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Nicaragua: Selected Issues

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NICARAGUA

Selected Issues

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Approved by the Western Hemisphere Department

June 12, 2012

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I. Raising Potential Output: the Challenge of Inclusive Growth[1]

Alternative techniques produce estimates consistent with a 4-percent potential growth rate for Nicaragua. With population growing about 2 percent annually, the current increase in GDP per capita is not enough to reduce poverty decisively. To raise potential growth, appropriate structural reforms to enhance productivity should be implemented.

A. Introduction

1. **Albeit unobservable, potential growth is a crucial variable for economic policy discussions**. In the case of monetary policy, potential output and output gap are useful concepts to evaluate the existence of inflationary pressures, while a good estimate of potential GDP allows measuring the structural fiscal stance (as it allows the identification of cyclical factors), thus allowing planning a sustainable fiscal path.[2] Moreover, by assessing Nicaragua's growth potential, staff can assess the speed of future reductions in poverty.

2. **Several estimations of potential output and output gaps are discussed in this chapter**. Results are consistent across different methodologies, comprising a production function approach, and switching and state-space models. They are consistent with a 4-percent potential growth rate and a zero output gap in 2011. Given projected population growth levels, sustained efforts should be made over a prolonged period of time to increase GDP per capita and hence decrease poverty faster.

3. **Policies should aim at raising total factor productivity (TFP) growth**. According to the estimates in this chapter, productivity has been the Achilles' heel of the Nicaraguan economy. Low productivity is associated with lack of human capital, and inadequate investment and production organization. Structural policies should aim at raising productivity by increasing the quality of education and, more broadly, raising incentives to human capital accumulation, including by lowering labor market informality. Better protecting property rights, and improving the business environment and institutions would raise incentives to invest and innovate in the country, thus boosting productivity and capital levels.

B. Potential Output and Output Gap: The Production Function Approach

4. **The growth accounting exercise assumes standard production function parameters and equilibrium labor utilization**. The Nicaraguan economy is assumed to be characterized by a Cobb-Douglas production function with constant returns to scale (CRS) technology $Y_t = A_t K_t^{\alpha} L_t^{1-\alpha}$ where Y_t is output, K_t and L_t are capital and labor services, while A_t is the contribution of technology or total factor productivity (TFP); and where the output

[1] Prepared by Christian Johnson.

[2] Closing large and persistent fiscal gaps lead to a crowding in of private capital raising potential growth.

elasticities (α denotes the capital-output elasticity) sum up to one reflecting CRS (Box 1). The natural rate of unemployment is assumed to be either 7.8% (the average between 1997 and 2010) or the result of applying a Hodrick-Prescott (HP) filter to the unemployment series. The estimation used annual data from 1994 to 2011.

5. **This method points to potential growth between 3.3 percent and 3.7 percent, depending on the assumed natural rate of unemployment**. Average GDP growth for 1995-2011 is 3.8 percent with a volatility of 2 percent due to episodes of slow growth in 2002, the recession in 2009, and the economic boom in the second half of the 90s. The model based on a fixed rate of unemployment produces an output gap series with a large standard deviation: 2.5 percent or almost 1 percentage point above the alternative model with filtered unemployment rate. The average output gap for the whole sample period is -1 percent if the equilibrium unemployment rate is assumed constant, which suggests that it is a biased measure of cyclical variations, while the model assuming a variable equilibrium unemployment rate produces an average output gap for the same period near zero. If the recent macroeconomic stability is maintained, it is possible that potential growth going forward would be a bit better than observed historically, and a potential growth rate around 4 percent looks reasonable.

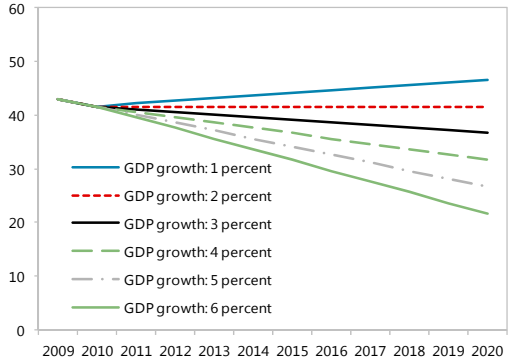
	Mean	Std. Dev.	Min	Max
Actual GDP Growth	3.83	2.03	-1.47	7.04
Potential Growth (u=HP)	3.69	0.81	2.62	5.72
Potential Growth (u=7.8)	3.33	0.55	2.65	4.97
	Mean	Std. Dev.	Min	Max
Output Gap (u=HP)	-0.15	1.47	-3.11	1.59
Output Gap (u=7.8)	-0.97	2.46	-7.21	2.43

6. **Since the end of the 1990s, the output gap has been fluctuating between ±2 percent**. (Figure 1) Our results suggest that the typical business cycles duration is around eight years. We can identify 2002-2003 as the beginning of the last cycle which ends in 2009 after a one-year recession associated with the international crisis. Unambiguously, the two models suggest that the output gap is practically closed during 2011 after two years of GDP growing over 4 percent (4.5 and 4.7 percent in 2010-2011 respectively). This would imply no inflationary pressures from aggregate demand; however estimations of traditional Philips curves using low frequency data and optimal number of lags suggest that the feedback from output gap to inflationary pressures is statistically insignificant.

7. P**roductivity growth, as measured by this approach, is low independently of specific assumptions and the sample period used**. From the mid 1990s until 2011, capital growth explained 55 percent of the growth in GDP while labor services explained 42 percent, leaving only a marginal role for total factor productivity. Breaking the sample period in two, the Nicaraguan economy grew 5.4 percent in the 1990s, with total factor productivity either explaining only about 7 percent of this performance (assuming a fixed equilibrium unemployment rate) or actually declining. TFP is estimated to have either remained unchanged or declined in the following decade with some cyclicality during the recent recession and recovery period. This performance is much worse than observed in Latin America, where productivity explained on average about 50 percent of GDP growth

(6.3 percent) in the last 30 years, with labor and capital formation sharing equalts parts of the remaining contribution (Harberger, 2007).[3]

8. **Low productivity is an obstacle to decisive reductions in poverty**. If output grows at about 3.7 percent, as suggested by the production function approach, and considering a 2-percent population growth, the potential output growth per capita GDP is about 1.7 percent. Using an elasticity *poverty reduction-growth* of -0.5 percent (FUNIDES, 2012), that implies a reduction of about 8 percentage points in the poverty rate by the end of the decade. With the right structural measures and policies, the economy could grow faster, say about 5 percent, which would imply poverty rates of about 27 percent of the population. An even higher potential growth, say 6 percent, would reduce poverty to almost 20 percent of the population by 2020.



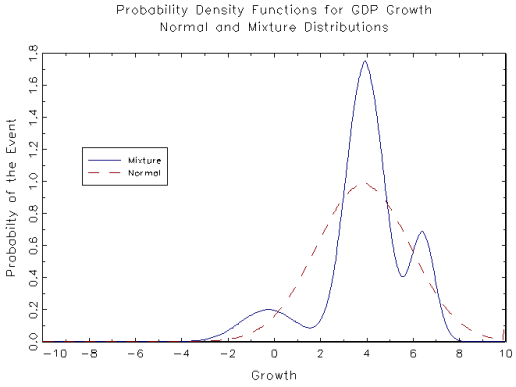
C. Potential Growth: A Switching Model Approach

9. **An alternative way to measure potential growth would be to consider explicitly that the economy could be in any of three basic states: overheating, sustainable growth, and recession**. (Box 2) Using this approach we can derive the distribution functions for each predefined scenario. The left distribution represents the recessionary state scenario, with growth rate of about -0.3 percent and a standard deviation of about 1.2 percent. The distribution at the center represents the sustainable growth, with a mean value of about 3.9 percent and a standard deviation of 0.8 percent, and finally, the distribution on the right represents an overheating economy, with a mean growth rate of about 6.4 percent and a standard deviation of 0.5 percent.

Convergence Results for Each Scenario

Statistic	Overheating	Sustainable Growth	Moderate Growth or Recession
Growth	6.4	3.9	-0.3
Std. Deviation	0.5	0.8	1.2
Probability [1/]	17.8	70.2	12.0

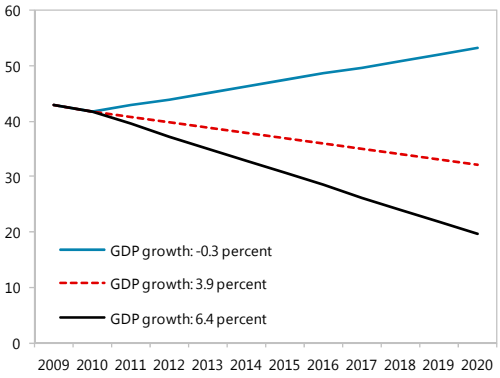
Source: Fund staff calculations.
[1/] Unconditional.



10. **Under a sustainable growth scenario, potential output grows 3.9 percent** while in the recessionary and overheating economy growth is -0.3 and 6.4 percent, respectively. One

[3] Harberger (2007) reports a TFP contribution of 0.2 percent for Nicaragua while our analysis suggests a marginal contribution between -0.2 and 0.1 percent depending on the sample.

interesting result is the homogeneity in the standard deviations. Independently of the state, the level of uncertainty is not much different: 0.5 for the overheating state, 0.8 for the sustainable growth, and 1.2 percent for the moderate growth (recessionary) scenario. This methodology yields a potential growth very close to the preferred specification for the production function approach (3.7 percent). With an economy growing at 4 percent the poverty reduction is not substantive, as the poverty headcount declines to only 32 percent by the end of the decade.



D. Potential Output: A State-Space Representation

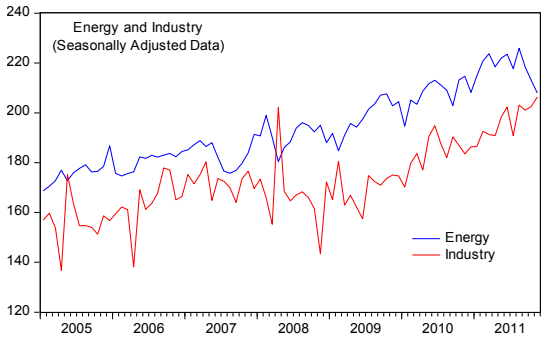
11. **A state-space approach produces a 4-percent potential growth for Nicaragua**. This method looks for joint identification of the output gap and potential output growth—both treated as latent or unobserved variables. The approach considers two specifications (constant and cyclical drifts), with potential growth measured by the parameter μ (Box 3). In the case of constant drift, growth is calculated at 3.92 percent while in the cyclical drift model, potential growth is 3.96 percent, with output gap uncertainty between 1.8 and 2.2 percent—figures similar to estimates obtained by the previous approaches.

	ρ_1	ρ_2	μ	β	σ_{ygap}
Constant Drift	1.17	-0.33	3.92		1.78
t-statistic	5.34	-1.41	18.00		5.84
Cyclical Drift	1.16	-0.25	3.96	-0.22	2.19
t-statistic	4.38	-0.90	7.96	-0.50	5.76

Source: Fund staff calculations.

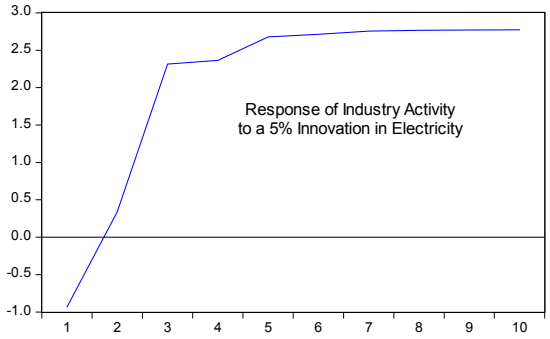
E. Idiosyncratic Shocks and Potential Output: Spillovers from the Electricity Sector

12. **A vector error correction (VEC) analysis is implemented to assess the impact of energy sector developments on the industrial sector**. Since the middle of the last decade, Nicaragua has suffered from electricity shortages, which has limited growth. Using monthly data since 2005, a baseline vector autoregression (VAR) model estimates the relationship between industrial activity and electricity usage as a proxy of energy production. Standard causality tests indicate that the industrial sector is vulnerable to shocks from energy supply and unit root tests also indicate non stationarity in both variables. With this information at hand, a vector error-correction



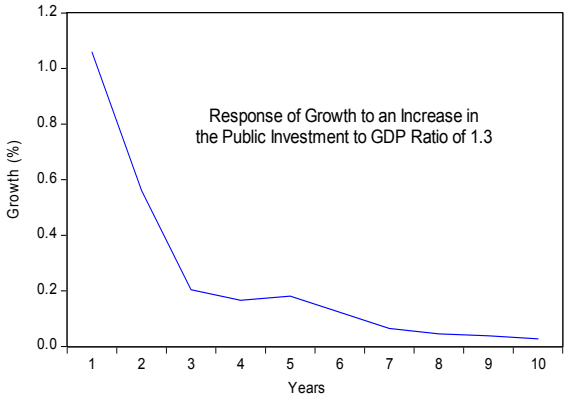
model (VEC) can be estimated and the impulse-response functions for industry activity following a standard shock in the electricity sector can be computed.[4]

13. **An improvement in electric power supply drives industrial production to a significantly higher level**. For instance, an expansion in electricity generation of 5 percent causes a statistically significant increase in industrial production of about 3 percent in the medium term.



F. Growth and Public Investment: how to raise growth with productive investment

14. **A vector autoregression (VAR) analysis is implemented to assess the impact of public investment on growth.** An increase in the public investment-to-GDP ratio of 1.4 percentage points will increase growth by about 1 percentage point in the first year, with the positive effect declining rapidly after three years. Or, a percentage point increase in public investment/GDP will raise growth by about 0.7 percentage point in the short run, with a declining impact in the following years. An important caveat is that this analysis uses historical data (1994-2011), so the expected impact on growth will depend on the quality of past investment. If the quality of future investment is larger, the final growth effect would also be larger and could even be more permanent if public investment unleashes trend productivity gains. The ultimate impact of public investment on growth could also depend on its effect on private investment. If public investment complements private investment, public investment would crowd-in private investment. If public investment is a substitute to private investment, an increase in public investment would reduce private investment, and growth effects of raising public investment would be smaller. Exploratory analysis including private investment rates in the baseline VAR shows neither crowding-out nor crowding-in effects from increases in public investment.



[4] VAR estimated with 2 lags and the Johansen Cointegration test indicates one cointegrating equation.

G. Policies to Boost Growth

15. **Nicaragua's moderate output growth is explained by low productivity growth**. If total factor productivity growth is raised to, say, 1.5 percent a year, potential growth would exceed 5 percent and the poverty rate would be near 20 percent by the end of this decade.

16. **A recipe for higher productivity growth would include better incentives for formal labor contracts, improved education, pro-productivity public investment and better business environment**. Indeed, high informality in Nicaragua lowers incentives to innovation and growth; low education levels limit the types of products and production methods that can be used in the country affecting negatively productivity and growth; and available indicators of business and institutional conditions consistently place Nicaragua in the bottom-third of nations (Chapter 4). To change these structural problems, enforcement of formal labor relations needs to improve. Benefits associated to having a formal job also need to be raised, including by designing flexible social security plans that look more attractive to specific, high-informality groups (e.g. rural workers). Education needs to be geared at forming efficient workers, which may demand a focus on technical education that can be directly applied in the agro industry, manufacturing and key service sectors. Institutional reforms would also help, including strengthening property rights and improving business conditions (for instance, decreasing the number of days to start a business and to obtain construction permits). More broadly, larger investments in electricity production and distribution, and in infrastructure; modernization of the agro industry; broad access to credit and capital markets;[5] and funding for business plans and marketing studies, would help raise productivity (FUNIDES, 2012). Reforms across a broad range of sectors are better-suited to raise growth than piecemeal reforms (Swiston and Barrot, 2011).

[5] Swiston and Barrot (2011) found that sound bank supervision and well-developed securities markets have the largest impact on growth.

Box 1.1. Production Function Approach

The growth accounting exercise assumes a Cobb-Douglas production function with constant returns to scale (CRS) technology $Y_t = A_t K_t^{\alpha} L_t^{1-\alpha}$ where Y_t is output, K_t and L_t are capital and labor services, while A_t is the contribution of technology or total factor productivity (TFP). The labor input is defined as the number of employees in the economy and can be derived using the labor force (LF_t) and the rate of unemployment (u_t) by $L_t = LF_t \cdot (1 - u_t)$. Because capital input is not available, it is generated using a procedure standard in the literature (Estevão and Tsounta, 2010, Epstein and Macchiarelli, 2010, Teixeira de Silva, 2001). Assuming the following law of motion for the capital stock: $K_t = (1 - \delta)K_{t-1} + I_t$ where δ is the depreciation rate and consistent with previous studies is assigned the value of 0.05, while the initial capital stock is computed as $K_0 = I^*/(g + \delta)$. I^* is the benchmark investment (calculated as the average proportion of investment in the total GDP which for Nicaragua: 0.22) while g is the average growth of the economy during the sample period 1994-2011, equivalent to 3.8 percent. Hence, based on these parameters, the initial capital stock is derived by: $K_0 = 0.22 \cdot Y_{1994}/(g + \delta)$. Since TFP is not observable, the usual procedure applies and is computed inverting the technological process from the production function as follows:

$$A_t = \frac{Y_t}{K_t^{\alpha} L_t^{1-\alpha}} = \frac{Y_t}{K_t^{\alpha}\left(LF_t \cdot (1 - u_t)\right)^{1-\alpha}}$$

Now with the TFP series and using the other inputs it is possible to decompose GDP growth in the sample period. In the production function approach, the output gap is computed using the TFP generated from the previous equation, but evaluating the production function using trends for all the variables. The usual procedure to generate trends is applied here (HP filter assuming a smoothness parameter lambda of 100). It is also assumed that the elasticity of labor to output $(1 - \alpha)$ is 0.5 following Harberger (2007).

Box 1.2. Regime-Switching Model

Regime-switching models are created in order to provide a numerical interpretation of the idea that the data generating process for a time series can come from a set of stationary processes with different probability density functions. The actual data is represented by a continuum jumping from one probability density function to another, where each probability density function represents a specific scenario.

Regarding a variable y_t that comes from N alternative and possible states (s_t=1,..., N), and each one represented by its own probability density function $y \to N\left(\theta_{s_t}, \sigma^2_{s_t}\right)$, it is straightforward to define the maximum likelihood function as:

$$f\left(y_t \mid s_t = j, \Psi_{t-1}; \Gamma\right) = \frac{1}{\sqrt{2\pi\sigma^2_{s_t}}} . e^{-\frac{1}{2}\left[\frac{y_t - \theta_{s_t}}{\sigma_{s_t}}\right]^2} \quad , \forall\ j = 1, 2, ..., N$$

where $\Gamma = \left[\theta_1, \theta_2, ..., \theta_N, \sigma^2_1, \sigma^2_2, ...\sigma^2_N\right]'$. The traditional optimization procedure consists in estimating the linear transformation of this expression maximizing its logarithmic function through traditional gradient methods. Assuming *iid* observations for all t=1, 2, 3...., T, the target equation can be represented by the transformation of the maximum likelihood equation using the natural logarithm of the function. With this methodology we can get the probability of being in each of the N alternatives states. In our exercise N is equal to three representing overheating, sustainable growth and recession.

Box 1.3. State-Space Models

The general structure of the model is represented by two blocks of equations which represent the state space system: the measurement and the state equations.

$$y_t = H\mathrm{B}_t + Ax_t + \varepsilon_t^y \quad (1)$$

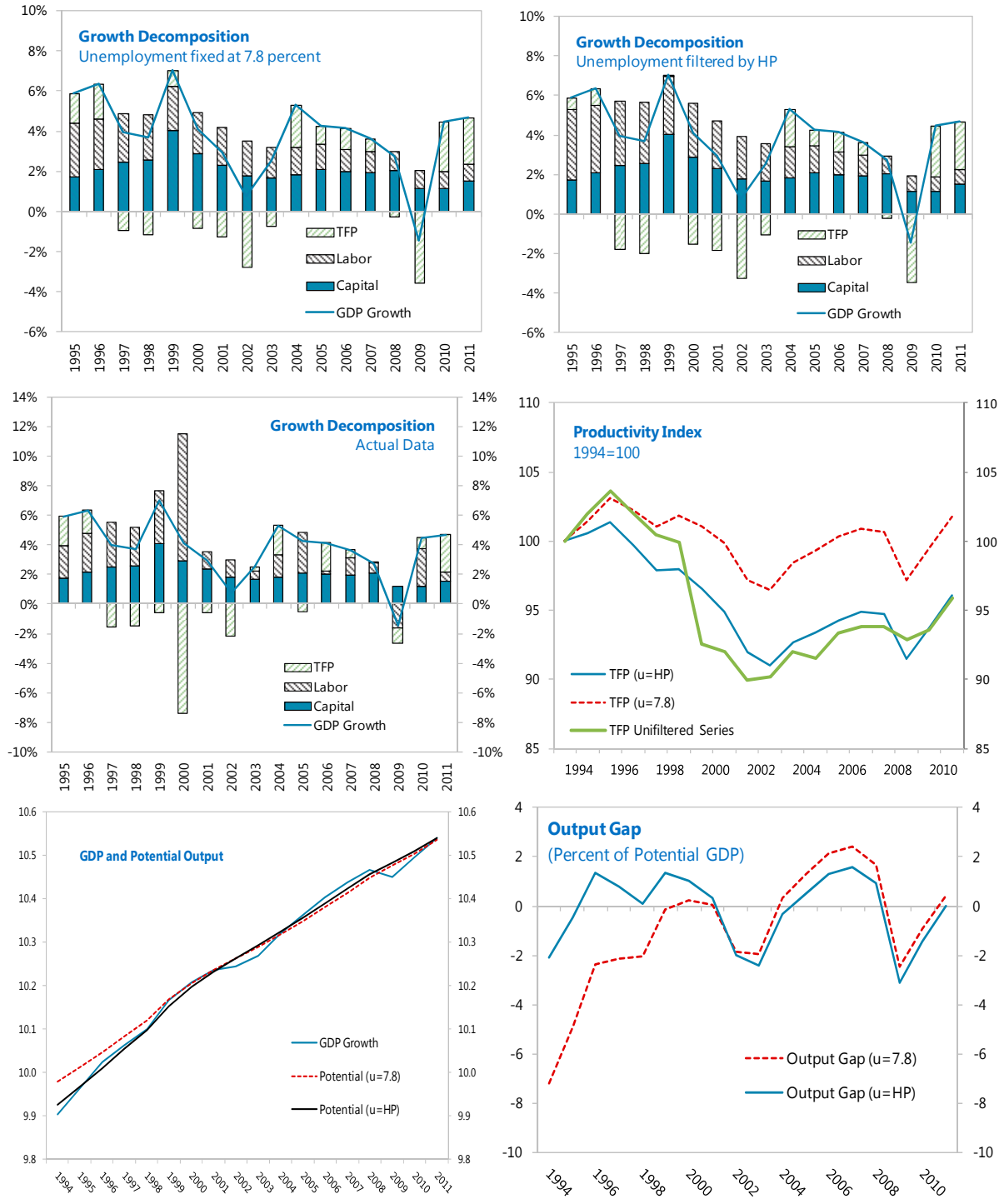
$$\mathrm{B}_t = \Gamma_0 + \Gamma_1 \mathrm{B}_{t-1} + \varepsilon_t \quad (2)$$

Equation (1) represents the dynamic of the measurement variables defined by y_t (log of GDP) explained by a vector of observed exogenous variables x_t, a vector of unobserved state variables B_t and an *iid* error term $\varepsilon_t^y \xrightarrow{iid} N(0,\Theta)$. For one measured variable the variance covariance matrix is defined by the scalar $\Theta = \sigma_y^2 < \infty$ and should be estimated by maximum likelihood procedures (Benes, J. and P N'Diaye, 2004, and Johnson, 2012).

The dynamic of the state variables is represented by the state equation (2). The error term is uncorrelated with the error term of the measurement equation (3), and in general is represented by a data generating process centered in zero, normally distributed, and with a diagonal variance covariance matrix Q: $\varepsilon_t \xrightarrow{iid} N(0,Q)$. In our exercise we use two structures: first. the model with constant drift is defined by: $y_t = y_t^p + ygap_t$, $y_t^p = \bar{\mu} + y_{t-1}^p$, $ygap_t = \rho_1 ygap_{t-1} + \rho_2 ygap_{t-2} + \varepsilon_t^{ygap}$, and second a model with mean reverting process defined by: $y_t = y_t^p + ygap_t$, $y_t^p = \mu_{t-1} + y_{t-1}^p$ $ygap_t = \rho_1 ygap_{t-1} + \rho_2 ygap_{t-2} + \varepsilon_t^{ygap}$, $\mu_t = (1-\beta)\bar{\mu} + \beta\mu_{t-1} + \varepsilon_t^{\mu}$. In both models the potential growth is defines by the coefficient μ, where output is defined by $\{y_t\}$ and the two unobserved state variables, potential output and output gap, are represented by $\{y_t^p, ygap_t\}$ respectively.

The maximum likelihood estimation of the state space representation (1)-(2) is implemented by the Kalman filter. This is a recursive procedure based on two stages: prediction and correction. For prediction we use some prior information on estimates of the parameters Γ_0, Γ_1, H and A, and the variance covariance matrices Θ and Q, while for the correction, we use the posteriors on the estimates and the variance covariance matrix. The Kalman factor uses prior information to generate the posteriors, and this learning procedure is iteratively repeated until all the sample data is analyzed (similar to a recursive estimates procedure).

Figure 1. Production Function Approach: GDP Decomposition and Output Gap



Source: Fund staff calculation.

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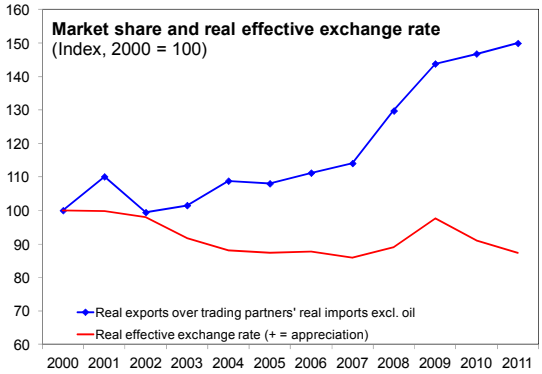
II. External Competitiveness and Exchange Rate Assessment[1]

During the last decade, Nicaragua's external competitiveness has improved steadily, mainly driven by the maquila and manufacturing sectors. Nevertheless, current account deficits continue to be large. Standard models suggest that the real exchange rate is broadly in line with fundamentals, but non-price competitiveness indicators suggest that structural conditions still weigh on Nicaragua's external competitiveness. As external vulnerabilities persist, higher reserve coverage could provide a buffer against external shocks.

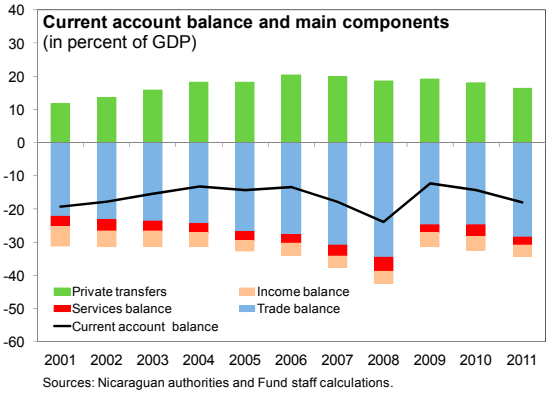
A. Introduction

1. **Nicaragua's external competitiveness has improved steadily since the early 2000s**. Exports as a share of trading partners' non-oil imports have increased sharply, consistent with the observed real depreciation of the Córdoba. While traditional goods (coffee, meat, and other agricultural products) have remained an important part of exports, the maquila and manufacturing sectors have been the sources of export dynamism with a significantly larger presence in the U.S. market. At the same time, foreign direct investment (FDI) has trended up, in particular in the maquila and energy sectors.



Sources: Nicaraguan authorities, IMF, and Fund staff calculations.

2. **Despite these competitiveness gains, current account deficits continue to be large**. Nicaragua has a history of large trade deficits, averaging 26 percent of GDP over the last decade, in part explained by a high dependency on oil imports (on average 14 percent of GDP over the last 5 years). At the same time, Nicaragua has been a large recipient of remittances (around 17 percent of GDP), mainly from the United States and Costa Rica, which mitigates the vulnerabilities coming from the large trade deficits. Still, the country has faced substantial current account deficits, fluctuating between 12 and 24 percent of GDP. These deficits have been financed mainly by official loans and transfers of around 9 percent of GDP and FDI of around 7 percent of GDP. In most years, capital inflows in excess of the current account deficit have allowed for a gradual accumulation in international reserves.



Sources: Nicaraguan authorities and Fund staff calculations.

[1] Prepared by Julia Bersch.

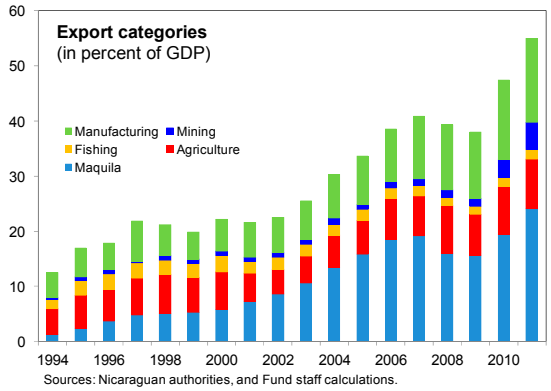
3. **Since 2007, Nicaragua has benefitted from an oil collaboration scheme with Venezuela**. Under this scheme, Caruna, a private credit cooperative, has received long-term concessional financing amounting to one half of the oil bill from Venezuela. These substantive capital flows (around 7 percent of GDP in 2011) have helped to finance large current account deficits and alleviate pressures on international reserves. However, the collaboration scheme is political in nature and could be discontinued at any time. A sudden stop in these sizable flows could be very disruptive for Nicaragua, potentially leading to reserve losses and requiring an accelerated current-account adjustment. There would also be fiscal pressures, as these flows currently finance well-established social programs. Effects on the balance of payments would also depend on the fiscal policy response.

4. **Looking forward, the projected increase in alternative energy generation will gradually improve the current account balance, but vulnerabilities will persist for a while**. Ongoing and planned investment in non-oil generation of energy is expected to reduce Nicaragua's dependence on oil imports over the long run. However, staff projects that the current account deficit will remain large in the meantime, representing a non-negligible risk for Nicaragua's limited international reserve position and its large stock of international liabilities. Given a relatively fixed exchange rate regime (crawling peg) and vulnerabilities to external shocks, the Nicaraguan authorities should aim at increasing the official reserve coverage.

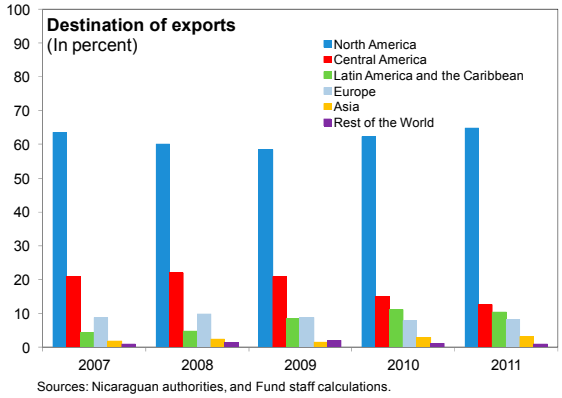
B. Dynamism in the Export Sector

5. **Nicaraguan exports are dominated by maquila and manufacturing exports**. Total exports as percent of GDP have skyrocketed during the last decade, mainly driven by maquila and manufacturing products (Figure 1). Traditional agricultural products still accounted for close to 20 percent of total exports during the last few years, compared with around 45 percent in the early 1990s.

Figure 1. Export Categories and Destination of Exports

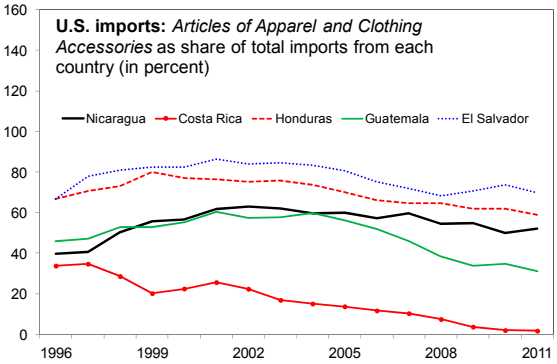


Sources: Nicaraguan authorities, and Fund staff calculations.



Sources: Nicaraguan authorities, and Fund staff calculations.

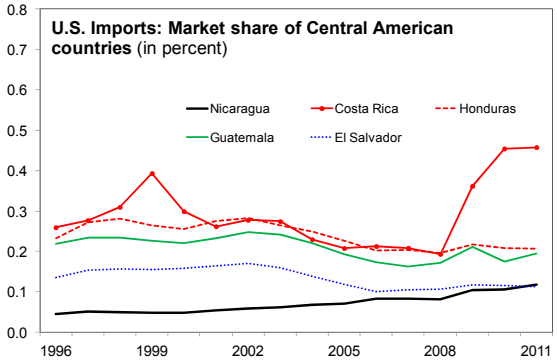
6. **Nicaragua continues to export mainly to North America**. The United States is Nicaragua's main trading partner, accounting for half of the country's exports, followed by Mexico (Figure 1). In recent years, Venezuela has also become an important destination for Nicaraguan exports, while exports to other Central American countries have been losing importance. Exports of some Nicaraguan neighbors have not performed as well, as suggested by a relative reduction in their presence in the U.S. market.



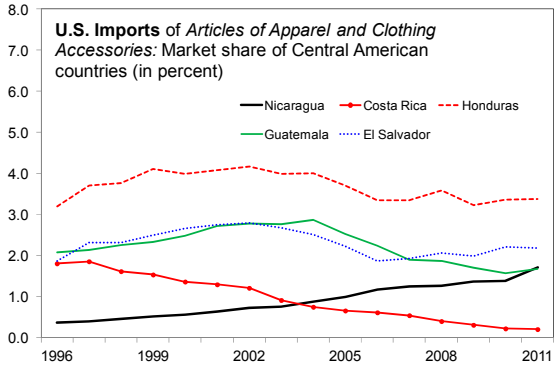
Sources: U.S. Department of Commerce, the U.S. International Trade Commission, and Fund staff calculations.

7. **Maquila exports have been capturing increasingly larger shares of the U.S. market**. Nicaragua was one of only two Central American countries (the other being Costa Rica) to post a continuous increase in its share of U.S. imports, tripling it between 1996 and 2011. For instance, the share in U.S. imports of apparel and clothing accessories (accounting for about two-thirds of Nicaragua's maquila exports and ¼ of its total exports) quadrupled since 1996, while the share of other Central American countries has remained unchanged or even declined (Figure 2).

Figure 2. U.S. Imports from Central America



Sources: U.S. Department of Commerce, the U.S. International Trade Commission, and Fund staff calculations.



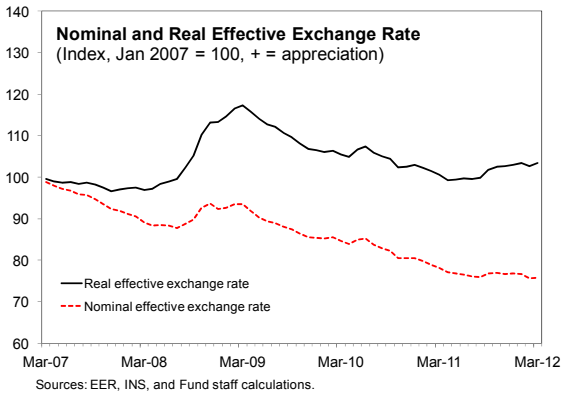
Sources: U.S. Department of Commerce, the U.S. International Trade Commission, and Fund staff calculations.

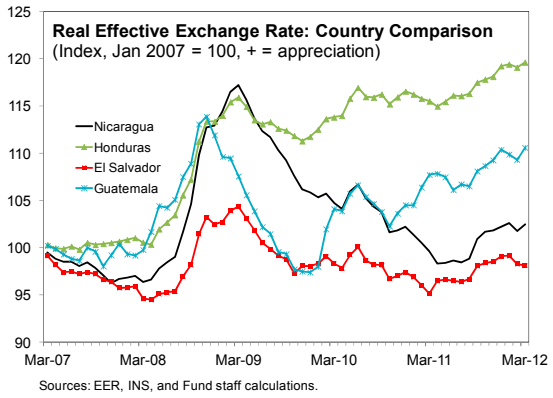
C. Price Competitiveness: Real Exchange Rate

8. **The currencies of Nicaragua's main competitors appreciated in real effective terms vis-à-vis the Córdoba**. In the past four years, El Salvador (a fully dollarized economy) posted a less marked appreciation and depreciation cycle than Nicaragua and ended up at slightly better level of competitiveness (Figure 3). In contrast, by March 2012, the currencies of Honduras and Guatemala were, respectively, 17 and 8 percent above the Nicaraguan Córdoba in real effective terms.

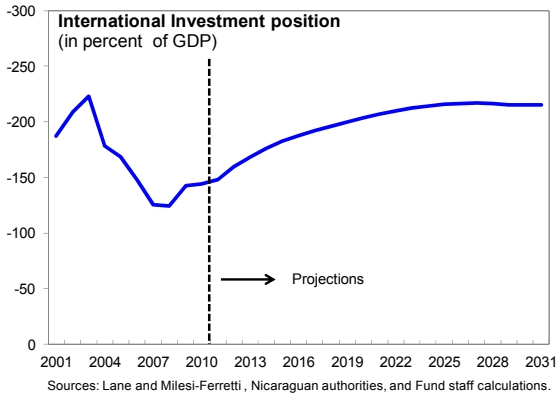
9. **The macroeconomic-balance (MB) approach suggests that Nicaragua's current account deficit is only slightly larger than implied by economic fundamentals**. The MB approach evaluates Nicaragua's current account after correcting for any temporary factor or shock relative to an estimated current account norm. The calculation of such norm is based on panel estimates from Vitek (2012), explicitly taking into account the role of large remittances in Nicaragua. Assuming that only exchange rate changes can deliver a substantial current account adjustment, a depreciation of around 3 percent would be needed to close the gap between the underlying current account and the norm.[2]

Figure 3. Nominal and Real Effective Exchange Rate





10. **The external sustainability approach (ES) also suggests that Nicaragua's real exchange rate is broadly in line with fundamentals**. The ES calculates the current account balance that is needed to stabilize the net foreign assets (NFA) position. To maintain its current international debtor position at 144 percent of GDP,[3] Nicaragua could sustain a current account deficit of 8 percent of GDP, suggesting a small overvaluation of around 5 percent.[4] However, the current large international debtor position entails substantial risks, in particular considering that Nicaragua



[2] This estimate uses the Nicaragua-specific export and import elasticities calculated by Tokarick (2010) of 1.11 and -1.33, respectively. The standard CGER elasticities (Lee and others, 2008) of export and import volumes of -0.71 and 0.92, respectively, yield a higher overvaluation.

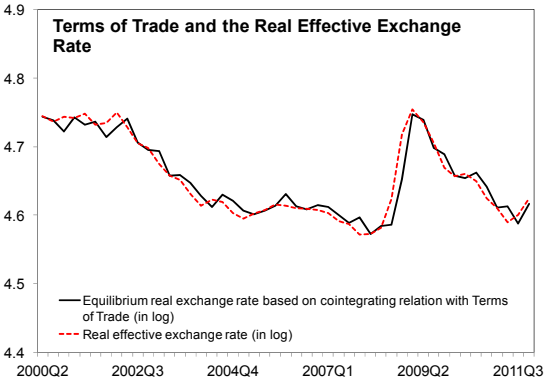
[3] We use the International Investment Position in an updated and extended version of the Lane and Milesi-Ferretti (2007) dataset instead of Net Foreign Assets because the NFA position substantially underestimates external debt by excluding private external debt.

[4] See footnote 2.

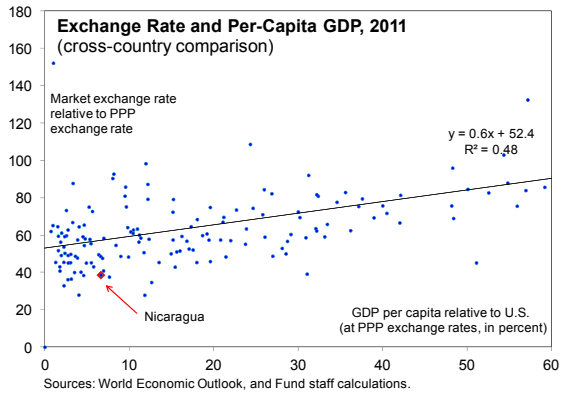
has already benefited from the HIPC/MDRI initiatives and obtained debt relief. Hence, to reduce the NFA position, an even smaller current account deficit seems advisable. The text figure illustrates the path for the International Investment Position that is consistent with staff's baseline current account projections.

11. **Simple exchange rate models suggest that the real exchange rate is either at equilibrium or undervalued**. Nicaragua is a price taker in world markets and hence its terms of trade are exogenously determined. A simple equilibrium real exchange rate model suggests that Nicaragua's real exchange rate is around its equilibrium value (Figure 4). However, accounting for the fact that the real exchange rate tends to appreciate as a country develops and productivity increases (Balassa-Samuelson effect), Nicaragua's exchange rate seems relatively undervalued (Figure 4).

Figure 4. Real Exchange Rate



Sources: Nicaraguan authorities, World Economic Outlook, INS, and Fund staff calculations.



Sources: World Economic Outlook, and Fund staff calculations.

12. **These standard methods send mixed signals about Nicaragua's real exchange rate, but short to medium-term approaches suggest that the Córdoba is broadly in line with fundamentals**. A development focused, cross-country analysis accounting for the Balassa-Samuelson effect suggests significant real exchange rate undervaluation in Nicaragua. However, the MB and the ES approaches suggest that the underlying current account is only somewhat larger than the norms and that some depreciation might be needed to close the gap.

Table 1. Estimates of overvaluation of the Cordoba

Approach	(In percent of GDP)	Over- (+) or Under- (-) Valuation
Macroeconomic Balance		+ 3
Current account norm	-10.2	
Underlying current account	-14.6	
External Sustainability		
Current account norm	-8.1	+ 5
Underlying current account	-14.6	

D. Non-Price Competitiveness: Structural Impediments

13. **Structural conditions still weigh on Nicaragua's external competitiveness**. Looking at business regulations and their enforcement, the World Bank's Doing Business Indicators rank Nicaragua at the bottom half of all countries assessed, even though the country's relative position has improved compared to last year (Table 2). Nicaragua ranks somewhat worse than some of its regional peers, in particular due to low relative rankings on "getting electricity" and "registering property", well-known structural problems of the Nicaraguan economy (see SIP, chapter 3, and the staff report). However, two of its main trade competitors, Honduras and El Salvador, also rank relatively poorly in general.

Table 2. Doing Business Indicators (2012, rank out of 183 countries)

	Ease of Doing Business	Starting a Business	Dealing with Construction Permits	Getting Electricity	Registering Property	Getting Credit	Protecting Investors	Paying Taxes	Trading Across Borders	Enforcing Contracts	Resolving Insolvency
Nicaragua	118	130	150	136	122	98	97	155	83	52	78
Nicaragua 2011	*122*	*121*	*146*	*133*	*151*	*96*	*93*	*158*	*85*	*82*	*80*
Median											
Regional Peers	110	138	123	79	74	48	150	139	71	108	111
Low-income countries	139	112	115	126	120	126	122	110	133	119	126
Regional Peers											
Costa Rica	121	122	141	43	46	98	166	138	73	129	121
Dominican Republic	108	140	105	123	105	78	65	94	45	83	154
El Salvador	112	136	144	130	54	48	166	146	69	66	88
Guatemala	97	165	151	30	23	8	133	124	119	97	101
Honduras	128	150	70	114	94	8	166	140	103	177	131
Panama	61	29	71	15	120	48	111	169	11	119	83

Source: World Bank (2012).

14. **Perceived corruption can also be holding back Nicaragua's ability to compete in international markets**. The Corruption Perceptions Index from Transparency International ranks Nicaragua's perceived public sector corruption, as assessed in opinion surveys and by experts, at the bottom third among the 183 countries covered (Table 3). Moreover, it has deteriorated slightly during the past few years. Nicaragua's score is worse than the median of its regional neighbors, but is comparable to two of its main trading competitors, Honduras and Guatemala.

Table 3. Corruption Perceptions Index (Rank and Score)
(Score ranges from 0 = highest perception to 10 = lowest perception)

	Rank			Score		
Year	**2003**	**2007**	**2011**	**2003**	**2007**	**2011**
Number of countries	133	180	183	133	180	183
Nicaragua	88	123	134	2.6	2.6	2.5
Median						
Regional Peers	68	97	103	3.4	3.1	3.0
Low-income countries	106	123	134	2.3	2.6	2.5
Regional Peers						
Costa Rica	50	46	50	4.3	5.0	4.8
Dominican Republic	70	99	129	3.3	3.0	2.6
El Salvador	59	67	80	3.7	4.0	3.4
Guatemala	100	111	120	2.4	2.8	2.7
Honduras	106	131	129	2.3	2.5	2.6
Panama	66	94	86	3.4	3.2	3.3

Source: Transparency International (2011).

15. **Security and the cost of crime is a concern for businesses in Central America, although Nicaragua scores relatively well in this regard**. The Executive Opinion Survey carried out by the World Economic Forum, ranks the business cost of crime and violence in Nicaragua at the bottom third of the countries assessed. However, Nicaragua scores significantly better than all other countries in the region (Table 4).

Table 4. Business costs of crime and violence
(2011-12, rank out of 142 countries, values from 1=high cost to 7=no cost)

	Business costs of crime and violence 1/	
	Rank	Value
Nicaragua	105	4.0
Regional Peers		
Costa Rica	117	3.6
Dominican Republic	122	3.4
El Salvador	141	1.9
Guatemala	142	1.7
Honduras	137	2.5
Panama	116	3.7

Source: World Economic Forum, The Global Competitiveness Report 2011-12.
Notes: Weighted average for 2010-11. 1/ "To what extent does the incidence of crime and violence impose costs on businesses in your country?" [1 = to a great extent; 7 = not at all]

Table 5. Global Competitiveness Index

Year	2011-12	2010-11
Number of countries	142	139
Nicaragua	115	112
Median		
Regional Peers	85	80
Low-income countries	116	115
Regional Peers		
Costa Rica	61	56
Dominican Republic	110	101
El Salvador	91	82
Guatemala	84	78
Honduras	86	91
Panama	49	53

Source: World Economic Forum (2011).

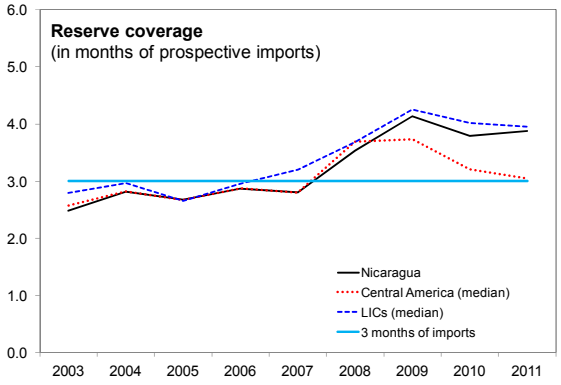
16. **Nicaragua's global competitiveness is low but it is improving**. The World Economic Forum's Global Competitiveness Index, based on a comprehensive assessment of countries' competitiveness, ranks Nicaragua at the bottom third of 142 countries (Table 5). Nicaragua is also ranked lower than any of its regional peers. On the positive side, this survey identifies Nicaragua as having a comparative advantage in a number of goods and labor market efficiency indicators.[5]

E. Adequacy of International Reserves

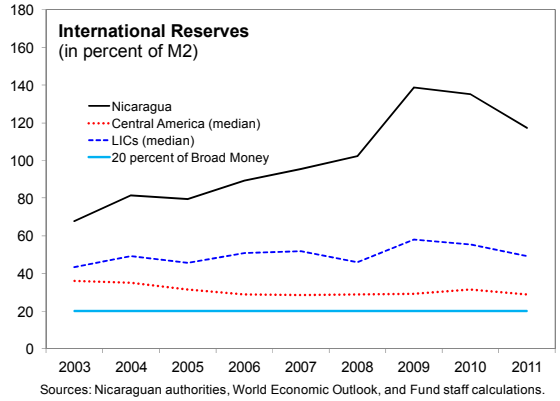
17. **Nicaragua's reserve coverage is above standard rules-of-thumb**. Countries hold international reserves to self-insure against external shocks. In this regard, standard rules-of-thumb assess international reserve levels as appropriate if, for example, import and broad money coverage is above 3 months and 5-20 percent, respectively. In 2011, Nicaragua's gross official reserves reached US$ 1,892 million, bringing reserve coverage to 4 months of prospective imports (excluding maquila) and about 120 percent of M2 (Figure 5).

[5] Nicaragua ranks in the top third in the goods market efficiency indicators "Number of procedures to start a business", "Trade tariffs, % duty", "Imports as percentage of GDP" and in the labor market efficiency indicators "Hiring and firing practices" and "Redundancy costs, weeks of salary". Also, the 2011 government budget balance (as percent of GDP) indicator ranked Nicaragua 22nd of 142 countries.

Figure 5. International Reserve Coverage



Sources: Nicaraguan authorities, World Economic Outlook, and Fund staff calculations.

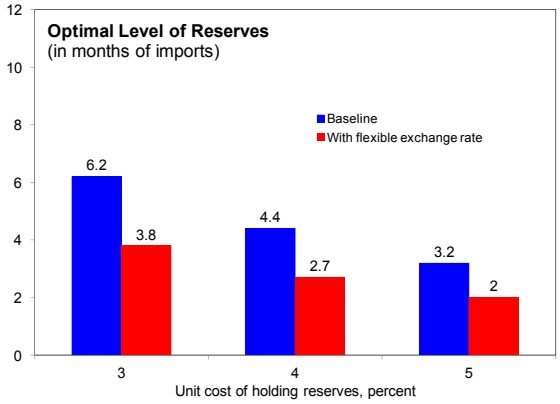


Sources: Nicaraguan authorities, World Economic Outlook, and Fund staff calculations.

18. **The costs and benefits of holding international reserves need to be balanced**. IMF staff has developed a new methodology to assess reserve adequacy in low-income countries (Dabla-Norris, Kim, and Shirono, 2011) that explicitly looks at the costs of holding international reserves (in terms of foregone alternative investment opportunities) compared to their benefits (in terms of crisis prevention and mitigation). This new methodology is used to assess the adequacy of Nicaragua's reserves. The key shock variables (external demand, terms of trade, FDI as a ratio to GDP and aid flows as a ratio to GDP) are set equal to the bottom tenth percentile of their realizations in Nicaragua over the last five years, and the fundamentals (fiscal balances and CPIA[6]) to their 2008-10 average.

Variables	
Balance of the Consolidated Public Sector (percent of GDP)	-2.0
CPIA	3.7
External demand growth (percent)	-1.5
Terms of trade growth (percent)	-3.7
Change in FDI to GDP	-1.4
Change in aid to GDP	-2.7

19. **Nicaragua's reserve coverage could be increased**. The analysis suggests that the optimal level of reserves for Nicaragua varies between 3 and 6 months of imports, depending on the unit cost of holding reserves, compared with 4 months of coverage in 2011. Given a relatively fixed exchange rate regime, Nicaragua needs a higher level of reserves as insurance against external shocks than it would need with a flexible exchange rate, as the exchange rate cannot be used as adjustment mechanism.



[6] The World Bank's Country Policy and Institutional Assessment (CPIA) measures the extent to which a country's policy and institutional framework supports sustainable growth and poverty reduction, and, consequently, the effective use of development assistance.

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III. Lifting a Constraint on Growth: Achievements and Challenges of Nicaragua's Electricity Sector [1]

Adopting a medium-term framework to guide tariff-setting policies is essential to ensure the sector's solvency, attract the needed investment to change the generation matrix, and decrease electricity costs. Successful policies could result in savings in the oil bill in the range of 3– 4 percent of GDP per year.

A. Introduction

1. **By the middle of the last decade, Nicaragua was suffering frequent and unplanned electricity shortages that caused significant economic and social losses and exposed structural problems in the sector**. The problems included insufficient electricity generation capacity, widespread electricity theft, and accumulated crossed arrears between the sector's actors, including state institutions. These problems peaked in 2007, when electricity shortages reached the equivalent of more than 15 percent of domestic generation.

2. **These problems prompted policy makers to act in three different fronts**. First, the government would adjust tariffs to reflect actual generation costs, and it would temporarily subsidize the consumption of disadvantaged neighborhoods, while non-technical losses were reduced; in turn, the private distribution company would undertake an aggressive investment program with the purpose of reducing non-technical losses and improving the quality of service (GON 2009). The government would also enact legislation to strongly penalize electricity theft. Such legislation was passed in 2008, and strengthened in 2010 (GON 2010). Finally, the government would promote investment in electricity generation, in particular from renewable sources.

3. **The policy action produced positive results relatively fast, though the rebound in oil prices since 2010 has resulted in renewed stress on the sector**. Generation capacity increased and shortages were eliminated. Infrastructure improvements in distribution and a stronger legal framework contributed to reduce non-technical losses by about 5 percentage points through 2011. The government and the sector's stakeholders eliminated their crossed arrears, which contributed to more clarity in the sector's balance sheets. However, the large increase in the long-term price of oil (which resulted in increases in generation costs exceeding 70 percent since 2006), combined with still-large (unrecognized) non-technical losses, began to significantly dent the aggregate value of distribution operations. This resulted in renewed crossed arrears among the sector's main agents, while tariff-cost gaps caused an increase in public contingent liabilities.

[1] Prepared by Gabriel Di Bella.

4. **This chapter argues that electricity tariff-setting policies should be underpinned by a medium-term framework**. The chapter describes ongoing challenges facing the electricity sector in Nicaragua, in particular those brought about by higher long-term oil prices. The chapter further concludes that if ongoing challenges are left unaddressed, they could hamper the sector's normal functioning, act as a disincentive for private investment in generation from renewable sources, and leave Nicaragua in a "low equilibrium" of large non-technical losses of distribution and high electricity costs (Di Bella, 2012; Strand, 2011). This, in turn, would constrain economic growth, and hurt Nicaragua's regional competitiveness.[2]

B. Ongoing Challenges: High Oil Prices, Tariff-Costs Gaps, and Unrecognized Distribution Losses

5. **The still-large electricity theft and the significant increase in generation costs present a difficult policy dilemma**. Electricity produced from non-renewable sources (mainly fuel oil) still represents about 70 percent of the total. Moreover, non-technical losses and delinquency represent about ¼ of electricity purchases by the distribution company. Adjusting electricity tariffs upwards to match increasing generation costs and to recognize actual non-technical losses would contribute to preserve the sector's solvency, but would raise the cost of producing goods and services, and the cost of living, thus limiting GDP growth. Keeping the gap between electricity costs (including theft) and tariffs open would provide a short-term cushion to the economy, but, if sustained, would also put the electricity sector's solvency at risk and distort the use of resources in the economy.

6. **Eventually, policy-makers addressed this dilemma by establishing a dual tariff system**. Although, initially, tariff increases lagged and were lower than those in generation costs, since 2011, the regulator began establishing two different tariff schedules. Concretely, "notional" tariffs would reflect the best available annual forecast for electricity generation costs, while "effective" tariffs would be those applied to clients. Any difference between the two tariff concepts would be financed with Venezuela-related resources received in the context of the oil-collaboration scheme. However, non-technical losses of distribution recognized in tariffs continued to lag their actual level.

7. **Although the dual tariff system constitutes a step forward with respect to discretion, the existing gap between notional and effective tariffs may prove difficult to sustain**. The dual tariff system is better than a discretion-based system, as it allows assessing the tariff-cost gap originated in generation costs; moreover, the associated financing flows ease the constraint on electricity distribution's cash-flow. However, the gap between

[2] ECLAC (2010) includes a summary of electricity indicators in Central American countries. In particular, it shows that Nicaragua's generation matrix compares unfavorably with that in other Central American countries. World Bank (2009a, 2009b) summarize cross-country experience in reducing non-technical losses.

effective tariffs and notional tariffs (about 43 US$/MWh in 2011) resulted in a generalized transfer to consumers that (only last year) amounted to about 1.5 percent of GDP.[3] Even though the gap between effective and notional tariffs was reduced at the beginning of 2012, it continues to be significant (about 28 US$/MWh), which would imply an additional 1-percent-of-GDP transfer to final consumers during the year.

8. **The large difference between non-technical losses recognized in tariffs and actual losses further compounds the problem.** Technical and non-technical losses of distribution still represent more than 21 percent of the electricity purchases by the distribution company (about 25 percent when including delinquency), and losses recognized in tariffs amount to only 11.5 percent. While actual losses have been larger than those recognized in tariffs for some time now, the dramatic increase in generation costs have turned such gap into a binding constraint for electricity distribution, and as a result, the sector is again suffering from generalized crossed arrears. Concretely, the large unrecognized distribution losses (plus, at times, payment arrears in the electricity bill of public sector institutions, including SOEs), have caused the distribution company to run arrears with some electricity generators (mainly ENEL and ALBANISA).[4] In turn, electricity generators ran arrears with their fuel supplier, ALBANISA, which finances itself with Venezuela-resources from the oil-collaboration scheme. This adds to the Venezuela-related financing that from 2011 onwards is filling the gap between effective and notional tariffs. In this connection, total cumulated financing from Venezuela to the sector reached an estimated US$ 250 million (about 3.5 percent of GDP) as of end-2011, out of which about 1.5 percent of GDP correspond to arrears with electricity generators.

C. Preserving the Sector's Solvency: Underpinning Policies in a Medium-Term Framework

9. **Preserving the sector's solvency requires tariff policies to be underpinned in a medium-term framework.** If the policy choice is to continue using a dual tariff system instead of recognizing in tariffs, at all times, actual generation costs and non-technical losses, all decisions regarding tariffs should take into consideration the medium-term outlook for a

[3] Even though the distribution company acts as the recipient of the financing, the actual debtors are final consumers. The authorities announced that such financing would be long-term and at zero-interest; they also expressed that lower generation costs would be brought about by investment in electricity generation from renewable sources.

[4] ENEL is the state-owned electricity generation company. ALBANISA, a bi-national company in which PDV Caribe (a subsidiary of *Petroleos de Venezuela SA*, PDVSA) owns 51 percent of the shares and PETRONIC (the Nicaraguan state-owned oil company) owns the remaining 49 percent, produces about 20 percent of electricity and imports about 90 percent of crude and oil derivatives coming into Nicaragua.

range of variables affecting the sector.[5] Failure to do so may result in the sector facing both liquidity and solvency problems. Solvency problems may result in Nicaragua getting stuck in a "low equilibrium" of high electricity generation costs, large non-technical losses and lack of investment in generation from renewable sources.

10. **To illustrate this, Table 1 shows baseline and alternative scenarios for Nicaragua's electricity sector, assuming no further adjustments in effective tariffs**. In addition, the baseline assumes a static generation matrix while the alternative scenario shows the implications of a change in the electricity generation matrix towards renewable sources. Although both scenarios are only indicative, they provide a concrete application of the type of framework that should underpin tariff determination in case the current dual system is kept through the medium-term.[6]

11. **The baseline scenario underscores the need to adjust effective tariffs to avoid unsustainable dynamics in the sector.** Concretely, in case of unchanged policies and a static generation matrix, the debt of consumers and that of the distribution company with generators would keep climbing through the medium term, to reach a combined 12 percent of GDP by the end of the decade. In contrast, changing the generation matrix would allow such debt to stabilize around 2–3 percent of GDP.

12. **Moreover, the contrast between the results of both scenarios highlights the importance of implementing policies ensuring a change in the generation matrix.** While in the baseline scenario notional tariffs and electricity costs continue to climb through the medium term, they significantly decrease in the alternative scenario. The implications for economic growth are clear: while in the baseline scenario the electricity sector's oil bill stays at about 4–5 percent of GDP through the medium term, it decreases to about 1 percent of GDP in the alternative scenario; in other words, a change in the generation matrix would bring about permanent savings in the range of 3–4 percentage points of GDP per year.

13. **These results are sensitive to changes in the assumptions, in particular with respect to the oil price.** Table 2 shows the effect of a 15 percent increase in long-term oil prices, while Figure 1 compares the path for some key variables in the baseline and

[5] These include the expected paths for the price of oil, for technical and non-technical losses of distribution, and for ongoing and prospective investment in generation, among other variables.

[6] The alternative scenario assumes that a number of planned investments in electricity generation from renewable sources become operational during the next five years, involving investment flows for about US$ 2 billion (30 percent of GDP). Concretely, about 102 MW of new geothermal projects, 118 MW of new wind-based projects, 20 MW of new biomass projects, and 266 MW of new hydroelectric projects are assumed to become operational by end-2016. This would increase the share of electricity produced from renewable sources from the current 30 percent to about 75 percent by 2020.

alternative scenarios, and shows the implications of an oil price shock on both scenarios.[7] Given the different electricity generation matrices in both scenarios, the impact of such a change is felt more strongly in the baseline than in the alternative scenario. The obvious conclusion is that going beyond more active pegging of actual tariffs with notional tariffs, a change in the generation matrix would contribute to eliminate one source of macroeconomic vulnerability, namely the negative impact of oil price increases in electricity generation costs. It would also contribute to decrease GDP growth volatility and to increase the competitiveness of Nicaraguan firms.

D. Policy Implications

14. **If investment in generation from renewable sources does not occur, tariff policy should consider the impact of long-term oil price increases on electricity costs as permanent.** In such a case, effective tariffs should be increased so as to match the increase in generation costs, and subsidies should be strictly focused on low-income households. In contrast, if investment in generation from renewable sources is expected to proceed relatively fast and in significant quantities, the adjustment in effective tariffs could lag somewhat the increase in generation costs, as the change in the electricity matrix would bring about a long-term decrease in costs. However, the extent to which notional and effective tariffs can diverge (and the time period in which they could diverge) will depend on the amount of resources available for such a purpose. In the end, the specific timing for new investments in generation from renewable sources, and the impact of such investment in generation costs is subject to uncertainty. Thus tariff-setting policy should be embedded in a medium-term framework that establish procedures to update policy variables, (including notional and effective tariffs, recognized electricity losses, and public transfers to finance the consumption of disadvantaged neighborhoods), should the ex-post paths for the relevant sector variables differ from original assumptions. A framework like this would contribute to anchor expectations, provide clear rules for the sector, and contribute to attract more investment in generation. In short, such a framework would contribute to move Nicaragua to a "high equilibrium" of low generation costs and low non-technical losses. This, in turn, would contribute to lift an ongoing constraint on economic growth.

[7] This is about equivalent to one standard deviation in oil prices for a 10-year period through 2017, as included in the WEO forecast.

Table 1. Nicaragua: Electricity Sector's Medium Term Sustainability

	2011	2012	2013	2014	2015	2016	2020
Baseline Scenario							
Electricity Tariff (US$/MWh)							
Notional	248	260	264	261	261	261	272
Effective	205	223	223	223	223	223	223
Tariff Gap (US$/MWh)	43	36	41	38	37	38	49
Electricity Generation Cost (US$/MWh)	174	183	186	183	181	180	186
Electricity from Non-Renewable Sources (percent of total)	68	66	67	68	70	71	75
Electricity Sector's Oil Bill (percent of GDP)	4.9	5.0	5.0	4.8	4.7	4.6	4.4
Electricity Sector Debt (percent of GDP)	2.9	4.1	5.5	6.7	7.8	8.8	12.1
Transfer to Consumers	1.9	3.0	4.1	5.1	6.0	6.8	10.1
Net Debt to Generators	1.0	1.2	1.4	1.7	1.9	2.0	2.0
Alternative Scenario							
Electricity Tariff (US$/MWh)							
Notional	248	243	230	230	229	201	208
Effective	205	223	223	223	223	223	223
Tariff Gap (US$/MWh)	43	20	7	7	5	-23	-16
Electricity Generation Cost (US$/MWh)	174	168	156	155	153	127	132
Electricity from Non-Renewable Sources (percent of total)	68	54	43	44	43	10	13
Electricity Sector's Oil Bill (percent of GDP)	4.9	4.1	3.2	3.1	2.9	0.6	0.8
Electricity Sector Debt (percent of GDP)	2.9	3.5	3.7	3.9	4.0	3.1	2.4
Transfer to Consumers	1.9	2.4	2.5	2.5	2.6	1.7	1.2
Net Debt to Generators	1.0	1.1	1.2	1.3	1.4	1.4	1.2
Memorandum Items							
Loss Factor recognized in tariffs	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Subsidy for Disadvantaged Neighborhoods (percent)	1.50	0.50	0.00	0.00	0.00	0.00	0.00
Technical and Non Technical Losses of Distribution (percent)	22.0	21.5	21.5	21.5	21.5	21.5	21.5
Transmission Fee (US$/MWh)	6.4	6.5	6.6	6.8	6.9	7.0	7.6
AVD in tariffs (US$/MWh)	50.0	52.7	53.7	54.8	55.9	57.0	61.7
WTI (US$/barrel)	95.0	103.2	103.6	99.7	97.0	95.2	94.2
Spread (Price Fuel Oil No. 6 "Bunker" - WTI, US$/barrel)	-0.1	0.0	0.0	0.0	0.0	0.0	0.0
Real GDP growth (percent)	4.7	3.7	4.0	4.0	4.0	4.0	4.0
US Inflation (percent)	2.0	2.0	2.0	2.0	2.0	2.0	2.0

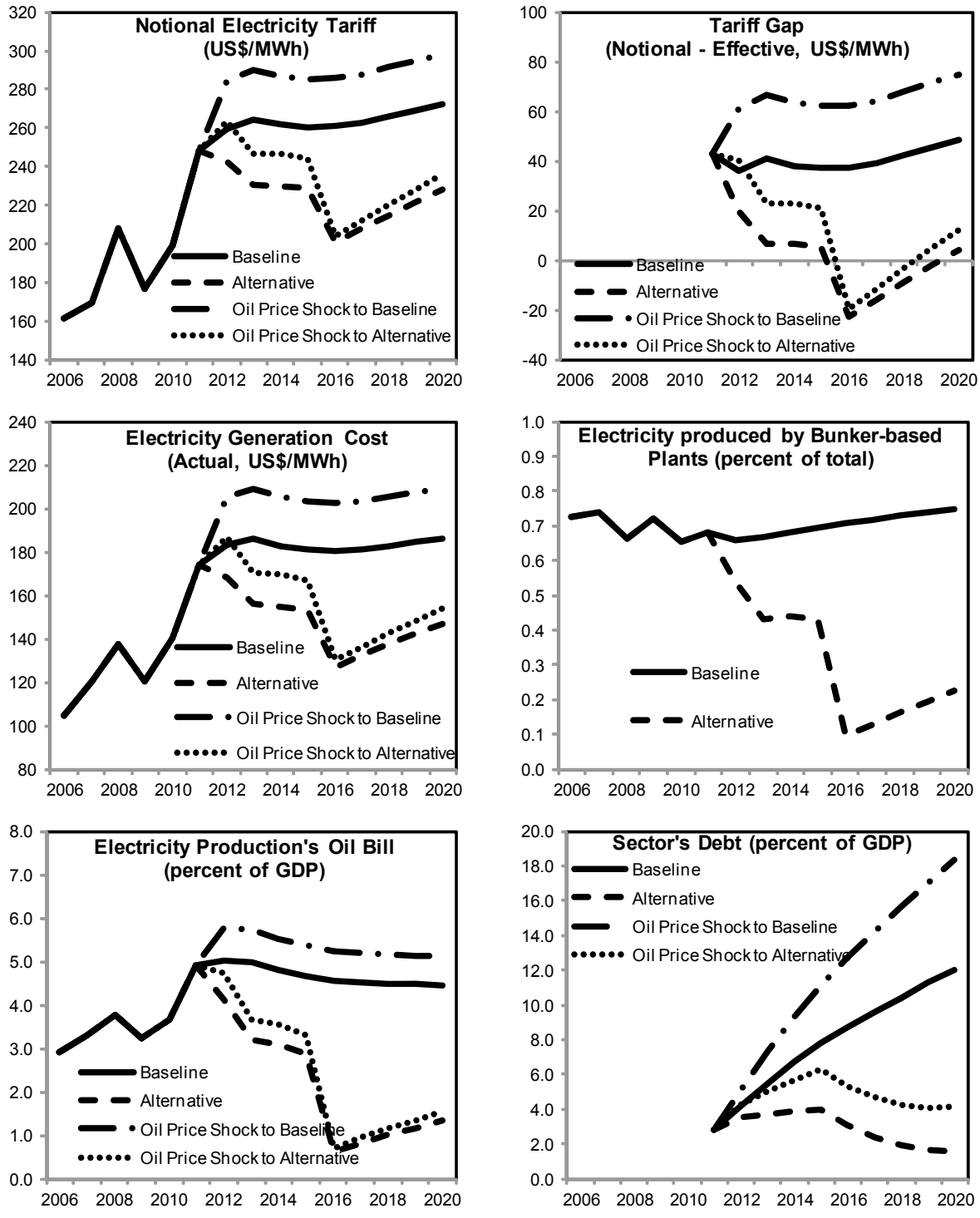
Source: IMF staff calculations

Table 2. Nicaragua: Effect of a 15 percent increase in oil prices on Electricity Sector's Sustainability

	2011	2012	2013	2014	2015	2016	2020
Baseline Scenario							
Electricity Tariff (US$/MWh)							
Notional	248	285	290	287	285	286	298
Effective	205	223	223	223	223	223	223
Tariff Gap (US$/MWh)	43	61	66	63	62	62	75
Electricity Generation Cost (US$/MWh)	174	205	209	205	203	202	209
Electricity from Non-Renewable Sources (percent of total)	68	66	67	68	70	71	75
Electricity Sector's Oil Bill (percent of GDP)	4.9	5.8	5.7	5.5	5.4	5.3	5.1
Electricity Sector Debt (percent of GDP)	2.9	5.1	7.4	9.4	11.2	12.8	18.3
Transfer to Consumers	1.9	3.8	5.7	7.4	8.9	10.3	15.7
Net Debt to Generators	1.0	1.3	1.6	1.9	2.2	2.4	2.7
Alternative Scenario							
Electricity Tariff (US$/MWh)							
Notional	248	264	247	246	244	204	212
Effective	205	223	223	223	223	223	223
Tariff Gap (US$/MWh)	43	40	23	23	21	-19	-11
Electricity Generation Cost (US$/MWh)	174	187	171	169	167	130	136
Electricity from Non-Renewable Sources (percent of total)	68	54	43	44	43	10	13
Electricity Sector's Oil Bill (percent of GDP)	4.9	4.7	3.7	3.6	3.3	0.7	0.9
Electricity Sector Debt (percent of GDP)	2.9	4.3	5.0	5.7	6.3	5.3	4.7
Transfer to Consumers	1.9	3.1	3.6	4.2	4.6	3.7	3.2
Net Debt to Generators	1.0	1.2	1.4	1.5	1.7	1.6	1.5
Memorandum Items							
WTI (US$/barrel)	95.0	118.7	119.1	114.6	111.5	109.5	108.4
Spread (Price Fuel Oil No. 6 "Bunker" - WTI, US$/barrel)	-0.1	0.0	0.0	0.0	0.0	0.0	0.0

Source: IMF staff calculations

Figure 1. Nicaragua: Electricity Sector's Medium Term Sustainability



Source: IMF staff calculations

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IV. Fiscal Consolidation–Issues and Policy Options[1]

Nicaragua's still-high debt, limited fiscal space, and large exposure to external financing argue for fiscal consolidation. This chapter estimates short- and medium-term fiscal multipliers for Nicaragua (controlling for feedback effects from public debt) and use them to assess the impact of different modalities of fiscal consolidation on economic growth. The results show that fiscal consolidation has only a small temporary negative effect on growth in Nicaragua, while it raises medium-term output. Shifting expenditure composition toward capital expenditure would further support long-run growth.

A. Introduction

1. **Nicaragua's high public debt limits the space for countercyclical policies and measures to reduce poverty, but reducing debt could, in principle, hurt growth**. Nicaragua's public debt and spending ratios to GDP are the highest among Central American countries despite the debt relief initiated in 2006. Even though staff has assessed the risks of debt distress in the country as moderate (inter alia, because of its concessional nature), Nicaragua's vulnerability to external capital inflows, contingent fiscal liabilities, and other shocks requires wider policy buffers. But, the process of creating such buffers could hurt growth and limit needed reduction in poverty.

2. **This chapter finds a *positive* long-term effect of fiscal consolidation in Nicaragua on output, more so if this consolidation is based on cutting public spending**. Advanced and emerging market economies are also shown to post better medium-term output effects when fiscal consolidation focuses on spending cuts—a well-known result from recent papers. However, in general, other Central American and low-income countries seem to benefit more from exogenous increases in tax revenues than from spending cuts—an interesting result that requires additional research. As far as staff knows, these are the first set of estimates for the growth-effect of fiscal consolidation in Central American countries using structural VAR techniques.

B. Fiscal Multipliers and Exogenous Fiscal Shocks

3. **A fiscal multiplier is the ratio between output change and an exogenous variation in the fiscal deficit with respect to their respective baseline values**. Past work has shown that the size of the fiscal multiplier depends on the country, time period, special circumstances, and the methodology used to estimate them. Taken as a whole, results suggest a wide range of fiscal multiplier estimates going from -1.5 to 1.5, including instantaneous impact and cumulative effects, suggesting that multipliers can be negative—a phenomenon named "contractionary fiscal expansion." In general, these episodes are marked by a

[1] Prepared by Issouf Samake.

widening of interest rate spreads which affect economic activity negatively despite the initial positive impulse from larger net government demand for resources.

4. **Estimating fiscal multipliers requires isolating fiscal policy shocks from the initial influence of economic conditions**. This so-called "identification issue" arises from the bi-directional causality between government spending or tax revenue, and growth. It has been addressed more successfully recently by a class of models called structural VAR (SVAR). Papers in this tradition also use monthly and/or quarterly data, and institutional information on the timing of fiscal policy decisions to identify exogenous shocks. However, Central American countries do not have such high-frequency information as a group and this chapter develops a way to identify exogenous fiscal policy shock using annual data (see appendix for details).[2]

5. **The proposed method incorporates feedback effects from public debt accumulation and is also applied to data from advanced and emerging market economies**. The inclusion of debt as a ratio to GDP in the estimation (as suggested by Favero and Giavazzi, 2007) allows for attenuating effects from changes in the fiscal deficit. For instance, as public debt declines as a result of a smaller fiscal deficit, interest rates would also decline, thus undoing part of the initial negative impulse. The chapter also compares the results from applying the proposed procedure and data frequency to advanced and emerging market economies with estimates from other recent papers, which validates the new methodology proposed here.

C. Results

6. **Overall, in less developed countries, fiscal consolidation hurts output only in the short-term** (Figure 1). The negative short-term effect is largest for advanced economies (AEs), significant for emerging markets (EMEs), and small for less developed economies—a result consistent with the evidence presented in Ilzetzki, Mendoza, and Végh (2010). The impact multipliers for spending cuts in Central America range from -0.01 (Nicaragua) to -0.44 (Panama). For comparator countries, the multipliers for spending cuts are found to be between -0.01 (HIPCs) and -0.42 (AEs). For the medium term, spending cut multipliers in Central America range from -0.54 (Panama) to 0.43 (Nicaragua) and are positive for poorer economies, although not in emerging markets and advanced economies. On the tax revenue side, the impact multipliers for increase in tax collection in Central America are statistically not significantly different from zero; a result that is shared by some other groups of countries. The cumulative effects of increases in tax revenue are positive for Central American countries (ranging from 0.20 in the Dominican Republic to 0.51 in Guatemala), HIPCs, low-

[2] Contrary to a number of studies on Latin American countries which focus on clusters, the proposed model is tailored for each country to account for their idiosyncratic factors (on monetary, exchange rate, trade, and fiscal policies) as well as vulnerabilities and structural breaks.

income countries (LICs), and sub-Saharan Africa (SSA), but negative for the advanced and emerging market economies, and oil producers.

7. **Fiscal consolidation based on expenditure cuts tends to produce the highest medium-term output effects in advanced and emerging economies, but not necessarily in less developed countries**. Results for advanced economies and emerging markets match the evidence in other papers.[3] Surprisingly, the long-run tax multipliers tend to be higher than expenditure multipliers in HIPCs, LICs, SSA, and oil producers, suggesting that a well-accepted result that fiscal stabilization focused on spending cuts have better growth outcomes may not apply to poorer economies. Such an outcome may be caused by inefficient tax administration in those countries and observed increases in tax revenues may be the result of improved efficiency with little distortive impacts. Most Central American countries appear to have larger tax and spending multipliers in the medium term than other countries with a similar stage of development.

8. **Unlike other Central American countries, in Nicaragua expenditure cuts produce slightly larger medium-term gains in output** (Figure 2). Using current staff's medium-term framework for Nicaragua as the baseline scenario, a 1-percentage-point cut in expenditure in 2012 would reduce output vis-à-vis its baseline value by 0.4 percent in 2012–13 but boost output in 2014–15 by 0.9 percent. Assuming that any extra revenue generated in the medium-term is used to pay down debt, the debt-to-GDP ratio would be 1.9 percentage points below its baseline value in 2014–15. Similarly, a 1-percentage-point increase in tax revenue collection would lower real GDP relative to its baseline by 0.2 percent and boost it by 0.6 percent in 2014-15, bringing the debt-to-GDP ratio to a level 1.8 percent below its baseline value.

9. **Increases in government investment in Nicaragua raise output in the short and in the long run while increases in current spending always hurt output growth**. The impact and long-run multipliers of public investment spending are 0.21 and 0.58, respectively, and that of current expenditure are -0.24 and -0.41, respectively, suggesting the composition of expenditure matters significantly for growth. Government size in Nicaragua has grown steadily during 2004–11 (Figure 2) but the composition of public spending has been skewed toward current expenditure.[4] With Nicaragua's vast infrastructure bottlenecks,

[3] Recently, Ilzetzki (2011) found that government expenditure is more potent in expanding output in high-income countries than in developing countries. On tax, he found that tax multiplier is virtually zero in most countries. However, the exception was developing countries where the tax multipliers range from 0.3 on impact to close to 0.8 in the long-run. See also Ilzetzki, Mendoza, and Végh (2010), IMF (2010), and Perotti (2004 and 2011).

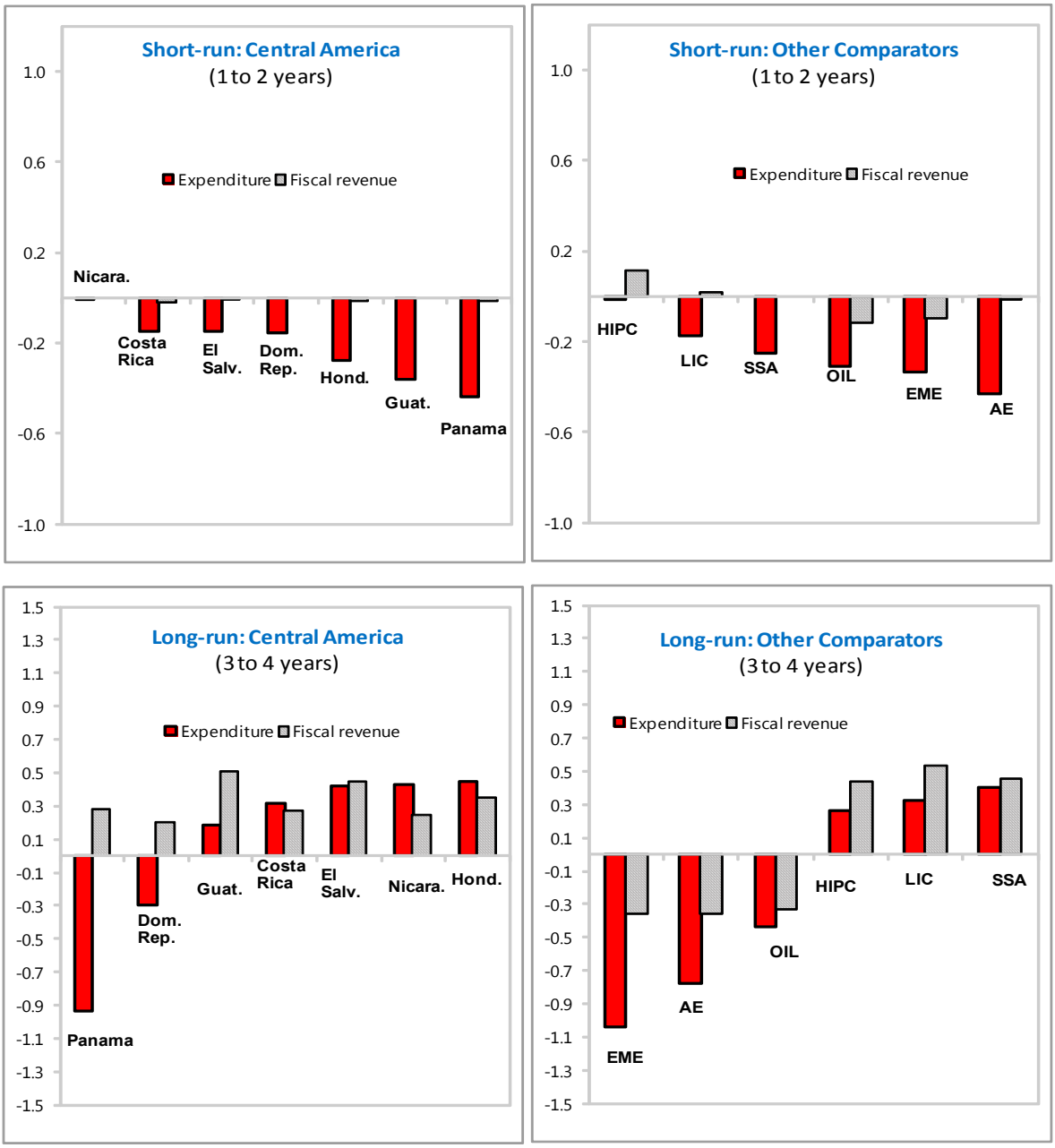
[4] Note, however, that in 2007, the salaries of teachers and service staff from autonomous colleges were reclassified (mostly capital spending) from municipalities to the central government budget (as current spending).

continuation of such a trend could adversely impact medium-term growth potential, which hinges in part, on investments in infrastructure, including for roads and the energy sector.

D. Policy Implications

10. **Nicaragua should continue on a fiscal consolidation path not only to create fiscal space for cyclical and structural policies, but also to raise medium-term output**. The recent international experience has shown the importance of having fiscal space to counteract cyclical shocks. But, even more importantly, Nicaragua's public sector faces many demands for investment and social programs. In this context, a steady path of fiscal consolidation can actually help, in particular if needed capital and social expenditures are preserved (or, even better, increased) in the effort. As the government moves away from excessive operational spending and the stock of debt declines, the results presented in this chapter suggest that output would grow faster. Tax reforms to increase fiscal revenues without burdening particular economic activities and increasing distortions may also be helpful. In addition, keeping current expenditure under control and steadily shifting expenditure composition toward capital expenditure would help support medium-term growth.

Figure 1. Output Effects of 1 Percentage Point Cut in Expenditure or Increase in Tax Revenue–A Structural VAR Approach With Debt Feedback [1/,2/, 3/, 4/]



Source: Authors' estimates.

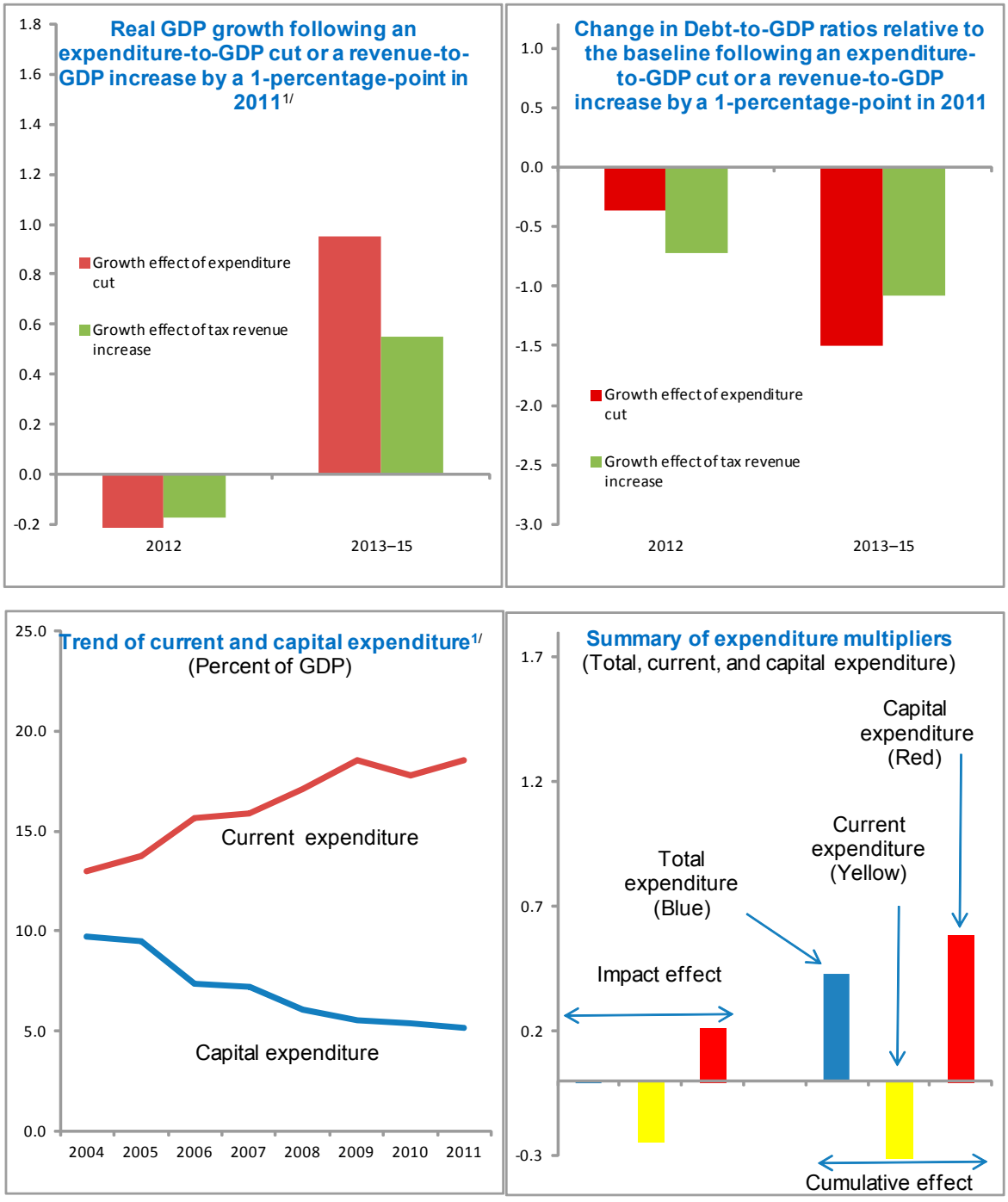
[1/] Response of output growth to a one standard deviation of expenditure and tax shocks, rescaled to output growth response to a 1-percentage-point increase in expenditure and in taxes.

[2/] 95% confidence intervals include zero and (almost always) exclude 1.

[3/] The identification scheme utilizes the institutional assumption (Blanchard and Perroti, 2002) and the Long-run employs coefficient from the system long-run cointegration estimates.

[4/] "Tax revenue" referrers to total tax collection and tax base (perhaps at given tax rates).

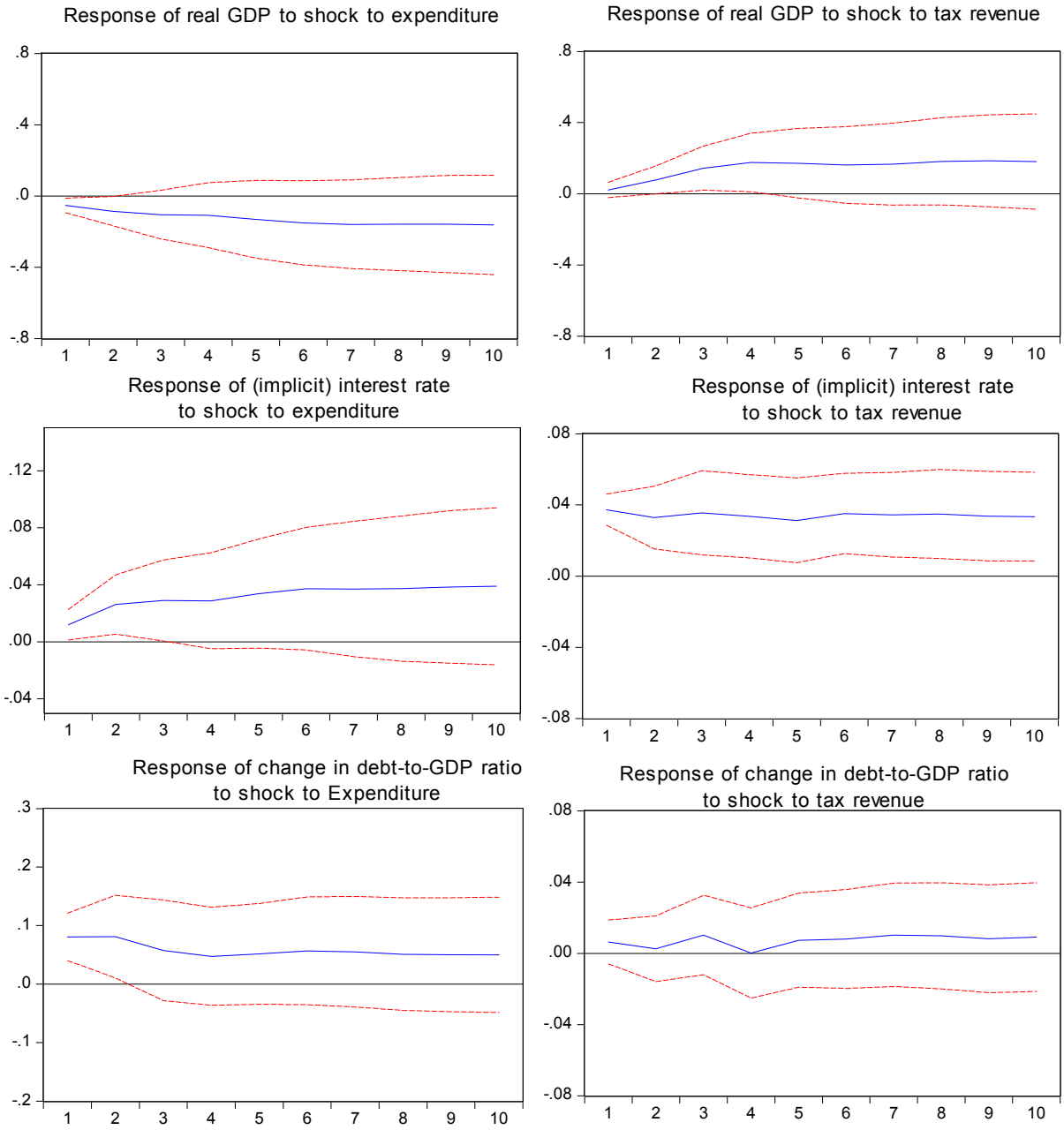
Figure 2. Nicaragua: Effects of Cut in Expenditure and Increase in Tax Revenue



Sources: Nicaragua authorities; and IMF staff estimates.

1/ In 2007, education worker wages was reclassified from capital spending to current spending, which shows that the spike in current spending is offset by the decline in capital spending.

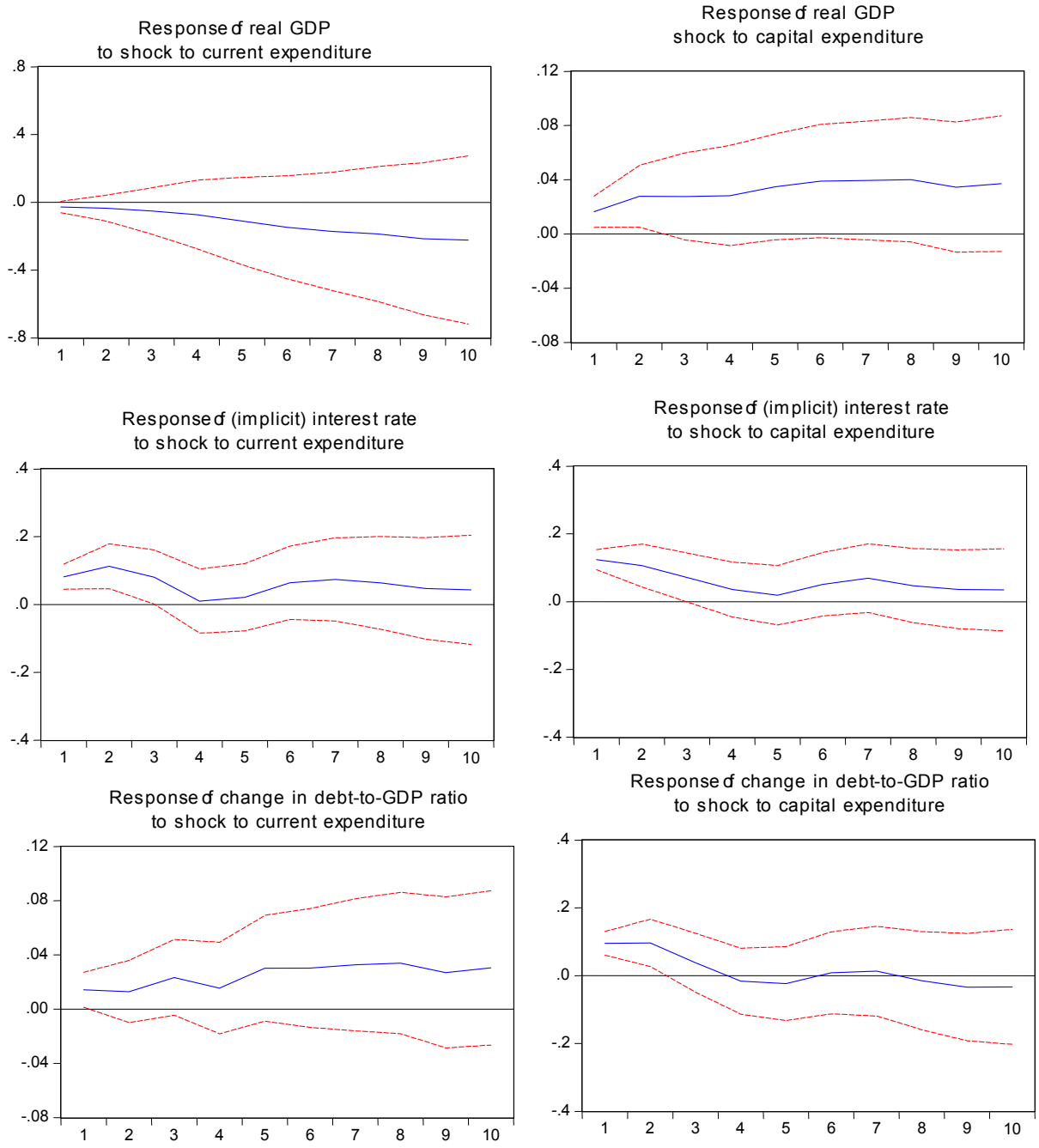
Figure 3. Fiscal Multiplier in Nicaragua
(From structural vector error correction model)



Source: IMF staff estimates.

Note: One standard deviation (70 percent) confidence intervals. Variables are in growth rates and the impulse responses are cumulated and presented for orthogonalized error.

Figure 4. Nicaragua: Fiscal Multipliers of Current and Capital Expenditures
(Structural vector error correction model)



Source: IMF staff estimates.

Note: One standard deviation (70 percent) confidence intervals. Variables are in growth rates and the impulse responses are cumulated and presented for orthogonalized error. "Tax revenue" referrers to total tax collection (perhaps at given tax rates).

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APPENDIX: MODEL SETUP

We nest traditional short-run restrictions and use the long-run properties of the model to introduce cointegrating relationships so that we identify exogenous fiscal shocks (Pagan and Pesaran, 2008). Further, we follow Favero and Giavazzi (2007) which extends the Blanchard and Perotti (2002) and Perotti (2004) SVAR to account for government's budget constraint.

We typically consider the following SVAR model in which the public debt ratio (d_t) enters as exogenous: [5]

$$A_0 Y_t = A(L)Y_{t-1} + F(L)d_t + B\varepsilon_t \qquad [1]$$

The debt ratio, in turn, is determined in the government budget constraint from [1]:

$$d_t = \frac{(1+i_t)}{(1+\Delta p_t)(1+\Delta y_t)} d_{t-1} + \frac{Exp(g_t) - Exp(t_t)}{Exp(y_t)} \qquad [2]$$

Where, following Blanchard and Perroti (2002), the vector of endogenous variables $Y_t = \left[g_t, t_t, y_t, reer_t, i_t \right]'$ includes government spending (g_t) defined as the sum of government consumption and investment (excluding interest payment), net revenue (excluding interest receipt on government debt) (t_t), real output (y_t), real effective exchange rate ($reer_t$), and the yield on government securities (i_t). $\varepsilon_t = \left[\varepsilon_t^g, \varepsilon_t^t, \varepsilon_t^y, \varepsilon_t^{er}, \varepsilon_t^i \right]'$ is the vector of structural shocks to the endogenous variables respectively and $e_t = \left[e_t^g, e_t^t, e_t^y, e_t^{er}, e_t^i \right]'$ is the corresponding innovation. A_0 is the matrix of contemporaneous parameters, L is the lag operator, $A(L)$ is the matrix of the VAR component parameters, B is the structural matrix associated with innovations.

Identification is achieved with assumptions about policy decision lags and estimated elasticity through cointegrating properties. As defined in Banchard and Perotti (2002) and in Perotti (2004), observed fiscal policy reactions (expenditure and tax):

$$e_t^g = \left(\alpha_{g,y} e_t^y + \alpha_{g,er} e_t^{er} + \alpha_{g,i} e_t^i \right) + \left(\beta_{g,g} \varepsilon_t^g + \beta_{g,t} \varepsilon_t^t \right) \qquad [3]$$

$$e_t^t = \left(\alpha_{t,y} e_t^y + \alpha_{t,er} e_t^{er} + \alpha_{t,i} e_t^i \right) + \left(\beta_{t,g} \varepsilon_t^g + \beta_{t,t} \varepsilon_t^t \right) \qquad [4]$$

[5] A pitfall of using standard VAR (or VECM) is the lack of power to measure foreseen changes in fiscal policy (Ramey, 2007; Romer and Romer, 2007).

is function of (i) automatic response of spending/ tax to output, exchange rate, and financial shocks; (ii) systematic discretionary response of fiscal policy to macroeconomic system; and (iii) random discretionary fiscal policy shocks. The relation between the structural shocks and the innovation is thus given by:

$$\begin{bmatrix} 1 & 0 & -\alpha_{g,y} & -\alpha_{g,er} & -\alpha_{g,i} \\ 0 & 1 & -\alpha_{t,y} & -\alpha_{t,er} & -\alpha_{t,i} \\ -\gamma_{y,g} & -\gamma_{y,t} & 1 & 0 & 0 \\ -\gamma_{er,g} & -\gamma_{er,t} & -\gamma_{er,y} & 1 & 0 \\ -\gamma_{i,g} & -\gamma_{i,t} & -\gamma_{i,y} & -\gamma_{i,rer} & 1 \end{bmatrix} \begin{bmatrix} e_t^g \\ e_t^t \\ e_t^y \\ e_t^{er} \\ e_t^i \end{bmatrix} = \begin{bmatrix} \beta_{g,g} & \beta_{g,t} & 0 & 0 & 0 \\ \beta_{t,g} & \beta_{t,t} & 0 & 0 & 0 \\ 0 & 0 & \beta_{y,y} & 0 & 0 \\ 0 & 0 & 0 & \beta_{er,er} & 0 \\ 0 & 0 & 0 & 0 & \beta_{t,t} \end{bmatrix} \begin{bmatrix} \varepsilon_t^g \\ \varepsilon_t^t \\ \varepsilon_t^y \\ \varepsilon_t^{er} \\ \varepsilon_t^i \end{bmatrix} \quad [5]$$

Or in matrix format [5] is: $A_0 e_t = B\varepsilon_t$

From [5], a just identification of [5] would require $\frac{5(5+1)}{2} = 15$ restrictions on the A_0 matrix (left-hand-side of [5]), implying that 5 additional restrictions are needed.

1. We make the assumptions that: $\alpha_{g,i} = \alpha_{t,i} = 0$ [6]

on the ground that interest payments on government debt are excluded from the definition of expenditure and tax that enter the model. Furthermore, the contemporaneous impact of interest rate on tax is generally likely to be small or close to zero (in practice).[6]

2. Next, we consider that the interest rate on government depends on fiscal stance and exchange rate, but (contemporaneously less on output.; thus: $\gamma_{i,y} = 0$ [7]
3. We now need (at least) 2 restrictions. Notice that most studies using high frequency data, have assumed that either ($\alpha_{g,y} = 0$) expenditure or ($\alpha_{t,y} = 0$) tax do not respond to the economic activity within a quarter. Such assumption may not hold for annual data. One can rule out this constraint by dwelling on the statistical properties of the cointegration analysis. Suppose that there is at least one cointegration relation (which is likely to be the case, given that, by construction, all system variables enter in level and generally follow I(1) processes), then one could either estimate the automatic response of tax to change in economic environment or exchange rate movement or the automatic response of government spending to economic or exchange rate shocks.

[6] However, the assumption that tax is inelastic to interest rate change is controversial given that income tax-base includes interest income as well as dividends, which co-move negatively with interest rate.

Assuming that there is evidence of (at least) one cointegrating vector[7], then the structural VECM counterpart of the baseline model [1] is:

$$A_0 \Delta y_t = a\left[\beta' y_{t-1}\right] + A_1 \Delta y_{t-1} + F(L) d_t + B\varepsilon_t \quad [8]$$

where $a = A_0 \alpha$ where α is the loading parameter.[8]

Now let's assume that such cointegration is found between government spending, output growth, and exchange rate, then the remaining two coefficients can be obtained by:[9]

$$\beta' y_{g,t-1} = y_{g,t-1} - \alpha_{g,y} y_{GDP,t-1} - \alpha_{g,rer} y_{rer,t-1} = ECM_{t-1}. \quad [9]$$

Hence, the corresponding SVECM representation of the baseline model is:

$$A_0 \Delta Y_t = a\left[\beta' Y_{t-1}\right] + A_1 \Delta Y_{t-1} + F(L) d_t + B\varepsilon_t \quad [10]$$

And its associated error correction terms with parameters to achieve, at least, a just-identified system is: $y_{g,t-1} - \alpha_{g,y} y_{GDP,t-1} - \alpha_{g,er} y_{er,t-1} = ECM_{t-1}$ [11]

With this estimation, all fiscal shocks are identified and the matrix A_0 can be fully estimated.

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[7] The SVECM representation also hold with mix of I(0) and I(1) system variables. We assume shocks are either temporary or persistent.

[8] The $\beta' y_{t-1}$ is estimated e $\beta' y_{g,t-1} = y_{g,t-1} - \alpha_{g,y} y_{GDP,t-1} - \alpha_{g,rer} y_{rer,t-1} = ECM_{t-1}$

[9] Typically, this would imply that $\beta_{g,g} u_t^g + \beta_{g,t} u_t^t \; or \; \beta_{t,g} u_t^g + \beta_{t,t} u_t^t \sim I(0)$

V. ACHIEVING SUSTAINABILITY: REFORMING THE NICARAGUAN PENSION SYSTEM[1]

The Nicaraguan social security system is unsustainable given its current parameters, and ongoing demographic and macroeconomic trends. Reforming the system is essential for long-term fiscal sustainability. A reform should be based on changing the benefits formula to make it actuarially fair and equitable, gradually raising the retirement age, and increasing the minimum number of years of contributions to qualify for a full pension to 30 years, while limiting increases in contribution rates.

A. Main Issues

1. **The Nicaraguan social security system is unsustainable given its current parameters, and ongoing demographic and macroeconomic trends**.[2] Under the Nicaraguan pay-as-you-go pension system (defined-benefit), revenue and expenditures should be in balance over the long run to minimize fiscal pressures.[3] The retirement age of 60 years; the number of years making contributions (approximately 15) to qualify for benefits; a minimum pension that is high relative to mean wages in the formal sector; and the level of total contributions (24.3 percent to finance pension, health insurance, job training, and occupation risk) constitute an explosive combination that will make the system to turn into deficit by 2015, and its trust funds to be depleted by 2021.[4]

2. **At the request of the Nicaraguan government, an independent consultant carried out an actuarial assessment of the Disability, Old Age, and Survivor Program (**IVM for its initials in Spanish) in 2009.[5] The consultant's proposals to balance the system include: (i) increasing the minimum retirement age; (ii) redesigning the benefit formula; (iii) calculating the contribution rate needed to balance the system; and (iv) reducing labor market informality.

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[1] Prepared by Ricardo Fenochietto; the author is grateful to Gabriel Di Bella, Mauricio Soto, and Javier Kapsoli for their comments and suggestions.

[2] During the last decade, there have been numerous attempts to reform the pension system, often at odds with each other. The attempts include: (i) Law 340 (April 2001), creating the framework for an individual account regime; (ii) creation of a National Advisory Commission (August 2004) that recommended a multi-pillar system with a pay-as-you-go first pillar to protect low-income workers, and simultaneous suspension of the Law 340; (iii) Law 539 (May, 2005) of Social Security, later declared unconstitutional by the Supreme Court, and never implemented. For more details see Gillingham (2010).

[3] Under a defined-benefits system, benefits usually depend on the number of years of contributions and the average covered earnings. Under a defined-contribution system, benefits depend on the contribution history and the returns to these contributions.

[4] This result is obtained under the baseline scenario described in section III.

[5] Troncoso Consulting Group 2009 (TGS).

B. The Current Pension System

3. **Although the system's coverage has increased in recent years, it is still limited**. The number of participants in the system reached about 550 thousand workers by end-2010, equivalent to about 23 percent of the labor force (a 4 percentage-point increase from the 2005 figure). This implies that any proposal to balance the system in the medium term (in particular increasing payroll taxes), should take into consideration their effects on workers' incentives to enter into a formal work relationship. In this regard, total payroll taxes (including health care and others) were more than 24 percent of wages in 2011 (Table 1)[6]– already a significant pressure on labor costs.[7]

4. **The main characteristics of the current pension system are:**

- To qualify for a pension, a worker needs to be both 60 years old, and to have contributed to the system for at least 750 weeks (15 years).[8]

- The minimum pension cannot be lower than the minimum wage (more than 75 percent of pensioners receive the minimum pension). Pensions over this minimum are adjusted every year on November 30th according to the annual exchange rate crawl (5 percent). These two factors impact negatively the financial statement of the *Instituto Nacional de Seguridad Social* (INSS).[9] In turn, the maximum benefit that a pensioner can receive is US$1,500 a month.

Table 1. Nicaragua Payroll Taxes

	Worker	Employer	Total
Pensions 1/	4.0	7.0	11.0
Occupational risks		1.5	1.5
Health	6.0	2.3	8.3
War victims		1.5	1.5
Job training		2.0	2.0
Total	10.0	14.3	24.3

Source: Prepared by IMF staff based on Nicaraguan Legislation

1/ Disability, Old Age, and Survivor Program (IVM)

- The dependency ratio is expected to increase: while in 2009 it was 0.17 (six workers financed one pensioner), under the government's baseline scenario it will raise to 0.25 by 2020 (four workers will finance one pensioner).

[6] This level is somewhat lower than the international average, which shows high dispersion. For instance, Argentina, Brazil, Mexico, Russia, Colombia, and Venezuela have higher rates.

[7] The INSS administers all contributions except those for job training.

[8] Teachers and miners can retire when they reach 55 years of age if they contributed for at least 15 years. For disability pensions, workers must be certified as disabled, be younger than 60 years of age, and have at least 150 weeks of contributions.

[9] While the INSS manages Nicaragua's social security system, there are two additional special social security programs, one for the armed forces (administered by the *Instituto de Previsión Social Militar*) and another one for the national police (administered by the *Instituto de Seguridad Social y Desarrollo Humano*).

- Benefits have grown faster than wages in recent years: while the average reported wages grew at a nominal annual rate of about 9 percent, average pensions rose in excess of 12 percent a year over the last decade.

- The formula used to determine the level of benefits includes two factors: a base (or fixed) factor and a factor of weeks worked in excess of 150 weeks (see Appendix A). The current system aims at being progressive by paying a minimum wage for all low income pensioners; however, it is also inequitable, particularly because the formula does not give adequate weight to the number of years of contribution by pensioners (Table 2). For instance, low-wage workers who have contributed for 17 years receive the same benefit as low-wage workers who have contributed for 32 years or more.

- The INSS surplus of recent years was invested in its majority in government bonds, a way of financing the cost of current government consumption. As social security accounts turn into deficit, (and the trust fund begins to be depleted), the government will be forced to eventually raise taxes on citizens to pay the bonds.

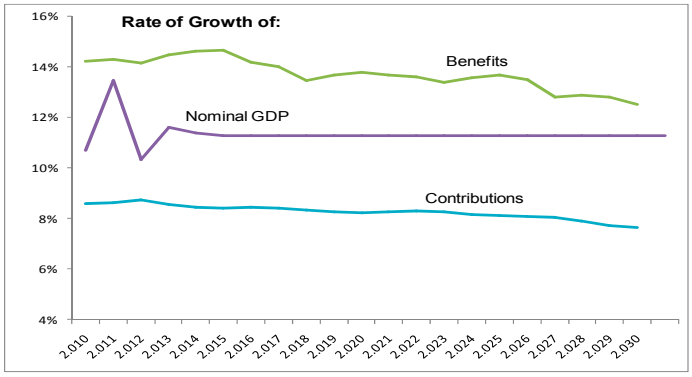
C. The Baseline Scenario[10]

5. **The baseline scenario main assumptions include:**

- The rate of growth of total contributions (separated between the rate of growth of the number of participants and of per capita contributions) and benefits are lower than that of the nominal GDP (Figure 1). The rate of growth in the number of participants is assumed to follow the projected growth in the labor force, which increases rapidly in the near future and moderately over the long term. The underlying demographic trends are closely aligned with those of the United Nations.

- The average wage (in nominal terms) grows at a rate that oscillates between 0.75 and 11.5 percent across age brackets and gender in 2008. In turn, the minimum wage and nominal GDP are assumed to grow at higher rates than those of the average wage (about 10 and 11 percent a year, respectively).[11] The final results under the baseline scenario are very sensitive

Figure 1. Rate of Growth of Benefits and Contributions under the Baseline Scenario and of Nominal GDP



Source: prepared by IMF staff with data from basic actuarial assumptions of the actuarial report.

[10] The baseline refers to that included in TCG (2009).

[11] Between 2000 and 2008, the average reported wages subject to social security contributions grew at an annual rate of 9.1 percent. Data suggest that reported wages decline as workers reach their late 50s and early 60s.

to these assumptions, in particular the magnitude of minimum wage increases with respect to average wage growth, as the minimum pension is set equal to the minimum wage.

- The nominal annual rate of return on trust fund assets is assumed to remain constant throughout the period of analysis at 6.5 percent a year.

- The assumed operational cost is 1.2 percent of total contributions (4.2 percent of the INSS total administrative cost in 2010, including the health system). This cost is similar to that of private-pension administrators in Latin American countries.

D. The Proposals under Consideration[12]

Changing the Benefit Formula

6. **Changing the benefit formula contributes to achieve actuarial solvency**. In this connection, TCG (2009) proposes a modification of the formula to incorporate three factors: a base multiplier (between 1 and 0.1); a general base factor; and, an accrual-based factor on years of service: 0.01 per each year of contribution (see Appendix A).

7. **The proposed benefit formula would increase progressivity**. While under the current system the ratio of benefits to final salaries between high-wage workers and low-wage workers with seventeen years of paid contributions is 0.50, under the proposed new formula the ratio would be 0.27 for workers with fifteen years of paid contributions (Table 2).

Table 2: Ratio of Pension Benefit to Final Salary

Final Payment to Minimun Wage	Current formula		Consultant's Proposal /1	
	Number of years of participation in the program		Number of years of participation in the program	
	17	32	15	30
1	100.0	100.0	80.0	95.0
2	56.8	79.3	56.0	71.0
4	50.0	69.4	41.0	56.0
6	50.0	69.4	34.5	49.5
10	50.0	69.4	21.5	36.5
10 to 1	0.50	0.69	0.27	0.38

Source: prepared by IMF staff with data from tables 4 and 6 of the actuarial report, Troncoso Group (2009)

1/ Base multiplier = 0.65 and acrual factor = 0.01

8. **Moreover, the proposed formula would reduce benefits, in particular, for those with fewer years of contributions**. Table 3 shows that the application of the proposed formula would reduce benefits, but that such reduction would be inversely related to the

[12] The proposals described in this section refer to those included in TCG (2009).

number of contribution years. This provides a stronger incentive for workers to join and remain in the system. Moreover, the requirement that the minimum benefit be equal to the minimum wage is eliminated.

Table 3. Percentage of Benefit Reduction under the TCG, 2009 Proposal

Final Payment to Minimum Wage	Number of years of participation in the program			
	7	17	32	37
1	-28.0	-18.0	-3.0	2.0
4	-17.7	-14.0	-16.4	15.5
6	-33.9	-27.0	-25.7	-24.2
10	-66.3	-53.0	-44.5	-41.6
10 to 1	2.4	2.9	14.8	24.8

Source: prepared by IMF staff with data from table 8 of TCG (2009).

TCG proposal includes base multiplier = 0.65 and acrual factor = 0.01.

Changing other Parameters

9. **Other, not mutually exclusive, alternatives could also contribute to balance the system in the long run**. In this regard, TCG (2009) includes the following proposals: increasing retirement age to 65 years; limiting the annual increase of benefits to that of the minimum wage, and minimum wage increases to 5 percent a year; and increasing the number of participants.[13]

10. **Table 4 shows the contribution rate needed to balance the system under different reform assumptions.** These estimates assume that, the minimum and average wages will grow at similar rates; and, that there will not be any labor market response to higher payroll taxes. Increases in contribution rates are not too high only if the proposed new formula is implemented. Moreover, increasing the participation rate would only temporarily improve the financial situation of the INSS: once new entrants begin to receive benefits, the improvement is reduced until it disappears, as each new participant adds to the system's liabilities.

[13] The increase in the number of contribution years to qualify for benefits is implicit in the consultants' proposed formula, because it increases the minimum required contribution period for receiving full pension to 30 years.

Table 4: Government Options: Rate of Contributions to Balance the System

	Option	Rate
1	Current law.	24.7%
2	Current law, 25% more new entrants.	23.3%
3	Current law, 25% more entrants, and increasing cap on taxable earnings.	23.5%
4	Current law, increasing retirement age to 65 and cap on taxable earnings	17.5%
	With the new formula	
5	New formula with 65 base, 1%/year accrual, retirement age at 65 and increasing cap on taxable earnings with 25 percent more new entrants.	14.3%
6	New formula with 65 base, 0.5%/year accrual, retirement age at 65 and increasing cap on taxable earnings.	13.15%
7	New formula with 65 base, 0.5%/year accrual, retirement age at 65 and increasing cap on taxable earnings with 25 percent more new entrants.	12.15%

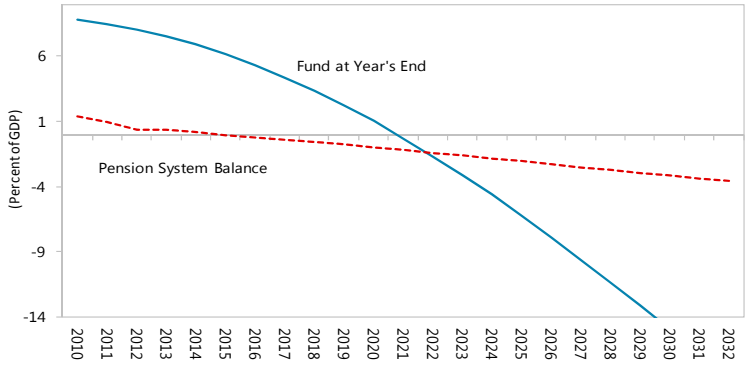
Source: prepared by IMF staff with data from table 11 of the actuarial report.

E. Policy Implications and Staff's Views

11. **Reforming the system is essential to limit the government exposure to contingent liabilities.** Figure 2 shows how, under the baseline scenario described above, the pension system's balance turns negative in 2015, and reaches a deficit of about 1.5 percent of GDP by 2022.

Figure 2: Current System: Fund Year's End and Pension System Balance

Percent of GDP



Source: prepared by IMF staff with data from TCG (2009): basic actuarial assumptions.

12. **The reform should consider using different instruments to address each of the causes of the system's financial problem**. However, as pointed out above, contribution rate increases should not jeopardize efforts to reduce labor market informality. A more balanced strategy could contemplate the following options:

- **Adopting a new benefit formula**. A formula similar to that in TCG (2009) could be implemented with an accrual-based factor of 1 percent per year of contribution, but with somewhat less progressivity through a slighter reduction of the base multiplier when earnings increase (see Appendix A). The progressivity of the formula in TCG (2009) leads to some very low internal rates of return on contributions for higher-income workers, which could discourage their participation in the system.[14]

- **Gradually increasing the retirement age to 65 years**. The average life expectancy at retirement grew in Nicaragua from 18.7 (1995-2000) to 21.1 years (2005-2010),[15] therefore, it is reasonable that the retirement age also increase. By increasing labor earnings, raising retirement ages can also boost the growth of real consumption, even in the short run. Increasing the retirement age would also help avoiding even larger cuts in replacement rates than those already legislated.[16] The gradual increases in retirement ages should not have substantial adverse effects on unemployment in the short-run. In addition, there is little evidence that increasing labor force participation of the elderly would increase the aggregate unemployment rates in the long run (IMF, 2011).

- **Increasing the minimum number of years of contributions to qualify for a full pension to 30 years**. The current minimum contribution requirement of 15 years is too low compared with regional averages (one of the lowest among Latin American Countries, Table 5), considering the population's average life expectancy at retirement (21.1, according to the United Nations – Population Division), and that survivors also receive benefits.

[14] For instance, a male retiring at age 65 with 35 years of services and average earnings equal to 10 times the minimum wage might expect to get an internal rate of return of -0.7 percent per year with the supplemental replacement rate of 1 percent and a total contribution rate of 14.3 percent (IMF, 2011).

[15] Source: United Nations – Population Division. Average life expectancy at birth was in Nicaragua 73.0 in 2010 (71.4 for men and 77.5 for women).

[16] The most common measure to compare preretirement and postretirement income levels is the "replacement rate": the result of dividing retirement income by working income.

Table 5. Number of Months of Contributions to Qualify for Benefits	
Nicaragua	**175**
Venezuela	175
Honduras	180
Guatemala	192
Panama	216
Colombia	280
Paraguay	292
Mexico	292
Costa Rica	300
El Salvador	300
Argentina	360
Dominican Republic	360
Ecuador	360
Uruguay	360
Average without Nicaragua	**282**

Source: US Social Security Administration. Social Security Programs Throughout the World: The Americas, 2011.

- **Workers who contributed less than 30 years would not receive a full pension, but a pension proportional to years of contribution.** Allowing some pension proportional to years of contribution would benefit some temporary workers (such as in the agricultural sector) where contribution years are usually lower than that of workers in less seasonal or temporary occupations. It also helps women, who often drop out of the labor force or work part-time in childbearing years, thus facing obstacles to contributing fully for thirty years.

- **Delinking minimum pensions from the minimun wage**. In particular, considering that nearly half of the workers report earnings less than two times the minimum wage (TCG, 2009), the current link makes the system financially unsustainable.

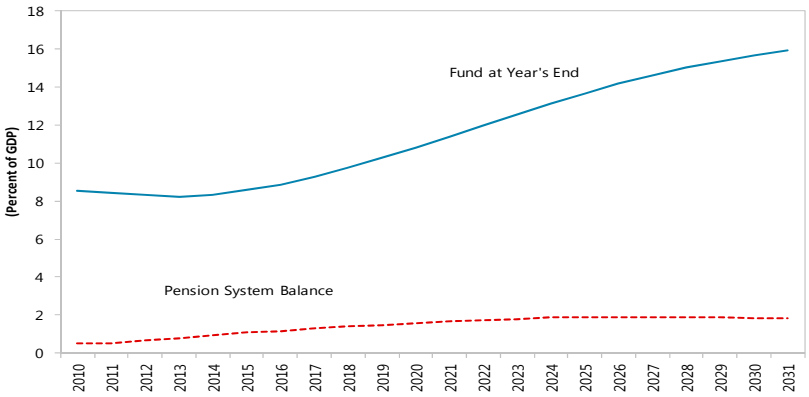
- **Redoubling efforts to reduce labor market informality**. Participants into the system could increase at rates higher than those assumed. In this connection, TCG (2009) assumes the growth rate of contributors to the system to be 4 percent in 2012 (and declining through the medium term), while the actual rate during the last few years averaged about 7 percent yearly. Even though, a faster reduction in informality would not directly improve the financial situation of the system in the long run, it would improve it temporarily in the short-term, allowing more time to gradually implement needed reforms. Of course, lower informality would help the sustainability of the pension system in the long run by raising total factor productivity (Chapter 1 of this Selected Issues Paper).

- **Expanding and diversifying INSS portfolio of investment by considering other alternatives than that of government bonds**, with the aim of increasing its financial income and deepening Nicaragua's capital market. Under this scenario and taking into account the recent levels of investment income of INSS, staff assumes an 8.5

percent nominal annual rate of return on assets, instead of the 6.5 percent assumed in the actuarial report.

Figure 3. Fund at Year's End and Pension System Balance Under Staff Alternative Scenario

Percent of GDP



13. **Last but not least, reforms should start by separating clearly the IVM system from the health care accounts**. IVM contributions only represent about than half of the funds administered by the INSS. While each branch has a separate accounting of funds, there is no legal restriction to shifting reserves across branches. A reform of the IVM system should occur within a general INSS reform that legally and operationally splits pension and health care functions. This would allow creating separate trust funds and establishing rules that would guarantee the internal viability of each of the two branches.

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APPENDIX: CURRENT AND PROPOSED FORMULAS TO DETERMINE BENEFITS

Current formula

A summary version of this formula can be written as:

$$B = [BF + (0.01591 * FWW)] * BMW$$

Where,

B = amount of pension.
BF = the base factor which is not significantly different for lower-paid workers (whose final average wages are less than two times the minimum wage), 0.45, and higher-paid workers, 0.40.
BMW = the basic monthly wage: the average wage of the last number of weeks worked (100; 200; or 250 weeks, depending of the number of weeks worked).
FWW = factor of weeks worked in excess of 150 weeks = (number of weeks worked – 150) / 50

Proposed formula in TCG (2009)

$$B = BM * GBF * AER + (0.01 * NY * AER)$$

Where,
B = amount of pension.
BM = base multiplier, between 1 and 0.1, inversely related to the level of earnings, which is reduced when the ratio of final payments to the minimum wage increases.
GBF = general base factor. For instance, if a worker's final pay is twice the minimum wage and the general base factor is 0.5, she/he receives a benefit of 0.36 percent of his final pay or 0.72 percent of a minimum wage.
AER = average earnings at retirement
NY = number of year of contributions. For instance a worker who contributes 20 years will receive a 20 percent supplementary benefit.