Estimating and forecasting using simple fiscal rules for euro area countries

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Motivation

European sovereign debt crisis brought the implementation of fiscal rules to the forefront of many policy discussions.

- Targets for or restrictions on fiscal aggregates often seen as a useful policy to reach sustainable government finances.
- May reduce uncertainty about future policy decisions.

This paper specifies a fiscal rule and then:

- Measures fiscal policy behavior in the eurozone based on different structural indicators.
- Proposes a specification for a simple fiscal policy rule, forecasts future debt and primary balance paths based on this rule.

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A rule in levels

General specification of Snower et al. (2011):

$$\frac{L_t}{Y_t} = k_t + a\left(1 - \frac{\bar{Y}_t}{Y_t}\right) + c^{CR}\left(\frac{B_{t-1}}{Y_{t-1}} - b^{CR}\right)_+ + e_t, \qquad (1)$$

$$k_t = \left(1 - \frac{1}{(1+\bar{\pi}_t)(1+\bar{g}_t)}\right) b^{CR}. \qquad (2)$$

Alternatively, our generalization (as a primary surplus rule):

$$\frac{P_t}{Y_t} = k_t + a\left(1 - \frac{\bar{Y}_t}{Y_t}\right) + c\left(\frac{B_{t-1}}{Y_{t-1}} - b^*\right) + c^{CR}\left(\frac{B_{t-1}}{Y_{t-1}} - b^{CR}\right)_+ + e_t; \qquad (3)$$

$$k_t = \left(\frac{(1+\bar{i}_t)}{(1+\bar{\pi}_t)(1+\bar{g}_t)} - 1\right) b^*. \qquad (4)$$

The choice of $\bar{Y}_t$ and stationarity issues

Calculation of (unobservable) structural indicator variable necessary.

- Potential GDP and trend GDP are possible indicators.
- Model-contingent, not precisely measured, prone to revision.
- Implications for measured cyclicality.

(Near-) unit root behavior in the debt ratio: $\rightarrow$ e_t might follow a random walk.

- Take equation (3) in first differences.
- Trend growth of output (vs. growth in trend output): More robust to unreliable estimates.

A rule in first differences

Taking equation (3) in first differences, omitting c^{CR}:

$$\Delta \frac{P_t}{Y_t} = a \left(\frac{1}{1+\bar{g}_t} - \frac{Y_{t-1}}{Y_t} \right) - c\Delta \frac{B_{t-1}}{Y_{t-1}} + \varepsilon_t, \tag{5}$$

where ε_t equals Δe_t.

We add an additional term to capture additional consolidation which is required to push the debt-GDP ratio towards b^{CR}:

$$\Delta \frac{P_t}{Y_t} = a \left(\frac{1}{1+\bar{g}_t} - \frac{Y_{t-1}}{Y_t} \right) + c\Delta \frac{B_{t-1}}{Y_{t-1}} + d^{CR} \left(\frac{B_{t-1}}{Y_{t-1}} - b^{CR} \right)_+ + \varepsilon_t. \tag{6}$$

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Estimation procedure

- AMECO database, spliced to OECD data for Spain before 1995 and Italy before 1980.
- Output gap endogenously related to fiscal impulse $\rightarrow$ (nonlinear) 2SLS.
- Rule (3): e_t follows AR(1) with persistence coefficient ρ. Shift dummy for Germany post-reunification. Country fixed effects in pooled estimates.
- Rule (6): Blip dummy for Germany in 1991.
- Both rules, baseline: c^{CR} and d^{CR} omitted, respectively.

Estimation results I

Panel estimates of all specifications (full sample):

Level Specifications	c	a	ρ
Potential GDP, full sample	0.081	0.493	0.717
	(0.014)	(0.133)	(0.040)
Trend GDP, full sample	0.093	0.419	0.748
	(0.017)	(0.100)	(0.039)

First Diff. Specifications	*const.*	c	a
Potential GDP, full sample	0.000	0.087	0.443
	(0.001)	(0.021)	(0.110)
Trend GDP, full sample	−0.001	0.104	0.494
	(0.001)	(0.022)	(0.096)
Trend growth, full sample	−0.001	0.107	0.482
	(0.001)	(0.022)	(0.095)

Standard errors are given in parentheses.

Estimation results II

Panel estimates of all specifications (post-1992):

Level Specifications	c	a	ρ
Potential GDP, post-1992	0.082	0.715	0.557
	(0.023)	(0.161)	(0.068)
Trend GDP, post-1992	0.081	0.310	0.660
	(0.032)	(0.126)	(0.065)

First Diff. Specifications	*const.*	c	a
Potential GDP, post-1992	0.000	0.116	0.893
	(0.001)	(0.028)	(0.183)
Trend GDP, post-1992	0.000	0.117	0.555
	(0.001)	(0.029)	(0.153)
Trend growth, post-1992	0.000	0.121	0.532
	(0.001)	(0.029)	(0.149)

Standard errors are given in parentheses.

Estimation results III

The fiscal rule in differences (using growth in trend GDP):

Country	*const.*	*c*	*a*
France	−0.004	0.243	0.830
	(0.002)	(0.087)	(0.257)
Germany	−0.007	0.567	0.618
	(0.004)	(0.170)	(0.351)
Ireland	0.005	0.202	0.926
	(0.005)	(0.108)	(0.612)
Italy	−0.001	0.141	−0.041
	(0.003)	(0.080)	(0.327)
Spain	0.000	0.096	0.635
	(0.002)	(0.059)	(0.206)
Pooled	−0.001	0.104	0.494
	(0.001)	(0.022)	(0.096)

Standard errors are given in parentheses.

Estimation details

- Country-specific coefficients vary greatly among specifications, not always precisely measured.
- Additionally: (pooled) c^{CR} may be positive, d^{CR} hard to tell.
- Time period matters in some cases.
- Evidence of debt stabilization in levels or growth rates.

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Forecasting methodology I

- Start with data from AMECO database, use EC projections through 2014. Trend interest rate, inflation rate, growth rate of trend output equal to 1999-2012 average.
- Set up 'zero-fiscal' baseline level of actual and potential output, to account for endogeneity of output.
- Simple multiplier relationship:

$$Y_t = Y_t^* - mP_t. \tag{7}$$

- Similarly, for potential output:

$$\bar{Y}_t = \bar{Y}_t^* - m\bar{P}_t. \tag{8}$$

Forecasting methodology II

- Trend primary surplus $\bar{P}_t$ can be approximated by:

$$\bar{P}_t = \left(\frac{(1 + \bar{i}_t)}{(1 + \bar{\pi}_t)(1 + \bar{g}_t)} - 1 \right) B_{t-1}. \tag{9}$$

- Beyond 2014, assume that zero-fiscal log output gap ($log(Y_t^* / \bar{Y}_t^*)$) is equal to 0.8 times its previous value; zero-fiscal trend output grows at its trend rate $\bar{g}_t$ which is set to the average growth in trend output from 1999-2012.

Forecasting methodology III

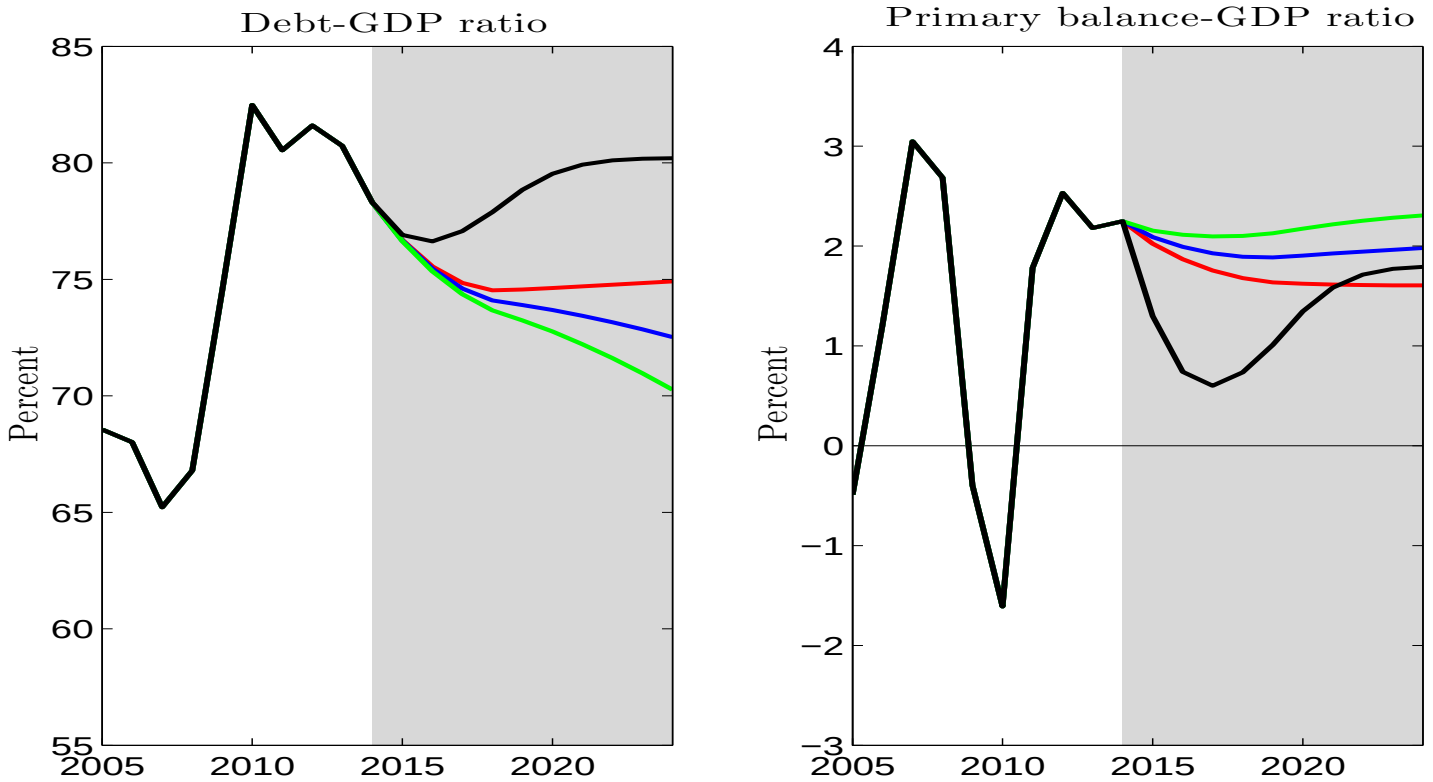
- Then derive equilibrium fiscal balance implied by equations (6) and (7) in the years after 2014:

$$P_t = \frac{1}{1 + mj_t} \left(Y_t^* j_t - aY_{t-1} \right), \tag{10}$$

where:

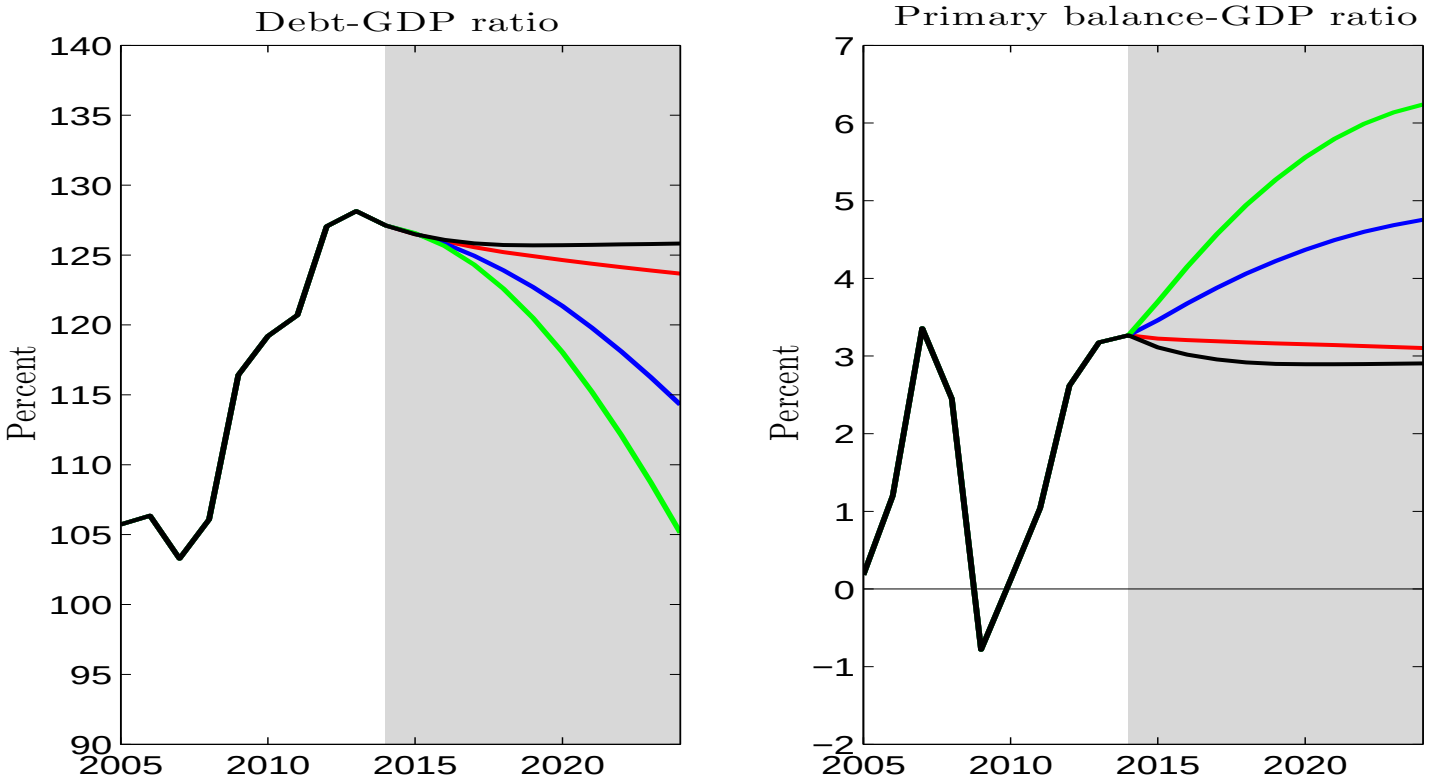
$$j_t = \frac{P_{t-1}}{Y_{t-1}} + c\Delta \frac{B_{t-1}}{Y_{t-1}} + d^{CR} \left(\frac{B_{t-1}}{Y_{t-1}} - b^{CR} \right) + a \frac{1}{1 + \bar{g}_t} + \varepsilon_t. \tag{11}$$

Forecasts for GERMANY



Black: Country-specific estimates of a and c, no correction factor. **Red:** EA-wide estimates of a and c, no correction factor. **Blue:** EA-wide estimates of a and c, $d^{CR} = 0.005$. **Green:** EA-wide estimates of a and c, $d^{CR} = 0.01$.

Forecasts for ITALY



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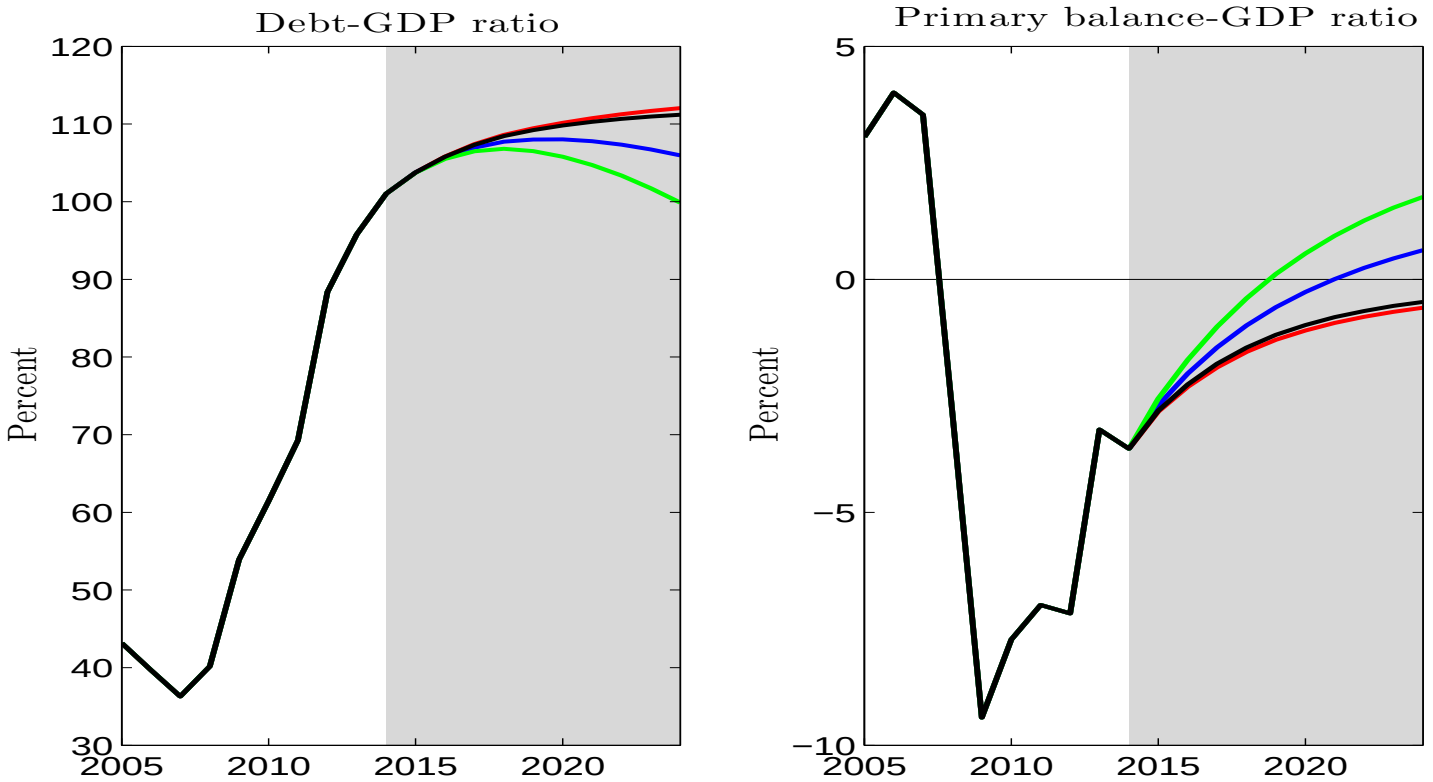
Forecasts for SPAIN



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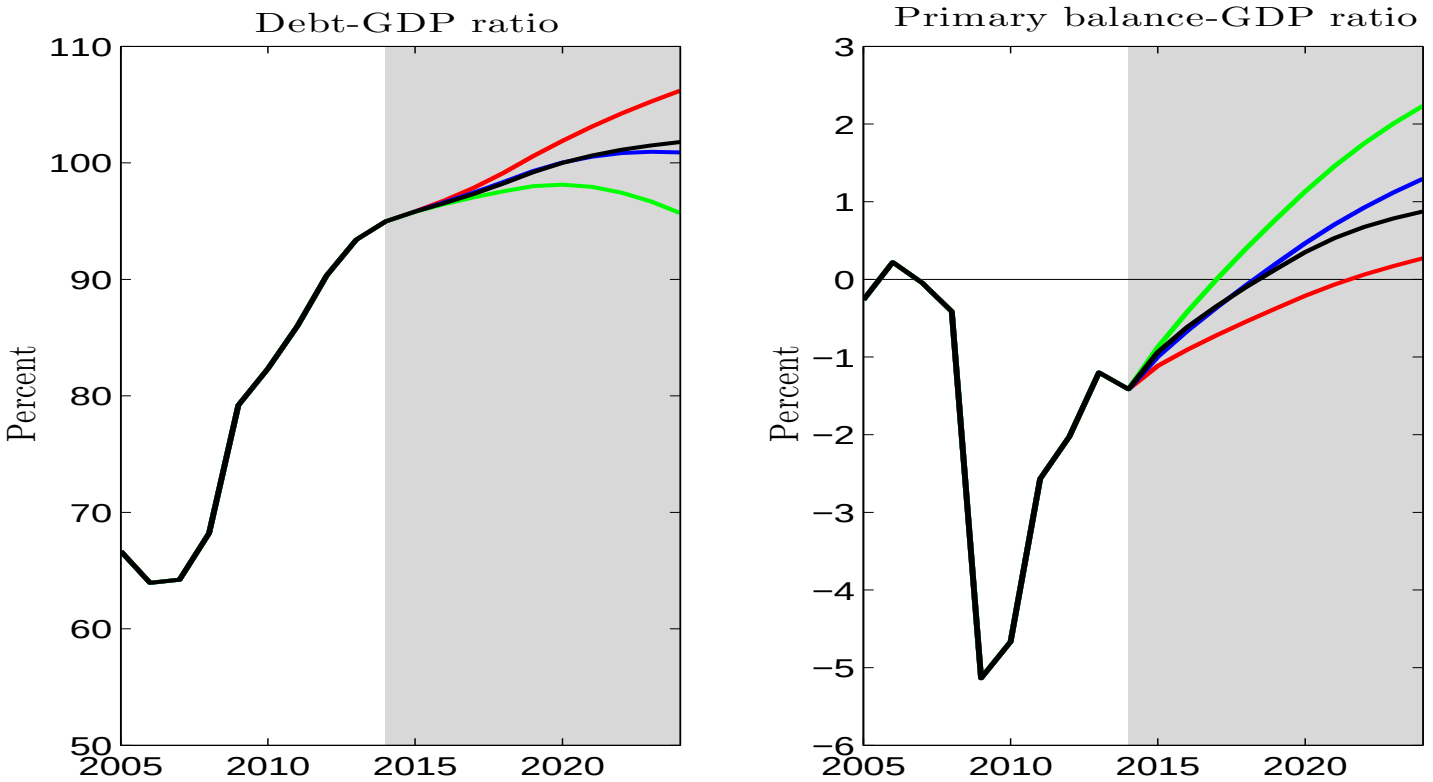
Forecasts for FRANCE



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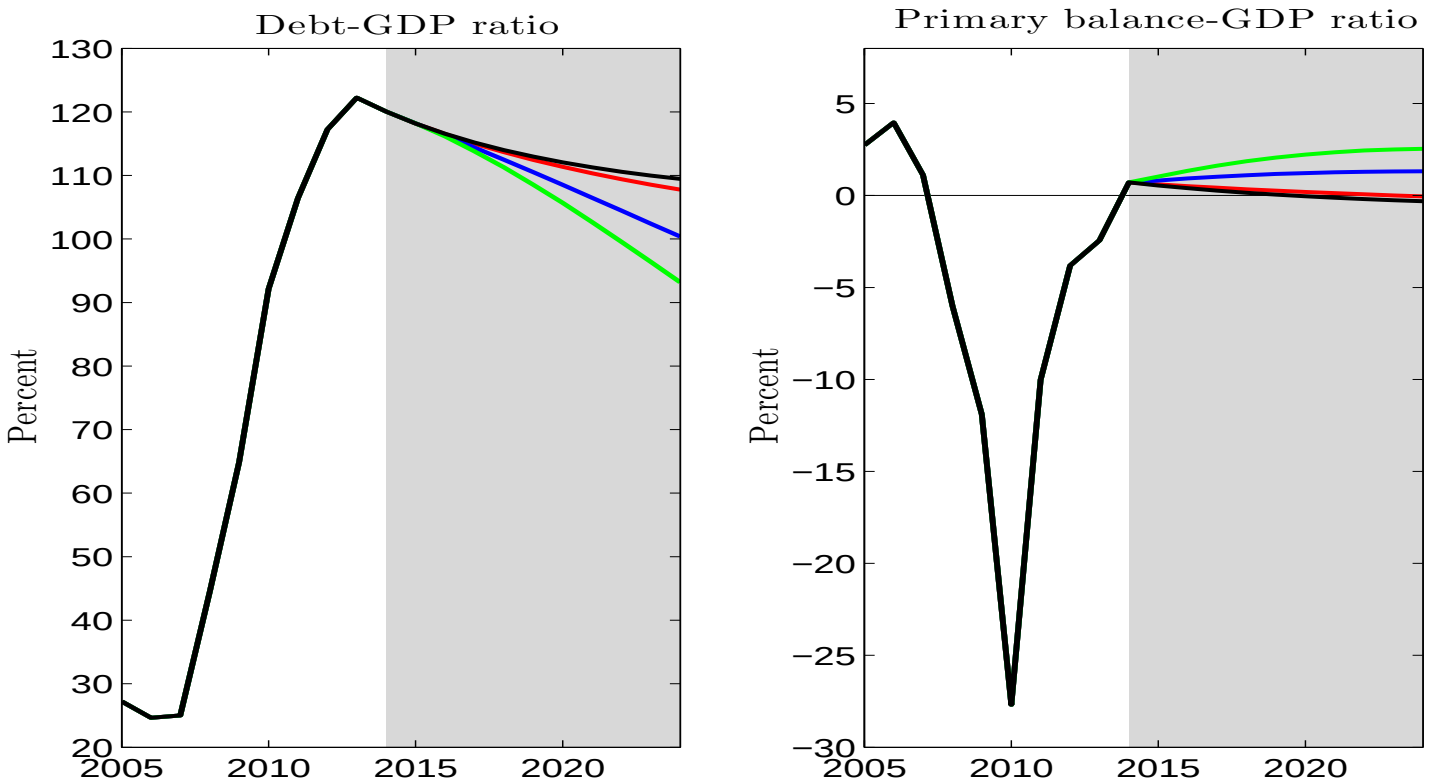
Forecasts for IRELAND



Black: Country-specific estimates of a and c, no correction factor. **Red:** EA-wide estimates of a and c, no correction factor. **Blue:** EA-wide estimates of a and c, $d^{CR} = 0.005$. **Green:** EA-wide estimates of a and c, $d^{CR} = 0.01$.

Summary

- Short-run debt levels are not very sensitive to consolidation coefficients, for reasonable parameters. Very sensitive in 'out years'.
- Forecasts depend greatly on expected growth rates, parameters.
- Simulations can detect pressure to engage in rapid consolidation.