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PARAGUAY

TECHNICAL ASSISTANCE REPORT—ESTABLISHING A STRUCTURAL BALANCE RULE AND A PUBLIC DEBT OBJECTIVE

March 2017

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Establishing a Structural Balance Rule and a Public Debt Objective

Luc Eyraud, Antonio C. David, and Felipe Bardella

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PREFACE

A mission from the Fiscal Affairs Department (FAD) of the International Monetary Fund (IMF) visited Asuncion, Paraguay during the period November 8–21, 2016 to provide technical assistance on establishing a structural balance rule and a public debt objective. The mission was led by Luc Eyraud (FAD) and comprised Felipe Bardella (FAD expert) and Antonio C. David (WHD).

The mission met with Mr. Santiago Peña (Minister of Finance), and with Ms. Lea Giménez (Vice-Minister, Ministry of Finance). In the Ministry of Finance, the mission met with Mr. Humberto Colman (Head of the Macro-Fiscal Unit) and his staff; with Mr. Oscar Llamosas (Treasury Director); with Mr. Oscar Lovera (Budget Director); as well as with Ms. Stella Guillen (Director of the Debt Policy Unit) and her staff. The mission also met with members of the fiscal advisory council that is in the process of being formed and held three workshops presenting some of the methodology and preliminary results of the report.

Furthermore, the mission also held meetings with stakeholders outside the Ministry of Finance. At the Central Bank of Paraguay, the mission met with Mr. Miguel Mora (Chief Economist) and staff of the Central Bank. At the Ministry of Planning, the mission met with Mr. José Molinas (Minister of Planning) and staff of the Ministry. The mission also benefited from discussions with Mr. Manuel Ferreira (Ex-Minister of Finance). The mission met with Mr. Eduardo Almeida (Inter-American Development Bank Resident Representative) and his staff. Finally, the mission met with Mr. Miguel Gómez (Financial Director of Itaipu).

The mission benefited from very helpful discussions with Mr. Felipe Larrain (Professor, Catholic University of Chile) and Mr. Rodrigo Cerda (Professor, Catholic University of Chile), who previously advised the authorities on the design of the structural balance rule.

The mission would like to express its sincere gratitude to all these officials for their warm welcome and for the frank and candid discussions. A particular thanks is due to Mr. Humberto Colman and Mr. Rolando Sapriza of the Macro-Fiscal Unit for their excellent cooperation and logistical support during the mission.

The mission would also like to thank Mr. Alejandro Santos (Senior Resident Representative, WHD) and his staff at the IMF office in Asuncion for facilitating the dialogue with authorities; Mariusz Jarmuzek (EUR) for his contributions on the debt anchor section; Benjamin Carton (RES) for the growth model calibration; and Mercedes Garcia-Escribano and Maximilien Queyranne (both FAD) for sharing the expenditure assessment templates. Ehab Tawfik (WHD), Kim Young, and Kyungla Chae (both FAD) provided excellent research assistance during the elaboration of the report.

EXECUTIVE SUMMARY

The enactment of the Fiscal Responsibility Law in 2013, which came into force in 2015, was a major achievement toward strengthening Paraguay's fiscal framework. Its implementation has nonetheless been complex, with slippages occurring in the first year of its enactment. Concerns have also emerged about the current design of the nominal balance rule, which is perceived as excessively rigid. Given the high volatility of fiscal revenues, the rule translates into an unstable path of public expenditure and does not provide sufficient space for countercyclical policies. Paraguay's tight fiscal deficit ceiling may also constrain capital expenditure plans, possibly to the detriment of overall economic development needs.

The authorities have decided to replace the nominal balance rule with a structural balance rule, starting in 2019, to achieve a more stable path of public expenditure and better link it to the medium-term objectives of fiscal policy. The government is also considering modifications of the Fiscal Responsibility Law in order to enhance public investment without damaging the credibility of the rule-based framework.

Setting a Public Debt Anchor

Debt anchors are a common feature of rule-based fiscal frameworks around the world. They provide a guide for both expectations and nearer term policies, create an upper limit to repeated fiscal slippages, and their threshold can be calibrated to ensure the long-term fiscal sustainability of public finances.

There is an inherent trade-off when deciding on the level of the debt anchor. Higher debt increases vulnerability to shocks and can undermine market confidence and lead to fiscal distress. Nevertheless, in a context where substantial infrastructure and other development needs are present, additional public investment to close these gaps should be primarily financed by debt issuance for efficiency and equity reasons. Simulations based on these principles show that a debt anchor for Paraguay could lie in the range of 30 to 45 percent of GDP.

To be credible and effectively guide fiscal policy, the debt anchor should be supported by an active debt management policy that continuously works to link the debt projections to the medium-term fiscal framework and demonstrates the feasibility of the debt objective. Paraguay could improve the transparency and predictability of the government's borrowing plans by producing a medium-term debt management strategy, updated on an annual basis, and making it available to the public.

Implementing the Structural Balance Rule

The high volatility of fiscal revenues in Paraguay has resulted in a path of public expenditure that is unstable and difficult to predict. In the authorities' view, the instability of expenditure has had

destabilizing effects on the economy and made budget management more complex. In this context, the government has decided to adopt a structural balance rule to disconnect the path of spending from actual revenues. Having settled on the general design of the new rule, the authorities have requested technical assistance to help in its implementation.

The structural balance formula considered by the authorities is adapted to the Paraguayan context and differs from the standard approach used by many countries and international institutions. The main advantage of the authorities' formula is that it dictates a very stable path of public spending. But, the strict relationship that it assumes between structural revenues and trend output may create policy risks, including risks of (i) overestimating structural revenues and allowing excessive expenditure (because the formula, estimated over the past, assumes that revenues grow faster than GDP on average); (ii) mis-measuring structural revenues when policy changes necessitate to re-estimate the formula; and (iii) creating a disincentive for revenue mobilization, given that tax measures cannot be spent immediately under the rule (until the formula is re-estimated).

To address these risks, the report proposes a series of adjustments to the authorities' formula:

- The formula should be more conservative and assume that structural revenues will grow at the same pace as trend GDP in the future to mitigate the risk of unwarranted expenditure growth. Under this assumption, the structural balance rule becomes broadly equivalent to an expenditure rule constraining spending to grow at trend GDP—a formulation that is simpler to implement and easier to communicate to the public.

- The formula should account for new revenue measures more explicitly, provided that some safeguards for their fair estimation are in place.

- Revenues from binational dams should be smoothed out separately (but still be included in the total estimate of structural revenues). The pattern of these revenues as well as the prospect of windfalls from 2023 justify a differentiated treatment.

When setting the structural balance rule threshold, the authorities will need to take a comprehensive approach to the fiscal framework, because the fiscal balance path should be consistent with the medium-term debt anchor. Linking the structural balance to the debt anchor suggests that the structural deficit of the central government should not exceed 2 percent of trend GDP per year.

The combination of the structural balance rule (which imposes a ceiling on total expenditure) and the existing current expenditure rule will indirectly constrain public investment. To achieve the objective of closing Paraguay public capital gap in the medium-term, the ceiling on current expenditure growth will have to be tightened. Otherwise, the public investment-to-GDP ratio is likely to remain stable and Paraguay will not be able to catch up with its peers.

The structural balance rule will also create challenges for public financial management. To stabilize expenditure in accordance with the new rule, Paraguay will need to strengthen its ability to generate a steady flow of funding. Debt managers will have to be more active in accessing financial markets in bad times and develop adequate strategies and instruments to borrow large amounts on a regular basis. The legal restrictions on borrowing should be, as much as possible, relaxed. Cash managers will have to maintain an adequate cash buffer and manage public funds in a consolidated way, overcoming the current segmentation of resources. A short-term debt instrument should also be in place to finance current spending when there are temporary revenue shortfalls.

Developing a Communication Strategy on the Rules

Moving towards a structural balance rule creates additional challenges in communicating with the public. Successful experiences largely rely on a simple but clear message that emphasizes the main benefits of the new rule—in this case, enhancing the stabilization of the economy through a more stable path of public spending; containing expenditure pressures; and promoting public investment. A particularly effective way of communicating on the structural balance rule is to present it as an expenditure ceiling, for instance by emphasizing that "expenditure cannot grow faster than the whole economy unless new and durable revenue measures are taken."

To avoid a situation where a change in the FRL could be interpreted as a weakening of the fiscal framework, the government will have to reaffirm its commitment to fiscal discipline. In this context, it may be useful to tighten the current expenditure growth ceiling, while switching to the structural balance rule in order to reaffirm the objective of fiscal prudence.

Once the message has been crafted, it should be disseminated to multiple audiences. Paraguay could further improve its reporting practices under the structural rule framework by producing the fiscal planning report earlier in the year with a greater focus on medium-term fiscal projections; publishing an end-year report on compliance; and monitoring rules in quarterly execution reports. Importantly, rules should also be assessed on an ex-post basis to enhance the credibility and transparency of the fiscal framework.

International experience also shows that independent fiscal institutions can help support the adoption of fiscal rules. The success of the new Paraguayan fiscal council will hinge on its ability to mobilize resources and reach out to the public effectively.

ABBREVIATIONS

CPB   Bureau for Economic Policy Analysis
DMS   Debt Management Strategy
DSA   Debt Sustainability Analysis
EUR   European Department
FAD   Fiscal Affairs Department
FC   Fiscal Council
FRL   Fiscal Responsibility Law
GDP   Gross Domestic Product
IDB   Inter-American Development Bank
IFP   Informe de Finanzas Publicas
IMF   International Monetary Fund
LAFE   Ley de Administración Financiera del Estado
MMM   Marco Macroeconómico Multianual
MMMR   Marco Macroeconómico Multianual Revisado
MOF   Ministry of Finance
PFM   Public Finance Management
RES   Research Department
SBR   Structural Balance Rule
SWF   Sovereign Wealth Fund
TA   Technical Assistance
TSA   Treasury Single Account
VAR   Vector Autoregression
WEO   World Economic Outlook
WHD   Western Hemisphere Department

SUMMARY OF RECOMMENDATIONS

Chapter of the Report		By Mid-2017	By December 2017	By December 2018
II.	Setting a Public Debt Anchor	Make a decision on the appropriate level of the debt anchor (2.1) * Publish an annual debt management strategy (2.3)	Announce the public sector debt objective to the public (2.2)	
III.	A Structural Balance Rule for Paraguay		Revise the structural balance rule formula: • structural revenues should grow at the same pace as trend GDP (3.1) • incorporate the effect of new durable revenue measures in real time (3.2) • smooth binational revenues separately (3.3) * Calculate the structural balance rule threshold by linking it to the debt objective (3.4)	Tighten the current expenditure growth ceiling (3.5) * Ensure that the Sovereign Wealth Fund formula is consistent with the structural balance rule (3.6) * Create a short-term debt instrument to finance current spending (3.7)
IV.	Communication Strategy	Draft a fiscal council charter and devise a communication strategy (4.4.)		Bring forward the IFP to the first semester with focus on medium-term fiscal plans (4.1) * Produce an end-year report assessing rule compliance based on outturns (4.2) * Track compliance with rules in quarterly execution reports (4.3)

I.   INTRODUCTION

1.   The enactment of the Fiscal Responsibility Law (FRL) in 2013, which came into force in 2015, was a major achievement toward strengthening Paraguay's fiscal framework and institutionalizing fiscal discipline. The main numerical targets are a headline deficit ceiling of 1.5 percent of GDP for the central government and a limit on real current primary expenditure growth of 4 percent for the entire public sector.[1] According to the law, compliance is judged based on adhering to the ceilings in the budget approved by Congress rather than on the basis of fiscal outturns.

2.   The implementation of the FRL has initially been complex but there are signs of increased effectiveness of the fiscal framework. Issues emerged in the first year of the implementation of the FRL. The 2015 budget exceeded the deficit ceiling by a noticeable margin. The 2015 Budget Law also introduced the possibility of excluding capital expenditure (financed by sovereign bonds) from the calculation of the deficit ceiling on a one-off basis. Since then, the authorities have begun building a track record under the law. The 2016 budget approved by Congress respected the deficit ceiling and there was no provision for the exclusion of capital expenditures from the deficit calculation. The 2017 budget submitted to Congress complied with the numerical targets of the FRL.

3.   There is also a concern that the current design of the nominal balance rule is excessively rigid. Given the high volatility of fiscal revenues, the nominal balance rule translates into an unstable path of public expenditure and does not provide sufficient space for countercyclical policies.[2] Paraguay's fiscal deficit ceiling appears to be relatively tight compared to other countries and given its low public debt level. With the low deficit ceiling and limited escape clauses, capital expenditure plans may have to be contained to ensure compliance, possibly to the detriment of the overall economic development and infrastructure needs.

4.   The authorities plan to introduce a structural balance rule (SBR) from 2019 to add flexibility to the fiscal framework. The main objective of the SBR is to achieve a more stable path of public expenditure. More broadly, the government has been considering modifications of the FRL in order to promote public investment without damaging the credibility of the rule-based framework. In this context, an FAD technical assistance mission conducted a review of the FRL in April 2016 (Tollini and others, 2016). It explored various options to enhance the flexibility of the framework, including through a SBR, provided that a set of preconditions are in place. The report advised that future reforms of the fiscal rules should take into account the medium-term objectives of fiscal policy with respect to investment, public debt, and revenue mobilization. The report also emphasized the importance of maintaining the current rules in place since 2015 in a

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[1] See Appendix 1 for a full description of the set of fiscal rules.

[2] Section IV.A. shows that fiscal policy has been mildly countercyclical in Paraguay.

context of economic uncertainty, while assessing and testing in parallel possible revisions for a couple of years.

5.   **This report relates the SBR to the medium-term objectives of fiscal policy and discusses a number of implementation issues.** Chapter II computes a range of medium-term public debt objectives based on precautionary and development needs considerations. Chapter III reviews the SBR formula considered by the authorities and examines a number of technical aspects, including the calibration of the rule threshold, which has to be linked to the public debt anchor. Chapter IV outlines the main components of a communication and fiscal reporting strategy around the new SBR.

II.   SETTING A PUBLIC DEBT ANCHOR

6.   **Well-designed fiscal frameworks are structured around two main pillars: a medium-term fiscal anchor linked to the final objective of fiscal policy, and one (or several) operational target(s) on fiscal aggregates.** A natural anchor is the debt-to-GDP ratio, which provides a guide for both expectations and nearer term policies, creates an upper limit to repeated fiscal slippages, and whose threshold can be calibrated to ensure the long-term fiscal sustainability of public finances. Nevertheless, the debt ratio does not offer operational guidance in the short-run. Therefore, the fiscal framework should also include shorter-term operational target(s), which are under the direct control of governments, while also having a close and predictable link to debt dynamics. To the extent possible, these targets should be easy to monitor, and serve to communicate the fiscal stance to the public. One of the options for such target is the SBR considered by the authorities.

7.   **There is no consensus about a generally applicable "optimal" level of public debt.** A large body of empirical and theoretical research has tried to determine public debt ratios beyond which there is a high risk of debt distress or debt has adverse macroeconomic consequences (for surveys of this literature see IMF, 2016 and Eberhardt and Presbitero, 2015). Nevertheless, the results are highly uncertain. Debt threshold estimates are country-specific and sensitive to the methodology used to determine the ceiling. An additional complication is that the debt anchor should not be set at its "maximum limit;" otherwise, debt dynamics may get out of control in the aftermath of negative shocks. Thus, a safety margin needs to be maintained between the debt limit and the anchor, but there is no consensus on how to measure this margin.

8.   **A debt anchor for Paraguay should be sufficiently low to protect the country against negative shocks, but also allow space for financing public investment projects.** There is an inherent trade-off when deciding whether to further accumulate debt. Higher debt levels increase vulnerabilities to shocks and can eventually lead to fiscal distress. Therefore, from

the point of view of risk management, lower levels of debt are desirable, as they reinforce market confidence and provide space for borrowing to face adverse situations. Nevertheless, in a context where substantial infrastructure and other development needs are present, economic theory suggests that additional public investment to close these gaps should be primarily financed by debt issuance rather than taxes (Ostry and others, 2015). One of the reasons is that the distortions brought by taxation are smaller when tax increases are smoothed over time (through debt finance). In addition, public investment projects are expected to generate gains over several years and benefit future generations; therefore, their full cost should not be borne by current taxpayers. Finally, in the current environment of low interest rates, the return of many public investment projects can more easily exceed their debt cost. Overall, higher (debt-financed) infrastructure spending may spur economic growth, which would contribute to sustain higher debt levels in nominal terms.

9. **In this section, we explore different approaches to assess the level of the debt anchor that would be suitable to Paraguay and, ultimately, serve as a guide to calibrate the ceiling of the SBR.** We begin by presenting some evidence on debt anchors in fiscal frameworks around the world. Subsequently, we follow a precautionary approach to obtain a range of "safe" debt anchors for Paraguay, given the history of macroeconomic and fiscal shocks faced by the country. Nevertheless, as previously discussed, the debt anchor should also provide some space to accommodate additional public investment. We use cross-country evidence and standard theoretical growth models to quantify Paraguay's infrastructure gap. Finally, we discuss the implications of the debt anchor for debt management.

A. Debt Anchors in Fiscal Frameworks Around the World

10. **Ceilings on public debt are a common feature of rule-based fiscal frameworks.** Incorporating the debt anchor into the fiscal framework (in the form of a legally binding debt ceiling) can strengthen the credibility of the anchor. As of 2014, about 70 countries worldwide had a rule-based fiscal framework that included an explicit cap on gross public debt. In addition, the number of countries with debt rules within their fiscal frameworks has increased steadily over time (Figure 2.1).

Figure 2.1. Public Debt Ceilings Around the World (Number of Countries)

Debt ceilings are a common feature of fiscal frameworks.

Debt rules are frequently combined with budget balance rules.
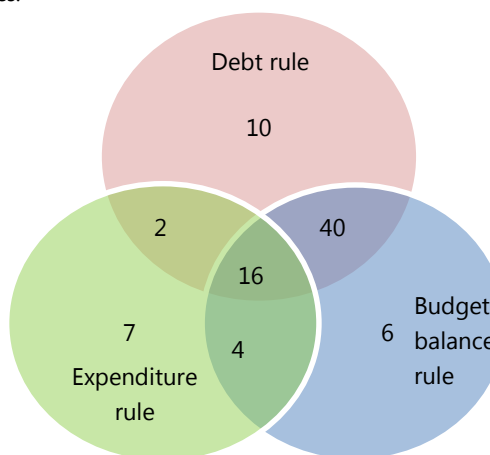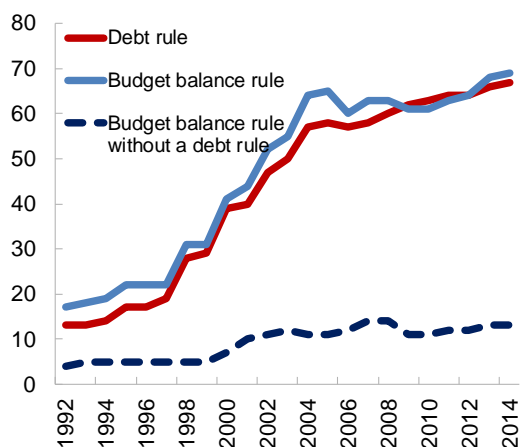
Note: The budget balance indicator used in the charts covers both nominal and structural balance rules.
Source: IMF Fiscal Rules Database.

11.   Moreover, most fiscal frameworks rely on budget balance rules to operationalize debt ceilings. This occurs because debt trajectories are not directly controlled by policy makers. Factors other than policy decisions affect public debt, including below-the-line operations and valuation effects. Therefore, more than 80 percent of countries with a debt ceiling have also rules imposing constraints on the (nominal or structural) budget balance, and among those, almost a third also include expenditure ceilings in their fiscal frameworks (Figure 2.1).

12.   Specific debt ceilings can vary significantly across countries, but frequently range between 40 and 70 percent of GDP (Figure 2.2). The clustering of countries around ceilings of 60 to 70 percent of GDP reflects in a large part the strong representation of European Union and West African Economic and Monetary Union member states in the sample of countries with fiscal rules. Paraguay's current public debt level (below 25 percent of GDP) is relatively low compared to countries at similar levels of development as well as regional partners, such as Colombia, and is well below the most commonly adopted debt ceilings.

13.   Typically, debt rules are set in gross rather than net terms. In principle, if government assets could easily be liquidated to cover financial obligations, net debt (gross debt minus financial assets) would be a more relevant concept from the perspective of fiscal sustainability. However, in practice, measuring net debt is challenging, because it is hard to determine which government assets are truly liquid, particularly in times of stress. The concept is also less transparent than gross debt and more difficult to communicate to the public. Another issue is that targeting net debt might mask important financing ("below-the-line") operations that would be accounted for under the gross debt concept, concealing the build-up of fiscal risks over time. Examples of such operations could be the recapitalization of a public bank or loans to state-owned enterprises.

Figure 2.2. Public Debt Ceilings and Public Debt Levels

Most public debt ceilings range between 40 to 70 percent of GDP....
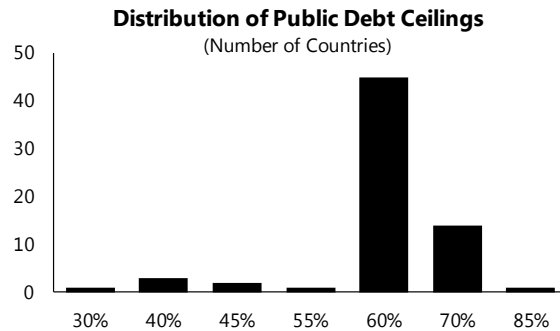
... well above Paraguay's moderate public debt ratio.

Distribution of Public Debt Ceilings
(Number of Countries)
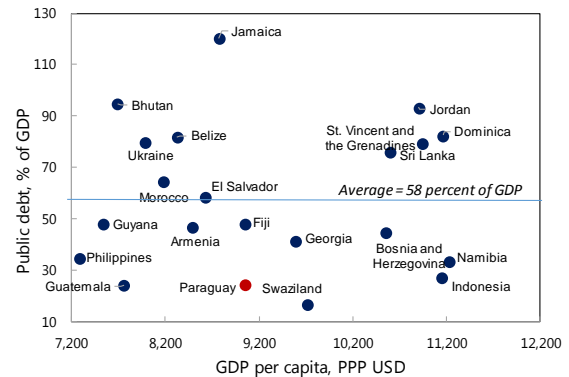
Source: IMF Fiscal Rules Database and Staff estimates based on WEO data.

14.   To better capture emerging fiscal risks, it is generally desirable to set debt objectives at a broad public sector level. Such broad coverage is important to correctly assess exposure to vulnerabilities that arise beyond the central government and could have a significant impact on public finances, particularly through the realization of contingent liabilities (for instance in state owned companies or local governments).

B.   A Precautionary Approach for Setting the Debt Anchor

15.   This section uses a method based on precautionary considerations to compute a range of debt anchor levels for Paraguay. The "safe" debt level is defined as the debt-to-GDP ratio that ensures that debt dynamics remain under control even if bad shocks occur. The approach is based on two main principles. Firstly, we assume that there is a point beyond which debt dynamics can spiral out of control, which we call a (maximum) debt limit. This limit is country-specific and may vary over time and depending on circumstances.[3] The second principle is that the fiscal framework should aim at keeping debt well below this limit. Because countries are vulnerable to significant macroeconomic and fiscal shocks (including changes in market sentiment), there must be a sufficient safety margin between the debt anchor and the debt limit. We use analytical tools to determine this safety margin for Paraguay. These tools are described in detail in IMF (2016) and Debrun and others (forthcoming).

16.   In that context, the debt anchor for Paraguay is computed in in three stages: (i) first, an estimate of the maximum debt limit is obtained; (ii) then, we proceed to estimate the required safety margin; (iii) and finally the debt anchor is inferred as the debt limit

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[3] Various considerations may be taken into account when determining the debt limit: (i) *fiscal sustainability* (debt should not exceed a level beyond which debt dynamics become explosive); (ii) *financing and liquidity conditions* (the level of debt should be sufficiently low to protect against debt-related market distress events, sovereign downgrades, etc); and (iii) *growth implications* (high debt may engender adverse macroeconomic consequences).

minus the safety margin. More specifically, the required safety margin is estimated through stochastic simulations. To do so, we estimate the distribution of macroeconomic and fiscal shocks faced by the country in the past. Subsequently, we simulate future debt trajectories under these shocks over 6 years (the medium-term horizon of the WEO projections). This creates a fan chart of debt realizations, which allows us to calibrate the debt anchor and calculate the probability that public debt would exceed the maximum debt limit in the medium-term.

Setting a Debt Limit for Paraguay

17.   We use three alternative approaches to estimate the maximum debt limit of Paraguay.[4] First, the standard Debt Sustainability Analysis (DSA) undertaken by the IMF includes a threshold based on the occurrence of debt distress. Subsequently, we use a simple method to calibrate the debt level beyond which debt dynamics would become unsustainable, based on historical realizations of primary balances and interest rate-economic growth differentials in Paraguay. Finally, we estimate a model linking debt to growth in order to identify the level of debt beyond which growth could slow-down substantially.

18.   The first method relies on the standard DSA framework of the IMF, which incorporates a critical debt benchmark for emerging markets of 70 percent of GDP. In the DSA for market access countries, the debt limit is characterized as the level that best predicts the occurrence of debt distress events, defined for emerging markets as debt defaults, debt restructuring or rescheduling, and IMF financing (IMF, 2011 and IMF, 2013a). In other words, when a country exceeds this limit, the probability of facing debt distress increases significantly. The debt limit is calculated based on history for separate samples of advanced and emerging market economies and yields proposed benchmarks of 85 percent of the GDP for the former and 70 percent for the latter.[5]

19.   The second method estimates the limit above which debt cannot be stabilized in times of fiscal stress. The intuition behind this method is that policymakers cannot do "whatever it takes" to generate primary surpluses to stabilize debt in a very unfavorable macroeconomic environment. The notion that the primary surplus is bounded upward can be justified by a variety of considerations, including Laffer curve effects (tax increases become ineffective beyond a certain point), the impossibility to cut expenditure below certain levels, and political economy difficulties to maintain large budget surpluses. Because of the existence of a

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[4] A wide range of methods can be considered to estimate the debt limit and this section does not claim to provide an exhaustive analysis. Some papers, for instance, compute the debt limit by estimating a non-linear relationship between sovereign spreads and public debt ratios. Belhocine and Dell'Erba (2013) show that the sensitivity of spreads to debt sustainability doubles when public debt increases above 45 percent of GDP in emerging markets. However, the fact that macro-fiscal conditions worsen above certain debt thresholds does not necessarily imply that fiscal sustainability is at stake. The debt limit should be considered as a point of no return.

[5] More specifically, the limit is computed using a noise-to-signal approach, in which the debt benchmark is the level of the indicator that best predicts the occurrence of debt distress in the sense that it minimizes the sum of the missed crises and false alarms.

primary surplus ceiling, there is necessarily a debt level that cannot be stabilized. This maximum debt level is reached when very negative macroeconomic conditions (measured by the interest-growth differential) create an upward pressure on debt, but the government cannot increase the primary balance to offset this pressure. From an analytical point of view, we approximate the maximum debt level that could be stabilized under stress by calculating the ratio of the maximum achievable primary balance (PBmax) divided by the interest rate-economic growth differential under stress (r-g): PBmax/(r-g).

20.   An application of this second method to Paraguay yields debt limits ranging from 50 to 70 percent of GDP. Historically, the highest primary balance achieved in Paraguay over the period 1991-2015 was around 3 percent of GDP, whereas the international experience points to more typical maximum primary balances of around 2 percent of GDP in emerging markets (Escolano and others, 2014). Considering a broad sample of emerging markets, a relatively high level of the real interest rate-economic growth differential under stress could be in the order of 4 to 5 percent. Nevertheless, it is important to note that this differential has reached 6 percent in Paraguay in 2009 and is around 7 percent currently in Brazil. Using historical values for the maximum primary balance in Paraguay and an interest rate-economic growth differential under stress of 5 percent yields a debt limit of 60 percent of GDP, for instance.[6]

21.   Finally, the third method attempts to determine a debt limit beyond which economic growth is likely to slow down substantially. We use a theoretical model constructed by Checherita-Westphal and others (2014) to derive the level of public sector debt beyond which debt starts to have a negative impact on growth, even when considering the positive impact of public investment on GDP. In this framework, the maximum debt-to-GDP ratio depends on the output elasticity of the public capital stock (i.e. how additional public capital translates to higher GDP levels). Appendix 2 provides details regarding the model.

22.   Our empirical estimate of this model implies a public debt limit for Paraguay of close to 65 percent of GDP. We use data from the Penn-World Tables (version 9.0) and from the IMF's Investment and Capital Stock Dataset to estimate the output elasticity of public capital for Paraguay. The regressions yield estimates of around 0.28, which would imply a maximum debt-to-GDP ratio of around 65 percent. Nevertheless, this estimate is subject to a number of caveats. In particular, the model focuses exclusively on the growth implications and makes the stringent assumption of absence of borrowing constraints.

23.   Overall, the three approaches considered suggest maximum debt limits in the range of 50 to 70 percent of GDP for Paraguay. It is important to note that this range provides a sense of the debt limit that authorities would not want to exceed under most circumstances

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[6] The result is given by 0.03/0.05*100. If an interest-growth differential of 4 percent is used, the debt limit would be 75 percent of GDP (0.03/0.04*100). Relying on a more typical maximum primary balance of 2 percent, the debt limit would decrease to 50 percent of GDP (0.02/0.04*100). Similarly, if the denominator is increased to 6 percent (maximum value of the interest-growth differential in the sample for Paraguay), the debt limit would be reduced to around 50 percent of GDP (0.03/0.06*100).

and should not be viewed as a debt anchor. As discussed above, it is necessary to infer an appropriate safety margin between the actual debt anchor and this limit, which we do in the next section.

From the Debt Limit to the Debt Anchor

**24.	Having computed a debt limit, we now turn to estimate a required safety margin based on the history of shocks that the country can sustain.** This exercise starts by estimating the distribution of macroeconomic and fiscal shocks facing Paraguay. Then we use these shocks to perform simulations of future debt trajectories. The resulting debt paths are presented in a fan chart. Each trajectory represents the evolution of debt under a certain shock scenario. The debt anchor is the initial point of the different simulations presented below and it is calibrated, so that the fan chart stays below the debt limit over a 6-year horizon with a high probability. Intuitively, the debt anchor is computed as the largest debt level that the government could reach and still have a relatively low risk of experiencing fiscal distress in the medium-term. The methodology is described in detail in Appendix 3.

**25.	The simulations point to a debt anchor of 40 percent of GDP for Paraguay, if policymakers are willing to accept a 5 percent probability of breaching the maximum debt limit in the medium-term** (Figure 2.3). In other words, 40 percent of GDP is the "safe" level of debt that ensures that Paraguay can withstand negative shocks without breaching the debt limit (assumed to be 60 percent of GDP, which is the central value of the 50-70 percent of GDP interval) by the 6th year with very high probability. The required safety margin below the debt limit is relatively large because of the inherent volatility of Paraguay's economy. Another important factor determining the results is the large share of debt denominated in foreign currency (75 percent in the parametrization used in the simulations), which renders the country's debt dynamics more vulnerable to exchange rate shocks.

**26.	The debt anchor would increase to about 45 percent of GDP, if one is ready to accept a 10 percent probability of breaching the debt limit** (Figure 2.4). The sample period for the underlying econometric model used in the simulations is relatively short because of data constraints for Paraguay and also encompasses the global financial crisis. Therefore, the economic shocks simulated could be somewhat biased towards negative outcomes. In this context, accepting a probability of around 10 percent of exceeding the debt limit of 60 percent of GDP over the medium-term might be suitable. As the accepted probability of breaching the debt limit is higher than in the preceding simulation (10 rather than 5 percent), the estimated safety margin is shifted upwards, and, by construction, the debt anchor, which is the starting point of the simulation, is higher than in Figure 2.3.

Figure 2.3. Simulations with 5 Percent Probability of Breaching Debt Limit
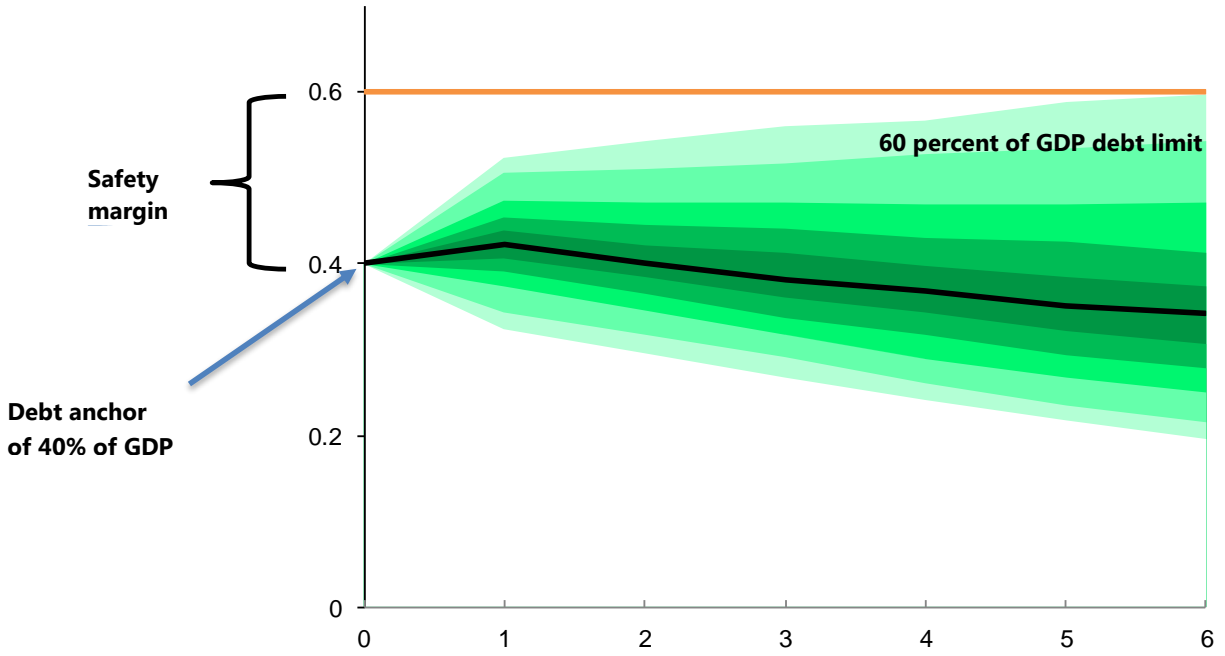
Source: IMF staff estimates.

Figure 2.4. Simulations with 10 Percent Probability of Breaching Debt Limit
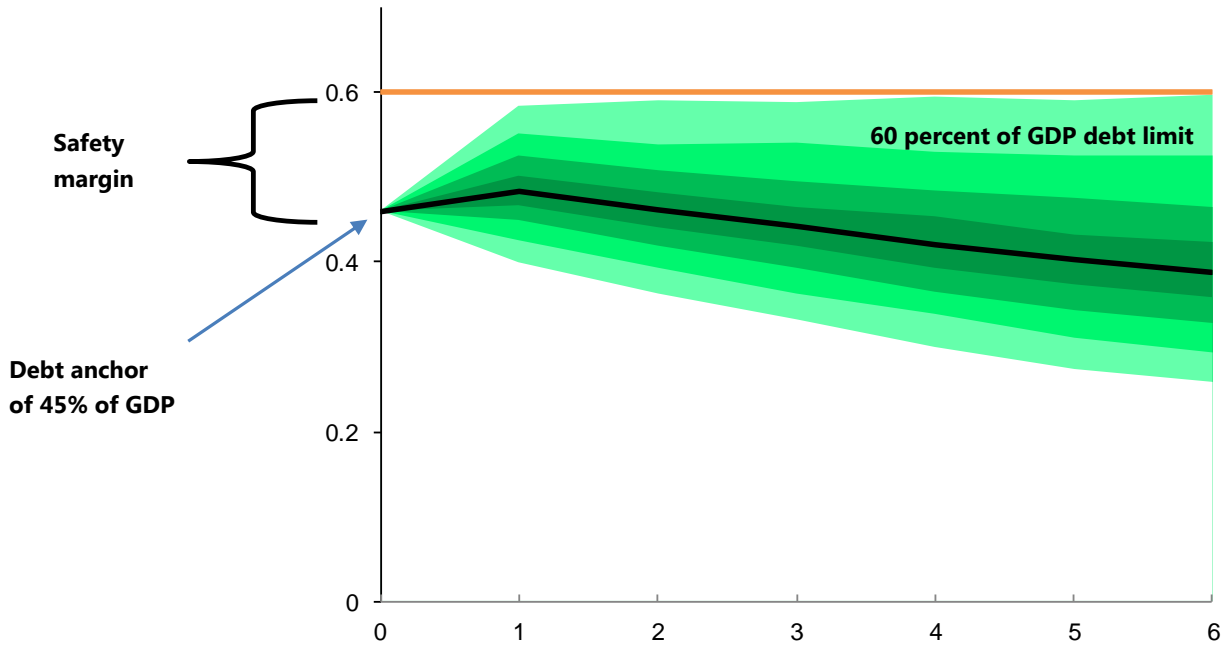
Source: IMF staff estimates.

Accounting for Contingent Liabilities

27.   The framework used previously can incorporate the possible realization of contingent liabilities. Realizations of contingent liabilities can have a significant impact on the public debt-to-GDP ratio and are not necessarily rare events. A recent IMF study estimates that, on average, the probability of realization of contingent liabilities exceeding 1 percent of GDP is close to 6 percent in a sample of emerging and developed economies (Bova and others, 2016). This means that on average, a country is likely to experience the realization of large contingent liabilities every 20 years or so. The average fiscal cost of these realizations is around 10 percent of GDP.

28.   A buffer for contingent liabilities in the order of 10 percent of GDP seems appropriate for Paraguay. In addition to being consistent with the cross-country evidence presented in the previous paragraph, such buffer would be in line with recent Paraguay-specific estimates of the likely costs of realizations of contingent liabilities. Total contingent liabilities (encompassing a wide range of areas, including natural disasters) are estimated at around 30 percent of GDP over a 10-year horizon (Moskovits, 2015). Larraín and Cerda (2016) conjecture that out of this total, about 10 percent of GDP is likely to materialize in the medium-term.

29.   The debt anchor would be reduced to 30 percent of GDP, when incorporating the likely costs of contingent liabilities to the debt limit (Figure 2.5). The anchor is obtained by applying the framework previously described, but lowering the debt limit by 10 percentage points to 50 percent of GDP and accepting a probability of exceeding the debt limit of 5 percent. Nevertheless, it is important to bear in mind that this exercise is rather stringent. In fact, the costs of contingent liabilities are already accounted for, albeit imperfectly, in our previous simulations, as these simulations include fiscal shocks in addition to more standard macroeconomic shocks.[7] Therefore, adjusting the debt limit to account for a contingent liability buffer might constitute a form of "double counting".

30.   Overall, following the precautionary approach, a debt anchor for Paraguay would lie in the range of 30 to 45 percent of GDP. The obtained debt anchors vary depending on three main parameters: (i) the estimate of the debt limit; (ii) the risks that policy makers are willing to accept, and (iii) whether an additional buffer for contingent liabilities is introduced. Other parameters are kept unchanged across the simulations presented, but are not expected to substantially alter the conclusions obtained.

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[7] Fiscal shocks are estimated using the fiscal reaction function of the country. A deviation between the fiscal response observed in the past and what the fiscal reaction function would have predicted based on past debt and output gap is interpreted as fiscal shock. Some of these deviations may be due to the realization of contingent liabilities.

Figure 2.5. Simulations with 5 Percent Probability of Breaching Debt Limit with Buffer for Contingent Liabilities
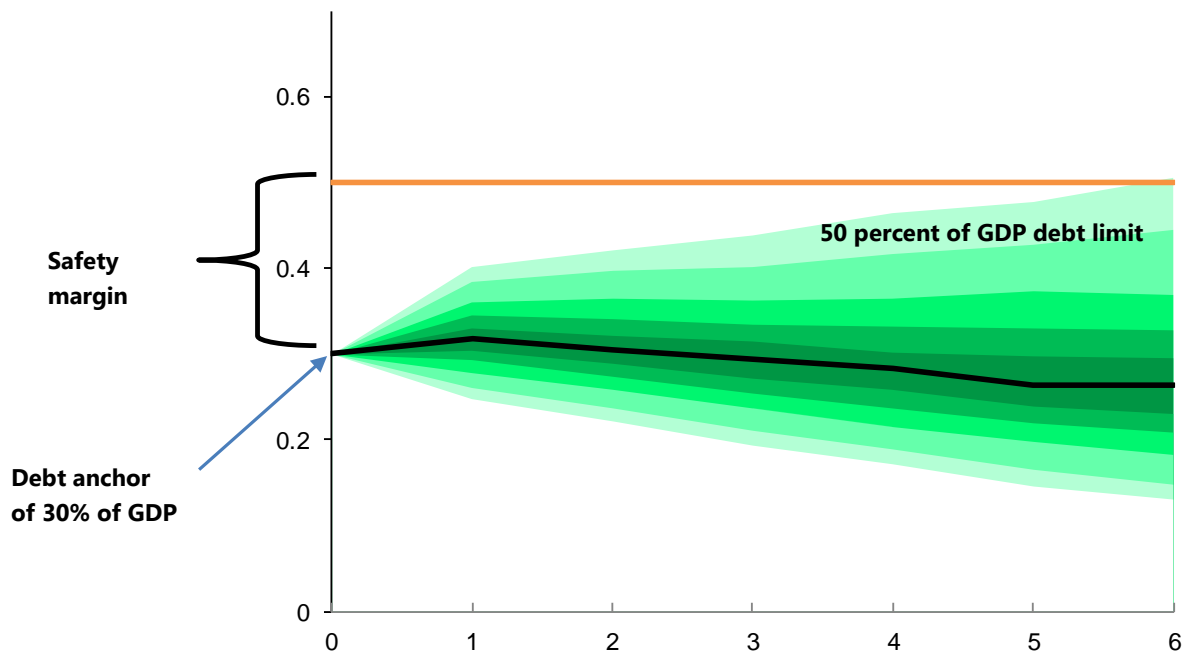
Source: IMF staff estimates.

C. Development Needs Considerations for the Debt Anchor

31.   Maintaining prudent debt levels is crucial to ensure fiscal sustainability, but increasing investment in infrastructure is also a priority for Paraguayan authorities and at least part of these development needs would have to be financed through debt. This section uses two approaches to attempt to quantify the investment needs of the country. This assessment would serve as a guide for the space needed to accommodate additional public investment within the range of debt anchors previously estimated. The first approach focuses on cross-country comparisons of the public capital stock and other infrastructure indicators to quantify Paraguay's gap relative to peers. The second approach is theoretical and calibrates standard growth models to Paraguay with the objective of obtaining the implied optimal capital stock for the country.

A Cross-Country Comparison of Public Capital Needs in Paraguay

32.   Notwithstanding a recent acceleration in the execution of public investment, Paraguay still faces a substantial gap in terms of its public capital stock relative to comparator countries. According to the IMF Investment Capital Stock Dataset, the stock of public capital in Paraguay stood at 44 percent of GDP in 2015, while the average for emerging markets was 79 percent and for Latin American countries over 84 percent of GDP. This partly reflects years of low public investment. Paraguay's public capital stock has been persistently

below comparators over the past quarter of a century (see Figure 2.6). When measured in per capita terms this gap has widened over the last 25 years.

33.   Additional indicators confirm the sizeable infrastructure investment needs faced by the country. Different measures related to the quantity of physical infrastructure show that access is lacking on a number of dimensions, with the notable exceptions of electricity production (because of the country's large hydroelectric power generation capacity) and water (Appendix 4). In addition, when data on perceptions about the quality of infrastructure is considered, Paraguay scores well-below other Latin American and emerging market countries.

Figure 2.6. Paraguay: Public Capital Needs from a Comparative Perspective

Partly as a result of several years of underinvestment …
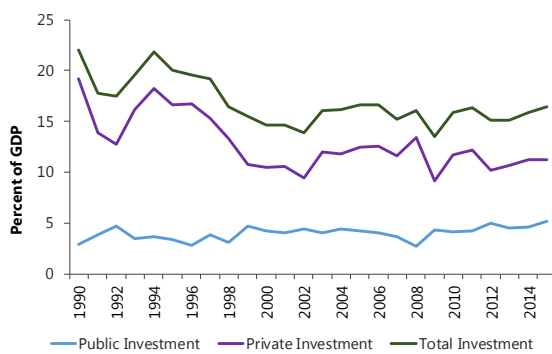
…Paraguay's public capital stock is small as a share of the economy relative to regional peers…
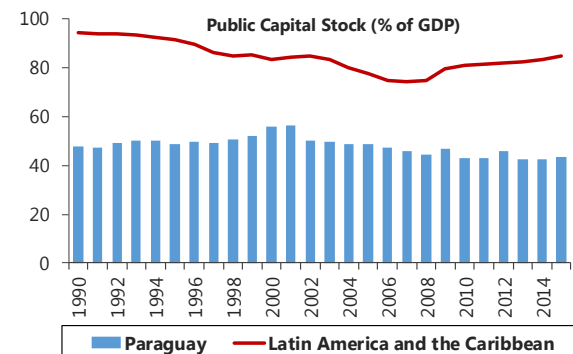
… and emerging markets more generally.
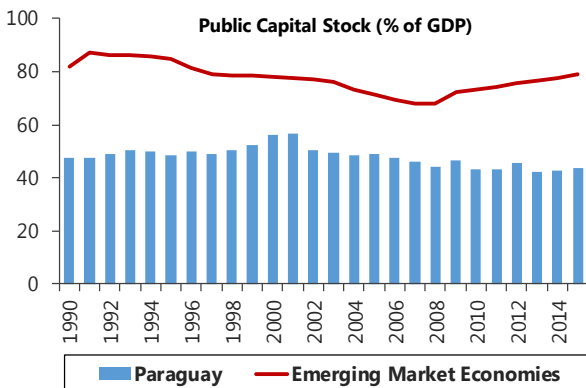
The gap relative to peers has widened in per capita terms over the last quarter century.
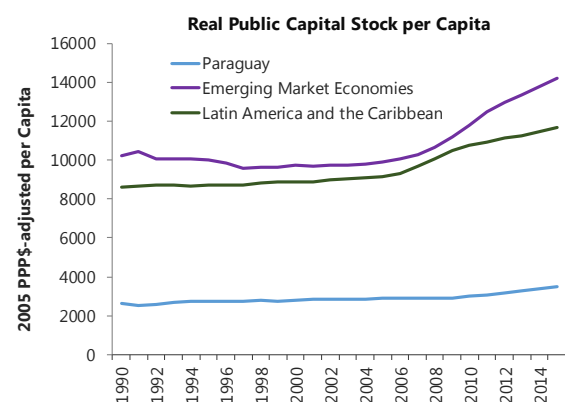
Source: IMF Investment and Capital Stock Dataset.

34.   There is also significant scope to enhance the efficiency of public investment. Historical "underinvestment" does not entirely explain Paraguay's relative performance. The IMF's Investment and Capital Stock dataset also contains a hybrid indicator that combines measures of physical infrastructure (for example, roads per capita) with data on perceptions about the quality of infrastructure. This hybrid indicator is used in a cross-country analysis to estimate an

"efficiency frontier," which links public capital and infrastructure indicators (IMF, 2015). Paraguay is situated far away from the efficiency frontier (Appendix 4), which essentially means that the country is well-behind top performers in terms of converting public capital into effective infrastructure. In other words, Paraguay could be getting substantially more infrastructure for the same amount of investment. Furthermore, the efficiency gap (a measure of the distance to the frontier) is estimated at about 40 percent, meaning that Paraguay is 40 percent below the most efficient countries according to this synthetic indicator. This places Paraguay in the bottom quartile of countries. Administrative and implementation capacity constraints pose important challenges to close the efficiency gap.

35.   In sum, the cross-country comparative analysis suggests that Paraguay has a significant public capital stock gap (above 35 percent of GDP), which weighs down on growth prospects. Building the public capital stock to catch up with peers would require large increases in public investment. But to ensure that additional capital expenditures effectively contribute to increase potential growth, authorities should intensify efforts to enhance public investment management, including in the crucial dimensions of project appraisal, implementation, and evaluation (Veloz and others, 2014).

36.   Furthermore, the authorities' own assessment of public infrastructure gaps ranges from 50 to 70 percent of GDP. Following a bottom-up approach, the Ministry of Planning identified in 2013/2014 crucial infrastructure investment projects that would suggest capital needs in the order of 16 billion US dollars (or close to 50 percent of GDP). Furthermore, an analytical exercise undertaken by the Ministry, based on the comparison between historical investment data and a benchmark adequate level of investment in infrastructure, which are cumulated to obtain the respective capital stocks, points to a gap of almost 70 percent of GDP.

Optimal Capital Stock Estimates from Standard Growth Models

37.   An alternative way to assess Paraguay's capital needs is to estimate optimal capital stock levels based on theoretical models. We base our estimates on two versions of the Ramsey-Koopman-Cass model calibrated to Paraguay with parameter values derived from public sources and standard assumptions used in the literature. The derivation of the formulas as well as the parameters for Paraguay are presented in Appendix 5.

38.   These models also suggest that Paraguay's total capital stock (public and private) is well-below optimal levels. While the capital-to-GDP ratio is estimated at around 240 percent of GDP in 2014 in the Penn World Table database (Feenstra and others, 2016), the optimal ratios given by the models range from 290 to close to 350 percent of GDP. Nevertheless, these results should be taken with caution, as they are sensitive to assumptions about parameters that are difficult to measure precisely. In addition, they reflect the "steady state" equilibrium to which the economy would gradually converge.

39.   To sum up, Paraguay faces substantial gaps in terms of public and total capital stocks relative to benchmarks, which vary from 35 to over a 100 percent of GDP depending on the methodology. The expansion in public investment required to close these gaps will have to be at least partly financed through additional debt. In fact, there are a number of reasons why it might be desirable to use debt to fund public investment. For example, equivalent increases in taxes are likely to be distortionary with negative consequences for growth. In addition, the benefits of an expansion in infrastructure would also accrue to future generations, therefore it would be more equitable if they also bear some of the costs of financing these expenditures. At the same time, not all the capital gap should be covered by public debt issuances. The authorities are also actively pursuing a number of alternative strategies to finance development needs, including the implementation of Public-Private Partnerships, which could reduce public sector borrowing needs. Revenue mobilization efforts through tax reform and revenue administration improvements will also ease the funding constraint on investment.

40.   The large size of the public capital gap suggests that it might be desirable to choose a debt anchor in the upper part of the range estimated with the previous methods. There is no model to estimate the amount of public debt needed to cover the capital gap. As discussed above, the financing of the investment necessary to close the gap does not need to come entirely from additional debt issuance. In other words, a 35 percent capital gap does not translate into a need to raise public debt by 35 percent of GDP. However, space should be provided in the context of the choice of the debt anchor to partly accommodate development needs and this assessment has to be based on judgement. One possibility would be to select a debt anchor in the upper part of the range estimated with the precautionary approach.

D.   Implications for Debt Management

41.   The debt anchor should be supported by an active debt management policy. The debt anchor needs to be credible in order to guide fiscal policy and effectively influence the public's expectations. For the debt anchor to be credible, a necessary condition is that the ceiling is properly calibrated, as discussed in the previous section. But this is not a sufficient condition. The calibration exercise should be complemented by a transparent and active debt management policy that continuously works to link the debt projections to the medium-term fiscal framework, demonstrates that reaching (and not exceeding) the anchor is feasible, and ensures that the government meets its financing needs at the lowest cost and with a prudent level of risk.

42.   A three-to-five-year debt management strategy (DMS) is considered an essential tool for guiding debt operations and ensuring that debt converges towards its medium-term objective. Such a strategy should broadly identify the funding targets and the potential financing instruments necessary to achieve the objectives; describe the desired composition of the debt portfolio; and highlight the risks, while outlining strategies to manage them. A credible

DMS can help reduce debt-servicing costs, strengthen investor confidence, and mitigate market instability. Guidelines on best practices in elaborating a DMS can be found in IMF (2013b) and IMF (2014).

43.   A public and regularly updated DMS could improve the transparency and predictability of the government's borrowing plans and operationalize the debt management policy. It main components can be described as follows:

- Assess the impact of the medium-term fiscal plan on the borrowing needs and debt trajectory and provide inputs about the evolution of debt (composition, cost, maturity) for the fiscal planning process. This enhanced coordination between the fiscal framework and the debt strategy should facilitate the convergence towards the debt anchor in the medium-term.

- Show that the debt trajectory is feasible, i.e., that it can be serviced over the medium term at low cost and with low risk.

- Express the desirable composition of the debt (instruments, maturity, currency) considering the trade-off between cost and risk, and describe the debt management approach to achieve it.

- Manage the risk exposure embedded in the debt portfolio.

44.   Paraguay produced a stand-alone DMS in 2012. The main objective of the 2012 DMS, which was formulated with the support of the World Bank, was to ensure that sufficient resources would be available to cover the government's future financing needs. The DMS did not establish an explicit debt objective. It described the evolution of public debt from 2003 to 2012 and its characteristics in terms of composition and maturity. The report also assessed the various kinds of risks (currency, interest rate and refinancing risks). A section explicitly linked the fiscal forecasts to the debt trajectory and the DMS presented four alternative borrowing scenarios to meet the projected financing needs until 2017.[8.] None of the scenarios incorporated the large issuances of external sovereign bonds that started in 2013. This policy completely changed the profile of the Paraguayan debt in the following years, stressing the need to review and revise the DMS more regularly.

45.   Publishing a DMS on an annual basis could improve the debt management practice of Paraguay and strengthen the credibility of the debt anchor. The DMS could be produced at the same time as the *Informe de Finanzas Publica*s (IFP) to facilitate the coordination between the fiscal framework and the debt strategy. The IFP usually includes a DSA, but this does not substitute for a proper DMS, which is a plan to guide debt operations. The debt management

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[8] The alternative scenarios considered different combinations of internal and external debt, concessional loans or bonds, and instruments with various maturity horizons (short, medium and long term).

department has started updating the 2012 DMS in partnership with the World Bank and intends to produce a first draft by the end of the year. However, the updating process needs to be institutionalized.

46. **The DMS could also inform periodical reassessments of the debt anchor and may lead to an eventual recalibration of the debt objective.** The DMS would allow policymakers to verify whether current and future debt can be serviced in a comfortable manner. A regularly updated DMS would provide an assessment of the public sector's debt service capacity from an operational perspective. Therefore, it could even lead to revisions of the anchor, following large changes in the macroeconomic environment (for example, a normalization of international interest rates) or other factors (such as windfall gains from the complete amortization of the Itaipu hydroelectric dam's debt).

E. Recommendations

47. **Recommendation 2.1 Calibration of the public debt anchor.** Analytical work is necessary to determine the appropriate level of the debt anchor (mid-2017). The choice of the threshold should be guided by three main considerations: insurance against shocks, development needs, and feasibility.

48. **Recommendation 2.2 Public announcement of the debt anchor.** Authorities should announce a public sector debt objective and consider incorporating it into the fiscal rule framework (in the form of a debt ceiling) to enhance its credibility (end-2017).

49. **Recommendation 2.3 Medium-term debt management strategy.** The authorities should publish and regularly update a DMS to support the debt anchor (starting in the first quarter of 2017 and then updated annually).

III. A STRUCTURAL BALANCE RULE FOR PARAGUAY

50.   The high volatility of fiscal revenues in Paraguay has resulted in a path of public expenditure that is unstable and difficult to predict. Revenue volatility is higher than in other emerging markets, reflecting a range of factors: the interplay of the business and commodity cycles; weather conditions that impact agricultural and electricity production; the prevalence of external demand and exchange rate shocks; and structural factors, such as the gradual process of formalization of the economy (Figure 3.1). In turn, the observed revenue volatility is associated with unstable expenditures. In particular, due to their discretionary nature, capital spending has frequently had to bear to burden of fiscal adjustment. In the authorities' view, the instability of expenditure has had destabilizing effects on the economy and made budget preparation and management more complex.

Figure 3.1. Volatility of Revenues in Paraguay

Government revenues in Paraguay are volatile relative to other countries at similar levels of development.
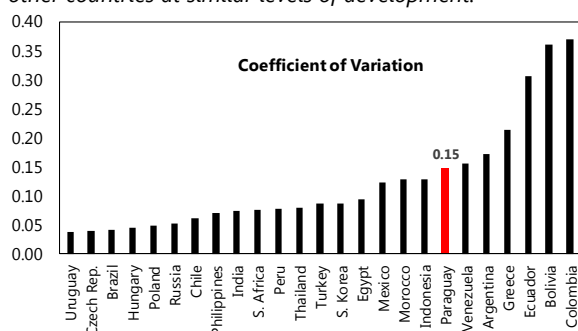
Binational revenues have been the most volatile category since 1991.
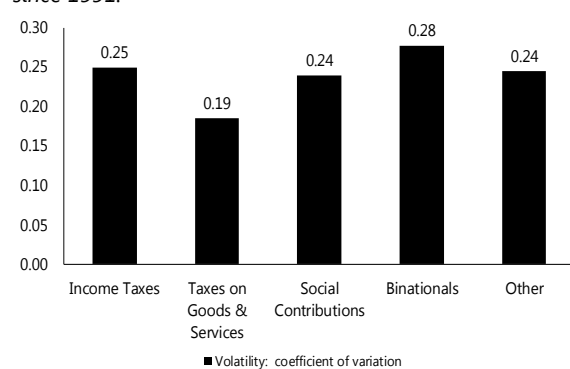
Revenue volatility is associated with some instability of expenditure in Paraguay.
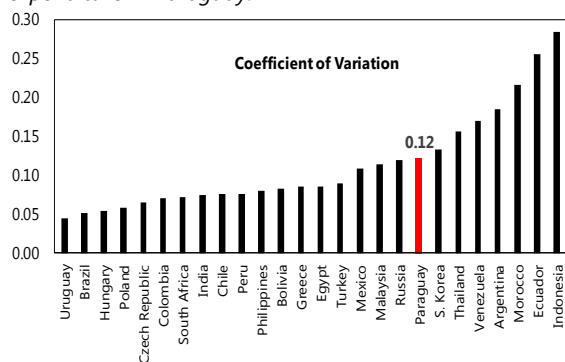
Capital spending has been more volatile than current spending since 1991.
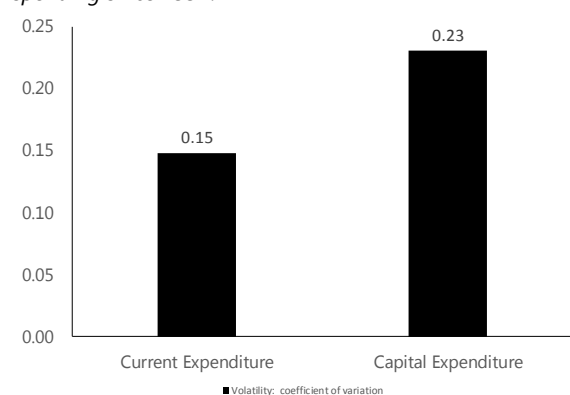
Source: IMF staff estimates based on authorities' and WEO data.

51.   The authorities plan to replace their nominal balance rule with a structural balance rule (SBR) to achieve a more stable path of public expenditure. Many countries use SBRs to disconnect the path of expenditure from actual revenues (Fedelino and others, 2009). The simplest version of the SBR is the "cyclically-adjusted balance rule," which insulates expenditure from the business cycle. More sophisticated versions of the rule have been developed to also smooth out the effect of one-off factors and unconventional cycles (commodity, asset prices).

52.   The new SBR is expected to come into effect by 2019. Following a consultation process, the authorities have settled on the general design of the new rule and are now working on its implementation features. In particular, some technical elements are still pending, such as the calibration of the rule's threshold. A draft law will be prepared next year to be approved by Congress in 2018.

A.   The Formula Used to Compute the Structural Balance

**53.   The degree of expenditure stabilization achieved by the SBR depends fundamentally on the formula used to compute structural revenues.** Given that the cyclicality of expenditure is negligible in most countries (including Paraguay), the SBR is not different from an expenditure ceiling. When the rule's threshold is zero, the SBR simply requires that the amount of expenditure be capped by the amount of structural revenue.[9] Thus, the smoother the structural revenue, the more stable the expenditure allowed under the rule.

54.   Estimating structural revenues is a difficult exercise, which requires finding the right balance between insufficient and excessive smoothing. Structural revenues should not be *too volatile* (to allow expenditure to have a stabilization function) but neither should they be *too stable* (because some changes in revenue are really of a structural nature and expenditure should adjust accordingly).

55.   The structural balance formula considered by the authorities has been adapted to the Paraguayan context. The formula proposed by Larraín and Cerda (2016) and adopted by the Paraguayan authorities is different from the one used by most countries and international institutions. The authorities' formula produces a stronger smoothing of revenues and therefore a more stable path of expenditure. At the same time, it also raises some policy issues that should be well understood. The following paragraphs discuss the pros and cons of the two approaches (Appendix 6 provides technical details).

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[9] If the threshold is different from zero, the logic remains the same, except that a wedge is imposed below or above structural revenues (as a multiple of trend GDP). The formula can be written as: $SB \geq x\%$ $\Leftrightarrow (R^S - E^S)/Y^S \geq x\% \Leftrightarrow E \leq R^S - x.Y^S$, where SB is the structural balance, x is the rule threshold, and R^S, E^S, Y^S, denote structural revenues, structural expenditure (assumed to be equal to actual expenditure), and trend output.

Standard Formula

56. **The standard formula of the structural balance corrects the nominal balance for the effect of the business cycle**. The standard formula, widely used by countries and international institutions, assumes a stable relationship between cyclical revenues and the cyclical component of GDP (Fedelino and others, 2009). In other words, the formula posits that the revenue gap (distance between actual and structural revenues) should move like the output gap (distance between actual and trend output), which has some intuitive appeal.

57. **The standard formula implies that all the volatility of actual revenues is transmitted to structural revenues *except the fluctuations associated with the business cycle***. Changes in revenues due to the business cycle are filtered out but all other sources of volatility are transmitted to structural revenues. For example, an increase in Itaipu revenues due to heavy rainfalls is considered structural by the formula; hence, the SBR would allow the government to spend these revenue windfalls entirely. The same happens when the authorities increase tax rates: the rule would allow the extra revenues to be spent. In contrast, a cyclical increase in revenues due to the business cycle would have to be saved.

58. **The standard formula may not stabilize public expenditure sufficiently in Paraguay**. The standard approach is warranted in countries with large automatic stabilizers, and where revenue fluctuations are mainly due to the economic cycle and new policy measures. Applying this approach to Paraguay is somewhat problematic for two reasons:

- Automatic stabilizers are limited by the small size of the public sector as a share of GDP (David and Novta, 2016). For this reason, the economic cycle cannot have an effect on the fiscal position as large as the effect observed in advanced economies. This means that the standard formula would provide very little smoothing.

- As discussed above, there are many sources of revenue volatility in Paraguay, which is a small open economy exposed to external shocks. Revenues fluctuate for reasons that go beyond the standard factors (business cycle and policy measures). The standard formula would transmit this volatility to structural revenues and, indirectly, expenditure.

Authorities' Formula

59. **The authorities use a different formula to compute the structural balance**. Their starting point is to assume a stable relationship between *structural* revenues and the *structural* component of output estimated with an HP filter (see Appendix 6 and IFP, 2016).[10] The main difference between their formula and the standard one is that the standard formula assumes a stable relationship between the *cyclical* components of revenue and output. This difference may seem innocuous but it has important policy implications, as discussed below. .

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[10] Under the authorities' formula, structural revenues associated with the proceeds of the binational hydroelectric plants are assumed to follow the same stable relationship with trend GDP as other revenue items.

60.   The authorities' formula would result in a very stable path of public expenditure. One of the main advantages of the authorities' approach is that it achieves a very stable path of expenditure compared to the standard formula. The reason is very simple: in the authorities' formula, structural revenues evolve proportionately to trend output, and are therefore very smooth. As the SBR requires that expenditure be capped by structural revenues, the formula translates into a stable path of expenditure. Figure 3.2. confirms this result by simulating the two formulas on historical data.

Figure 3.2. Expenditure Allowed Under Different Structural Balance Rules
(In percent of trend GDP)
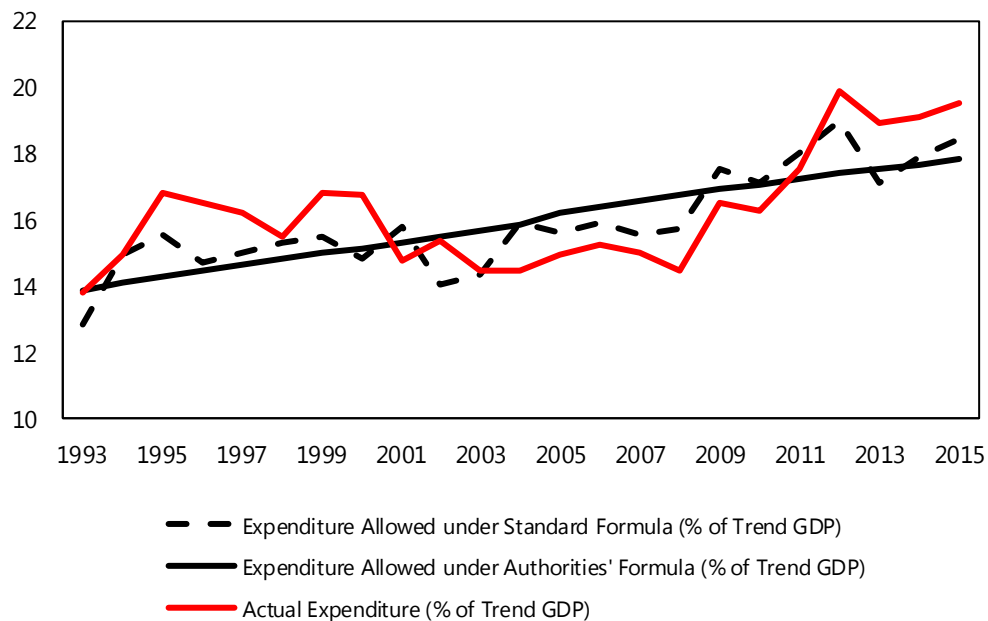
- - - Expenditure Allowed under Standard Formula (% of Trend GDP)
—— Expenditure Allowed under Authorities' Formula (% of Trend GDP)
—— Actual Expenditure (% of Trend GDP)

Note: Trend GDP is constructed using HP filter on annual data. Allowed expenditure is assumed to be equal to structural revenues (zero structural balance). Standard formula assumes revenue elasticity of 1 relative to output gap. Parameters of authorities' formula are from Annex 4.2 of IFP (2016).
Sources: IMF staff estimates and authorities' data.

61.   Nonetheless, the very strict relationship between structural revenues and trend GDP that the authorities' formula assumes may create three policy risks:

- *Risk of overestimating structural revenues and authorizing too much expenditure*. Fiscal revenues have, on average, grown faster than GDP in Paraguay in the past 20 years—partly because of the process of formalization of the economy and the gradual gains in revenue administration. As a result, the econometric estimation of the formula rightfully finds that the elasticity of structural revenues to trend GDP has been above 1 *in the past* ($\gamma > 1$). However, if the estimated formula is used to calculate the amount of allowed expenditure *in the future*, it may overestimate structural revenues and result in a growing share of expenditure to trend GDP. In other words, the formula implies that future expenditure will grow faster than the

size of the economy, which could lead to a steady deterioration of the fiscal position at unchanged policy, unless history repeats itself and there is a coincident increase in tax collected (for instance, related to structural changes in the economy). Figure 3.3 illustrates this risk by simulating the effect of the authorities' formula on the nominal balance if the revenue-to-trend GDP ratio remained constant over time.

Figure 3.3. Nominal Fiscal Balance Under the Authorities' Structural Balance Rule (In percent of nominal GDP)
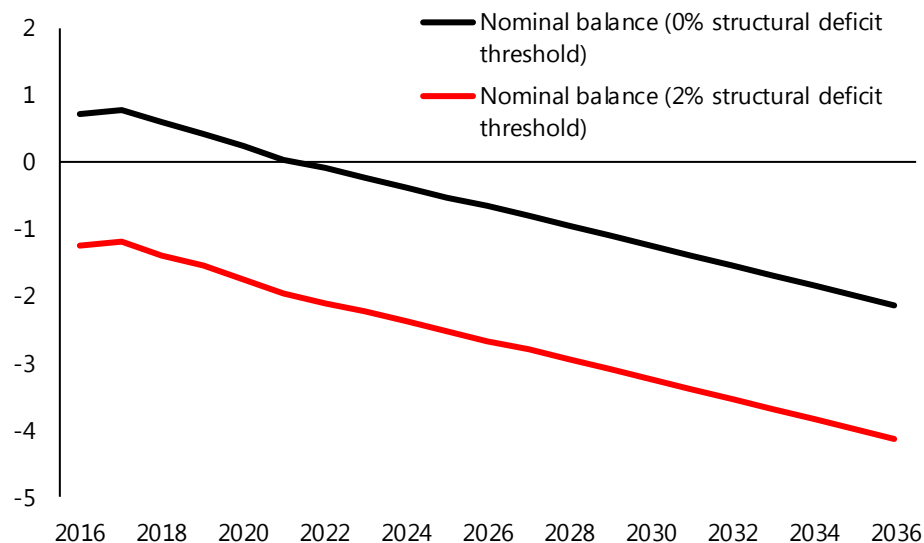
Note: The simulation assumes unchanged revenue policy: revenue-to-potential GDP ratio remains constant at 2016 levels over 2017-36. Structural revenues are calculated using the authorities' formula (IFP, 2016). The nominal balance is given by the difference between actual and structural revenues under the zero structural deficit threshold. Under the 2 percent structural deficit threshold, the nominal balance is given by the difference between actual revenue and allowed expenditure (determined as structural revenues plus 2 percent of potential GDP). The projected output gap and potential output are from the WEO database until 2021 and the output gap is set to 0 from 2022 onwards.
Sources: IMF staff estimates and authorities' data.

- ***Risk of mis-measuring structural revenues when there are tax policy changes***. Contrary to the formula's assumption, the relationship between structural revenues and trend output is not stable in reality. It breaks when new policy measures are introduced. To be relevant and up-to-date, the formula would have to be re-estimated regularly to reflect changes in the elasticity of structural revenues to trend output. However, it is unclear whether the estimation method used by the authorities (cointegration) can accurately capture the effect of policy changes, as it is meant to measure long-term relationships between variables. Extending the estimation period by one or two years may not be sufficient to revise accurately the coefficients, in particular if there are structural breaks. This is problematic, because the results are very sensitive to the estimation of the elasticity: Table 3.1 shows that

a small measurement error of the elasticity (γ) may result in large changes in the estimate of structural revenues and the allowed amount of expenditure under the SBR.

- ***Risk of creating a disincentive for revenue mobilization***. Given that the formula has to be re-estimated ex post, it can create, ex ante, a disincentive to introduce *revenue-enhancing* measures, as the authorities will not be able to spend the new revenues until the relationship is re-estimated and the elasticity is revised upward. On the contrary, the government may face an incentive to take *revenue-diminishing* measures, because the rule will not immediately force a corresponding adjustment of expenditure. These policy distortions come essentially from the fact that the amount of expenditure allowed under the authorities' formula is linked to trend GDP, not explicitly to tax measures.

Table 3.1. Sensitivity of the Nominal Fiscal Balance to Changes in the Elasticity of the Structural Balance Rule

Reference year 2015				
Elasticity Estimate	1.090	1.096	1.100	1.105
Allowed Expenditure (% of GDP)	17.1	18.5	19.3	20.5
Nominal Balance (% of GDP)	1.3	-0.1	-0.9	-2.1

Note: Simulations are based on structural balance rules with a zero threshold. As a result, nominal balance is calculated as actual revenue - structural revenue. Structural revenues are based on the authorities' formula (IFP, 2016) with the exception of the elasticity of structural revenue to trend GDP. Sources: IMF staff estimates and authorities' data.

Proposed Changes to the Authorities' Formula

62.   The SBR formula should not assume that structural revenues will grow faster than trend output in the future. As discussed above, it is risky to assume that the past developments will continue in the future. In fact, revenues have systematically underperformed compared to plans in the past 4 years (Figure 3.4). Moreover, the fact that the tax structure is mainly proportional in Paraguay (in statutory and effective terms), with limited progressivity built into the tax structure, would also point to an elasticity of one relative to trend output growth going forward. Assuming that structural revenues will grow faster than trend GDP may result in excessive expenditure growth. A more cautious approach would be to assume in the budget that structural revenues grow at the same pace as trend GDP. In practice, there are two alternative ways of implementing this more conservative assumption:

- ***The first method keeps the authorities' formula, but modifies its coefficients.*** A unit elasticity of structural revenues to trend output could be assumed ($\gamma = 1$) in lieu of the estimated 1.096. The other coefficient ($\propto$) would have to be calibrated. One easy way is to note that $\propto$ is the structural effective tax rate in the economy.[11] Thus, the value of the coefficient can be proxied by what the authorities consider to be their tax burden "in the steady state" (excluding temporary/cyclical factors).

- ***The second method does not rely on any formula and uses a rule of thumb to set the desired growth rate of spending.*** There is an alternative and easier way to implement the conservative approach, which is to interpret the SBR as an expenditure rule. When the elasticity γ is equal to 1, the authorities' formula has a very simple property: the structural balance remains unchanged if expenditure grows at the same pace as trend GDP (see Appendix 6). This means that if the authorities are already at a structural fiscal position that they deem appropriate, they just need to let expenditure grow like trend output to maintain this position. This interpretation of the structural balance as an expenditure rule in growth rate is widely used in the European fiscal rule framework under the name "expenditure benchmark" (see European Commission, 2016). It is considerably easier to implement than computing a structural balance and it achieves broadly the same purpose.

Figure 3.4. Fiscal Revenues: Planned vs. Actual
(In percent of GDP)
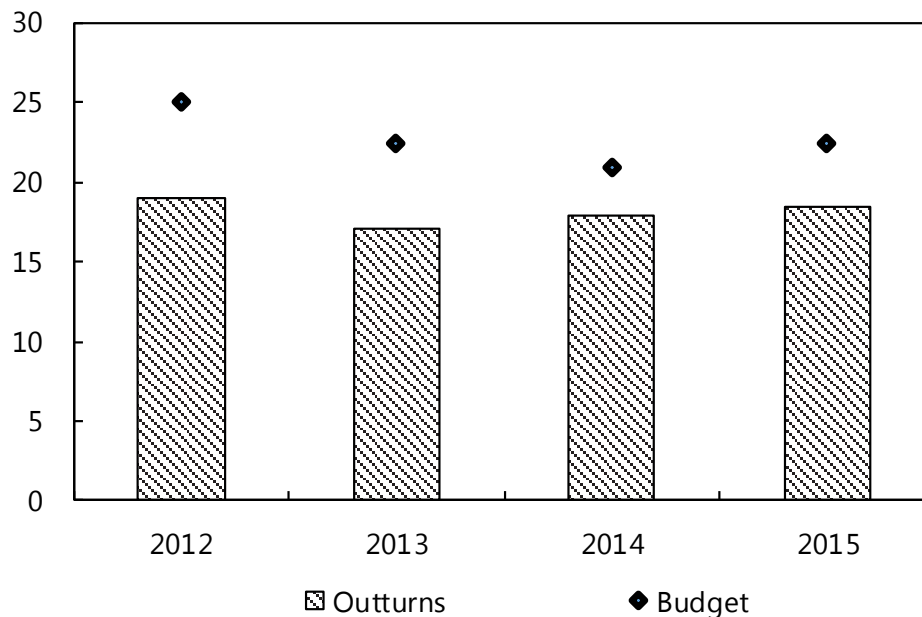
Source: IMF staff calculations and Authorities' data.

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[11] By definition, if $\gamma = 1$, $R^S =\propto Y^S \Leftrightarrow R^S/Y^S =\propto$ (with R^S and Y^S denoting structural revenues and trend output). See Appendix 6 for details.

63.   The authorities' formula should also be adjusted to incorporate the effect of new revenue measures in real time. The formula only adjusts for revenue measures ex-post, when it is re-estimated and a revised elasticity is computed. As discussed above, this may create a disincentive to revenue-mobilization. A solution is to take into account revenue measures separately in the spirit of the European expenditure benchmark: "Member states at their medium-term objective [structural balance target] must ensure that government spending grows at most in line with a medium-term rate of potential GDP *unless any excess growth is matched by discretionary revenue measures yielding additional revenues*" (European Commission, 2016). In operational terms, this means that (i) the authorities could use their formula to set an annual expenditure cap (in nominal terms) based on trend output, but (ii) they would need to adjust it for new revenue measures—to the extent that these measures impact current year revenue and are durable (i.e. of a structural nature).[12] This adjustment should persist until the relationship between structural revenues and trend output is re-estimated and the policy measures are reflected in a revised elasticity. In short, the proposed adjustment to the formula would be:

$$Allowed\ expenditure\ in\ the\ budget = \propto (Y^S)^\gamma + yield\ of\ new\ revenue\ measures$$

64.   Revenues from binational dams should be excluded from the formula and smoothed out separately. Applying the general formula to binational revenues may create two difficulties:

- First, the authorities' formula assumes that structural revenues and trend GDP grow approximately at the same rate and that the relationship is stable overtime. These two assumptions are not well grounded in the case of binational revenues. Figure 3.5. shows that these revenues have undergone a series of structural breaks in the past. Since the early 2000s, the ratio of revenue to trend GDP has declined, primarily because of the relatively low growth of the dam production (0.5 percent a year in volume—well below trend GDP growth) and the fact that electricity prices are fixed by contracts.

- Second, the relationship is expected to break again from 2023 onwards when Itaipu's debt is repaid and revenues increase significantly (by up to 3 percent of GDP, according to the authorities). If the authorities' formula was applied, the SBR would not allow the authorities to spend the extra revenues for many years—until the re-estimation of the relationship captures the structural break. Smoothing the binational revenues separately may give the authorities more flexibility to decide how and when they want to allocate the revenue windfall.

- For these reasons, it may be better to differentiate between the two types of revenue and split the calculation of structural revenues into two parts: the revenues linked to the business cycle could be estimated with the formula using trend output (which should be re-estimated

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[12] To mitigate the risk of overestimating the yield of new policy measures, the independent fiscal council could play an important role in reviewing the government's methodology and estimates.

by excluding binational revenues). For binational revenues, a different method should be developed, for instance based on a linear trend.

Figure 3.5. Fiscal Revenues from the Binational Hydroelectric Dams
(In percent of trend GDP)
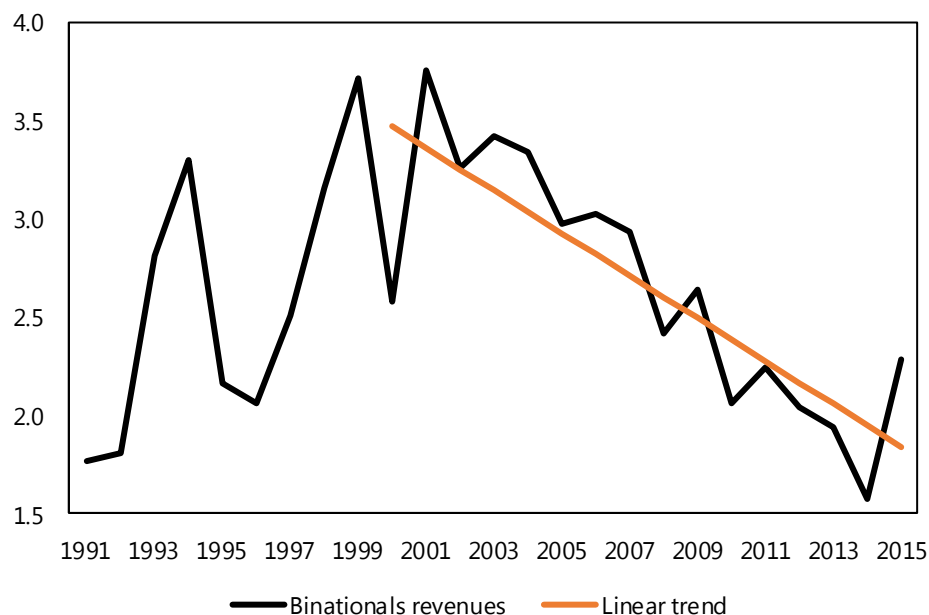
Source: IMF staff calculations and Authorities' data.

Link with The Sovereign Wealth Fund

65.   The authorities are exploring the possibility of establishing a sovereign wealth fund (SWF) associated with the SBR. The exact function of the fund is not yet finalized. The SWF could be set up for stabilization, savings, and/or development purposes. One of its objectives would be to manage the fiscal surpluses generated by the SBR with a view to insulating the budget from the revenue volatility. The fund would build up assets during the years of high fiscal revenues to prepare for leaner years. A second function could be to save part of the extra revenue from the Itaipu dam, which are expected to materialize after 2023. Savings invested in a diversified portfolio of international financial assets may be used to achieve long-term objectives. Finally, the fund could also have a development function and be mandated with allocating resources for and managing priority socioeconomic projects, such as infrastructure.

66.   The allocation formula of the SWF will need to be consistent with the SBR. The analysis of the SWF is beyond the scope of this report but, regardless of its design, it will be important to ensure that the SWF and the SBR formulas do not conflict with each other. One key principle is that the criteria dictating the allocation of savings to the SWF should be consistent with the fiscal balance rule. The SBR will be used by the authorities to determine how much revenue is saved or spent. Among this pool of savings, part of it could be allocated to the SWF.

Chile provides an example of how he SWF formula can be nested within the SBR: any fiscal surplus generated by the rule is allocated to various funds (economic and social stabilization fund, pension reserve fund, and until 2011 a capitalization fund for the Central Bank) based on predetermined thresholds.

B. The Structural Balance Rule Threshold

67.   The ceiling of the SBR should be linked to the debt objective. When setting the rules' thresholds, the authorities need to take a comprehensive approach to the fiscal framework, as the short-term operational rules (on the fiscal balance and expenditure) should be consistent with and support the medium-term objective on public debt. One of the problems frequently faced by fiscal rule frameworks is the inconsistency between the debt ceiling and the other rules. For instance, in the European framework, the 3 percent nominal deficit ceiling is clearly too loose to bring back public debt to 60 percent of GDP, which is the level of the anchor (Andrle and others, 2015).

The Calibration of the Rule Threshold

68.   The debt simulations of Section II suggest that the structural deficit of the public sector should not exceed 2-3 percent of trend GDP. Assuming a 30-45 percent debt target for the public sector and 7-8 percent nominal trend growth, the structural deficit that would make debt converge towards its medium-term objective would be around 2-3 percent of trend GDP.[13] This range is indicative and sensitive to the assumptions. If the authorities want to target a smaller debt ratio, they should reduce the structural deficit ceiling, whereas a higher debt target would allow them to set a higher ceiling.

69.   This range would translate into a structural deficit ceiling for the *central government* of about 2 percent of trend GDP. The central government ceiling should be set at the lower end of the previous range for two main reasons. First, fiscal deficits are not concentrated at the central government level and may also occur in other parts of the public sector. Thus, a buffer needs to be created for possible fiscal imbalances in local governments, state owned enterprises, and the social security system. Second, a safety margin should also be maintained to account for future deviations from the rule. In the absence of correction mechanisms in the FRL, the government is not required to offset past departures from the rule. These deviations may pile up overtime and lead to an upward drift of public debt. Based on these two considerations, the structural deficit of the central government could be capped at 2 percent of trend GDP.

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[13] The debt-stabilizing overall deficit is computed as d*g/(1+g) in which d denotes the debt-to-GDP ratio and g the trend GDP growth in nominal terms (Escolano, 2010). For instance, in the steady state (assuming no output gap), a structural deficit of 2 percent of GDP would bring the debt ratio towards 30 percent of GDP (deficit*(1+g/g) = 2*1.07/0.07=30.6) if nominal GDP grows at 7 percent a year.

70.   If the authorities implement a structural balance rule with a threshold of 2 percent, the *nominal* deficit could deteriorate well below 1.5 percent of GDP. This is a normal and expected effect of the SBR: the greater stability of expenditure translates into more volatility of the nominal balance. Counterfactual simulations show that the nominal deficit would have deteriorated up to 3-4 percent of GDP if the SBR had been implemented since the early 1990s (Figure 3.6). The extent of the deterioration depends on the formula used to compute the SBR. With the standard formula, a "normal" downturn would bring the nominal deficit to about 3 percent of GDP.[14] The authorities' formula could imply larger deficits (over 4 percent of GDP in 2002), because expenditure is more stable under their rule and, relatedly, the nominal balance is more volatile. In fact, the standard deviation of the nominal balance under the authorities' formula is 40 percent higher than under the standard formula, using the two series shown in Figure 3.6.

Figure 3.6. Nominal Fiscal Balance Under Structural Balance Rules
(Based on 2 percent threshold; in percent of nominal GDP)
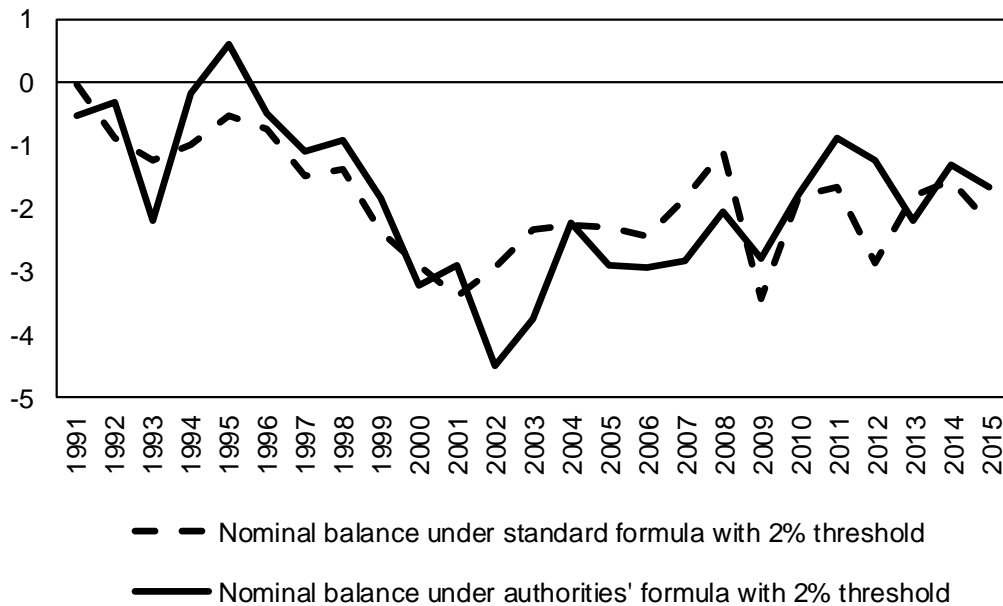
- - - Nominal balance under standard formula with 2% threshold

——— Nominal balance under authorities' formula with 2% threshold

Note: Trend GDP is constructed using HP filter on annual data. Allowed expenditure
is assumed to be equal to structural revenues plus 2 percent of trend GDP. Standard
formula assumes revenue elasticity of 1 relative to output gap. The parameters of
the authorities' formula are from Annex 4.2 of IFP (2016).
Sources: IMF staff estimates and authorities' data.

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[14] The size of automatic stabilizers in the standard formula can be proxied by the product of the output gap times the share of spending to GDP (see Fedelino and others, 2009). Our calculation assumes a "normal" economic downturn with a negative output gap of -5 percent and a share of spending to GDP of 20 percent. As a result, the nominal deficit could deteriorate by 5*0.2 = 1 percent of GDP relative to the 2 percent structural deficit ceiling.

Implications for Public Investment

71.   The effect of the SBR on public investment will depend on how the SBR interacts with the existing rule on current expenditure.[15] By itself, the SBR could create more space for public investment if its ceiling is set above 1.5 percent, which is the ceiling of the existing nominal balance rule. The impact on investment will also depend on whether the current expenditure rule is maintained and/or amended. It is important to note that simply combining the SBR and the current balance rule will not be sufficient to close the investment gap. Assuming, to simplify, that the SBR applies to the whole public sector and has the same coverage as the current expenditure rule, it is easy to see that the combination of the two rules would not be sufficient to shift the composition of public expenditure towards capital spending. Indeed, both the growth rates of total expenditure and current expenditure are capped by trend GDP growth (the former because of the SBR[16]; the latter because of the current expenditure rule). Therefore, public investment would also grow approximately at trend growth, which means that (i) it would remain stable as a share of trend GDP, and (ii) the ratio of current to capital spending would not change over time. In these conditions, Paraguay would not be able to close the investment gap with emerging markets, where the public investment ratio is closer to 6 percent of GDP, on average (Figure 3.7).

**Figure 3.7. Public Investment Gap in Paraguay
(2005 PPP$-adjusted; in percent of GDP)**
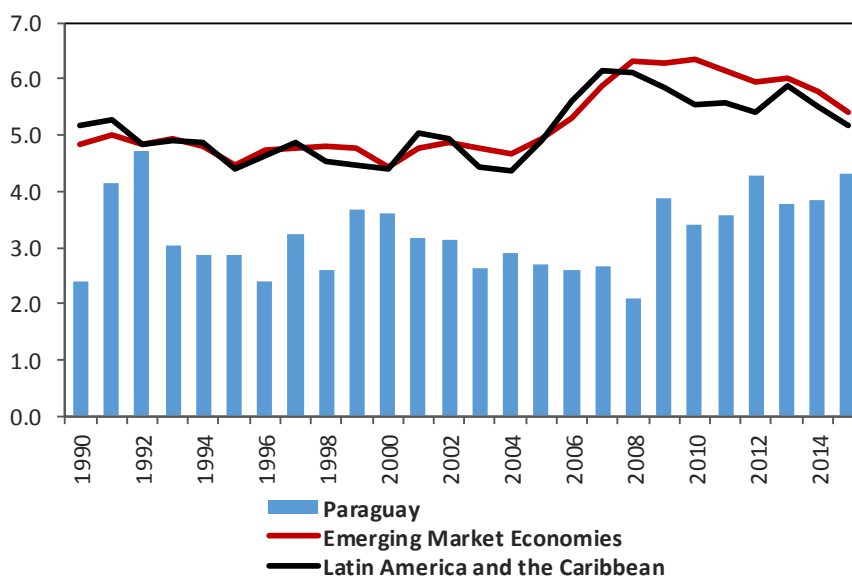
Source: IMF Investment and Capital Stock Dataset

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[15] To simplify, this section abstracts from the fact that the authorities' rule applies to current *primary* spending, but given the small size of the interest bill, this simplification does not alter the main conclusions.

[16] Assuming an elasticity $\gamma = 1$. The simulations would need to be updated once the formula and the coefficients of the SBR are finalized.

72. **To reduce the public capital gap, the SBR will have to be combined with a tighter current expenditure rule**. Table 3.2 presents results from simulations based on tighter current expenditure growth ceilings of 2 and 3 percent in real terms (compared to the existing ceiling of 4 percent). The simulations are conducted in two stages and apply to the public sector as a whole. During the first period, the public sector's investment ratio of Paraguay grows gradually from its current level (4.2 percent of GDP in 2015) to 6 percent of GDP, which is assumed to be the emerging market benchmark. During the second period, the investment ratio stays at 6 percent of GDP until half of the public capital stock gap is closed.[17] The table shows the number of years necessary to achieve both objectives depending on the current expenditure assumption. For instance, a ceiling of 3 percent on current expenditure growth would allow public investment to grow at 9 percent on average, while complying with the SBR. It would take 8 years to reach the benchmark investment rate of 6 percent and another 9 years to close half of the capital gap.

Table 3.2. Time to Close the Public Capital Stock Gap

Current expenditure growth in first period (real)	Implied public investment growth in first period (real)	Time to reach public investment ratio of 6% of GDP in first period	Time to get to 60% public capital stock in second period	Total time to close half of the capital stock gap in the two periods
3%	9%	8 years	9 years	17 years
2%	14%	4 years	11 years	15 years
1%	19%	3 years	11 years	14 years

Source: Staff estimates.

C. Structural Balance Rule and Public Financial Management

73. **The SBR entails additional requirements for debt and cash management.** The need to stabilize expenditure over the business cycle (as mandated by the SBR) can have important implications for public financial management:

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[17] The targeted public capital ratio is set at 60 percent of GDP, which corresponds to the sum of the initial capital stock (43 percent of GDP in 2015) plus half of the gap with emerging markets (estimated at 17 percent of GDP). During the second period, current expenditure growth is assumed to be 4 percent a year (in real terms), so that investment grows at the same rate as trend GDP and the investment ratio is constant at 6 percent of trend GDP. The simulations rely on a deprecation rate of public capital of 5 percent per year. We assume that the shift in composition towards higher public investment does not increase trend GDP growth; thus, the number of years to close half of the gap might be overestimated. Nevertheless, we also consider that there will be no deceleration of trend GDP growth over the simulation period (for example due to demographic factors), which would have the opposite effect of the one previously mentioned (i.e. underestimation of required years to close the gap).

- **Ability to borrow in economic downturns.** The SBR leads to greater volatility of the nominal fiscal balance. Nominal deficits can deteriorate substantially in economic downturns, raising the borrowing needs. Under a SBR, debt managers have to be more active in accessing financial markets and develop adequate strategies and instruments to borrow large amounts on a regular basis.

- **Ability to access all available cash.** The objective of smoothing public expenditure is inconsistent with an excessive segmentation of fund sources and/or a high degree of revenue earmarking. Cash managers have to manage all public funds in a consolidated way. Maintaining an appropriate cash buffer is also necessary to meet cash outflows, particularly when the ability to borrow is constrained.

74.   **Paraguay has made progress in its capacity to manage funding needs.** The Treasury single account (TSA) was established in 1999 by the State Law on Financial Administration (*Ley de Administración Financiera del Estado, LAFE*) and its coverage has been expanded since then. The TSA is operated at the Central Bank and currently covers the central government operations (executive, judiciary and legislative branches) and autonomous entities.[18] It enables the Treasury to manage public funds in a consolidated way, which improves efficiency and reduces costs. The Law of Modernization of the Financial Administration (*Ley de Modernización de la Administración Financiera del Estado*) enacted in 2013 created the Treasury Bills as a short-term (up to 1-year) debt instrument to support the TSA operations. But further regulation is needed for the law to become operative. In parallel, debt management has undergone significant reforms. In 2013 Paraguay issued US$500 million in ten-year Treasury Sovereign Bonds. The issuance marked the first time the country accessed the international financial markets and changed the Paraguayan debt profile, traditionally concentrated on concessional loans. Several other issuances were made in the following years and the share of sovereign bonds in the total debt portfolio exceeded 40 percent by June 2016.

75.   **Despite these reforms, Paraguay may still face constraints to cover large fiscal deficits with debt issuances.** These constraints are of legal and economic natures:

- **Legal constraint**. The golden rule, established in article 40 of LAFE, states that resources from debt operations can only be used to finance capital expenditure and debt repayment. The rule applies to the central government and the public sector as a whole. It is well institutionalized in the country and there is little desire to modify it. In practice, the golden rule imposes a de facto limit on the size of the nominal deficit and could conflict with the SBR, particularly in economic downturns. In the past, the sum of capital expenditure and debt repayments (for the central government) has fluctuated between 3 and 10 percent of GDP depending on the year, with an average of 5 percent GDP over 1991-2015.

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[18] The Social Security System, the decentralized entities and the universities are still not covered by the TSA.

- **Economic constraint**. Access to financial markets may be constrained during economic downturns. Paraguay has a recent and successful experience in accessing the international financial markets. The country has been issuing long-term bonds (10 and 30 year bonds) at a relatively low cost during the last 4 years. However, this positive recent history cannot be taken as a guarantee of future market demand for Paraguayan bonds. International markets could become more restrictive and discriminating in economic downturns. Furthermore, the size of the domestic market in Paraguay is limited.

76.   **Furthermore, cash is not managed in a consolidated way in Paraguay.** Public funds may not be fully available for smoothing expenditure for two main reasons:

- **Segregation of resources.** Resources from debt operations are managed in separate bank accounts and are not covered by the TSA. Besides keeping them outside the TSA, the Treasury applies a specific funding code (FF20) to resources originated from debt operations. In practice, the Treasury deals with two independent cash management processes: i) tax revenues inflows and current expenditures outflows, consolidated in the TSA (funding codes FF10 and FF30); and ii) debt operation resources and capital expenditures, managed outside TSA (code FF20). There is no fungibility between these resources, meaning that a wage expense cannot be paid through debt, even on a temporary basis.

- **Limited cash buffer.** The TSA cash management cannot use debt instruments to build and maintain a cash buffer (as it is done in many countries), which makes the existing cash management for current spending a simple exercise of matching payments to cash inflows from tax revenues. In practice, this means that in an economic downturn, the MOF may have no choice but to cut spending when revenues are down, violating the spirit of the SBR. Despite the absence of a TSA buffer mechanism, the Treasury is allowed to finance cash flow mismatches with temporary cash advances from the Central Bank, but these advances are subject to certain limits.[19]

77.   **Paraguay needs to strengthen its ability to generate a steady flow of funding.** The T-bond/T-bill instruments should be continuously developed. It is also important to access the market on a regular basis through bond issuances in order to improve the demand for Paraguay securities. A forward-looking debt strategy should also be developed to access market in economic downturns when financial conditions are more difficult. The government should finalize the T-bills regulation to add this instrument to the debt portfolio. Ideally, there should be provisions for the T-bills to be used as an unrestricted cash management tool, including for the accumulation of the cash buffer. If the T-bills cannot be used for this purpose for legal reasons,

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[19] The National Constitution, the LAFE (article 26) and the Central Bank Organic Law (Law 489/1995) include provisions for this mechanism. Nevertheless, they impose different limits. The LAFE sets the maximum amount to 1 percent of the approved budget, while Law 489/2015 establishes that the advances cannot exceed 10 percent of the budgeted tax revenues during the fiscal year. In practice, the Treasury has been using such advances at the beginning of the fiscal year to pay arrears accumulated in the previous year.

the MOF would have to create another debt instrument to finance current spending when there are temporary revenue shortfalls.[20] This instrument would create more flexibility to manage cash during the year. To comply with the golden rule, any issuance of this new instrument would have to be offset through buy-backs by the end of the year (otherwise, these issuances would result in a net increase in public debt to fund current expenditure, which would conflict with the golden rule).

78.   **Paraguay should generate a prudent level of cash buffer in the TSA.** A general rule of thumb is that countries should accumulate cash buffers sufficient to pay all bills (all spending, including debt amortizations if there is no assumption of rollover) from 30 to 90 days. A more sophisticated method relies on the analysis of the seasonality of payments and revenue collections in the last 2-3 years (preferably based on daily data). This analysis provides concrete information on cash flow patterns and accumulated gaps. One approach is then to calibrate the cash buffer as the size of the gap during the worse month in the last two years to avoid the accumulation of arrears. The size of the buffer will, of course, depend on the quality of the cash flow projections and soundness of the financial market to tap the gaps. Guidelines on best practices for cash management and the calibration of the cash buffer can be found in Lienert (2009), Pessoa and Williams (2012) and IMF (2013b).

D.   Recommendations

79.   **Recommendation 3.1: Projection of structural revenues.** The SBR formula should not assume that structural revenues will grow faster than trend GDP in the future (December 2017).

80.   **Recommendation 3.2: Effect of new revenue measures.** The SBR formula should be adjusted to incorporate the effect of new revenue measures in real time (December 2017).

81.   **Recommendation 3.3: Revenues from binational hydroelectric dams.** Binational revenues should be smoothed out separately and excluded from the main SBR formula (December 2017).

82.   **Recommendation 3.4: Threshold of the SBR.** The threshold should be calculated by linking the SBR to the medium-term debt objective (December 2017).

83.   **Recommendation 3.5: Ceiling of the current expenditure rule.** The expenditure ceiling should be tightened when the new SBR is adopted to reaffirm the commitment to fiscal discipline and ensure that the combination of the two rules contributes to close the public investment gap (December 2018).

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[20] Law 5097/2013 states that resources from T-bills can only be used to finance capital expenditures and debt repayments.

84.   Recommendation 3.6: Allocation of funds to the future SWF. The allocation formula of the SWF should be consistent with and nested in the SBR (December 2018).

85.   Recommendation 3.7: Short-term instrument for cash management. A short-term debt instrument should be in place before implementing the SBR to finance current spending when there are temporary revenue shortfalls (December 2018).

IV.   COMMUNICATION STRATEGY

86.   Moving towards a SBR creates additional challenges in communicating the fiscal rule and fiscal position to the public. The output gap concept is abstract and the computation of the structural balance is complex, relying on mathematical formulas and statistical estimations understood only by specialists. The absence of a direct link between the structural balance indicator and budget items is also an obstacle when the authorities have to explain how the rule impacts fiscal policy. The SBR could easily be perceived as "creative accounting" (as it allows higher deficits in certain circumstances) or superfluous technicality. In the absence of an effective communication strategy, the SBR may undermine the credibility of the fiscal framework and complicate the budget process.

87.   Successful communication experiences largely rely on a simple but clear message on the new rule. This message should aim at educating the public about the objectives of the rule, its requirements, and the benefits that could be expected from it. A well-crafted communication strategy should generate support for the change towards the rule. To be effective, communication has to start early, that is well before the reform is finalized and implementation starts.

88.   Once the message has been crafted, it should be disseminated to multiple audiences. Government should present the message through multiple vehicles (speeches, press interviews, conferences) in order to reach multiple audiences (politicians and congressmen, private sector, trade unions, investors, donors). The effort will be more effective if the message is delivered in a consistent manner and supported by documents (including "visuals") that can be easily digested and repackaged, in particular by the press.

89.   Well-structured fiscal reporting practices and the implication of an independent fiscal council (FC) can help disseminate the message more effectively. Featuring the structural balance indicator and the SBR in fiscal reports published by the government can help disseminate the message and educate the public on the advantages and requirements of the rule. The independent opinion of the FC can support the credibility of the message, guide the public debate, and provide clarifications to the public on the design and implementation of the SBR.

A. Crafting the Message

90.   An effective message should clearly emphasize the benefits of moving towards the SBR. The perception of the public will be driven by their understanding of the macroeconomic and fiscal gains associated with the rule. The message should highlight how the SBR will improve the fiscal framework relative to the previous rule. Importantly, the SBR should not cast doubts on the authorities' commitment to fiscal discipline. The authorities could focus on three main advantages of the SBR: (i) enhancing the stabilization of the economy; (ii) containing expenditure pressures; and (iii) promoting public investment. The rest of the section describes these benefits in greater detail.

91.   The traditional way of communicating on the SBR relies on the argument that the SBR can mitigate the procyclicality of fiscal policy and enhance its stabilization function. "Procyclicality" means that the government tends to spend all the revenues windfalls in good times and tends to impose sharp cuts in spending in bad times when cyclical revenues are down. By stabilizing public expenditure, the SBR is a mechanism that mitigates this bias and strengthens the stabilization function of fiscal policy. The government could explain that the SBR will generate savings under favorable economic circumstances—e.g., peak of the economic cycle; soybean price booms; or higher revenues from the Itaipu dam due to heavy rainfalls. These savings can be used when the economic environment becomes more difficult. Chile introduced its SBR in 2000 and became a reference in the application of structural rules. The rule helped the authorities stabilize the expenditure path and ensure macroeconomic stability over 15 years, despite two recessions, a boom period, and an earthquake (Marcel, 2013).

92.   However, this argument is not as persuasive in the case of Paraguay, where fiscal policy has not shown a clear procyclical bias in the past. Focusing on the role of discretionary fiscal policy, Frankel and others (2013) show that fiscal policy was slightly countercyclical in Paraguay over the period 2000-09 by calculating the correlation between the cyclical components of real government expenditures and real GDP growth. Taking a broader definition of stabilization (through discretionary actions as well as automatic stabilizers), David and Novta (2016) find a positive "fiscal stabilization coefficient" for Paraguay by regressing the overall budget balance on the output gap (Figure 4.1). Although smaller than the ones obtained for other Latin American countries, positive coefficients indicate some degree of countercyclicality in Paraguay.

Figure 4.1. Fiscal Stabilization Coefficients
(Paraguay and Latin American Countries)
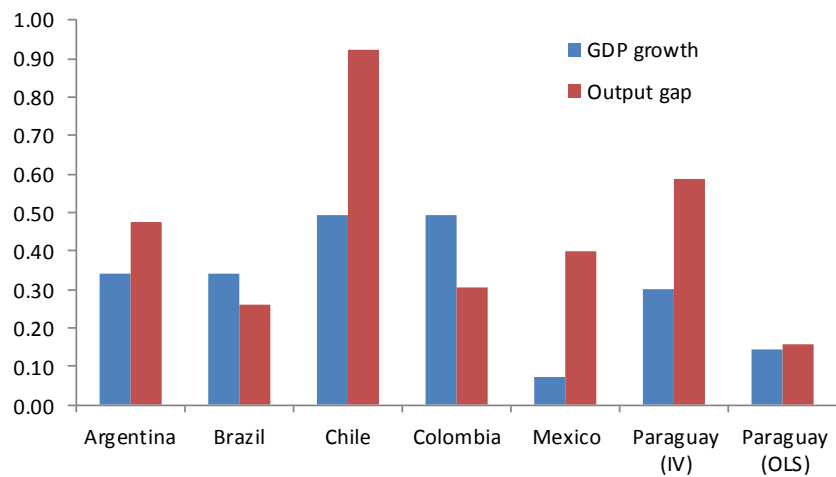
Source: David and Novta, 2016.

93.   A second way of communicating on the SBR is to present it as a "smart" expenditure ceiling. As discussed in Section III and Appendix 6, a SBR is not fundamentally different from an expenditure rule. It is in fact a "smart" expenditure rule, because the ceiling is adjusted annually with trend growth. Compared to the structural balance, the expenditure ceiling is easier to explain, understand and monitor (Colman, 2013). In addition, the SBR implies that "expenditure cannot grow faster than the whole economy," which is a message that can be easily understood by the public. Another advantage of this "smart" expenditure ceiling is that it is difficult to manipulate: if the Congress revises the macroeconomic assumptions of the budget proposal to overestimate *nominal* revenues and accommodate higher spending, this will not impact the ceiling (which depends on *structural* revenues), unless the assumption on trend output is also tweaked, which is more difficult to justify.

94.   A number of countries follow this approach to communicate on the SBR. For example, Peru has a medium-term objective for the structural balance established by law and this rule is translated into an expenditure ceiling during the macro fiscal planning process. The ceiling is determined after forecasting the structural and cyclical components of revenue. This exercise occurs early in the year – in March and April – and precedes the budgetary process that takes place in the second semester. Although the methodology, the assumptions and the calculation of the SBR are extensively publicized, the communication strategy of the government focuses only on the expenditure ceiling. Policymakers, congressmen and the general public are informed about the ceiling, which is a binding limit for the formulation and approval of the budget. The ceiling is also monitored during the budget execution.

95.   Thirdly, the rule can be presented as a mechanism to create fiscal space for public investment. The SBR can promote public investment in two main ways. First, the SBR can reduce political incentives to cut public investment in bad times. It is well documented that nominal

balance rules tend to distort the budget composition towards current spending (IMF, 2014). By stabilizing expenditure over the business cycle, the SBR may therefore contribute to protect public investment. Second, a less restrictive threshold for the SBR (compared to the threshold of the existing nominal balance rule of 1.5 percent of GDP) would allow more capital expenditure in the medium-term. In this case the message should emphasize that the additional fiscal space under the new rule will be allocated to public investment, closing the infrastructure gap currently faced by Paraguay. The public will benefit from better infrastructure in the country (roads, bridges, hospitals).

96.   To avoid a situation where the move to a structural balance rule could be interpreted as a weakening of the fiscal framework, authorities will have to reaffirm their commitment to fiscal discipline. An important challenge would be how to credibly manage a shift to an unobservable structural target that may imply greater volatility in the observable nominal balance that the public has come to focus on. In this context, to avoid perceptions of a dilution of the FRL, some reference to areas where the fiscal framework is more stringent can be helpful (for instance, by emphasizing that the new fiscal rule may be associated with the creation of a SWF, where some revenue windfalls could be saved for future generations). It may also be useful to tighten the current expenditure growth ceiling, while switching to the structural balance rule in order to reaffirm the objective of fiscal prudence.

B. Fiscal Reporting under the SBR

97.   The annual report on public finances used the structural balance indicator for the first time in 2016.[21] This year's IFP presents the structural balance as an indicator of the fiscal position, not as a fiscal rule. The objective is to start communicating to the public with the new concept. There is an entire section describing the methodology used to calculate the structural balance and an application to the period 1990-2015. Following the methodology proposed by Larraín and Cerda (2016), the report presents all the formulas and, in an annex, the calculations of the revenue elasticity to trend GDP. It compares the nominal and structural balances over the past. Projections for 2016-19 are also disclosed in the table on medium-term fiscal plans, together with calculations of the fiscal impulse derived from the structural balance for the period 2004-19.

98.   The IFP is the only report that communicates on the fiscal rule framework in a comprehensive way. This practice reflects the particularity of the Paraguayan FRL, which

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[21]The IFP presents the budget proposal for the following year and assesses its compliance against all current fiscal rules, as mandated by the FRL. Macroeconomic assumptions (such as real GDP, inflation, imports, exchange rate), revenue forecasts by economic category and allocation of expenditures are disclosed in the report. The IFP also contains a medium-term fiscal plan for three years ahead with forecasts of macroeconomic and fiscal aggregates, which is also assessed against the current average (over the three years) nominal balance rule.

mandates the observation of fiscal rules only at the budget approval stage, not at the execution stage. The MOF also produces in-year budget execution reports, which compare fiscal outturns to selected rules' thresholds, in particular the nominal balance and personnel expenditure ceilings, but the comparison is not exhaustive. Finally, Paraguay does not publish an ex-post end-year report analyzing compliance with the rules.

99.   International experience shows that countries with SBRs provide ex-ante and ex-post reporting against the rules. E*x-ante fiscal planning reports* focus on defining and communicating the medium-term structural objectives and present the macroeconomic assumptions as well as the parameters used in the forecasting of fiscal aggregates. These reports can be released either early in the year such as in Peru and Europe (in April) or later (Colombia in June and Chile in October) as part of the budget process. *Ex-post compliance reports* describe in greater details the methodology behind the structural balance calculation, assess compliance of fiscal outturns with the rule(s), explain possible deviations and, in some cases, call for the activation of ex-post correction mechanisms or escape clauses. In Latin America, all the countries that set fiscal targets in structural terms (Chile, Colombia and Peru) have adopted this two-pronged reporting practice. In particular, they present an end-year report on compliance that, in some cases, is subject to congressional approval (Box 4.1).

100.   Paraguay could further improve its reporting practices under the new SBR framework. There is scope for strengthening ex-ante, ex-post and, in-year fiscal reporting by:

- ***Producing the fiscal planning report earlier in the year with a greater focus on medium-term fiscal projections.*** The planning report (the IFP) should be mostly forward-looking and present the objectives of fiscal policy as well as the macroeconomic assumptions and the forecasts of fiscal aggregates over the medium-term. The macroeconomic assumptions and scenario should be explained. If these assumptions are reviewed by the FC, the note containing the opinion of the FC should be incorporated to the report. Fiscal forecasts of structural and cyclical revenue should rely on the SBR formula but a possible review of the methodology would better fit in other reports, because the public may perceive changes in the structural balance computation as a way to distort fiscal plans. Finally, the publication date of the IFP could be moved forward. Currently the IFP is published in September. Producing the report earlier in the first semester could contribute to enhance the quality of the fiscal debate by allowing more time for public scrutiny of fiscal objectives and fiscal forecasts (Box 4.1).

- ***Publishing an end-year report on compliance and methodology.*** A backward-looking report is important to review the execution and assess compliance with the rules ex-post in a systematic way. For transparency and credibility, the first section of the report could clearly state if the fiscal outcomes were consistent with the rules, even if the FRL does not require to assess compliance ex post. In case of deviations, the report needs to provide explanations and suggest corrective actions. It should also compare macroeconomic assumptions and fiscal forecasts with outcomes and comment on the discrepancies. The report could also

propose a recalibration of the forecasting methodologies if needed. The methodological review of the SBR could be discussed here. Any review of the rule by the FC should also be incorporated in the report. Finally, it is recommended to submit the report to Congress and conduct a hearing in order to raise reputational and electoral costs of noncompliance.

- ***Monitoring fiscal rules in quarterly execution reports.*** A short write-up on fiscal rules should be included in the existing execution reports of the budget department, which are published on a quarterly basis. The write-up would track the in-year fiscal performance relative to annual rules. It should explicitly flag possible risks of deviations and make recommendations for corrective actions when slippages appear. Quarterly hearings in Congress to present the report could strength enforcement.
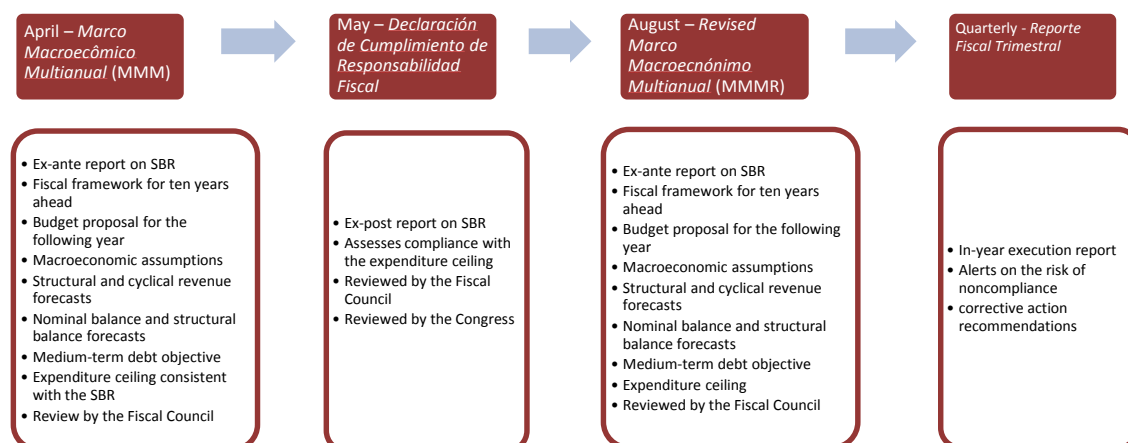
Box 4.1. Fiscal Reporting under the SBR in Latin America

There are three countries currently using a SBR in their fiscal framework in Latin America: Chile, Colombia and Peru. Chile introduced its SBR in 2001, Colombia in 2011, and Peru in 2013. The three countries have an extensive reporting system, comprising ex-ante and ex-post annual reports as well as in-year quarterly reports. The example of Peru is of special interest.

Peru: Fiscal Reporting Under the SBR

Peru discloses its medium-term fiscal plans under the SBR in an annual report called *Marco Macroeconómico Multianual* (MMM) which is published in April. The MMM presents the fiscal framework for the next ten years, including the macro assumptions, structural and cyclical revenue forecasts, nominal and structural balance forecasts, the medium-term debt objective and the budget proposal for the following year. The MMM is subject to review by the recently established FC, which has to provide a qualified opinion.

The early release of the MMM allows more time for the public debate on fiscal policy before the discussion of the budget that takes place in the second semester of the calendar year. This practice facilitates the communication on the SBR, which, in Peru, is presented as an expenditure ceiling. The FC reviews and makes a qualified opinion on the macroeconomic assumptions and calculations. Although not mandatory, the MMM is usually revised in August during the budgetary process (only 2 out of the past 15 MMM reports have not been updated). The FC also reviews the Revised MMM (MMMR).

April – *Marco Macroecômico Multianual* (MMM)		May – *Declaración de Cumplimiento de Responsabilidad Fiscal*		August – *Revised Marco Macroecnónimo Multianual* (MMMR)		Quarterly - *Reporte Fiscal Trimestral*
• Ex-ante report on SBR • Fiscal framework for ten years ahead • Budget proposal for the following year • Macroeconomic assumptions • Structural and cyclical revenue forecasts • Nominal balance and structural balance forecasts • Medium-term debt objective • Expenditure ceiling consistent with the SBR • Review by the Fiscal Council		• Ex-post report on SBR • Assesses compliance with the expenditure ceiling • Reviewed by the Fiscal Council • Reviewed by the Congress		• Ex-ante report on SBR • Fiscal framework for ten years ahead • Budget proposal for the following year • Macroeconomic assumptions • Structural and cyclical revenue forecasts • Nominal balance and structural balance forecasts • Medium-term debt objective • Expenditure ceiling • Reviewed by the Fiscal Council		• In-year execution report • Alerts on the risk of noncompliance • corrective action recommendations

In May, the Peruvian MoF releases the report on past compliance with the SBR called *Declaración de Cumplimiento de Responsabilidad Fiscal*. The report assesses the ex-post compliance with the expenditure ceiling (equivalent to the SBR). The report is reviewed by the FC with a qualified opinion and submitted to the Congress.

Peru also produces in-year quarterly reports monitoring the budget execution relative to the expenditure ceiling. The report raises alerts when there is risk of breaching the rule and proposes correction recommendations whenever execution is clearly not in line with complying with the annual ceiling.

C. The Role of the Fiscal Council

101.   International experience shows that fiscal councils (FC) can help support the adoption of fiscal rules, in particular under SBR arrangements. A FC is an independent public institution informing the public debate on fiscal policy. It can support the implementation of SBRs by performing one or several of the following functions (IMF, 2013):

- *Contributing to the calculation of the structural balance.* Some FCs produce or review/validate the macroeconomic assumptions and fiscal forecasts used in the calculation of the SBR. For instance, the Dutch FC (Bureau for Economic Policy Analysis, CPB) produces the macro assumptions used in the budget formulation (including inflation, economic growth rates, and output gap). Independent commissions in Chile and Colombia make forecasts of commodity prices and trend GDP, which are essential components of the structural balance calculation. The Peruvian and Portuguese FCs review the macroeconomic assumptions prepared by the Ministry of Finance and present a qualified opinion.

- *Communicating and explaining the rule to the public.* The FC can produce technical notes and reports describing the objectives of the rule and its benefits and how it can affect the population. More importantly, the FC can have a strong presence in the media, influencing the public debate by continuously interacting with the press and opinion makers and regularly producing press notes and articles. For instance, the Dutch CPB provides a significant volume of media articles and research reports on the SBR, in particular during the budget preparation.

- *Monitoring the SBR*, including the calculation of the rule and the ex-ante and ex-post compliance. For instance, the Dutch, German and Chilean FCs actively monitor compliance with the rules. The Dutch CPB has also produced several methodological papers on the SBR calculation.

102.   Legal and operational independence and strong media presence are key features that ensure the effectiveness of the FC in supporting the SBR. Legal independence prevents the council from facing political interference while performing its tasks, increasing public perception of neutrality and non-partisanship. Operational independence is achieved by staffing the council with qualified and experienced professionals as well as ensuring predictable funding commensurate to the council's mandate. Effective FCs continuously communicate their assessment of government's fiscal policy to the public through the media, influencing the policy debate. The media presence is particularly important when the FC needs to raise alarms when the budget proposal and/or outturns are not in line with the rules and the macro forecasts are over-optimistic. In the case of a SBR, it is essential that the FC reviews and provides an independent opinion on the estimation of trend (or potential) output. Overestimating trend output growth in the budget could lead to an excessive pace of expenditure increase under the SBR. When trend output is revised down ex-post, the structural position suddenly appears worse than it seemed to be. As a result, the SBR, which seemed to be complied with based on fiscal plans, is breached

when applied to fiscal outturns (for a discussion on this problem in Europe, see Eyraud and Wu, 2015).

103.   Paraguay is in the process of setting up a FC, which could facilitate the transition towards the SBR. Although the FC will initially be established by presidential decree, the MOF has also plans to incorporate the design and mandates of the council in the amended FRL to give it a stronger legal support. The presidential decree is already drafted and under review at the presidency. The authorities expect the decree to be released by the end of this year.

104.   The mandate of the Paraguayan FC will be to assess the proposed and approved budgets, but not fiscal outturns (Tollini and others, 2016). The draft decree describes three mandates of the FC: i) review the budget proposal sent to Congress by the MOF; ii) review the modifications to the budget proposal and the approved budget by Congress; and iii) provide analysis on specific fiscal issues at the request of the MOF. There is no provision for the FC to monitor budget execution and to assess ex-post compliance with fiscal rules. This reflects the particularity of the current FRL, which assesses fiscal rules based on budgetary plans, not fiscal outcomes. The council will be composed of three members nominated by the minister of finance. The members should come from the private sector or the academia and are nominated by the minister of finance for a three-year period, which can be extended. The FC will not have permanent staff.

105.   The effectiveness of the Paraguayan FC to support the SBR will depend on its ability to mobilize external resources and reach out to the public. Although the FC has no permanent staff, the decree provides for administrative and technical support from the macro-fiscal department of MOF, which has qualified personnel to respond to the council's needs. Furthermore, the members have personal connections to universities and economic consulting companies and could contact specific professionals for specific requests. In terms of communication, the FC will need to establish a plan to influence the public debate on fiscal policy. The council will have to define the documents and reports that will be produced and the frequency and forms of participation in public events (press interviews, conferences, hearings at Congress etc.). More generally, the MOF, in collaboration with the council members, should draft a charter describing the FC organization and operations.

106.   To enhance its ability to influence the public debate, the Paraguayan FC will need to expand in the future. Reviewing the key stages of the budgetary process can be very demanding and time-consuming. International experience shows that successful FCs are staffed with permanent personnel and have financial resources. The support provided by MOF staff could create strains on the limited resources of the ministry's macro-fiscal department and potentially undermine the public perception of the FC independence. Access to funding is also essential to build up the necessary infrastructure to support the council's activities (phone line, email address, website, organization of public events, physical production and dissemination of reports, travel etc.). Creating a website is particularly important to disseminate the FC opinions and analyses to the public.

D. Recommendations

107.   **Recommendation 4.1: Ex-ante fiscal reporting.** The MOF should bring forward the publication of the IFP to the first semester (April or May) and, possibly, revise it at the beginning of the budget process (August or September). The IFP should focus on presenting medium-term fiscal plans (December 2018).

108.   **Recommendation 4.2: Ex-post fiscal reporting.** The MOF should produce an end-year report assessing budget execution and compliance with fiscal rules based on outturns, even if this is not required by the FRL (December 2018).

109.   **Recommendation 4.3: Execution fiscal reporting.** Quarterly execution reports should track compliance with the rules throughout the fiscal year December 2018).

110.   **Recommendation 4.4: FC regulation.** The MOF, in collaboration with the council members, should draft a charter describing its organization and operations. Council members should devise a communication strategy, which should include the creation of a dedicated website (mid-2017).

Appendix 1. Fiscal Rules in Paraguay

2013 Fiscal Responsibility Law

The 2013 FRL has introduced a number of rules in Paraguay's fiscal framework. Compliance with the targets is judged based on adhering to these ceilings in the budget approved by Congress rather than on the basis of fiscal outturns.

* The deficit of the central government must not exceed 1.5 percent of GDP.

* The average deficit (budgeted) over three consecutive budget periods must not exceed 1 percent of GDP. This rule only applies to the medium-term fiscal plan presented with the budget.

* The growth rate of current primary expenditure for the public sector must not exceed 4 percent in real terms.

* Any salary increase for civil servants is limited by the percentage increase in the minimum wage.

The 2013 FRL has clearly defined, but narrow escape clauses. The headline deficit ceiling can reach up to 3 percent of GDP in cases of national emergency, international crises, or negative growth. This increase does require congressional approval and in some cases a report by the central bank and the approval of the national economic team composed of several ministers (including the Minister of Finance) as we all the President of the Central Bank.

1999 Law on Financial Administration

The 1999 State Law on Financial Administration (*LAFE*) institutes guidelines for financial administration in Paraguay. It establishes the golden rule, which states that resources from debt operations can only be used to finance capital expenditure and debt repayments. The rule applies to the central government, as well as the public sector as a whole.

Appendix 2. Estimating a Debt Limit from a Growth Model

We use the methodology outlined in Checcherita-Westphal and others (2014) to derive the level of public sector debt level that maximizes output growth in an infinite horizon model with flexible prices and wages with a production function that includes labor (L); private capital (K); and public capital (K_g). Output is given by the production function below, where α is the output elasticity of the public capital stock:

$$Y = L^\gamma K^{1-\gamma} \left(\frac{K_g}{K}\right)^\alpha$$

Assuming that public debt is used exclusively for public capital financing ("golden rule"), the optimal debt to GDP ratio is given by the following expression and depends crucially on the output elasticity of the public capital stock.

$$d^* = \left(\frac{\alpha}{(1-\alpha)^2}\right)^{1-\alpha}$$

We use data from the Penn-World Tables version 9.0 (Feenstra and others, 2016) and from the IMF's Investment and Capital Stock Dataset to estimate the parameter α for Paraguay over the period 1960-2013. We follow Checcherita-Westphal and others (2014) and use two different specifications. The results are presented in Appendix Table 2.1. In the first model, output and labor are expressed as a share of the private capital stock. In the second model variables are expressed in per capita terms (except for the ratio of public capital to private capital). Both regressions yield estimates of around 0.28, which would imply an optimal debt to GDP ratio target of about 65 percent.

Appendix Table 2.1. Estimates of Output Elasticity of Public Capital

	Model 1 ln(Y/K)	Model 2 ln(Y/L)
ln($K_{g/K}$)	0.285***	0.285***
	[0.051]	[0.051]
ln(L/K)	0.418***	
	[0.082]	
ln(K/L)		0.582***
		[0.082]
Constant	0.731***	0.731***
	[0.154]	[0.154]
Observations	54	54
R-squared	0.391	0.886

Note: *** denotes statistical significance at the 1 % level. Standard errors are in brackets.
Source: IMF staff estimates based on Penn World Tables and IMF Investment and Capital Stock Dataset.

Appendix 3. Determining a Safety Margin for Public Debt Using Stochastic Simulations

This Appendix provides additional details on the methodology used to construct the safety margins for the debt anchor. A full description of the approach can be found in IMF (2016) and Debrun and others (forthcoming). It essentially consists in generating macroeconomic and fiscal shocks based on an econometric model and subsequently simulating several possible paths for public sector debt using a debt accumulation equation and a fiscal reaction function.

Firstly, we estimate an unrestricted vector autoregressive model (VAR) at quarterly frequency for Paraguay. The VAR describes the joint dynamics of the macroeconomic (non-fiscal) variables needed to project public debt, namely real interest rates, real GDP growth, and the exchange rate. The model is estimated over a relatively short period 1994: Q1-2015:Q4 because of data availability. The estimated variance-covariance matrix of the residuals of the model serves to calibrate the generation of random shocks to the economy.

In a second stage, the random shock sequence is incorporated to the estimated VAR to obtain consistent forecasts of the macroeconomic variables. As shocks occur each period, the VAR produces joint dynamic responses of all endogenous variables.

Third, a fiscal reaction function aimed at capturing the main features of fiscal policy is estimated for a panel of 26 emerging economies, including Paraguay. The fiscal reaction function captures solvency by linking the primary balance to public debt, while also accounting for current economic conditions measured by the output gap. More specifically the estimated equation takes the following form:

$$pb_{i,t} = \alpha_i + \beta_1 pb_{i,t-1} + \beta_2 ygap_{i,t} D_{i,t} + \beta_3 ygap_{i,t} (1 - D_{i,t}) + \beta_4 d_{i,t-1} + \varepsilon_{i,t}$$

where pb is the ratio of the primary fiscal balance to GDP; d is the gross public debt-to-GDP ratio at the end of the previous year; $ygap$ is the contemporaneous output gap; D is a dummy variable equal to 1 when the output gap is nonnegative (actual output above or equal trend) and 0 otherwise; and α are the country fixed effects. To account for the possibility that fiscal policy can itself be a source of shocks, the primary balance is subject to a fiscal policy shock $\varphi_{i,t} \sim N(0, \sigma^2_{\varphi_i})$, where $\sigma^2_{\varphi_i}$ is calibrated to the country-specific variance of the reaction function's residuals. In addition, the function is restricted by assuming that the maximum primary surplus that a country is capable of achieving following a shock is capped at 2 percent of GDP for emerging market economies, following Escolano and others (2014).

Fourth, the debt trajectories are obtained by combining the shocks with the two equations (fiscal policy response and debt accumulation equation). A projected debt path is computed for each set of country-specific shocks, which include shocks to the macroeconomic variables from the

VAR, and fiscal-specific shocks. In practice, we compute the annualized VAR projections of the macroeconomic variables, then use the estimated fiscal reaction function (in which the fiscal balance depends, inter alia, on debt) as well as the conventional debt accumulation equation (in which debt depends on the fiscal balance).

The algorithm generates a large number of random shock sequences over the forecasting period (6 years), and computes for each sequence of shocks the corresponding debt paths. For each projection year, the frequency distribution of the projected debt-to-GDP ratios is calculated and allows for a probabilistic analysis of debt trajectories. In particular, it is possible to calculate the share of the debt paths that cross a given debt limit at a certain date.

The validity of this approach is conditioned on the quality of the statistical model used to produce the forecasts. Important shortcomings include the possibility that relationships estimated using past data may not be relevant for the future and the importance of a satisfactory goodness-of-fit of the forecasting model.

Appendix 4. Indicators of Public Investment Efficiency in Paraguay

## Appendix Figure 4.1. Public Investment Efficiency

With the exception of electricity and water, access to infrastructure is limited...


Measures of Infrastructure Access
(Most Recent Year)
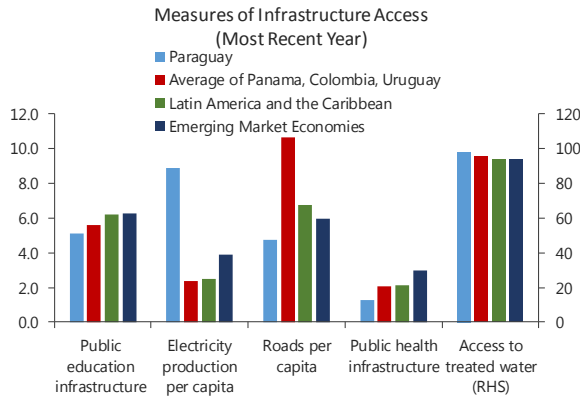
...and indicators of the quality of infrastructure also suggest that Paraguay lags behind its peers.

Perceptions of Infrastructure Quality
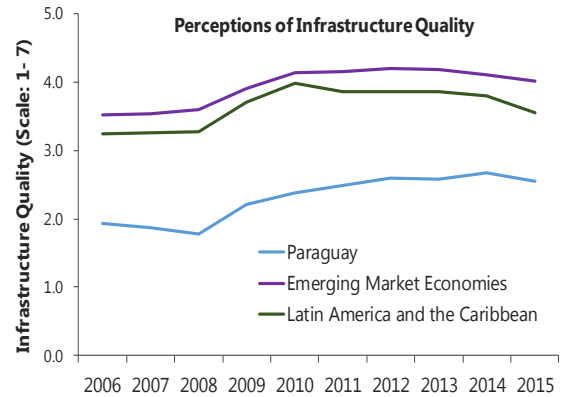
Paraguay is well-below the efficiency frontier for the hybrid infrastructure index...

Hybrid Indicator
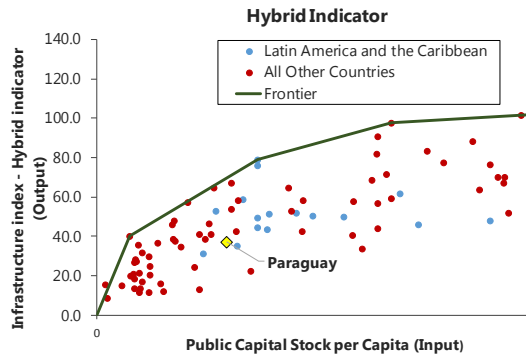
...and is in the bottom quartile of the cross-country distribution in terms of the efficiency gap.
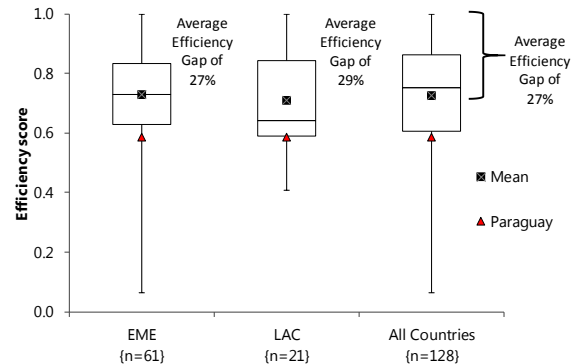
Note: In the upper left panel, units vary to fit scale. In the left axis, public education infrastructure is measured as secondary teachers per 1,000 persons; electricity production per capita as thousands of kWh per person; roads per capita as km per 1,000 persons; and public health infrastructure as hospital beds per 1,000 persons. In the right axis, access to treated water is measured as percent of population. In the bottom right panel, the average efficiency gaps for the hybrid indicator presented are for the selected region or income group. Sources: IMF Investment and Capital Stock Dataset, IMF (2015), and World Economic Forum, Global Competitiveness Index.

Appendix 5. Using the Ramsey-Koopman-Cass Model to Derive an Optimal Capital-Output Ratio

We consider a Cobb-Douglas production function $Y = F(K, E.L) = A.K^\alpha[E.L]^{1-\alpha}$, where E is an exogenous trend of labor-augmenting technical progress, growing at rate g.

We re-scale all variables by $E.L$ and denote $F(K, L) = f(k) = A.k^\alpha$ with $k = K/EL$.

In equilibrium, the marginal productivity of capital is equal to the cost of capital: $F'_K = r + \delta$, where r = risk-free interest rate and δ is the capital depreciation rate. As $F'_K = dF(K, L)/dK = df(k)/dk = A\alpha k^{\alpha-1}$, the equation linking the marginal productivity of capital to the cost of capital results in: $k = [(r + \delta)/(A\,\alpha)]^{\frac{1}{\alpha-1}}$,

Therefore, $K/Y = k/y = (1/A).k^{1-\alpha} = \alpha/(r + \delta)$.

The key issue is how to calibrate r, the equilibrium interest rate.

- In the *Solow model*, the "golden rule", defined as the rate of saving that maximizes the consumption, implies that $r = n + g$, with n being the growth rate of employment. Then the optimal capital stock is given by: $K/Y = \alpha/(n + g + \delta)$.

- In the *Ramsey-Koopman-Cass model*, the optimal savings rate is not set by a central planner (like in the Solow model), but by households who maximize an intertemporal utility function and determine their level of optimal saving. In this model, r is the interest rate expected/required by households to substitute away from current consumption. The "modified golden rule" in that version of the model implies that $r = n + \rho + \sigma g$, with ρ being the rate of time preference and σ the intertemporal elasticity of substitution. Then, the optimal capital stock is given by $K/Y = \alpha/(n + \rho + \sigma g + \delta)$.

- The required interest rate could also include a compensation for the risk incurred when lending to the public and private sectors (which use household savings to invest and accumulate capital). In this *modified version of the Ramsey-Koopman-Cass model* with risk premium, the "modified golden rule" can be written as $r = n + \rho + \sigma g + \zeta$, where ζ is the risk premium over the risk-free rate. Then: $K/Y = \alpha/(n + \rho + \sigma g + \delta + \zeta)$.

Appendix Table 5.1. Paraguay: Optimal Capital/Output Ratios (K/Y)

	Parameter	Source
g (growth rate of technical progress) in %	1.50	IMF staff calculations and Central Bank of Paraguay
n growth rate of employment	2.50	IMF staff calculations and Central Bank of Paraguay
δ (capital stock depreciation) in %	5.00	Penn World Table version 9.0
α (capital share in Cobb-Douglas production function)	0.40	Central Bank of Paraguay
β (subjective discount factor)	0.97	Asumption
σ (intertemporal eslasticity of substitution)	0.50	Asumption
ρ (rate of time preference)	0.03	(1/β-1)
ζ (risk premium) in percent	2.50	EMBI spread
Optimal capital stock estimates:		
K/Y Ramsey Model in %	352.6	α/(n+ρ+σg+δ)
K/Y Modified Ramsey Model in %	289.0	α/(n+ρ+σg+δ+ζ)
Current capital stock estimates:		
K/Y in 2014 in %	247.1	Penn World table version 9.0

Sources: Central Bank of Paraguay, Penn World Table, and IMF staff estimates.

Appendix 6. Alternative Formulations of the Structural Balance Rule

Standard Approach to the Structural Balance

The standard formula of the structural balance assumes a steady relationship between cyclical revenues (revenue gap, denoted RG) and the cyclical component of GDP (output gap, noted OG):

$$R^S/R = (Y^S/Y)^\beta \Leftrightarrow 1/(1 + RG) = 1/(1 + OG)^\beta.$$

where β denotes the elasticity of the RG to the OG; R and Y denote actual revenue and GDP; and R^S and Y^S denote structural revenue and trend GDP.

This formula is agnostic about the specific relationship between R^S and Y^S, and in particular does not assume a linear relationship between them, as $R^S/Y^S = R/Y$ is not constant over time (assuming $\beta = 1$). Relatedly, this formula does not impose any restriction on the steady state of the economy (when all the gaps are closed and the structural variables can be interpreted as long-term values of revenue and output).

Taking $\beta = 1$ for simplicity, the formula implies that $R^S = R/(1 + OG)$. Thus, all the volatility of current revenues is transmitted to structural revenues except the fluctuations associated with the business cycle, which are filtered out by the term $1/(1 + OG)$. The advantage is that policy measures (which are reflected in R) are included in R^S, and thus, new revenue measures modify "automatically" the amount of expenditure allowed under the rule.

A downside of this formula is that, if revenues are still volatile after correcting for the business cycle and accounting for policy measures, this volatility will be transmitted to R^S and, indirectly, expenditure.

Authorities' Approach to the Structural Balance

The formula used by the authorities and proposed by Larrain and Cerda (2016) assumes a stable relationship between structural revenues and the structural component of output (trend GDP): $R^S = \propto (Y^S)^\gamma$, where R^S and Y^S denote structural revenues and trend GDP and $\propto$ and γ are two coefficients estimated econometrically over past data.

One implication of the formula is that $dR^S/R^S = \gamma . dY^S/Y^S$, which means that the growth rate of structural revenues is proportional to trend GDP growth.

The formula presents two main advantages:

- It has an intuitive interpretation: structural revenues can be seen as the product of the effective tax rate $\propto$ times the tax based Y^S (adjusted with γ).

- By construction, the formula implies a smooth evolution of R^S (which evolves like trend output), and thus a stable path for expenditure. Assuming constant elasticities for simplicity, the standard method implies that $R^S = (R/Y).Y^S$, while the authorities' formula results in $R^S = \propto.Y^S$. Given that the revenue ratio R/Y is not constant over time, R^S is, by construction, more volatile in the standard method.

Nonetheless, the main assumption of a stable relationship between R^S and Y^S raises questions both on theoretical and empirical grounds:

- From a theoretical point of view, the formula imposes a very restrictive relationship between R^S and Y^S: $dR^S/R^S = \gamma . dY^S/Y^S$. Thus, if $\gamma \neq 1$, the system is explosive and R^S/Y^S will either move to zero or infinity in the steady-state, which could be difficult to justify.

- If R^S has grown faster than Y^S in the past, the econometric estimation will find $\gamma > 1$. If the estimated elasticity is used to calibrate the amount of allowed expenditure in the future, it may overestimate the rate of increase in structural revenues and entail a growing share of expenditure relative to trend GDP, which would result in a steady deterioration of the nominal fiscal balance over time.

- Another issue is that the relationship between R^S and Y^S is not stable in reality. It breaks when new policy measures are introduced. While the standard formula achieves too little smoothing, the authorities' formula has the opposite drawback: it stabilizes structural revenue (and expenditure) too much and filters out policy changes, such as tax policy measures, that should be reflected in structural revenues.

Equivalence of a SBR with an Expenditure Rule in Growth Rate

This section shows that a SBR is conceptually equivalent to an expenditure rule in growth rate with a ceiling equal to trend GDP.

We first assume that the elasticity of structural revenues to trend GDP is one, meaning the ratio of structural revenues to trend GDP is constant over time (equal to φ). Then the structural balance can be written as:
$$SB = (R^S - E^S)/Y^S \Leftrightarrow SB = \varphi - E/Y^S$$
where R^S, E^S, E, Y^S, g, denote structural revenues, structural expenditure, actual expenditure, and trend GDP. By assumption, there is no cyclical component in expenditure and $E^S = E$.

The equivalence between the two rules can be written as:
$$\Delta SB = 0 \Leftrightarrow dE/E = g$$
$$\Delta SB > 0 \Leftrightarrow dE/E < g$$

$$\Delta SB < 0 \Leftrightarrow \mathrm{dE/E} > \mathrm{g}$$

where $\Delta SB = SB_t - SB_{t-1}$; dE/E denotes expenditure growth; and g denotes trend GDP growth.

In practical terms, compliance with the SBR can thus be assessed by comparing expenditure growth with trend GDP growth:

- If the government has achieved a fiscal position in structural terms that complies with the rule, it can maintain it by simply letting expenditure grow in line with trend GDP (both variables are in real terms).

- If the initial structural balance is not at its targeted value (that is, the country does not comply with the rule), letting expenditure grow like trend GDP would simply stabilize the structural balance at its current level.

- If the initial structural balance is above (respectively, below) the targeted value, expenditure should grow above (respectively, below) trend GDP on a temporary basis in order to bring back the structural balance to the SBR target.

If we relax the assumption of unit elasticity of structural revenues to trend GDP, and introduce the possibility of new revenue measures, all the previous statements hold but "expenditure growth" should be replaced with "net expenditure growth," which is the growth of expenditure that is not financed by corresponding changes in revenue measures.

This is the formulation of the SBR used in the European fiscal framework under the name "expenditure benchmark": "Annual expenditure growth should not exceed a reference medium-term rate of potential GDP growth, unless the excess is matched by discretionary revenue measures." (European Commission, 2016).

Thus, compliance with the SBR can be assessed as follows:

- If the government has achieved a fiscal position in structural terms that complies with the rule, it can maintain it by simply letting expenditure *net of new revenue measures* grow in line with trend GDP.

- If the government wants to improve its fiscal position in structural terms, expenditure *net of new revenue measures* should grow below trend GDP.

- If the government wants the structural fiscal position to deteriorate, expenditure *net of new revenue measures* should grow above trend GDP.

More information on how the European fiscal framework computes the expenditure benchmark, the concept of "net expenditure," and revenue measures can be found at European Commission (2016), in particular in section 1.3.2.6 (pages 48-53).

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