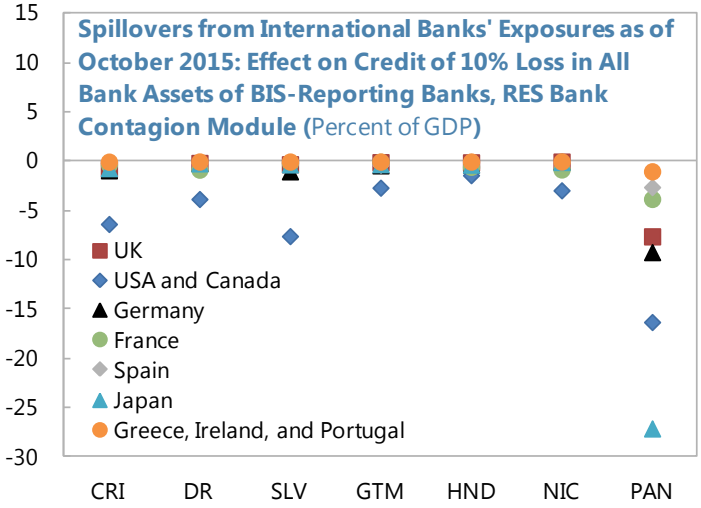
3/ Assumes a 14 percent depreciation of the FX rate, leading to 6 percent of FX loans becoming non-performing, and a 50 percent provisioning rate.

4/ Assumes a 10 and 8 percent per day withdrawal of demand deposits in domestic and foreign currency respectively; and a 5 and 3 percent per day withdrawal of time deposits in domestic and foreign currency respectively.

C. Inwards Spillovers from Stress in International Banks

8. **We used the IMF Bank Contagion Module to assess the impact of financial spillovers to Costa Rica from stress in international banks.** Based on BIS banking statistics and bank-level data, the model 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 borrowers.[5] 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]

9. **Spillovers to Costa Rica from stress in international banks are larger than in regional peers.** The impact on foreign credit availability in Costa Rica of the severe stress scenarios in asset values of BIS reporting banks, presented in the text figure and table below, is larger than in other countries in the region, with the exception of Panama and El Salvador. As of October 2015, the most sizable impact on claims on Costa Rican borrowers would stem from shocks in the US and Canada. Spillovers from a 10 percent shock to assets originating in the U.S. and



1/ In Panama, the loss of credit includes credit by banks in the off-shore center with minimal links to the domestic economy.

[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. Banks exposures and spillover estimates were provided by Camelia Minoiu and Paola Ganum (RES).

[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.

Canada would reduce credit in Costa Rica by 6.3 percent of GDP (or 7.9 percent of total domestic and cross-border credit to the public and private sectors).[8] In contrast, a similar shock would reduce credit in Guatemala and Honduras by only 2.7 and 1.4 percent of GDP respectively. More generally, the level of upstream exposures of Costa Rica to international banks[9] implies an upper limit of rollover risks on external credit of about 11.6 percent of GDP (or 14.6 percent of total domestic and cross-border credit to the public and private sectors in Costa Rica).[10] 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.

Table 6. Costa Rica: Spillovers from International Banks' Exposures, as of October 2015

Creditor banking system	Magnitude of Shock to Creditor Banks' Exposures 1/	Impact on Credit Availability (% GDP) 2/
USA	10	-2.8
Canada	10	-3.6
USA and Canada	10	-6.3
UK	10	-0.8
Germany	10	-0.9
France	10	-0.3
Spain	10	-0.2
Italy	10	0.0
Greece	10	0.0
Ireland	10	0.0
Portugal	10	0.0
GIP 3/	10	0.0
Switzerland	10	0.0
Netherlands	10	-0.3
Japan	10	-0.7
Selected European countries 4/	10	-2.4

Source: Research Department Macro-Financial Division Bank Contagion Module based on BIS, ECB, IFS,

1/ Percent of on-balance sheet claims (all borrowing sectors) that default.

2/ Reduction in foreign banks' credit due to the impact of the shock on their balance sheet, assuming uniform deleveraging across domestic and external claims. All simulations are based on 2015Q3 data.

3/ Greece, Ireland, and Portugal.

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

[8] Spillovers from exposures to the USA increased significantly compared to the earlier (2013Q3) estimates of 0.29 percent of GDP because the latest simulations require advanced economy banking system to hold 8.5% capital ratio to be considered as "adequately capitalized" (in line with Basel III) compared to 6% in previous estimates. For any given shock to their balance sheets, this higher required minimum capital leads to a greater deleveraging by the banking system that receives the shock, and therefore to a higher funding risk exposure of the borrower country, in this case Costa Rica.

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

[10] 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).

10. **Spillovers from a shock originating in the U.S. assets only are significant, but financial regional integration is important in the transmission of shocks.** The impact of a 10 percent loss in U.S. asset values on cross-border credit availability in Costa Rica would be 2.8 percent of GDP. This effect stems from the large share of U.S. banks in total foreign bank claims on Costa Rica, although the strengthening in international banks' capital buffers and the cross-border deleveraging of assets after the global financial crisis is likely to have mitigated it. As of October 2015, a 10 percent loss on European assets would result in a reduction in credit availability to Costa Rica of about 2.4 percent of GDP.[11] This result, however, is largely 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 (0.6 percent of GDP) resulting from a shock originating in Europe would be transmitted through cross-border lending from Panama, which is more dependent on European banks' funding.

[11] Spillovers from exposures to large European banks are lower compared to the earlier (2013Q3) estimates of 4.04 percent of GDP because foreign claims decreased significantly, more than offsetting the deleveraging effect caused by the higher minimum capital requirement.

MONETARY POLICY STANCE[1]

This note presents an empirical assessment of the current monetary policy stance in Costa Rica. We find that monetary policy is appropriately expansionary after eight consecutive policy rate decreases since early 2015. All the employed estimates of the neutral monetary policy rate support this conclusion. The decrease in inflation below the lower bound of the target range in 2015 can largely be explained by the fall in international commodity prices—which in turn resulted in lower domestic prices of regulated goods and services, and agricultural products—and a widening output gap. While the current easing cycle is projected to support the return of inflation within the new target range and of economic activity to its potential level over the short and medium term respectively, the BCCR should stand ready to start reversing it should signs emerge that price pressures are materializing, also in light of the prospective normalization of global interest rates.

1. **The central bank seized the fall of inflation below the lower limit of the target range to reduce the target inflation band.** Headline inflation was negative and core inflation stood below the central bank's target range of 3–5 percent during most of 2015, while expectations fell within the target range for the first time. To stimulate the economy, the central bank has cut the monetary policy rate by 350 cumulative basis points since the beginning of 2015, to 1.75 percent in January 4, 2016, undoing the three interest rate increases implemented in 2014. The central bank also took advantage of the negative inflation shock to decrease the inflation target range to 2–4 percent, in line with trading partners.

2. **To assess the adequacy of the current monetary policy stance this note estimates the neutral monetary policy interest rate.** Looking at the difference between the actual policy rate and the estimated short-run operational neutral interest rate (NIR)—which would yield a stable inflation under closed output gap conditions—we can assess the monetary stance taking into account the economy's current position in the cycle.

3. **We use five different empirical approaches to estimating the neutral monetary policy interest rate.** Following Magud and Tsounta (2012), we employ: (1) an Uncovered Interest Parity (UIP) condition; (2) a specification of the Taylor rule augmented for inflation expectations; and (3) a general equilibrium model that focuses on aggregate demand and supply equations. In addition, we estimate: (4) a forward looking monetary model à la Clarida, Galí, and Gertler, 1998, and Galí and Monacelli, 2005; and (5) a linear semi-structural new-Keynesian Quarterly Projection Model (QPM) with model-consistent expectations, of the kind used in several Central Banks and other institutions, including the IMF (Berg, Karam and Laxton, 2006), to help set an appropriate level of the policy interest rate given an inflation target and the macroeconomic conditions. The first three models use

[1] Prepared by Valentina Flamini and Rodrigo Mariscal Paredes

monthly data from March 2006 to November 2015; the fourth model from January 1994 to August 2015; and the fifth model uses quarterly data from 1996Q1 to 2016Q1.

4. **The UIP condition points to a neutral nominal interest rate of 4.6 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:

$$i_t = i_t^* + \hat{E} + \rho$$
$$\hat{E} = RER + \left(\pi - \pi^*\right)$$

where it is the neutral policy rate in Costa Rica, i_t^* is the current policy rate in the U.S., Ê 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 and π^* are current end 2016 inflation projections in Costa Rica and the U.S respectively.

5. **The expected-inflation augmented Taylor rule model estimates a neutral nominal interest rate of 5.4 percent.** The model incorporates information from the yield curve and inflation expectations, in addition to the standard output gap and deviations from the inflation target in standard Taylor rule models. The real neutral level for the monetary policy rate estimated under this model is 2.4, which corresponds to a neutral nominal interest rate of 5.4 percent with the staff's projected inflation of 3 percent at the end 2016.[2] 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 system of equations:

$$r_t = r_t^* + \pi_{t+6}^e + \beta\left(\pi_{t+5}^e - \pi_t^*\right) + \theta\tilde{y}_t + \varepsilon_t^1$$
$$R_t = r_t^* + \alpha + \pi_{t+6}^e + \varepsilon_t^2$$
$$r_t^* = r_{t-1}^* + g_{t-1}$$
$$g_t = g_{t-1} + \vartheta_t^1$$

where r_t is the short-term interest rate (rate on the central bank's open-market operations), r_t* is the neutral real policy rate, $\pi^e{}_t$ is the end-of-year inflation expectation at time t, $\pi^e{}_{t+6} - \pi^*{}_t$ is the deviation of the end-of-year inflation expectation at time t+6 from the target, $\tilde{y}_t$ is the output gap, 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, ε_t^2 and ϑ_t^1) are assumed to have zero mean and constant variance. The transition process for the NIR is defined as a random walk process with drift, g_t being the growth rate of the unobserved state variable r_t^*. The model parameters, unobserved variables, and residual terms are estimated using a Kalman filter based on a log likelihood function as in Durbin and Koopman (2001).

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

6. **The general equilibrium model puts the nominal neutral rate at 5.6 percent.** This model includes 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. It 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 system of equations:

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

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

$$y_t = y_t^* + \varepsilon_t^c$$
$$y_t^* = y_{t-1}^* + g_{t-1}$$
$$g_t = g_{t-1} + \varepsilon_t^g$$
$$r_t^* = r_{t-1}^* + \varepsilon_t^r$$

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, ε_t^{π} ε_t^c, ε_t^g and ε_t^r) are assumed to have zero mean and constant variance. The (unobserved) NIR and potential GDP are estimated, along with the model parameters, with a Kalman filter assuming that the NIR follows a random walk, the potential GDP grows at a rate g_t, and real GDP is given by stochastic deviations from its potential level, using a log likelihood function à la Durbin and Koopman (2001).[3]

7. **The forward-looking monetary model yields a neutral interest rate of 4.8 percent.** The model includes three structural equations derived for a small open economy. Specifically: a New Keynesian Philips curve with international oil prices; a forward-looking IS curve with real exchange rate and foreign demand; and a standard Taylor rule with a smoothing parameter. Parameters are estimated by the generalized method of moments (GMM). The system was then solved and found to be saddle-path stable using Blanchard and Kahn's method.[4] The model consists of the following equations:

$$x_t = x_{t+6} + \alpha\left(r_t - \bar{r}\right) + \delta\Delta s_t + \psi\Delta y_t^* + \varepsilon_t^x$$
$$\pi_t = (1-\phi_1)\pi_{t-1} + \phi_1\pi_{t+6} + \phi_2 x_{t+6} + \phi_3\pi_t^{\text{oil}} + \varepsilon_t^{\pi}$$
$$r_t = \rho r_{t-1} + (1-\rho)\left[\bar{r} + \beta\left(\pi_{t+6} - \bar{\pi}_t\right) + \gamma x_{t+6}\right] + \varepsilon_t^r$$

[3] See Magud and Tsounta (2012) for additional methodological details.

[4] This condition guarantees that the system will converge to the steady state for any given initial value in the state variables and any given change in the value of the control variables that satisfy the feasibility constrains.

where x_t is the output gap at time *t*, Δs_t is the annual rate of change of the real exchange rate index between t and $t-1$, Δy_t^* is the annual growth rate of foreign demand (approximated with the US GDP growth rate), π_t is the inflation rate, calculated as the annual rate of change of the CPI, and π_t^{oil} the annual rate of change of the international oil price index; r_t is the monetary policy rate and $\bar{r}_t$ is the neutral (nominal) interest rate. Finally, the error term in each equation, ε_t, is a linear combination of forecast errors and an exogenous disturbance (by assumption, this error term is orthogonal to the set of instruments).

8. **The QPM model gives a neutral interest rate of 4.4 percent.** The model consist of four basic behavioral equations—for aggregate demand (IS curve), (short term) aggregate supply (Phillips curve), the UIP condition, and a Monetary Policy rule—and several identities. The aggregate demand equation includes a monetary condition index which combines deviations of both the interest and exchange rates from their equilibrium (neutral) levels. The aggregate supply equation accounts for shocks to energy and food prices, as well as to core inflation. The UIP condition and monetary policy rule are modeled to accommodate nominal exchange rate persistency and imperfect control of the money market due to FX Central Bank interventions, and imperfect capital mobility. The model's main equations are:

Aggregate demand:

$$\hat{y}_t = b_1 \hat{y}_{t-1} - b_2 mci_t + b_3 \hat{y}_t^* + \varepsilon_t^y$$
$$mci_t = b_4 \left(\hat{r}_t + cr\_prem_t \right) + (1-b_4)(-\hat{z}_t)$$

Aggregate supply:

$$\pi_t^{core} = a_1 \pi_{t-1}^{core} + (1-a_1)\mathrm{E}_t \pi_{t+1} + a_2 rmc_t + \varepsilon_t^{\pi}$$
$$rmc_t = a_3 \hat{y}_t + (1-a_3)\hat{z}_t$$
$$\pi_t = w^{oil} \pi_t^{oil} + w^{food} \pi_t^{food} + \left(1 - w^{oil} - w^{food}\right) \pi_t^{core}$$

UIP:

$$s_{t+1} - s_t = e_2 \left(\bar{\pi}_t - \bar{\pi}_t^* + \Delta \bar{z}_t \right) + \left(1-e_2\right)\left(i_t^* - i_t + prem_t \right) + \varepsilon_t^s$$

Monetary Policy Rule:

$$i_t = h_1 \left(\Delta s_{t+1} + i_t^* + prem_t \right) + (1-h_1)\left(g_1 i_{t-1}^n + (1-\mathrm{g}_1)\left(i_t^n + g_2 \left(\mathrm{E}_t \pi_{t+4} - \pi^T \right) + g_3 \hat{y}_t \right) \right) + \varepsilon_t^i$$

Where $\hat{y}_t$ is the output gap at time *t*, mci_t is the real monetary conditions index, $\hat{y}_t^*$ is the foreign output gap, $\hat{r}_t$ and $\hat{z}_t$ are the real interest rate and RER gap, rmc_t are real marginal costs, cr_prem_t and $prem_t$ are credit and sovereign premium terms respectively. π_t, π_t^{core}, π_t^{oil}, and π_t^{food} are headline, core, oil and food inflation respectively, and w the respective weight in the basket. $\bar{\pi}_t$ and $\bar{\pi}_t^*$ are the domestic and foreign (target) inflation objective, and $\Delta \bar{z}_t$ the 'desired' change in the real exchange rate path along which the CB smoothes the actual nominal exchange rate. ε_t^y, ε_t^{π}, ε_t^s

and ε_t^i are demand, cost-push, exchange rate, and monetary policy shocks.[5] The model is solved using a variant of the Blanchard and Khan (1982) algorithm. The model's structural shocks and unobservable variables—i.e. trends and gaps, whose dynamics are jointly described by a VAR (1) representation—are estimated using a Kalman smoother as described in Hamilton (1994, chapter 13).

9. **To conclude, the monetary stance seems broadly adequate, however, vigilance is required going forward.** Averaging the results from the five models above, the nominal neutral interest rate for Costa Rica is estimated at 4.6 percent. This value is lower than what was estimated in 2014 (5.1 percent), consistent with comparatively lower estimates of potential output and inflation. The current nominal monetary policy interest rate of 1.75 percent is below the estimated neutral monetary policy rate. With a positive output gap and inflation projected to remain below target in the near term, the monetary policy is appropriately expansionary. However, the BCCR should remain vigilant and stand ready to raise interest rates should inflation increase faster than anticipated due to: (i) faster U.S. growth; (ii) a rebound in international commodity prices; (iii) upward food price pressures stemming from regional droughts; and (iv) possible second-round effects from currency depreciation following the normalization of global interest rates.

Table 1. Costa Rica: Neutral Interest Rate, Latest Estimates

		Expected Inflation Dic-2016	3.00
		Actual Monetary Policy Rate	1.75

Method 1/	Neutral Real Interest Rate (NRIR)	Neutral Nominal Interest Rate (NNIR)	Nominal Monetary Policy GAP (bps) 2/
Uncovered Interest Parity	1.6	4.6	283
Expected-Inflation Augmented Taylor Rule			
2006-2015	2.4	5.4	368
General Equilibrium Model			
2006-2015	2.6	5.6	381
Forward Looking Monetary Model			
1994-2015	1.8	4.8	301
QPM Model			
1996-2015	1.4	4.4	265
Average	1.9	4.9	320

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

[5] See Berg and others (2006) for additional model equations and properties.

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FINANCIAL DEEPENING IN COSTA RICA[1]

This note examines the current state of financial development in Costa Rica, as well as implications for potential growth and stability from further financial deepening. Costa Rica's financial system continues to lag behind those of other emerging markets as well as the country's macroeconomic fundamentals. In the short run, Costa Rica should aim at removing distortions that prevent the country from reaching its full financial development potential given the current state of macroeconomic fundamentals. This includes following through on the modernization of its collateral framework, ensuring a level playing field for private and public banks, following market-friendly debt management and issuance strategies, and taking steps to support the development of the stock market. In the longer term, as fundamentals continue to evolve, Costa Rica would benefit from further financial development in terms of growth and stability, provided there is adequate regulatory oversight to prevent excesses.

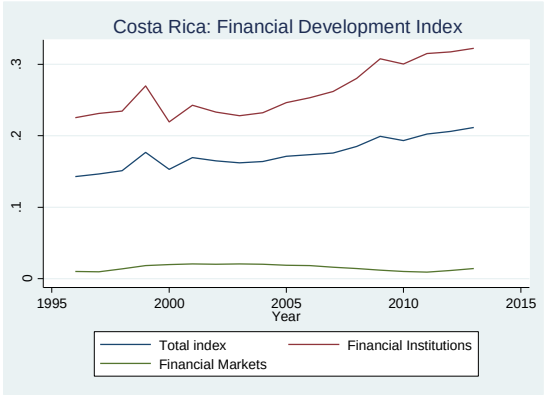
A. Financial Development: Where Does Costa Rica Stand?

1. **Costa Rica's financial development was assessed using a comprehensive index.** Financial development has proven difficult to measure. Typical proxies in the literature such as the ratio of private credit to GDP and, to a lesser extent, stock market capitalization are too narrow to capture the broad spectrum of financial sector activities. To better capture different facets of financial development, we employ a comprehensive and broad-based index covering 123 countries for the period 1995–2013 (see Appendix and Heng and others, 2015). The index contains two major components: financial institutions and financial markets. Each component is broken down into access, depth, and efficiency sub-components. These sub-components, in turn, are constructed based on a number of underlying variables that track development in each area.

2. **Costa Rica's financial system deepened notably in the past decade but continues to lag behind those of other emerging markets.** The improvements came from growth in financial institutions, in particular, better institutional access and improved efficiency. In contrast, market development stagnated. Despite the recent progress, Costa Rica continues to lag behind other emerging markets on many dimensions. In particular, it lags other EM groups on all of the subcomponents of financial market development. It is also behind other EMs on some aspects of institutional development, though performance varies by component. In fact, Costa Rica compares favorably on institutional access, outperforming all other EM country groupings. Good access reflects a wide network of ATMs and bank branches per 100,000 adults. However, the country lags behind other EMs on institutional efficiency, though it slightly exceeds the LAC average on this component. Low efficiency reflects high interest rate spreads, high overhead costs, and high net interest margins. Finally, Costa Rica is behind all other country groupings on institutional depth due to the low level of credit and deposits to GDP as well as small mutual fund and insurance industries.

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

Figure 1. Costa Rica: Financial Sector Development



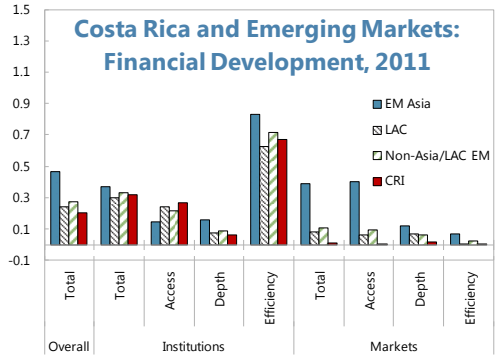
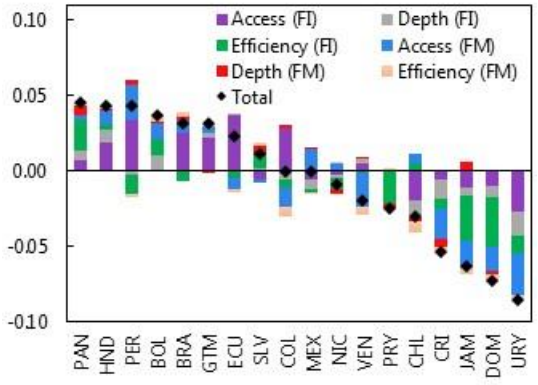
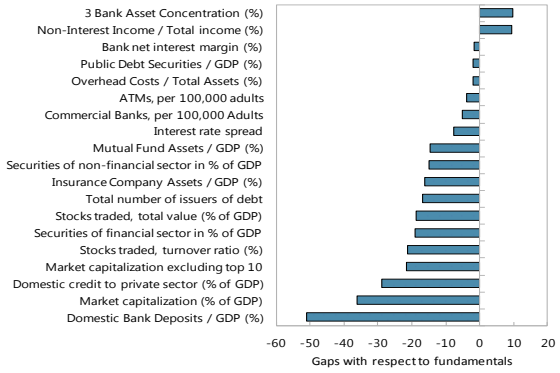


Figure 2. Costa Rica: Financial Development Gaps





1/ The signs on the gaps were harmonized such that a negative gap indicates low level of development compared to the fundamentals.

3. **Costa Rica's financial development is also below the levels predicted by country's fundamentals (Panel 2).** A simple cross-country comparison above does not account for differences in the underlying macroeconomic conditions. Financial development gaps—the deviation of the financial development index from a prediction based on economic fundamentals, such as income per capita, government size, and macroeconomic stability—can help identify potential under or overdevelopment of Costa Rica, compared to countries with similar fundamentals. These gaps suggest that Costa Rica's financial development is below the levels predicted by its macroeconomic fundamentals on all but two subcomponents. The exceptions are two narrow measures of institutional efficiency, namely, 3-bank asset concentration and non-interest income. Other measures, however, including lending-deposit spread, bank interest margin, and overhead cost, point to inefficiencies in the banking sector. To the extent that the negative gaps reflect distortions or market frictions, they need to be addressed. For example, high interest rate spreads are likely a reflection of the substantial presence of public banks, which lack strong incentives to improve efficiency. The relatively low credit-to-GDP ratio at least to some extent reflects a weak legal collateral framework, which was in place before 2015, and was probably one of the causes of the high collateral-to-loan ratio.

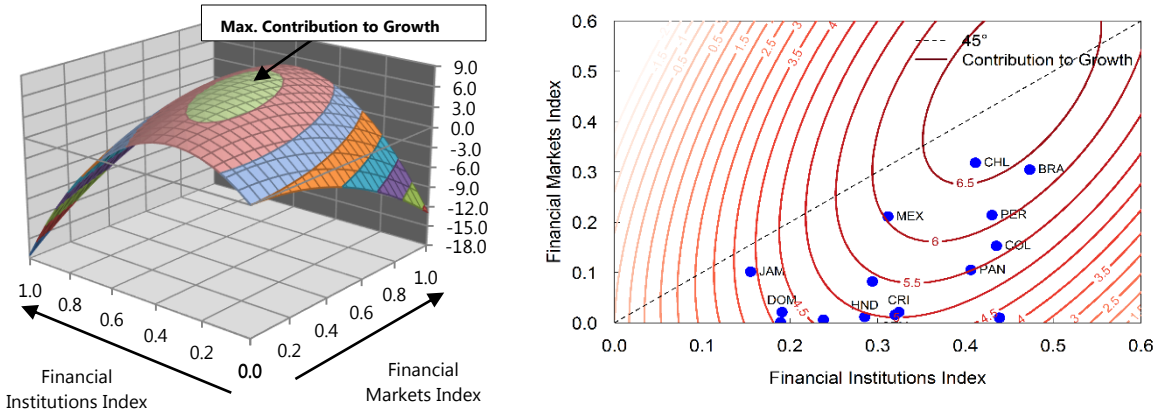
B. The Potential for Raising Growth and Stability through Further Financial Deepening in Costa Rica

4. **There is a non-linear relationship between growth and stability on the one hand and financial development on the other hand.** Financial development gaps do not address the question of the optimal level of financial development in terms of growth and stability. To explore this question, we examine the relationships between financial development and growth as well as financial development and stability (see Heng and others, 2015). We find that these relationships are nonlinear. In other words, the benefits from financial development are rising at the early stages of development as resources are increasingly channeled into productive uses. However, there is a turning point beyond which the positive growth benefits diminish. Similarly, at the early stages, financial development can help reduce instability, for example, by providing insurance services, but these benefits also start to diminish after a certain point. The turning points likely reflect the fact that large financial systems can eventually divert resources from more productive activities, while excessive borrowing and risk-taking by financial institutions can lead to increased instability and lower long-term growth. Indeed, the inverted U-shaped relationship with growth is driven by the depth of financial institutions, or a measure of size. Access and efficiency, on the other hand, yield unambiguously increasing benefits to growth, although with potential stability costs as reduced bank profitability may encourage risk-taking. Lastly, too much market development at the early stages of institutional development may have negative implications for stability. One reason for this could be increased market volatility, which may more easily set in when financial institutions are not strong enough to help guard against shocks. For similar levels of development, however, institutions and markets are complementary for growth and stability.

5. **Costa Rica has not yet reached the levels of institutional and market development that yield maximum benefits to growth and stability.** In Latin America and the Caribbean, Brazil and Chile are closest to reaping those benefits, whereas the Dominican Republic, Paraguay, and Honduras lag behind (Panel 3). Costa Rica is still far away from reaping the maximum benefits to growth and stability, in particular, in terms of financial market development. Note that these estimates stem from a partial analysis that assumes that all other growth determinants (such as income level, inflation, government size etc.) are held constant while financial development is consistent with the level of macroeconomic fundamentals. Thus, in the longer term, reaping maximum benefits from financial development for growth and stability would also require improving Costa Rica's macroeconomic fundamentals, which in turn would support further development of the financial systems. This is an interactive process whereby financial systems are shaped by fundamentals, and fundamentals evolve partly as a function of more developed financial systems. Estimates should, however, be interpreted with caution since it is difficult to disentangle

causality in econometric terms, even though instrumental variables were used to address potential endogeneity issues.[2]

Figure 3. Costa Rica: Financial Institutions, Market Development, and Economic Growth



Source: IMF staff calculations.
Note: surface shows the predicted effect in growth for each level of the indices, holding fixed other sets of controls.

C. Conclusions and Policy Recommendations

- Costa Rica's financial system deepened notably in the past decade, but continues to lag behind those of other emerging markets as well as the level of development implied by its macroeconomic fundamentals.

- Given that the fundamentals are sticky in the short term, Costa Rica should aim at removing distortions that prevent the country from reaching its full financial development potential given the current state of macroeconomic fundamentals.

    - To facilitate deepening on the side of financial institutions, Costa Rica should follow through on the modernization of its collateral framework while balancing it with proper regulation and supervision. In 2015, the country adopted a new secured transactions law that establishes a functional secured transactions system and a modern, centralized, notice-based collateral registry. The law also broadened the range of assets that can be used as collateral, including intangibles such as intellectual property rights, allowed a general description of assets granted as collateral and permitted out-of-court

[2] We use *system GMM* estimation (Arellano and Bover, 1995; Blundell and Bond, 1998) to address the dynamic dependence of our variables of interest and potential endogeneity of control variables. We also employ additional instrumental variables used in the literature, namely, rule of law (Kaufmann, Kraay and Mastruzzi 2010) and a set of dummies for the country's legal origin (La Porta, Lopez-de-Silanes and Shleifer 2008).

enforcement of collateral. Nevertheless, careful monitoring is warranted at this stage to hinder abuse as the new system is being tested.

- To improve efficiency of financial intermediation it should ensure *a level playing field for private banks compared to public banks*. An important first step would be to remove the explicit guarantee currently given by the state to all colon-denominated deposits in state banks.

- Costa Rica could benefit from following *market-friendly debt management and issuance strategies* to help foster secondary markets for government securities, such as the use of standardized simple instruments with conventional maturities, as well as strengthening legal and regulatory frameworks.

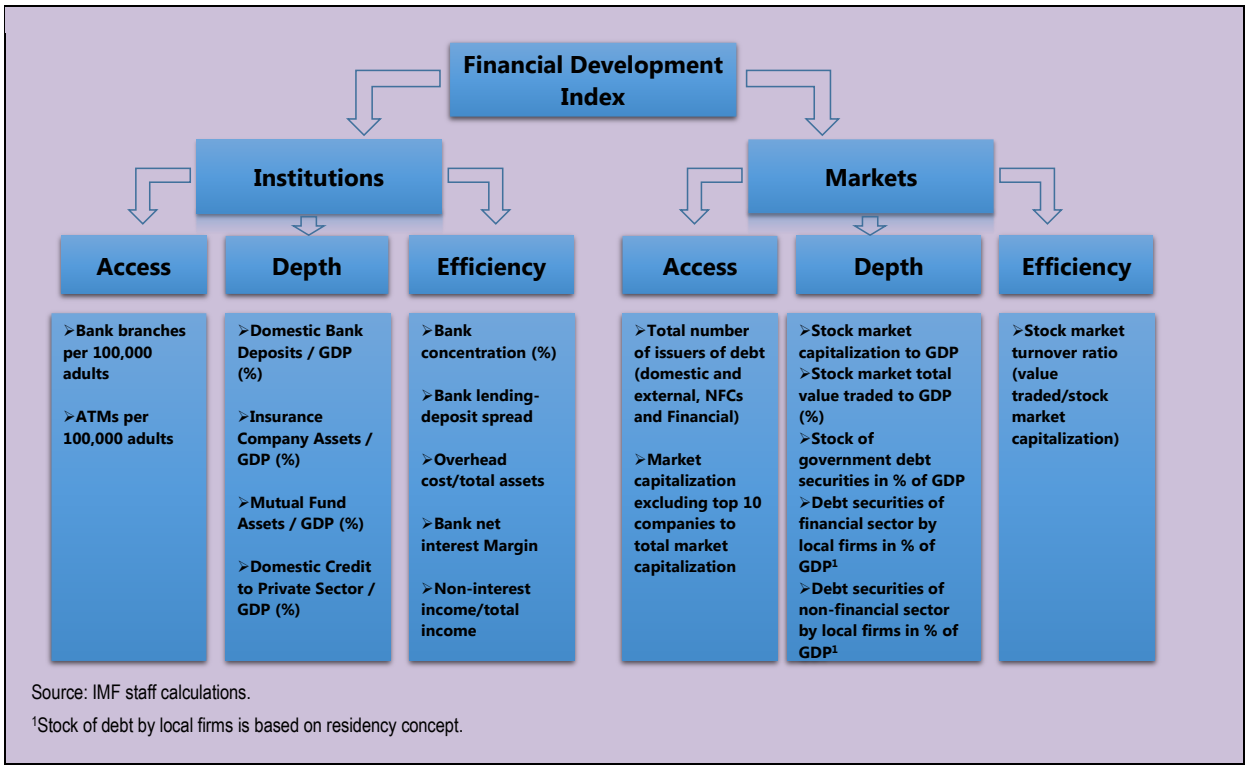
- To promote the development of the stock market Costa Rica would certainly gain from *a more robust macroeconomic environment, as well as stronger institutional and legal frameworks, which promote investor rights, information disclosure, as well as policies that increase market size, in particular, those supporting the development of an institutional investor base* In recent years, an important step has been taken by allowing private participation into the insurance sector where it used to be a state monopoly but more could be done to encourage further entry. Strengthening protection of minority investors – an area where Costa Rica does not score well in Doing Business indictors - could also help. Finally, reviewing tax treatment of securities issuance and investment to make the tax system more attractive to issuers may be warranted as long as it does not jeopardize fiscal sustainability objectives.

- In the longer term, as fundamentals continue to evolve, including toward a higher income per capita, further financial development would be advantageous for Costa Rica in terms of growth and stability, provided there is adequate regulatory oversight to prevent excesses. The process, however, is likely to be gradual and iterative with income growth supporting financial development and vice versa. In the process, care should be taken not to promote excessive market development when financial institutions are underdeveloped.

Appendix I. Measuring Financial Development

To measure financial development we employ the same framework as in Heng and others, 2015. [1]

Sources and Data Processing



- The data generally cover the period 1995 to 2013 with gaps, in particular, for countries in the Middle East, Sub-Sahara Africa and Latin America. For some variables, e.g., ATMs per thousands of adults, the data were only available starting in 2004. Our data came from numerous sources: World Bank's World Development Indicators (WDI), FinStats, Non-Bank Financial Institutions database (NBFI), Global Financial Development database (GFD); International Monetary Fund's International Financial Statistics (IFS); Bureau van Dijk, Bankscope; Dealogic's debt capital markets statistics; World Federation of Exchanges (WFE); and Bank for International Settlements' debt securities statistics.
- After a gap filling process to generate a balanced panel, all variables were normalized using the following formula:

$$I_{x,it} = \frac{x_{it} - \min(x_{it})}{\max(x_{it}) - \min(x_{it})}$$

[1] The framework in Heng and others, 2015, in turn, follows Sahay and others (2015). For further details see "Advancing Financial Development in Latin America and the Caribbean," forthcoming, IMF working paper.

- where $I_{x,it}$ is the normalized variable x of country i on year t, $\min(x_{it})$ is the lowest value of variable x_{it} over all i-t; and $\max(x_{it})$ is the highest value of x_{it}. For variables capturing lack of financial development, such as interest rate spread, bank asset concentration, overhead costs, net interest margin, and non-interest income, one minus the formula above was used.
- The weights were estimated with principal component analysis in levels and differences, factor analysis in levels and differences, as well as equal weights within a subcomponent of the index. For most of the methods the weights were not very different from equal weights and econometric results were robust to the method of aggregation. For simplicity, we use an index with equal weights.

Regression Frameworks

- Regressions use 5-year averages in order to abstract from cyclical fluctuations, and estimated using dynamic panel techniques common in the growth literature.
- Financial Development Gaps
- The benchmarking regressions link financial development (FD), institutions (FI) and markets (FM) development indices to fundamentals. Following the literature on benchmarking financial development (Beck and others 2008) fundamentals ($\mathbf{X}_{it}^{FI}$) included initial income per capita, government consumption to GDP, inflation, trade openness, educational attainment proxied by the average number of years of secondary schooling for people 25+, population growth, capital account openness, the size of the shadow economy (given its importance for the LAC region) and the rule of law. Instruments (Z_{it}) for financial development such as the rule of law and legal origin dummies were also used. Predicted norms were computed using the following equation:
- $FI_{it} = \boldsymbol{\delta}'_1 \mathbf{X}_{it}^{FI} + \boldsymbol{\delta}'_2 \mathbf{Z}_{it} + h^{FI}_t + e^{FI}_{it}$
- where FI_{it} stands for one of the financial indices (FD, FI or FM). Gaps shown are the difference between the actual values of the index and the calculated norms.
- Financial Development, Growth, and Stability
- The link between financial development, growth and stability was examined using a dynamic panel regression framework. Real GDP growth ($\boldsymbol{DY}_{it}$) is linked to financial development allowing for a potential non-linearity by adding a square of financial development while controlling for other factors that are likely to affect growth (below). In the case of individual sub-components of FI and FM, the interaction term between these two indices is included. The controls for the growth regression $\mathbf{X}_{it}^{FI}$ were the same

as in the benchmarking regression ($\mathbf{X}_{it}^{FI}$) with two additional variables: ratio of FDI to GDP and capital account openness.

- The impact of financial development on financial and macroeconomic instability used a similar framework. Financial instability ($\boldsymbol{FS}_{it}$) is measured by the first principal component of the inverse of the distance to distress (z-score),[2] real credit growth volatility, and real and nominal interest rate volatility. This combined variable allows capturing different facets of financial instability, thus improving over previous research which typically focused on a single variable. Growth volatility ($\boldsymbol{GV}_{it}$) is measured by the standard deviation of GDP growth. The controls included initial income per capita, government consumption to GDP, trade openness, changes in terms of trade, growth in per capita income, capital flows to GDP, exchange rate regime, a measure of political stability, and an indicator for whether a country is an offshore financial center.
- The following three equations were estimated using the Arellano-Bond approach:

$$\mathrm{D}Y_{it} = (a_0 - 1)\ln(Y_{it-1}) + \mathrm{b}' f(FinDev_{it}) + \ldots \\ \mathrm{g}'\mathbf{X}_{it}^{Y} + h_t^{Y} + n_i^{Y} + e_{it}^{Y}$$

$$FS_{it} = a_0 FS_{it-1} + \mathrm{b}' f(FinDev_{it}) + \mathrm{g}'\mathbf{X}_{it}^{S} + \ldots \\ h_t^{S} + n_i^{S} + e_{it}^{S}$$

$$GV_{it} = a_0 GV_{it-1} + \mathrm{b}' f(FinDev_{it}) + \mathrm{g}'\mathbf{X}_{it}^{V} + \ldots \\ h_t^{V} + n_i^{V} + e_{it}^{V}$$

Where $f(FinDev_{it})$ have two forms, one with the aggregated index: $f(\mathrm{FD}_{it}) = b_1 FD_{it} + b_2 FD^2_{it}$ and one with the subcomponents: $f(FI_{it}, FM_{it}) = b_1 FI_{it} + b_2 FI^2_{it} + b_3 FM_{it} + b_4 FM^2_{it} + b_5 FI_{it} \times FM_{it}$

Table below shows the results of the estimated equations for growth and instability.

[2] Z-score is a measure of financial health. Z-score compares the buffer of a country's commercial banking system (capitalization and returns) with the volatility of those returns.

Costa Rica: Estimated Equations

Dependent Variable	Financial Instability		Growth Volatility		Growth	
FD	-6.457*		-21.42***		11.47*	
	(3.814)		(7.270)		(6.279)	
FD^2	6.263		23.74**		-12.38*	
	(5.735)		(10.82)		(6.556)	
Δ FD	5.283**		8.423**		5.698*	
	(2.160)		(4.008)		(3.075)	
FI		-13.75**		-27.89***		30.83***
		(5.419)		(9.533)		(8.788)
FI^2		18.64**		36.38**		-48.36***
		(8.123)		(14.45)		(11.58)
FM		-0.772		-6.779		-0.586
		(3.119)		(5.345)		(3.987)
FM^2		3.360		18.02**		-12.35**
		(4.886)		(8.324)		(5.314)
FM*FI		-5.140		-5.354		27.27**
		(9.730)		(15.81)		(13.16)
Δ FI		4.753**		14.08***		7.088**
		(2.114)		(3.708)		(2.958)
Δ FM		3.190*		-2.335		0.508
		(1.672)		(2.846)		(2.222)
Obs.	143	143	158	158	301	301

Source: IMF staff calculations.
Note: Standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1

FINANCIAL INCLUSION IN COSTA RICA[1]

This note examines the current status of financial inclusion in Costa Rica, identifies the remaining gaps, and analyzes the impact on growth and inequality of removing impediments to financial inclusion. Costa Rica has excelled on household inclusion but lags behind on enterprise inclusion, compared to both other emerging markets and the country's own fundamentals. Financial physical infrastructure could also be improved. Financial inclusion policies in Costa Rica should focus on modernizing the collateral framework and strengthening regulatory environment in the first instance. Improving efficiency of financial intermediation by ensuring the level playing field for private banks could also help improve inclusion and raise economic growth but inequality might also rise in tandem.

A. Introduction

1. **The benefits of financial inclusion could be notable in Costa Rica.** Financial inclusion holds the promise of boosting economic growth and reducing poverty and inequality, notably by mobilizing savings and providing households and firms with greater access to resources needed to finance consumption and investment and to insure against shocks. In addition, financial inclusion can foster labor and firm formalization, helping, in turn, to boost government revenues and strengthen social safety nets. Given modest potential growth, rising inequality as well as low savings and investment in Costa Rica, the benefits from further financial inclusion could be pronounced.

2. **The note takes two separate approaches for examining different facets of financial inclusion and its impediments in Costa Rica.[2]** First, an empirical approach focuses on measuring financial inclusion, identifying financial inclusion gaps, their underlying drivers, and policy actions that could help narrow them. It is based on a composite measure of household and firm financial inclusion as well as access to financial infrastructure using the recently updated FINDEX dataset (World Bank), the Enterprise Survey (World Bank), and the Financial Access Survey (IMF). These measures allow placing Costa Rica in a temporal and cross-country perspective. Second, a novel theoretical framework is employed to identify the most binding financial sector frictions that impede financial inclusion in Costa Rica on enterprise side. This framework allows examining the implications of alleviating financial frictions on both inequality and growth.

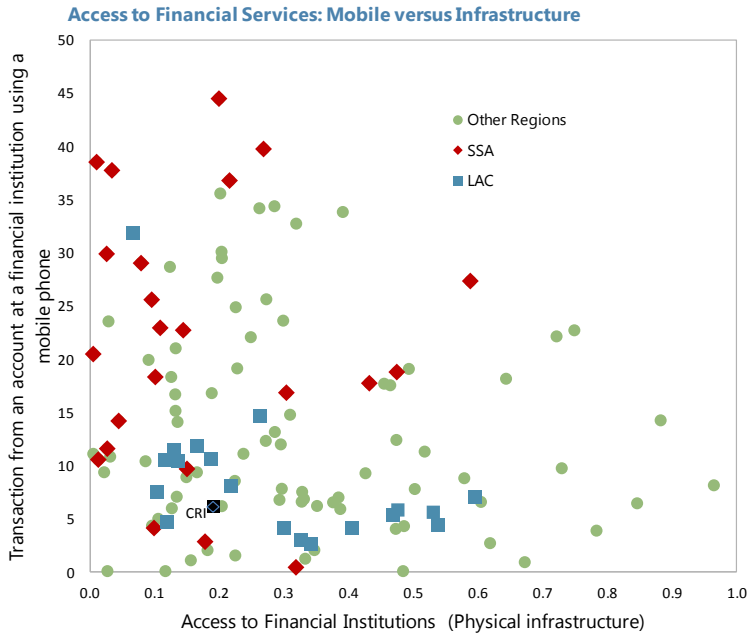
[1] Prepared by Anna Ivanova, Yixi Deng, and Joyce Wong.

[2] The notes follows closely the IMF working paper "Financial Inclusion: Zooming in on Latin America" by Era Dabla-Norris, Yixi Deng, Anna Ivanova, Izabela Karpowicz, Filiz Unsal, Eva VanLeemput, and Joyce Wong.

B. Empirical Approach

B1. Where Does Costa Rica Stand on Financial Inclusion Compared to Peers?

3. **Costa Rica has excelled on financial inclusion of households but lags behind peers on inclusion of enterprises and access to financial infrastructure (Figure 1).** Costa Rica has made important strides on household inclusion over the past few years, with the largest improvements in account holdings, usage of ATMs, and debit cards. The country now stands as one of the champions on financial inclusion of households among LAC countries. It also compares favorably on this dimension to other emerging markets. In fact, it outperforms its peers on all of the subcomponents of the household financial inclusion index. However, the country is lagging behind its peers on the inclusion of enterprises. This reflects, in particular, high collateral requirements compared to other emerging markets. Access to and cost of finance is also seen as a major constraint by a large share of SMEs in Costa Rica. This, in part, may reflect relatively weak access to financial institutions as measured by the number of bank branches and ATMs in relation to population and area. Some countries have been successful at filling this last void using mobile phones and correspondents banking but in Costa Rica's case, these measures also compare poorly to peers.



4. **Costa Rica also lags behind on creating an enabling environment for financial inclusion.** It scores below the average of other emerging markets on the Global Microscope index, which assesses the regulatory environment for financial inclusion across 12 indicators and 55 countries. This is in contrast to many LAC countries which score well on this index, with Peru being the world champion. Costa Rica performs well on prudential regulation and is ahead of other LAC countries on credit reporting systems, but it underperforms on all other indicators, namely, regulation and supervision of deposit-taking activities, regulation and supervision of branches and agents, regulation and supervision of credit portfolios, grievance redress and operation of dispute resolution mechanisms, market conduct rules, requirements for non-regulated lenders, regulatory and supervisory capacity for financial inclusion, regulation of electronic payments, regulation of insurance for low-income populations, and government support for financial inclusion. High financial inclusion of households and weak regulatory environment may seem contradictory but as shown below we find that the Microscope score is more relevant for explaining the inclusion of enterprises.

B2. Where Does Costa Rica Stand on Financial Inclusion Compared to Macroeconomic Fundamentals?

5. **Financial inclusion gaps help account for the differences in the underlying macroeconomic conditions.** We compute financial inclusion gaps with respect to own fundamentals as deviations of financial inclusion indices from the values predicted by the exogenous domestic factors such as income per capita, education, size of the shadow economy, the rule of law, the share of foreign-owned firms, and importance of fuel exports. The calculated negative gaps may capture possible distortions or market frictions while positive gaps may reflect financial excesses.[3] We find that financial inclusion is higher in countries with the following characteristics (Table 1 and Dabla –Norris et al, 2015): higher income per capita (for households and firms), higher education (for households), stronger rule of law (for households), lower degree of informality (for households), lower prevalence of foreign-owned firms (for firms and access to financial institutions), lower fuel exports (for firms and access to financial institutions). In the longer run, as domestic fundamentals continue to improve, there may be scope for further gains in financial inclusion. To identify such possibilities, we have constructed gaps with respect to an Asian benchmark—a recognized success story on financial inclusion in countries with relatively strong fundamentals.

6. **Costa Rica has a positive financial inclusion gap for households but a negative financial inclusion gap for enterprises.** It is broadly in line with fundamentals on account holding while the positive gaps on ATM and debit card usage outweigh negative gaps on savings and borrowing from a financial institution and the usage of credit cards resulting in an overall positive household inclusion gap. In contrast to many other LAC countries, Costa Rica has positive financial inclusion gap also with respect to an Asian benchmark and there are no obvious indications that the positive household gap reflects excesses or inefficiencies. Hence, Costa Rica appears to be at the frontier on household inclusion. On the firm side, however, the overall gap with respect to own fundamentals is negative. The negative gap reflects high value of collateral, high share of firms identifying access to/cost of finance as a constraint, and low usage of banks by SMEs to finance investment and working capital, which outweigh the positive gaps on savings and checking account holdings as well as high share of SMEs having a loan or credit line from the bank. The large negative gap on collateral required for a loan can be linked to the weak legal collateral framework. The high cost of financing is, in part, due to the substantial presence of public banks, which lack incentives to improve efficiency. The gap with respect to an Asian benchmark on the firm side is also negative suggesting potential gains in firm inclusion over the longer run as fundamentals continue to improve.

[3] The regressions explain a large portion of the variation in financial inclusion, with R-squares close to 0.7 in the regressions for households and firms. Nonetheless, the lack of a solid theory on the factors driving financial inclusion implies that the correct model specification is subject to uncertainty. Hence, the gaps should be interpreted with due caution, in particular, with respect to causality. Nevertheless, they could be useful in indicating a possible area where financial inclusion is lacking. The explanatory power for access to financial institutions regression is low and we omit the discussion of the results of this regression for Costa Rica.

7. **An econometric examination of the factors behind financial inclusion gaps reveals the importance of strengthening the regulatory environment in Costa Rica.** The results of a simple regression analysis (Table 2 and Dabla-Norris et al) suggest that higher (more positive/less negative) financial inclusion gaps with respect to domestic fundamentals are associated with lower non-interest income (for household and firms), lower bank safety buffers (for households), lower bank efficiency, as measured by the overhead costs (for firms) and stronger regulatory environment, as measured by the Global Microscope score (for firms). However, the direction of causality is not clear, in particular in the case of bank safety buffers and efficiency, which could be the result of increased inclusion rather than themselves being the driver of inclusion. In the case of Costa Rica, one obvious recommendation that results from this analysis is that strengthening the regulatory environment for financial inclusion (as measured by the Global Microscope) could help improve inclusion of firms. In particular, putting in place regulatory incentives to formalize micro-lenders/savers (which are currently constituted as non-regulated NGOs) and explicit regulations related to banking agents, e-money and micro-insurance would help bring many of these activities, which currently exist, into the light. However, this analysis is only partial and other factors, as indicated above, are likely at play.

C. Theoretical Approach

8. **We apply a micro-founded structural model to shed light on the implications of relaxation of various constraints to financial inclusion for fostering growth and reducing inequality.** (See Appendix and Dabla-Norris et al. (2015) for model description).

We group financial constraints into three broad dimensions:

- *Participation costs*. These typically reflect high documentation requirements by banks for opening, maintaining, and closing accounts, and for loan applications that impede access to finance. These can also reflect various forms of barriers, including red tape and the need for informal guarantors as connections to access finance.
- *Borrowing constraints*. The amount firms can borrow (the depth of credit) once they have access to banking systems is generally determined by collateral requirements, which depend on the state of creditors' rights, information disclosure requirements, and contract enforcement procedures, among others.
- *Intermediation costs*. High intermediation costs resulting from information asymmetries between banks and borrowers and limited competition in the banking system can lead to smaller and less capitalized borrowers being charged higher interest rates and fees.

The model's key parameters are calibrated to match the moments of firm distribution, such as the percent of firms with credit and firm employment distribution, as well as the economy-wide nonperforming loan ratio and interest rate spread (Figure 4). We conduct policy experiments to identify the most binding constraints to financial inclusion and examine the macroeconomic effects of removing these constraints (Figure 5). Three illustrative simulations include: (i) reducing the financial participation cost to 0, (ii) relaxing borrowing constraints in the form of collateral

requirements to the world minimum (iii) increasing intermediation efficiency (i.e., reducing monitoring costs to 0 by equalizing spreads to the proportion of non-performing loans).[4]

9. **The results suggest that there can be policy tradeoffs between achieving growth and equity objectives.** A decline in financial constraints pushes up GDP through several channels. A lower participation cost enables more firms to have access to the formal banking system, leading to more capital invested in production. Moreover, lower financial frictions result in a more efficient allocation of funds and higher productivity as the best firms increase their scale of production. Finally, fewer funds are wasted in unproductive contract negotiation, freeing up more capital for investment. The impact on GDP, however, varies across countries, depending on country-specific characteristics and the underlying constraint being alleviated. The model findings suggest that the highest growth dividends accrue from a relaxation of collateral requirements, but this policy may drive up inequality since the main benefits of this policy accrue to those entrepreneurs which are most productive, already have access to credit, and thus already have higher incomes. This increase in inequality, however, could be alleviated if the relaxation of the collateral constraint also benefits previously constrained entrepreneurs. Similar trade-offs occur with the reduction in intermediation costs but not with participation costs (which tend to bind those outside the financial system more). In general, entrepreneurs who are already included in the financial system benefit more from the reduction in collateral requirements and less so from a reduction in the participation cost which is a fixed cost and a relatively lower share of their income. Lower participation costs, however, benefit new entrepreneurs more, thereby decreasing inequality.[5] Nevertheless, the "poor" may still be better off overall under the lower borrowing constraints scenario, albeit with smaller gains than the "rich."

10. **Costa Rica faces substantial borrowing and intermediation costs.** The share of firms with access to credit in Costa Rica is close to 60 percent, which places it at the average of the Central American countries. While the number of firms that have access to finance is relatively good, at least compared to Central American countries, Costa Rica has the highest collateral-to-loan ratio in the region. Collateral needed for loans by firms in Costa Rica is 1.5 times higher in Guatemala, for example. Similarly, Costa Rica tops the list of Central American countries on the interest rate spreads (the difference between lending and deposit rates), which are 2.5 times higher in Costa Rica than in Panama and El Salvador.

11. **Costa Rica could raise growth by relaxing collateral constraints and lowering intermediation costs but only the former will provide the added benefit of lowering inequality.** Collateral levels are so high in Costa Rica that a significant number of firms remain constrained in the amount of borrowing they can access (even those which have a positive level of

[4] Specifically, we focus on changes in the steady state of the economy when these constraints changes. These examples are illustrative, however, as the calibration for the financial inclusion process is chosen arbitrarily. Moreover, in practice, as many reforms are implemented on various fronts contemporaneously they are likely to reduce the frictions in unison with additive effects.

[5] This is because "rich" entrepreneurs (possibly also more talented and more productive) can borrow much more when collateral constraints are relaxed increasing their profits, thus becoming richer. The optimal production scale of new entrants is lower and, even if they can borrow, they are not likely to achieve the same profits.

credit). Because of this, the benefits of lower collateral accrue not only to those firms at the top of the distribution, but also a large mass of medium-sized firms, some of which expand significantly, driving up workers' wages and lower inequality. In contrast, a reduction in monitoring costs, while providing high growth benefits, may lead to a moderate increase in inequality as the marginal benefit of their reduction accrues much more to those firms which already have credit access and thus also tend to be higher-income entrepreneurs. The reason why the relaxation of these two constraints has differing effects on inequality is explained by their different effects on the extensive and intensive margins of credit access. While the lowering of collateral constraints (which are unusually high) will both help bring new entrepreneurs into the credit net and relieve constraints for some which already have credit, the change in the intermediation costs affects mainly the intensive margin, thus mostly benefitting those entrepreneurs which already have credit and are unconstrained.

D. Conclusions and Policy Recommendations

- *Costa Rica has excelled in financial inclusion of households, but lags behind other emerging markets on the inclusion of enterprises and access to financial physical infrastructure*. The country has made important strides in household inclusion over the past few years, with the largest improvements in account holdings, usage of ATMs, and debit cards.
    - *Costa Rica also lags behind peers on creating enabling environment for financial inclusion*. While the country performs well on prudential regulation and is ahead of other LAC countries on credit reporting systems, the fact that large portions of the financial system remain outside of the regulatory perimeter hinders further inclusion.

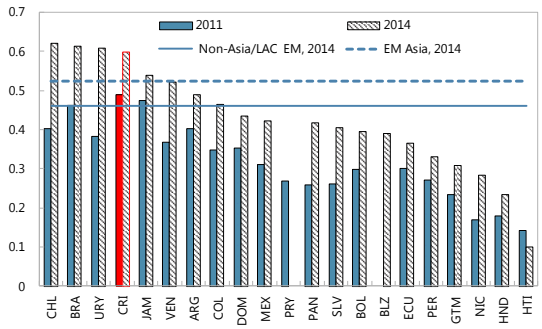
- *Even after accounting for differences in macroeconomic fundamentals, Costa Rica has a positive financial inclusion gap for households but a negative gap for enterprises*. The negative gap on firm inclusion reflects high value of collateral required for a loan, which can be linked to the weak legal collateral framework, and high cost of financing, which can be related to the dominance of public banks that lack incentives to improve efficiency, an uneven playing ground for private banks that stifles competition, and weak regulatory environment for financial inclusion.

- *Costa Rica could raise growth by relaxing collateral constraints and intermediation costs, but only the former will provide the added benefit of lowering inequality. More generally, the results of the micro-founded general equilibrium model suggest that there may be a trade-off between the objectives of growth and inequality reduction.*

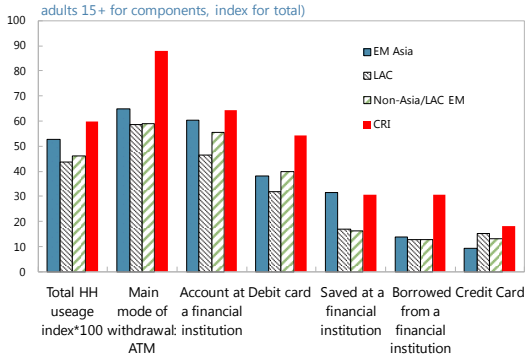
- *Financial inclusion policies in Costa Rica should focus on further modernizing the collateral framework and strengthening regulatory environment in the first instance*. Ensuring the level playing field for private banks compared to public banks, which can help lower intermediation costs, could provide additional growth benefits but policymakers should be aware of the potential for inequality in this case.

Figure 1. Financial Inclusion in Costa Rica and Emerging Markets

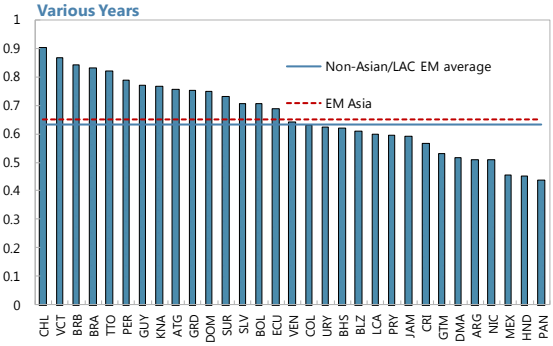
Latin America: Index of Household Use of Financial Services, 2011-2014



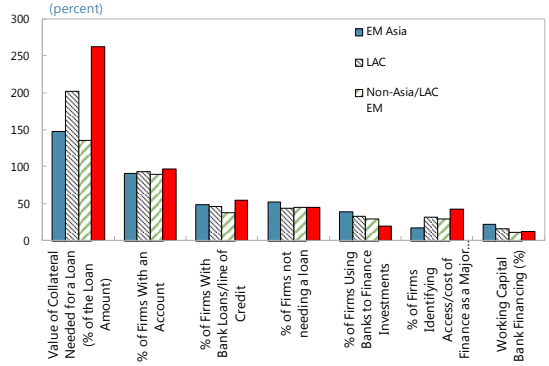
LAC and EMs: Household Use of Financial Services (Percent of adults 15+ for components, index for total)



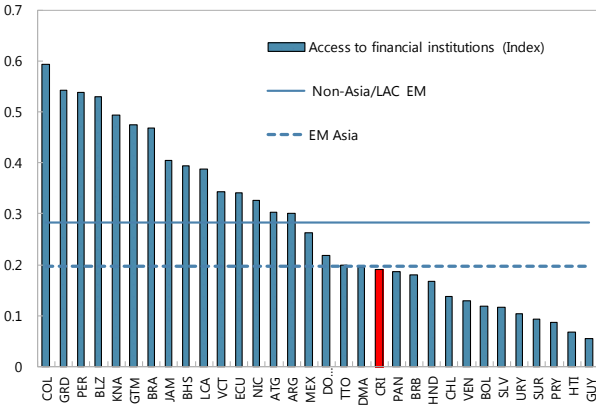
Latin America: Index of Firm Use of Financial Services, Various Years



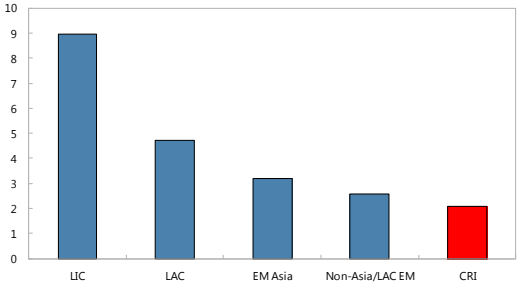
LAC and EMs: Enterprise Use of Financial Services (percent)



Access to financial institutions (physical infrastructure)



The Use of Bank Correspondents for Withdrawal (% with an account, age 15+)



1/ it includes the percentage of respondents with an account at a bank or another type of financial institution who report obtaining cash from their account from a bank agent who works at a sotre or goes to their home; or in some other way except ATM or bank teller.

Figure 2. Enabling Environment for Financial Inclusion

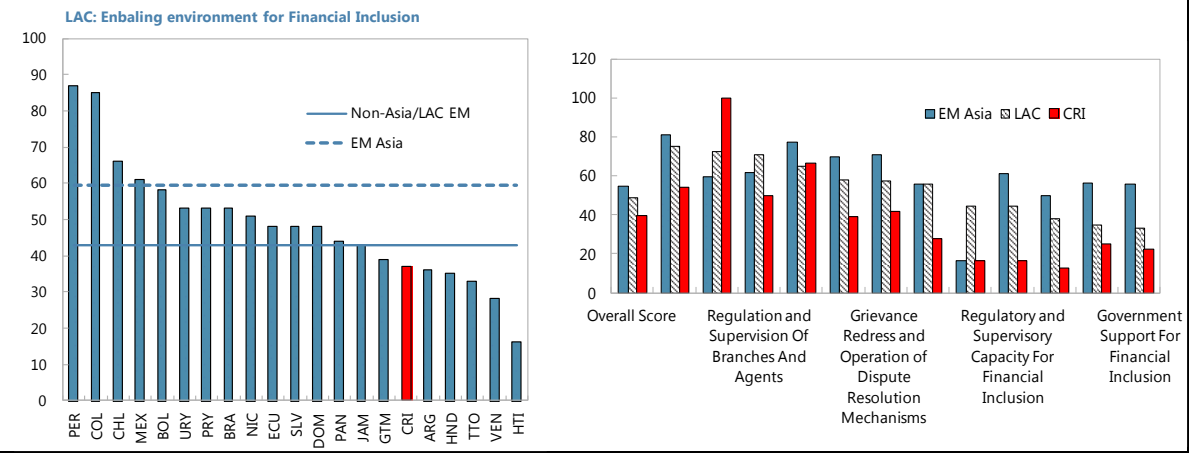
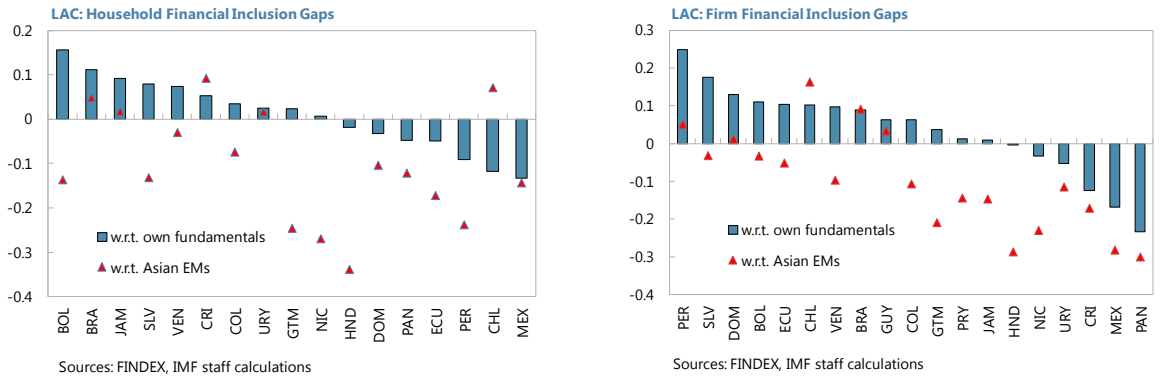
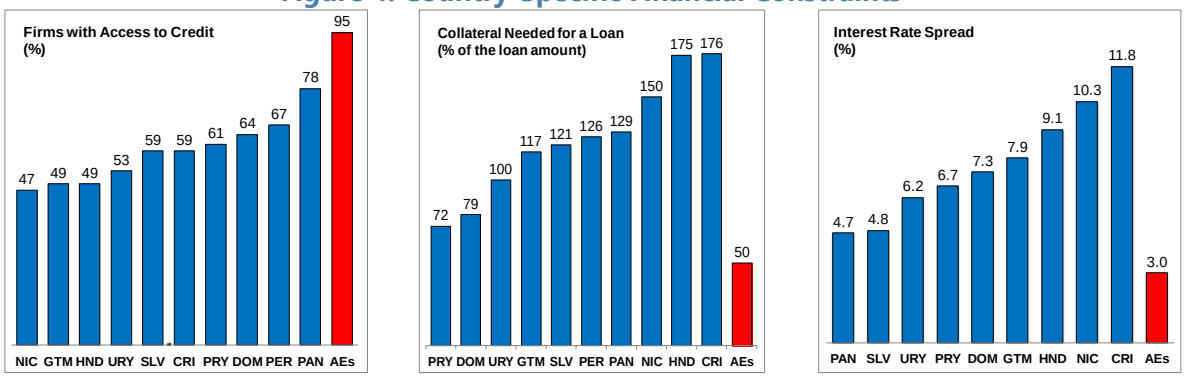


Figure 3. Financial Inclusion Gaps



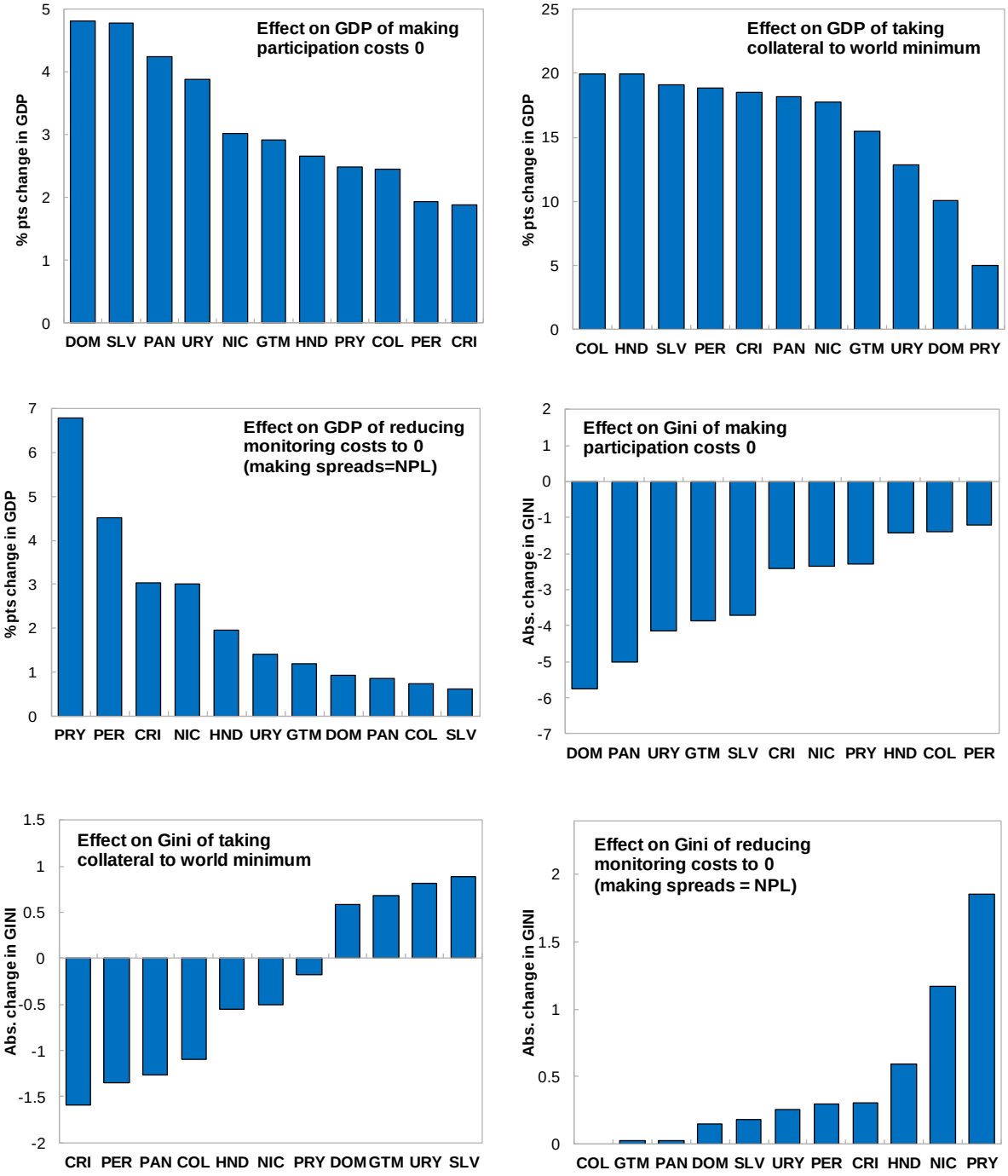
Source: Authors' calculations.

Figure 4. Country-Specific Financial Constraints



Source: World Bank Enterprise Surveys.

Figure 5. Impact of Reducing Financial Constraints on GDP and Inequality



Source: Authors' calculations.

Table 1. Costa Rica: Financial Inclusion and Fundamentals

VARIABLES	(1) HH 2011	(2) HH 2011 &2014	(3) HH 2014	(4) Firm	(5) Access to Financial Institutions (Physical Infrustructure)
log_GDP_pcap	0.0918***	0.104***	0.111***	0.142***	0.131***
	(0.0295)	(0.0190)	(0.0255)	(0.0461)	(0.0467)
Mean years of schooling (of adults) (years)	0.0173**	0.0160***	0.0162**	0.00927	-0.0189
	(0.00815)	(0.00543)	(0.00738)	(0.0120)	(0.0157)
Shadow Economies Index	-0.00118	-0.00188*	-0.00268*	-0.000872	0.00149
	(0.00143)	(0.00108)	(0.00146)	(0.00228)	(0.00216)
Fuel exports (% of merchandise exports)	-0.000506	-0.000389	-0.000285	-0.00235**	-0.00200*
	(0.000628)	(0.000506)	(0.000726)	(0.00110)	(0.00110)
Prevalence of foreign ownership, 1-7 (best)	-0.0281	-0.0159	0.00585	-0.107***	-0.0634**
	(0.0241)	(0.0155)	(0.0223)	(0.0284)	(0.0267)
Rule of Law (-2.5(weak) to 2.5(strong))	0.0733***	0.0657***	0.0502**	0.0670	0.0330
	(0.0266)	(0.0193)	(0.0242)	(0.0412)	(0.0405)
Constant	-0.414**	-0.509***	-0.614***	-0.122	-0.487
	(0.205)	(0.153)	(0.221)	(0.366)	(0.352)
Observations	78	158	80	45	111
R-squared	0.732	0.708	0.738	0.658	0.215

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2. Costa Rica: Determinants of the Financial Inclusion Gaps

VARIABLES	HH FI Gap 2014	Firm FI Gap 2011	Access Gap 2011
Non-Interest Income / Total income (%)	-0.00428**	-0.00515*	0.00272
	(0.00171)	(0.00289)	(0.00381)
Bank net interest margin (%)	-0.0144	-0.0202	0.0399
	(0.0137)	(0.0159)	(0.0248)
3 Bank Asset Concentration (%)	0.000987	0.000895	0.000984
	(0.00133)	(0.00127)	(0.00174)
Overhead Costs / Total Assets (%)	0.0183	0.0320*	-0.0216
	(0.0167)	(0.0157)	(0.0272)
Microscope-Overall Score (0-100, 100 best)	0.000430	0.00314*	0.000585
	(0.000967)	(0.00178)	(0.00256)
Distance to default	-0.00261**	-0.00243	-0.000316
	(0.00123)	(0.00236)	(0.00265)
Constant	0.115	0.00381	-0.303
	(0.0971)	(0.127)	(0.189)
Observations	43	30	46
R-squared	0.200	0.268	0.154

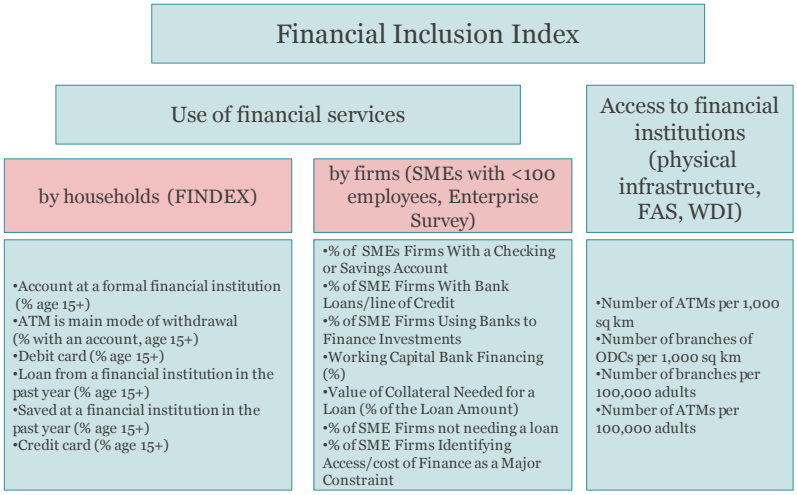
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix I. Financial Inclusion Indices

This Appendix explains the construction of Indices of Financial Inclusion and its components and provides an overview of the data and its processing for the construction of indices.

Measuring Financial Inclusion

- Since there is no commonly accepted definition of financial inclusion we used a practical definition for the purpose of this note, namely, access and effective usage of financial services by households and firms. We employ multi-dimensional indices to capture different faucets of financial inclusion. In particular, we construct three multi-dimensional indices capturing different angles of financial inclusion: (i) usage of financial services by households (Findex); (ii) usage of financial services by SMEs (Enterprise Survey); and (iii) access to financial institutions (Financial Access Survey). The diagram below illustrates indicators included in each of the indices. We chose indicators that cover the most important aspects of financial inclusion emphasized in the literature, while taking into account data constraints. For example, the household inclusion index encompasses information on the use of bank accounts, savings, borrowing, and payment methods but omits information on insurance due to data constraints. We also chose not to combine the three indices into a single index, notably because cross-country data coverage across households and firms varies substantially. Instead, we compare Costa Rica and other LAC countries to other regions and for households across time,[1] separately on each dimension.[2]



[1] Findex data is available for two years: 2011 and 2014.

[2] We explore different aggregation methods, namely, weights derived from the principle component analysis (Camara, N., and D. Tuesta, 2014), factor analysis (Amidžić et al., 2014) and equal weights. The results are similar when using alternative measures (see Appendix 1). For simplicity of exposition we present the results for indices constructed using equal weights.

Data Sources and Processing

Table below shows the main data sources. The data from Global Findex covers the period for 2011 and 2014 only. The data point from enterprise survey is the latest observation available.

- From the components to the composite index
- All variables were normalized using the following formula: $I_{x,it}$

$$I_{x,it} = \frac{x_{it} - \min(x_{it})}{\max(x_{it}) - \min(x_{it})}$$

- Where $I_{x,it}$ is the normalized variable x of country i on year t, $\min(x_{it})$ is the lowest value of variable x_{it} over all it; and $\max(x_{it})$ is the highest value of x_{it}. For those variables that capture a lack of financial inclusion, such as *Value of collateral needed for a loan* and *percent of firms identifying access or cost of finance as major constraint*, the reverse formula was used:

$$I_{x,it} = 1 - \frac{x_{it} - \min(x_{it})}{\max(x_{it}) - \min(x_{it})}$$

- Several methods were used to estimate the weights: principal component analysis with the variables in levels and in differences, factor analysis with the variables in

Indicies	Subcomponents	Variables	Sources
Use of Financial Services	Households	Account at a formal financial institution (% age 15+)	Global Findex
		ATM is main mode of withdrawal (% with an account, age 15+)	Global Findex
		Debit card (% age 15+)	Global Findex
		Loan from a financial institution in the past year (% age 15+)	Global Findex
		Saved at a financial institution in the past year (% age 15+)	Global Findex
	Firms/SMEs (Enterprise Survey, <100 employees)	% of SMEs Firms With a Checking or Savings Account	Enterprise Survey
		% of SME Firms With Bank Loans/line of Credit	Enterprise Survey
		% of SME Firms Using Banks to Finance Investments	Enterprise Survey
		Working Capital Bank Financing (%)	Enterprise Survey
		Value of Collateral Needed for a Loan (% of the Loan Amount)	Enterprise Survey
		% of SME Firms not needing a loan	Enterprise Survey
		% of SME Firms Identifying Access/cost of Finance as a Major Constraint	Enterprise Survey
Access to financial infrastructure		Number of ATMs per 1,000 sq km	IMF, Financial Access Survey
		Number of branches of ODCs per 1,000 sq km	IMF, Financial Access Survey
		Number of branches per 100,000 adults	IMF, Financial Access Survey
		Number of ATMs per 100,000 adults	IMF, Financial Access Survey

levels and in differences, as well as equal weights within a subcomponent of the index. For most of the methods the weights were not very different from equal weights and econometric results were robust to the method of aggregation. Thus, for simplicity of exposition the paper presents an index with equal weights.

Household Inclusion Index

Region	2011	2014
East Asia and Pacific	9	9
Europe and Central Asia	29	29
Latin America	20	20
Middle East and North Africa	9	9
South Asia	6	6
Sub-Sahara Africa	31	31
Total	104	104

Firm Inclusion Index

Region	M.R.A. 1/
East Asia and Pacific	9
Europe and Central Asia	2
Latin America	31
Middle East and North Africa	5
South Asia	4
Sub-Sahara Africa	28
Total	79

Access Index

Region	M.R.A. 1/
East Asia and Pacific	24
Europe and Central Asia	46
Latin America	32
Middle East and North Africa	15
North America	2
South Asia	7
Sub-Sahara Africa	35
Total	161

1/ Most recent year available.

Appendix II. Model Characteristics

The model features an economy where agents differ in their talent and wealth. Each person has to decide whether to become a worker (earn wages) or an entrepreneur (earn profits) and whether to pay a fixed *participation cost* to be able to borrow from the banking system. Entrepreneurs then decide on how much of their wealth to invest in their business, whether and how much to borrow at the going interest rate, and how many workers to employ at the going wage rate. The output from business projects depends on the amount of capital invested, the amount of labor hired, as well as on the entrepreneur's talent. In the model, the magnitude of the participation cost represents the cost of financial contracting. The higher is this cost, the more agents remain in credit autarky. Moreover, it tends to disproportionately exclude poor but talented individuals as the fixed cost amounts to a larger fraction of their wealth.

Once in the banking system, the amount of credit available is constrained by other financial frictions. If an entrepreneur has paid the participation cost, he or she can borrow from the banking system at the going interest rate. The model assumes that a business can fail for external reasons ("bad luck"), with some probability. Given imperfect enforceability of contracts, entrepreneurs have to post personal wealth as collateral for the loan. Since banks runs the risk that entrepreneurs can defraud them, this constrains the amount that can be borrowed. Therefore, weak contract enforceability leads to lower leverage, imposing *borrowing constraints* on entrepreneurs. A second friction is modeled as arising from asymmetric information between the bank and the borrower. The underlying intuition is that if the entrepreneur does not pay back the loan, the bank cannot be sure whether the business actually failed. Banks have to pay an audit or monitoring cost to find out. Otherwise, entrepreneurs could benefit from claiming failure and keep the profits. These costs—measure of the degree of *intermediation costs* in the economy—are recuperated by banks through interest rates and high overhead fees.[1]

In the baseline, the model is calibrated to data for 12 LAC countries. Firm-level data for 2005 from the World Bank Enterprise Survey are used, in addition to standard macroeconomic and financial variables (savings rate, non-performing loans (NPLs), and interest rate spreads) for 2010 or the latest year available. While lack of financial inclusion is an even more acute problem for firms in the informal sector, the model focuses primarily on formal sector firms. The model's key parameters are jointly chosen to match the simulated moments, such as the percent of firms with credit and the firm employment distribution, with the actual data for each country (see Dabla-Norris et al., 2015, for details).

[1] In the model, the bank's optimal verification strategy follows Townsend (1979), whereby verification only occurs if the entrepreneur cannot pay the face value of the loan. This happens when the entrepreneur is highly leveraged and also faces a production failure. As a result, banks only monitor if a production failure is reported and the loan contract is highly-leveraged. A low-leveraged loan implies that entrepreneurs are not borrowing much from the bank and therefore the required repayment is small.

RECENT FISCAL DEVELOPMENTS AND MEDIUM-TERM SUSTAINABILITY[1]

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 early corrective action remains critical to restore debt sustainability. A moderately front-loaded adjustment as part of a balance policy mix with supportive monetary policy (AN III) would strike the appropriate balance between achieving fiscal sustainability and maintaining robust growth. Postponing fiscal consolidation further could endanger macroeconomic stability.

A. Recent Developments

1. **Fiscal sustainability remains elusive as debt continued its rapid ascent, with the primary fiscal deficit stabilizing at post-crisis peak levels.**

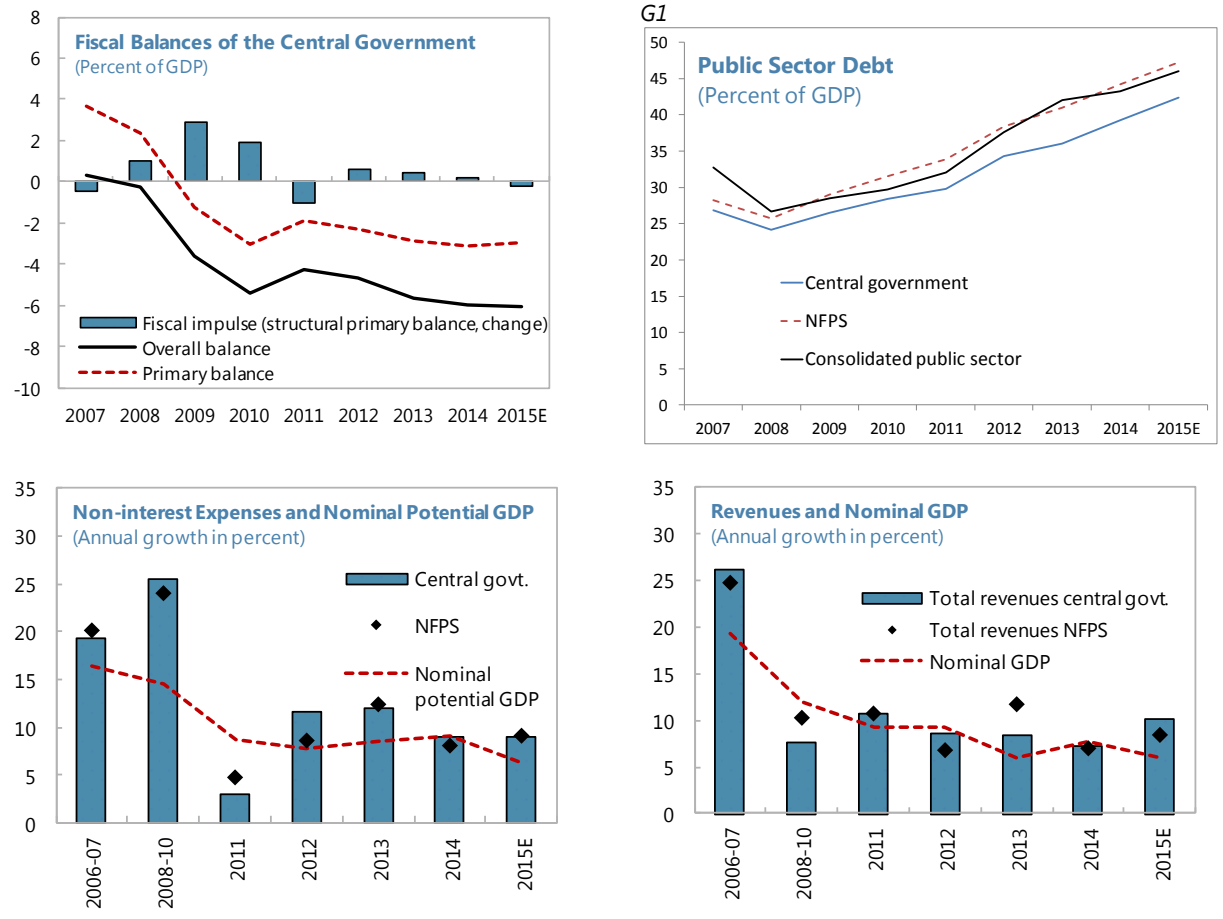
- The fiscal position of the central government deteriorated sharply during the global credit crisis. After posting large primary surpluses for several years, and even a small overall surplus in 2007, the primary and overall fiscal deficits reached 3 and 5½ percent of GDP by 2010, respectively. The worsening of the fiscal position was the result of both an endogenous fall in revenue (after above-trend GDP growth in the run up to the 2008-09 crisis) and a sharp increase in expenditure (mainly wages and transfers) on account of countercyclical policies implemented in response to the 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 arguing procedural irregularities in its Congressional approval. As a result, the central government primary and overall deficits returned to their post-crisis peaks by 2013.

- The new administration that came into power in mid-2014 conducted a broadly neutral fiscal policy with respect to the economic cycle, with the primary deficit remaining broadly flat at 3 percent of GDP aided by substantial expenditure under-execution relative to the original 2014 budget and strong efforts to reduce tax evasion in 2015.

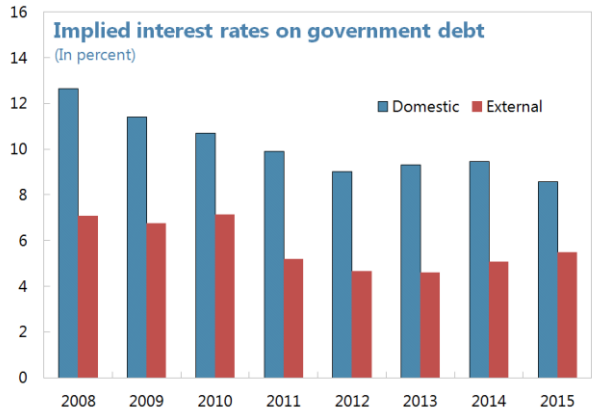
[1] Prepared by Jaume Puig-Forné.

Figure 1. Costa Rica: Recent Fiscal Developments

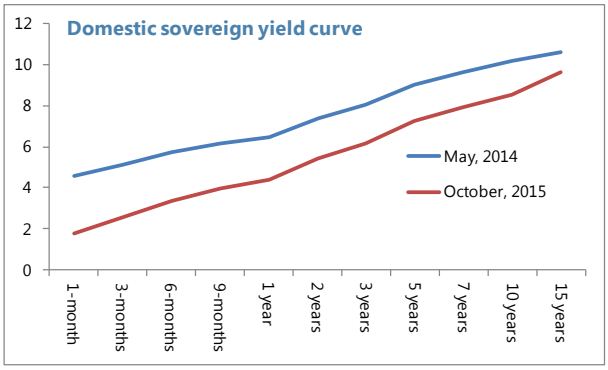


Sources: National authorities and Fund staff estimates.

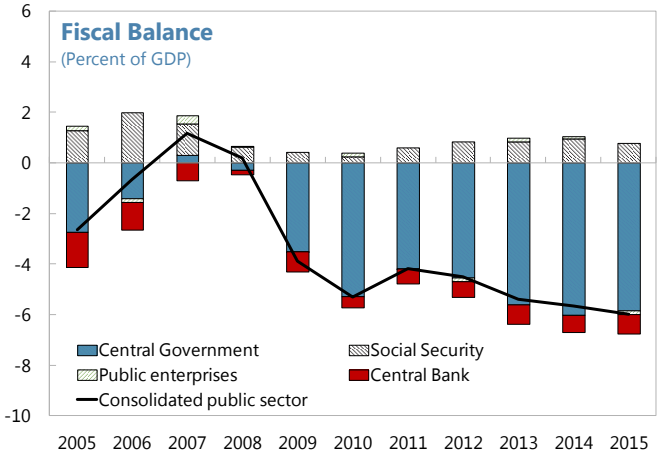
- Despite the continued increases in public debt—to 42½ percent of GDP in 2015, up from 24 percent of GDP in 2008—the interest bill increased only moderately, helping to keep the overall deficit around 6 percent of GDP in the last few years. This was made possible by the relatively low financing costs, in the context of historically low international rates. In 2015, domestic government financing costs declined further, especially at the short-end of the yield curve, amid strong disinflation and associated aggressive monetary policy response.



Sources: National authorities.



2. **Trends in the other levels of government have remained more stable.** The pay-as-you-go social security system (CCSS) has maintained a small surplus of 0.75 percent of GDP in 2015, while the balance of public sector enterprises turned to a small deficit of 0.1 percent of GDP—reflecting mainly losses at the public refinery driven by lower sales prices, in line with international oil prices, while operating costs remained high. The central bank operational deficit was also broadly constant at about 0.75 percent of GDP, reflecting interest expenses on securities issued for liquidity management purposes. Our analysis of fiscal vulnerabilities, medium-term sustainability issues, and related adjustment needs is therefore focused on the central government, while also briefly discussing longer-term sustainability issues in the social security system.[2, 3]



Sources: National authorities and Fund staff estimates.

[2] Moreover, the analysis of debt sustainability at the consolidated public sector level could be misleading, as it would net out relatively large central government debt holdings by the social security system (about 16 percent of the total). 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.

B. Sustainability Gap and Recommended Adjustment

3. **A total adjustment of about 3¾ percent of GDP is necessary to restore debt sustainability.** In a passive scenario, without any adjustment measures, the primary deficit is projected to rise to 3¼ percent of GDP in 2016, and to 3½ over the medium term as the Constitutionally-mandated objective of reaching 8 percent of GDP in expenditure on education is gradually achieved. According to staff analysis, a primary surplus of ¼ percent of GDP is needed to stabilize debt in the medium term within "safe levels" given projected increase in real rates above real GDP growth as global monetary conditions normalize.[4] Further postponing fiscal retrenchment is costly, since, the longer the delay, the larger will be the improvement in the primary balance required to stabilize the public debt ratio.

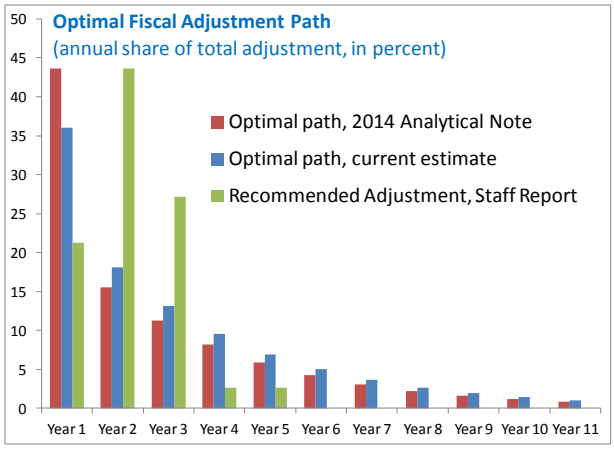
Costa Rica. Fiscal Sustainability Gap
(In percent of GDP, unless otherwise stated)

Medium-term primary balance 1/ (I)	-3.5
2015 outturn	-3.0
2016, projected change	-0.2
2017-21, projected change	-0.2
Debt stabilizing primary balance (II)	0.3
2021, real growth (in percent)	4.0
2021, real interest rate (in percent)	4.6
2021, debt	55.5
Fiscal Sustainability Gap (II - I)	3.8

Source: Fund staff estimates.

1/ The primary deficit is projected to reach 3.3 percent of GDP in 2016 in the absence of measures. The commitment to continue raising spending on education toward 8 percent of GDP will also add to adjustment needs in the medium term.

4. **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.[5] Relative to the model results obtained in the 2014 Article IV, the optimal fiscal consolidation path is somewhat less frontloaded reflecting the moderate widening of the negative output gap in 2015-16, with a bit less than one third of the adjustment now recommended in the first year of fiscal adjustment. The distribution of the total adjustment in the adjustment scenario of the staff report, which takes into account sequencing of fiscal reforms taking into account political considerations, is less frontloaded in the first year, and more concentrated in the second and third years of adjustment, with the full sustainability gap assumed to be closed by the end of the 5-year projection period.[6]



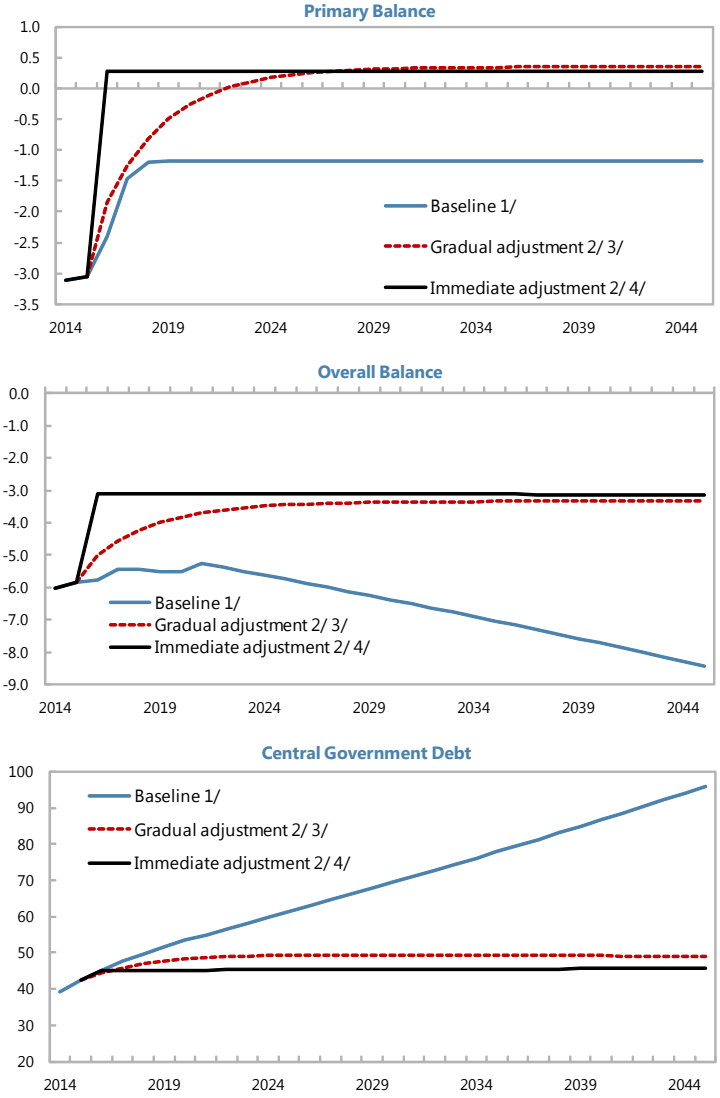
[4] See Debt Sustainability Analysis in Annex III.

[5] 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).

[6] 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 in the adjustment scenario of the staff report differs from this in three ways. First, the fiscal sustainability gap driving the total

Figure 2. Costa Rica: Long Term Sustainability

(percent of GDP)



Source: National authorities and Fund staff estimates.

1/ This path is the baseline through 2021, 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 2016 in both scenarios. The debt stabilizing primary balance is calculated based on medium-term baseline projections of real interest and growth rates that are maintained constant over the projection period in line with the requirements of the fiscal-adjustment-optimization model. The gap is then measured relative to the 2015 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 2016 and has no impact on growth.

5. **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.[7] The system currently runs a cash surplus of about 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 to maintain actuarial balance over the next 50 years—the gap would increase to almost 4 percent of GDP under a longer-term horizon of 100 years.[8] These reforms could take the form of higher contributions, reduced replacement rates, and/or an increase in the retirement age.

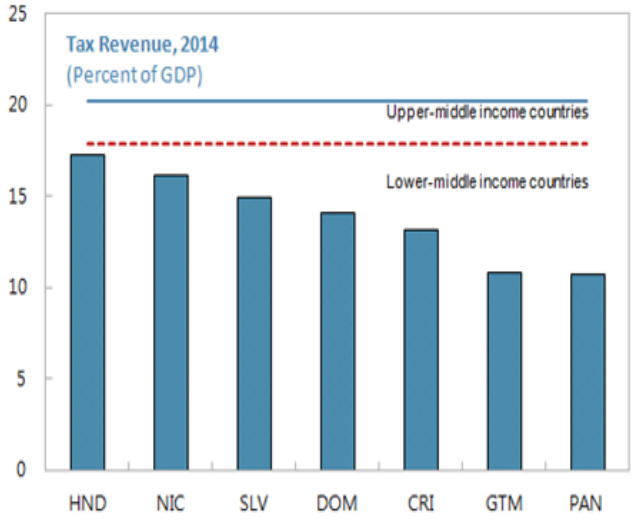
(continued)

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 to increased expenditure in the 2016 budget and Constitutionally-mandated increases in education over the medium-term. 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 primary deficit of 3 percent of GDP in 2015—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 2021, 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 taking into account political considerations.

[7] The IVM currently covers ⅔ of the labor force (approximately 1½ million workers) , including civil servants who joined civil service after 1992, and has about 165,000 beneficiaries. In addition to the IVM, there are special pension regimes for the judiciary (*Fondo de Jubiliaciones y Pensiones del Poder Judicial*, FPJPJ) and for teachers who started working after 1992 (Collective Capitalization Regime, RCC). There are also legacy regimes for civil servants and teachers that were closed to new entrants in 1992; these are currently financed with transfers from the central government budget (reaching about 2½ percent of GDP in 2015).

[8] Calculated as a one-time permanent improvement in the balance of the CCSS—relative to the projections in the baseline scenario of the latest actuarial report available from the CCSS, published in 2015—that brings the present value of the stream of projected net income of the CCSS—including return on reserves until their projected depletion—to zero. The actuarial report's baseline scenario incorporates the agreement reached in 2005 to gradually increase contribution to 10½ percent by 2035, from current rate of 8½ percent. The other key assumptions in the report's baseline scenario are: (i) an increase in coverage from 65 to 75 percent by 2050, (ii) real salary increases in line with historical average of about 1½ percent of GDP, and (iii) pensions continue to be indexed to consumer prices. The staff makes an additional assumption that the real return on reserves—as well as the real discount rate used to estimate the present value of the future stream of net income—is 1 percent higher than the projected real growth rate of the economy, in line with the standard approach of the Fund's fiscal department to estimate actuarial balances.

6. **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. As in other Central American countries, revenue mobilization should be the cornerstone of fiscal consolidation, given generally low tax revenues compared to other middle-income countries.[9]



C. Authorities' Plans and Fiscal Scenarios

7. **The authorities have developed a strategy for fiscal consolidation focused on strengthening revenue, but expenditure measures need to be further clarified.** After the nullification of the 2012 tax reform, the previous administration prepared a fiscal consolidation plan with total adjustment of about 3½ percent of GDP to stabilize debt in the medium-term, broadly in line with previous staff recommendations. However, the plan was not implemented before the 2014 elections. The new administration has developed a new fiscal consolidation plan that is also broadly in line with staff recommendations regarding size, composition and pace of adjustment, although measures on the expenditure side need to be further clarified.

- The government has already submitted to Parliament measures that would yield some 2¾ percent of GDP. On the revenue side these include VAT and income tax reforms that would yield slightly more than 2 percent of GDP over the medium-term, and other provisions—further amendments to the corporate income tax and anti-tax evasion measures—that would generate almost ½ percent of GDP. The VAT reform envisages broadening the tax base to include services and a gradual increase in the rate from 13 to 15 percent, starting in 2016, as well separate increases of taxes on sales of vehicles and real estate. The bill also foresees a radical reduction in the basic goods basket, conditional on the establishment of a transfers system that would make this element of the reform broadly revenue-neutral for lower-income households. The income tax reform introduces two additional marginal rates of 20 and 25 percent on higher-income brackets, unifies taxation of income on capital at 15 percent, and introduces taxation of capital gains. On the expenditure side, the government has presented to Congress provisions that would reduce outlays by ¼ percent of GDP in 2016—these include caps on budgetary pensions and paring down transfers to decentralized institutions.

[9] For a more detailed discussion, see Garza, Morra and Simard (2012).

- In addition to these legislative proposals, the government has agreed with the main opposition party to make miscellaneous cuts of ¼ percent of GDP to be implemented through a supplementary 2016 budget.

- The authorities agree that the additional ¾ percent of GDP of fiscal consolidation measures needed to close the sustainability gap should focus on the expenditure side. They have identified administratively-determined spending cuts that would contain the growth of current spending—mostly transfers and public sector wages—to keep it through the medium term below the expansion of nominal GDP, yielding the total adjustment needed in percent of GDP.

- The authorities also presented a fiscal rule proposal aimed at the preservation of government debt sustainability. This is broadly in line with Fund advice on the desirability of two-pillar frameworks with an anchor (e.g. debt) and an operational target (expenditure)., though the proposals still requiring greater specification of its key elements.[10]

8. **Scenarios of partial and full implementation of the fiscal adjustment needed to restore debt sustainability highlight the importance of reaching political agreement on fiscal reforms**.

- A baseline scenario incorporating the measures already submitted to Congress that have a higher probability of being approved as well as the agreed expenditure cuts under a supplementary budget would imply partial adjustment of about 2¼ percent of GDP. Under this scenario, the CG fiscal deficit would decline moderately to around 5½ percent of GDP and the public debt ratio would continue to increase to almost 55 percent of GDP by 2021.

[10] See Cordes and others (2015).

Table 1. Costa Rica: Central Government Fiscal Consolidation Measures
(in percent of GDP)

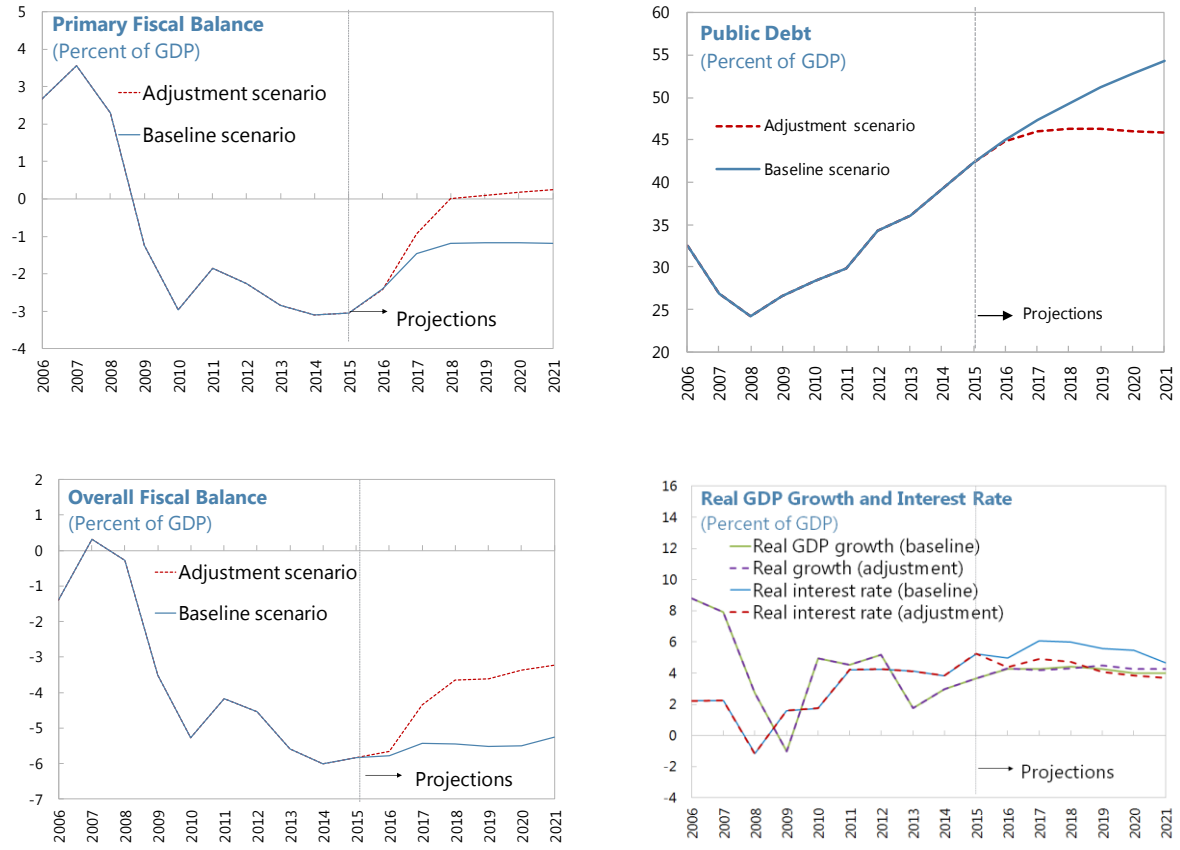
	Authorities' plans			Adjustment Scenario 3/	
	Total	Submitted to Congress, Staff Assessment 1/	Baseline Scenario 2/ (I)	Additional Measures (II)	Total adjustment (I + II)
Total adjustment	**4.0**	**2.9**	**2.3**	**1.5**	**3.8**
Revenue	2.7	2.5	1.7	0.8	2.5
Anti-tax evasion	0.5	0.2	0.2	-	0.2
VAT 4/	1.3	1.3	0.5	0.8	1.3
Income tax 5/	0.6	0.6	0.6	-	0.6
Corporate income tax 6/	0.2	0.2	0.2	-	0.2
Vehicles and real estate tax	0.2	0.2	0.2	-	0.2
Expenditure	1.3	0.4	0.6	0.7	1.3
Transfers 7/	0.4	0.4	0.4	-	0.4
Wages 8/	0.6	-	-	0.6	0.6
Miscellaneous cuts in 2016 budget 9/	0.2	-	0.2	-	0.2
Goods and services	0.1	-	-	0.1	0.1

Sources: Authorities and IMF staff estimates.
1/ On the revenue side, includes staff's assessment of the expected yield from revenue measures submitted to Congress. On the expenditure side, includes measures already submitted to Congress.
2/ In addition to the lower yield assumed from anti-tax evasion meaures, the difference with the authorities' plans is that it incorporates only measures that are deemed to have a higher probability of approval. The assumption in the baseline is that the proposed VAT tax rate increases will not be approved by Congress.
3/ Reflects total adjustment needed to close the sustainability gap.
4/ The VAT tax reform proposal submitted to Congress envisages full move from sales tax to VAT, extending coverage to services sector in the baseline scenario, and gradual increase in the tax rate from 13 to 15 in the full adjustment scenario.
5/ The income tax reform introduces two additional marginal rates of 20 and 25 percent on higher-income brackets, unifies taxation of income on capital at 15 percent, and introduces taxation of capital gains.
6/ Amendments to the corporate income tax law directed at reversing budgeted decline in 2016 revenue resulting from Constitutional Court ruling that proper procedure was not followed to introduce amendments made in 2010 to among other things include subsidiaries of foreign companies in the tax base.
7/ Includes cuts in transfers to finance capital expeditures of decentralized government institutions and enforcement fo legal cap on pensions paid out of the budget.
8/ Includes measures to contain nominal growth of public wages, so that their share in GDP is gradually reduced. Also includes freeze in hiring outside education, and cuts to public compensation bonus schemes.
9/ Includes miscellaneous cuts to the 2016 budget agreed between the ruling party and the main opposition party, to be introduced through a supplementary budget.

- An alternative scenario incorporating the full fiscal adjustment necessary to restore debt sustainability would yield a more favorable outlook. A tighter fiscal stance consistent with restoring debt sustainability could be achieved without significantly affecting growth, as it would allow for a more balanced macro policy mix with a looser monetary policy stance consistent with achieving the inflation target over the medium-term. Moreover, the focus on

revenue measures that increase the progressivity of the tax system and have mainly an effect on higher earner with lower propensity to consume—including higher income tax rates on higher income brackets, higher VAT tax rates accompanied by a transfers system to make the VAT reform broadly revenue-neutral for lower-income households, and anti-tax evasion measures—is also likely to contribute to the limited impact of fiscal consolidation on growth. Frontloaded fiscal adjustment would also mitigate increases in market rates associated with the normalization of U.S. monetary policy (USMP), and reduce the current account deficit.

Figure 3. Costa Rica: Baseline and Adjustment Scenarios

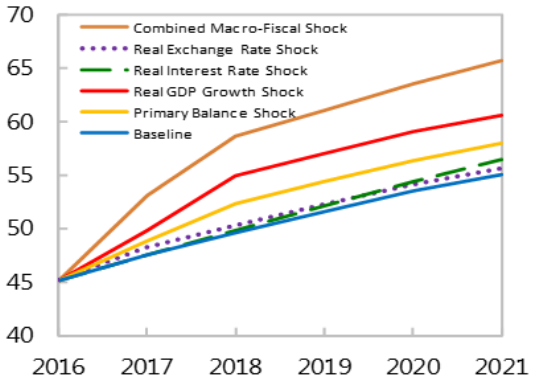


Source: National authorities and Fund staff estimates

D. Risks and Mitigating Factors

9. **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 rising above 65 percent of GDP by 2021, more than 10 percent above the level in the baseline scenario (DSA Annex to the staff report).[11] Debt dynamics are most sensitive to a growth shock, with an isolated one standard deviation shock to growth in 2016-17 resulting in an increase in central government debt of about 5 percent of GDP by 2021 relative to the baseline scenario. A fiscal shock equivalent to an additional 1¼ of GDP increase in the primary deficit in 2016–17 would increase debt by about 3 percent of GDP by 2021, 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. 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 2021.

Gross Nominal Public Debt
(percent of GDP)

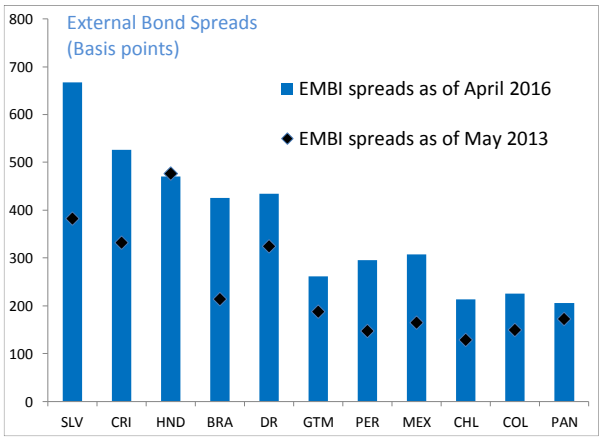


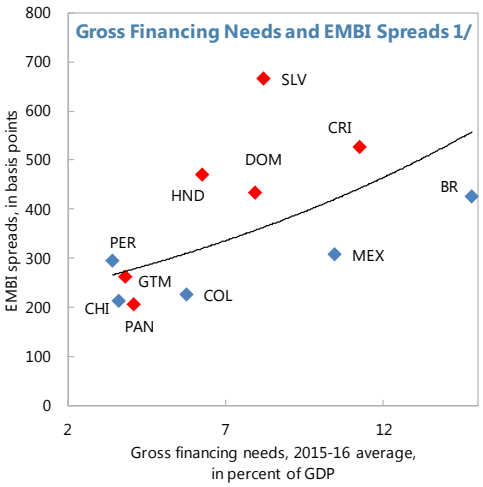
Source: Fund staff estimates.

10. **Relatively large gross financing needs and uncertain access to external financing pose upside risks to sovereign funding costs.** While the fiscal situation has benefitted from fairly low financing costs in recent years, especially since the approval of the external bond issuance for 2012-15, uncertainties about Congressional approval of new external bond issuance and expected upward normalization of global interest rates over the medium term, with potential periods of financial volatility during the transition to higher rates, suggest that Costa Rica's financing costs are likely to increase going forward. Spreads on external sovereign bonds have already increased substantially since the troughs reached before the start of US tapering, and are now among the highest of CAPDR and LA-5 countries. Sustained high fiscal deficits and substantial amortizations coming due result in average projected financing needs of close to 10 percent in 2015-16, also among the highest of CAPDR and LA-5 countries. Costa Rica already lost its only investment grade rating in 2014, and rating agencies lament continued weakness in the fiscal position and political obstacles to fiscal

[11] 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.

reform.[12] The risk of a debt spiral with potentially non-linear increases in financing costs cannot be discarded if debt continues to rise unabated.





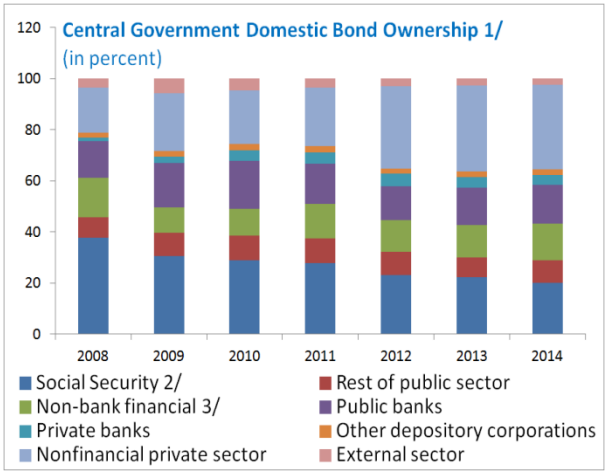
Sources: Bloomberg; national authorities; and Fund staff estimates.

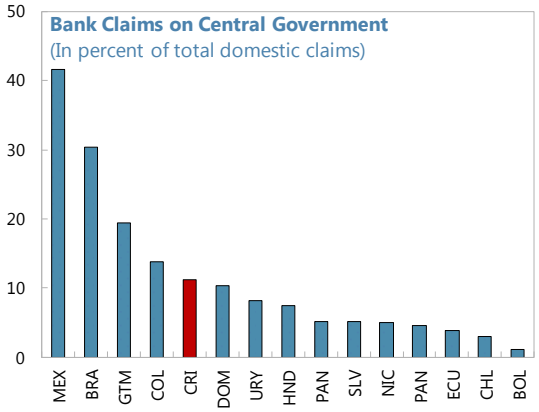
1/ Gross financing needs for LA-5 are based on data from latest Article IV reports, published in 2015.

11. **Risks are mitigated by the existence of a captive domestic investor base, although their share of total debt has declined in recent years**. In 2008, domestic institutional investors, including the CCSS, nonfinancial public sector institutions, and banks, held about 80 percent of domestic government bonds. By 2014, this share had fallen to 60 percent, as the non-financial private sector disproportionately absorbed the increase in the debt resulting from the worsening of the fiscal position. While holdings of the banking sector are not high by regional standards, additional increases in their exposures to the sovereign could have negative consequences for financial stability under downside scenarios of limited fiscal adjustment. Simulations of a similar increase in domestic sovereign yields as in 2012—before the approval of $4 bn external sovereign bond issuance for 2012-15—show that banks could be close to failing regulatory capital requirements in the medium term from mark-to-market losses on their growing exposures to the sovereign in a passive scenario of no fiscal consolidation. Losses would be even larger under more plausible assumptions of much higher government financing costs under this scenario.

[12] 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.

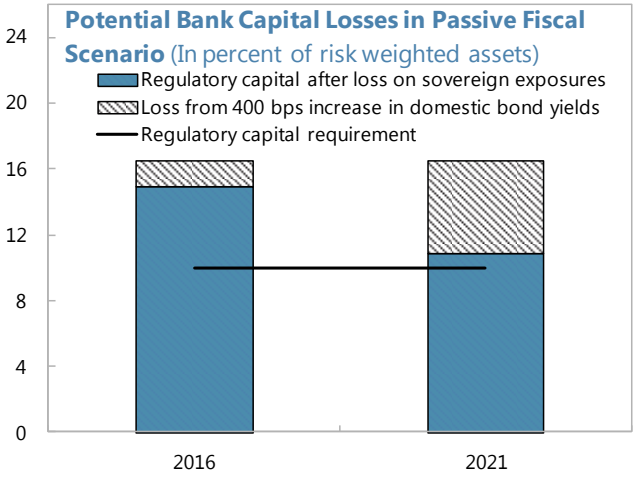
Figure 4. Costa Rica: Sovereign-Financial Linkages





Source: IFS and Fund staff estimates.

1/ Share of domestic government bonds by type of holder, excluding inflation-linked bonds.
2/ Includes also small holdings by other decentralized government entities.
3/ Includes mostly other entities related to the public sector, like the public insurance company and the pension fund for the judiciary.



Source: National authorities and Fund staff estimates.

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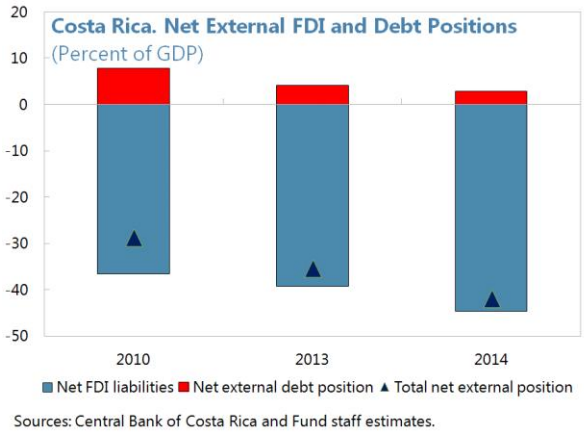
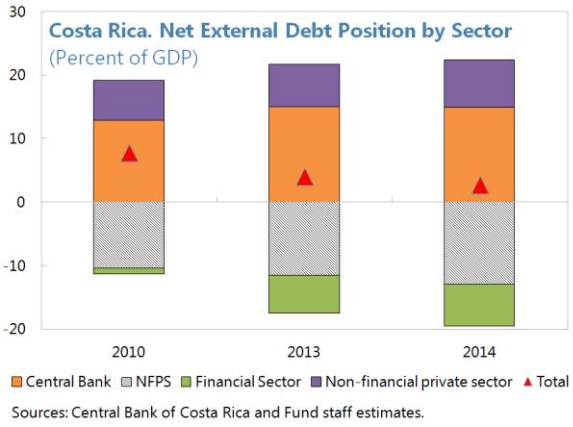
BALANCE SHEET ANALYSIS[1]

This note provides an update of the balance sheet analysis (BSA) of the Costa Rican economy presented in the 2014 Article IV report.[2] The net external debtor position of the economy increased further in 2014, but this was again driven by continued FDI flows to the private sector, implying limited external risks. While the country maintains a net external creditor position excluding FDI liabilities, this net creditor position continued to fall as a result mainly of external debt issuance by the central government. Risks from currency mismatches appear limited at the aggregate sectoral level, although unhedged borrowers in FX present key risks. The rising trend in household debt deserves monitoring.

1. **External risks remain limited given the country's net external creditor position excluding FDI liabilities, although this has been shrinking over the last years.** Costa Rica has a total net external debtor position of about 42 percent of GDP in 2014, up from 35 percent in 2013, but this largely reflects continued increase in 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 3 percent of GDP, implying limited risks of a capital account crisis (Figure 1 and Table 1). At the same time, the net creditor position of the economy continued its steady decline with an additional fall to 3 percent of GDP, from 4 percent in 2013 and 8 percent in 2010. While increased reliance on external financing by the financial sector was an important driver of the decline in the economy's net creditor position excluding FDI from 2010 to 2013, the additional decline in 2014 was driven mostly by continued external debt issuance by the central government (Figure 2).



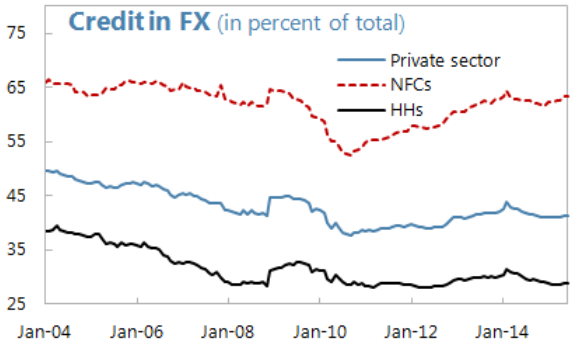


[1] Prepared by Jaume Puig-Forné.

[2] Full intersectoral data required for the BSA analysis are currently available from the central bank up to end-2014. The BSA analysis in the 2014 Article IV report was based on intersectoral data as of end-2013 (see IMF (2015)).

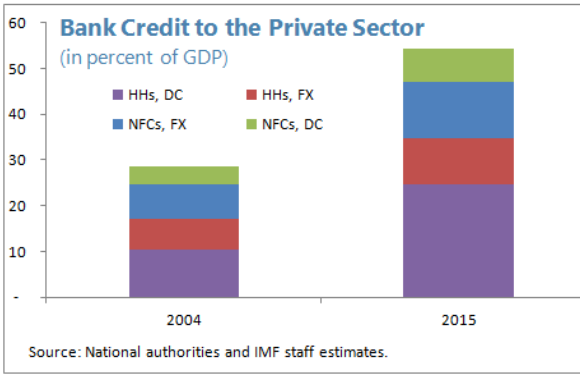
2. **Risks from currency mismatches appear limited at the aggregate level, but unhedged FX borrowers in the private sector remain a key risk.** Currency mismatches by sector were little changed in 2014. The net external creditor position of the public sector declined slightly from 3½ percent of GDP in 2013 to 2 percent of GDP in 2014, as a result of continued external bond issuance of the central government, as well as a small decline in central bank reserves after the exchange rate volatility of early 2014 (Table 1).[3] The net external debtor position of the financial sector excluding FDI increased further in 2014 as banks continued to borrow from abroad, but the increase was at a more moderate pace, rising to 6½ percent of GDP, from 6 percent in 2013 and 1 percent in 2010. The financial sector, however, remained a net foreign currency creditor—with a creditor position of 1½ percent of GDP excluding FDI—as the sector continued to channel the additional external financing into domestic credit in FX. While the non-financial private sector maintained its net FX creditor position at about 5 percent of GDP—with foreign assets held by the sector continuing to offset the sector's net FX debtor position vis-à-vis banks—risks from the large proportion of unhedged borrowers in the sector remain a key risk for the financial sector (AN II).

3. **The household sector has experienced the largest increase in leverage during the last decade.** Higher frequency data on bank credit by sector shows that the household sector has been the main driver of the sharp increase in bank credit since 2004. Bank credit to the private sector increased from less than 30 percent of GDP in 2004 to almost 55 percent in 2015, with credit to non-financial corporate (NFCs) increasing from 11 to 17 percent of GDP, and credit to households (HHs) increasing from 20 to 35 percent of GDP (Figure 3). The bulk of the increase in credit to households has been in domestic currency (Figure 4), with the share of credit in FX relative to total credit to households falling appreciably in 2004-09, and remaining fairly stable around 30 percent since then (Figure 5). In contrast, the share of credit in FX to the corporate sector, currently about 65 percent of total credit to corporate, has increased significantly from the lows reached in 2010.

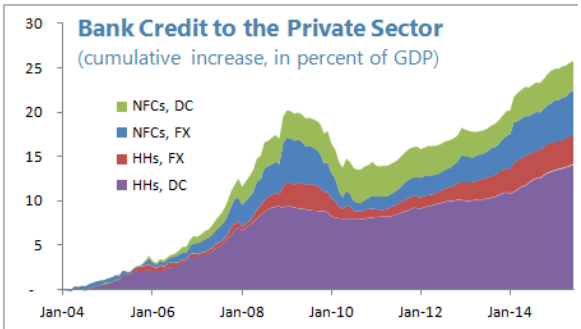


Source: National authorities and IMF staff estimates.

[3] More recent data shows that this trend continued in 2015, as the new issuance of external debt by the central government outpaced the renewed accumulation of international reserves by the central bank.



Source: National authorities and IMF staff estimates.



Source: National authorities and IMF staff estimates.

Table 1. Costa Rica: External and Foreign Currency Positions

	Central Bank	Non-financial Public Sector	*Public Sector*	Financial Sector	Private Sector	*Economy*
End-2014			(In percent of GDP)			
Gross External Assets	15.7	0.5	*16.3*	4.7	17.0	*38.0*
Gross External Liabilities	0.9	13.5	*14.4*	13.6	51.9	*79.9*
Net External Position	14.8	-12.9	1.9	-8.9	-34.9	*-41.9*
Net External Debt Position 1/	*14.8*	*-12.9*	*1.9*	*-6.6*	*7.5*	*2.8*
Gross FC Assets	15.7	1.2	*16.9*	37.4	37.7	*92.1*
Gross FC Liabilities	4.6	16.2	*20.8*	38.3	75.1	*134.2*
Net FC Position	11.1	-14.9	-3.9	-0.8	-37.4	*-42.1*
Net FX Debt Position 1/	*11.1*	*-14.9*	*-3.9*	*1.4*	*5.0*	*2.6*
Gross ST FC Assets	14.5	0.7	*15.2*	3.0	14.6	*32.7*
Gross ST FC Liabilities	0.6	0.0	*0.6*	11.8	2.5	*15.0*
Net ST FC Position	13.9	0.7	14.6	-8.9	12.0	17.7
End-2013						
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
Net External Debt Position 1/	*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
Net FX Debt Position 1/	*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 Exetrnal 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*
Net External Debt Position 1/	*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*
Net FX Debt Position 1/	*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.

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

Costa Rica: Net Intersectoral Asset and Liability Positions, 2014

(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		
Holder of liability (creditor)	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				0.2	0.1	0.1	1.2	0.0	1.2	12.3	0.0	12.3	4.3	0.0	4.3	3.8	0.0	3.8	0.9	15.7	-14.8
In domestic currency				0.1	0.1	0.0	1.2	0.0	1.2	8.8	0.0	8.8	4.2	0.0	4.2	3.8	0.0	3.8	0.0	0.1	-0.1
In foreign currency				0.1	0.0	0.1	0.0	0.0	0.0	3.5	0.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.9	15.7	-14.8
Central government	0.1	0.2	-0.1				12.0	0.8	11.2	5.8	0.2	5.6	13.4	1.7	11.7	0.0	0.7	-0.7	9.4	0.0	9.4
In domestic currency	0.1	0.1	0.0				11.7	0.8	10.9	3.5	0.2	3.3	12.9	1.7	11.2	0.8	0.7	0.1	0.0	0.0	0.0
In foreign currency	0.0	0.1	-0.1				0.3	0.0	0.3	2.4	0.0	2.3	0.5	0.0	0.5	-0.8	0.0	-0.8	9.4	0.0	9.4
Public Nonfinancial Corps.	0.0	1.2	-1.2	0.8	12.0	-11.2				0.6	1.8	-1.2	0.9	0.1	0.8	1.7	2.7	-0.9	4.1	0.5	3.5
In domestic currency	0.0	1.2	-1.2	0.8	11.7	-10.9				0.5	1.6	-1.2	0.7	0.1	0.7	1.7	2.7	-0.9	0.0	0.0	0.0
In foreign currency	0.0	0.0	0.0	0.0	0.3	-0.3				0.2	0.2	0.0	0.2	0.0	0.1	0.0	0.0	0.0	4.1	0.5	3.5
Other depository corporatio	0.0	12.3	-12.3	0.2	5.8	-5.6	1.8	0.6	1.2				9.2	1.2	8.0	55.6	54.7	0.9	13.5	4.0	9.4
In domestic currency	0.0	8.8	-8.8	0.2	3.5	-3.3	1.6	0.5	1.2				6.7	0.7	6.0	37.3	32.4	4.9	0.2	0.0	0.1
In foreign currency	0.0	3.5	-3.5	0.0	2.4	-2.3	0.2	0.2	0.0				2.5	0.5	2.0	18.3	22.3	-4.0	13.3	4.0	9.3
Other financial corporations	0.0	4.3	-4.3	1.7	13.4	-11.7	0.1	0.9	-0.8	1.2	9.2	-8.0				27.0	2.3	24.7	0.2	0.7	-0.5
In domestic currency	0.0	4.2	-4.2	1.7	12.9	-11.2	0.1	0.7	-0.7	0.7	6.7	-6.0				23.8	1.4	22.3	0.0	0.3	-0.2
In foreign currency	0.0	0.0	0.0	0.0	0.5	-0.5	0.0	0.2	-0.1	0.5	2.5	-2.0				3.2	0.9	2.3	0.1	0.4	-0.3
Nonfinancial private sector	0.0	3.8	-3.8	0.7	0.0	0.7	2.7	1.7	0.9	54.7	55.6	-0.9	2.3	27.0	-24.7				51.9	17.0	34.9
In domestic currency	0.0	3.8	-3.8	0.7	0.8	-0.1	2.7	1.7	0.9	32.4	37.3	-4.9	1.4	23.8	-22.3				0.0	0.0	0.0
In foreign currency	0.0	0.0	0.0	0.0	-0.8	0.8	0.0	0.0	0.0	22.3	18.3	4.0	0.9	3.2	-2.3				51.9	17.0	34.9
Rest of the world	15.7	0.9	14.8	0.0	9.4	-9.4	0.5	4.1	-3.5	4.0	13.5	-9.4	0.7	0.2	0.5	17.0	51.9	-34.9			
In domestic currency	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	-0.1	0.3	0.0	0.2	0.0	0.0	0.0			
In foreign currency	15.7	0.9	14.8	0.0	9.4	-9.4	0.5	4.1	-3.5	4.0	13.3	-9.3	0.4	0.1	0.3	17.0	51.9	-34.9			
Total	15.8	22.6	-6.8	3.6	40.6	-37.0	18.2	8.1	10.1	78.7	80.3	-1.6	30.8	30.2	0.6	105.1	112.3	-7.2	79.9	38.0	41.9
in domestic currency	0.1	18.0	-17.9	3.4	28.9	-25.5	17.2	3.7	13.5	45.8	46.0	-0.2	26.2	26.2	0.0	67.4	37.2	30.2	0.2	0.4	-0.2
in foreign currency	15.7	4.6	11.1	0.2	11.7	-11.5	1.1	4.4	-3.4	32.9	34.3	-1.4	4.5	4.0	0.6	37.7	75.1	-37.4	79.7	37.7	42.1

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

Costa Rica: Net Intersectoral Asset and Liability Positions, 2010

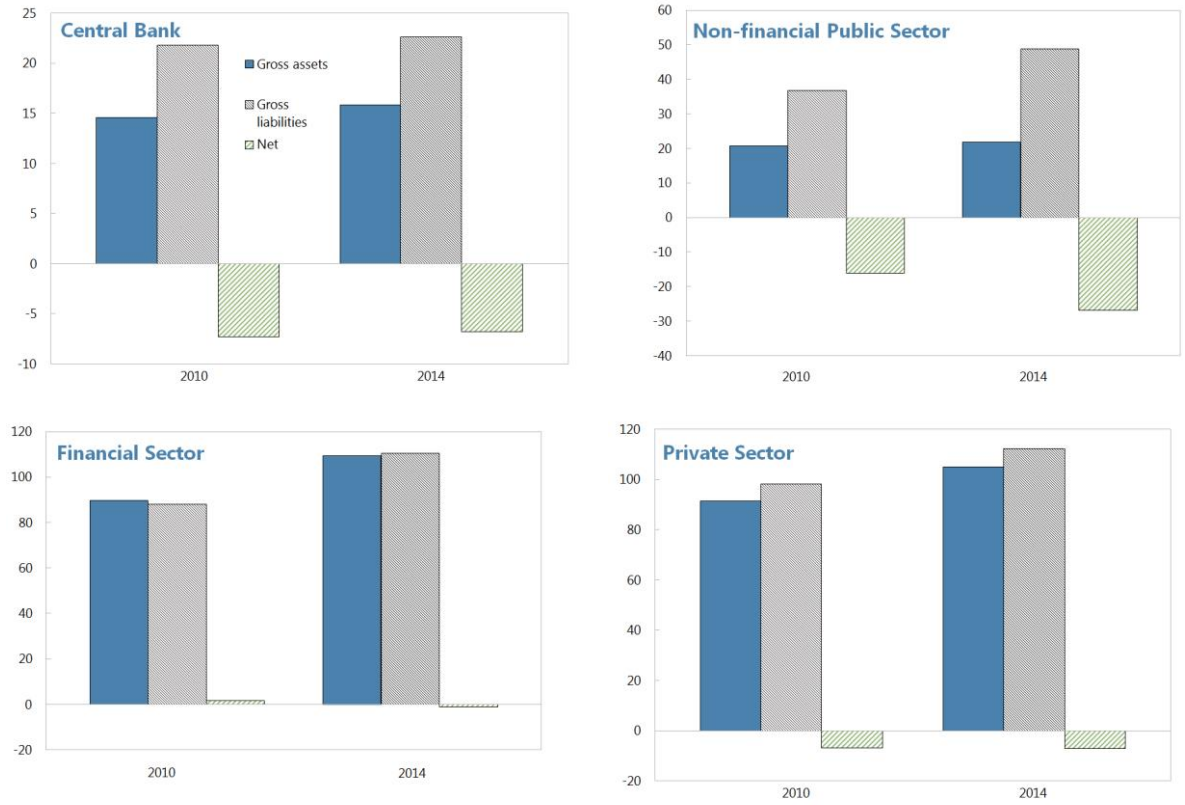
(In percent of GDP)

Issuer of liability (debtor) / Holder of liability (creditor)	Public sector									Financial Sector						Nonfinancial Private Secto			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 corporatio	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.

Costa Rica: Gross Financial Assets and Liabilities of Economic Sectors

(Percent of GDP)



Sources: National authorities; and Fund staff estimates.

SELECTED REAL SECTOR ISSUES[1]

This note examines potential output in Costa Rica. Estimates suggest that current potential GDP growth is about 4.0 percent, the output gap is at around -1 percent, and Intel's withdrawal lowered actual and potential real GDP by about ¾ percentage points over 2014-2015.

A. Potential Output Estimates

1. **Staff analysis suggests that Costa Rica's potential output growth in 2015 is about 4.0 percent and the output gap somewhat negative.** Results are relatively robust across different methodologies that include several well-known univariate time series filters, univariate and multivariate Kalman filters that 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 4.6 percent. The analogous estimate for the post-crisis period is, as expected, lower, at 3.9 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 2015 to -1.1 percent.

2. **Cycle extraction filters and univariate Kalman filters suggest that potential output growth is between 3.8 and 4.6 percent.** 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 do not diverge dramatically for 2015. The version of the univariate Kalman filter model which allows for mean reversion (and is thus more flexible than conventional cycle extraction filters), estimates a higher potential output growth that the version that employs deterministic drift (4.6 versus 4.1 percent).

3. **Estimates using a multivariate filter that includes inflation and financial variables suggest that potential output growth is about 3.6 percent.** This multivariate filter considers the information contained in inflation (through a Phillips curve, for example), 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.

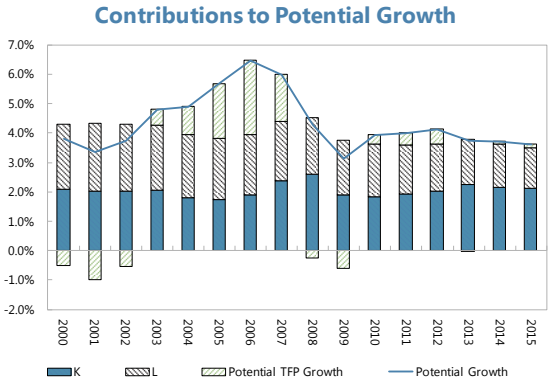
4. **The production function approach shows that the main recent drivers of potential GDP growth are capital and labor supply**. Results show that potential output grew at an average rate of 4.8 percent in 2000-2008, one of the highest in Central America. While contributions from capital remained relatively stable since 1991, most of the changes in potential GDP growth were driven by changes in productivity (TFP) and human-capital-weighted labor supply. Productivity growth in Costa Rica explains why GDP growth in Costa Rica has been higher than in other Central American countries and, at the same time, lower than in other emerging economies.

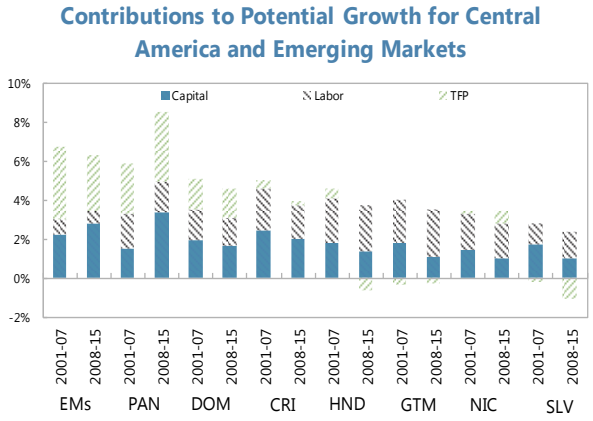
[1] Prepared by Lennart Erickson, Iulia Teodoru and Dmitry Plotnikov.

Table 1. Potential Output Growth and Output Gap Estimates

	Potential GDP growth rate			Output Gap 1/	
	2000-08	2009-14	2015	2014	2015
Production Function	4.60	3.78	3.95	0.25	-0.36
Cycle Extraction Filters					
Hodrick-Prescott	4.60	3.74	3.85	0.46	-0.06
Butterworth	4.52	3.66	3.78	0.49	0.03
Christiano-Fitzgerald	4.53	3.52	3.99	0.42	-0.24
Baxter-King	5.23	3.76	3.80	0.16	-0.31
Univariate Kalman Filters					
Deterministic Drift	4.11	4.11	4.11	0.43	-0.33
Mean Reversion	4.51	4.60	4.60	-0.40	-1.15
Multivariate Kalman Filter					
With inflation	4.78	3.78	3.64	-0.02	-0.34
Average of All Models	**4.61**	**3.87**	**3.97**	**0.22**	**-0.35**
Macroframework 2/	**4.79**	**4.00**	**4.00**	**-0.43**	**-1.11**

Source: Fund staff estimates.
1/ Includes level effect on potential output of Intel exit, estimated at 0.2 percent of GDP in 2014 and 0.8 percent in 2015.
2/ The output gap in the macroeconomic framework is slightly different from model-based estimates, as the level of potential output for each past year in the historical series reflects the estimate available at the time.





5. **In general, the estimates of TFP growth 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 attributed to TFP. For instance, migration of skilled labor, mismeasured changes in the quality of the capital and labor stocks, and changes in the level of capital utilization or the use of land will affect TFP.

6. **However, several indicators suggest that lower productivity growth can indeed explain lower GDP growth in Costa Rica relative to other emerging economies.** First, decree of informality, which is associated with lower labor productivity, has increased since 2011. In particular, since 2011 the number of people employed in the informal sector has increased by 40 percent since 2011, while the number of workers in the formal sector has not changed. Second, the share of R&D in Costa Rica as percentage of GDP is much lower than in other emerging economies. The economy as whole spend less than ½ percent of GDP, while the OECD average is around 2.5 percent of GDP with some emerging economies spending more than 4 percent of GDP. Third, quality of infrastructure as well as efficiency of public spending on education is lacking. According to the World Economic Forum survey, Costa Rica's quality of infrastructure is one of the worst among OECD countries. As for quality of education, Costa Rica spends around 7-8 percent of GDP on education, but has education outcomes similar to Chile, which spends almost 50 percent less on education as percentage of GDP.

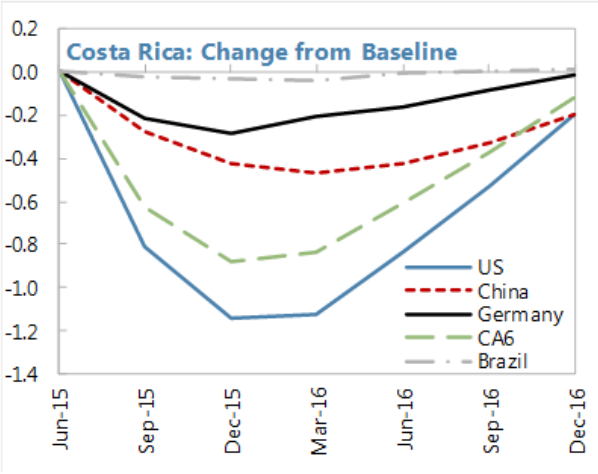
B. Impact of Intel Exit

7. **The Costa Rican authorities estimate that the effect of Intel's withdrawal was about ¾ percent of GDP over 2014-15.** Intel's shut down its micro-chip production facilities, with production ramping down in 2014 and halting completely by mid-year 2015. The authorities estimate that the shutdown lowered real and nominal output by 0.2 percent of GDP in 2014 and a further 0.6 percent in 2015. The estimates are obtained using recently adopted chained real GDP data with 2012 as the reference year. The outturns are in line with staff projections from the 2014 Article IV staff report.

8. **While the long-term effect of Intel's exit on potential growth is uncertain, it is unlikely to be significant.** Specifically, staff estimates that the effect of the exit on potential output in 2014-15 is similar to the effect on actual output (¾ percent) with virtually no effect on the output gap as a result. With the end of Intel's manufacturing operations in Costa Rica, possible future productivity spillovers from those operations to the rest of the economy are also lost. However, prospects for high value-added production remain bright, with other technology and medical device manufacturing companies maintaining or strengthening their presence in Costa Rica. Indeed, Intel itself not only kept open its R&D operations in Costa Rica, but also hired additional R&D personnel after the departure of the manufacturing operations.

C. Real Sector Spillovers

9. **Costa Rica is less vulnerable to the current slowdown in large emerging markets than to growth trends in the U.S.** A multi-country VAR model was used to assess the sensitivity of Costa Rica GDP growth to growth shocks originating in its trading partners while taking into account growth spillovers between all countries in the sample.[2] The model results suggest that shocks originating in the U.S. and the rest of Central America have the most 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 over 1 percentage points, while a similar reduction in growth in other Central American countries over a year would lower Costa Rica growth by about ¾ percentage points. Meanwhile, Costa Rica appears less vulnerable to adverse developments in key emerging markets, including China and Brazil, consistent with relative trade ties, with a 1 percentage point reduction in Chinese domestic demand growth lowering Costa Rica growth by less than ½ percentage points, and a similar reduction in Brazilian domestic demand growth barely having any effect on Costa Rica growth.



[2] See IMF (2015) for a description of the model and the sample.

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:

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

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 $\mu_t = (1-\beta)\bar{\mu} + \beta\mu_{t-1}$.

A multivariate filters based incorporating inflation is also employed. The specification broadly follows Laxton et al. (2010) and is given by the following decomposition for GDP:

$$\log(GDP_t) = \overline{Y_t} + Y_t$$
$$\overline{Y_t} = \overline{Y_{t-1}} + G + \epsilon_t^{\bar{Y}}$$
$$G_t = \theta G^{ss} + (1-\theta)G_{t-1} + \epsilon_t^G$$
$$Y_t = \phi Y_{t-1} + \epsilon_t^Y$$

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

$$\pi_{t+j}^{C} = \pi_{t+j} + \epsilon_{t+j}^{\pi^c}, \qquad j = 0,1$$
$$G_{t+j}^{C} = G_{t+j} + \epsilon_{t+j}^{G^c}, \qquad j = 0,1$$

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.

This method estimates a level of "sustainable" output defined as the level of potential output that does not trigger inflation (Okun's definition) and thus the most directly pertinent for the conduct of conventional inflation-targeting monetary policy.

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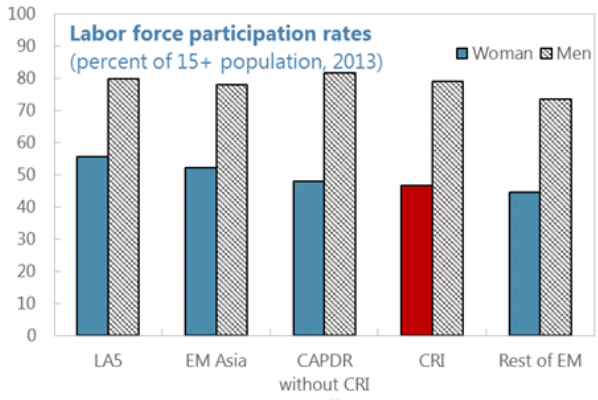
FEMALE LABOR FORCE PARTICIPATION IN COSTA RICA[1]

Despite the high educational attainment of women in Costa Rica, its female labor force participation (LFP) rate lags behind those of LA5. Using both evidence from household surveys and cross-country data, this note examines the determinants of female labor force participation and the factors behind low female LFP rate in Costa Rica. Income and education levels, presence of children in the household, physical and informational access to jobs as well as labor market efficiency are important determinants of female LFP. Increasing investment in infrastructure and information technology as well as taking measures to support working mothers with children could help raise female LFP in Costa Rica, in particular.

A. Introduction

1. **Costa Rica ranks low on economic participation and opportunities for women, despite high educational attainment of women.** Costa Rica boasts a number one ranking in the WEF's Gender Gap Index on the subcomponent of women's educational attainment reflecting a large gender education gap where women outperform men. Nonetheless, it ranks 105 out of 142 countries on the subcomponent of economic participation and opportunity for women in the same index. The poor ranking reflects low female labor force participation (LFP) and the gender wage gap. While male the LFP rate in Costa Rica is almost at the same level as that in other emerging markets, its female LFP rate is much lower than in other regions, in particular, it is 10 percentage points lower than the average of LA5. The differences are particularly pronounced among professional and technical workers. Stagnating female LFP rates in Costa Rica over the past decade are all the more surprising given a pronounced increase elsewhere in Latin America during this period.



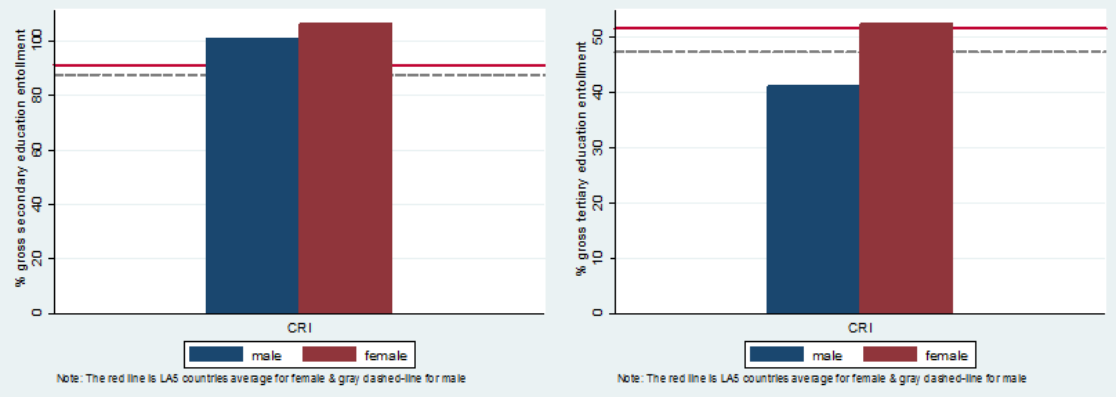
Sources: World Bank, WDI and Fund Staff calculations.

2. **Higher female LFP could help spur growth in Costa Rica.** Given especially the high level of education of women in Costa Rica, increasing female LFP can help raise productivity and growth. Higher female LFP could also help mitigate the impact of a shrinking workforce in the face of the forthcoming demographic pressures. Indeed, Costa Rica has the highest life expectancy among LAC countries (79 years versus 75 years in LAC). As a result, its percentage of people aged 65 and above is expected to double from 6.5 percent in 2010 to 14.1 percent by 2030. To better understand

[1] Prepared by Anna Ivanova, Ryo Makioka, and Joyce Wong.

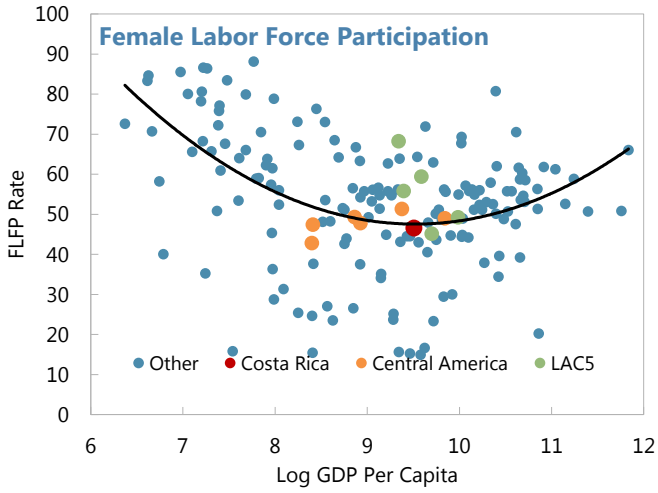
the drivers of female LFP participation in Costa Rica and the possible actions that could be taken to raise it, this note addresses the following questions: (i) what are the main determinants of female LFP rates; (ii) why are female LFP rates relatively low in Costa Rica, compared to LA5; and, finally, (iii) if and why Costa Rica is different from other upper middle income countries.

Internet Use, Labor Market Efficiency and Urbanization: CRI vs LA5



Sources: WDI; WEF, and Fund staff estimates.

3. **One potential explanation of the relatively low female LFP in Costa Rica is its middle income status.** The literature finds a U-shaped relationship between the level of economic development (e.g. GDP per capita) and female LFP rate (Goldin 1994). One reason for this relationship is that when a country is poor, women work out of necessity, mainly in subsistence agriculture or home-based production. With income growth, the activity shifts from agriculture to industry, with jobs which are away from the home, making it more difficult for women to juggle home production and children with a market job. As education levels rise, fertility rates fall, and social stigma weakens, women shift into the growing service sector which appeals more to women's comparative advantages (Rendall 2010). At the level of a household, these changes can also be described with a neoclassical labor supply model: as the husband's wage rises, there is a negative income effect on the supply of women's labor. Once wages for women start to rise, however, the substitution effect increases incentives for women to increase their labor supply, until this effect dominates the negative income effect.

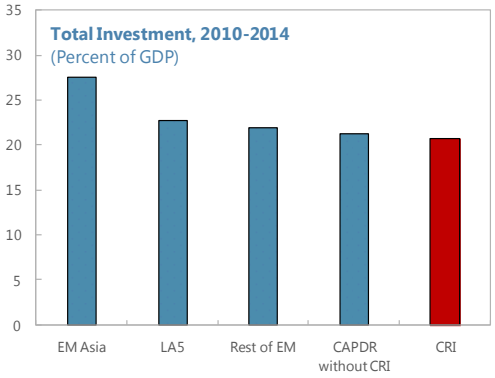


4. **But income level alone does not explain everything.** First, there is a large variation in female LFP rates even among upper middle income countries. For example, there are several countries with similar GDP per capita levels as Costa Rica with female LFP rates ranging from 20 to

80 percent. These variations suggest the importance of other elements. Second, examining other determinants of female LFP, Costa Rica actually enjoys several conditions (see below), including a low fertility rate, high educational attainment, and a service-dominated production structure, which are found to be associated with higher female LFP rates. (Bloom et al 2007; Klasen and Pieters 2015; Gaddis and Klasen 2014).

B. Some Stylized Facts

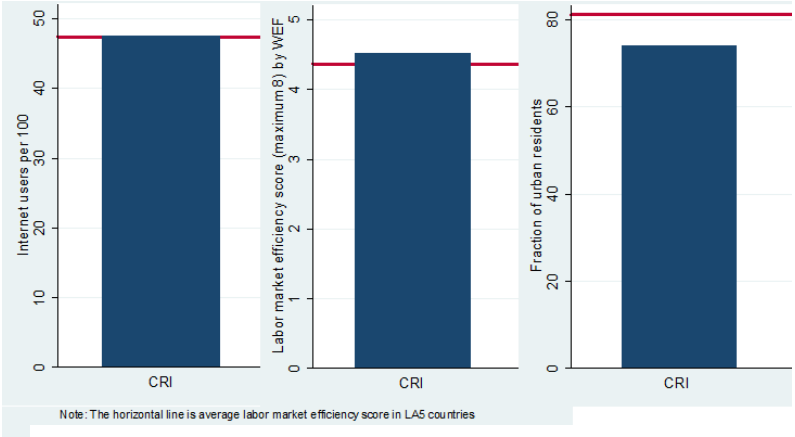
5. **Costa Rica has a relatively large services sector, but low overall investment, factors considered important in determining female LFP.** In 2012, the services sector accounted for almost 70 percent of total GDP, with manufacturing and agriculture each accounting for about half of the remainder. This share of services is relatively high compared to other countries with similar level of income per capita, such as Malaysia and Thailand, where the size of the services sector is close to 50 percent. On the other hand, investment in Costa Rica has been relatively low at about 20 percent of GDP during 2010–2014, ranking behind other emerging markets.



Sources: WEO and fund staff calculations.

6. **The labor market in Costa Rica is relatively efficient, internet access is at par with LA5, but urbanization lags somewhat.** The number of internet users per 100 people in Costa Rica is at LA5 average. Labor market efficiency rated at 4.5 out of 7 is a little above LA5 average, but still lagging the world maximum. Interestingly, the fraction of urban residents in Costa Rica is lower than in LA5 (74 percent vs 81 percent), despite its relatively small size, and high level of GDP per capita and educational attainment.

Secondary and Tertiary Enrollment: CRI vs LA5

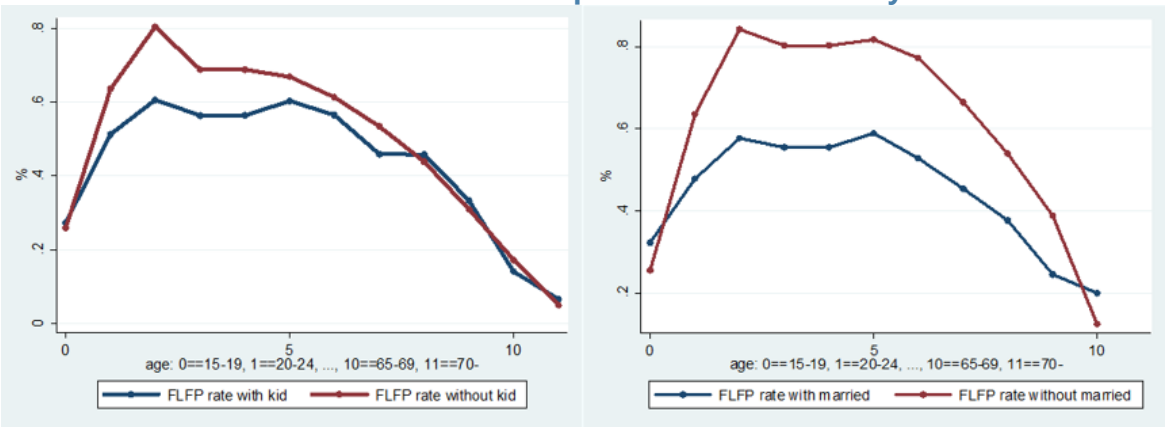


Sources: WDI and Fund staff estimates.

7. **Lastly, as in many advanced countries, female LFP rates in Costa Rica differ significantly between women with and without children.** The difference of participation rates is particularly large for women aged between 20 and 40, which is also a prime age for accumulation of

experience. Also, there is a similar but larger difference between married and unmarried women where the differences reach nearly 20 percentage points during ages 20 to 40. Both of these trends have been extensively documented for the U.S. (e.g. Attanasio et al. (2008)).

Female Labor Force Participation Across the Life-Cycle



Sources: Costa Rica Household Survey; and Fund staff estimates.

C. Evidence from Microdata

8. **We first estimate a model containing many of the drivers of female LFP identified in the literature, using a 2012 Costa Rican household survey.** The following regression is run using Costa Rica's household survey (the *Encuesta Nacional de Hogares,* ENAHO) of 2012:

$$labor\_force_{ir} = \alpha + \beta_1 prim\_second\_edu_i + \beta_2 second\_tertiary\_edu_i + \beta_3 more\_than\_tertiary\_edu_i + \beta_4 urban_i + \beta_5 married_i + \beta_6 age_i + \beta_7 (age)_i^{\,2} + \beta_8 cellphone_i + \beta_9 computer_i + \beta_{10} kid\_0to6_i + \beta_{11} kid\_6to12_i + \beta_{12} old\_morethan\_70_i + \beta_{13} \log(headincome)_i + \gamma_r + \varepsilon_{ir}$$

where $prim\_second\_edu_i$, $second\_tertiary\_edu_i$, and $more_than_tertiary_edu_i$are dummy variables for the woman i's final educational attainment level, and $urban_i$, $married_i$, $cellphone_i$, and $computer_i$ are dummy variables for the location of the household in urban area, household being a married couple, and household having a cell-phone. kid_0to6_i, kid_6to12_i, and $old\_morethan\_70_i$ are equal to one if a household has a member in these categories, respectively. $\log(headincome)_i$ is the log of income of a household head. Regional fixed effects are also included.

9. **Regression results using such microdata confirm the importance of education, marital status, and urbanization in driving female LFP.** The regression results are reported in Table 1, separately, for all women versus only those married. The results show the usual "hump-shaped" relationship between female LFP rates across the life-cycle with the age terms being significant and with the expected signs. Second, a higher educational attainment is related to a higher participation rate. Third, ownership of cell-phones and computers, as well as living in an urban area are positively and significantly associated with higher female LFP rate–these results point towards the importance of information and physical ability to reach jobs. Fourth, being married has a negative and

significant association with female LFP. Fifth, the presence of young children and the elderly in the household are also related to lower participation, albeit insignificantly for the latter. Lastly, attesting to the wealth effect in household labor supply, a higher income of the household head is associated with the lower female LFP.

D. Cross-Country Evidence

10. **In order to understand the differences between the main drivers of female LFP in Costa Rica and those of other countries, cross-country data is examined next.** A panel is constructed for 184 countries from 1990-2013, mostly using World Development Indicators complemented by labor market efficiency data from the Global Competitiveness Report. The following regression is estimated following Bloom et al. (2007):

$$FLFP_{irt} = \alpha + \alpha_1 \log(GDPCapita_t) + \alpha_2 [\log(GDPCapita_t)]^2 + \beta_1 fertility_{it} + \beta_2 internet_{it} + \beta_3 share\ female\ secondary\ edu_{it} + \beta_4 share\ female\ tertiary\ edu_{it} + \beta_5 share\ male\ tertiary\ edu_{it} + \beta_6 urban_{it} + \beta_7 labor\ market\ quality_{it} + \beta_8 investment_{it} + \delta_r + \gamma_t + \mu_{rt} + \varepsilon_{irt}$$

where $\log(GDPCapita_t)$ and $\log(GDPCapita_t)^2$ control for the countries' GDP per capita levels, $FLFP_{irt}$ is the female LFP rate for country i in region r at year t, $fertility_{it}$ is the fertility rate, and $internet_{it}$ is the number of internet users per 100 people. $share\ female\ secondary\ edu_{it}$, $share\ female\ tertiary\ edu_{it}$, and $share\ male\ tertiary\ edu_{it}$ are the ratios of total female (male) enrollment for secondary and tertiary education levels to the total female population (male population). $urban_{it}$ is the percentage of urban residents out of the total, $labor\ market\ quality_{it}$ is an indicator for labor market efficiency referred to in paragraph 5, and $investment_{it}$ is the log of investment in telecommunications and transportation with private participation.[2] Dummies include the regional dummy δ_r, the year dummy γ_t, and the year-region dummy μ_{rt}. Error terms ε_{irt} are clustered at the country level.

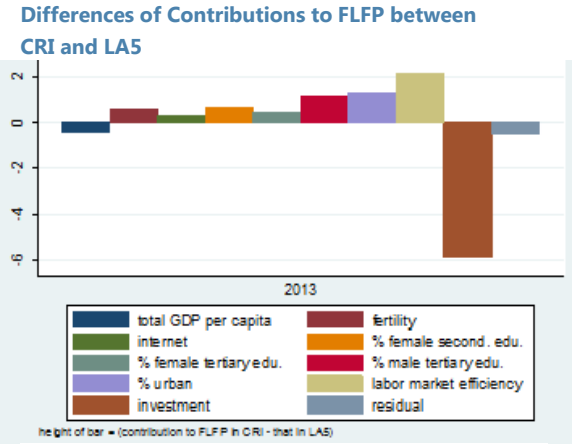
11. **Cross-country regression results are consistent with many of the findings in the micro-data.** Results for these regressions are reported in table 2. The importance of investment in infrastructure, the presence of children proxied by higher fertility rates, higher education levels, and internet access are all supported by the cross-country regression results. These factors have also been found to be important in the literature – see, e.g. Jensen (2012), Klasen and Pieters (2015). Investments in transportation and telecommunications have positive and significant coefficients, as do coefficients on internet access. In the latter case, the effect is stronger when LFP of women under the age of 25 is considered, suggesting, perhaps, the importance of technology for the younger

[2] Investment in telecoms with private participation is the value of telecom projects that have reached financial closure and directly or indirectly serve the public, including operation and management contracts with major capital expenditure, greenfield projects, and divestitures. Investment in transport with private participation is the value of transportation projects that have reached financial closure and directly or indirectly serve the public, including operation and management contracts with major capital expenditure, greenfield projects, and divestitures.

cohorts. The share of female tertiary enrollment also has positive and significant coefficients, while that of male tertiary educational attainments is negative and statistically significant, in line with the results from microdata on the impact of husband's earning capacity on female LFP. Fertility rates which serve as a proxy for the effect of children on women's decision to work also have negative and marginally significant coefficients.

12. **In addition, cross-country regressions also help shed light on the importance of development levels, urbanization, and labor market efficiency for female LFP.** First, the polynomial of the log of GDP per capita is statistically significant and generates the well documented U-shaped relationship between female LFP and the level of economic development (see, e.g. Goldin (1994), Gaddis and Klasen (2014)). The polynomial fit is quite good and Costa Rica is located at the bottom of the U-shape. Second, measures of labor market efficiency are positively and significantly related to LFP rates. Lastly, and in contrast to the micro-data evidence for Costa Rica, the share of urban residents has negative and marginally significant coefficient. Intuitively, urbanization has two contradictory effects on female LFP. While increased access to services jobs helps female LFP, the need to commute may impair women's availability to work when compared to rural areas where women work much closer to home. These factors, combined with the importance of the services sector and higher education levels of women in Costa Rica (both of which tend to cluster jobs in urban centers), together with relatively low levels of urbanization in Costa Rica, may explain why urbanization has positive and significant effects on female LFP in Costar Rica specifically.

13. **Differences in investment explain a large portion of Costa Rica's lower female LFP rates, compared to LA5.** Investment in telecommunications and transportation contributes significantly to explaining female LFP variation, both in levels and in differences, compared to LA5. This is the largest driver of Costa Rica's female LFP gap with LA5. Another factor that contributes slightly to Costa Rica's relatively low female LFP is total GDP per capita, with Costa Rica featuring at the lowest point of the estimated U-shaped relationship. Lastly, the contribution of the residuals to the difference between Costa Rica and LA5 is negative and could reflect elements which are not captured by the model, including potentially social stigma about women working and cultural elements.



Sources: Costa Rican Household Survey and Fund staff estimates.

14. **Policies to close the female LFP gap in Costa Rica vis-à-vis LA5 could include higher investment in infrastructure and information technology as well as measures to support working mothers with children.** One obvious choice given Costa Rica's low levels of investment compared to peers and the importance of the factor in supporting female LFP would be to increase investment, not only on physical infrastructure but also on promoting the development of

information technology and telecommunications. One factor which constrains investment is implementation capacity. Policies to improve implementation could thus serve not only to increase female LFP rates but also to take advantage of the large pool of educated women in the country. Given the relatively low fertility rates further work could also be done in order to better understand whether the low levels of fertility are the result of the lack of a developed supporting child-care framework for families. For instance, at 1.8 children per woman, fertility rates are much lower than those of Panama (2.5 children per woman) and, in 2013, the fertility rate in Costa Rica reached the lowest in its history. Low fertility rates combined with low levels of female LFP could signal a weak system of childcare, either public, or private or through family members, though other explanations such as cultural norms are also possible.

Table 1. Regression Results Using Microdata

Dependent variable	All women			All married women		
	(1)	(2)	(3)	(4)	(5)	(6)
Independent variables:	Dummy on labor force participation					
Less than secondary	0.202***	0.059***	0.090***	-0.019	-0.027	-0.030
	(0.019)	(0.018)	(0.021)	(0.030)	(0.033)	(0.038)
Less than university	0.283***	0.104***	0.140***	0.038	0.025	0.051
	(0.019)	(0.019)	(0.022)	(0.031)	(0.034)	(0.040)
University and more	0.509***	0.278***	0.289***	0.271***	0.263***	0.302***
	(0.020)	(0.021)	(0.024)	(0.034)	(0.037)	(0.043)
Age		0.036***	0.065***	0.016***	0.025***	0.024***
		(0.001)	(0.002)	(0.002)	(0.003)	(0.004)
(Age)^2		-0.0004***	-0.001***	-.0002***	-.0004***	-.0004***
		0.00001	(0.00002)	(0.00002)	(0.00004)	0.00005
Cellphone		0.035**	0.050**	0.003	0.017	0.036
		(0.016)	(0.019)	(0.027)	(0.031)	(0.038)
Computer		0.014	0.006	0.061***	0.049***	0.074***
		(0.009)	(0.009)	(0.014)	(0.014)	(0.016)
Urban		0.054***	0.058***	0.057***	0.060***	0.063***
		(0.008)	(0.008)	(0.013)	(0.013)	(0.014)
Married		-0.120***	-0.157***			
		(0.008)	(0.009)			
With kids 0-6			-0.005		-0.097***	-0.104***
			(0.009)		(0.014)	(0.015)
With kids 6-12			-0.055***		-0.058***	-0.061***
			(0.009)		(0.013)	(0.014)
With old 70-			-0.027*		-0.018	-0.051
			(0.014)		(0.026)	(0.035)
Log head income						-0.044***
						(0.008)
# obs.	15256	15251	14164	6454	6162	5344
Region FEs	Yes	Yes	Yes	Yes	Yes	Yes

Table 2. Cross Country Regression Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variables	**Independent variable: FLFP rate (FLFP rate under 25 years-old in (6))**							
Log GDP per capita	-46.918***	-52.519***	-54.902***	-55.646***	-69.790***	-66.596***	-92.947***	-113.19***
	(11.909)	(13.460)	(11.701)	(11.391)	(12.611)	(14.006)	(19.612)	(32.321)
(Log GDP per capita)^2	2.511***	2.757***	2.845***	2.944***	3.638***	3.525***	4.623***	5.963***
	(0.641)	(0.719)	(0.619)	(0.605)	(0.672)	(0.758)	(0.987)	(1.857)
Fertility rate per 100		-1.881	-1.949	-2.267*	-2.171	-0.831	-0.695	-2.051
		(1.282)	(1.352)	(1.368)	(1.506)	(1.728)	(1.840)	(1.955)
Internet uses			0.077	0.096*	0.110**	0.317***	0.049	-0.071
			(0.052)	(0.049)	(0.053)	(0.077)	(0.066)	(0.107)
Share of urban residents				-0.102*	-0.116	-0.105	-0.135	-0.203
				(0.060)	(0.079)	(0.090)	(0.094)	(0.132)
Share of female secondary education					0.023	0.003	0.086	0.039
					(0.050)	(0.064)	(0.078)	(0.093)
Share of female tertiary education					0.182***	0.066	0.147**	0.342**
					(0.061)	(0.101)	(0.066)	(0.146)
Share of male tertiary education					-0.228***	-0.127	-0.091	-0.416**
					(0.071)	(0.135)	(0.06)	(0.204)
Labor market efficiency							9.012***	9.424***
							(2.053)	(2.499)
Invest to transportation and telecoms								1.461*
								(0.776)
Observation	4073	4069	3514	3514	1789	1789	592	303
R square	0.495	0.502	0.507	0.513	0.556	0.458	0.692	0.710

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Annex I. Costa Rica: Bank Heat Maps

Relative Soundness of Individual Bank Compared to Peers[1]

Asset Quality

Bank	2007	2008	2009	2010	2011	2012	2013	2014	2015
1	-0.6	-0.4	-0.3	-0.4	-0.3	-0.2	0.2	2.2	2.5
2	-0.7	-0.6	-0.5	-0.5	-0.6	-0.6	-0.1	0.4	..
3	-0.6	-0.8	-0.7	-1.0	-0.9	-0.8	-0.4	-0.3	-0.4
4	0.2	-0.7	-0.7	-0.8	-0.7	-0.7	-0.6	-0.7	..
5	1.2	1.2	2.0	2.0	0.9	1.3	-0.2	..	..
6	-0.1	1.3	1.9	1.4	0.9	-0.5	-0.4	0.0	..
7	..	0.9	-0.5	1.7	1.7	-0.2	0.1	1.0	..
8	..	..	..	..	-1.1	-1.0	-1.0	-1.1	-1.8
9	0.3	0.2	0.0	..	0.2	-0.5	-0.6	-0.8	..
10	-0.5	-0.5	-0.4	-0.5	-0.5	-0.4	0.4	0.6	..
11	-0.5	-0.4	0.3	1.1	0.6	-0.4	0.0	-0.2	..
12	-1.0	-1.0	-1.1	..	-1.2	-1.1	-1.5	-1.7	-1.0
13	..	..	..	..	-0.7	-0.6	-0.5	-0.3	..
14	2.4	-0.3	-0.5	-0.1	0.1	-0.4	-0.1	-0.1	..
15	..	..	..	..	-0.6	-0.4	-0.1	..	..
Public banks	-0.6	-0.2	-0.5	0.0	0.0	-0.4	-0.1	0.8	1.0
Private banks	0.2	0.0	0.2	0.5	-0.2	-0.4	-0.4	-0.5	-1.4

Earnings

Bank	2007	2008	2009	2010	2011	2012	2013	2014	2015
1	0.6	-0.2	-0.5	-0.4	-0.3	0.3	-0.8	-0.4	-0.4
2	0.6	-0.1	-0.5	-0.4	0.0	0.1	-0.3	-0.8	-0.4
3	1.8	0.3	-0.1	0.5	2.6	1.9	0.9	0.8	0.9
4	1.1	0.9	0.4	-0.1	2.2	2.0	1.8	2.7	..
5	-2.1	-0.8	-1.1	-0.9	-0.8	-0.2	-0.5	..	..
6	-1.0	-0.5	-1.1	-0.8	-0.9	0.2	0.1	0.1	..
7	-0.2	0.0	-0.8	-0.4	0.2	-0.2	-1.0	-1.5	..
8	..	..	..	..	-1.7	0.2	0.2	-1.2	0.0
9	0.0	0.8	-0.3	-0.4	1.3	0.6	0.4	0.4	..
10	-0.5	-0.4	-0.4	-0.8	-0.4	-0.3	-1.1	-1.0	-1.0
11	-0.1	-0.1	-0.3	-0.5	-0.7	-0.3	-0.7	-0.3	..
12	-0.2	0.1	-0.2	-0.4	0.5	0.8	-0.3	1.4	0.2
13	..	4.0	-1.1	-1.2	-0.8	-0.5	-0.8	-1.3	..
14	-0.1	0.4	0.7	-0.1	-0.2	0.3	0.2	-1.2	..
15	..	..	..	..	-0.9	-0.6	-1.2	..	..
Public banks	0.7	0.0	-0.5	-0.2	0.6	0.5	-0.3	-0.5	0.0
Private banks	-0.3	0.5	-0.4	-0.6	-0.2	0.2	-0.2	0.0	-0.3

[1] Heat Maps are based on the methodology by Lian Ong, L., P. Jesakul, and S. Kwoh, (2013), "HEAT! A Bank Health Assessment Tool," IMF Working Paper WP/13/77. They show normalized z-scores for the displayed financial ratios compared to the whole domestic banking system. The system mean and standard deviations are calculated over three periods to incorporate both the time and cross-sectional dimensions.

Liquidity

Bank	2007	2008	2009	2010	2011	2012	2013	2014	2015
1	-1.4	-1.0	-1.4	-1.4	0.2	-1.6	-1.3	-1.7	-1.2
2	-1.5	-0.7	-1.1	-1.0	-0.9	-1.3	-1.2	-1.6	-1.8
3	-0.5	0.3	0.2	-0.3	-0.6	-0.1	-0.2	-0.2	0.9
4	0.8	-1.2	-0.8	-0.8	-1.0	-1.1	-1.0	-1.2	..
5	0.2	0.3	0.7	0.7	0.0	0.2	0.3	..	..
6	0.3	0.3	0.4	0.6	0.9	0.8	0.6	0.6	..
7	0.4	0.9	1.2	-0.5	-0.6	-0.6	0.1	0.2	..
8	..	..	..	..	1.2	1.3	-0.4	0.4	-0.6
9	0.4	0.8	0.3	0.6	0.4	0.3	0.3	0.3	..
10	-0.4	-0.9	1.6	0.4	0.2	0.1	0.0	0.2	0.4
11	-0.9	-0.9	0.4	-0.2	0.0	-0.1	0.0	0.4	..
12	0.6	0.3	-0.5	-1.0	-1.0	0.9	0.7	1.4	1.4
13	..	..	3.7	0.9	2.9	-0.9	-0.9	0.0	..
14	1.9	-0.1	-0.5	-0.1	-0.2	-0.2	-0.1	1.8	..
15	..	..	..	..	1.1	1.0	1.3	..	..
Public banks	-0.8	-0.1	-0.3	-0.8	-0.5	-0.9	-0.7	-0.8	-0.7
Private banks	0.4	-0.2	0.6	0.1	0.4	0.2	0.1	0.4	0.4

Leverage

Bank	2007	2008	2009	2010	2011	2012	2013	2014	2015
1	-0.6	-0.3	-0.3	-0.3	-0.3	-0.4	-0.7	-0.7	-0.6
2	0.0	-0.2	-0.3	-0.3	-0.4	-0.5	-0.6	-0.7	-0.6
3	1.7	0.1	0.2	0.3	0.9	1.9	2.3	2.3	2.0
4	-0.7	-0.3	-0.3	-0.3	-0.2	-0.1	0.0	0.2	..
5	-0.4	-0.3	-0.3	-0.2	-0.2	0.0	0.1	..	..
6	-0.2	-0.4	-0.3	-0.2	-0.3	0.1	0.1	-0.3	..
7	-0.1	-0.2	-0.5	-0.5	-0.7	-1.0	-0.1	-0.4	..
8	..	..	..	..	0.9	0.5	1.1	0.6	2.3
9	-0.6	-0.4	-0.4	-0.4	-0.5	-0.6	-0.6	-0.7	..
10	-0.7	-0.3	-0.4	-0.4	-0.8	-1.4	-1.1	-0.8	-0.8
11	-1.1	-0.5	-0.3	-0.5	-0.6	-0.9	-1.0	-1.3	..
12	0.5	-0.3	-0.2	-0.3	-0.1	0.0	0.5	0.7	0.2
13	..	4.2	2.1	0.6	0.6	1.2	0.9	0.0	..
14	2.2	1.9	0.5	-0.1	0.0	0.0	-0.6	0.1	..
15	..	..	..	..	-0.1	-0.6	-1.4	..	..
Public banks	0.24	-0.18	-0.22	-0.21	-0.11	-0.01	0.20	0.1	0.3
Private banks	-0.12	0.40	0.05	-0.21	-0.12	-0.15	-0.19	-0.2	0.6

Capital Adequacy

Bank	2007	2008	2009	2010	2011	2012	2013	2014	2015
1	-0.3	0.2	0.1	0.2	0.2	..	-0.2	..	..
2	0.5	0.6	0.4	0.5	0.3	0.1	0.0	..	..
3	1.1	0.8	1.6	2.5	2.2	1.5	..	..	..
4	..	-0.8	-0.6	-0.5	-0.5	-0.5	-0.6	..	..
5	..	..	..	..	..	..	..	..	..
6	..	..	..	..	..	..	..	..	..
7	..	..	..	..	..	..	..	..	..
8	..	..	..	..	1.5	0.3	0.6	0.0	..
9	..	..	..	..	..	..	..	..	..
10	-1.2	-1.0	-0.9	-1.4	-1.4	-1.6	..	..	..
11	..	..	..	..	..	..	..	..	..
12	..	-1.0	-0.6	-0.7	-0.6	-0.6	..	..	..
13	..	..	..	..	0.8	..	..	..	..
14	..	..	..	..	..	..	..	..	..
15	..	..	..	..	-0.5	..	..	..	..
Public banks	0.4	0.6	0.7	1.1	0.9	0.8	-0.1		
Private banks	-1.2	-0.9	-0.7	-0.9	-0.1	-0.6	0.0	0.0	

Overall

Bank	2007	2008	2009	2010	2011	2012	2013	2014	2015
1	-1.3	-0.9	-1.9	-1.5	0.0	..	-3.2	..	..
2	0.3	0.2	-1.0	-0.7	-0.4	-1.1	-2.0	..	..
3	4.7	2.3	2.6	3.9	6.1	6.1	..	..	..
4	..	-0.8	-0.6	-0.9	1.4	1.0	0.7	..	..
5	..	..	..	..	..	..	..	..	..
6	..	..	..	..	..	..	..	..	..
7	..	..	..	..	..	..	..	..	..
8	..	..	..	..	2.9	3.3	2.6	0.9	..
9	..	..	..	..	..	..	..	..	..
10	-2.4	-2.1	0.4	-1.7	-2.0	-2.8	..	..	..
11	..	..	..	..	..	..	..	..	..
12	..	0.2	-0.5	..	0.1	2.2	..	..	..
13	..	..	..	..	4.1	..	..	..	..
14	..	..	..	..	..	..	..	..	..
15	..	..	..	..	0.2	..	..	..	..
Public banks	1.2	0.5	-0.1	0.5	1.9	2.5	-2.6		
Private banks	-2.4	-0.9	-0.2	-1.3	1.1	0.9	1.7	0.9	

Source: BankScope; and IMF staff calculations.