



# NICARAGUA

## SELECTED ISSUES

June 2017

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## SELECTED ISSUES

June 8, 2017

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# NICARAGUA'S SOCIAL SECURITY SYSTEM: PATHWAYS TO SUSTAINABILITY<sup>1</sup>

Nicaragua's social security system (INSS) is projected to run out of liquid reserves by 2019, several years earlier than anticipated. To avoid burdening the budget, reforms to the system are urgently needed. This note examines the causes of the imbalances and focuses specifically on reform options for the IVM pension system.

## A. Background and Regional Context

### System Overview

**1. Nicaragua's social security system provides pension, disability and healthcare benefits to its members.** There are several components to the system, which is managed by the Nicaraguan Institute of Social Security (*Instituto Nicaragüense de Seguridad Social* or INSS). The pension system (known as *Invalidez, Vejez y Muerte* or IVM) is a defined benefit, pay-as-you-go system, which provides pension, disability and survivor benefits. Additional INSS programs include health insurance (*Enfermedad-Maternidad*), occupational risks (*Riesgos Profesionales* or RP) and disability and survivor benefits for victims of the civil war (*Víctimas de la Guerra* or VG). Beneficiaries of occupational risks civil war-related disability and survivor benefits will typically shift to receiving an IVM pension once they reach age 60.

**2. Benefits are financed by mandatory employer and employee contributions, as well as interest revenue from the INSS reserve fund.** All formal private sector and most public sector workers are eligible to participate in the INSS.<sup>2</sup> Contributors can opt only for the pension and occupational risks insurance (*Régimen de IVM-RP*) or they can add health insurance as well (*Régimen Integral*). Self-employed workers may contribute voluntarily (*Régimen Facultativo*), and may choose to be covered for both pension and health care benefits (*Régimen Facultativo Integral*) or pension benefits only, at a lower contribution rate (*Régimen Facultativo IVM*).

**Table 1. INSS Current Contribution Rates**  
(Percent of pensionable salary)

	Employer	Employee	Govt	TOTAL
Regimen Integral				
Health insurance	6	2.25	0.25	8.5
Pension (IVM)	10	4		14
Workplace-related disability	1.5			1.5
War victims	1.5			1.5
TOTAL - Regimen Integral	19	6.25	0.25	25.5
Regimen Facultativo Integral		18.25		18.25
Regimen Facultativo IVM		10		10

Source: INSS

<sup>1</sup> Prepared by Rosalind Mowatt. Helpful comments and inputs were provided by Mauricio Soto (FAD) and Vimal Thakoor (AFR).

<sup>2</sup> As of end-2016, the INSS had about 857,000 active contributors. There are two other social security systems in Nicaragua, one for the military and one for the police, firefighters, and prison employees. There is no published data on these systems and, unlike the INSS, they are not included in public sector accounts.

**Table 2. INSS Revenue and Expenditure, 2012-16**  
(Percent of GDP)

	2012	2013	2014	2015	2016
<b>Revenue</b>	<b>4.8</b>	<b>5.1</b>	<b>5.3</b>	<b>5.5</b>	<b>5.9</b>
<i>Old-age pensions (IVM)</i>	2.2	2.4	2.6	2.9	3.1
<i>Healthcare</i>	1.6	1.7	1.7	1.7	1.8
<i>RP</i>	0.3	0.3	0.3	0.3	0.3
<i>War victims</i>	0.3	0.3	0.3	0.3	0.3
<i>Other 1/</i>	0.4	0.4	0.3	0.3	0.3
<b>Expenditure</b>	<b>4.7</b>	<b>5.2</b>	<b>5.5</b>	<b>5.8</b>	<b>6.3</b>
<i>Old-age pensions (IVM)</i>	2.1	2.3	2.5	2.7	3.0
<i>Healthcare</i>	1.5	1.6	1.6	1.8	1.8
<i>RP</i>	0.1	0.1	0.1	0.1	0.1
<i>War victims</i>	0.3	0.3	0.3	0.2	0.2
<i>Other 2/</i>	0.1	0.2	0.2	0.1	0.2
<i>Administrative 3/</i>	0.6	0.7	0.8	0.8	0.9
<b>Balance</b>	<b>0.2</b>	<b>-0.1</b>	<b>-0.3</b>	<b>-0.3</b>	<b>-0.4</b>

1/ Includes investment income from the reserve fund.

2/ Includes subsidies for funerals, marriages, infant formula, and for maintenance of children, as well as for days missed from work due to accidents, illness or maternity.

3/ Including expenditure on wages, goods and services, and capital expenditure.

**3. Pension benefits are determined by base salary and years of contributions.** INSS members become eligible for a pension when they turn 60 and have at least 750 weeks (about 15 years) of contributions, which do not need to be continuous. There is a special retirement age of 55 for teachers and miners. Benefits are determined by a formula based on the average salary and the number of weeks of contributions. The system has an element of progressivity as there are two different formulas, one for those with a base salary which is less than two minimum wages, which covers about 70 percent of all pensioners, and another for those with a base salary above this level (see Annex for a full description of the formula). The minimum starting pension cannot be lower than the minimum wage. Pensioners also receive a thirteenth payment in December.

**4. Healthcare benefits provide access to a better quality of care.** Households without health insurance can access free services provided by the Ministry of Health (MINSa), but MINSa facilities are often under-resourced and services are perceived to be of lower quality compared with those that can be accessed with INSS insurance. Alternatively, households pay out-of-pocket for care from private sector providers (Thornton et al, 2010). One of the strategies to increase INSS membership has therefore been to offer improved healthcare benefits to its members, including extending the geographic area where health services are available and through a focus on prevention and early detection of diseases. Cancer treatment and hemodialysis programs were introduced in 2007, and have expanded in scope. To provide benefits, INSS contracts with private and public healthcare providers. It pays a fixed per capita amount per member to providers, and has pre-negotiated tariffs for specific events. Members require three months of continuous contributions to receive healthcare benefits. Children are covered up to the age of 12, and female spouses or partners are covered for maternity benefits.

**5. Other benefits provided by the INSS system include those of the RP and War Victims programs.** The RP provides insurance coverage for medical expenses and wages lost due to workplace-related accidents or illnesses for about 15,000 people at end-2016. The War Victims program, which is funded by a 1.5 percent contribution from employers, provides disability and survivor pensions for those affected by the armed conflicts of the late 1970s and 1980s, and currently covers about 32,000 people. Finally, there are “special pensions” which are granted to people who have not contributed to the system but who the state deems to be deserving (currently about 2,000 people); these pensions are financed by both the IVM and the RP programs. Both the war victims and the special pensions have been declining as a percentage of both total INSS pensioners and total pension payments, and the absolute number of these pensioners has declined considerably since the 1990s.<sup>3</sup>

**Table 3. Coverage Indicators for INSS  
(2006 and 2016)**

	2006	2016
Share of labor force contributing to INSS (active coverage) 1/	19	32
Share of population 60+ with INSS old age/survivor pension (passive coverage)	17	32
Share of INSS pensioners receiving a reduced pension	0	33
Share of working-age population receiving a disability pension	1	1
Share of INSS members with health insurance	n.a.	83

1/ Total labor force, including informal sector

Sources: INSS, UNPOP, ILO and IMF staff calculations

**6. Coverage is relatively low but has shown strong gains.** It is estimated that about 80 percent of businesses operate informally in Nicaragua (COSEP, 2015), and the low active coverage of INSS reflects this. To increase coverage by making it easier for independent workers to pay the monthly contribution, INSS has expanded its physical presence across the country through a network of branches. Thus, the RF, aimed at independent and informal sector workers, has grown rapidly from a low base. At the same time, the share of the population receiving an INSS pension has expanded, partly due to the introduction of the reduced pension in 2013. The tendency has been for elderly family members in Nicaragua to reside with their children, partly mitigating the need for an old age pension. Nevertheless, this characteristic of Nicaraguan society is likely to change over time, with changing demographics and social norms, making a wider social safety net for the elderly more of a priority in the future.

**7. A law reforming the pension system was passed in 2013.** Recognizing that the sustainability of the pension system was in jeopardy, a discussion was initiated in 2007 between the private sector, labor unions and the government on a pension reform. Agreement was eventually reached on the following components:

<sup>3</sup> In 1995, recipients of war victims and special pensions made up about 50 percent of all pensioners, and these programs accounted for about 27 percent of total pension expenditure (Mesa Lago et al, 1997).

- An increase in the contribution rate for employers from 7 to 10 percent, implemented between 2014 and 2017.
- An increase in the maximum monthly pensionable salary to C\$72,000 (US\$2,774), with annual adjustments in line with the growth of the average wage.
- Minimum pensions to be adjusted in line with average wage growth, rather than with the minimum wage, which historically has grown faster than average wages. However, the link between the minimum starting pension and the minimum wage was maintained.
- The benefit formula for people earning at least twice the minimum wage was changed to make it somewhat less generous. The indexation mechanism for these pensions was changed to 5 percent annually, in line with the rate of crawl of the exchange rate against the U.S. dollar.
- An agreement was reached with the state to pay a debt to INSS through an annual payment of US\$10 million over 50 years. The obligation of US\$500 million arose from the non-payment by the budgetary central government of the 0.25 percent contribution required on the total wage bill (see Table 1), and which had been accumulating arrears since 1979. Despite the agreement to settle the outstanding debt at end-2013, the 0.25 percent contribution to INSS continues not to be included in the government budget.

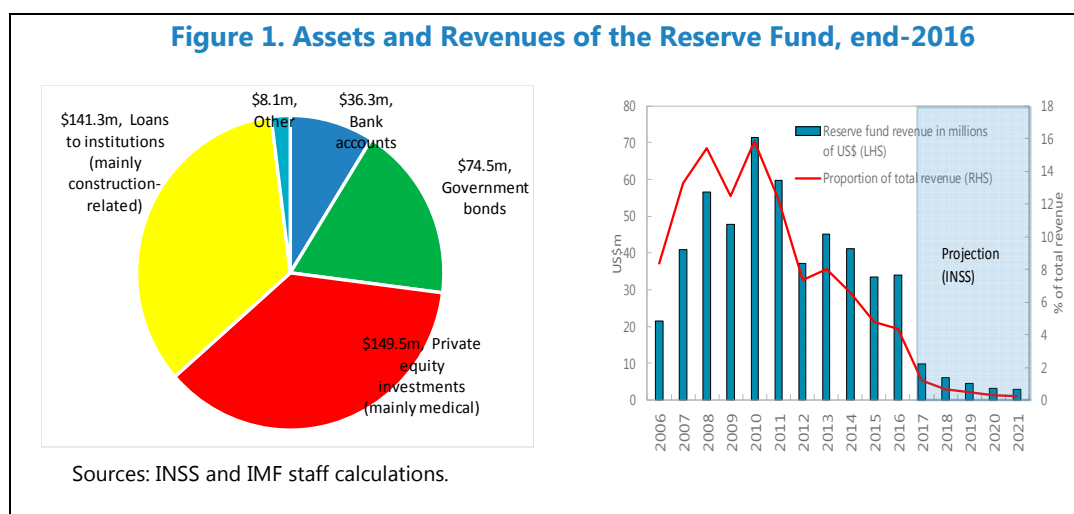
INSS estimates that savings from the reform were about 1 percent of GDP in 2016, with about four-fifths coming from an increase in contributions, due both to the higher rate and the increase in the maximum pensionable salary.

**8. Savings from the reform began to be eroded immediately as a partial pension benefit was introduced in 2013.** The *pensión reducida* (“reduced pension”) covers those participants with 250-750 weeks of contributions, insufficient to qualify for a full pension. The amounts of the reduced pension are related to the number of contribution weeks, are fixed in law, and are not indexed to the exchange rate, inflation, or wages. The average monthly reduced pension in 2016 amounted to about \$83, or 27 percent of the average wage. The number of reduced pension recipients has been growing rapidly as more participants have come forward to claim their benefits; as of March 2017, 46,071 pensioners (out of a total of 236,565) were receiving the reduced pension. The estimated cost of the reduced pension in 2016 was about 0.36 percent of GDP.

**9. The investment policy of the INSS has resulted in a reduction of financial income and a rapid depletion of liquid funds.** From 2007-2012, the INSS ran surpluses, which were invested in financial assets, largely government securities. The assets of the INSS reserve fund, which covers all branches of INSS (not only IVM), increased from US\$392 million in 2007 to US\$592 million in 2012. However, since 2013, the size of the fund has been declining, and stood at US\$410 million (3.1 percent of GDP) at end-2016. The composition of investments has shifted away from government bonds and central bank securities towards investments in real assets, including medical facilities which provide services to INSS. There has been significant investment in real estate development, which does not appear to be connected to the nature of INSS operations or those of the reserve fund. Funds from INSS have been used to finance mortgage loans at subsidized rates through the banking system. Thus, the revenue from the reserve fund has been declining in recent years, both in



absolute terms and as a proportion of total revenue, and, per INSS's projections, is expected to be very low relative to historical trends going forward (Figure 1). This has left INSS with only a small portion of reserves that are liquid and can be used to cover its deficits.<sup>1</sup>



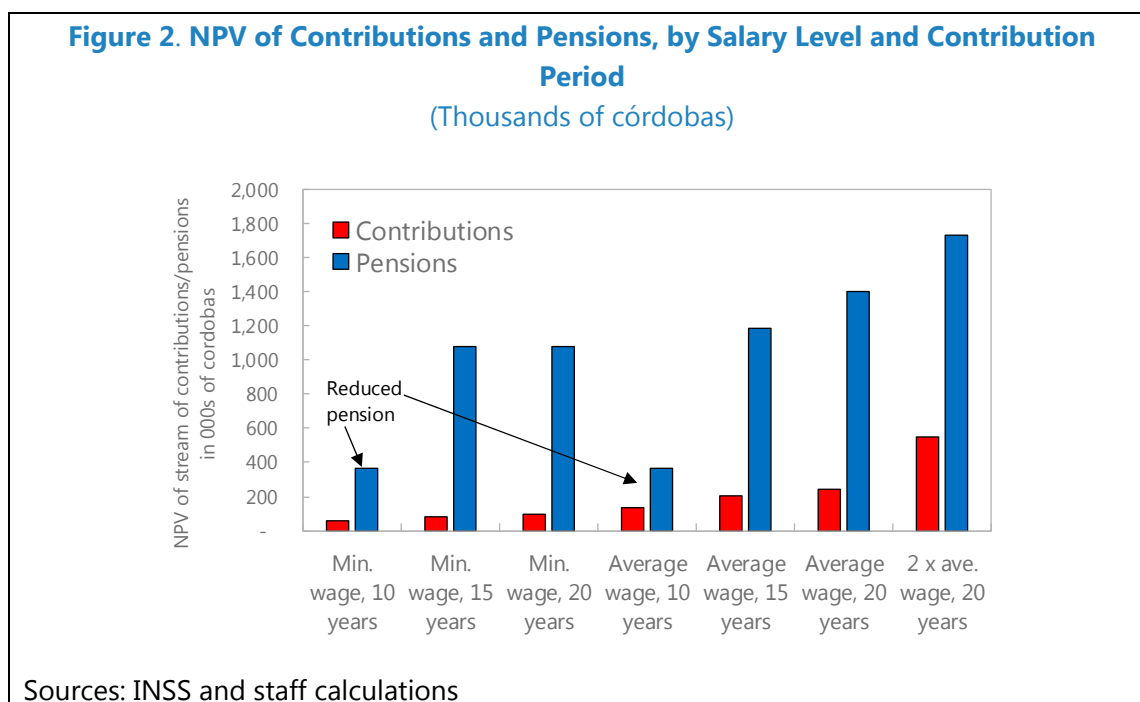
**10. The parametric changes introduced in the 2013 reform were insufficient to ensure long-term financial sustainability.** The pension benefits provided under the IVM system continue to be large compared with the financial capacity of the country and the size of contributions (Figure 2). The gross replacement rate<sup>2</sup> for an average income earner was estimated at 97 percent by the OECD/IDB/World Bank (2014), while the average old age pension in 2016 was about 80 percent of the average wage.

**11. Pensions are not necessarily high in absolute terms,<sup>3</sup>** but they are large relative to contributions, and the minimum pension is high enough to create some distortions in the system. To investigate this, we calculate the net present value (NPV) of the expected stream of pension payments for various base salary and contribution periods, assuming an average life expectancy after retirement of 15 years. These numbers are then compared with the corresponding NPV of the stream of contributions. The calculations demonstrate some perverse incentives. For example, whether minimum wage earners contribute 15 or 20 years makes no difference to their pensions, because the minimum starting pension cannot be less than the minimum wage. Also, although those earning an average wage contribute significantly more than those earning a minimum wage, their pensions will be very close in value (Figure 2). It should be noted that the NPV calculations are based on an assumed retirement date of end-2016, and so reflect lower contribution rates in the past (IVM contribution rates were as low as 5.5 percent up to 2001). Thus, going forward, the gap between contributions and pensions should decrease, but remain significant.

<sup>1</sup> According to INSS figures, liquid assets amounted to about \$91m at end-2016, or 22 percent of the total, taking into account that not all classes of government bonds are liquid.

<sup>2</sup> This measure reflects the "theoretical" replacement rate, based on a full set of contributions. "Gross" refers to before taxes; this distinction is not important in Nicaragua's case because pensions are not subject to taxation. (OECD/IDB/World Bank pp. 52)

<sup>3</sup> Moreover, as of end-2016, 42 percent of pensioners were receiving a minimum pension; 33 percent a reduced pension, and only 26 percent a pension higher than the minimum pension.



**12. Public pension expenditure in percentage of GDP terms is the highest among Central American countries.** Guatemala and Honduras are the two Central American countries which, like Nicaragua, maintain pure defined benefit systems, but unlike Nicaragua's, these systems have low contribution rates and very low coverage. Pension expenditure in percentage of GDP is relatively low in both Guatemala and Honduras. On the other hand, Costa Rica, the Dominican Republic, Panama and El Salvador closed their defined benefit system to new entrants and introduced new defined contribution or mixed systems. A large portion of El Salvador and Panama's pension expenditures are currently a result of transition costs. Also, the gross replacement rate in Nicaragua is high compared to other countries in the region (Table 4), about 15 percentage points above Costa Rica's, the second most generous pension system. Nicaragua therefore stands out due to its combination of relatively high contribution rates, replacement rates, and pension expenditure. Also notable is that all countries in the region, except for Nicaragua, have introduced a social pension, which is typically targeted to the most vulnerable.

**Table 4. Pension Systems in Central America and the Dominican Republic, 2015**

Country	Contributory system	Pensionable Age	Vesting period (min. years of contribution)	Contribution Rates 1/		Gross Replacement Rates	Public expenditure on pensions (% GDP)	GDP per capita in 2015 (US\$)
				Total	Employer			
				Costa Rica	DB/DC			
Dominican Republic	DC	60	30	10	7.1	22.8	0.1	6,469
El Salvador	DB/DC	60 (55)	25	13.5	7.3	46.6	2.6	4,219
Guatemala	DB	60	20	5.5	3.7	67.8	0.9	3,904
Honduras	DB	65 (60)	15	6	3.5	64.9 (60.9)	0.2	2,529
Nicaragua	DB	60	15	13.5	10	94.2	3.1	2,067
Panama	DB/DC	62 (57)	20	13.5	4.3	78.4 (72.8)	3.0	13,268
<i>OECD average</i>	<i>n/a</i>	<i>64.7 (63.5)</i>	<i>n/a</i>	<i>19.6</i>	<i>11.2</i>	<i>52.9</i>	<i>n/a</i>	<i>36,095</i>

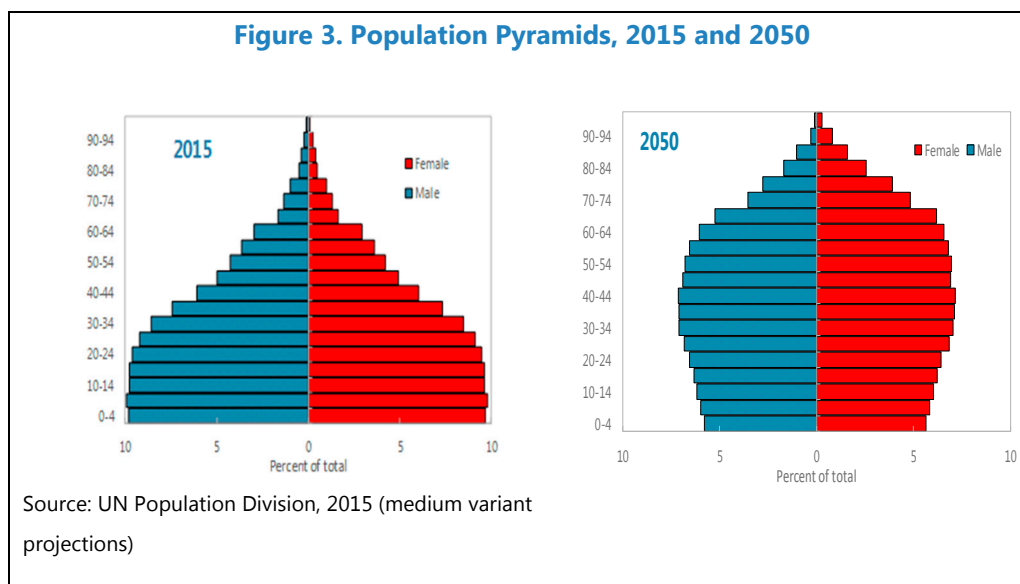
1/ Total contribution rates include both employer and employee contributions.

Source: IMF (forthcoming)

## B. Current Challenges

**13. Demographic changes will place additional pressure on Nicaragua's social security system in the coming years as retirees live for longer.** Nicaragua's population is still relatively young, but, like other countries in Latin America and the Caribbean, it is undergoing significant demographic change. Fertility rates have declined from five children per women in 1990 to 2.3 in 2015, while life expectancy has risen from 62 years in 1990 to 75 years in 2015. According to the United Nations, currently only five percent of the population is over 64; however, this is expected to rise to 12 percent by 2040. The old age dependency ratio—the ratio of the population 65+ to the population aged 15-64—is expected to increase from 7.8 percent to 17.8 percent by 2040. This is much lower than comparable ratios in advanced countries, and lower than the average for the Latin America and Caribbean region, and unlike in many other countries, the working age population will continue to expand well beyond the next 20 years. Nevertheless, population aging will place increasing pressure on the finances of the INSS in the next 20 years, as retirees live for longer.<sup>1</sup>

<sup>1</sup> As a caveat, it should be noted that specific demographic information on the INSS population was not available to the mission. The demographics of INSS may not mirror exactly those of the population as a whole. Since the INSS population is wealthier on average than the uninsured population, one may assume that the population aging process may be more advanced. INSS also has a history which may influence its demographic profile; it has been affected by the turbulence of the 1980s, the structural adjustment programs of the 1990s, and changes in policies in the 2000s.



### IVM Pension System

**14. Revenues from contributions have grown strongly over the past decade, but expenditure growth has outpaced that of revenues.** Higher revenues can be attributed to the recent pension reform and a strong increase in affiliates, in addition to the growth in pensionable salary. Contributions increased from 2.4 percent of GDP in 2013, before the reform, to 3.1 percent of GDP in 2016. Total pension spending has more than doubled in percentage of GDP terms, from 1.4 percent of GDP in 2006 to 3.0 percent in 2016. The major driving forces for this increase have been the increases in the minimum wage, to which the minimum pension was indexed, particularly in 2008 and 2009, a doubling of the number of ordinary pensioners, as well as the introduction and steady take-up of the reduced pension (about 0.4 percent of GDP in 2016).

**15. Pension costs are projected to rise in percentage of GDP terms as the population ages.** Staff uses projections from INSS for revenue and expenditure for the 2017-2020 period. Beyond 2020, a model developed by the Fiscal Affairs Department is employed, based on Clements et al (2013). The model projects that, by 2040, the expenditure of the IVM pension system will reach 5.9 percent of GDP. On the revenue side, IVM contributions are projected to continue growing rapidly until 2020 as INSS continues its efforts to recruit and retain more affiliates, and then to stabilize at around 3.4 percent of GDP from 2020 onwards.

### Other Elements of the Social Security System

**16. Healthcare expenditure has risen sharply.** While the number of insured has approximately doubled since 2006, healthcare expenditure has increased almost six-fold and expenditure on healthcare has exceeded contributions since 2015. In general, cost growth has been driven by a rapid increase in coverage, and an expansion of treatment for catastrophic conditions. Over the past two years, the INSS has attempted to contain healthcare cost growth. Strategies have included negotiating better tariffs with service providers and using the reserve fund to purchase of stakes in health service providers and generic drug manufacturers to better control costs. In 2016, health care expenditure per capita in the INSS system fell by 3 percent.

**17. The growth in administrative spending over the last 10 years appears excessive.** INSS's administrative expenditures have increased from 0.3 percent of GDP in 2006 to 0.9 percent of GDP in 2016. INSS has had unusually large capital expenditures in recent years, as it expands its branch network and increases coverage by providing easier access to services. Moreover, a significant proportion of this spending since 2014 has been destined to the rehabilitation of the Olof Palme Convention Center, which is owned by INSS. Personnel expenditure has more than doubled, from 0.2 percent of GDP in 2006 to 0.5 percent of GDP in 2016. The INSS Statistical Yearbook indicates that it had 4,090 staff on the payroll at end-2016, 65 percent of which earned a monthly salary of C\$20,001 or more.<sup>2</sup> INSS staff also benefit from a so-called "*doble aguinaldo*"—two extra months of salary every year (the public sector only has one "*aguinaldo*"). However, the latest medium-term expenditure projections from INSS imply a 14 percent reduction in administrative expenditure in nominal terms in 2017, with cuts planned to both personnel expenditure and capital expenditure.

**18. The war victims and occupational risks programs appear to be in balance.** The most recent actuarial reports for these programs indicate that expenditures are projected to remain lower than contributions over the long term. For the war victims program, the number of pension recipients should gradually decline as will expenditure in percentage of GDP terms, from 0.2 percent of GDP currently to 0.01 percent of GDP by 2040. For the occupational risks program, expenditure should to remain at 0.1 percent of GDP over the long term.

**19. The social security system is projected to have exhausted its liquid reserves by 2019.** INSS has run a deficit since 2013, which it has financed from its reserve fund. The share of liquid assets in the reserve fund has been reduced significantly, due to investment in real assets.

## C. Options for Reform

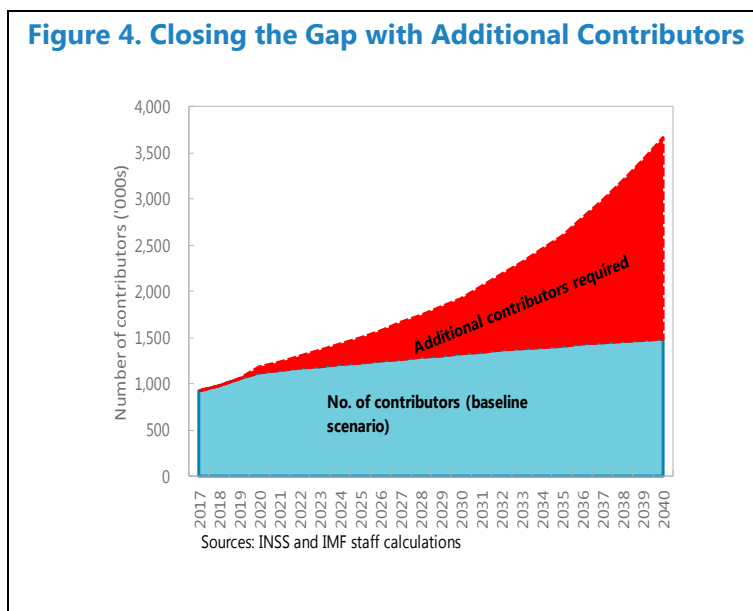
### Pension Reforms

**20. This section considers various scenarios for reforming the IVM pension system.** It should be noted that this analysis is intended mostly to give an idea of the magnitude of the reforms that may be required to achieve sustainability, and the scenarios described should not be taken as policy recommendations. The solution should consider both technical aspects specific to the pension system of Nicaragua, including but not constrained to parametric changes, and political constraints. Nonetheless, any acceptable solution should be sufficient to restore the necessary equilibrium to the INSS finances.

**21. Seeking to increase active coverage alone is unlikely to resolve the problem and may damage sustainability in the long run.** Recent efforts by INSS to achieve sustainability have focused on expanding contributions. Increased active coverage would indeed raise additional revenues, but the size of the increase in coverage needed to cover the deficit, without reforms in other areas, would be substantial. Projections for 2017-2020 incorporate the authorities' assumption that the strong growth in coverage will continue, with an almost 6 percentage point increase in

<sup>2</sup> For context, the average economy-wide monthly salary in 2016 was C\$9,386. The average salary in the central government was C\$10,131.

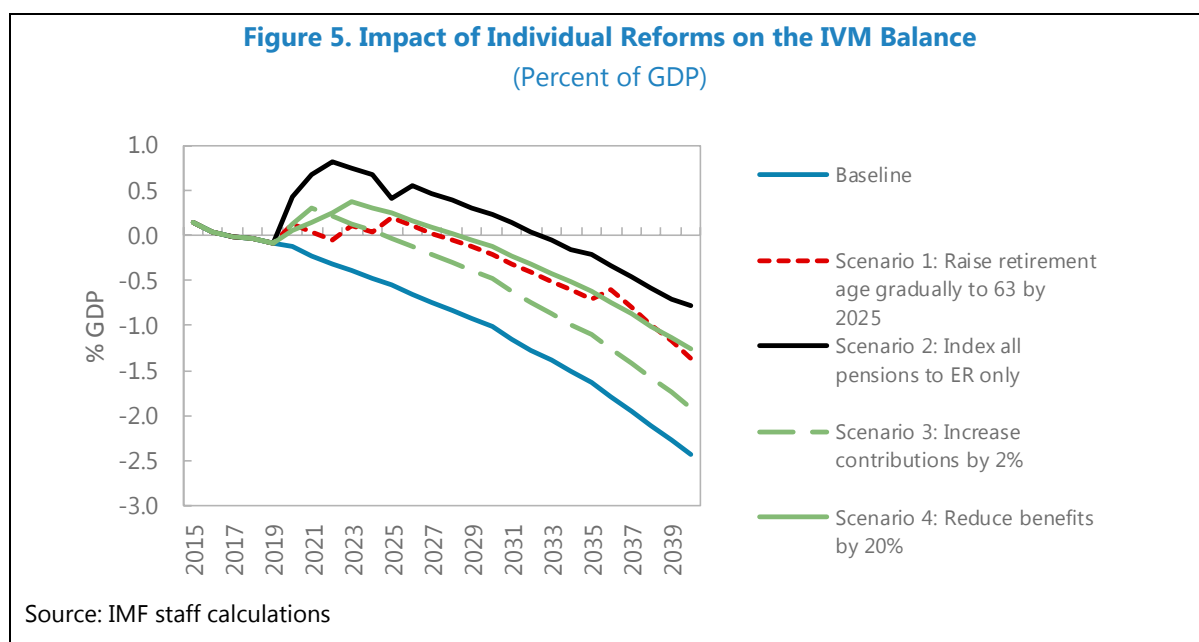
labor force coverage between end-2016 and 2020. This increase is, however, insufficient to close the gap between revenue and expenditures. After 2020, coverage is assumed to stabilize at about 37 percent of the labor force. Figure 4 shows the results of a simulation of the number of additional contributors that would be required to close the gap between revenue and expenditure, beginning in 2021, and assuming that contribution rates remain unchanged.<sup>3</sup> Coverage would need to increase to about 90 percent of the labor force by 2040, which seems very ambitious.<sup>4</sup> Not taken into account in this analysis is that in the long run, additional contributors are likely to worsen INSS's financial prospects, given that benefits tend to exceed the value of contributions (Figure 2).



**22. Figure 5 demonstrates the individual impact of various reforms on the balance of the INSS.** These are (i) scenario 1: a gradual increase in the retirement age to 63 by 2025; (ii) scenario 2: keeping pensions fixed in dollar terms (iii) scenario 3: increasing contributions by 1 percent in 2020 and a further 1 percent in 2021; (iv) scenario 4: reducing average benefits by 20 percent. On their own, none of these reform simulations achieves full sustainability over the next 20 years. Nevertheless, a combination of these measures could be implemented to achieve sustainability.

<sup>3</sup> The simulation does not project an increase in pension expenditure relative to the baseline. The additional pension spending due to additional beneficiaries is assumed to occur beyond the projection horizon, although in reality, as reduced pensions can be drawn after only 5 years of contributions, new members may retire before 2040. Provision is made for the likelihood that new affiliates will not contribute every month till the end of their careers, by assuming a contribution density of 75 percent, i.e. that new affiliates will contribute only nine months out of every 12, on average.

<sup>4</sup> Low employment coverage has been a problem for many Latin American pension systems, linked to high levels of informality, and few have successfully addressed it. The example of Brazil stands out here in a regional context. Brazil implemented several initiatives which have increased social contributions, including a simplification of the tax regime for SMEs, and incentive programs for independent workers and microentrepreneurs to join the social security system. There is also a robust education program for workers on social security issues. (Schwarzer & Liberal Ferreira de Santana, 2015).



**23. There is a compelling case to be made for increasing the retirement age.** Average life expectancy in Nicaragua is now 13 years higher than in 1990, while there has been no change in the retirement age over the same period. An increase in the retirement age can be an effective way to improve the sustainability of a defined benefit pension system, as it increases the number of contributors while also reducing the number of beneficiaries.<sup>5</sup> Increases can be introduced gradually, and the option of retirement at 60 can be retained, but with a penalty. An important caveat to this argument is that, while the average life expectancy has risen, gains have likely not been equally distributed amongst workers. Some workers, particularly those in physically demanding jobs such as agricultural workers<sup>6</sup> and miners, typically have shorter lifespans. Nicaragua currently has a lower retirement age of 55 years for miners for this reason, as well as an article in the law which allows exceptions to the legal retirement age on medical grounds. Teachers are also afforded a retirement age of 55 years; the reasons for this are less clear and so consideration could be given to increasing their retirement age to at least 60.

**24. There does not appear to be much scope to increase contribution rates.** Higher contribution rates for employers were the most salient aspect of the previous pension reform and it is likely to be difficult to get the private sector to agree to an additional increase. Overall, the contribution rate to INSS in Nicaragua is high compared with other countries in the region, at 25¼ percent of wages. An additional increase in contribution rates is also likely to act as a disincentive for employers to formalize.

<sup>5</sup>It may also result in higher average pensions, however, as average contribution periods will be extended (this potential impact is not modeled above).

<sup>6</sup> See for example <https://www.theguardian.com/world/2017/mar/19/mystery-deaths-nicaragua-sugarcane-fields>

**25. A reduction in pension costs could be achieved by bringing benefits more in line with those in the rest of the region.** Average replacement rates could be brought down to levels closer to the OECD average of 53 percent through an overhaul of the formula. However, if benefits are to be reduced, there may also be an impact on coverage, as fewer workers and employers decide it is worth their while to contribute. The most recent pension reform served to make Nicaragua's pension system more progressive, with higher income earners now having a lower replacement rate relative to those earning below two minimum wages. Care should therefore be taken not to increase this gap, as the perceived unfairness would be a disincentive for higher income earners to contribute. Social support to low income earners should rather be channeled through an expansion of non-contributory pensions, as considered below.

**26. There is room for further reform of the indexation mechanism.** The 2013 pension reform attempted to curb the growth in pension costs by delinking annual pension increases from the minimum wage. Staff's calculations suggest that the average IVM pension, not including the reduced pension, has increased by about 9 percent annually since the reform, less than in previous years and less than the increase in the minimum wage in the industrial sector (11 percent annually) but still well above inflation, which has averaged 4.5 percent over the same period. The change in indexation modeled above would imply delinking the minimum starting pension from the minimum wage, and indexing all pensions to the depreciation of the exchange rate against the dollar<sup>7</sup> or past-year inflation, whichever is lower.

**27. Certain expenditures could be shifted to the budget on a very limited basis.** Ideally the non-contributive pensions in the system—i.e. those for war victims and special pensions—should be financed by tax revenue rather than employer and employee contributions. The payment of these pensions could continue to be performed by INSS but it could be financed through budgetary allocations. This would free up some resources for the IVM system if contribution rates are maintained at the same overall level, i.e. the contributions previously paid for war victims could be folded into contributions for the IVM system.

**28. There are various combinations of individual reforms which would keep the IVM system in balance until 2040.** Table 5 and Figure 6 illustrate some of the potential reform packages that would achieve this objective. These do not consider other programs besides IVM, and do not take into account administrative expenditures, which also need to be financed from contribution revenues, and in Nicaragua's case are relatively substantial. The various packages are merely indicative and consider only very broad reforms, given the limitations of the model. All reforms are assumed to be implemented over the period 2020-2025, with some (e.g. indexation changes) implemented immediately, and others (e.g. reduction of benefits, increased retirement age) over the 5-year period. The simulations show that the parametric reforms needed would be significant but manageable. A full actuarial analysis should be conducted to inform any decisions on pension reform.

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<sup>7</sup> Currently 5 percent annually. This is already done for a portion of pensions.



**Table 5. Illustrative Reform Packages**  
(All numbers in percent of GDP)

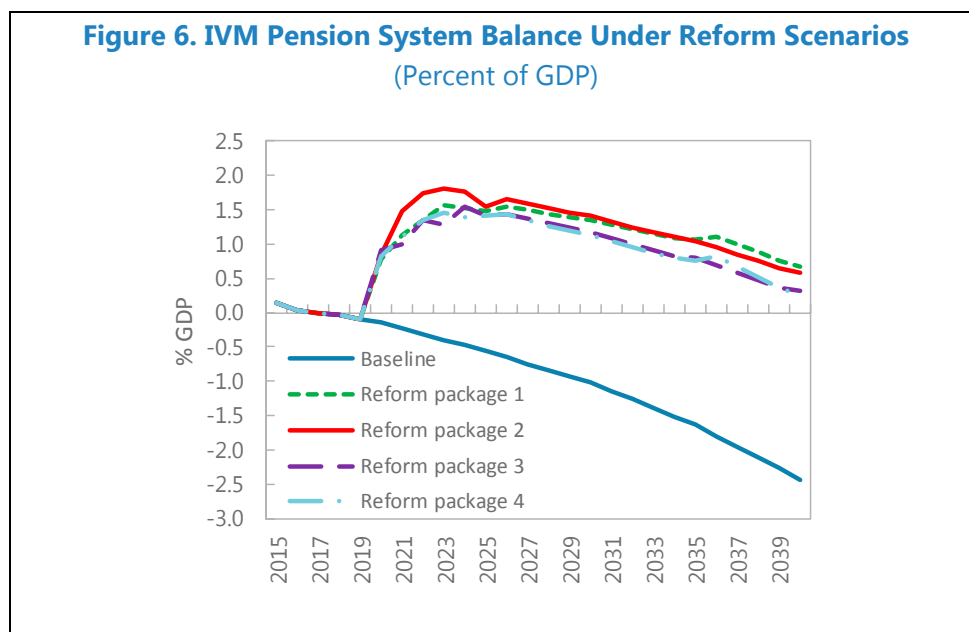
		2020	2025	2030	2035	2040	
<b>Reform package 1</b>	Index all pensions to US\$ exchange rate; increase retirement age to 63 by 2025; reduce average benefits by 20%	IVM system balance	0.8	1.5	1.2	1.1	0.7
		Savings rel. to baseline	0.9	2.0	2.4	2.7	3.1
<b>Reform package 2</b>	Index all pensions to US\$ exchange rate; reduce average benefits by 20%; increase contribution rate by 2%	IVM system balance	0.8	1.5	1.4	1.0	0.6
		Savings rel. to baseline	1.0	2.1	2.4	2.7	3.0
<b>Reform package 3</b>	Index all pensions to inflation <sup>1/</sup> ; reduce average benefits by 30%; contributions for war victims to IVM <sup>2/</sup>	IVM system balance	0.9	1.4	1.2	0.8	0.3
		Savings rel. to baseline	1.0	2.0	2.2	2.4	2.7
<b>Reform package 4</b>	Index all pensions to inflation <sup>1/</sup> ; increase retirement age to 65 by 2025; contributions for war victims shifted to IVM <sup>2/</sup>	IVM system balance	0.8	1.4	1.1	0.8	0.3
		Savings rel. to baseline	1.0	2.0	2.1	2.4	2.7

1/ Inflation is assumed to be 7 percent p.a. over the long term.

2/ Refers to the shifting of the financing of the war victims and special pensions to the budget and using contributions for the war victims' pensions (1.5 percent of the wage bill) for IVM pensions instead.

Source: Own calculations

**29. A shift to a defined contribution system does not seem appropriate at the current juncture, although a mixed system could be a long-term solution.** The experience of many Latin American countries with defined contribution systems has been problematic, with low real rates of return and low contribution densities, resulting in pensions which are below adequate levels (IMF, forthcoming). In addition, the transition costs which would arise from closing the current system—meeting pension expenditure commitments without current contributions—would be unmanageable at the current juncture. In fact, in Nicaragua's case, a defined contribution scheme was legislated in the early 2000s but never introduced, partly due to the potential size of the transition costs. Alternatively, after reforming the existing defined benefit system, the authorities may want to start the design and implementation of a mixed system incorporating a defined benefit component for lower salaries and a defined contribution component for higher income individuals, financed by additional contributions. Introduction of a defined contribution segment could be phased in slowly to avoid unmanageable transition costs.



**30. The reduced pension has created distortions and inequities which need to be addressed.** The number of potential beneficiaries of the reduced pension was much larger than initially foreseen, which was a major factor behind the recent rapid deterioration of INSS finances. While beneficiaries of the reduced pension contributed to the IVM system, the NPV of their contributions is substantially below the benefits they are entitled to, even considering that these benefits are not indexed. Any pension reform should therefore also involve the beneficiaries of the reduced pension; otherwise they will effectively be receiving a cross-subsidy from other contributors. Consideration could be given to re-scaling benefits so that they match the NPV of actual contributions. This should include both pensions and any associated health benefits. Alternatively, closing off the reduced pension to new beneficiaries and replacing it with a non-contributory pension targeted to families below the poverty line, could be considered.

**31. If fiscal space permits, a targeted non-contributory pension could be introduced.** Many countries in Latin America have introduced non-contributory pensions as a means of increasing pension coverage without the challenges of a contributory system. Such a pension could be means-tested and set as some proportion of the average or minimum wage, or a fixed dollar amount, and funded through the budget. For example, a pension of \$24 per month (equivalent to 15 percent of the minimum wage or about 1.1 percent of GDP per capita) benefiting one-quarter of the population 65+, would cost about 0.2 percent of GDP.

**Table 6. Social Pensions in Selected Latin American Countries**

	Expenditure (% GDP)	GDP per capita (2015)	Monthly benefit (US\$)	Benefit (% GDP per capita)	No. of beneficiaries (% of population >65)
Argentina	1.0	13,432	\$325	2.4	n.a.
Colombia	0.1	6,056	\$35	0.6	21
Ecuador	0.4	6,205	\$50	0.8	55
El Salvador	0.1	4,219	\$50	1.2	8
Guatemala	..	3,903	\$52	1.3	16
Panama	0.3	13,268	\$120	0.9	30
Paraguay	0.5	4,081	\$87	2.1	25

Sources: IMF (forthcoming), own calculations

### Administrative Reforms

**32. The scenarios presented above do not include administrative expenditures.** Expenditure on wages, goods and services, and capital spending is difficult to attribute to one branch of INSS or another. Nevertheless, it is important to take these aspects into account in Nicaragua's case, because administrative costs are well above most pension systems in relative terms, and have increased substantially in recent years. The baseline scenario already factors in the cuts to administrative expenditure planned by the authorities, starting in 2017, which drive the slight improvement in the INSS balance observed between 2017-2019. Administrative costs are assumed to decline from the 0.9 percent of GDP observed in 2016, stabilizing after 2020 at around 0.6 percent of GDP.

**33. A reduction in costs through improvements in INSS's operational efficiency would benefit both members and INSS finances, provided service quality is not affected.** Reducing the running costs of INSS by itself would not be sufficient to restore sustainability to the system. However, if administrative expenditures bear some of the burden of the reform through an increase in efficiency, there would be less of a need to reduce benefits or raise contributions. While a detailed analysis of operational efficiency is beyond the scope of this paper, several areas stand out as potential candidates for savings. By outsourcing payment of pensions to banks and non-bank financial institutions rather than investing heavily in a branch network, the INSS will be able to reduce expenditure on staff, equipment and maintenance. Furthermore, the sale of a large part of the existing branch network may generate additional income.

**34. Bringing the INSS payroll more in line with the rest of the Nicaraguan public sector would also save resources.** In 2016, the average annual salary of an INSS employee is estimated at C\$417,000 (\$14,570), which is 3.2 times that of the average salary in the central government. Even considering that INSS might employ a higher proportion of professionals relative to the central government, this seems very high—in 2007, the same ratio was 1.9. Bringing the ratio back down to

2007 levels would result in a saving of about 0.2 percentage points of GDP, equivalent to reducing the average pension benefit by five percent or a 0.75 percent increase in the contribution rate.

### Other Reforms

**35. Additional efficiency gains in healthcare could be identified.** Ideally a reduction in expenditures should be achieved through efficiency gains rather than reducing benefits. A more thorough investigation of the potential for efficiency gains is needed, however, which is beyond the scope of this analysis.

**36. Any reform package should also consider modernizing the management of INSS's reserves and improving overall governance.** The current social security law does not regulate INSS's investment fund. It is standard practice for the reserves of public pension systems to be invested in low risk assets which yield a steady return, such as government bonds. However, recent investment decisions have departed from traditional investments. This is especially problematic when coupled with the lack of disclosure to its members as to how the reserve fund is invested. There are also no constraints on shifting reserves from one regime (e.g. IVM) to another (e.g. healthcare). While this gives the INSS management more flexibility, it is less transparent and can lead to practices that could be perceived as being unfair—for example, if reserves from one program are used to finance another program.

**37. This paper has indicated that there are various pathways to sustainability for INSS's pension system.** A deep actuarial, economic and operational analysis is required to design a comprehensive reform program, and ensure that the defined benefit, pay-as-you-go system can sustain itself for another generation of workers and that the improved healthcare benefits can be maintained. A politically acceptable, pragmatic solution appears within reach. However, the authorities should act quickly to avoid a costly bailout of the system.

## Annex I. Technical Annex

### A. Formula for the Old Age Pension<sup>1</sup>

- The starting point for the calculation is the Monthly Remuneration Base (RBM), which is the average pensionable salary earned over the past “n” weeks, depending on the total number of weeks of contributions.

Weeks of contributions		Formula calculated on average earnings of last “n” weeks
From	To	
750	1000	250
1001	1249	200
1250	and more	150

- Second, the Excess Contribution Weeks Factor (FSCE) is calculated:

$$FSCE = (Weeks\ of\ Contributions - 150) / 52$$

- If the RBM is less or equal to two times the minimum wage, the following formula will be applied to obtain the base pension (Formula 1):

$$Base\ pension = RBM * (0.45 + 0.01591 * FSCE)$$

Under this formula, the base pension is limited to 100 percent of the RBM, plus the family benefits of 15 percent for spouse and 10 percent for each child younger than 21.

- If RBM is greater than two times the minimum wage, the following formula will be applied to obtain the base pension (Formula 2):

$$Base\ pension = RBM * (0.37 + 0.01150 * FSCE)$$

Under this second formula, the base pension is limited to 80 percent of the RBM, plus the 15 percent benefits for spouse and 10 percent for each child younger than 21. The sum of the base pension and the family benefits cannot exceed 100 percent of the RB. The amount of the base pension under this second formula cannot be less than the base pension calculation under formula 1.

The total pension, including family benefits, cannot exceed US\$1,500 monthly.

<sup>1</sup> From Reforma al Decreto No. 975 “Reglamento General A La Ley de Seguridad Social”.

## B. Reduced Pension<sup>2</sup>

The following monthly amounts are currently applicable:

Weeks of contributions	Monthly pension
250-349	C\$ 1,910
350-449	C\$ 2,356
450-549	C\$ 2,884
550-649	C\$ 3,290
650-749	C\$ 3,656

## C. Pension Identity

The model uses the following pension identity:

$$\frac{PE}{GDP} = \underbrace{\frac{\text{population 65+}}{\text{population 15-64}}}_{\text{Old-age dependency ratio}} \cdot \underbrace{\frac{\text{pensioners}}{\text{population 65+}}}_{\text{Elderly coverage ratio}} \cdot \underbrace{\frac{\text{average pension}}{\text{average wage}}}_{\text{Replacement rate}} \cdot \underbrace{\frac{\text{population 15-64}}{\text{workers}}}_{\text{Inverse employment ratio}} \cdot \underbrace{\frac{\text{labor income}}{GDP}}_{\text{Labor share of GDP}}$$

where  $PE/GDP$  denotes the ratio of pension spending to GDP,  $population\ 65+$  is the population aged 65 years or older, and  $population\ 15 - 64$  is the population between ages of 15 and 64. The employment ratio (labor force participation) and the labor income share of GDP are typically assumed to be constant over time (Clements et al, 2013).

### Key Assumptions for IVM Pension Projections 2017-2040

	Historical average (2012-2016)	2017	2018	2019	2020	Average 2021-2040
Wage growth (percent) 2/	7.1	3.4	10.4	7.3	6.3	7.5
Contribution rate (percent of wages) 1/	21	24	24	24	24	24
Labor force growth, annual (percent) 3/	2.3	2.1	2.0	1.9	1.9	1.4
Labor force covered by INSS (percent) 2/	27.3	32.5	33.7	35.5	37.3	37.3
Annual growth in active coverage (percent) 2/	8.8	5.3	5.7	7.3	7.1	1.4
Population over 60 receiving an INSS pension (percent) 2/	26.5	33.4	33.8	35.2	36.4	39.6
Average pension (in percent of GDP per worker) 2/	46.9	43.0	43.2	42.2	40.7	40.8

1/ INSS

2/ IMF staff calculations, based on the authorities' revenue and expenditure projections and staff forecasts of nominal GDP and other macro variables, as well as U.N. population forecasts (medium variant).

<sup>2</sup> See Decreto 12-2015 "Decreto Aumento Pensión Reducida".

## References

- Clements, B., D. Coady, F. Eich, S. Gupta, A. Kangur, B. Shang, and M. Soto, 2013, "The Challenge of Public Pension Reform in Advanced and Emerging Economies," IMF Occasional Paper, 275.
- Consejo Superior de la Empresa Privada (COSEP), 2015 *Encuesta de Empresas Sostenibles Nicaragua 2015: identificación de obstáculos para el desarrollo empresarial*. Geneva: ILO.
- IMF, 2012, "Nicaragua: Selected Issues", Washington D.C.: IMF.
- IMF, forthcoming, "From Gain to Drain: Policy Challenges of Population Aging in Latin America", Washington D.C.
- INSS, 2016. *Anuario Estadístico 2016*. Managua.
- Mesa-Lago, Carmelo, Sergio Santamaría, and Rosa María López, 1997, *La Seguridad Social en Nicaragua: Diagnostico y Propuesta de Reforma*, Managua: Fundación Friedrich Ebert.
- OECD/IDB/World Bank, 2014, *Pensions at a Glance: Latin America and the Caribbean*, OECD Publishing.
- Schwarzer, Helmut, and Rafael Liberal Ferreira de Santana, 2015, "Brazil", in Rofman, Rafael, Ignacio Apella, and Evelyn Vezza, eds. 2015. *Beyond Contributory Pensions: Fourteen Experiences with Coverage Expansion in Latin America*. Directions in Development. Washington D.C.: World Bank.
- Social Security Administration, 2016: *Social Security Programs Throughout the World: The Americas, 2015*. SSA Publication No. 13-11802, March 2016.
- Thornton, Rebecca L., Laurel E. Hatt, Erica M. Field, Mursaleena Islam, Freddy Solís Díaz, and Martha Azucena González, 2010, "Social Security Health Insurance for the Informal Sector in Nicaragua: A Randomized Evaluation", *Health Economics*, 19: 181-206.
- Troncoso Consulting, 2016, Actuarial Reports for the Invalidez Vejez y Muerte, Riesgos Profesionales, and Víctimas de la Guerra Programs, Managua.
- Urcuyo, Rodrigo, 2009, "Políticas No-Paramétricas para el Sistema de Pensiones en Nicaragua", Documentos de Trabajo, Managua: Banco Central de Nicaragua.
- United Nations, 2015, *World Population Prospects: The 2015 Revision. Key Findings and Advance Tables*. New York.
- United Nations, 2015, *World Population Prospects: The 2015 Revision. Volume II: Demographic Profiles*. New York.

# NICARAGUA: MACROECONOMIC IMPACT OF CLIMATE CHANGE AND DISASTERS<sup>1, 2</sup>

*He who has no anxious thoughts for the future will find trouble right at hand.*

--Chinese Proverb

**1. Nicaragua is highly vulnerable to the significant economic and social costs of climate change and disasters (CCDs).** CCDs' risks are disproportionate to Nicaragua's size, population and the emission of greenhouse gases (Table 1). High exposure to both types of risk compounds the total macroeconomic impact, as they are mutually reinforcing.<sup>3</sup> The authorities are aware and have taken measures to adapt and mitigate these risks. This paper reviews the current estimates on the potential impact of climate change on countries of initial temperature and income level similar to those of Nicaragua. It also estimates the macroeconomic impact of disaster events on Nicaragua. Based on the estimates, the paper discusses policy implications.

**Table 1. Exposure to Natural Disasters**

	Nicaragua	World	Nicaragua's Share in percent
Number of Natural Disasters (1950-2016)	78	14,145	0.55
Greenhouse Gas Emissions (2013) (metric tons of CO <sub>2</sub> equivalent)	14	48,257	0.03
Population (million)	6	7,176	0.08
Land Area (million Km <sup>2</sup> )	0.12	130	0.09

Source: EM-DAT, World Resource Institute, the World Bank and staff calculation.

## A. Macroeconomic Impact of Climate Change

**2. The impact of climate change on the global economy is expected to intensify over the coming decades.** Mean projected warming in the absence of mitigation is expected to reach about

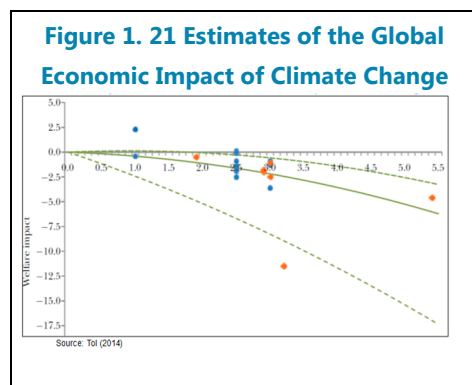
<sup>1</sup> Prepared by Fang Yang and Xiaodan Ding. Staff appreciates contributions and comments received from the authorities, including the National System for Disaster Management and Prevention (SINAPRED); Mr. Guillermo Gonzalez, Climate Change Advisor to the Presidency of the Republic of Nicaragua; Mr. Paul Oquist, Member of the Economic Council of the Presidency, and from Mr. Victor Campos, Director of the private sector think tank Centro Humboldt.

<sup>2</sup> In line with the recent change in terms in the specialized literature, this paper uses the term "disasters" instead of "natural disasters". The reason is that, while these events have natural causes, the disasters are also consequence of vulnerabilities generated by the human activities.

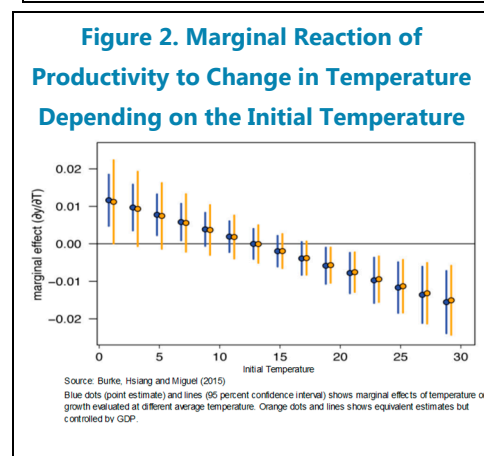
<sup>3</sup> While there is anecdotal evidence of the relationship between the increase in frequency of climate-related, global warming and the change in climate patterns (Van Aalst, 2006), several researchers explain the statistical relationship because of improved monitoring rather than more disasters actually taking place. There seems to be consensus that, albeit uncertain, outcomes of an increase in global temperatures include more and more intense climate-related disasters. (Riebeek, H., 2005).



3 to 4 degrees Celsius (°C) by 2100.<sup>1</sup> Temperature increase and related risks<sup>2</sup> are estimated to translate into output losses through the impact on climate-sensitive sectors such as agriculture, forestry, coastal real estate, and tourism. Other impacts include ecosystem disruption, infrastructure deterioration, health damages, and water stress. Tol (2009 and 2014) reviewed 21 studies on the global economic impact of climate change, which estimated the increase in temperature between 1 and 5.4 °C.<sup>3</sup> The impact on GDP growth is estimated in a range between -11.5 and 2.3 percentage points (Figure 1). Although there is considerable variation across studies, the average impact from a 3°C increase in temperature is projected at about -2 percent of global GDP by 2100.



**3. Climate change is expected to have greater impact for countries with higher initial temperatures and low income.** Based on economic production data for 166 countries over the period of 1960-2010, Burke, Hsiang and Miguel (2015) find that countries' productivity react differently to climate change depending on their initial temperature. Cold countries' (with annual average temperature below 13°C) productivity would increase as annual temperature increases whereas countries with average temperature above 13°C, productivity would decline with global warming (Figure 2). The marginal impact of increasing the average temperature by 1 °C for a country with average initial temperature of about 25°C, such as Nicaragua, would be a reduction of about 1 percent in productivity growth. Dell, Jones and Olken (2012) find a relationship between initial income and impact of climate change. In poor countries, one-degree rise in temperature in a given period reduces economic growth by about 1.3 percentage points on average, whereas there is effectively no effect on rich countries (Table 2).



**Table-2. Immediate-Effect-of-Change-in-Temperature<sup>1</sup>**

	GDP Growth	Growth in Agriculture Value-added	Growth in industrial value added
Poor countries	-1.374*** (0.408)	-2.666*** (0.948)	-2.036** (0.878)
Rich countries	0.262 (0.311)	-0.222 (0.650)	0.514 (0.452)

Source: Dell, Jones and Olken (2012)

\*\*\* Significant at 1 percent level; \*\* Significant at the 5 percent level.

**4. The impact of climate change on production is expected to be broad-based and particularly large on the agricultural sector.**

<sup>1</sup> See IPCC (2014). Note that warming projections are highly uncertain due to poorly understood feedbacks in the climate system.

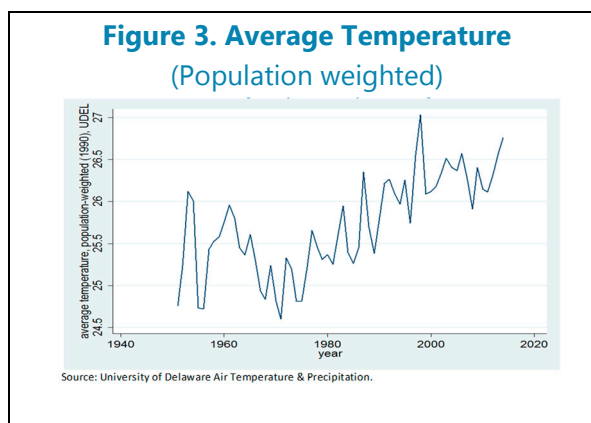
<sup>2</sup> Other risks include changes in precipitation patterns, sea level rises, more intense and frequent extreme weather, destruction of the marine food chain from ocean acidification, and changes in ocean circulation, which are at the origin of climatic disasters.

<sup>3</sup> The estimations are typically by the year 2100.

Dell, Jones and Olken (2012) find that, for poor countries, one-degree rise in temperature is associated with 2.66 percentage points lower growth in agricultural output, and 2.04 percentage points lower growth in industrial output. Exposure to climate change and related extreme weather events would also affect some service sectors such as tourism.

### 5. Average temperature in Nicaragua has already increased by about 1°C since 1950

(Figure 3). This increase is broadly in line with the global warming pattern. Further increase in temperature and related changes are expected to impact negatively GDP growth, mainly by reducing agricultural output; rising sea level and affecting coastal areas; degrading the environment and deteriorating health.<sup>1</sup> At the same time, changing weather patterns could disrupt traditional business models and lead to dislocation of economic activities. In addition to the damage from climate change, the need to implement adaptation measures will weigh on the budget.



**6. Nicaragua has limited possibilities to mitigate climate change.** The authorities estimate that Nicaragua's carbon footprint is very low. Nicaragua's greenhouse gas emission amounted to 14.3 metric tons of CO<sub>2</sub> equivalent in 2013, accounting for 0.03 percent of the world total. As a comparison, the emission of the major advanced and emerging economies is shown in Table 3.

**Table 3. Comparison of Size and Emissions of Selected Economies**

	PPP-adjusted GDP as share of world total	Population as share of world total	GHG emission as share of world total
Brazil	3.2	3.2	2.7
Canada	1.5	0.5	1.8
China	16.4	18.9	23.7
India	6.6	17.8	6.3
Indonesia	2.5	3.5	4.5
Japan	4.6	1.8	2.8
Mexico	2.0	1.7	1.5
Russian Federation	3.6	2.0	4.3
United States	16.3	4.4	12.9
European Union (28)	17.5	7.0	7.9
<i>Nicaragua</i>	0.1	0.1	0.03

Source: World Resources Institute, all data as of 2013.

**7. The expected costs of climate change in Nicaragua are likely to be high.** While there are no econometric studies on the impact of climate change on Nicaragua's growth, it could be inferred from global research and studies on country groups with attributes similar to Nicaragua—in particular, initial temperature and income level. Low per capita income, high initial temperature, and a relatively large contribution of the agricultural sector to GDP and employment, increase Nicaragua's vulnerability to climate change risks. The limited available resources and, therefore, low adaptive capacity, may also increase the cost of climate change. Estimates of the impact of climate change are:

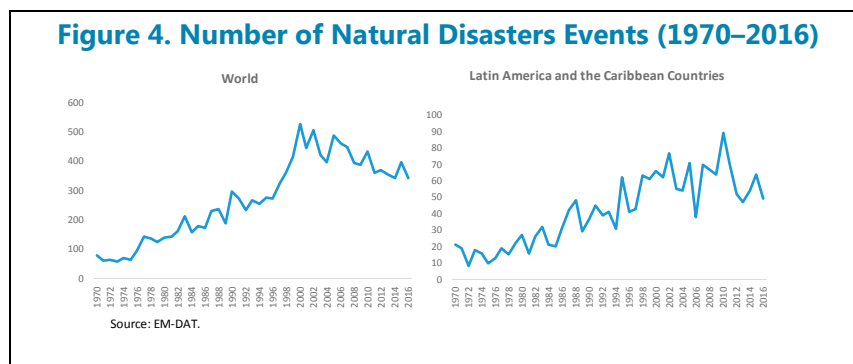
<sup>1</sup> World Bank, 2013.

- Assuming that the path of climate change is linear and that its negative impact on productivity growth is 1 percent per 1 °C of warming, this would translate into an annual productivity loss of 0.04 percentage points lower compared with the scenario with no climate change.
- Applying the findings of Dell, Jones and Olken (2012), a 1 °C increase in average temperature would reduce Nicaragua’s GDP growth by 1.3 percent. Thus, the negative impact on Nicaragua’s GDP growth would be 0.05 percentage points per year compared with the scenario with no climate change.
- Climate change is projected to reduce annual agriculture output by 0.1 percentage points compared with a scenario without climate change.

## B. Macroeconomic Impact of Disasters

### Regional Context

**8. Climate-related disasters have increased steadily during the last 4 decades worldwide, and in Latin America and the Caribbean in particular** (Figure 4)<sup>2</sup>. Climatic disasters increased by 326 percent during 1970-2010, driven mainly by the growth of storms, which increased by 453 percent. Storms in Central America and the Caribbean increased fivefold, while other climate disasters increased by over 400 percent and 300 percent, respectively.



**9. CAPDR<sup>3</sup> countries are disproportionately exposed to disasters.** During 1950-2014, there were 478 disaster events<sup>4</sup> in the CAPDR region. While the land and population of the region is less than one percent of the world’s total, the number of disasters in the region account for over 5 percent of the total events in the world during this period.

<sup>2</sup> Bello (2017).

<sup>3</sup> Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama and Dominican Republic.

<sup>4</sup> 44 droughts, 78 earthquakes and volcanic activities, 188 floods and landslides, and 113 storms.

**10. Nicaragua is among the most vulnerable CAPDR countries.** Nicaragua is the fourth country in the world by number of disasters.<sup>5</sup> <sup>6</sup>According to the international Disaster Database maintained by the Center for Research on the Epidemiology of Disasters (EM-DAT),<sup>7</sup> there were 78 disaster events during 1900-2016 in Nicaragua, indicating a frequency of 0.7 disasters per year. During 1950-2014, each event on average had a reported economic cost of 2.2 percent of GDP<sup>8</sup>, affecting 1.5 percent of the population per event (Table 4).

Nicaragua ranks third in CAPDR by number of disaster events occurred during 1950-2016, after Guatemala and Honduras. However, in terms of average economic cost, Nicaragua ranks first in the region (Table 5 and Figure 5).

**Table 4. Summary of Natural Disasters 1900-2016**

Disaster Type	Number of Events	Total Deaths	Number of People Affected	Total Damage (million US\$)
Drought	5		1,013,000	18
Earthquake	10	12,688	748,175	890
Epidemic	11	54	20,898	0.007
Flood	23	557	684,461	2.1
Landslide	1	29	5,769	-
Storm	20	3,920	1,719,477	1757.2
Volcanic Activity	5	1	321,370	2.7
Wildfire	3		16,000	80

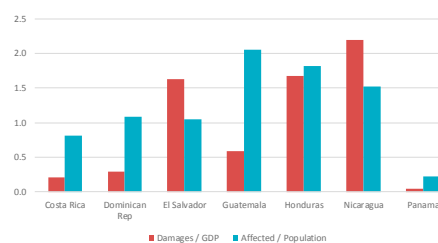
Source: EM-DAT.

**Table 5. CAPDR: Natural Disasters (1950-2016)**

	Epidemic	Droughts/ Wildfire	Earthquakes/ Volcanic Activity	Flood/ Landslide	Storms	Total
Costa Rica	2	6	20	29	8	65
Dominican Rep	8	4	1	28	30	71
El Salvador	10	6	10	18	14	58
Guatemala	9	8	24	34	14	89
Honduras	9	12	5	34	21	81
Nicaragua	12	8	13	22	21	76
Panama	5	4	4	37	5	55
CAPDR total	55	48	77	202	113	495
Global	1381	1071	1385	5374	3809	13020

Source: EM-DAT.

**Figure 5. CAPDR: Average Economic Cost of Natural Disasters (1950-2014)**



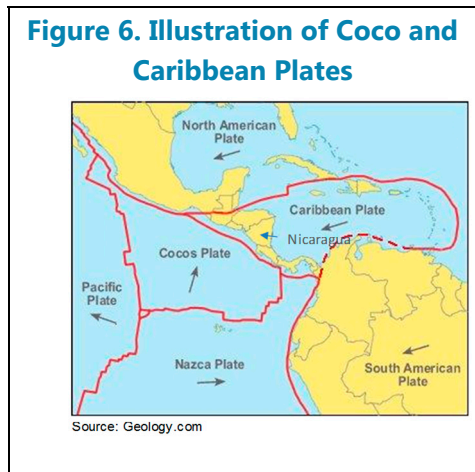
<sup>5</sup> After Honduras, Myanmar and Haiti, based on Global Climate Risk Index 1996-2015 data (Kreft, Eckstein and Melchior, 2017). The Climate Risk Index indicates the level of exposure and vulnerability to extreme events. It is based on data on past events and should not be used for linear projection of future impacts.

<sup>6</sup> Nicaragua ranks 158 out of 173 countries in World Risk Index which considers a country's vulnerability and its exposure to natural hazards. The WRI measures the risk of becoming a victim of a disaster as a result of vulnerability and natural hazards such as earthquakes, storms, floods, droughts and sea level rise. The higher the rank, the more risk it indicates.

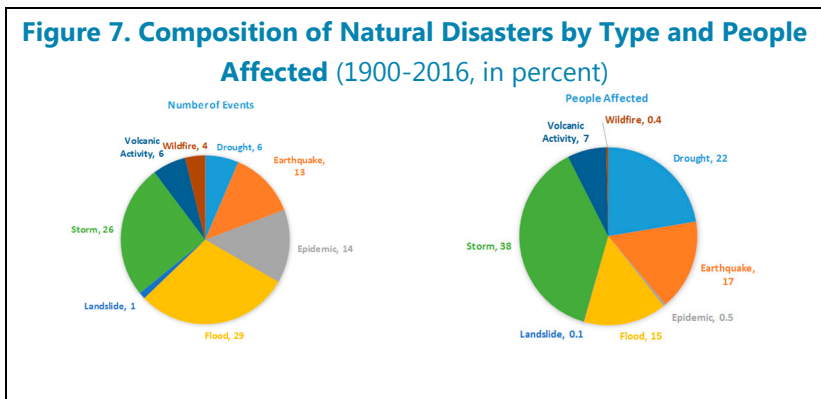
<sup>7</sup> The EM-DAT database includes all disasters meeting one of the following criteria: 10 people killed, 100 people affected (injured, homeless, or requiring immediate assistance such as food, water, sanitation, and medical assistance), a declaration of a state of emergency, or a call for international assistance. It contains essential core data on the occurrence and impact of over 22,000 mass disasters in the world from 1900 to 2016. The database is compiled from various sources, including UN agencies, non-governmental organizations, insurance companies, research institutes and press agencies.

<sup>8</sup> GDP in PPP terms reported by Penn World Table.

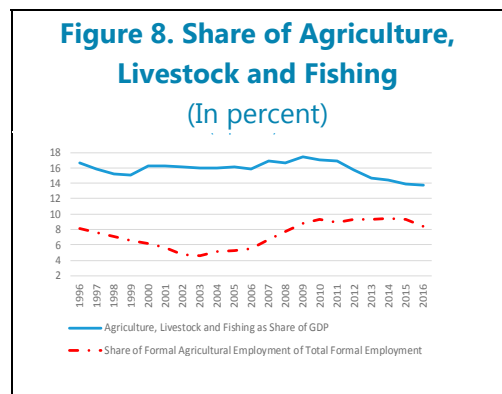
**11. The high frequency of disasters in Nicaragua can largely be attributed to the geological and geomorphological characteristic of the country.** Nicaragua is located between the Cocos and Caribbean tectonic plates where seismic activities are frequent (Figure 6). There are 25 volcanoes in Nicaragua, five of which are considered active and two additional had eruptive activities in the last 200 years. According to the Nicaragua Institute of Territorial Studies (Instituto Nicaragüense de Estudios Territoriales, INETER), 37 percent (i.e. about 65 municipalities) of the 153 municipalities in Nicaragua present some level of earthquake risks, of which 47 percent are classified as high risk. The seismic activities concentrate on the Pacific region, which is the most developed of the country, concentrating 75 percent of the population and about 90 percent of the economic activity.



**12. Risk of floods and landslides is higher in the central region while storms occur mainly in the Atlantic region.** The Central and Atlantic regions are less developed than the Pacific coast. The presence of mountainous areas and high precipitation, plus the influence of tropical storms originating in the Caribbean Sea, make the Central region of the country particularly exposed to floods and landslides. The Atlantic region, however, presents a high risk of tropical storms. While the number of storms reported by the database is lower than that of floods, they impacted a larger proportion of the population (Figure 7).



**13. Nicaragua’s economic structure increases its vulnerability to disasters.** The large share of agriculture, a productive sector highly exposed to CCDs, in output and employment constitutes an additional source of vulnerability.<sup>9</sup> As of end-2016, agriculture, livestock and fishing contributed 14 percent of Nicaragua’s GDP, 8.4 percent of formal employment (Figure 8), and most informal employment. Exports of agricultural products account for about 30 percent of total exports of goods.



<sup>9</sup> World Bank, 2015.

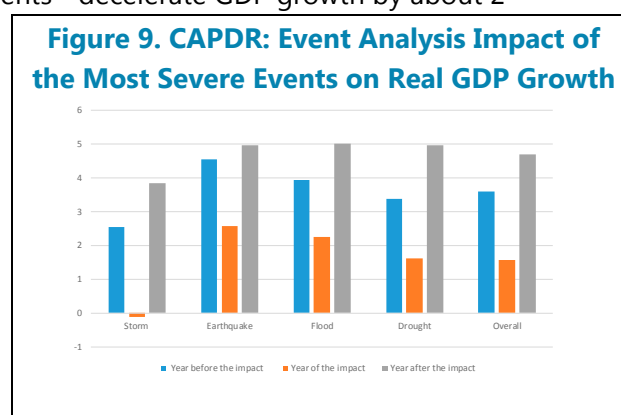
**14. The impact of disasters can be exacerbated by structural factors.** While geographic location determines largely the number and intensity of disasters, structural factors such as poverty may constrain the ability to build up resilience and intensify vulnerability to disasters. As of 2014, 29.6 percent of the Nicaraguan population lived under the national poverty line. Building standards are inadequate to face the risks of disasters and are insufficiently enforced, which could further exacerbate the costs of disasters. According to UNISDR and CEPREDENAC,<sup>10</sup> approximately 70 percent of the housing constructions do not provide sufficient security against disasters.

**15. Nicaragua's shallow financial markets significantly limit the capacity for risk transfer and for post-disaster relief and reconstruction financing.** The insurance industry is underdeveloped, with total assets of less than 2½ percent of GDP, and insurance products against disasters are very limited.

### Quantitative Analysis

**16. The quantitative analysis of disasters poses important challenges.** First, the impact of disasters may not be adequately captured by available data. Most data are reported on a calendar basis, whereas disasters and their impacts have widely varying durations, frequently overlapping two years. Second, other factors could affect the observed the impact of disasters on macroeconomic variables. Therefore, econometric techniques are combined with intuitive methodologies to control for relevant exogenous variables and better understand the impact of disasters on output. Third, the limited number of country observations frequently prevents meaningful country by country econometric studies. Finally, different types of disasters—floods, storms, earthquakes and droughts—should be analyzed separately, as they may have different impact patterns.

**17. Event studies indicate that disasters have short-term negative impacts on GDP growth.** For CAPDR countries, the most severe disaster events<sup>11</sup> decelerate GDP growth by about 2 percentage points on the event year, but GDP growth tends to accelerate by about 3.1 percent the following year, possibly due to reconstruction efforts. The comparison of impacts on GDP growth rates show that, among the four types of events with higher incidence in the region, storms seem to have the largest impact and strongest recovery (Figure 9). Event studies, however, do not control for other factors affecting GDP growth and, therefore, no causality could be established without an econometric analysis.



<sup>10</sup> United Nations Office for the Reduction of Disasters (UNISDR) and the Center for the Coordination of Natural Disaster Prevention in Central America (CEPREDENAC), 2015

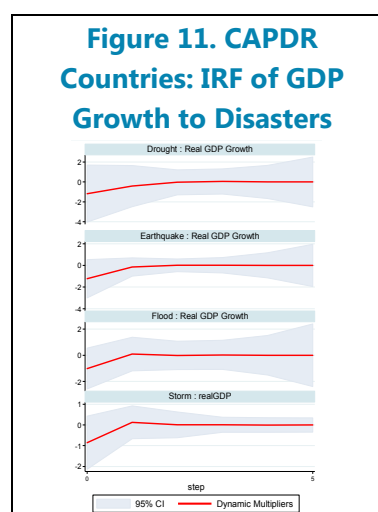
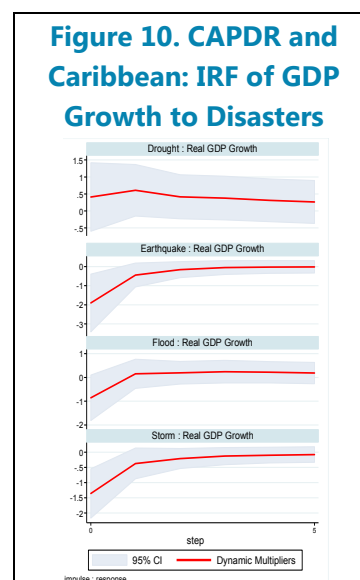
<sup>11</sup> Each country's most severe events in each category based on the population affected are selected. Impact on GDP growth is measured in simple average of the relevant countries.

**18. The empirical analysis for the Central American and Caribbean region confirms that disaster events, apart from drought, have a substantial negative impact on output growth.**

Following Fomby (2013) and Acevedo (2014), a vector auto-regression model (VAR) with exogenous shocks is constructed, controlling for domestic and external conditions.<sup>12</sup> The model estimates the dynamic effects on GDP growth from each of the four categories of disasters more relevant in the region.<sup>13</sup> Given the relatively similar exposure to disasters of the Caribbean region and CAPDR, the model is first run pooling the 18 countries together.<sup>14</sup> The impulse response functions show that earthquakes, floods and storms have an immediate negative impact on output growth ranging from 0.8 percentage points for floods to 1.9 percentage points for earthquakes (Figure 10). Although growth tends to recover in about three years, the damage to the output level is permanent. The direction of the impact of disasters on GDP growth is consistent with Acevedo (2014) estimates. Results on impact from droughts are inconclusive, as they seem to follow differing intra-regional dynamics.<sup>15</sup>

**19. Floods and droughts have a greater impact on growth in CAPDR, compared with Caribbean countries.**

Results for CAPDR countries indicate that floods have slightly greater negative impact than when the model is run for the pool of CAPDR and Caribbean countries (Figure 11).<sup>16</sup> The impact of droughts on CAPDR countries is consistent with intuition: an immediate negative deviation from the GDP growth baseline of 1.2 percentage points, which recovers in about 3 years.<sup>17</sup>



<sup>12</sup> See the Appendix for a full description of the model.

<sup>13</sup> The analysis includes disaster events beyond a minimum threshold. The threshold considered is defined as the ratio of people affected (number of fatalities plus 0.3 times the number of people affected) to total population being greater than 0.1 percent. This threshold applies to storms, floods and droughts events. For earthquake events, the threshold applied is 0.01 percent.

<sup>14</sup> Antigua and Barbuda, the Bahamas, Barbados, Costa Rica, Dominica, Dominican Republic, Grenada, Guatemala, Haiti, Honduras, Jamaica, Nicaragua, Panama, el Salvador, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, and Trinidad and Tobago.

<sup>15</sup> Results should be interpreted with caution due to the large standard errors of some estimates. Mean impulse-response functions can mask important case-specific differences. Large standard deviations are consistent with the large tail risks on disasters' impact.

<sup>16</sup> Acevedo (2014) estimated a higher the impact of floods on GDP growth in the Caribbean (3 percent), which could be explained by the longer period and improvements in our data series (see Appendix).

<sup>17</sup> It is possible that the lower agricultural contribution to GDP in most Caribbean countries makes their growth less sensitive to droughts. Furthermore, the tourism industry—which is relatively more important to Caribbean



**20. Disasters have negative impacts on fiscal revenue, exports and agriculture.** For CAPDR countries, the median estimates indicate that all categories of events cause a decline in the share of revenue as percent of GDP in the year of the event, which recovers in about 2 years. Earthquakes cause the large impact on revenue (about 5 percent of GDP on the event year), although they also show the strongest recovery ratio (Figure 12). The loss in tax revenue in absolute terms is more significant given that output growth already slows down in the event year.

**21. Impact of climatic disasters on exports is lagged.** Storms, droughts and floods reduce the growth of export-to-GDP ratio by a range of 11 to 24 percentage points 1 to 2 years after the event. Exports tend to recover only after 2 to 4 years after the event (Figure 13). The timing of the events, largely linked to the rain and hurricane season from May to October, the harvest season, which for most agricultural export product extends from October to March, and the time required to process export products, may partially explain these lags. The impact of the only geological disaster considered, earthquakes, is contemporaneous with the observed reduction in exports, possibly because it might affect directly export processing facilities and transport infrastructures.

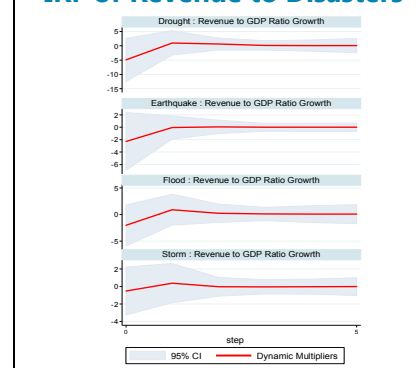
**22. As anticipated, climatic disaster events are found to have a negative impact on the agricultural sector.** Droughts, storms and floods reduce the growth of share of agriculture products in total primary commodity exports by 15 percent to 51 percent in the event year. The impact of earthquakes, however, appears to be less significant (Chart 14).

**23. The impact of disasters on GDP growth and fiscal revenue in Nicaragua is estimated to be among the highest in CAPDR.** While there is insufficient data to run the model for Nicaragua independently, the model was adapted to estimate the impact of floods and storms.<sup>18</sup> The result indicates that, on average, impact is greater than those observed for the average CAPDR country during the year event (Table 6), except for the impact of floods on GDP growth,

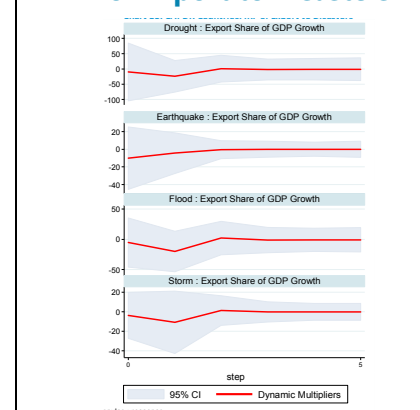
countries—may marginally benefit from extended dry periods. The same considerations affect the Caribbean coastal regions of CAPDR, as well the Dominican Republic. Together with the gap between rainfall and harvest, which tend to happen in different calendar years for the main export products, these could explain the relatively moderate observed incidence of droughts in CAPDR.

<sup>18</sup> Data on droughts and earthquakes events was insufficient to estimate their impact even under the simplified model.

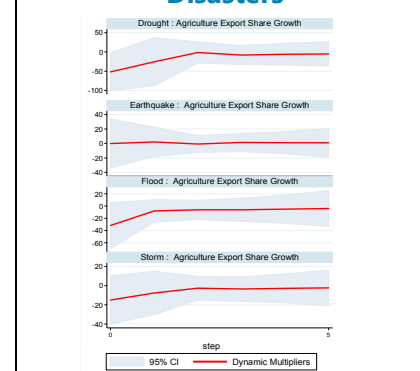
**Figure 12. CAPDR Countries: IRF of Revenue to Disasters**



**Figure 13. CAPDR Countries: IRF of Export to Disasters**



**Figure 14. CAPDR Countries: IRF of Agriculture to Disasters**





which is 0.4 percentage point smaller in the case of Nicaragua. Estimates of the decline in Nicaragua's revenue to GDP growth ratio are particularly large compared with its regional peers, possibly derived from the larger contribution of the agriculture sector to fiscal revenues. However, the smaller sample size increases the uncertainty of the estimates within a larger confidence band.

GDP growth (decline, pp)		Revenue to GDP growth (decline, pp)			
	CAPDR	NIC		CAPDR	NIC
Storm	0.85	1.74	Storm	0.52	2.5
Flood	1.01	0.61	Flood	2.04	8.68
Overall	0.93	1.18	Overall	1.28	5.59

Source: Fund staff estimation.

### C. Fiscal Preparedness

**24. Nicaragua lacks fiscal resources to deal with disaster events.** The public sector is directly and indirectly affected by disasters. In addition to the loss revenue estimated in the previous section, the costs of humanitarian aid and infrastructure reconstruction, among other, will increase fiscal expenditure. The sufficiency of fiscal space to address the losses from an extreme catastrophic event is measured by the IDB's Disaster Deficit Index (IDD).<sup>19</sup> The IDD compares the losses generated by extreme events with the available public sector resources, considering the probability of occurrence of these extreme events within the next 10 years. An IDD greater than 1 indicates that the country does not have the economic capacity to deal with disasters of that scale. The greater the IDD, the larger the gap between fiscal space and potential fiscal losses from disasters. For Nicaragua, the IDD has been consistently greater than 1 (Table 7), indicating that in an extreme event,<sup>20</sup> Nicaragua would not have sufficient fiscal resources or accessible financing to pay for the losses and replenish the capital stock affected. This index has been growing in time, indicating that the fiscal space has not coped with the increase in frequency and magnitude of disaster events. If a disaster of a severity equal to the largest that occurred in the last 50 years had stricken Nicaragua in 2012, the country would have necessitated 2.74 times the available fiscal space to cope with the fiscal impact.

	2000	2005	2010	2012
IDD50	1.17	1.29	2.49	2.74
IDD100	2.52	2.75	4.84	5.22
IDD500	4.02	4.24	6.07	6.30

Source: IDB (2015).

<sup>19</sup> IDB, 2015.

<sup>20</sup> The IDD measures three scenarios of extreme events: IDD50, the largest event that occurred in the last 50 years occurs within the next 10 years; IDD100, largest event that occurred in the last 100 years occurs within the next 10 years; and IDD500, the largest event that occurred in the last 500 years occurs within the next 10 years.

**25. Revenue loss due to severe disasters will reduce fiscal space.** As an alternative to the IDD, which is based on the extreme events' impact, Table 8 shows the Fund staff's econometric model estimates on the average impact of each type of severe disasters event on revenue, which ranges from 0.1 to 0.4 percent of GDP.

Floods pose the largest risk of fiscal losses due both to their higher frequency and average revenue impact. Total fiscal impact is likely to be well above these figures, as the fiscal cost to repair public

infrastructures, humanitarian aid and other public expenses are not included in these estimates. Given that the fiscal space in Nicaragua is limited, it is likely that the event of a severe flood would have a substantial impact on fiscal resources. To ensure fiscal stability, additional fiscal space needs to be built.

**Table 8. Estimation of Impact on Revenue**

	Storm	Flood	Earthquake	Drought
Number of Events in Model	8	9	5	4
Probability	0.12	0.14	0.08	0.06
Impact on revenue as % of GDP	-0.16	-0.39	-0.09	-0.11

Source: EM-DAT and staff calculation.

## D. Policy Response<sup>21</sup>

### Adaptation Measures

**26. Nicaragua has taken several measures to adapt to CCDs' risks.** At the technical level, the INETER plays an important role in developing a knowledge base and reinforcing the awareness to the risk of disasters. Hazards and vulnerabilities have been mapped for the most vulnerable municipalities in the country. Some building codes have been upgraded and enforcement has improved. Developing an early warning system and improve dissemination of information can significantly enhance preparedness and reduce events' impact. The World Bank estimates that every U.S. dollar invested in early warning system yields US\$4 in reduced losses.<sup>22</sup>

**27. Efforts are ongoing to strengthen the resilience of the agriculture sector.** With assistance from international organizations, progress has been made in diversifying agricultural products, extending irrigation and improving the resilience of crops to weather conditions. The Nicaraguan Institute of Insurance (INISER) have launched a new Agricultural and Livestock Insurance policy that offers protection to agricultural producers in the event of hazards such as climatic phenomena or biological hazards. This insurance product comes to fill an important gap in the range of financial services to cover CCDs' risks.

### Mitigation Measures

**28. Nicaragua adopted a comprehensive and multi-sectoral approach to disaster risk management.** In 2000, Nicaragua created the national disaster prevention and response plan and established the National System for Disaster Management and Prevention (SINAPRED) to coordinate the efforts and resources in responding to disasters in a timely and effective manner, as well as in rehabilitating and rebuilding the areas affected after the events. SINAPRED is also involved in strengthening the capacity of response to disasters. Prevention, mitigation and disaster relief is an

<sup>21</sup> See also IMF, 2016.

<sup>22</sup> World Bank, 2016.

integral part of the National Plan for Human Development, a top-priority, broad-based policy program of the government. The Plan confers SINAPRED an important role in issuing guidance to municipalities and individuals. Within the Plan, local communities, trade unions, and the civil society at large are part of the civil effort to implement adaptation, mitigation and disaster recovery measures, starting at the most basic level to raise citizens' awareness on how to react in case of disaster events.

**29. Significant progress has been made to improve financial preparedness.** Nicaragua established a National Disaster Fund (NDF), managed by the executive secretariat of SINAPRED. The size of the NDF, however, is insufficient to cover the fiscal costs of disasters. In 2016, the 40 million córdobas allocated to the NDF (about US\$1.4 million), were totally spent and no remnant was left for the following years. Law 337 mandates that local governments allocate funds for risk management activities within their jurisdictions. Nicaragua has made good use of the Caribbean Catastrophe Risk Insurance Facility (CCRIF). The CCRIF is a regional catastrophe risk insurance scheme developed under the technical leadership of the World Bank and financed by member countries and donors. While the Council of Finance Ministers of Central America (COSEFIN) negotiated the extension of the scheme to CAPDR countries in 2015, Nicaragua is the only country so far to subscribe to the negotiated policy. Nicaragua's annual premium of US\$3.5 million was paid by the World Bank. The country received catastrophe insurance payouts of US\$1.6 million during 2016.<sup>23</sup> Nicaragua also acquired contingent credit lines for disasters from the World Bank and IDB. If a disaster of certain magnitude strikes, the IDB would be ready to make US\$156 million available to the country. Concurrently, the World Bank would frontload all resources available in the pipeline.

**30. The World Bank is assisting in developing a reforestation plan.** The plan aims to reduce CO<sub>2</sub> emissions by 11 metric tons in 20 years through reforestation and prevention of deforestation and forest degradation. The program will be partly financed by the Green Climate Fund (GCF). GCF is designed to help developing countries finance clean energy, other mitigation efforts and adaptation to climate change. The fund is financed by major industrial countries, with the World Bank operating as its trustee. For lower income countries, it is advisable to continue exploring further opportunities to access international donors' resources to help financing mitigation measures.

**31. The use of renewable energies is increasing exponentially.** Clean primary energy sources already account for more than half of the primary electricity matrix (Table 9), while in 2006 their contribution was of only 30 percent. Nicaragua has abundant renewable resources and their use for electricity generation has been promoted through tax incentives. While hydroelectrical energy might face challenges from the impact of global warming on water reserves, geothermal and solar energy have a strong potential. A plan to

**Table 9. Power Generation in 2015**

	(GWh)	Share of total
Thermal	2689	59.4
Hydroelectrical	294	6.5
Gas Turbine	2	0.1
Geothermal	678	15.0
Wind	865	19.1
Solar	2	0.05
<i>Memorandum item</i>		
Clean energy share of total		50.6
Energy from petroleum		49.9
National Interconnected System	4531	100
Source: National authorities.		

<sup>23</sup> Corresponding to an earthquake near Chinandega in June 2016, and Hurricane Otto in December 2016.

increase the contribution of renewable energy sources to over 90 percent by 2020 is ongoing.

**32. The Nicaraguan authorities consider the Paris Agreement insufficient.**<sup>24</sup> Nicaragua is one of the few countries that did not sign the Paris agreement. The authorities believe that the goal of the agreement, i.e. reducing global warming to between 2 °C and 3 °C, fell short of the needs to contain global warming. Large industrial countries responsible for most CO<sub>2</sub> emissions did not take enough responsibility, agreed objectives were insufficient, and agreements to limit emissions were not legally binding. At the same time, small countries like Nicaragua continue to be vulnerable to the consequences of climate change without any specific compensation included in the agreement. However, despite the rejection to the agreement, the government is engaged in a high priority comprehensive plan to adapt and mitigate the effects of CCDs, as part of the National Plan for Human Development.

### Macroeconomic policies

**33. Macroeconomic policies have an important role in improving resilience and reducing the impact of disasters and climate change.** While there is a wide range of policies and actions that would have a bearing in reducing the vulnerabilities to CCDs, this section will focus on macroeconomic policy actions where the Fund has comparative advantage.

#### *Fiscal policy*

**34. CCDs' risk management should be undertaken within a comprehensive public financial management framework.** As discussed in Box 3 of the Staff Report, together with macroeconomic shocks and risks stemming from the social security institute and SOEs, climate change is among the top risks faced by public sector finances. As a first step, it is important to identify and quantify the relevant risks of disasters and climate change and inform the macroeconomic policy framework. The legislature and the public should have access to information on the most relevant risks and how the government plans to address them. This can be achieved by including CCDs' risk in a fiscal risk annual report to be incorporated to the medium-term budgetary framework. The fiscal risk report could describe and quantify the main fiscal risks, discuss their likelihood, and propose fiscal measures to mitigate and manage them. Sound macroeconomic data and fiscal transparency are critical for risk mitigation and contingency planning.

**35. Public investment in resilient infrastructure and incentives to encourage private sector investment in CCDs' risk mitigation are important components of a risk management strategy.** Despite progress, there remain significant infrastructure gaps in Nicaragua. Public spending on risk reduction needs to be consistent with fiscal space, debt sustainability, and absorption capacity. It is also important to continue to invest in education and healthcare to further reduce poverty and foster inclusive growth. Social safety nets need to be strengthened to help the households in poverty better deal with the impacts of disaster events. The private sector should be given appropriate incentives to encourage private investments in risk adaptation and mitigation.

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<sup>24</sup> Oquist, 2016.

Appropriate zoning rules and building codes can help ensure that physical structures are strong enough to withstand disasters.

**36. Fiscal policy needs to be counter-cyclical and adequate fiscal space should be built through public savings.** The fiscal stance should consider the need to progressively build contingent buffers in response to CCD risks. Thus, fiscal policy needs to be broadly counter-cyclical, creating fiscal space in non-disaster years that can be used to offset the adverse impact of future disaster events on public finances. Taking into consideration of the demand for disaster assistance and re-construction, the authorities should gradually build up a disasters-specific fiscal buffer of at least the average revenue cost of natural disasters plus the estimated impact on expenditure. It is important, however, that the fiscal effort to create additional fiscal space is spread along a sufficient timespan to not jeopardizing social and infrastructure programs critical for maintaining high rates of growth and reducing inequality. The size of this buffer should be reviewed at least annually in the context of the medium-term budget framework.

**37. Energy prices should be allowed to reflect the full range of environmental impacts.** Although Nicaragua contributes little to the global greenhouse gases, an appropriate pricing policy can help the country embark on a more environmental-friendly development strategy and improve revenue. Subsidies to electricity and public transportation need to be reduced. Electricity subsidies are estimated at 0.6 of GDP in 2016, and financed by both public and private resources. Subsidy is also provided to public transportation through reduced price for diesel and the VAT preferences. These subsidies are costly and inefficient—most of these subsidies are received by the households in the higher welfare quintiles.

### ***Monetary, Financial and Exchange Rate Policies***

**38. Further strengthening the financial regulatory and supervisory framework would increase resilience of financial institutions to climate change risks.** Disasters can threaten the health of the financial sector by undermining the repayment capacity of borrowers affected by disaster events and, thus, worsen asset quality. In addition to fully integrating CCDs' risks into the risk analysis and management system of financial institutions, increasing bank capital buffers and technical reserves for the insurance industry, taking into account exposure to CCD in provisioning policies, and a developing a reinsurance market that reduces the cost of catastrophic insurance, are among the measures conducive to enhance the capacity of the financial sector as whole to deal with disasters.

**39. Underdeveloped financial markets may delay or prevent the efficient reallocation of risks and financial resources.** Nicaragua can benefit from strengthening the legal and institutional basis of financial markets and making progress in improving financial literacy and financial inclusion. Financial deepening can help transfer the risks to entities most capable of bearing those risks. For instance, increasing access to financing and insurance for households and business can help mitigate financial stress.

**40. Under the current exchange rate framework, the optimal level of gross international reserves would be above conventional metrics.** Given the high exposure to CCDs, and the

increase in foreign currency demand associated to events, the central bank may have to conduct substantial foreign exchange interventions to maintain exchange rate stability within the crawling peg framework. Thus, a higher level of reserves will help prevent disorderly foreign exchange market developments. Eventually, the authorities may consider introducing some flexibility to allow the exchange rate to absorb external shocks and reduce the macroeconomic cost of CCDs.

## **The Role of the IMF**

**41. The IMF assists in building resilience to CCDs through policy advice, capacity building, and financing.** This paper is part of several pilots to better integrate the assessment on CCDs' risk within IMF's surveillance. The Fiscal Affairs Department of the IMF delivers technical assistance and training in topics related to climate change, particularly carbon taxation. The IMF's Rapid Credit Facility (RCF) and Rapid Finance Instrument (RFI) provide prompt assistance to countries with emergency balance of payments needs. The Fund recognizes the possibility that disasters may become more frequent and damaging than in the past, including because of climate change, and recently increased the annual access limits under the RCF and RFI from 37.5 percent of the quota to 60 percent of the quota.

## Annex I. Methodological Annex

1. **The methodology to estimate the macroeconomic impact of disasters follows closely Acevedo (2014).** Acevedo (2014) estimated the mean response of growth and debt to natural disasters in 12 Caribbean countries using vector auto regression model with exogenous variables. This paper estimates the macroeconomic impact of natural disasters in Nicaragua within the Central American and Caribbean context, using the same methodology.

2. **The use of complementary data sources improved the estimates.** Due to shortcomings in the Penn World Tables used in Acevedo (2014),<sup>1</sup> the information on macroeconomic variables in the Penn World Tables (v 9.0) was complemented with data from the IMF World Economic Outlook (2016) and the World

Bank World Development Indicators (WDI) (Table 1).<sup>2</sup> The source for disaster event data remains the Emergency Disaster Database (EM-DAT). The panel dataset includes series for 18 countries over the period 1950-2016. Data description is provided in Table 2.

Table 1. Source of Variables

Variables	Definition	Sources
Real GDP growth	Annual growth rate of real GDP	IMF, World Economic Outlook
Government revenue to GDP growth	Annual growth rate of general government revenue	IMF, World Economic Outlook
Investment share of GDP growth	Annual growth rate of investment as a share of real GDP	IMF, World Economic Outlook
Consumption share of GDP growth	Annual growth rate of consumption as a share of real GDP	IMF, World Economic Outlook
Inflation rate	Inflation rate	IMF, World Economic Outlook
Trade openness growth	Annual growth rate of of the sum of exports and import as share of real GDP	IMF, World Economic Outlook
Export share of GDP growth	Annual growth rate of real export to GDP share	Penn World Tables v.9.0 (variable openk)
Agriculture export of total export growth	Annual growth rate of agricultural raw materials exports (% of merchandise exports)	World Bank, World Development Indicators
Financial depth growth	Annual growth rate of domestic credit to private sector as a share of GDP	IMF, World Economic Outlook
Terms of trade growth	Annual growth rate of term of trade of good and service index	IMF, World Economic Outlook
World real GDP growth	Annual growth rate of world's real GDP	IMF, World Economic Outlook
Natural disaster variables	Defined in text	EM-DAT

<sup>1</sup> Some series present gaps and the latest available data corresponds to 2014.

<sup>2</sup> Specifically, investment share of GDP, consumption share of GDP and trade openness are complemented with IMF WEO data.

Table 2. Variable Description

Variable	CAPDR and Caribbean Countries					CAPDR Countries				
	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
Real GDP growth	975	3.57	4.12	-26.48	18.85	387	4.05	3.99	-26.48	14.19
Consumption share of GDP growth	785	0.36	9.48	-71.26	156.93	321	0.02	3.22	-12.34	19.45
Investment share of GDP growth	707	1.39	17.68	-72.85	213.78	325	2.28	20.82	-72.85	213.78
Trade openness growth	813	0.43	11.51	-71.50	117.06	321	1.28	11.94	-28.61	117.06
Government revenue to GDP growth	458	1.02	7.94	-31.40	28.21	156	0.85	5.90	-19.87	18.77
Credit to GDP ratio growth	813	2.81	14.12	-57.57	223.77	379	3.52	17.52	-57.57	223.77
Inflation rate	973	25.46	300.33	-14.74	7428.70	370	55.33	485.85	-14.74	7428.70
Agriculture export of total export growth	640	45.72	362.16	-99.62	5592.36	332	8.36	103.96	-90.35	1772.43
Export share of GDP growth	986	6.74	67.10	-94.82	1006.63	446	6.45	64.73	-94.82	1006.63
Terms of trade growth	835	0.81	13.05	-43.73	271.71	316	1.44	17.79	-30.05	271.71
World real GDP growth	970	3.95	1.45	-0.10	6.81	377	3.95	1.45	-0.10	6.81
Storm	1204	0.08	0.27	0.00	1.00	468	0.07	0.25	0.00	1.00
Flood	1204	0.05	0.23	0.00	1.00	468	0.10	0.30	0.00	1.00
Earthquake	1204	0.03	0.16	0.00	1.00	468	0.07	0.25	0.00	1.00
Drought	1204	0.03	0.16	0.00	1.00	468	0.04	0.21	0.00	1.00

3. **A dummy variable is used to determine the macroeconomic impact of each disaster.** As there are many disasters that do not have substantial impact, the estimates consider only severe events (Table 3). Severe disasters are defined as events which affect more than 0.1 percent of total population.<sup>3</sup> The severity dummy takes a value of 1 if it meets this threshold. This assumes that disasters with a significant macroeconomic impact are normally associated with a higher number of fatalities and individuals affected.

Table 3. CAPDR and Caribbean Countries: Number of Severe Events

Country	Storm	Flood	Earthquake	Drought
Antigua and Barbuda	6	0	0	1
Bahamas, The	8	0	0	0
Barbados	3	0	0	0
Costa Rica	5	9	6	0
Dominica	8	0	1	0
Dominican Republic	5	4	1	1
Grenada	2	0	0	0
Guatemala	4	4	8	5
Honduras	5	12	3	8
Haiti	13	9	1	8
Jamaica	7	5	0	2
St. Kitts and Nevis	4	0	0	0
St. Lucia	4	2	0	0
Nicaragua	8	9	5	4
Panama	1	6	2	1
El Salvador	3	3	6	2
Trinidad and Tobago	1	0	0	0
St. Vincent and the Grenadines	5	3	0	0
Total	92	66	33	32

4. **Model specification.** The model is set up as a fixed effects unbalanced panel with exogenous variables (VARX), and a  $p^{\text{th}}$  order vector auto regression with exogenous variable  $x$  can be written as:

$$y_t = v + A_1 y_{t-1} + \dots + A_p y_{t-p} + B_0 x_t + B_1 x_{t-1} + \dots + B_s x_{t-s} + u_t$$

where  $y_t$  is a vector of K endogenous variables, each modeled as function of  $p$  lags of those variables and a set of exogenous variables  $x_t$ , which include the severity dummy variables, world GDP growth, and terms of trade changes. The error term in the system is assumed to be both homogenous with mean zero and serially uncorrelated within and between equations. With the

<sup>3</sup> The affected population is calculated as the weighted average of the number of fatalities (with weight of 1) and the number of total affected individuals (with a weight of 0.3). Due to its lower frequency of occurrence, the threshold for earthquakes is set at 0.01 percent with a full weight on individuals affected to capture sufficient observations. The impact of earthquakes, thus, is likely to be underestimated.



presence of lagged dependent variables in the right-hand side of the system of equations, however, estimates would be biased even with large N (Nickell, 1981).<sup>4</sup> As a remedy, consistent estimates are obtained using the Generalized Method of Moments (GMM) proposed by Arellano and Bover (1995).<sup>5</sup>

5. **Selection of variables.** To assess the impact of disasters on GDP and fiscal revenue, the benchmark model investigates the impact of six exogenous variables on various endogenous variables presented in Table 4. To ensure stationarity of the time series involved, all variables are calculated as growth rates. The results presented in Table 5 indicate that the null hypothesis of a unit root is rejected for all series included. The impact on export and agricultural sector is estimated with two alternative model specifications to avoid further increasing the number of variables.<sup>6</sup> In the first one, the export-to-GDP ratio is used instead of trade openness. In the second specification, agriculture sector performance, proxied by the share of agricultural raw materials in total merchandise exports, replaces the revenue to GDP ratio.<sup>7,8</sup>

**Table 4. Endogenous and Exogenous Variables**

Endogenous Variable	Exogenous Variable
Real GDP growth	Storm
Government revenue to GDP ratio growth	Flood
Investment share of GDP growth	Earthquake
Consumption share of GDP growth	Drought
Inflation rate	Terms of trade
Private credit to GDP growth	World GDP growth
Trade openness growth	

**Table 5. Im-Pesaran-Shin unit-root test**

Variable	Statistic	p-value
Real GDP growth	-12.30	0.00
Consumption share of GDP growth	-19.32	0.00
Investment share of GDP growth	-18.21	0.00
Trade openness growth	-16.82	0.00
Government revenue to GDP growth	-10.71	0.00
Credit to GDP ratio growth	-13.86	0.00
Inflation rate	-6.16	0.00
Agriculture export of total export growth	-11.23	0.00
Export share of GDP growth	-18.10	0.00
Terms of trade growth	-18.19	0.00
World real GDP growth	-14.22	0.00

<sup>4</sup> Though the bias approaches zero as T gets larger.

<sup>5</sup> Instead of using first difference transformation, the GMM proposed by Arellano and Bover (1995) subtracts the average from all available future observations from the current observation, thereby minimizing data loss.

<sup>6</sup> Adding the exports and agriculture variables to the benchmark model without excluding any variables would result in over-identification, leading to non-convergence.

<sup>7</sup> Given the high volatility of the agriculture export share growth, extreme positive outliers are eliminated to reduce standard errors and improve accuracy of estimates.

<sup>8</sup> Impact on GDP and fiscal revenue is robust across all model specifications.

6. **Diagnostic tests.** To ensure model stability and to determine the lag structure of the model, stability condition and lag-selection tests were performed. Results of the eigenvalue condition for the benchmark model indicate that the VAR model satisfies the stability criteria (Table 6).<sup>9</sup> The optimal lag order was selected based on consistent moment and model selection criteria (MBIC, MAIC and MQIC), which is analogous to maximum likelihood-based model selection criteria. In this case, first order panel VAR is the

Table 6. Model Stability

Eigenvalue		
Real	Imaginary	Modulus
0.89	0.00	0.89
0.07	0.27	0.28
0.07	-0.27	0.28
0.14	-0.11	0.18
0.14	0.11	0.18
-0.17	0.00	0.17
-0.03	0.00	0.03

All the eigenvalues lie inside the unit circle.  
pVAR satisfies stability condition.

preferred model, since it has the smallest MBIC, MAIC and MQIC statistics for all model specifications (Table 7).<sup>10</sup>

Table 7. Lag Selection Criteria

lag	CD	J	J pvalue	MBIC	MAIC	MQIC
1	0.9	169.0	0.1	-670.9	-125.0	-343.4
2	1.0	101.6	0.4	-458.4	-94.4	-240.0
3	0.9	50.3	0.4	-229.7	-47.7	-120.5

7. **Impulse and response functions.** As the VAR is confirmed to be stable after the stationarity test, it can safely be rewritten in moving average form as:

$$y_t = \mu + \sum_{i=0}^{\infty} D_i x_{t-i} + \sum_{i=0}^{\infty} \phi_i u_{t-i}$$

The formula above shows the vector moving average representation of the VAR, where the endogenous variables are expressed as a function of a constant vector ( $\mu$ ), the exogenous variables ( $x$ ) and the current and past values of the error terms. To extract and visualize the disaster impact, we use the coefficient  $D_i$  (normally referred as dynamic multiplier functions or transfer functions) on the exogenous disaster variables to derive the impulse and response functions, which illustrate both the contemporaneous shift and subsequent dynamics of macroeconomic conditions due to a disaster event. An upper and lower bound are reported to represent a 95 percent confidence interval using Monte Carlo simulation. Thus, the response of the growth rate of four main economic variables (real GDP, export-to-GDP ratio, revenue-to-GDP ratio and agriculture share of exports) to the shock of each disaster type (storm, flood, earthquake and drought) are presented separately under different disaster scenarios.

<sup>9</sup> Models under alternative specifications also fulfill the stability condition.

<sup>10</sup> For simplicity, the table only presents the result of the benchmark model. Results of alternative model specifications result in the same lag selection.

## References

- Acevedo, Sebastian. 2014 "[Debt, Growth and Natural Disasters: A Caribbean Trilogy](#)", IMF Working Paper WP/14/125
- Abrigo, M. and Love, I., 2015, "Estimation of Panel Vector Autoregression in Stata: a Package of Programs", University of Hawaii working paper.
- Arellano, M. and O. Bover, 1995, "Another look at the instrumental variable estimation of error-components model", *Journal of Econometrics*, 68(1), 29-51.
- Bello, Omar. 2017 "[Desastres, crecimiento económico y respuesta fiscal en los países de América Latina y el Caribe, 1972-2010](#)", CEPAL Review No. 121, April 2017
- Burke, Marshall; Hsiang, Solomon M; and Miguel, Edward. 2015 "[Global non-linear Effect of Temperature on Economic Production](#)", *Nature*, Vol 527, pp 235-250
- Dell, Melissa; Jones, Benjamin F; and Olken, Benjamin A. 2012 "[Temperature Shocks and economic Growth: Evidence from the Last Half Century](#)", *American Economic Journal* 2012, 4(3), pp 66-95
- Fomby, Thomas; Ikeda, Yuki; and Loayza, Norman. 2013 "[The Growth Aftermath of Natural Disasters](#)", *Journal of Applied Econometrics*, Vol 28 (3), pp 412-434
- Intergovernmental Panel on Climate Change (IPCC) 2014. "[Climate Change 2014: Synthesis Report Summary for Policymakers](#)". Geneva.
- International Monetary Fund (IMF) 2016 "[Small States' Resilience to Natural Disasters and Climate Change—Role for the IMF](#)", IMF Policy Paper
- Inter-American Development Bank (IDB) 2015 "[Indicadores de Riesgo de Desastre y de Gestión de Riesgos](#)" *Programa para América Latina y el Caribe*. Inter-America Development Bank
- Kreft, Sonke; Eckstein, David; and Melchior, Inga 2017 "[Global Climate Risk Index 2017](#)", Germanwatch.
- Nickell, S.J., 1981, "Biases in dynamic models with fixed effects", *Econometrica*, 49(6), 1417-1426.
- Oquist, P. 2016, "Nicaragua y su posición ante el acuerdo de París", presentation to the Diplomatic Corps accredited in Nicaragua, June 7.
- Riebeek, H. 2005, "[The Rising Costs of Natural Hazards](#)", NASA Earth Observatory, March 28, 2005
- Tol, Richard S. J. 2009 "[The Economic Effects of Climate Change](#)", *Journal of Economic Perspectives*, Vol 23 (2), pp 29-51

Tol, Richard S. J. 2014 [“Correction and Update: The Economic Effects of Climate Change”](#), Journal of Economic Perspectives, Vol 28 (2), pp 221-226

United Nations Office for the Reduction of Disasters (UNISDR) and the Center for the Coordination of Natural Disaster Prevention in Central America (CEPREDENAC), 2015, “Informe Nacional sobre Gestión Integral del Riesgo de Desastres Nicaragua – 2013”, December

Van Aalst, M. K. 2006, [“The Impacts of Climate Change on the Risk of Natural Disasters”](#). *Disasters*, 30: 5–18, Blackwell Publishing

World Bank 2013 [“Climate Change Impacts on Water Sources and Adaptation in the Rural Water Supply and Sanitation Sector of Nicaragua”](#), the World Bank Latin America and Caribbean Region Environment and Water Resources Occasional Paper Series

World Bank 2015 [“Agricultural Risk Management in The Face of Climate Change”](#), the World Bank Agriculture Global Practice Discussion Paper 09

World Bank 2016 [“Confronting Drought in Africa’s Drylands”](#), the World Bank, Washington D.C.

# NICARAGUA: COPING WITH TRANSFER PRICING; THE SPECIAL CASE OF COMMODITIES AND FREE TRADE ZONES<sup>1</sup>

## A. Introduction

**1. One of the distinguishing characteristics of Nicaragua's tax system is the extensive use of exemptions and incentives to prop up economic activity, especially exports.** Export Tax Free Zones (FZ) were introduced in 1991<sup>2</sup>, allowing investors to import inputs exempt from tariff duties and VAT (as most special export zones do), but they also enjoy an exemption on corporate income tax (CIT).<sup>3</sup> Exporters outside FZ also benefit from other tax incentives, for example, a CIT credit is available for up to 1.5 percent of the value of exports.<sup>4</sup>

**2. Exports have increased substantially thanks to foreign direct investment (FDI) in manufacturing in FZs.** Nicaragua's economy has globalized quite significantly. Annual trade represents about 95 percent of GDP (2016), while net inflows of FDI have averaged nearly US\$ 800 million annually over the past five years<sup>5</sup>. An important industry has developed in FZs around the assembly of harnesses and apparel destined to international markets, representing a large proportion of Nicaragua's total exports (Table 1). This activity represents now a significant source of employment.<sup>6</sup> However, a growth strategy driven preeminently by tax exempt sectors may crucially dampen the state's capacity to mobilize revenues for development in the long-run, which may represent eventually a significant policy challenge.

**3. Globalization of the economy poses an additional tax policy challenge for Nicaragua.** Inevitably, integration into the world economy brings along the complication of taxing multinational corporations. Globalized industries subject to CIT are exposed to tax base erosion and profit shifting

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<sup>1</sup> Prepared by Roberto Schatan, with the assistance of Rosalind Mowatt.

<sup>2</sup> FZ were first introduced in 1976, but they were short lived.

<sup>3</sup> User firms of FZ are exempt of CIT for 10 years, renewable for a second term; after they benefit from an exemption of 60 percent. Service and interest payments to foreign residents are also exempt. Ley de Zonas Francas de Exportación, octubre 8, 2015 (art. 20)

<sup>4</sup> Maquila-type exports outside FZ enjoy this benefit as well as VAT and tariff exemptions for temporary imports. This regime is known as "Régimen de Admisión Temporal para Perfeccionamiento Activo". Ley (No.302) de Admisión Temporal para el Perfeccionamiento Activo y de Facilitación de las Exportaciones, 19 de marzo, 2001.

<sup>5</sup> Source, BCN.

<sup>6</sup> The FZ employed over 110,000 workers in 2016, representing two thirds of total manufacturing employment in Nicaragua; source, BCN.

(BEPS)<sup>7</sup>, especially through the manipulation of transfer pricing (TP) of cross-border transactions<sup>8</sup>. A similar complication may arise with domestic companies that operate with the FZ, as TP can serve to shift profits from the domestic economy into the FZ. The flipside is that profits shifted out of FZ via transfer pricing may seem innocuous, since those profits are not taxed in Nicaragua. However, TP manipulation may result in underestimating tax expenditures associated with the FZ. As explained below, it can be in the interest of transnational enterprises to undervalue exports even if profits are not taxed in Nicaragua.

**Table 1. Nicaragua: Exports by Product, 2016**  
(US\$ millions)

	<i>Non-Zona Franca</i>	<i>Zona Franca</i>
<b>Live animals and products of animal origin</b>	<b>835</b>	<b>96</b>
Meat	437	0
Fish & crustaceans	193	95
Milk and dairy products, eggs, honey	168	1
Other	36	0
<b>Vegetable products</b>	<b>641</b>	<b>46</b>
Coffee, tea, mate and spices	406	0
Oil seeds and oleaginous fruits	109	6
Other	126	39
<b>Prepared Foodstuffs; Beverages, Spirits, and Vinegar; Tobacco and Manufactured Tobacco Substitutes</b>	<b>287</b>	<b>204</b>
Sugars and sugar confectionery	133	0
Tobacco and manufactured tobacco substitutes	41	203
Other	113	0
<b>Textiles and Textile Articles</b>	<b>5</b>	<b>1347</b>
Articles of apparel and clothing accessories	1	1286
Other	4	61
<b>Precious Metals</b>	<b>370</b>	<b>7</b>
<b>Machinery and Appliances; Electrical Equipment</b>	<b>19</b>	<b>660</b>
Electrical machinery and equipment	5	659
Other	13	1
<b>Other exports</b>	<b>146</b>	<b>121</b>
<b>TOTAL</b>	<b>2303</b>	<b>2480</b>

Sources: Country authorities and IMF staff calculations

**4. Nicaragua has strengthened somewhat its international taxation framework, especially TP, but this has not become operational yet.** TP legislation was adopted in 2012<sup>9</sup>, allowing four years before it became effective, so that taxpayers and tax authorities could prepare for it. However, as the date came due, the task appeared quite daunting for all stakeholders. Its entry into force was

<sup>7</sup> The OECD discussed in detail the problems in international taxation leading to BEPS. See OECD (2013a); OECD (2013b). Recommendations on how to address BEPS summarized in OECD (2015c).

<sup>8</sup> Revenue losses, while probably significant, can be easily exaggerated. One source of confusion is with what some authors call 'illicit flows', which is the difference resulting from contrasting export data from one country with the import data from the destination country (and vice versa). That difference could be explained in more than one way, some due to illicit trade, but not due to TP manipulation, which is not carried out by differences in the invoices presented in exporting and importing countries. See for example, El Nuevo Diario, *Precios de transferencia dejarán US\$300 millones*, Nicaragua, noviembre 20, 2015, citing CEPAL (2016) p. 135.

<sup>9</sup> Ley de Concertación Tributaria (LCT), diciembre 17, 2012. (Ley No. 822). Arts. 93-106.

postponed till June 30, 2017.<sup>10</sup> This new date is now close and whether the administration's capacity is up to the challenge is still an open question<sup>11</sup>. But there is also an issue about priorities and simplifying the system, to make TP work where it matters. This section of the report discusses some aspects in the design of a TP regime that deserve special attention in Nicaragua.

## B. Transfer Pricing on Commodities

**5. Applying the arm's length principle for related party transactions is the standard to avoid profit shifting through TP.** There are various methods, as established by Organization for Economic Cooperation and Development (OECD) guidelines,<sup>12</sup> which can be applied to verify that a transfer price is arm's length, among them, the most intuitive: comparing the transfer price agreed in the controlled transaction with the price paid in the market (among independent parties) for a comparable good traded in similar circumstances. This is the Comparable Uncontrolled Price (CUP) method. At first sight, this method could be most useful for benchmarking commodity TP, since commodities—relative to other goods—are more homogenous, are traded in very efficient and well organized international markets and have normally a daily, publicly quoted price. However, related parties often price commodity exports following other methods that may easily erode the tax base of the producer country.

### Commodity exports are important for Nicaragua

**6. The taxation of income from commodity exports is a sensitive issue for developing countries and Nicaragua is no exemption.** For many developing economies commodity exports are a very significant proportion of their income tax base; at the same time, they represent the more modern and globalized sector of their economy, where large international businesses operate. Consequently, this tax base is particularly vulnerable to aggressive international tax planning, which can shift income away from producer countries.<sup>13</sup>

**7. Nicaragua's exports originating outside the FZ are mostly commodities.** The top five commodities<sup>14</sup> (meat, coffee, gold, sugar and oil seeds) represent around 60 percent of Nicaragua's total non-FZ export (Table 1). Another US\$397 million worth of commodity exports originate in the FZ (2016). The most important activity in the FZ in Nicaragua is a sizeable and labor intensive manufacture, dominated by apparel and auto harnesses (included in electrical equipment), sectors that represent by themselves not far from half of Nicaragua's total foreign trade. These sectors imply a different tax policy challenge, which is discussed in section D below.

<sup>10</sup> Ley No.922, December 17, 2015.

<sup>11</sup> ¿Listos para los precios de transferencia?, *La Prensa*, Nicaragua, diciembre 19, 2016.

<sup>12</sup> OECD (2010).

<sup>13</sup> OECD discussion on BEPS specifically addresses the issue of commodity pricing, which is discussed below. See OECD (2015b) <http://dx.doi.org/10.1787/9789264241244-en>

<sup>14</sup> Commodities understood as primary goods which have a daily international price benchmark.

## Tax Planning with Commodity Pricing

**8. Locating a related intermediary in a low tax jurisdiction, which allegedly provides a trading service, is a common tax planning strategy.** The scheme is essentially very simple: the intermediary performs no real functions, but it pays a low price for the commodity and resells it at spot prices to the final customer, keeping the difference, allegedly, as a payment for a marketing (or other similar) service. The goods, of course, are shipped directly to the customer with no intervention by the intermediary, except for issuing the contracts. There are a number of variants to the same scheme, but they all ultimately create a wedge between the international quoted price for the commodity in question and the price paid to the production affiliate. It reduces the tax base in the exporting country, which is kept in the dark as to the final price and customer of the commodity it exports.

**9. Another scheme to transfer profits from the producing country is to sign contracts retroactively selecting dates when the spot price was lowest within a certain period.** The trade will also be made typically through an intermediary (a related party) in a low tax jurisdiction which contractually resells the commodity at the current spot price. This amounts simply to backdating contracts, which can be done because they are, for all practical purposes, in-house contracts.<sup>15</sup>

**10. Often taxpayers do not refer their commodity exports to internationally quoted prices; they resort instead to a profit-based valuation method.** There are primary products that do not have a deep and transparent market and thus a CUP method may not apply. In such cases, other (OECD accepted) TP methods may be more appropriate. Alternative methods normally target the profit rate obtained by independent parties engaged in business activities comparable to that of the taxpayer.<sup>16</sup> But comparable businesses do not mean identical; comparability for TP purposes means sufficiently similar so that differences do not affect the price significantly or can be reasonably adjusted for. There is room for discretion in deciding when comparability is reasonable, which can become a contentious issue; comparability standards employed by taxpayers will tend to be much stricter with CUP than with other methods and it is objectively very difficult for tax authorities to determine when this asymmetry is being stretched too far to switch to a “profit method” (which may give very different results).

## Protecting the Tax Base

**11. Many developing countries, especially in Latin America, have limited the discretion taxpayers may exercise in pricing controlled commodity transactions.** Argentina’s is probably the stricter approach. Exports of primary goods sold to a related party which is a conduit entity, different from the final customer, must be valued according to quoted prices in international

<sup>15</sup> Manipulation could also occur with strike prices in controlled future contracts.

<sup>16</sup> See OECD *TP Guidelines* (2010), op cit. Profits rates (either gross or operational profits) can be measured in various ways for this purpose.



markets at the date of shipment.<sup>17</sup> The approach is particularly strict because it does not allow for adjustments to the international spot market price (for example, a quote from the London Metal Exchange) to reflect differences with the taxpayer's actual transaction, such as shipping costs and quality grades. Uruguay has a similar TP regime for commodities but allows adjustments for insurance and shipping costs, and taxpayer's transactions with independent customers (an internal comparable) are also accepted.<sup>18</sup> Mexico has a different approach: it prioritizes the use of CUP, as defined by OECD (thus, with reasonable adjustments), in all transfer pricing cases.<sup>19</sup>

**12. Nicaragua has no regulation specific to TP on commodities; this is a concern for authorities and should be reviewed.** Given the importance of commodities in Nicaragua's foreign trade and the need for relatively simple TP rules, Nicaragua could benefit from Latin American experience in protecting the commodity tax base. The rest of this section discusses what could be a balanced regulatory approach for Nicaragua.

### ***Most Appropriate Method***

**13. A key issue is that taxpayers should not cursorily reject the CUP method.** Without regulation prioritizing CUP for pricing controlled commodity transactions, taxpayers will typically argue that such method can apply only with the maximum level of accuracy for comparability, accepting spot market benchmarks only for identical commodities<sup>20</sup> and thus dismissing CUP routinely in favor of a profit method. The problem is, in a nutshell, that the marginal producer tends to set the international reference price for commodities and this price determines the economic rents obtained by competitors which enjoy production advantages. Since these advantages vary quite substantially from one commodity producer to another (they may change, for example, from one end of a mine to another), trying to impute a profit margin to a commodity producer from averages profits made by 'similar' operations, may completely misplace taxation rights on very sizeable economic rents. This error is avoided if TP is determined as a reference to an actual (and relevant) commodity price. Developing countries have moved farther than the OECD in this respect, but with differing approaches. The OECD was noticeably careful when evaluating this issue in its work on BEPS; it only went as far as saying that "... *the CUP method would generally be an appropriate transfer pricing method for commodity transactions between associated enterprises...*".<sup>21</sup> Nicaragua could justifiably aim at being more ambitious than OECD consensus on this topic, examining cautiously other countries' experiences (see Box 1).

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<sup>17</sup> Introduced in 2003, it pioneered this type of regulation, often called the 'Sixth method'. Ley de Impuesto a las Ganancias, art 15, sixth paragraph (which explains the name for this method). The 'Sixth Method' does not apply when the intermediary abroad complies with certain conditions that would indicate it is an actual trader and not simply a paper entity; further discussed below.

<sup>18</sup> Dirección General Impositiva (Uruguay), Decreto 56/009, enero 1, 2009. It also allows date when contract is registered with authorities.

<sup>19</sup> Ley del Impuesto sobre la Renta (Mexico), art. 180.

<sup>20</sup> BDO (2015), p.4

<sup>21</sup> OECD (2015b), p. 53.

## **Adjustments**

**14. Potential problems remain even when a CUP is applied.** Although commodities are generally very homogenous products, their actual price may reflect physical and other differences. International standards seek TP to reflect those differences, permitting adjustments to the quoted market price to accommodate the actual transaction carried out by the taxpayer. Arguably, this is a difficult task for a small tax authority such as Nicaragua's, with very scarce resources. The case could be made for limiting the types of adjustments allowed to the market spot price, for example, adjustments for shipping and insurance costs and quality differences, and possibly aim at setting a small range around the market price to consider for other differences. Allowing no adjustment is evidently too strict and allowing them only for some commodities is somewhat arbitrary, while permitting them only under certain circumstances could be very difficult to manage.

## **Contract Dates**

**15. Contracts among related parties can be set to benefit the enterprise and sacrificing the interest of any one of the contracting parties.** Further, contracts can be simulated, for example, backdating can shift profits even when applying CUP. Several countries have taken away discretion from taxpayers and regulate the date in which the price is verified for valuing a commodity transaction. There are options: the date of shipment is one unbiased reference; or the average price for several days before or after that date is equally unbiased. Countries like Uruguay allow taxpayers to register contemporaneously contracts with the tax authorities, so that the date of the contract can be accepted for anchoring the date of the quoted price. These are logical anti-abuse measures to protect the integrity of a CUP method which could be adopted in Nicaragua. However, allowing contract dates according to non-defined "industry practices", as it used to be in Peru,<sup>22</sup> undermines the anti-avoidance purpose of the rule. Allowing only the shipping date as a reference might be more restrictive than necessary.

## **Conduit Traders**

**16. Applying specific anti-abuse measures only to commodity transactions with (related) shell companies may be too narrow.** The "Sixth method" is often applied only when the foreign customer is a related party that operates as a "paper" entity which is not the final destination of the exported commodity. One fundamental problem with this exemption is that it is very hard for the tax authority to verify the taxpayer's version of the facts, even if the burden of proof is with the taxpayer. This is particularly difficult if paper transactions were carried out through entities that have other real functions. But regardless of simulations, an entity with real business functions, for example, the refiner of mining products, may have reasons to shift profits away from its related mineral producing affiliate (lower tax rate, losses, etc.). This alone would suggest not to target the anti-avoidance rule too narrowly. A simpler, less strict, but more general rule could be more appropriate for Nicaragua.

<sup>22</sup> Ley del Impuesto a la Renta (Perú), art. 32-A, e). Modified by Decreto Legislativo 1312, December 31, 2016.

### Box 1. Nicaragua: Commodity TP Regulations in Developing Countries

#### Several countries in Latin America have privileged CUP for pricing controlled commodity transactions.<sup>1</sup>

Argentina's is probably the stricter approach and the origin of what has been branded as the "Sixth Method" (introduced in 2003). Exports of primary goods sold to a related party that is deemed to be a conduit entity, different from the final customer, must be valued according to quoted prices in international markets at the date of shipment.<sup>2</sup> The 'Sixth method' does not apply when the intermediary abroad complies with certain conditions that would indicate it is an actual trader and not simply a paper entity. The approach is particularly strict because it does not allow for adjustments to the international market price (for example, a quote from the Chicago Mercantile Exchange) to reflect differences with the taxpayer's actual transaction, such as shipping costs and quality grades.

**There are different approaches, some more flexible.** Uruguay also allows only a CUP method for commodities but allows adjustments for insurance and shipping costs; taxpayer's transactions with independent customers (internal comparables) are also accepted as pricing benchmarks.<sup>3</sup> Uruguay also allows taxpayers to register contemporaneously contracts with the tax authorities, so that the date of the contract can be accepted for anchoring the date of the quoted price. Colombia does likewise, and accepts other evidence that date of contract is legitimate.<sup>4</sup> Since 2013 the law in Brazil<sup>5</sup> only permits CUP for commodities and authorizes the tax authority to determine what will be considered as commodities and which commodity exchange should be recognized for applying that method; the use of publications from authorized institutions in the case of commodities not traded on a stock exchange market are allowed as well. Freight and insurance costs and an average market premium, can be considered when comparing with the benchmark. Also, a "divergence" margin of 3 percent is permitted,<sup>6</sup> Mexico has a different approach: it prioritizes the use of CUP, as defined by OECD (thus, with reasonable adjustments), in all transfer pricing cases.<sup>7</sup> Ecuador instead recently repealed its 'Sixth Method' to adopt the OECD approach, which allows taxpayers to freely determine (and justify) which is the most appropriate method case by case.<sup>8</sup>

<sup>1</sup> OECD (2015b), p. 53.

<sup>2</sup> Ley de Impuesto a las Ganancias, (Argentina), art 15, sixth paragraph (which explains the name for this method).

<sup>3</sup> Dirección General de Impuestos (Argentina), Decreto 56/009, January 1, 2009. It also allows date of registering contract.

<sup>4</sup> Estatuto Tributario (Colombia), art 260-3.

<sup>5</sup> Brazil, Law 12715/12.

<sup>6</sup> IN1.312/12.

<sup>7</sup> Ley del Impuesto sobre la Renta (Mexico), art. 180.

<sup>8</sup> Ecuador, Decreto 973, 19 de abril, 2016

## C. The Additional Problem with Free Zones

**17. Some agro-industrial products are exported from FZs, free from CIT.** Capital mobility, that is, enterprises that can easily move from one country to another and are therefore in stronger negotiating position, has fostered intense tax competition among nations.<sup>23</sup> CIT rates dropped considerably in most countries, while special tax free zones competing for FDI have flourished in Central America and the Caribbean. FZs in Nicaragua are an expression of this international competition to attract foreign businesses. Less mobile capital is thus a more secure source of taxation, for example, income from immovable property, exploitation of natural resources, or enterprises that need to be close to their consumption market. Generally, primary exports are closer to this end of the spectrum. Consequently, CIT exemptions for modern primary exports sectors, which may enjoy considerable economic rents, are harder to justify.

**18. Agro-industrial processes may be subject to locational decisions and thus sensitive to international tax competition.** Developing countries have traditionally sought to increase the value-added of their commodity exports. Allowing agro-industrial activities to develop in the FZ, in the understanding that they would otherwise continue to locate abroad, would explain this policy. However, this policy introduces additional TP risk for Nicaragua's tax base, as purchases of primary goods into the FZ could also transfer domestic corporate profits into the Zone through TP abuse. In this way, a routine and relatively simple manufacturing function in the FZ, packaging for example, could concentrate a very high proportion of the total profits generated in the whole value chain controlled by an enterprise operating on both sides of the FZ, de facto extending the tax exemption well beyond the FZ. The potential tax revenue costs in such cases could undercut the benefits of the FZ whenever unprotected from TP manipulation. Although the current tax legislation in Nicaragua requires that transactions with related parties in the FZ be priced at arm's length, in the absence of more detailed regulations for commodities, it can be easy to plan around them.

**19. The problem can be compounded with high value-added agro-industrial activities.** Transforming primary products into manufacturing goods may require very specific know-how, which international markets may associate closely with certain jurisdictions; sometimes this can be legally protected as a denomination of origin, or as registered international brands. These intangibles, which may represent significant economic rents for taxpayers, can be registered anywhere and in this regard they represent a very mobile asset. However, when the intangible is driven by a distinct locational reputation (a Mexican tequila, a Cuban cigar, a Colombian coffee) the actual activity cannot migrate without losing its reputational value. Countries often have some type of protection against the tax consequences from the legal migration of brands (or other intangibles), including a deemed capital gains tax upon exit. TP can weigh in by requiring that transfer of the intangible must have the effect (for tax purposes) of a deemed sale valued at arm's length and thus consistent with royalties paid thereafter. Otherwise, countries with a territorial system, such as Nicaragua, are particularly vulnerable. Migrating a brand abroad, so that it is held by a foreign

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<sup>23</sup> IMF (2014).

subsidiary, would generate deductible royalty payments for the Nicaraguan user but the corresponding earnings would be considered foreign source income and remain untaxed.

**20. Transfer pricing rules can protect the tax base of companies dealing with the FZ.** It is accepted practice that the tested party, i.e. the party that must demonstrate that it operates at arm's length, be that which carries out the simpler functions in the transaction in question. That could be the case of the affiliate in the FZ if its function is fundamentally that of packaging or reselling a primary product. It would then be rewarded accordingly, probably with a relatively low profit margin, keeping the full residual profit in the head of the domestic commodity producing affiliate.

#### D. Transfer Pricing and Tax Expenditures in Nicaragua's Free Zones.

**21. In an earlier study, tax expenditures (TE) from the CIT exemption in FZ were estimated at 0.24 percent of GDP (2013).**<sup>24</sup> This is probably underestimated for more than one reason. One of them is that the calculation is based on data filed by the companies established in the FZ, whose income is exempt from tax and thus not audited for its veracity. Moreover, assembly plants of multinational enterprises operating in FZs are set up typically as costs centers, so profits shown in their balance sheets are just enough to fund expansion programs or some backup reserves. Intra-company services are priced to that effect, eliminating the need for an explicit repatriation of profits to whichever affiliate of the group performs treasury functions. So, the actual revenues registered by companies in the FZ, most probably, will not be arm's length.

**22. A more recent study, with a different methodology, estimated TE for FZ at 0.48 percent of GDP (2014)**<sup>25</sup>. The new methodology, rather than relying entirely on the profits declared by entities in the FZ, calculates an effective average CIT for the rest of the Nicaraguan economy and applies it to the gross revenues declared by those entities. The estimation error however is not fully corrected since revenues are also a function of transfer pricing.<sup>26</sup> Nonetheless, the result might be closer to the real TE in FZ: assuming an arm's length return for a typical assembly plant in the American market of 6.5 percent over total cost and expenses,<sup>27</sup> as benchmarked by Mexico's safe harbor<sup>28</sup> rule for *maquiladoras*, the TE for FZs in Nicaragua would be above 0.4 percent of GDP.<sup>29</sup>

**23. The potential magnitude of TE (measured at arm's length) should be kept in mind when considering renewal of CIT benefits in the FZ.** In the longer-run, an option for a smooth

<sup>24</sup> The TE includes both the net alternative minimum tax (1 percent on turnover) and the CIT forgone above that minimum. Cortes Selva (2014).

<sup>25</sup> Dirección General de Políticas y Estadísticas Fiscales (2016), p. 27.

<sup>26</sup> At the same time, assuming that the industry in the FZ should have a profit margin similar to the average in Nicaragua's domestic economy, including banking and other sectors which may enjoy some economic rents, might lead to an overestimation of the TE.

<sup>27</sup> Ley del Impuesto sobre la Renta (Mexico), art. 182, II.

<sup>28</sup> A Safe Harbor for transfer pricing purposes is a rule whereby the authority establishes publicly a minimum profit margin above which a specific industry, under defined circumstances, would comply with the arm's length principle.

<sup>29</sup> Total cost and expenses is obtained from subtracting profits from total exports; profits are equal to the CIT TE for FZ registered in Cortes Selva (2014) divided by the CIT rate.

transition out of the CIT exemption granted within the FZ should be devised, substituting the current 60 percent reduction in the rate after a (potentially) 20-year tax holiday. Instead, immediately after the initial ten-year term expires, entities in the FZ could transit into a safe harbor determining a minimum taxable profit margin, with which taxpayers would comply with all TP requirements. The full statutory CIT rate should apply to that profit margin. Otherwise, when companies now reach the end of their tax holiday in the FZ, they may pay a reduced CIT rate on very little, unless Nicaragua enforces complicated TP rules. The simplicity and certainty of a TP safe harbor, which will generate positive tax revenues, seems an attractive policy option for Nicaragua FZ.

## E. Conclusion

### 24. Nicaragua might consider developing its TP practice concentrating its efforts on two key areas: commodities and *maquiladoras*.<sup>30</sup>

- The induction into TP compliance and enforcement could be eased with more comprehensive regulation on commodity trading. Some measures that could be adopted:
  - Identify key commodities that should be subject to special treatment.
  - Prioritize CUP as the most appropriate TP method to value those commodities.
  - Extend this priority to all controlled transactions of such commodities.
  - Define specific (short list) of TP adjustment allowed (e.g., transport, quality, volume, type of contract).
  - Set reference price on shipping date, or average for short period around that date (e.g. one week), and allow registering contract so that contract day can be used also.
  - Revert tested party to foreign or FZ related party to price services they may provide in connection to Nicaraguan commodity exports, especially when relatively simple, routine agro-industrial activities operate in the FZ. Pricing them accordingly will place the residual profit in the domestic value chain.
  - Consider an exit tax on a deemed sale when intangible property is transferred to the FZ or abroad.

Consider adopting a TP Safe Harbor option, defining a minimum arm's length profit margin, as an exit strategy for companies benefiting from tax holidays in the FZ. The Safe harbor would apply instead of renewal of tax privileges.

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<sup>30</sup> Limitations to interest payments deductions is another area interest for TP in Nicaragua, but not discussed in this paper. See OECD (2015a).

## References

- BDO (2015), "Argentina, and the so-called "sixth method"", *Transfer Pricing News* No 16, Feb. 6.
- CEPAL (2016), *La Agenda 2030 para el Desarrollo Sostenible y los Desafíos del Financiamiento para el Desarrollo*, Santiago Chile.
- Cortes Selva, Ana (2014), "Gasto Tributario y Evasión en Nicaragua: 2010-2013", Ministerio de Hacienda y Crédito Público, Managua, Nicaragua.
- Dirección General de Políticas y Estadísticas Fiscales (2016), "Actualización de Gasto Tributario de Nicaragua, 2013-2014", Ministerio de Hacienda y Crédito Público, Managua, Nicaragua.
- IMF (2014), *Spillovers in International Corporate Taxation*; IMF Policy Paper, May 9.
- OECD (2010), *Transfer Pricing Guidelines for Multinational Corporations and Tax Administrations*, OECD Publishing, Paris.
- OECD (2013a), *Addressing Base Erosion and Profit Shifting*, OECD Publishing, Paris.
- OECD (2013b), *Action Plan on Base Erosion and Profit Shifting*, OECD Publishing, Paris.
- OECD (2015a), *Limiting Base Erosion Involving Interest Deductions and Other Financial Payments, Action 4 - 2015 Final Report*, OECD/G20 Base Erosion and Profit Shifting Project, OECD Publishing, Paris.
- OECD (2015b), *Aligning Transfer Pricing Outcomes with Value Creation, Actions 8-10 - 2015 Final Reports*, OECD/G20 Base Erosion and Profit Shifting Project, OECD Publishing, Paris.
- OECD (2015c), *Explanatory Statement*, OECD/G20 BEPS Project, OECD Publishing, Paris.

# TECHNICAL NOTE: MACROECONOMIC SCENARIOS<sup>1</sup>

## A. Adverse and Adjustment Scenarios

*Risks stemming from Venezuela and the NICA Act could have a significant impact on fiscal and external balances if they materialize. We use a simple model of the Nicaraguan economy to quantify the potential impact and ascertain how much fiscal adjustment might be needed.*

### Model and assumptions

**1. The effects of the shocks are modeled using a reduced form model of the Nicaraguan economy developed by staff.** The parameters of the model are drawn from various cross-country papers and staff's own estimates of the Nicaraguan economy. The model can be tailored to analyze the impact of different types of shocks on key macroeconomic variables such as the current account (CA), international reserves, GDP growth, and the fiscal balance. It can also be used to analyze the impact of policy variables. Nicaragua does not have an independent monetary policy, given the crawling peg exchange rate regime, so fiscal policy is the only adjustment channel.

**2. The shock scenario assumes a disappearance of Venezuela's oil cooperation within two years.** We assume that the loss of oil-related concessional financing result in social programs of about 0.6 percent of (baseline) GDP being absorbed by the budget. Furthermore, FDI from Venezuela declines in 2017 and is zero from 2018 onwards.

**3. The scenario also encompasses a negative impact on investment and availability of concessional financing from the NICA Act.** In the model, the NICA Act is assumed to be passed by the U.S. Congress in the latter part of 2017, and cause a confidence shock in 2018. The NICA Act would require the U.S. Executive Director at international financial institutions, such as the IMF, World Bank and the Inter-American Development Bank (IaDB), to oppose loans to Nicaragua unless they are for humanitarian purposes or the promotion of democracy.<sup>2</sup> It would also require the preparation of a report on corruption by the Department of State, which would identify senior Nicaraguan government officials involved in acts of public corruption. The potential impact of a measure such as the NICA Act on investor confidence is inherently difficult to forecast; however, given Nicaragua's strong trade and investment links with the U.S., we believe a significant impact on investment is possible, although not necessarily likely.<sup>3</sup> We therefore assume that, in an adverse

<sup>1</sup> Prepared by Rosalind Mowatt and Xiaodan Ding. This work builds on previous work by Francesco Grigoli. Assistance in modeling U.S. spillovers from Michal Andrle and Benjamin Hunt (both RES) is gratefully acknowledged.

<sup>2</sup> The U.S. does not have the voting power to block loans at any of these institutions, but could possibly use its influence.

<sup>3</sup> The NICA Act itself does not restrict U.S. investment in Nicaragua; however, it could be a red flag to potential investors. Discussions with public and private sector representatives yielded a range of views on the subject, with some noting that, while the institutional environment remains relatively weak, investment has continued to flow to Nicaragua, due in part to comparative advantages vis-à-vis regional peers. The announcement of the NICA Act has not affected investment significantly thus far.



scenario, the NICA Act could result in a confidence shock which reduces investment by 25 percent relative to the baseline, applied equally to foreign and domestic investment.<sup>4</sup> The shock only applies to 2018; after 2018, investment returns to its previous growth path, but from a lower base.<sup>5</sup>

**4. We also assume that the NICA Act will affect the availability of concessional financing from the IaDB and the World Bank.** The IaDB is Nicaragua's largest creditor, and is expected to account for about half of all external disbursements over the 2017-2022 period. The adverse scenario assumes that no further Policy-Based Loans (PBLs) from the IaDB are disbursed and that, from 2019 onwards, financing from the IaDB and the World Bank is halved, given that project loans for 2018 are mostly already committed. Additional financing needs are met through a combination of external multilateral (but less concessional) sources and domestic sources.<sup>6</sup> Effective rates on external borrowing rise from around 2 percent in 2016 to about 5 percent in 2022. There is some crowding out in the model because of increased borrowing from the domestic financial sector, with an impact on domestic interest rates.

## Results

**5. The shock impacts growth, the fiscal position, and external balances.** Output growth contracts to 2.9 percent in 2018, compared to 4.3 percent in the baseline. In addition, output growth in the 2020-2022 period is negatively affected by crowding out and the rapid increase in public debt. Thus, revenues are 1.5 percentage points of (baseline) GDP lower by 2022. At the same time, primary expenditure increases by 0.6 percent of GDP due to the absorption of social programs previously financed by Venezuela. Interest expenditure increases due to the higher financing needs and the recourse to less concessional debt. The overall CPS deficit widens to 3.8 percent of GDP in 2018 and continues to increase in the absence of any policy changes, driven primarily by higher interest payments and lower revenues. The resulting increase in debt weighs on growth, impeding a full recovery. On the external side, the CA deficit narrows marginally, as demand for imports contracts, while exports also contract due to lower investment. The reduction in capital inflows through lower FDI puts pressure on reserves, which fall to 1.4 months of non-maquila imports by 2022.

## Adjustment Scenario

**6. Policy measures could be taken to forestall the potential macroeconomic impact described in the adverse scenario.** In the adjustment scenario, we assume a reduction in discretionary spending equal to 0.6 percent of GDP, which in staff's view could come from eliminating most electricity and bus subsidies. Moreover, although social programs financed by the

<sup>4</sup> This is a somewhat conservative estimate, as FDI from the U.S. to Nicaragua accounts for about 20 percent of total flows. It would entail that U.S. FDI comes to a halt and that confidence spillovers affect a similar share of domestic investment, plus a few more non-U.S. potential projects.

<sup>5</sup> As with the hypothesis on the initial impact on FDI, this is an arbitrary assumption. The economic rationale is that, while macroeconomic equilibria will be threatened under the adverse scenario, the disappearance of the main uncertainty factor—the impact of the NICA Act—would have a positive effect that would allow for continuity of at least some of the investment projects planned.

<sup>6</sup> We assume that public investment remains the same as in the baseline.

Venezuela cooperation are absorbed by the budget, only 0.4 percent of GDP is incorporated, and programs are gradually phased out over the 2019-2022 period.

**7. The adjustment would also encompass some revenue-raising measures as well as a pension reform.** An additional one percent of GDP of tax revenue could be raised, by reducing some tax expenditures, continuing with improvements to tax administration, and by implementing the legislation on international taxation. We assume that the increase is permanent and would take place over two years (0.5 percent in 2018 and an additional 0.5 percent in 2019). Finally, there is a resolution to the financial problems of INSS, principally through parametric reforms rather than transfers from the budget.

**8. Output growth contracts initially but then rebounds.** Output growth contracts to 2.3 percent of GDP, a more severe deterioration than in the adverse scenario in 2018 because of the contractionary fiscal impulse, including from the reduction in the INSS deficit. However, in 2019, investment rebounds to about 90 percent of levels in the baseline as investors are encouraged by the government's policy measures.<sup>7</sup> This causes a recovery in output growth to 4.6 percent in 2019.

**9. The fiscal balance and reserve position remain within reasonable limits.** The fiscal balance deteriorates slightly relative to the baseline initially but remains below 2.2 percent of GDP over the medium term, while the CA deficit registers a slight improvement. GIR falls in 2018 to about 3.3 months of non-maquila imports and remains close to these levels over the medium term.

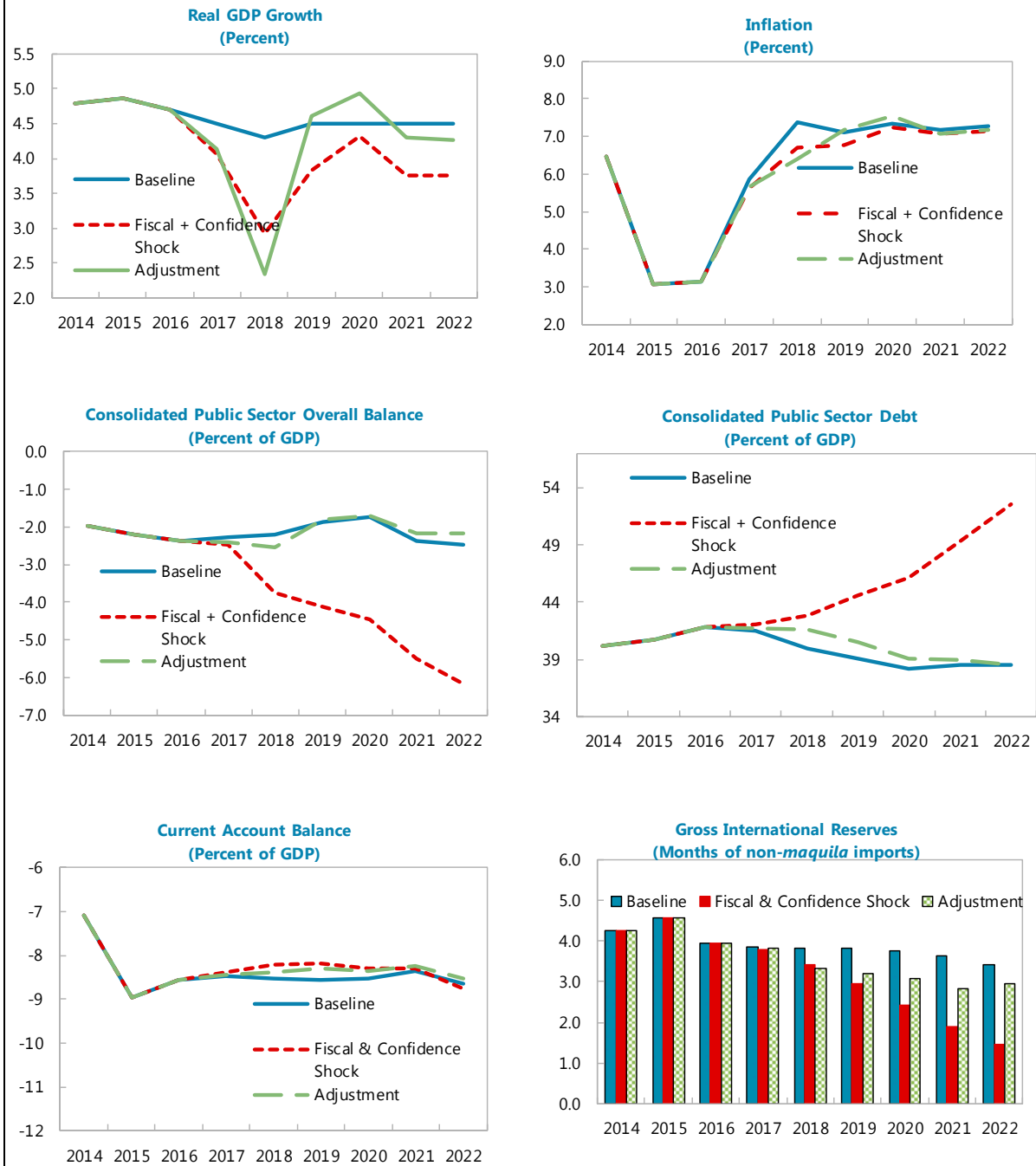
**10. The size of adjustment considered represents the minimum needed to weather a shock scenario.** The analysis indicates that a cumulative consolidation of 1.6 percent of GDP plus a phasing out of the Venezuela cooperation programs in the budget plus the achievement of a rapid and sustainable solution to the INSS problem seem to be the minimum needed for ensuring fiscal and external sustainability under a shock scenario.<sup>8</sup> In our view, the size of the adjustment is manageable in the current environment, and, even if the shock scenario is not realized, it would create much needed fiscal space to stave off potential external shocks and the impact of climate change and natural disasters.

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<sup>7</sup> As with most investor confidence crises, a steady state close to the original is likely to be recovered when and if the source of the risk disappears or its impact is deemed to be minor.

<sup>8</sup> Taking all these elements into account, the total fiscal effort is equivalent to about 2.7 percent of GDP.

**Figure 1. Baseline, Adverse and Adjustment Scenarios**



Source: Authorities' data; and Fund staff estimates.

**Table 1. Scenarios**  
(Percent of GDP, unless otherwise indicated)

	2014	2015	2016	2017	2018	Projections			
						2019	2020	2021	2022
<b>Baseline</b>									
Real GDP (percent change)	4.8	4.9	4.7	4.5	4.3	4.5	4.5	4.5	4.5
(per capita)	26,996	27,989	28,166	29,091	29,990	30,975	31,990	33,040	34,125
CPI inflation (eop; percent change)	6.5	3.1	3.1	5.8	7.4	7.1	7.3	7.2	7.3
NFPS primary balance	-1.0	-1.0	-1.2	-1.0	-1.1	-1.0	-1.0	-1.6	-1.5
NFPS overall balance	-1.8	-1.9	-2.2	-2.1	-2.0	-1.8	-1.8	-2.3	-2.4
CPS primary balance	-1.1	-1.1	-1.2	-1.1	-1.2	-1.0	-0.9	-1.6	-1.5
CPS overall balance	-2.0	-2.2	-2.4	-2.3	-2.2	-1.9	-1.7	-2.4	-2.5
CPS debt	40.2	40.7	41.9	41.5	40.0	39.1	38.2	38.5	38.5
Current account balance	-7.1	-9.0	-8.6	-8.5	-8.5	-8.6	-8.5	-8.4	-8.6
GIR (months of non- <i>maquila</i> imports)	4.2	4.6	3.9	3.9	3.8	3.8	3.8	3.6	3.4
(in U.S. dollars)	2,147	2,353	2,296	2,365	2,449	2,551	2,658	2,730	2,751
<b>Scenario 1 (Adverse)</b>									
Real GDP (percent change)	4.8	4.9	4.7	4.1	2.9	3.8	4.3	3.8	3.7
(per capita)	26,996	27,989	28,166	28,971	29,471	30,243	31,179	31,971	32,784
CPI inflation (eop; percent change)	6.5	3.1	3.1	5.6	6.7	6.8	7.2	7.1	7.1
NFPS primary balance	-1.0	-1.0	-1.2	-1.1	-2.2	-2.3	-2.4	-3.2	-3.3
NFPS overall balance	-1.8	-1.9	-2.2	-2.3	-3.5	-4.0	-4.5	-5.4	-6.1
CPS primary balance	-1.1	-1.1	-1.2	-1.2	-2.3	-2.3	-2.3	-3.2	-3.4
CPS overall balance	-2.0	-2.2	-2.4	-2.5	-3.8	-4.1	-4.5	-5.5	-6.2
CPS debt	40.2	40.7	41.9	42.0	42.9	44.5	46.1	49.3	52.5
Current account balance	-7.1	-9.0	-8.6	-8.4	-8.2	-8.2	-8.3	-8.3	-8.8
GIR (months of non- <i>maquila</i> imports)	4.2	4.6	4.0	3.8	3.4	2.9	2.4	1.9	1.4
(in U.S. dollars)	2,147	2,353	2,296	2,279	2,146	1,928	1,671	1,374	984
<i>Policy variables</i>									
Primary fiscal effort (deviation from baseline, percent of GDP)		0.0	0.0	0.0	-0.6	0.0	0.0	0.0	0.0
Private capital flows (dev. from baseline, percent of GDP)		0.0	0.0	-0.7	-2.1	0.0	0.0	0.0	0.0
<b>Scenario 2 (Adjustment)</b>									
Real GDP (percent change)	4.8	4.9	4.7	4.1	2.3	4.6	4.9	4.3	4.3
(per capita)	26,996	27,989	28,166	28,990	29,322	30,317	31,441	32,411	33,401
CPI inflation (eop; percent change)	6.5	3.1	3.1	5.7	6.4	7.2	7.5	7.1	7.2
NFPS primary balance	-1.0	-1.0	-1.2	-1.1	-1.1	-0.1	0.1	-0.3	0.0
NFPS overall balance	-1.8	-1.9	-2.2	-2.2	-2.3	-1.7	-1.7	-2.1	-2.1
CPS primary balance	-1.1	-1.1	-1.2	-1.2	-1.1	-0.1	0.2	-0.3	0.0
CPS overall balance	-2.0	-2.2	-2.4	-2.4	-2.6	-1.8	-1.7	-2.2	-2.2
CPS debt	40.2	40.7	41.9	41.8	41.6	40.5	39.0	38.9	38.5
Current account balance	-7.1	-9.0	-8.6	-8.4	-8.4	-8.3	-8.4	-8.2	-8.5
GIR (months of non- <i>maquila</i> imports)	4.2	4.6	4.0	3.8	3.3	3.2	3.1	2.8	2.9
(in U.S. dollars)	2,147	2,353	2,296	2,291	2,086	2,116	2,127	2,102	2,030
<i>Policy variables</i>									
Primary fiscal effort (deviation from baseline, percent of GDP)				0.0	0.7	0.8	0.1	0.3	0.3
Private capital flows (dev. from baseline, percent of GDP)				-0.7	-2.1	2.9	0.0	0.0	0.0

## B. Macroeconomic Impact of U.S. Policy Changes

*Spillovers from potential changes in U.S. policies could be particularly important in case of revisions to trade agreements and immigration enforcement, due to the extensive trade ties and substantial remittances from Nicaraguan residents in the United States.*

### Methodology

**11. Estimates are based in the results obtained from the IMF’s FSGM and the reduced form model of the Nicaraguan economy described in Section A.** The magnitudes of the spillovers stemming from potential changes to the U.S. policies were estimated through a simulation based on the WHDMOD module of the IMF’s Flexible System of Global Models (FSGM)<sup>9</sup> considering two scenarios: (1) effective immediately, NAFTA and CAFTA-DR members’ tariffs increase to the most-preferred nation (MFN) tariff of the World Trade Organization;<sup>10</sup> and (2) an increase in deportation rate and ensuing reduction of workers’ remittances by about 1 percent of GDP within the next five years.<sup>11</sup> Results from each scenario were fed into the reduced form model of the Nicaraguan economy to estimate parameters not directly generated by the FSGM.<sup>12</sup> Each shock was assessed separately due to their independent probabilities of materializing. Substantial impact is observed in all sectors under the trade shock, whereas impact stemming from migration policy changes is moderate, as the share of Nicaraguans in total foreign workers in the U.S. is relatively small.

### Scenario 1 – Macroeconomic Implications of a Trade Shock<sup>13</sup>

**12. GDP and private consumption would decline.** The increase in tariffs would immediately dampen Nicaragua’s exports, putting downward pressure on domestic growth and aggregate demand. The real GDP growth rate would fall by 2.3 percentage points below the baseline scenario, to recover in the medium-term. Private consumption is projected to deviate from the baseline by 3.2 percent of GDP over a 5-year period<sup>14</sup> and inflation would decline up to 1.5 percentage points.

<sup>9</sup> The model assumes that, after the initial shock affecting a steady status, the economy will adjust and eventually stabilize at a different steady status that, in case of a negative shock, would be worse than the initial.

<sup>10</sup> As of December 2016, the average tariff applied by the U.S. to Nicaraguan imports was 0.2 percent. The MFN tariff is 6.2 percent.

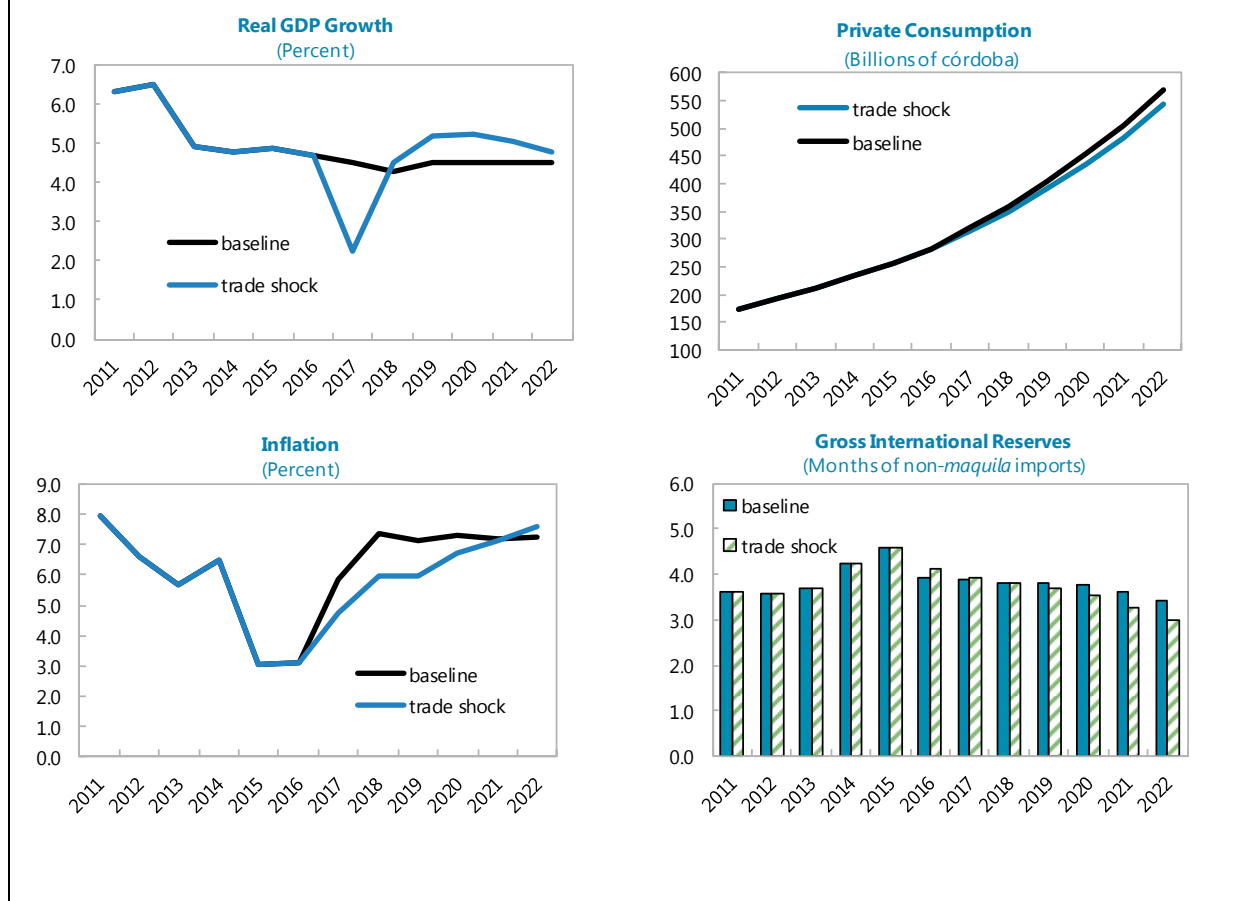
<sup>11</sup> The magnitude of the shocks is arbitrary and does not correspond to any specific U.S. approved or announced policy. It is presented here solely for analytical purposes.

<sup>12</sup> These include consolidated public sector and nonfinancial public sector overall balance and debt, as well as gross international reserves.

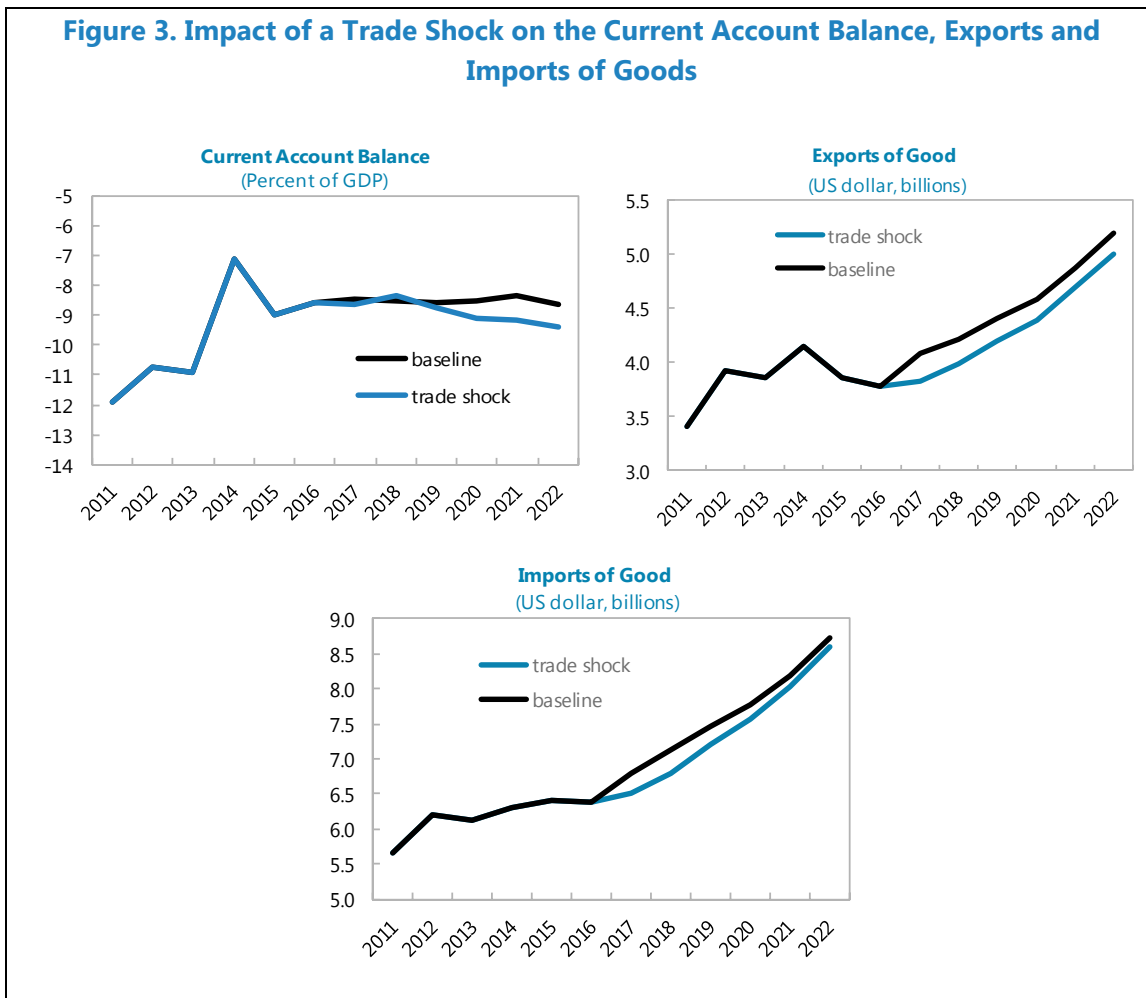
<sup>13</sup> The size of the impact on output growth and external sector balance might be underestimated, as the FSGM assumes no accompanying decrease in U.S. FDI to the rise in tariffs’ shock. The FSGM yields a 5 percent reduction in total investment because of the reduction in output growth, which is assumed to affect proportionally all its components, including FDI.

<sup>14</sup> All ratios on GDP over the medium-term refer to baseline 2022 GDP. Short-term ratios refer to baseline 2018 GDP.

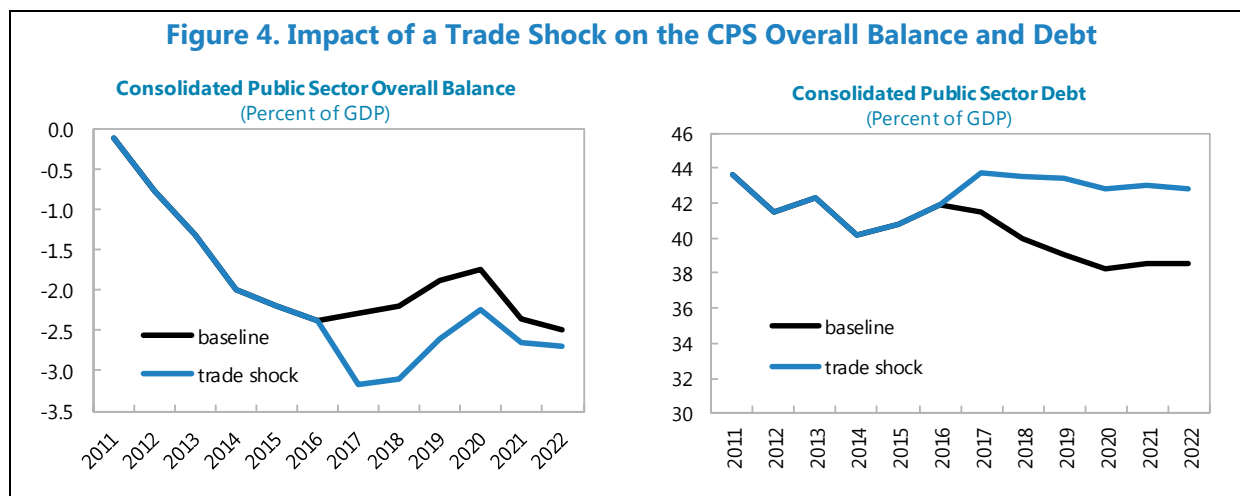
**Figure 2. Impact of a Trade Shock on GDP Growth, Private Consumption, Inflation and Gross International Reserves**



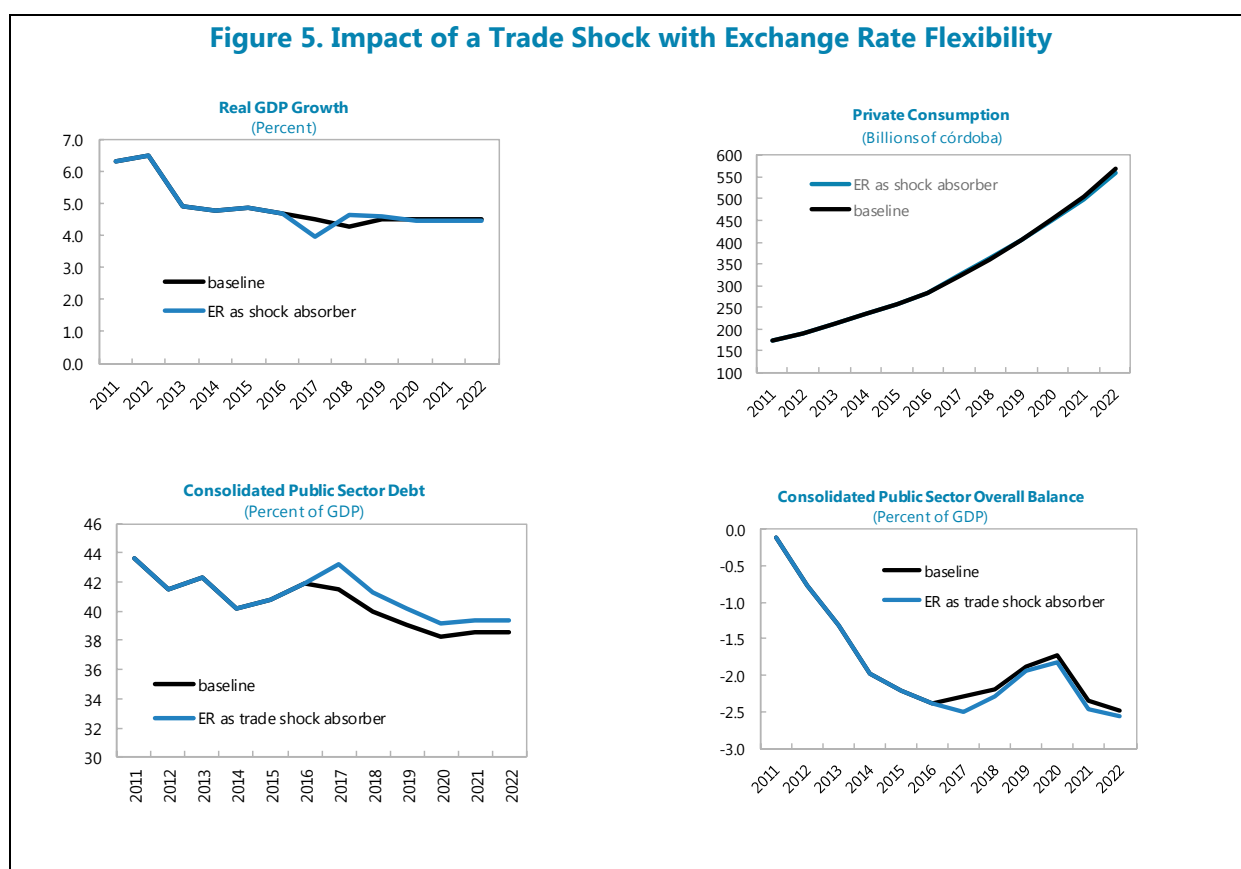
- 13. The CA deficit increases in the medium term.** Imports and exports decline by about 1 percent of GDP which keeps the CA deficit stable in the short term at around 8.7 percent of GDP. In the medium term, the CA deficit increases gradually from 8.6 to 9.4 percent of GDP, 0.8 percentage points above the baseline, owing to lower exports and limited financing resources. Gross international reserves in months of imports decline from 3.4 to 3.0 by 2022.



**14. The trade shock worsens the CPS balance and results in public debt stabilizing at a higher level.** The overall deficit would reach 3 percent of GDP in 2018, due to a reduction in fiscal revenue of 1.3 percent of GDP. Total public debt increases from 39 percent of GDP to 43 percent in the medium term.



**15. The model enables a comparative analysis of the macroeconomic impact assuming exchange rate could partially absorb the trade shock.** Allowing the exchange rate to react as a shock absorber would reduce the immediate impact on GDP by 1.7 percentage points to a relatively moderate 0.6 percentage points. Real interest rates also reverse their path from an increase of 1 percentage point to a reduction of 0.4 percent point, vis-à-vis the baseline scenario. Domestic prices rebound by 1.2 percentage points and private consumption declines only by 1.2 percent of GDP below the baseline, compared to 3.2 percent of GDP in the peg scenario. In the medium term, the CPS debt stock decreases from 42.8 to 39.3 percent of GDP, owing to higher revenue collection and lower debt service.

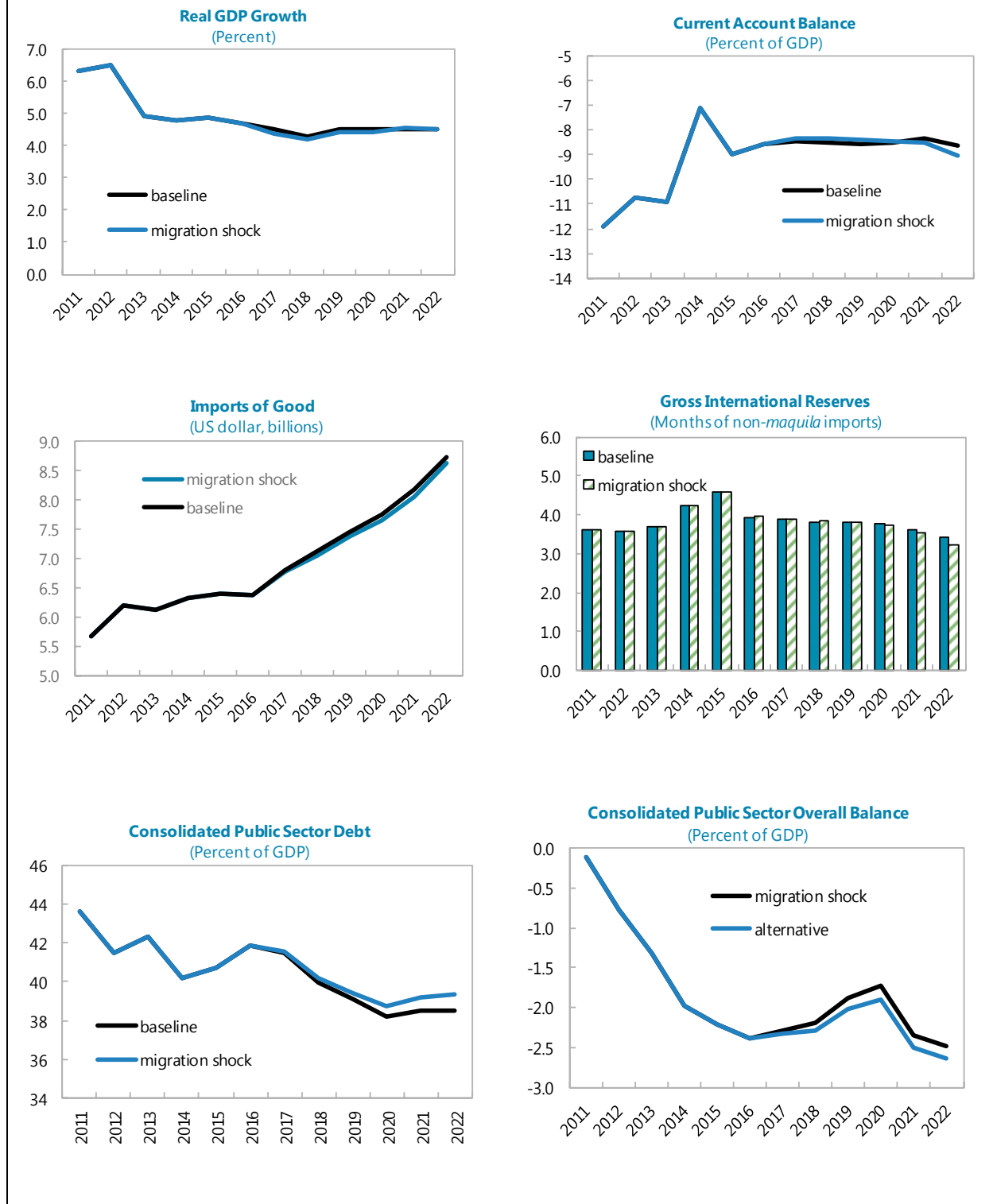


### Scenario 2 - Macroeconomic Implications of a Shock on Migration and Remittances

**16. GDP growth, the CPS deficit and public debt sustainability would deteriorate, albeit to a lesser extent than under Scenario 1.** The impact on remittances would reduce private consumption by 1.4 percent of GDP and would push inflation down by 0.2 percentage points in the medium term. Thus, GDP would decrease by 0.3 percent over the same period, vis-à-vis the baseline. Imports would decline by 0.6 percent of GDP with respect to the baseline, reducing the CA deficit by 0.2 percent of GDP in the short term. As imports recover gradually and workers' remittances keep constant at a lower level, the CA deficit would increase to 9 percent of GDP, 0.4 percent below the baseline, by 2022. The CPS balance and total debt would worsen by 0.2 percent and 0.8 percent of GDP, due to lower tax income (0.4 percent of GDP).



**Figure 6. Impact of a Shock on Migration and Remittances**



**17. If migration policy remains unchanged but a two percent fee is imposed on remittances, the macroeconomic impact is estimated at about half that of Scenario 2's.** Using an alternative cost-elasticity approach, staff estimates that remittances will fall by about 8.9 percent if an additional two percent fee were to be added to the existing 4.9 percent fee component of money transfer costs,<sup>15</sup> assuming an elasticity of remittances to transaction costs of  $-0.22$ .<sup>16</sup> This is equivalent to 0.4 percent of GDP and is slightly less than half the size of the hypothesis under Scenario 2 (which was for a one percent of GDP decline in remittances). Further, while Scenario 2 is considered permanent and, thus, could have prolonged negative consequences from both the initial shock and secondary impact from lower economic growth on disposable income, the effect of raising a temporary two percent fee will reverse when the fee is lifted. Also, part of the macroeconomic impact might be diluted by using alternative and informal channels for international transfers.<sup>17</sup>

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<sup>15</sup> World Bank "[Remittance Prices Worldwide](#)," February 2017.

<sup>16</sup> John David and Halahingano (2005) estimated the cost-elasticity of remittance with respect to the fix cost component is  $-0.22$ , which is the average of the elasticity over those who would decrease their remittance (for whom the elasticity is  $-0.74$ ) and those who would not (for whom it is zero).

<sup>17</sup> In 2006, only 0.4 percent of the transactions were made through online banking, and the figure in 2016 is 5.5 percent. Traditional, cash-based systems (hawallah) have worked effectively in many countries, although with negative effects on risk and financial sector development.