Reseach's outline

- Our **main objective** is to contribute to Costa Rica's fiscal sustainability analysis and discussion.

- First, by determining if its public debt level is sutainable or not, and then by assessing different risk scenarios of the main macro variables.

- In order to achieve this, we have analyzed the current methodology the Central Bank uses for this purpose, which is a simple IGBC approach.

  – It gives a first response to what should the government do to achieve fiscal sustainability in the long run: the debt level is sustainable when it is equal to the present value of the future primary balance.

Research's outline

- Then we complement the answer by considering that more than a third of Costa Rica's debt has been issued in foreign currency (USD).

- And then, we estimate, the fiscal reaction function, to attend Bohn's (2007) criticism to the previous approach.

  - Weak time series assumptions.

- The FRF will give depict the response of the primary balance to past det level.

- For this approach, the debt is sustainable if the response coefficient is positive and significant.

Research's outline

- It is possible, then, to estimate a "debt limit"; therefore, the degree of sustainability is given by the distance between the outstanding debt and the debt limit.

- Finally, we will assess the role of uncertainty in a broad way by estimating a fan chart for each methodology.

- And refer briefly, to the institutional change discussion given the possible impact of the fiscal reform on the debt's sustainability path.

Fiscal Context

Economic growth

10 yr moving average, 1970-2023
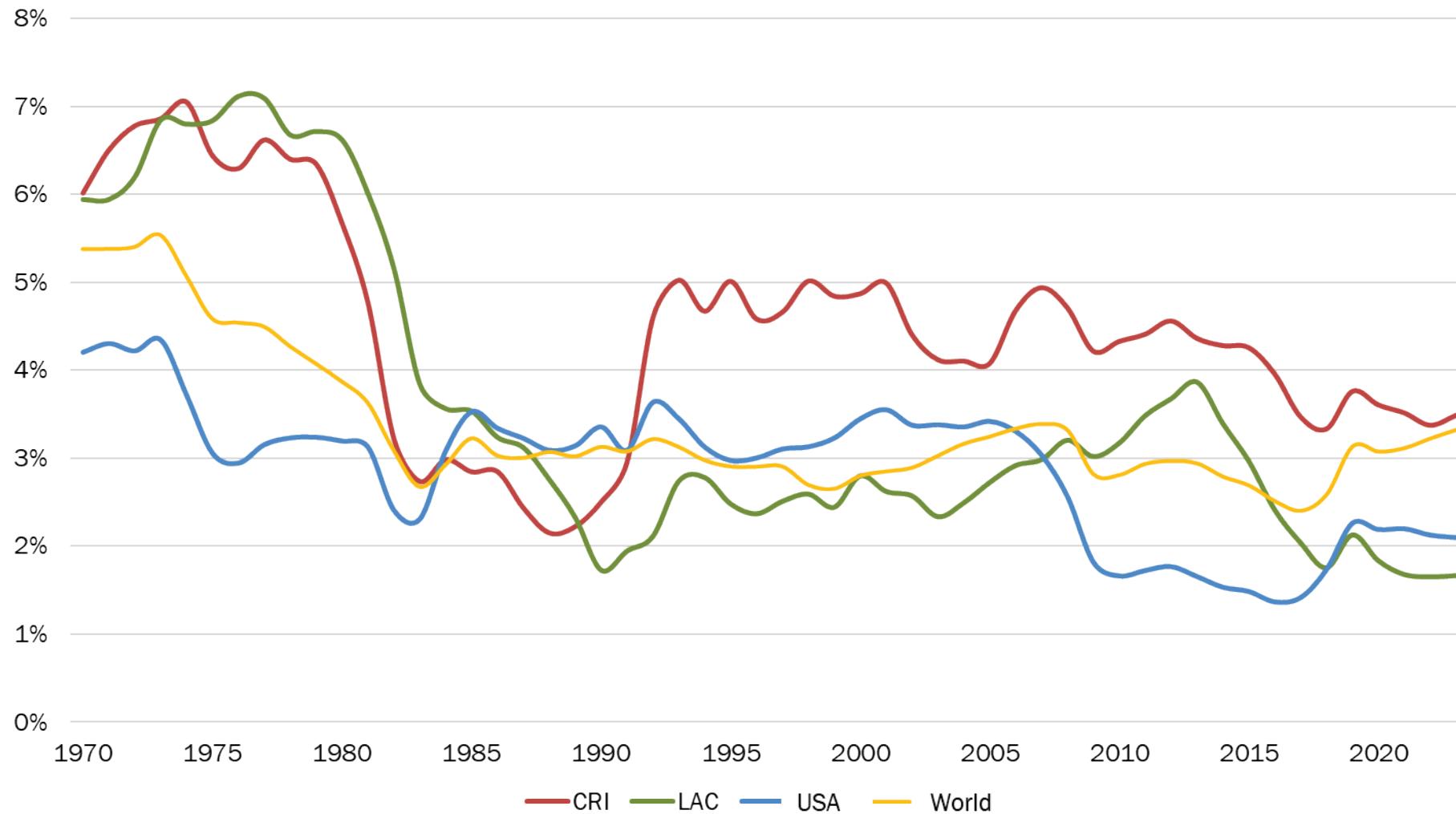
Source: World Development Indicators (1970-2017) and World Economic Outlook (2018-2023)

Costa Rica: output gap
1970-2018

Source: own elaboration with information from the BCCR.

Costa Rica:

Human Factor

5 mill.
Total population

2.5 mill.
Labor force

1.6 mill.
Population
15-34 years

100%   49%   31%

8% GDP
Education

No army
since 1949

9.9% GDP
Health

5% from the
World's
biodiversity
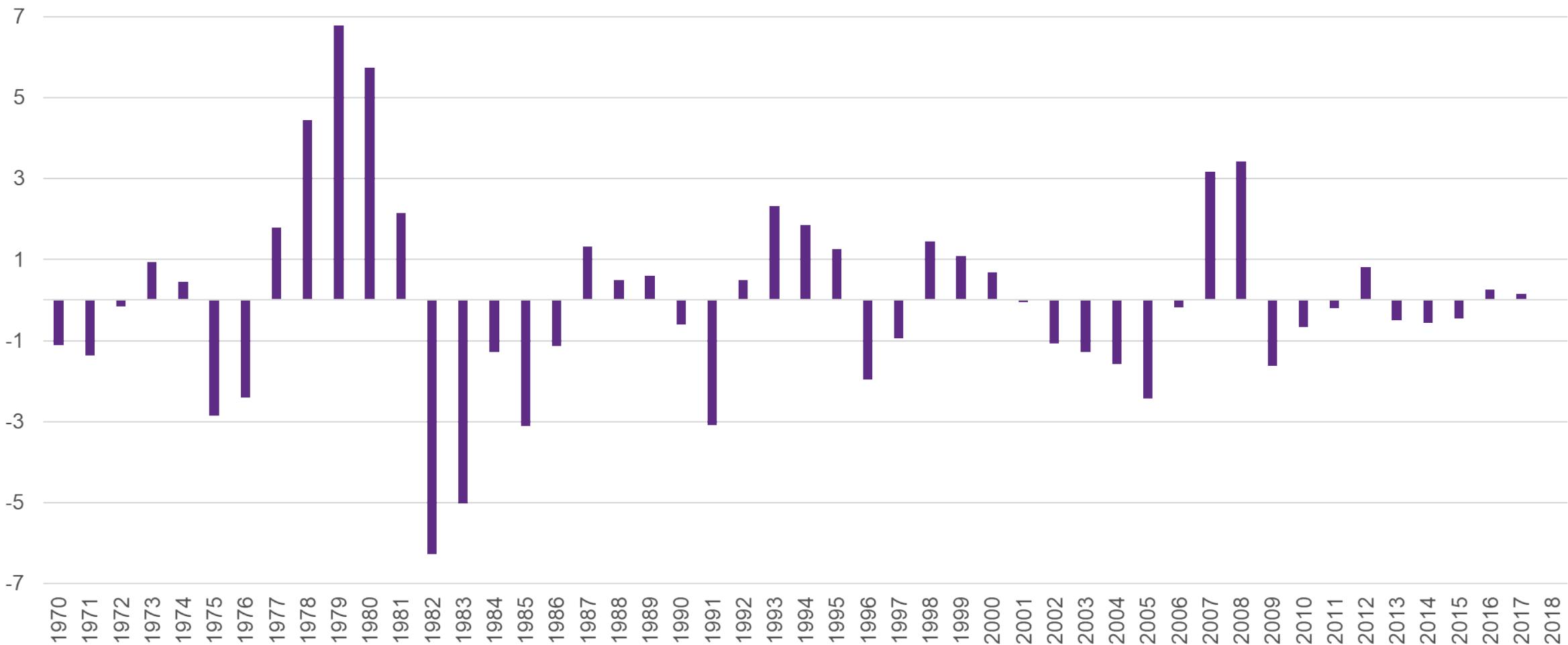
IV Quarter 2018
Source: CINDE with information from IMF, INEC, MEP.

Central Government: income and expenditure
as GDP percentage, 1970-2018

Debt crisis

Banco Anglo

Expansionary fiscal policy

■ Expenditure ■ Income

Source: own elaboration with information from the Treasury Ministry.
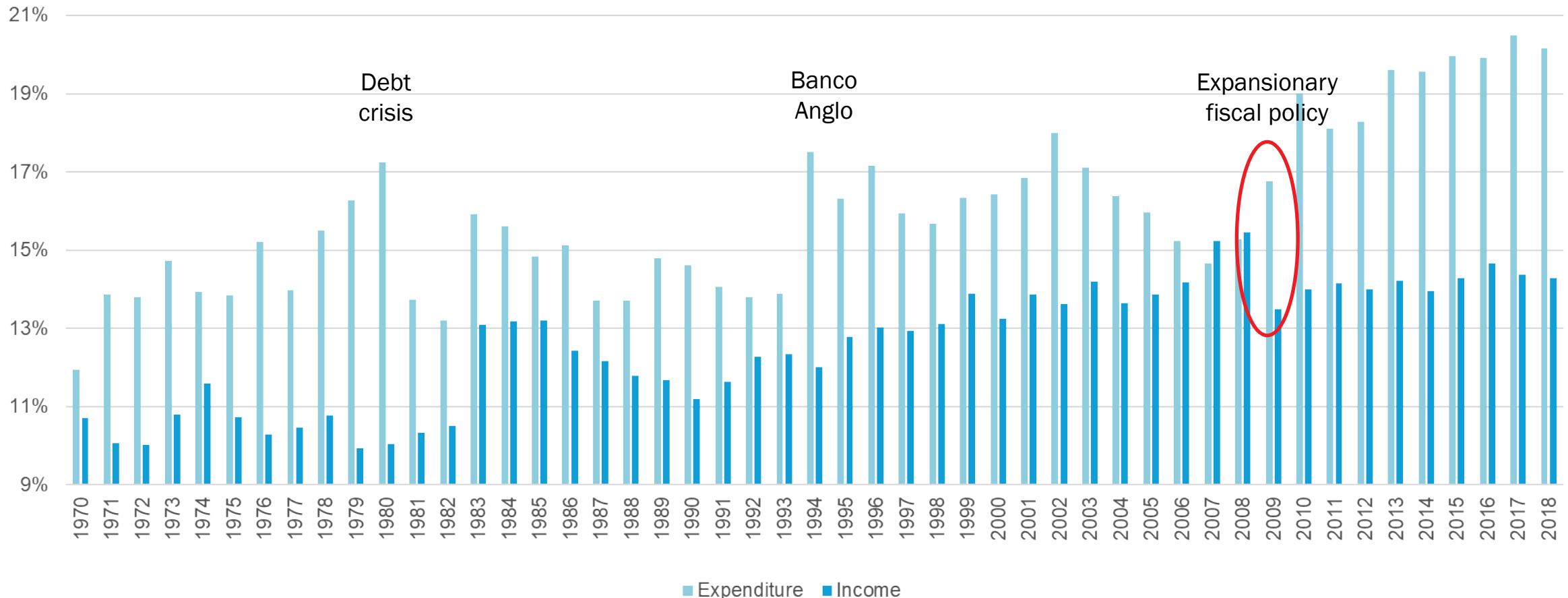
Central Government: expenditure composition
2006-2018

Source: own elaboration with information from the Treasury Ministry.
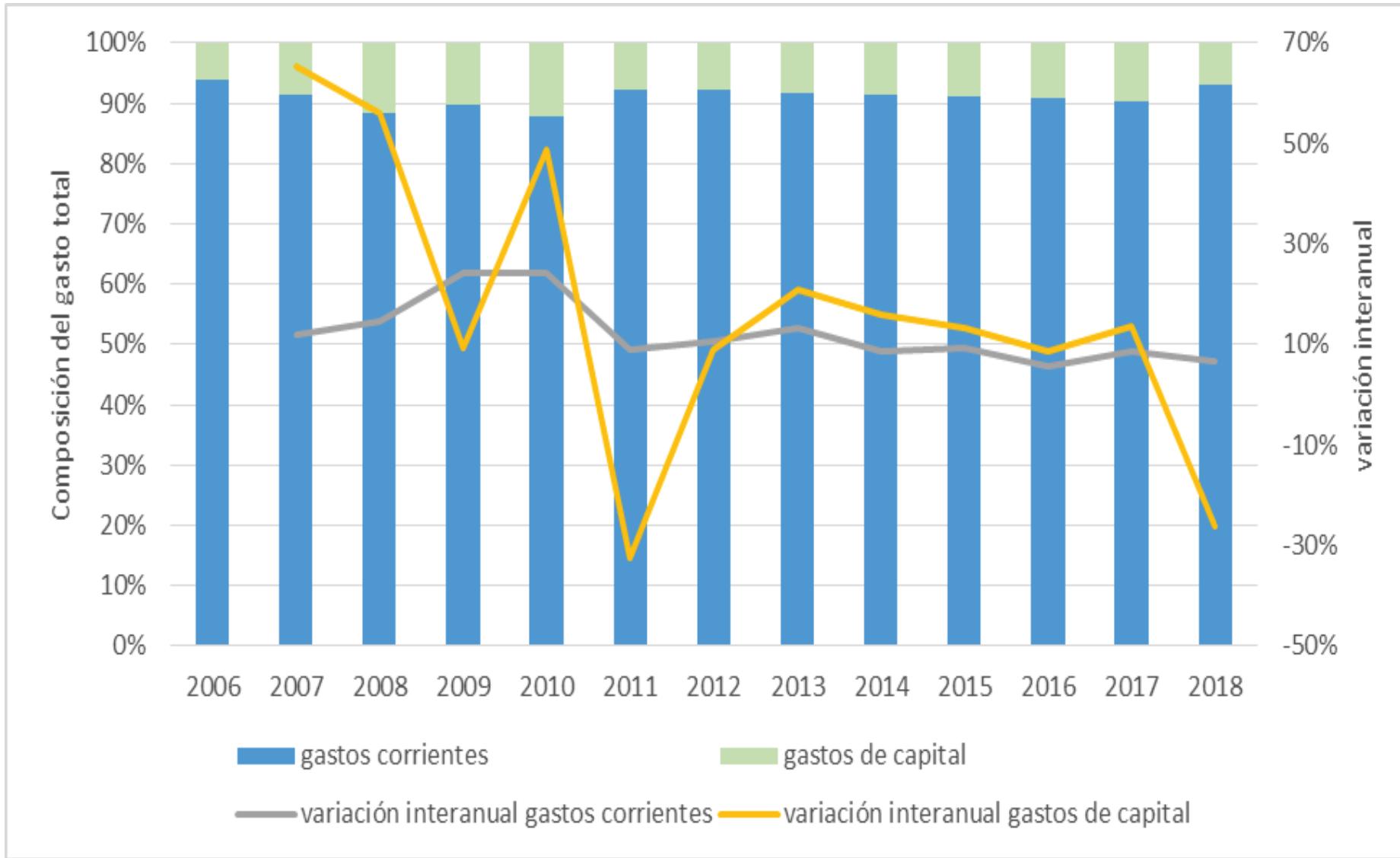
Central Government: financial deficit

as GDP percentage, 1970-2018

interest payment ■ primary deficit ● Financial deficit

Source: own elaboration with information from the Treasury Ministry.
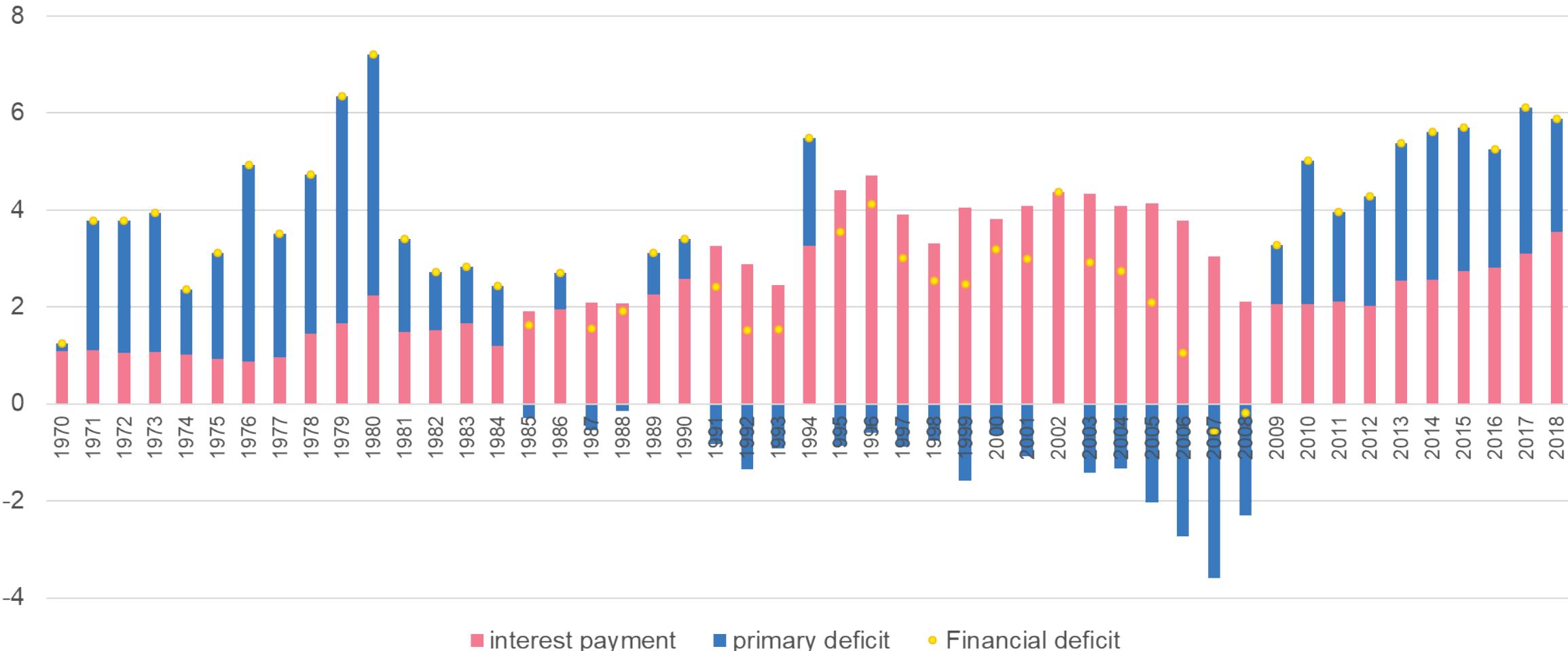
Central Government: total debt
as GDP percentage, 1970-2018

Source: own elaboration with information from the Treasury Ministry.
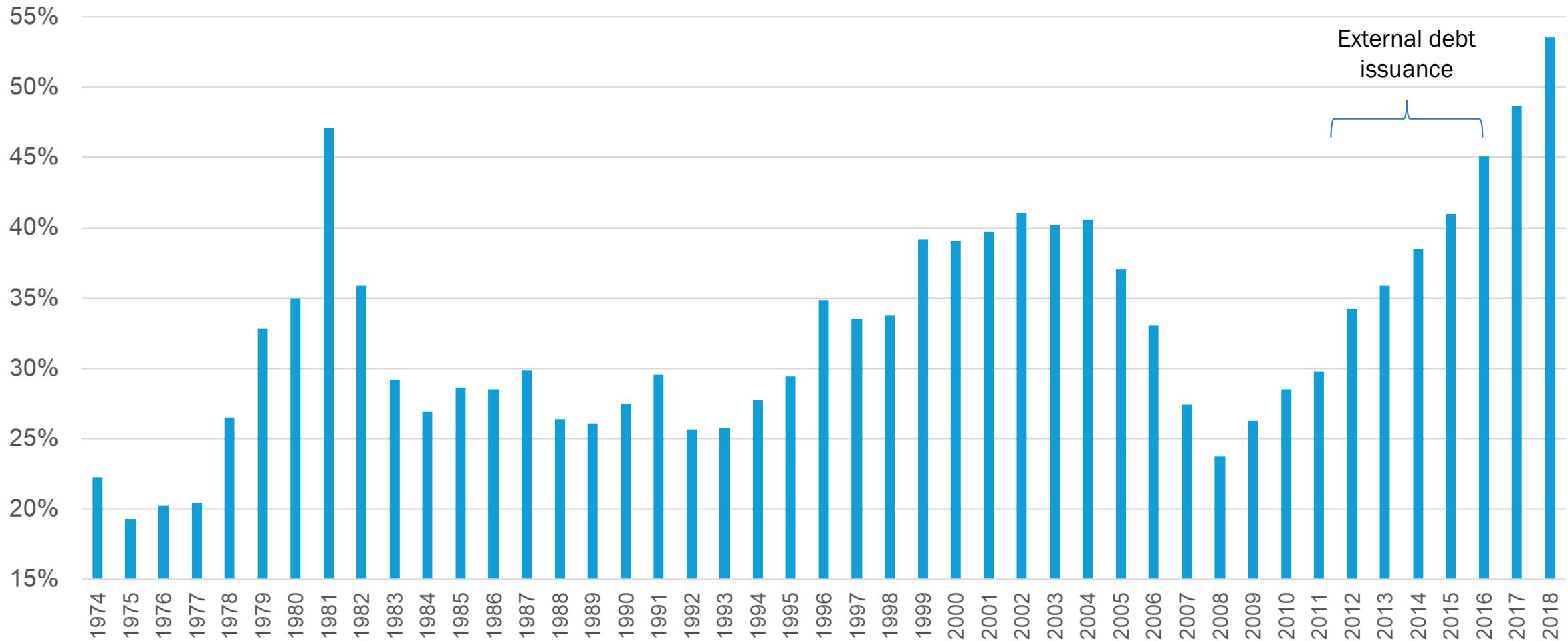
Central Government: total debt by local and external

as GDP percentage, 1970-2018

Internal Debt   External Debt

Source: own elaboration with information from the Treasury Ministry.
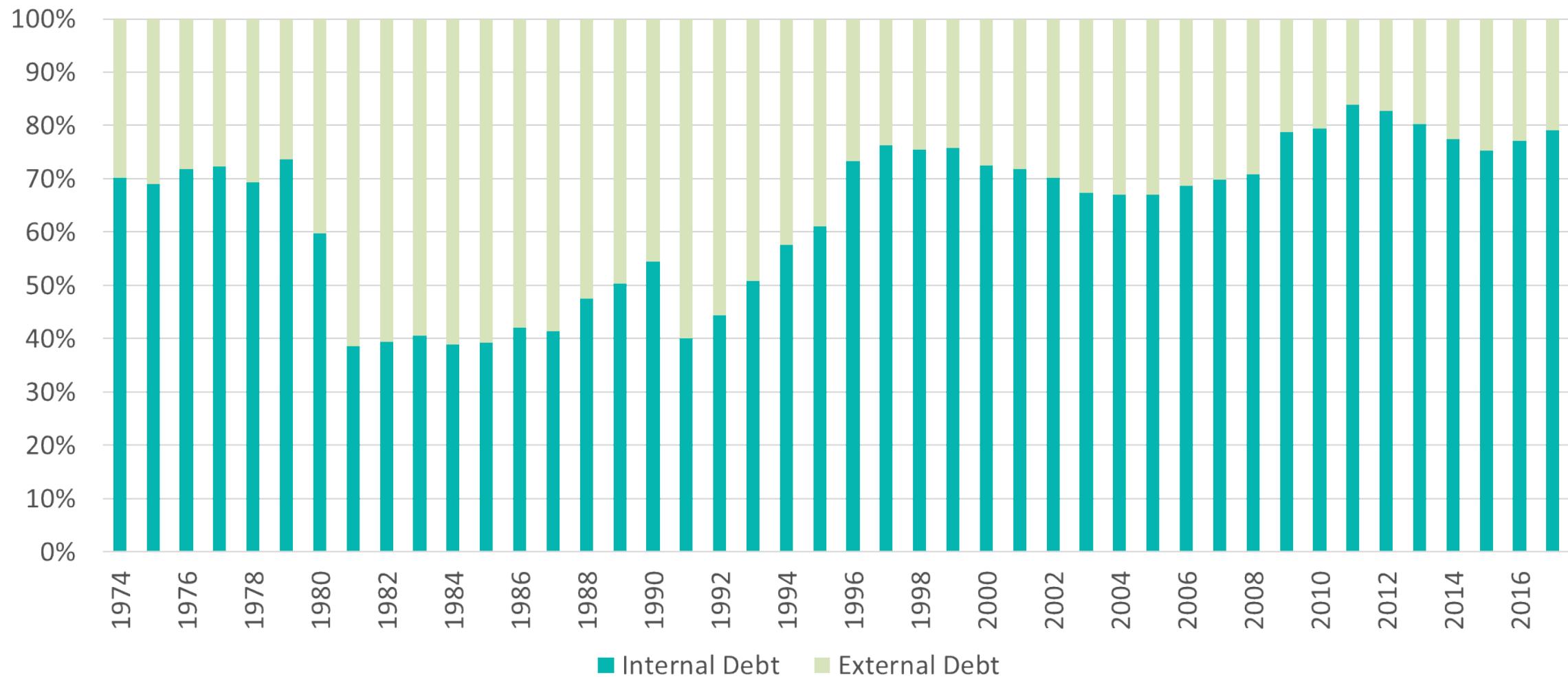
# Central Government: debt in local currency

as percentage of total, 1992-2018

Source: own estimation with information from the Treasury Ministry.

Intertemporal Government Budget Constraint

A year ago...

Legend: Natural debt limit, Total debt
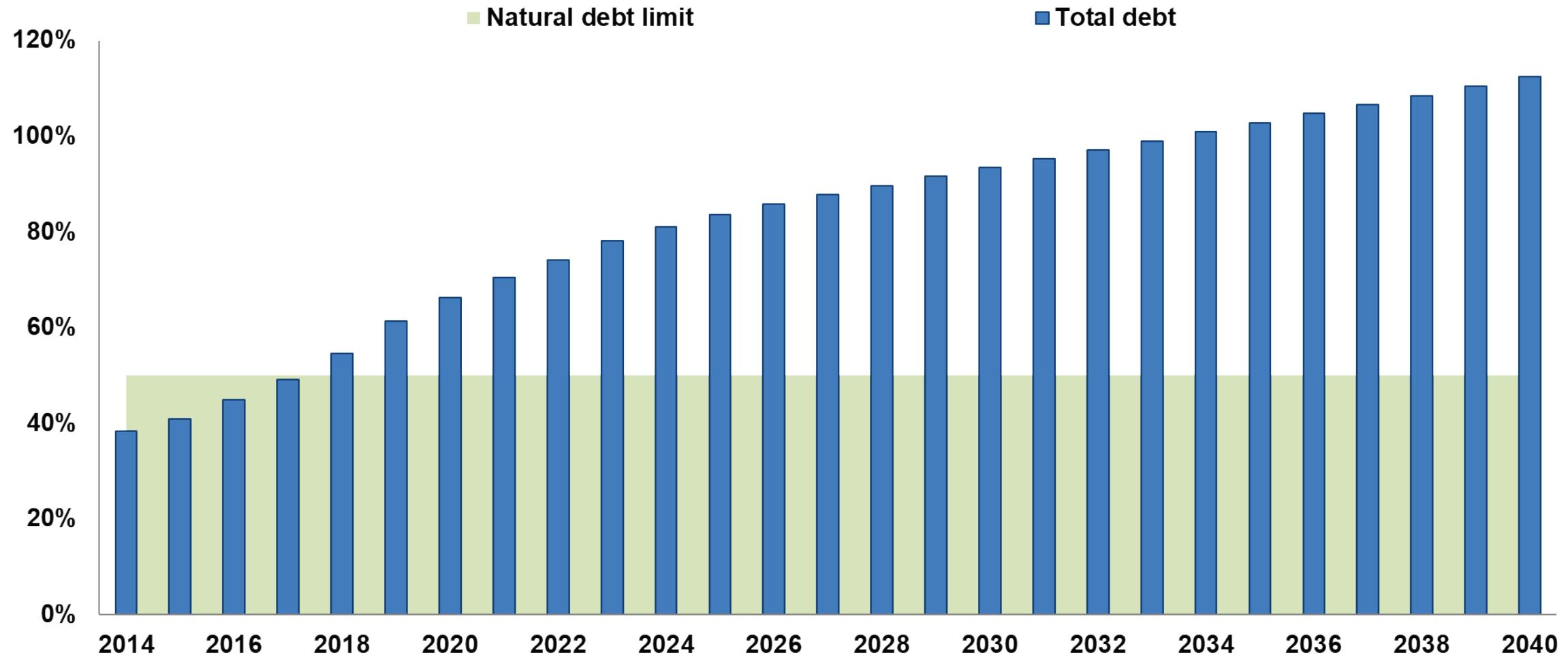
A year ago...
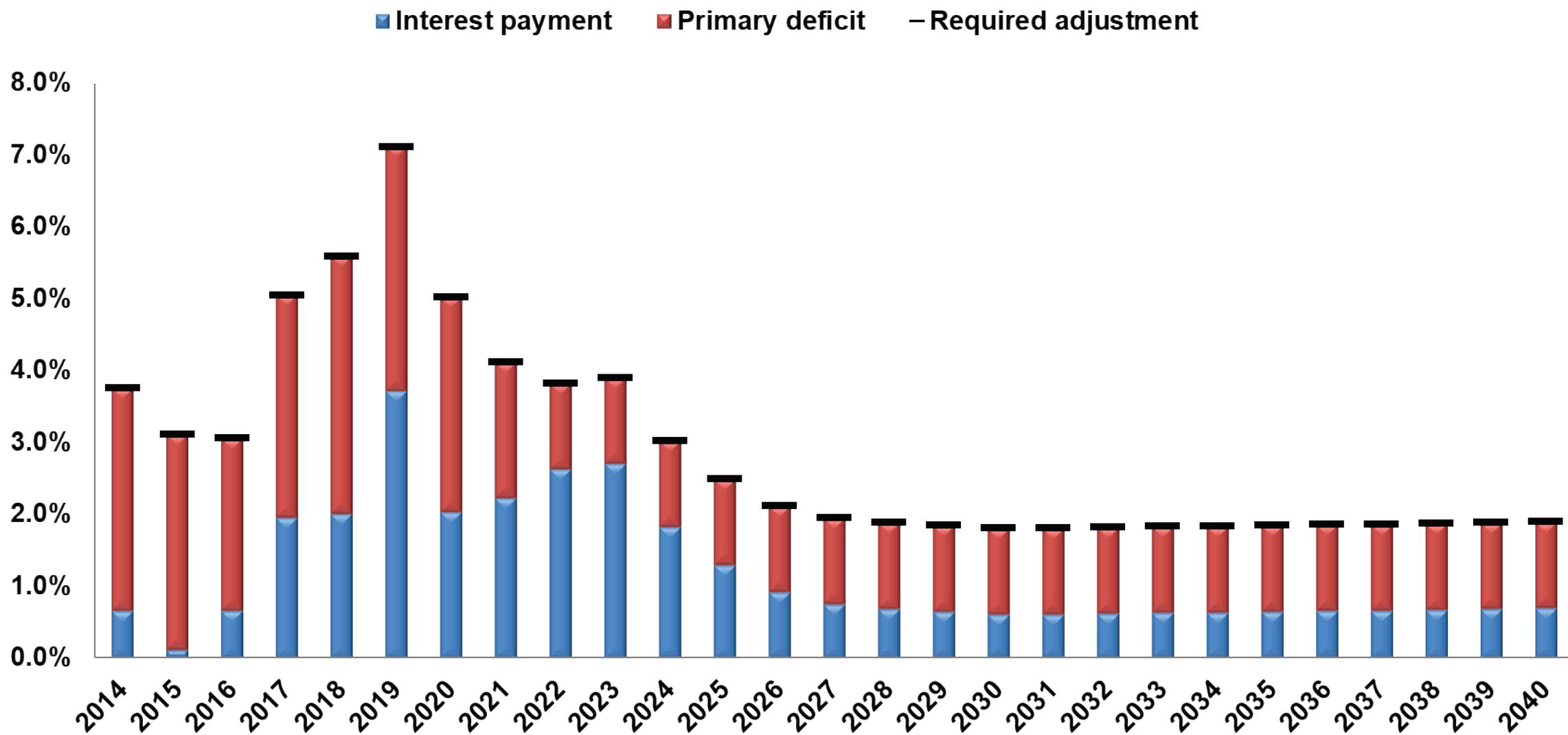
Debt Sustainability Analysis, DSA

- A sustainable position is understood as one where the government is solvent. Implying that the present value of government disbursements should not exceed the present value of revenues, or

- that the present value of future revenues net of interest payment should at least cover the existing public debt.

- As mentioned by Celasun et al. (2006), solvency is just a necessary condition for sustainability but defining sufficient conditions involves judgement.

- In reality, making judgements involves considering uncertainty. A key issue with the DSA is the omission of uncertainty

DSA - The Basics

- In the standard DSA setup, the assessment does not relate to the sustainability of a particular debt position but rather to whether given policies lead to particular trends in the debt-to-GDP ratio, which may in turn motivate calls for policy corrections.

- Concerns about sustainability may arise if

  – the debt ratio trends upwards

  – it stabilizes at a high level relative to peer countries with similar fundamentals, or relative to its own historical track record;

  – the magnitude of fiscal adjustment required to stabilize the debt ratio were deemed to be excessive.

Public Finances Solvency

- Conceptually, the main asumption is that the government will finance with new debt the interest payments not covered by the primary balance.

$$\dot{d}_t = -p_t + (r - \dot{y})_t \, d_{t-1}$$

- For the debt ratio to be sustainable, $\dot{d}_t = 0$, therefore,

$$p_t = (r - \dot{y})_t \, d_{t-1}$$

- The long run primary balance must cover the cost of interest payment.
- At BCCR's model, the deposits of the Government at the bank are also considered.

Results, 2019 - 2023

	2016	2017	2018	2019	2020	2021	2022	2023
Debt ratio (t)	44.8%	48.7%	53.6%	59.2%	62.0%	64.4%	65.8%	65.9%
Change in debt ratio (t)	4.0%	3.9%	5.5%	5.6%	2.9%	2.4%	1.4%	0.2%
Primary balance	-2.4%	-3.0%	-2.3%	-2.1%	-1.2%	-1.1%	-0.2%	0.9%
Real interest rate (implicit)	5.9%	6.4%	7.9%	7.5%	6.3%	4.9%	4.8%	4.7%
GDP growth	4.2%	3.4%	2.6%	2.2%	2.6%	2.8%	2.9%	3.1%
Debt ratio (t-1)	40.9%	44.8%	48.0%	53.6%	59.2%	62.0%	64.4%	65.8%
Deposits (National Bank System)	0.4%	-0.2%	-0.3%	0.8%	-0.5%	0.0%	0.0%	0.0%
Financial deficit	5.3%	6.1%	5.8%	6.4%	6.1%	6.17%	5.4%	4.3%
Interest expenditure (% of GDP)	2.9%	3.0%	3.5%	4.3%	4.9%	5.1%	5.2%	5.2%
Nominal interest rate	8.0%	9.1%	10.5%	10.5%	9.8%	8.2%	8.1%	7.9%
Inflation (GDP deflator)	2.0%	2.5%	2.4%	2.8%	3.3%	3.1%	3.1%	3.0%
External debt	10.1%	10.2%	10.2%	13.3%	14.4%	13.9%	13.4%	12.9%
Local debt	34.7%	38.6%	43.3%	45.9%	47.6%	50.5%	52.4%	53.0%
Total debt	44.8%	48.7%	53.6%	59.3%	62.0%	64.4%	65.8%	65.9%
Interest payment	0.7%	1.3%	2.5%	2.9%	2.2%	1.3%	1.2%	1.1%
Required primary balance	**3.1%**	**4.4%**	**4.9%**	**4.9%**	**3.4%**	**2.4%**	**1.4%**	**0.2%**

Results, 2019 - 2023

Legend: Financial balance, Primary balance, Total debt (right axis)
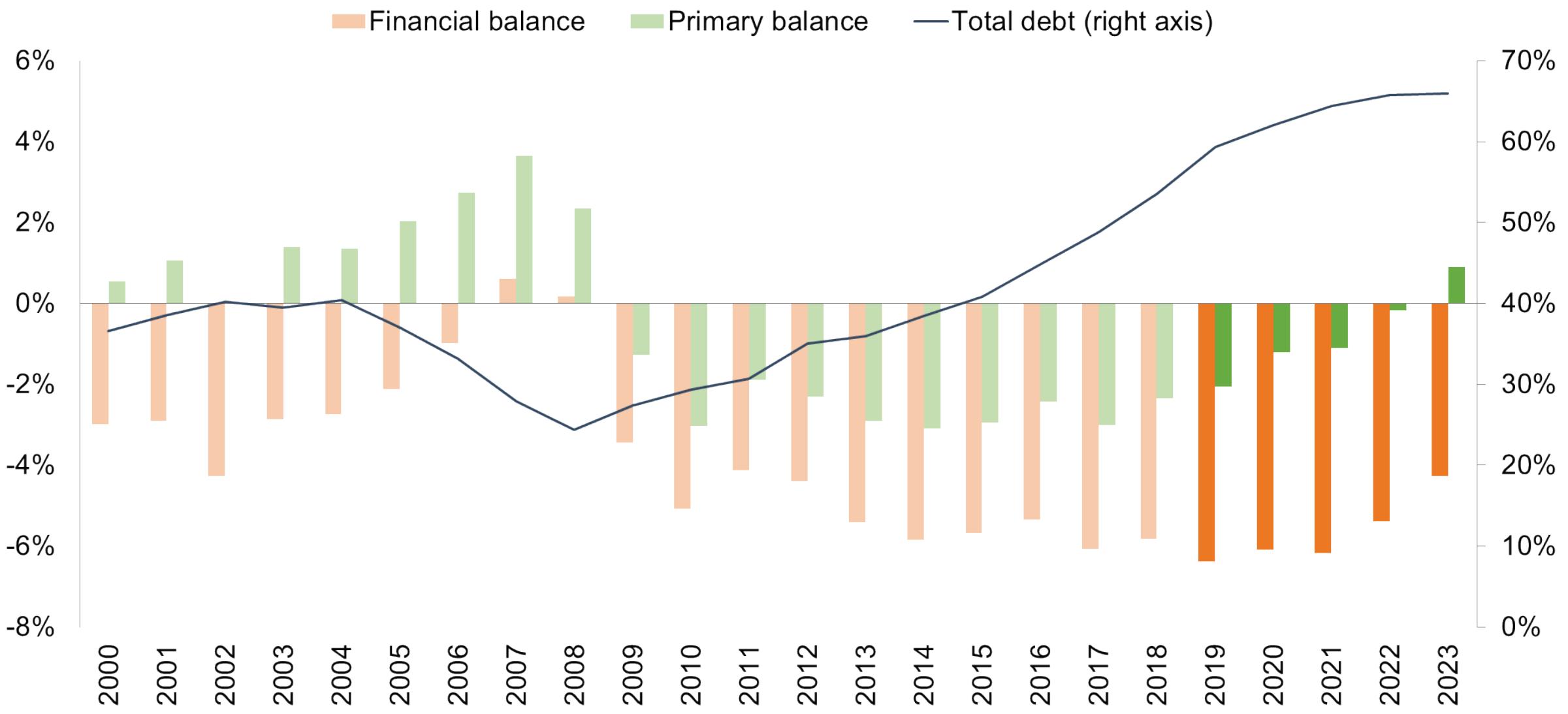
Results, debt level, 2019 - 2023
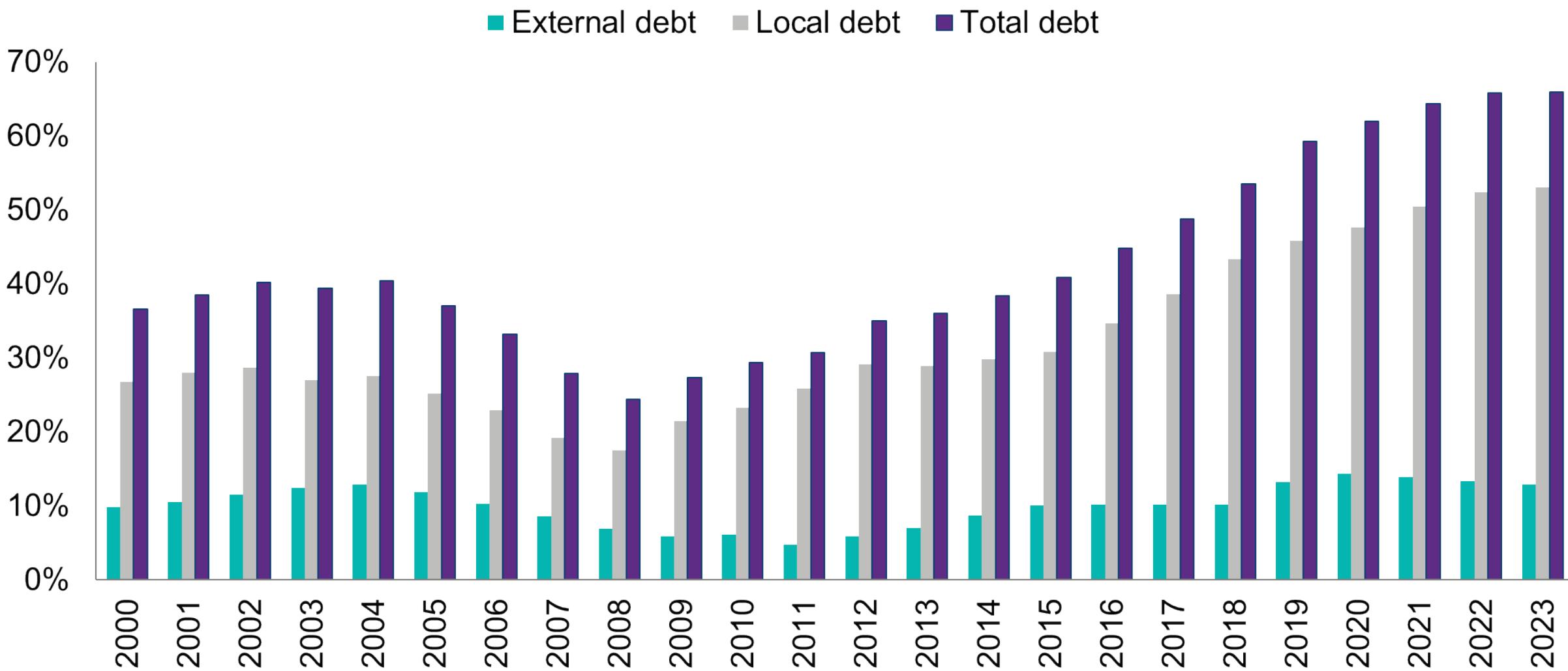
Results, 2019 - 2023
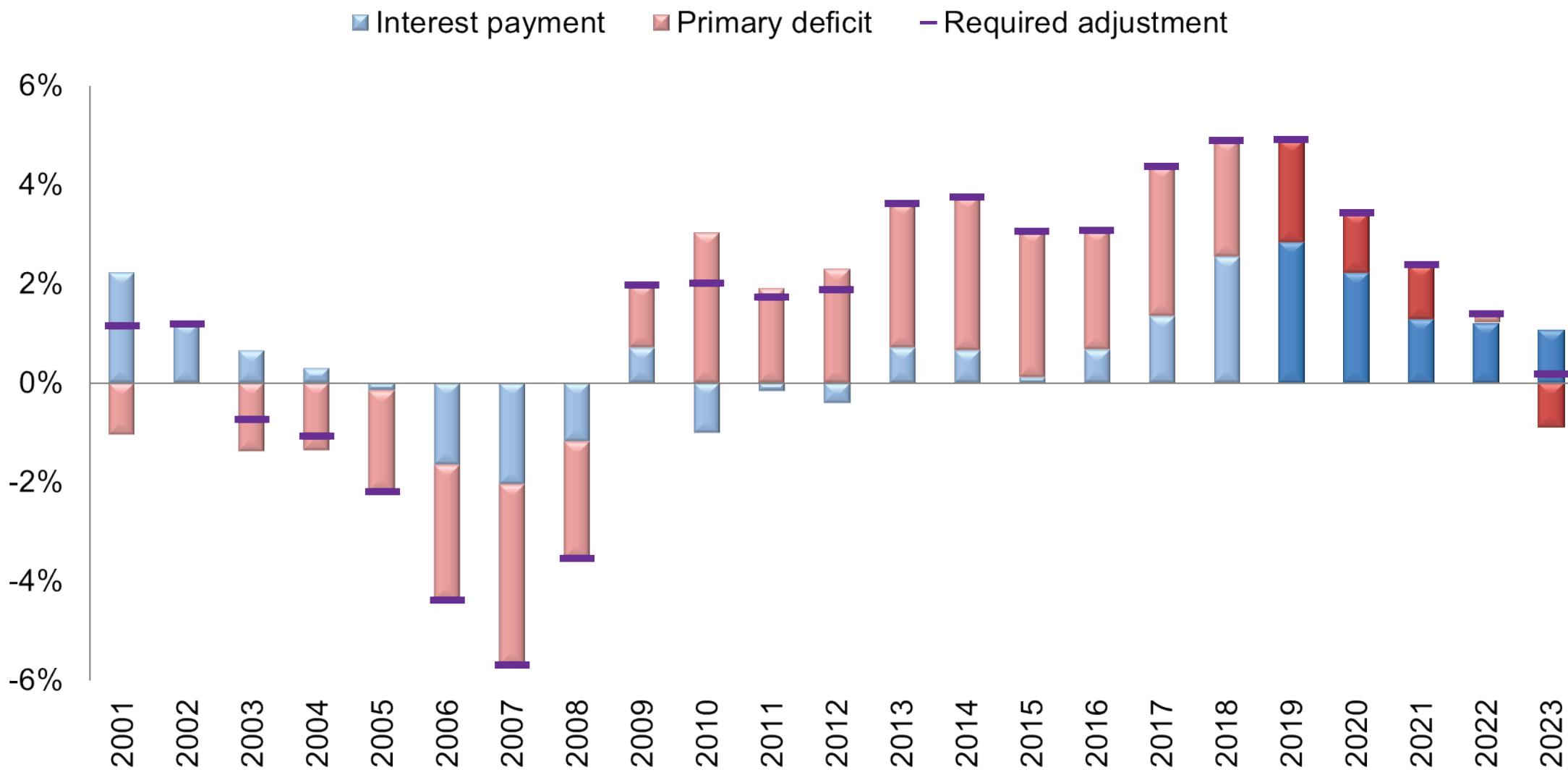
Fiscal Reaction Function

Fiscal reaction function - the basics

- The general objective is to depict how the government of Costa Rica reacts to its debt burden through the estimation of the fiscal reaction function.

- Intuitively, as the debt/GDP ratio increases, the government should react by improving the primary balance/GDP to arrest (or reverse) such increment in accordance to the budget constraint of the government.

- In a sustainable equilibrium it is assumed that debt equals the sum of the discounted value of all future primary surpluses.

- As known, the primary balance that will ensure the debt/GDP ratio remains unchanged (kind of a fiscal rule if debt levels are considered acceptable)

$$(B/Y)_t = ((r - g)/(1 + g))(D/Y)_{t-1}$$

Fiscal reaction function - the basics

- When substituting for the actual time series, as opposed to the required ratios,

$$(B/Y)_t = \alpha^*(D/Y)_{t-1} + \varepsilon_t$$

- where α^* should be on average equivalent to $(r - g)/(1 + g)$.

- For the estimation two other terms are added,
  - the lag of the primary balance allowing for inertia in government behavior, and
  - the output gap, $\hat{y}$, as a control variable to allow for the possibility that government pursues short-run demand stabilization.

- Then the basic reaction function estimated is

$$(B/Y)_t = \alpha_1 + \alpha_2(B/Y)_{t-1} + \alpha_3(D/Y)_{t-1} + \alpha_4(\hat{y})_t + \varepsilon_t$$

Fiscal reaction function - the basics

$$(B/Y)_t = \alpha_1 + \alpha_2(B/Y)_{t-1} + \alpha_3(D/Y)_{t-1} + \alpha_4(\hat{y})_t + \varepsilon_t$$

- From this equation we know that $\alpha_3/(1 - \alpha_2)$ is the long-term reaction which considers the short-run reaction, α_3, and the level of inertia, α_2.

- If that $\alpha_3/(1 - \alpha_2) = \alpha^* = (r - g)/(1 + g)$ the debt/GDP ratio and the primary balance will be first-difference stationary,
  - it would mean that government is attempting to stabilize its debt ratio at the realised level in the previous period.

- If $\alpha_3/(1 - \alpha_2) > \alpha^* = (r - g)/(1 + g)$ the debt/GDP ratio and the primary balance will be stationary.

Fiscal reaction function - an estimation for Costa Rica

- Given this background, unit root tests were done,

Variable	Include in test equation	ADF	PP	KPSS
Output gap	Intercept and trend	0,03%	0,00%	>10%
	Intercept	0,00%	0,00%	>10%
	None	0,00%	0,00%	✕
Debt/GDP	Intercept and trend	45,01%	60,24%	>10%
	Intercept	42,83%	62,02%	>5%
	None	87,35%	88,69%	✕
Primary balance/GDP	Intercept and trend	51,17%	41,52%	>1%
	Intercept	18,33%	20,13%	>10%
	None	3,08%	4,72%	✕
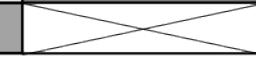
- ADF and PP: Output gap is stationary, debt/GDP is non-stationary, and primary balance/GDP is stationary.

- The results in KPSS show that all three variables are stationary.

Fiscal reaction function - an estimation for Costa Rica

- The data was gathered from the Central Bank and the Treasury Ministry. The annual series go from 1974 until 2018.

- The output gap is constructed using the Hodrick-Prescott filter.

- Given that the series are stationary, three different methodologies were used for the estimation, OLS, VAR and GMM.

- The VAR model is estimated given that there are multiple interactions between the variables.

Fiscal reaction function - an estimation for Costa Rica

- And the GMM addresses the possibility that the independent variables might be correlated due to non linearities, measurement error or simultaneity.

- Bohn (2008) states that given the results of the FRF, if there is a positive and significant coefficient between the primary balance (B/Y) and the debt level (D/Y), there is evidence to conclude that the IGBC is sustainable.

Fiscal reaction function - estimation results for Costa Rica

	OLS	OLS_trend	OLS_UST	VAR	VECM	GMM	GMM_educ
$(B/Y)_{t-1}$	**0,73**	**0,81**	**0,52**	**0,73**			
$(D/Y)_{t-1}$	**0,06**	**0,07**	**0,05**	**0,06**	**-0,15**	0,04	**0,22**
$(\hat{y})$	-0,02			-0,02		0,98	**-0,45**
$(\hat{y})_{t-1}$		-0,08					
Trend		**-0,02**					
D_1994	**-2,63**		**-1,41**	**-2,63**	**-2,66**		
D_post 2008	**-1,36**		**-2,43**	**-1,36**	**-1,35**	-3,12	**-4,17**
UST_1yr			**-0,16**			-12,50	**-0,38**
C	**-1,76**	**-1,37**	**-0,71**	**-1,76**	**0,43**		

Numbers in bold are significant to 10% or less.

What can this tell us about fiscal sustainability?

- According to the literature, fiscal policy will be sustainable if $\alpha_3/(1-\alpha_2) > \alpha^* = (r-g)/(1+g)$.
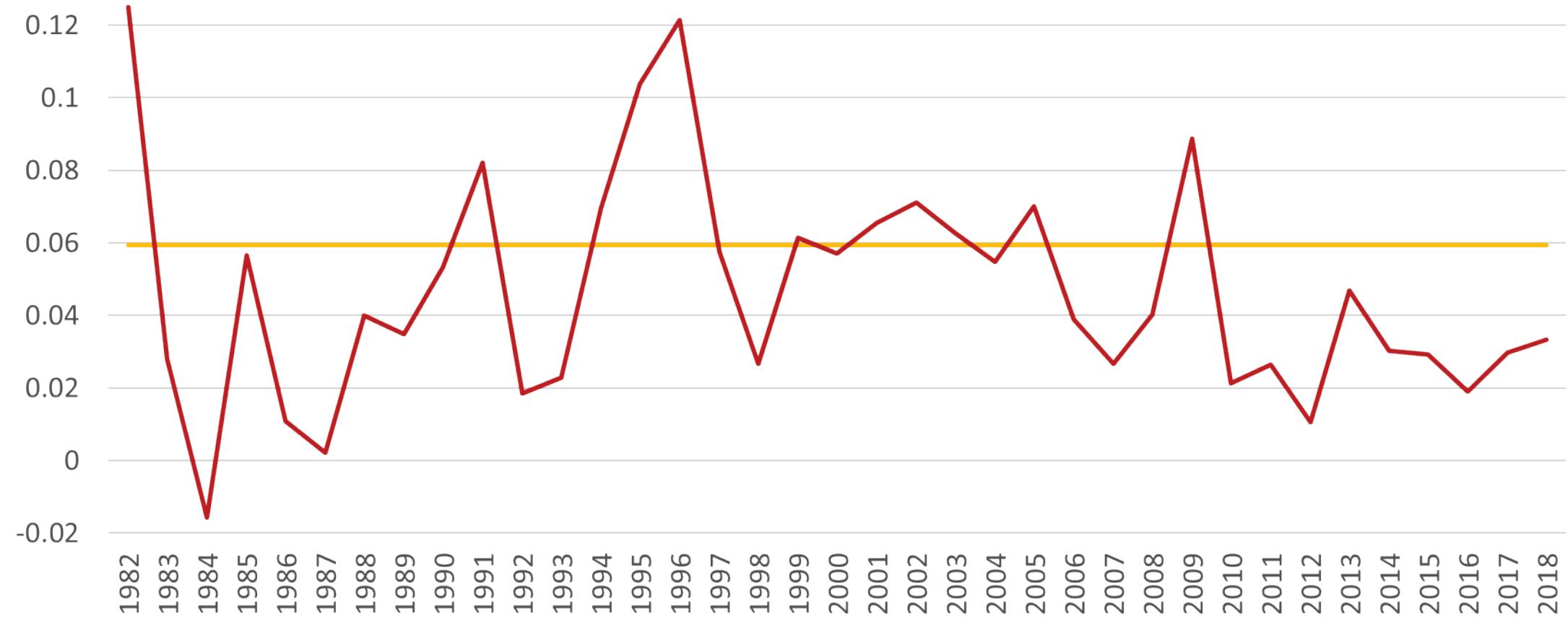
Risk Assessment

Fan Charts

- It is a probabilistic approach to public debt sustainability analysis. The objective is to depict the magnitude of risks, upwards and downwards, given the public debt projections as a result of uncertain economic conditions and policies; internal and external.

- For the DSA analysis, we assume a shock to the interest rate and to GDP growth.

- These shocks are normally distributed, and their variance is estimated with historical data. They follow an autoregressive process.

- A Montecarlo simulation is followed.

Fan Charts, DSA BCCR and DSA IADB (external projections)
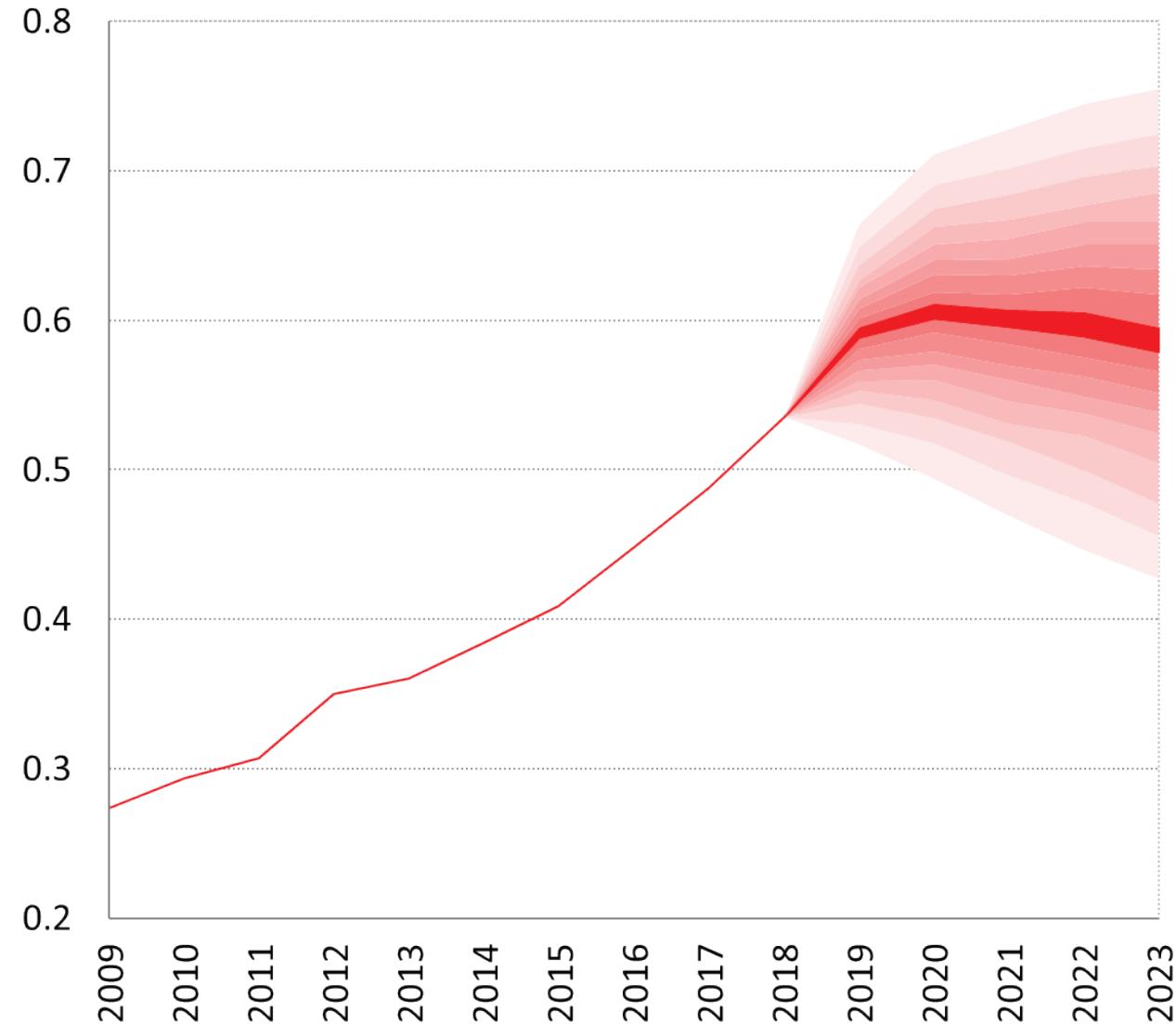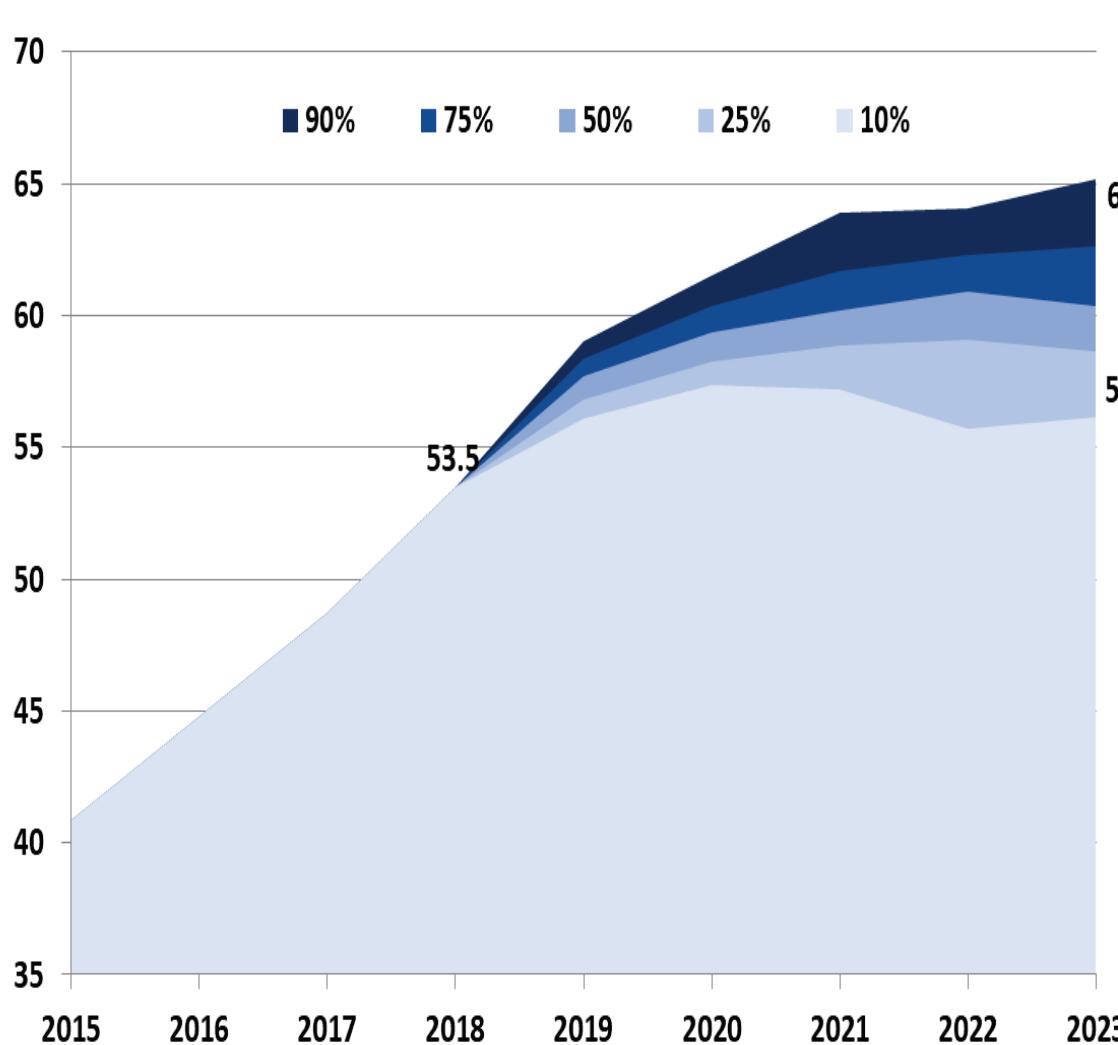
Fan Chart, FRF
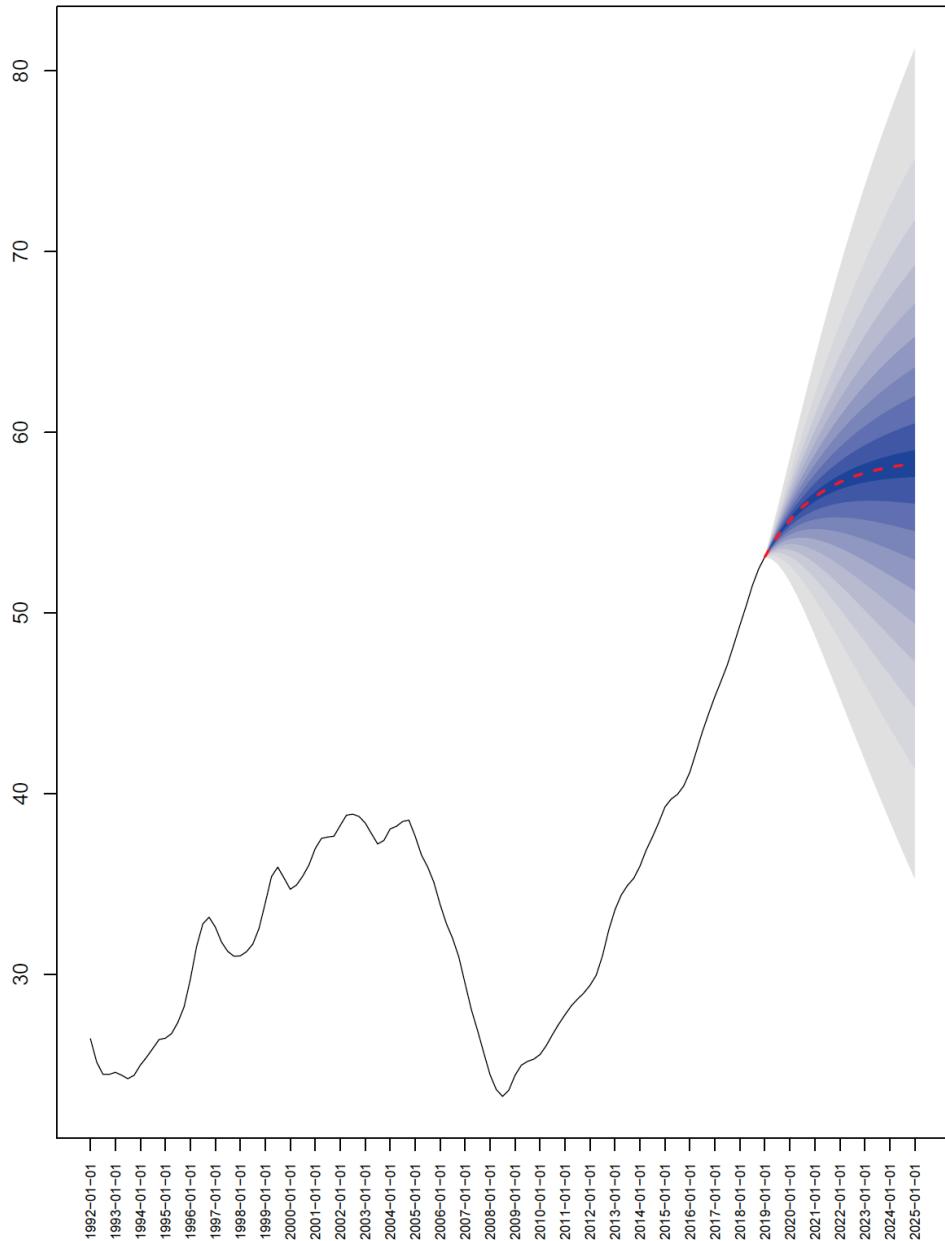
Main Conclusions

Sustainable debt

- A declining trend in the debt ratio signals that government policies are unlikely to jeopardize sustainability.

- Whereas a positive trend or even stabilization at a high level may motivate concerns about sustainability, especially if other factors—such as the fiscal adjustment needed to stabilize or reduce the debt ratio—point to likely difficulties in keeping debt under control, as is the case for Costa Rica.

- The FRF results show that there have been some efforts in the short run for debt sustainability but they have been far from the long run needs.

Institutional aspects for discussion

- (In) Flexibility degree of government expenditure.
  - Automatic expansion factors
  - Current vs. capital expenditure
  - Return over investment analysis

- Fiscal reform, law 9635, approved in December 5th, 2018.
  - Applicability
  - Tax income and the economy's growth
  - Fiscal rule: current expenditure

Central Government: primary balance
as GDP percentage, 1970-2018

Source: own elaboration with information from the Treasury Ministry.