What are the Consequences of the New Fiscal Rule of Korea?

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New Fiscal Rule of Korea

- A bill proposing a new fiscal rule had submitted in 2020, which would have been effective from 2025 if passed

$$\text{New Fiscal Rule} = (\text{Fiscal rule index} \leq 1)$$

where the fiscal rule index is defined as

$$\text{Fiscal rule index} \equiv \left(\frac{\text{Debt-to-GDP ratio}}{60\%}\right) \times \left(\frac{\text{Deficit-to-GDP ratio}}{3\%}\right)$$

- Its primary motivation is to guarantee fiscal policy (FP) that is sustainable in long run
  - expressed explicitly in the title "*the adoption of the new fiscal rule for fiscal sustainability*" (the Ministry of Economy and Finance press release on October 5th, 2020)

New Fiscal Rule of Korea

- Policy & academic research keep silent about the impacts of the rule, largely due to the following two aspects
  1. the constitution of the rule:
     - it imposes a ceiling on a combination of the debt-GDP and deficit-GDP ratios, whereas commonly used rules elsewhere set ceilings on both (65 countries, IMF, 2017)
  2. a forward-looking manner of the rule:
     - such a rule has never been practiced in Korea, thus no historical data are available for empirical analyses
- Understanding its implications, however, may be essential for public discourse about the policy

How to Tackle the Issue?

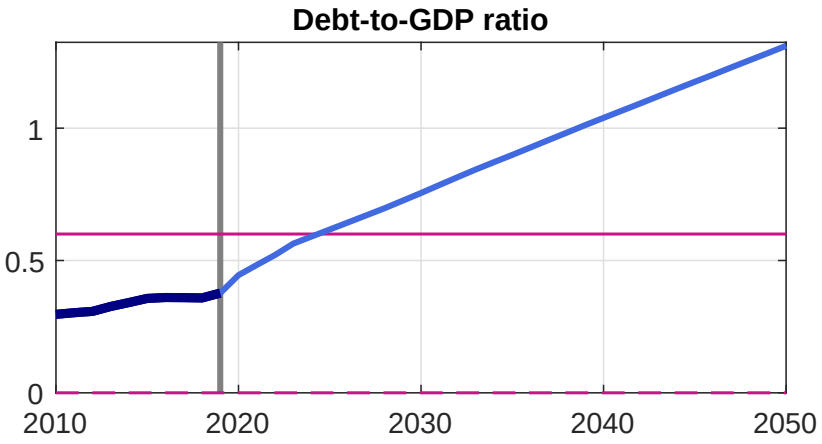
Idea: Use information in (and not in) the National Assembly Budget Office (NABO) long-term projections

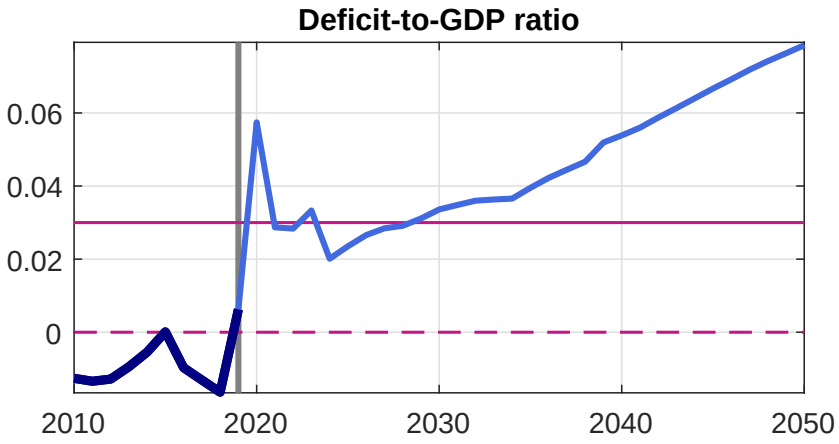
- The feature of the NABO's projections
  - the most up-to-date long-term projections were made prior to the introduction of the new fiscal rule
  - the NABO's projections are merely accounting exercises, formulated under the assumption that contemporary policies will remain in effect over the projection period

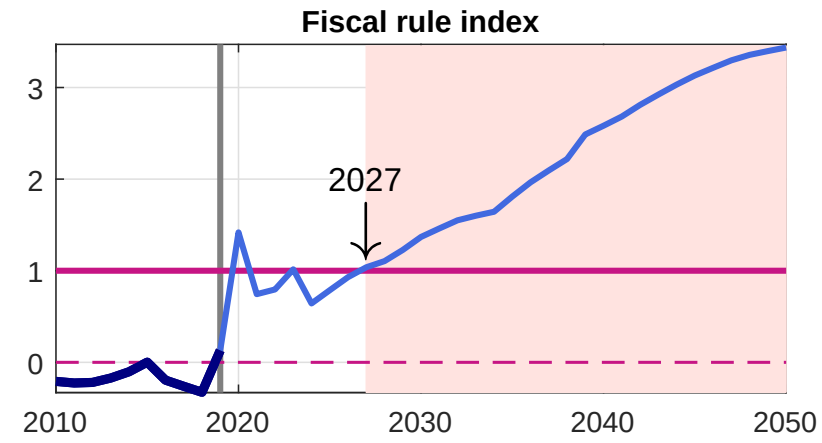
  $\Rightarrow$ thus the NABO's projections are unlikely to satisfy the new fiscal rule

- Then natural follow-up questions revolve around
  - how much fiscal adjustments should be made to do so (via debt-to-GDP ratio or deficit-to-GDP ratio?)
  - and what their impact on GDP is

Fiscal Rule Index from the Projections

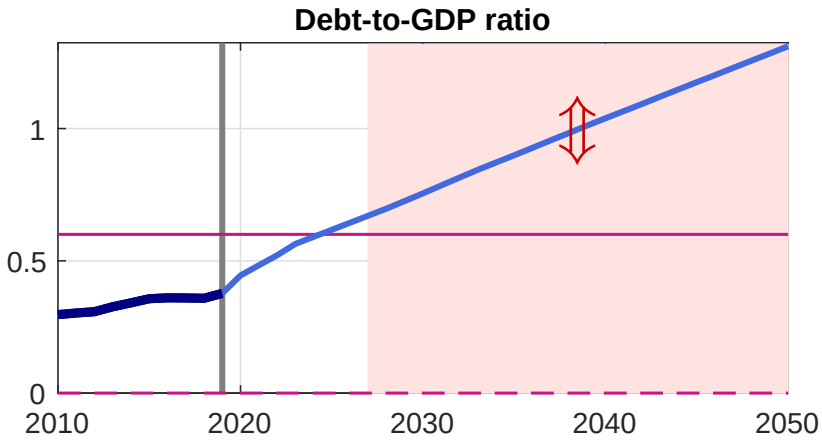


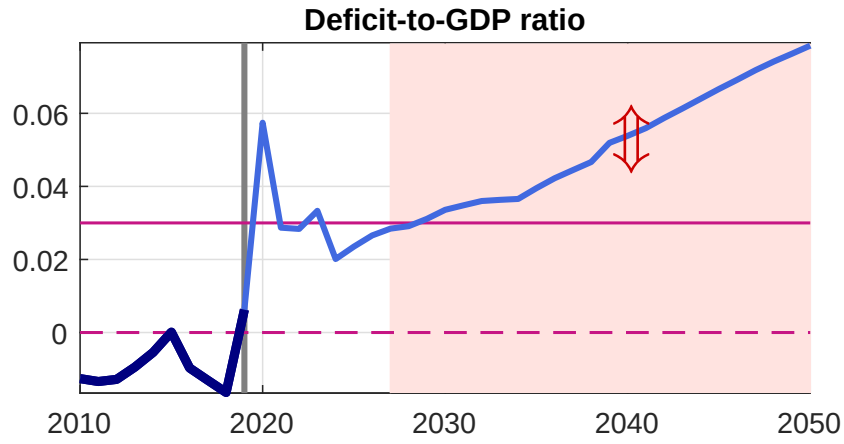


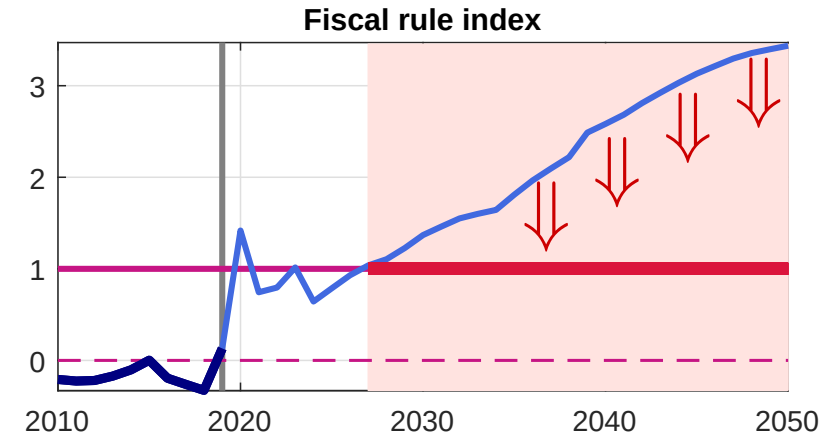


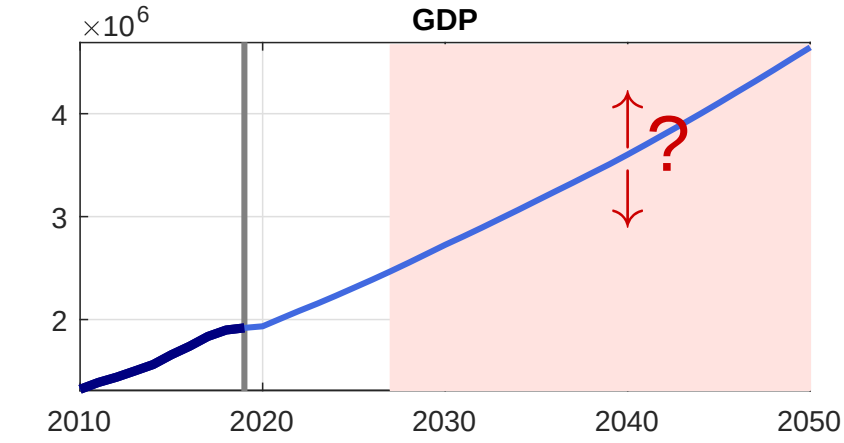
Thick: Actual; Thin: NABO long-term projections

Our Empirical Strategy: A Snapshot









Thick: Actual; Thin: NABO long-term projections

What We Do

- This is intrinsically a general equilibrium problem
  - a feedback loop between GDP and the fiscal objectives
    - required fiscal adjustments can be calculated exogenously
    - but these alter GDP and the debt/GDP (and deficit/GDP) ratio $\Longrightarrow$ the initial required adjustments should be revised
- Set up a new Keynesian DSGE model incorporating a rich description of fiscal policy:
  - specify policy rules for capital, labor, and consumption taxes, government spending, and lump-sum transfers
  - the FP specification allows contemporaneous responses to GDP and dynamic responses to the debt-to-GDP ratio

What We Do

- Establish a model-consistent accounting framework for macroeconomic consequences of the new fiscal rule
  - particularly consider cases in which required changes in the fiscal instruments are similar in percentage

What We Find

- Substantial adjustments in the fiscal instruments are necessary to satisfy the new fiscal rule as of 2050
  - labor, capital and consumption tax revenues should increase by 10% or more than the NABO's projections
    - tax rates: 5.8% (2020) $\rightarrow$ 6.5% (2050, labor); 19.1% $\rightarrow$ 20.7 (capital); 10% $\rightarrow$ 10.8% (consumption)
  - gov't spending and transfers decrease more than 10%
  - the required fiscal adjustments become even more sizable if only taxes or gov't outlays are involved
- Imposing the new fiscal rule decreases the debt-to-GDP projection as of 2050
  - 131.1% (NABO) $\rightarrow$ 100.9$\sim$115.1% (model with the rule)
  - the new fiscal rule is likely to be satisfied substantially by reductions in the deficit-to-GDP ratio

What We Find

- Expected GDP loss in 2050 is more than 1% compared to NABO's baseline projection
- The GDP loss can be mitigated by the fiscal authority's more active stance against the debt-to-GDP ratio
  - this, however, comes with a cost of higher macro volatility

The Model

THE MODEL: SUMMARY

- A medium-scale DSGE model augmented with the foreign sector
  - Christiano et al. (2005) and Smets and Wouters (2007)
  - incomplete pass-through [Adolfson et al. (2007)]
- Shocks + “Frictions”
- Monetary & fiscal policy

THE MODEL: SUMMARY

"Frictions"

1. Preferences
   - habit in consumption
2. Technology
   - adjustment costs in investment
   - capacity utilization
3. Market structure: Imperfect competition
   - monopolistic competition in products and labor markets
   - price and wage stickiness

MONETARY POLICY

MP obeys a Taylor-type rule

$$\hat{R}_t = \rho_r \hat{R}_{t-1} + (1-\rho_r)\left(\phi_\pi \hat{\pi}_t + \phi_y \hat{Y}_t\right) + \sigma_m \epsilon_t^m$$

where $\epsilon_t^m \sim N(0,1)$

- Nominal interest rate is set in response to fluctuations in output (Y_t) and inflation (π_t)

FISCAL POLICY

- Government budget constraint:

$$B_t + \tau_t^K R_t^K K_{t-1} + \tau_t^L W_t L_t + \tau_t^C C_t = R_{t-1} B_{t-1} + G_t + Z_t$$

  where

  - B_t: one-period nominal bonds
  - R_t^K: gross nominal rate of return from capital
  - τ_t^K, τ_t^L, τ_t^C: tax rates on capital income, labor income, consumption
  - G_t, Z_t: government spending and transfers

  - gov't spending and transfers are financed by proportional taxes levied against consumption, labor income, and capital returns, and by issuing one-period nominal debt

FISCAL POLICY

- FP specification:

$$\hat{G}_t = \rho_G \hat{G}_{t-1} - (1-\rho_G)\left(\varphi_G \hat{Y}_t + \gamma_G \hat{s}^b_{t-4}\right) + \sigma_G \epsilon^G_t$$

$$\hat{\tau}^K_t = \rho_K \hat{\tau}^K_{t-1} + (1-\rho_K)\left(\varphi_K \hat{Y}_t + \gamma_K \hat{s}^b_{t-4}\right) + \sigma_K \epsilon^K_t$$

$$\hat{\tau}^L_t = \rho_L \hat{\tau}^L_{t-1} + (1-\rho_L)\left(\varphi_L \hat{Y}_t + \gamma_L \hat{s}^b_{t-4}\right) + \sigma_L \epsilon^L_t$$

$$\hat{\tau}^C_t = \rho_C \hat{\tau}^C_{t-1} + (1-\rho_C)\left(\varphi_C \hat{Y}_t + \gamma_C \hat{s}^b_{t-4}\right) + \sigma_C \epsilon^C_t$$

$$\hat{Z}_t = \rho_Z \hat{Z}_{t-1} - (1-\rho_Z)\left(\varphi_Z \hat{Y}_t + \gamma_Z \hat{s}^b_{t-4}\right) + \sigma_Z \epsilon^Z_t$$

where

- $s^b_{t-4} \equiv B_{t-4}/Y_{t-4}$ (four-period lagged debt-to-GDP ratio)
- $\epsilon^X_t \sim N(0,1)$ where $X = \{G, K, L, C, Z\}$
- φ's are the automatic stabilizers and γ's capture the fiscal instruments' reaction to the 4-quarter lagged debt/GDP

EXOGENOUS DISTURBANCES

13 exogenous shocks:

- Tastes & technology: AR(1)
  - stationary technology / investment-specific / preference / risk-premium
- Policy: *i.i.d.*
  - MP disturbance / five FP disturbances
- Foreign: AR(1)
  - output / inflation rate / interest rate

Data and Estimation

DATA

- Observable variables, domestic
  1. GDP
  2. consumption
  3. investment
  4. CPI inflation (YoY)
  5. nominal interest rate
  6. consumption tax revenue (tax on G&S)
  7. labor tax revenue (income tax + social security + property tax/2)
  8. capital tax revenue (corporate tax + property tax/2)
  9. government spending (gov't consumption + investment)
  10. transfers

DATA

- Observable variables, foreign
  11. GDP
  12. CPI inflation
  13. nominal interest rate
      - foreign variables use US time series
- Quarterly data from 2000:Q1 to 2019:Q4
  - domestic fiscal variables are seasonally adjusted
  - detrend the logarithm of each time series with its own quadratic time trend, except for the inflation and interest rate variables

ESTIMATION: BAYESIAN INFERENCE

- Priors for the non-policy parameters are similar to Smets and Wouters (2007), Justiniano and Preston (2010), Leeper et al. (2017)
- Other parameters fixed at well-established values (e.g., $\beta = 0.99$, $\alpha = 0.4$, $\delta = 0.025$)
- Prior for the parameters in the fiscal policy specification are drawn from Hur and Rhee (2020)
  - priors for φ's and γ's follow a gamma distribution with a mean of 0.5 and a standard deviation of 0.3
- Random-walk MH, 30,000 final draws from posteriors

Estimation Results

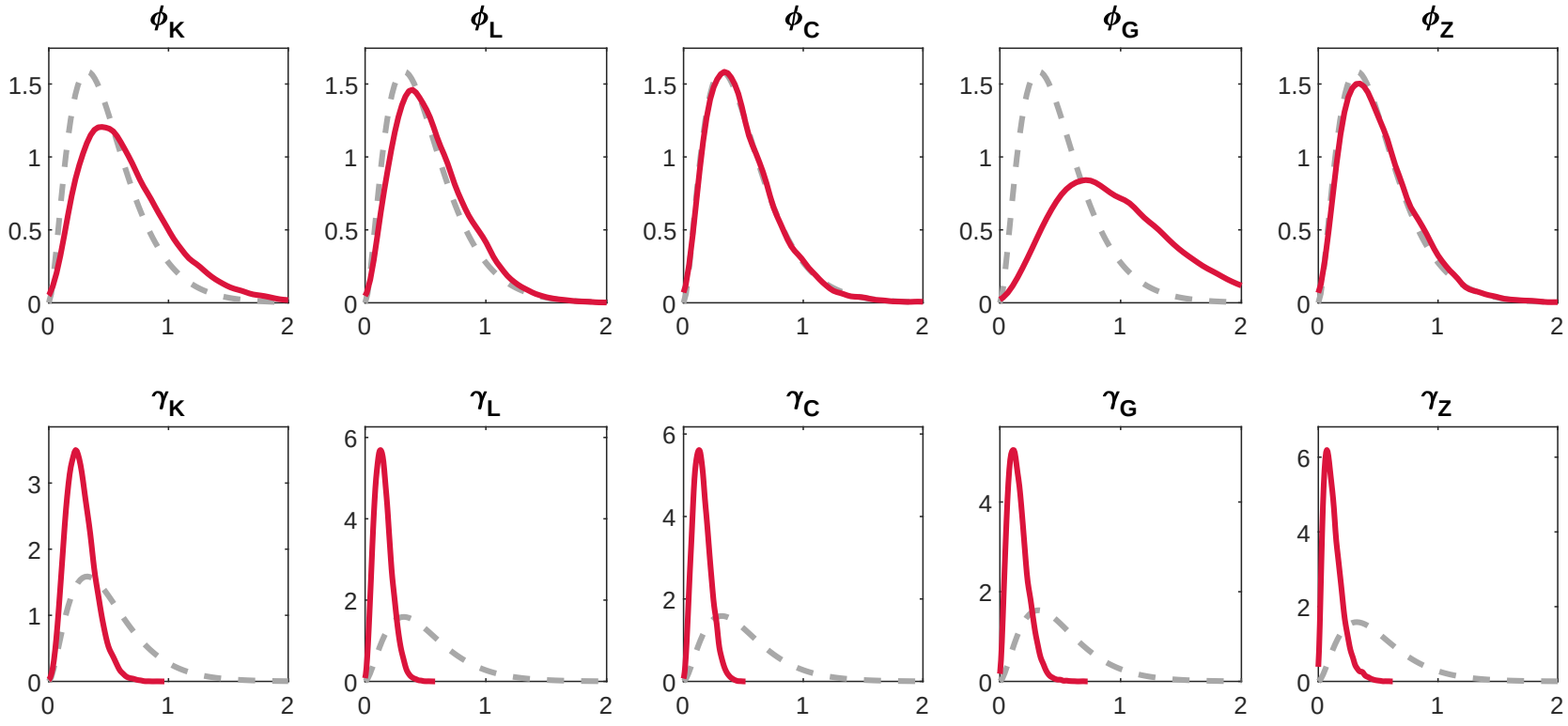
PARAMETER ESTIMATES

Parameter		Prior				Posterior	
		Fnc.	Mean	Std.	[5%, 95%]	Mean	[5%, 95%]
Preference							
θ	Habit formation in consumption	B	0.7	0.1	[0.52, 0.85]	0.76	[0.63, 0.86]
Frictions							
ω_w	Wage stickiness	B	0.5	0.1	[0.34, 0.66]	0.63	[0.50, 0.76]
ω_p	Price stickiness	B	0.5	0.1	[0.34, 0.66]	0.65	[0.55, 0.73]
ψ	Capital utilization	B	0.6	0.15	[0.35, 0.85]	0.86	[0.76, 0.94]
κ_i	Investment adjustment cost	N	6	1.5	[3.5, 8.5]	6.87	[4.36, 9.51]
Monetary Policy							
ρ_r	Lagged interest rate response	B	0.5	0.2	[0.17, 0.83]	0.97	[0.96, 0.98]
ϕ_π	Interest rate response to inflation	G	1.5	0.3	[1.04, 2.03]	1.01	[0.91, 1.26]
ϕ_y	Interest rate response to output	G	0.25	0.13	[0.08, 0.49]	0.90	[0.52, 1.37]

PARAMETER ESTIMATES

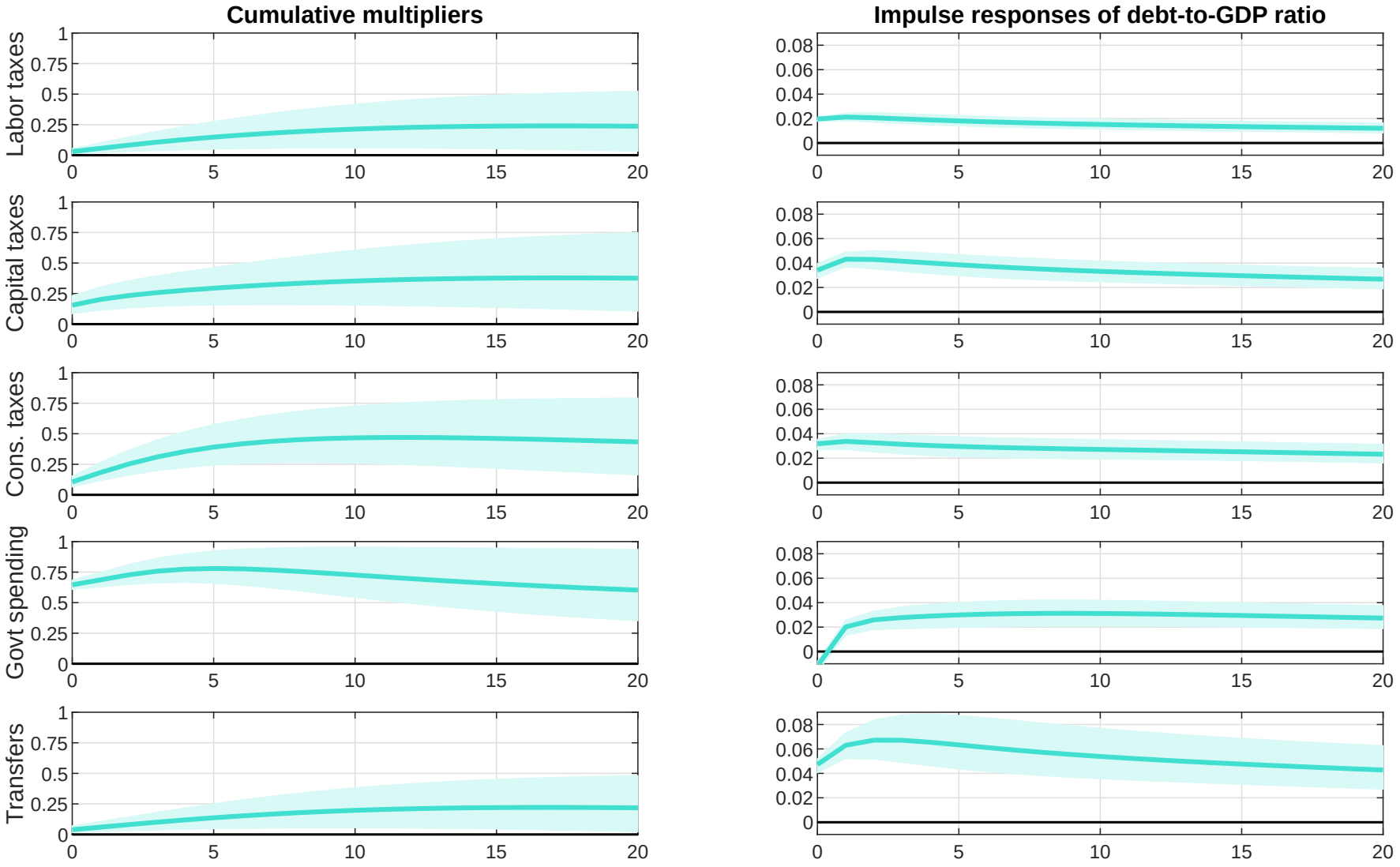
Parameter		Prior				Posterior	
		Fnc.	Mean	Std.	[5%, 95%]	Mean	[5%, 95%]
Fiscal Policy							
φ_K	Capital tax response to output	G	0.5	0.3	[0.13, 1.07]	0.65	[0.13, 1.56]
φ_L	Labor tax response to output	G	0.5	0.3	[0.13, 1.07]	0.56	[0.12, 1.26]
φ_C	Consumption tax response to output	G	0.5	0.3	[0.13, 1.07]	0.50	[0.10, 1.22]
φ_G	Gov't spending response to output	G	0.5	0.3	[0.13, 1.07]	0.97	[0.21, 2.14]
φ_Z	Transfers response to output	G	0.5	0.3	[0.13, 1.07]	0.52	[0.10, 1.25]
γ_K	Capital tax response to debt/GDP	G	0.5	0.3	[0.13, 1.07]	0.27	[0.08, 0.54]
γ_L	Labor tax response to debt/GDP	G	0.5	0.3	[0.13, 1.07]	0.15	[0.04, 0.31]
γ_C	Consumption tax response to debt/GDP	G	0.5	0.3	[0.13, 1.07]	0.15	[0.04, 0.31]
γ_G	Gov't spending response to debt/GDP	G	0.5	0.3	[0.13, 1.07]	0.15	[0.03, 0.35]
γ_Z	Transfers response to debt/GDP	G	0.5	0.3	[0.13, 1.07]	0.12	[0.02, 0.33]

Parameter Estimates for FP



Dashed: Prior; Solid: Posterior

Model-implied Fiscal Consequences



Solid: Median; Shaded: [5%, 95%]

Macroeconomic Consequences of the New Fiscal Rule

ANNUALIZATION OF THE MODEL

- Frequency mismatch between the NABO's projections (annual) and estimated model (quarterly)
- Annualize the model as follows:
  - converting some of the model's parameters into their annual counterparts $\Longrightarrow \beta = 0.96$ and $\delta = 0.1$
  - steady-state fiscal variables use their annualized end-year (2019) values to be suitable for the projection purpose
    - G/Y share of 0.059
    - average effective tax rates of 0.058 (labor), 0.191 (capital) and 0.010 (consumption)
  - set the steady state debt-to-GDP ratio to be 60% in order to be consistent with one of the criteria for the new fiscal rule

ANNUALIZATION OF THE MODEL

- The fiscal rule specification is also modified as:

$$\hat{G}_t = \rho_G \hat{G}_{t-1} - (1-\rho_G)\left(\varphi_G \hat{Y}_t + \gamma_G \hat{s}^b_{t-1}\right) + \sigma_G \epsilon^G_t \quad (1)$$

$$\hat{\tau}^K_t = \rho_K \hat{\tau}^K_{t-1} + (1-\rho_K)\left(\varphi_K \hat{Y}_t + \gamma_K \hat{s}^b_{t-1}\right) + \sigma_K \epsilon^K_t \quad (2)$$

$$\hat{\tau}^L_t = \rho_L \hat{\tau}^L_{t-1} + (1-\rho_L)\left(\varphi_L \hat{Y}_t + \gamma_L \hat{s}^b_{t-1}\right) + \sigma_L \epsilon^L_t \quad (3)$$

$$\hat{\tau}^C_t = \rho_C \hat{\tau}^C_{t-1} + (1-\rho_C)\left(\varphi_C \hat{Y}_t + \gamma_C \hat{s}^b_{t-1}\right) + \sigma_C \epsilon^C_t \quad (4)$$

$$\hat{Z}_t = \rho_Z \hat{Z}_{t-1} - (1-\rho_Z)\left(\varphi_Z \hat{Y}_t + \gamma_Z \hat{s}^b_{t-1}\right) + \sigma_Z \epsilon^Z_t \quad (5)$$

where the time unit is one year now

- The subsequent empirical results are evaluated at the mean of the posterior parameter estimates

ENFORCING THE NEW FISCAL RULE

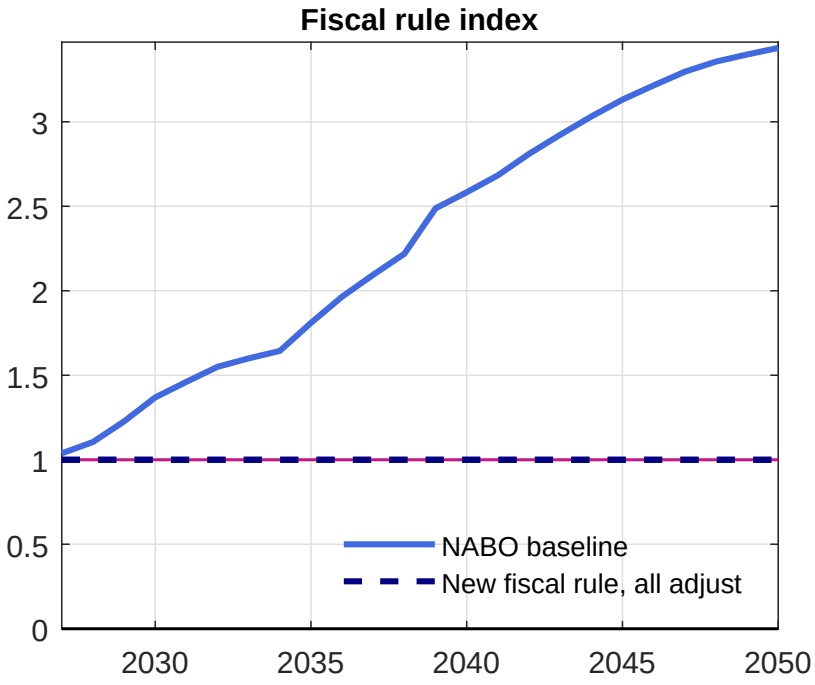
- Calculate minimum required fiscal adjustments to meet the new fiscal rule, for the period 2027-2050
  - search for sequences of ϵ^X's that bring down the fiscal rule index to one
- In doing so, consider three fiscal adjustment scenarios
  - in DSGE models, each fiscal instrument has its distinct impacts on GDP and gov't debt [Leeper et al. (2010); Zubairy (2014)]

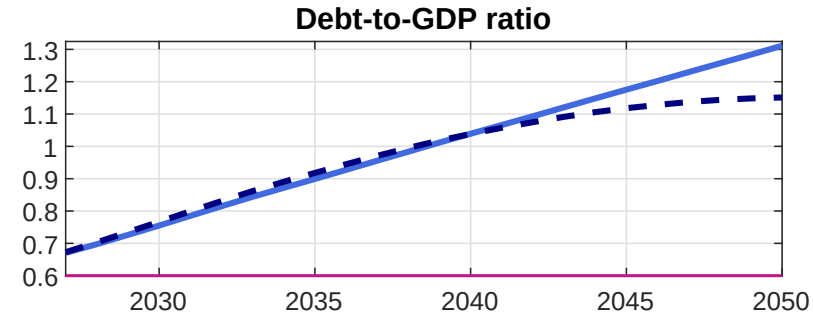
(S1) all the fiscal instruments adjust ($X = \{G, K, L, C, Z\}$)

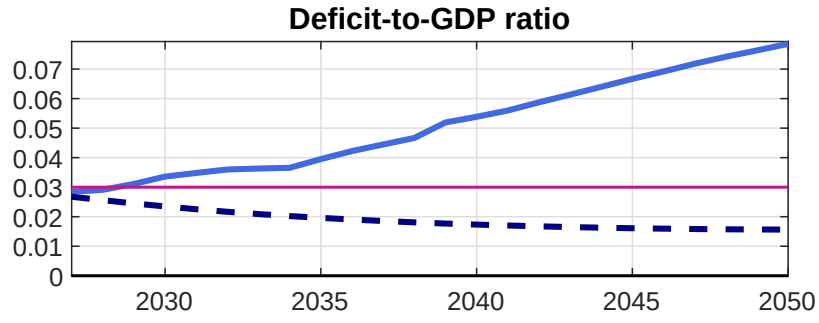
(S2) only taxes adjust ($X = \{K, L, C\}$)

(S3) only government outlays adjust ($X = \{G, Z\}$)

PROJECTIONS WITH THE NEW FISCAL RULE



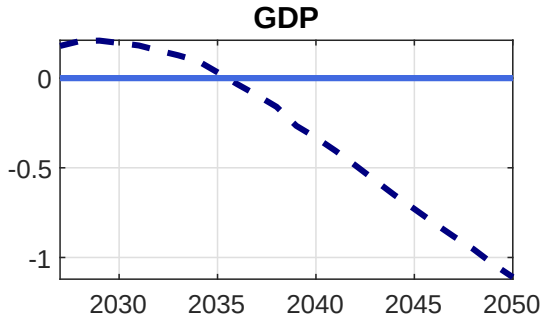


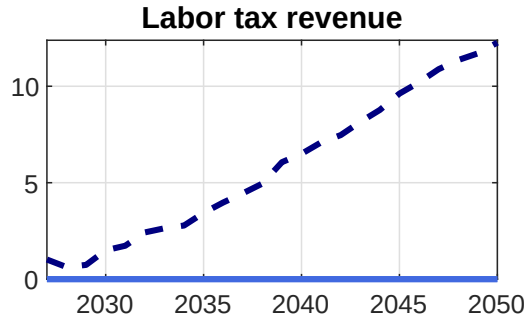


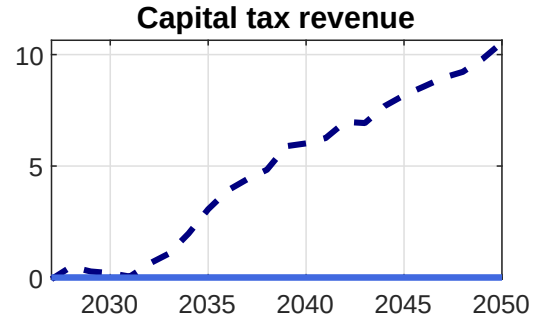
Solid: NABO baseline; Dashed: Model-implied (S1)

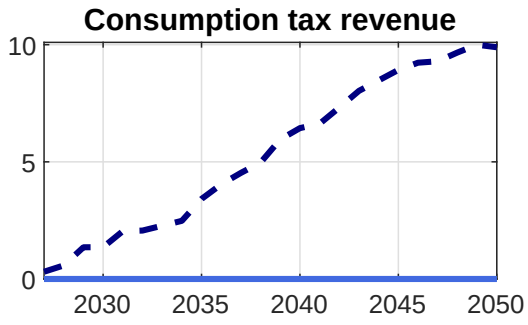
PROJECTIONS WITH THE NEW FISCAL RULE

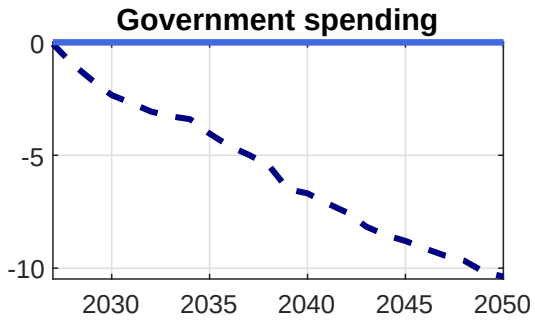
Percentage deviations from the NABO baseline projections

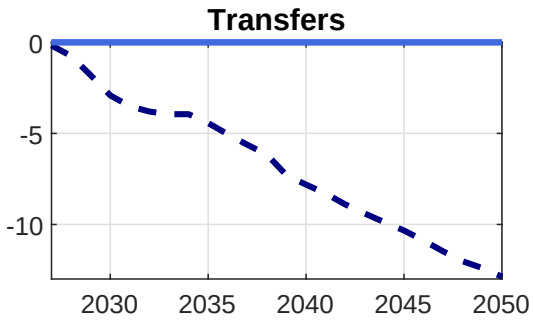


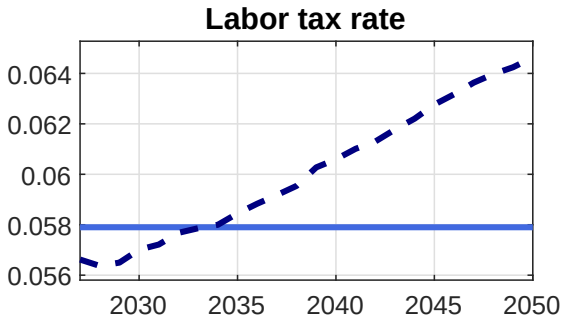


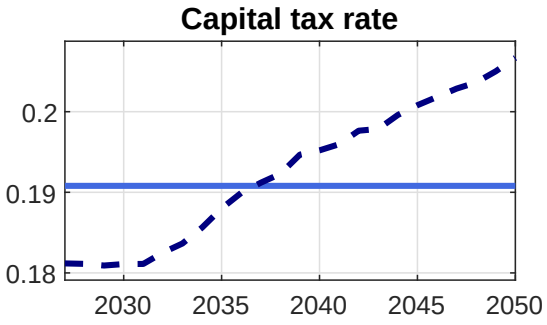


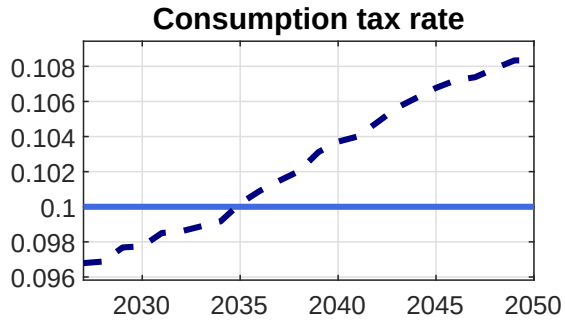








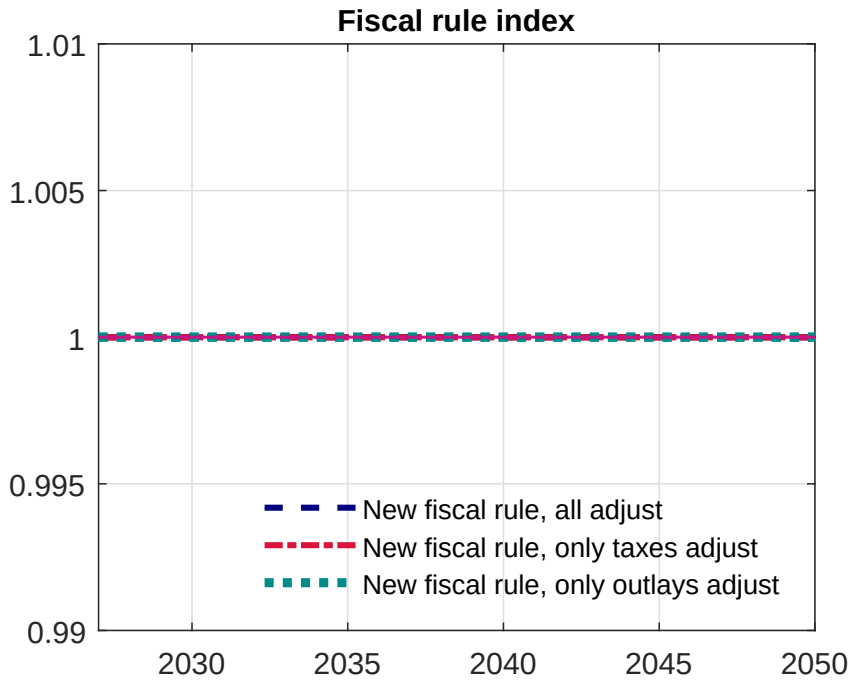


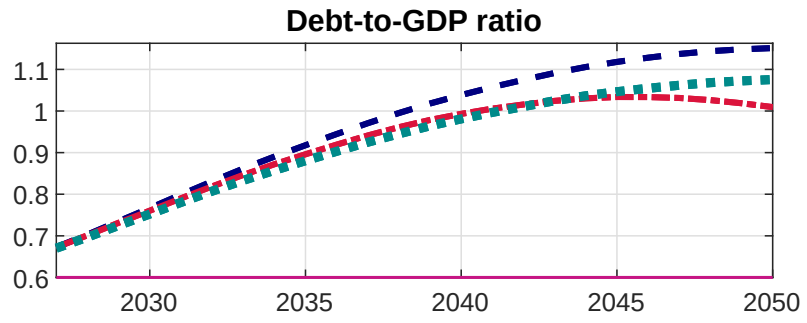


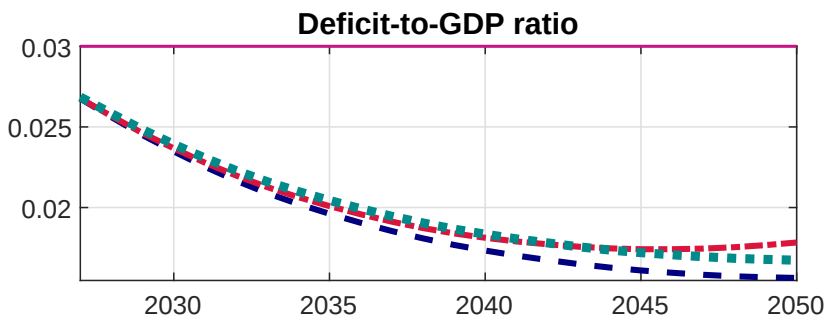
PROJECTIONS WITH THE NEW FISCAL RULE

- Imposing the new fiscal rule tends to be expansionary in the short run
  - the fiscal rule index changes not only due to fluctuations in debt and deficit, but also due to business cycles
  - there exists two opposite directions of changes in the tax rates that suppresses the fiscal rule index
    1. tax rates $\uparrow \Rightarrow$ tax revenues $\uparrow \Rightarrow$ debt & deficit $\downarrow \Rightarrow$ index $\downarrow$
    2. tax rates $\downarrow \Rightarrow$ GDP $\uparrow \Rightarrow$ index $\downarrow$
  - our results suggest that the second effect dominates when the fiscal rule index is slightly above its target of one
- This feature is rather short-lived as the tax rates are expected to exceed the current level after the mid-2030s
  - together with the lower gov't outlays, more than 1% of GDP loss is anticipated in 2050

PROJECTIONS WITH THE NEW FISCAL RULE





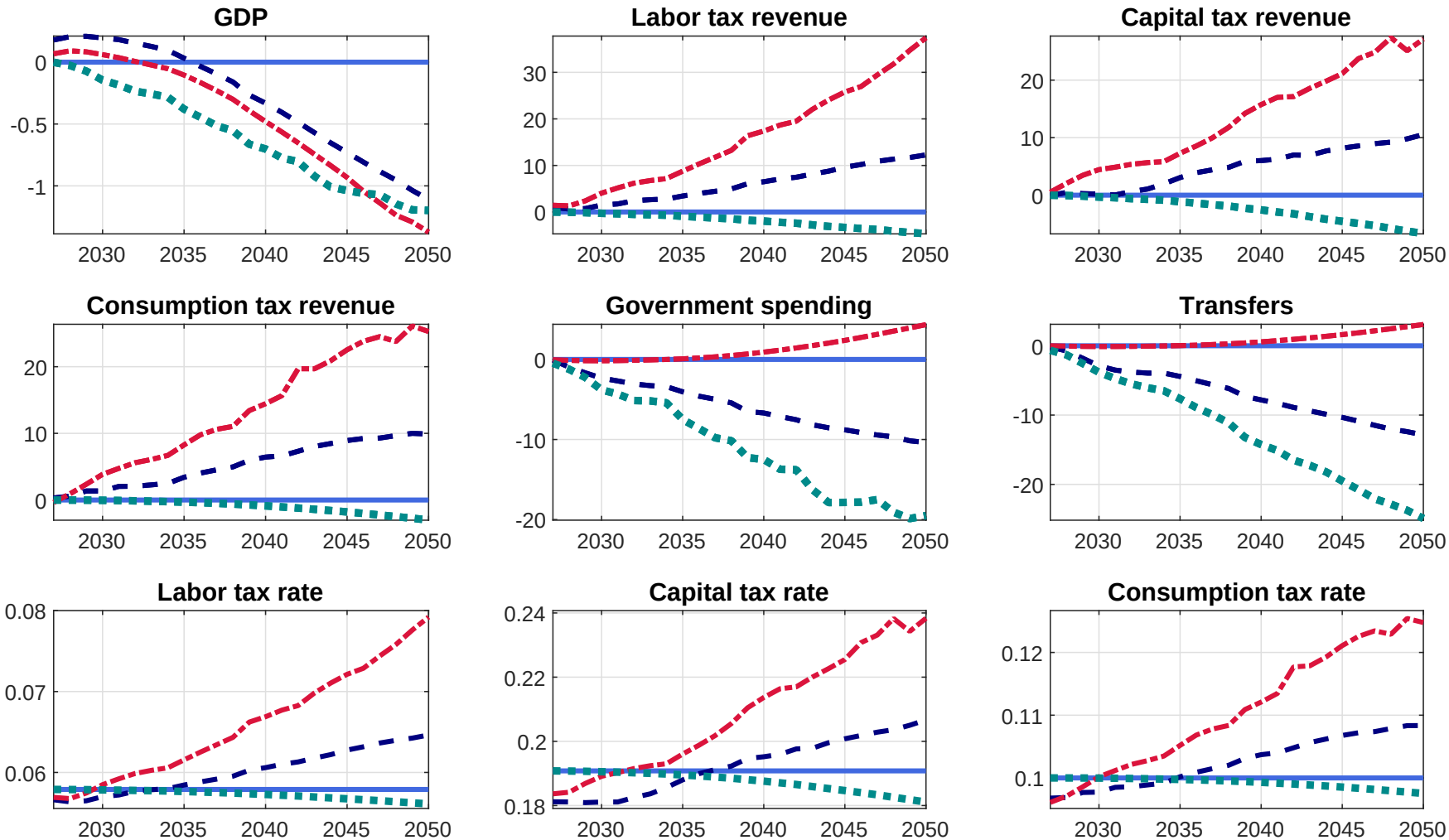


Dashed: All adjust (S1); Dash-dot: Only taxes adjust (S2)

Dotted: Only outlays adjust (S3)

PROJECTIONS WITH THE NEW FISCAL RULE

Percentage deviations from the NABO baseline projections



Dashed: All adjust (S1); Dash-dot: Only taxes adjust (S2)

Dotted: Only outlays adjust (S3)

PROJECTIONS WITH THE NEW FISCAL RULE

Variable	NABO projection		Model-implied projection as of 2050		
	2020	2050	All instruments	Taxes only	Outlays only
GDP	37,219	60,026 (61%)	59,360 (59%)	59,201 (59%)	59,307 (59%)
Debt-to-GDP ratio	44.5%	131.1%	115.1%	100.9%	107.6%
Labor tax revenue	3,592	6,214 (73%)	6,976 (94%)	8,539 (138%)	
Capital tax revenue	1,929	3,527 (83%)	3,898 (102%)	4,483 (132%)	
Consumption tax revenue	2,368	3,919 (66%)	4,306 (82%)	4,910 (107%)	
Government spending	3,124	3,972 (27%)	3,560 (14%)		3,197 (2%)
Transfers	6,902	14,402 (109%)	12,548 (82%)		10,813 (57%)
Labor tax rate	5.8%		6.5%	7.9%	
Capital tax rate	19.1%		20.7%	23.8%	
Consumption tax rate	10%		10.8%	12.5%	

NABO actual and model-implied projections of GDP and the fiscal objectives in 2020 and 2050. Real per capita values, measured in thousand Korean wons, are reported for the level variables. The numbers in the parenthesis are the growth rates of each variable from its 2020 value.

ALTERNATIVE FP STANCE TO DEBT/GDP

- The primary motivation of launching the new fiscal rule is to manage the debt-GDP ratio in a sustainable manner
  - this agenda can be mapped into higher degrees of the fiscal authority's responsiveness to the debt-to-GDP ratio
- To explore this issue, the fiscal policy specification is modified as follows:

$$\hat{G}_t = \rho_G \hat{G}_{t-1} - (1-\rho_G)\left(\varphi_G \hat{Y}_t + \mu\gamma_G \hat{s}^b_{t-1}\right) + \sigma_G \epsilon^G_t \tag{6}$$

$$\hat{\tau}^K_t = \rho_K \hat{\tau}^K_{t-1} + (1-\rho_K)\left(\varphi_K \hat{Y}_t + \mu\gamma_K \hat{s}^b_{t-1}\right) + \sigma_K \epsilon^K_t \tag{7}$$

$$\hat{\tau}^L_t = \rho_L \hat{\tau}^L_{t-1} + (1-\rho_L)\left(\varphi_L \hat{Y}_t + \mu\gamma_L \hat{s}^b_{t-1}\right) + \sigma_L \epsilon^L_t \tag{8}$$

$$\hat{\tau}^C_t = \rho_C \hat{\tau}^C_{t-1} + (1-\rho_C)\left(\varphi_C \hat{Y}_t + \mu\gamma_C \hat{s}^b_{t-1}\right) + \sigma_C \epsilon^C_t \tag{9}$$

$$\hat{Z}_t = \rho_Z \hat{Z}_{t-1} - (1-\rho_Z)\left(\varphi_Z \hat{Y}_t + \mu\gamma_Z \hat{s}^b_{t-1}\right) + \sigma_Z \epsilon^Z_t \tag{10}$$

where $\mu \geq 1$

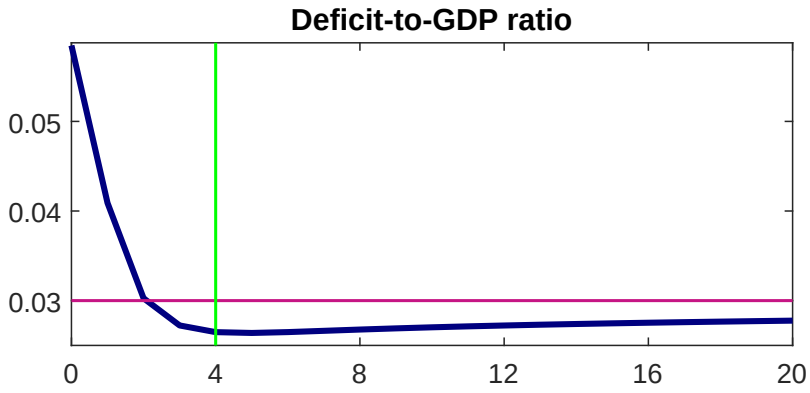
ALTERNATIVE FP STANCE TO DEBT/GDP

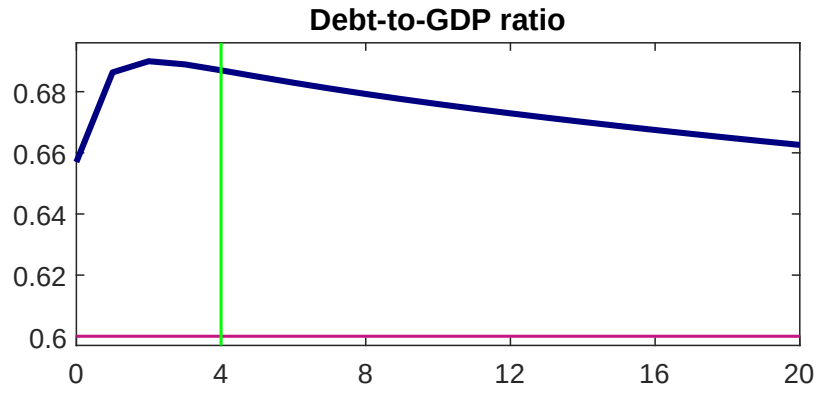
- Assess the implications of alternative scaling parameters
- Posit a scenario:
  - the economy is initially at a situation with the fiscal rule index of unity
  - but is perturbed by a one-time fiscal deficit shock causing a violation of the new fiscal rule for the subsequent period
- This scenario can be motivated by the exceptive clause for the new fiscal rule
  - the new fiscal rule is allowed to be violated temporarily in case of wars, disasters and global economic crises
  - however, the elevated level of the debt-GDP ratio due to these events should be cleared in four years

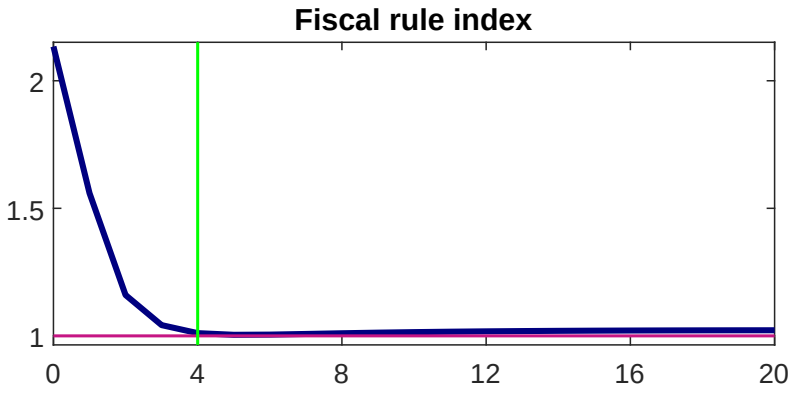
ALTERNATIVE FP STANCE TO DEBT/GDP

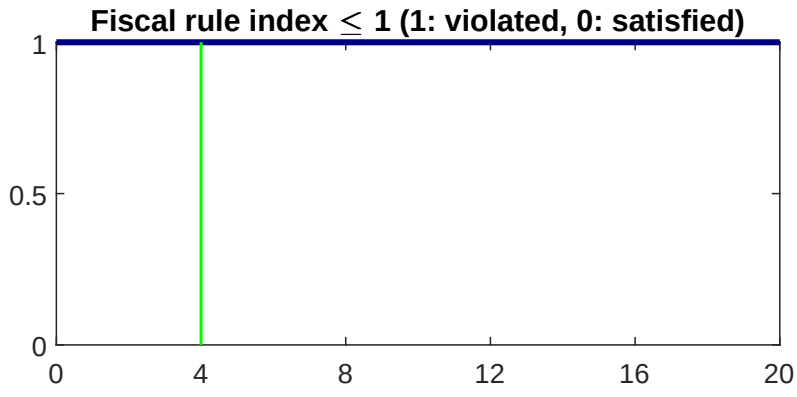
- Simulate a one-time fiscal deficit shock that matches the fiscal situation in response to an adverse economic event
  - the adverse event in particular considers the recent economic downturn caused by COVID-19
  - the debt-to-GDP rises by more than 6% during the sole year of 2020 in counteracting the pandemic
- In the model, a combination of expansionary fiscal shocks of three standard deviations mimics this situation
- Seek answers to the following two questions
  1. when $\mu = 1$, are fiscal adjustments following the one-time deficit shock completed in four years?
  2. if not, what is $\bar{\mu}$, the minimum value of μ satisfying such a criterion?

PROJECTIONS WITH THE NEW FISCAL RULE



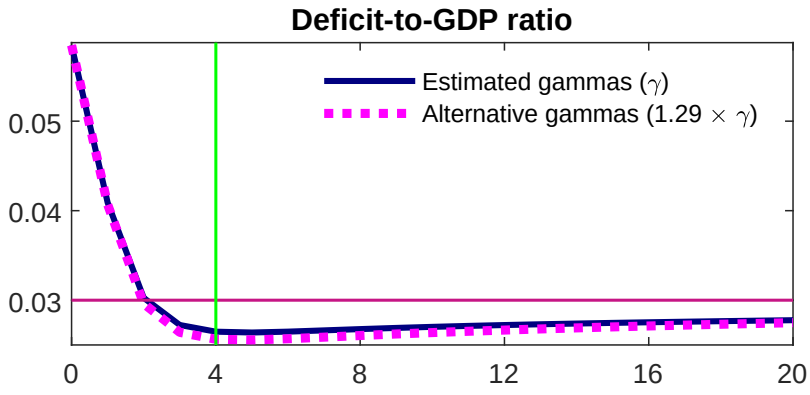


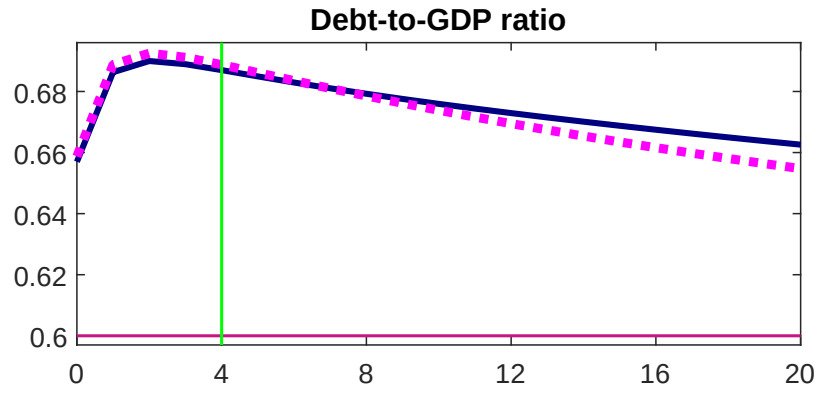


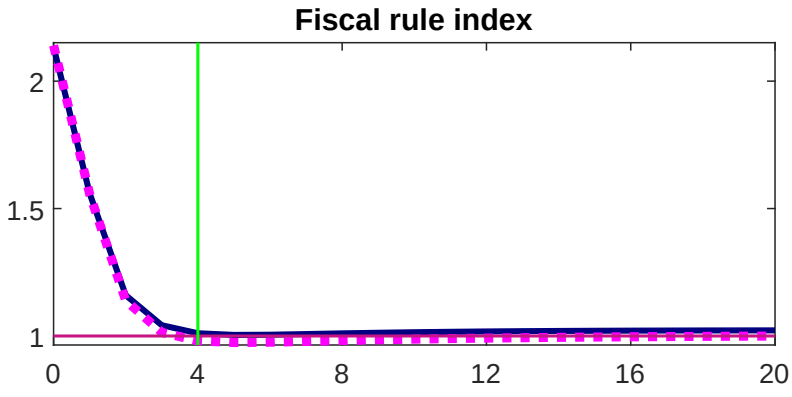


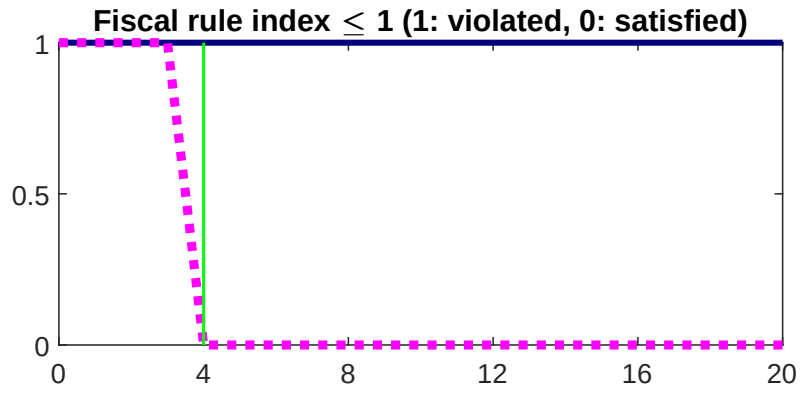
Solid: $\mu = 1$ (S1)

PROJECTIONS WITH THE NEW FISCAL RULE



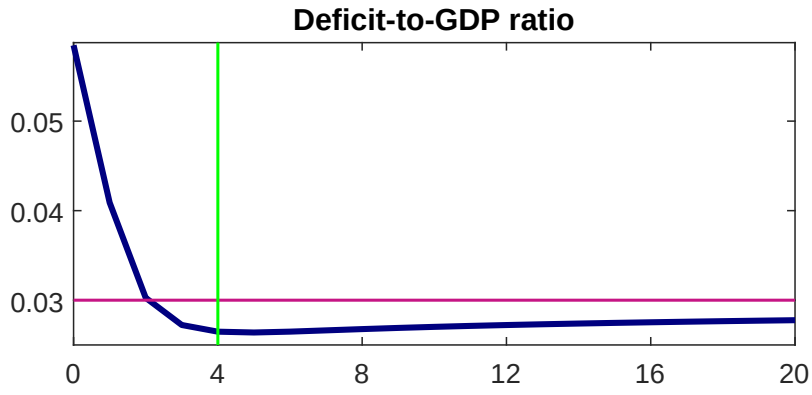


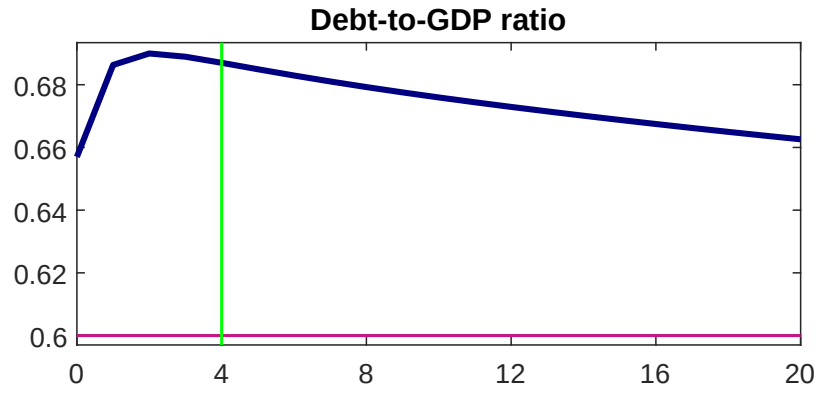


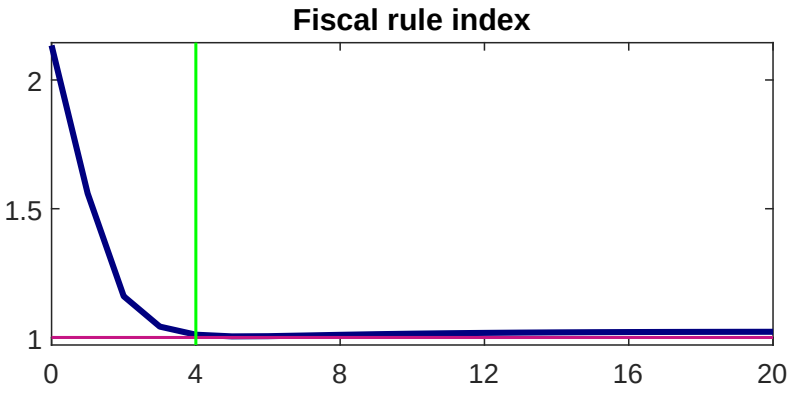


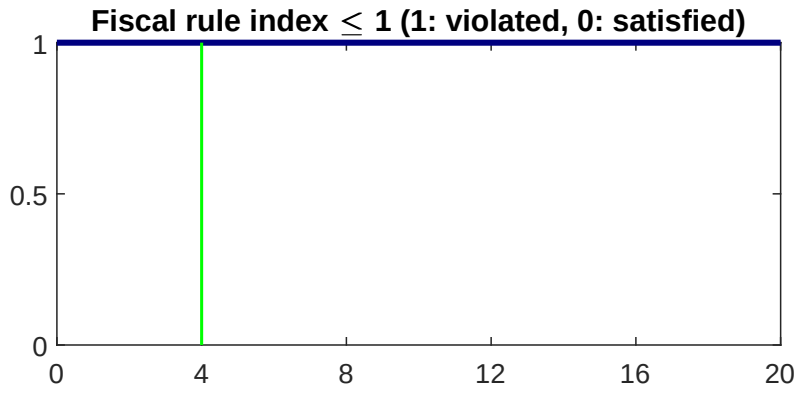
Solid: $\mu = 1$ (S1); Dashed: $\bar{\mu} = 1.29$ (S1)

PROJECTIONS WITH THE NEW FISCAL RULE



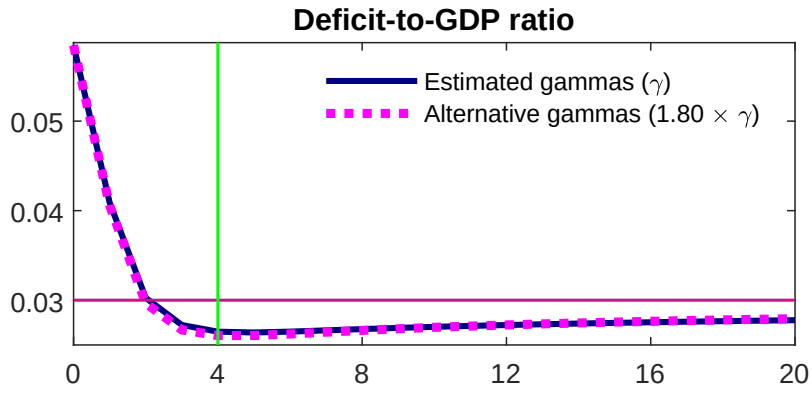


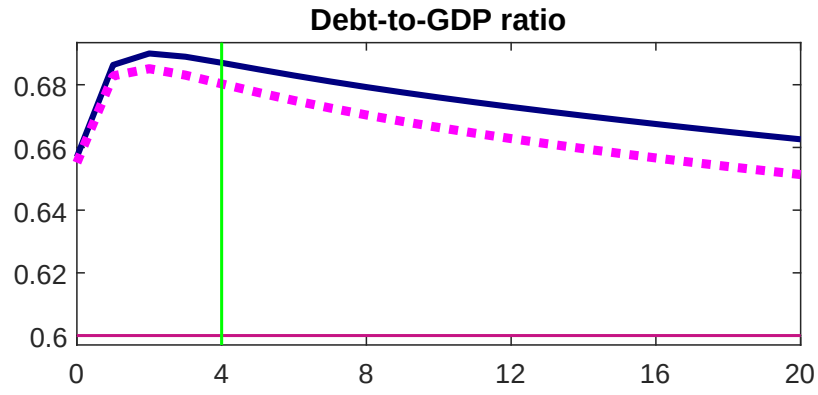


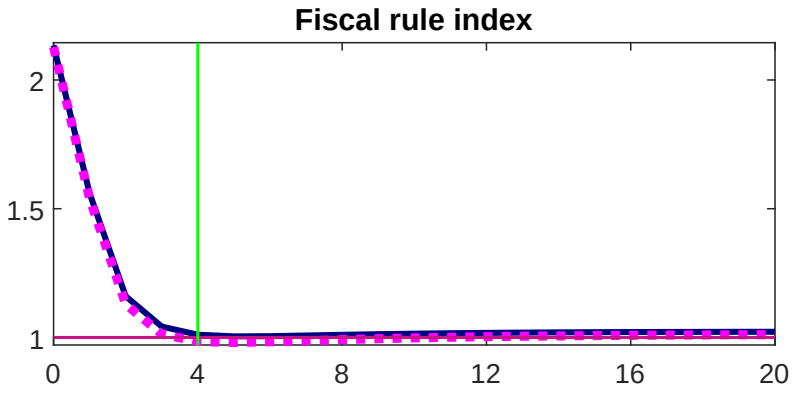


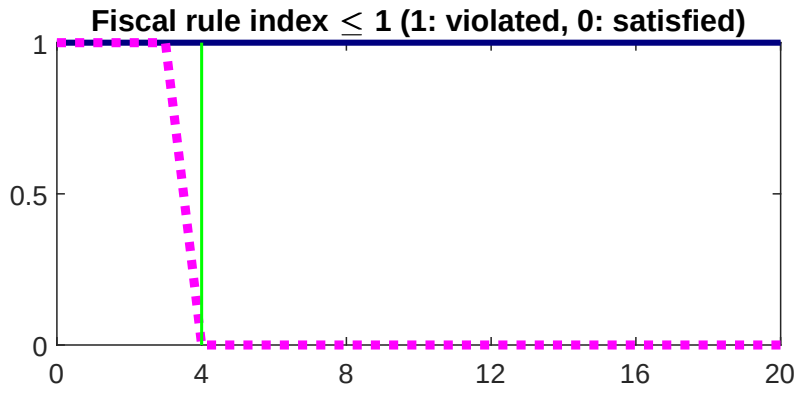
Solid: $\mu = 1$ (S2)

PROJECTIONS WITH THE NEW FISCAL RULE



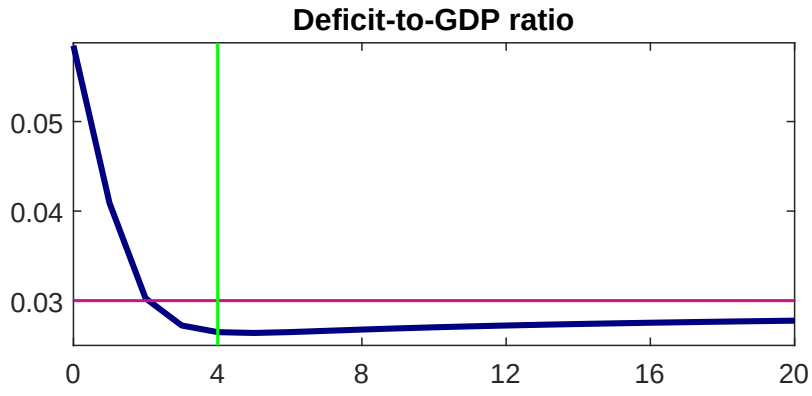


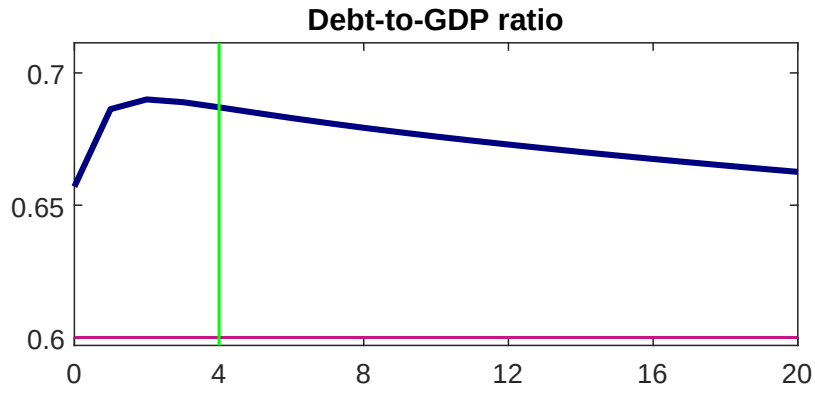


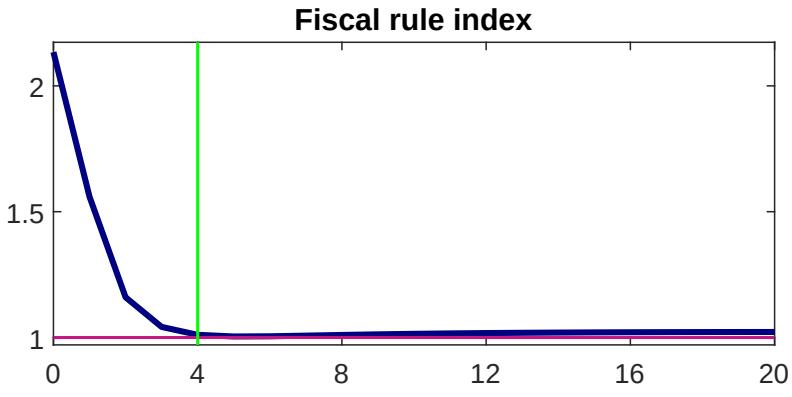


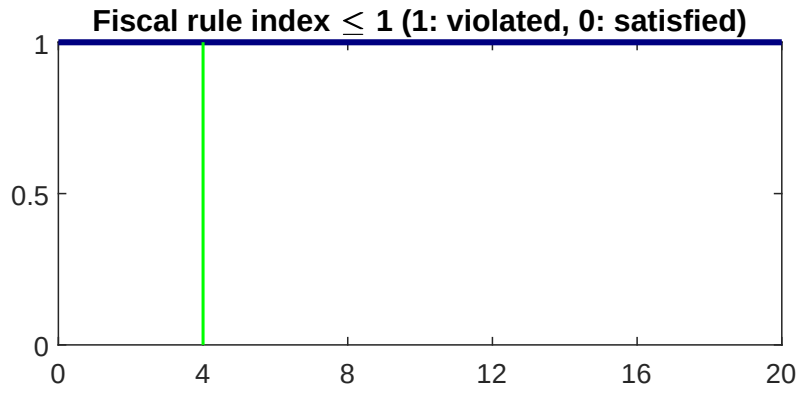
Solid: $\mu = 1$ (S2); Dashed: $\bar{\mu} = 1.80$ (S2)

PROJECTIONS WITH THE NEW FISCAL RULE



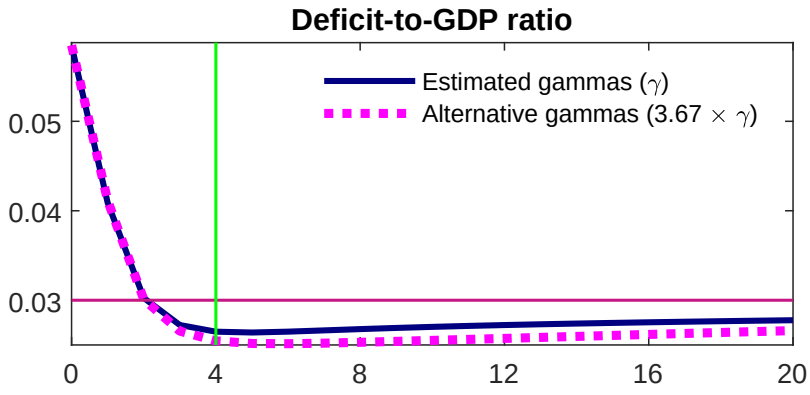


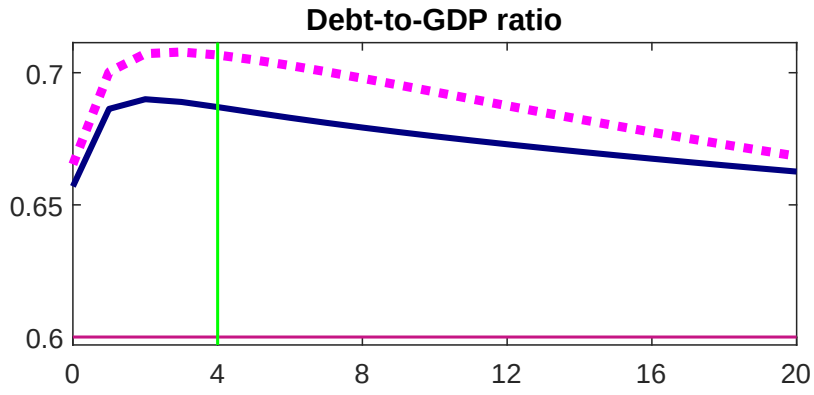


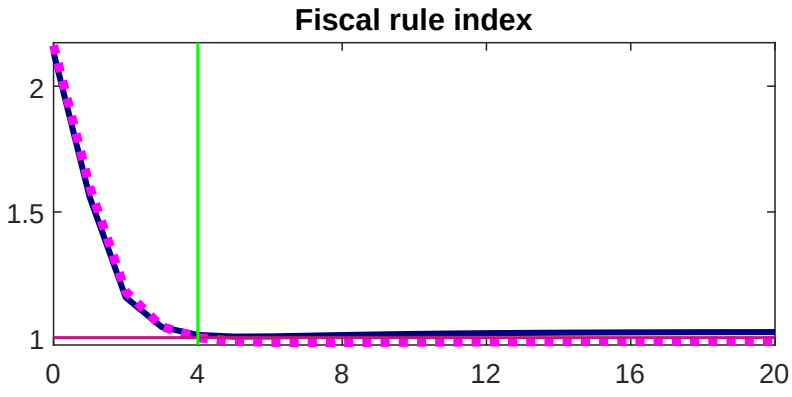


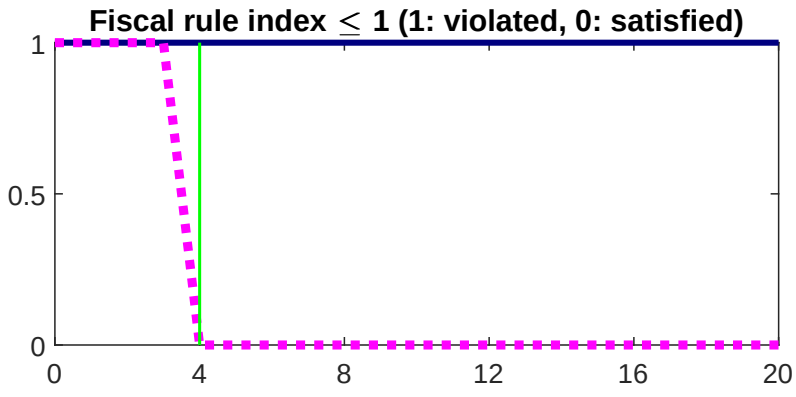
Solid: $\mu = 1$ (S3)

PROJECTIONS WITH THE NEW FISCAL RULE









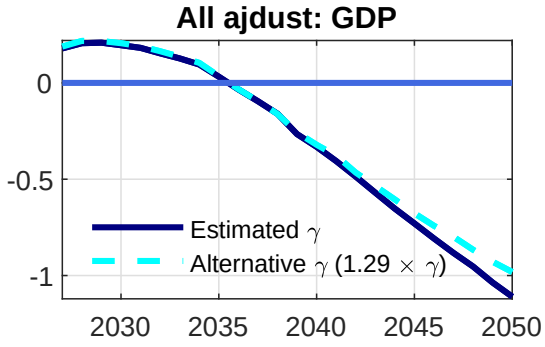
Solid: $\mu = 1$ (S3); Dashed: $\bar{\mu} = 3.67$ (S3)

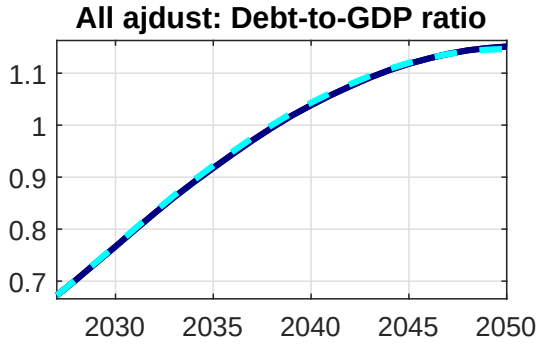
ENFORCING THE NEW FISCAL RULE WITH $\bar{\mu}$

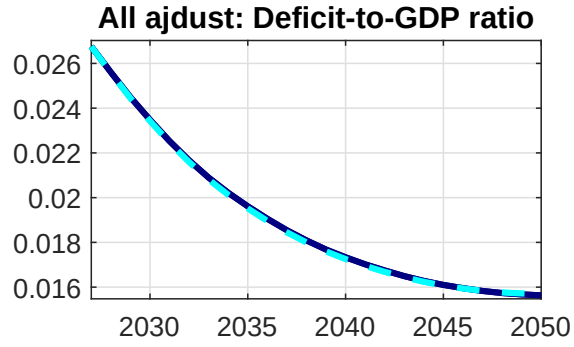
- Redo a search for sequences of ϵ^X's that reduce the fiscal rule index to one
  - but with $\bar{\mu}$ for each fiscal adjustment scenario
- How do the results change?

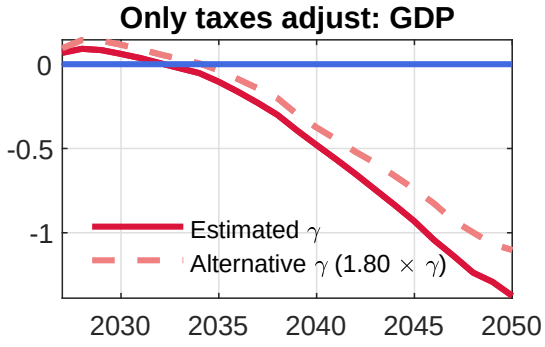
ENFORCING THE NEW FISCAL RULE WITH $\bar{\mu}$

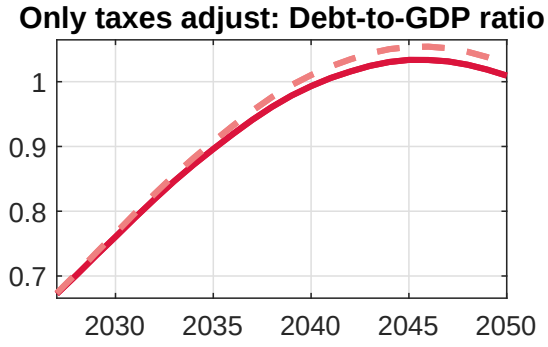
Percentage deviations from the NABO baseline projections

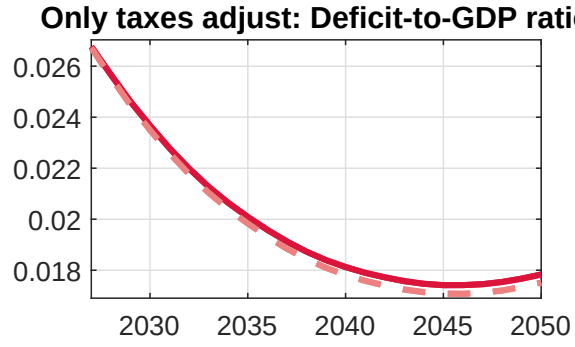


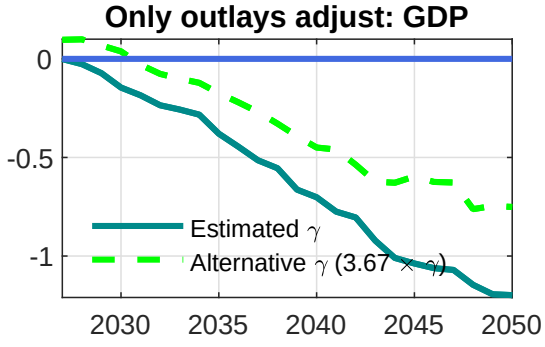


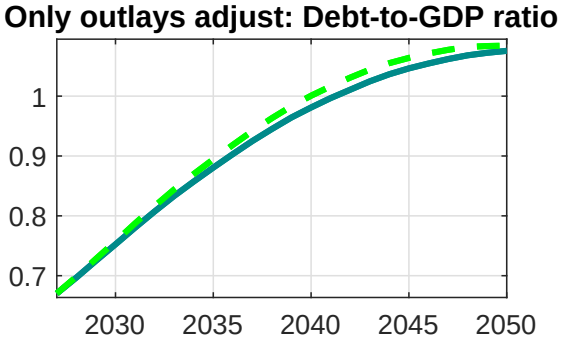


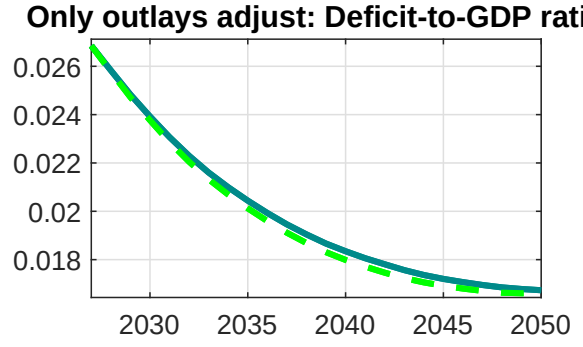








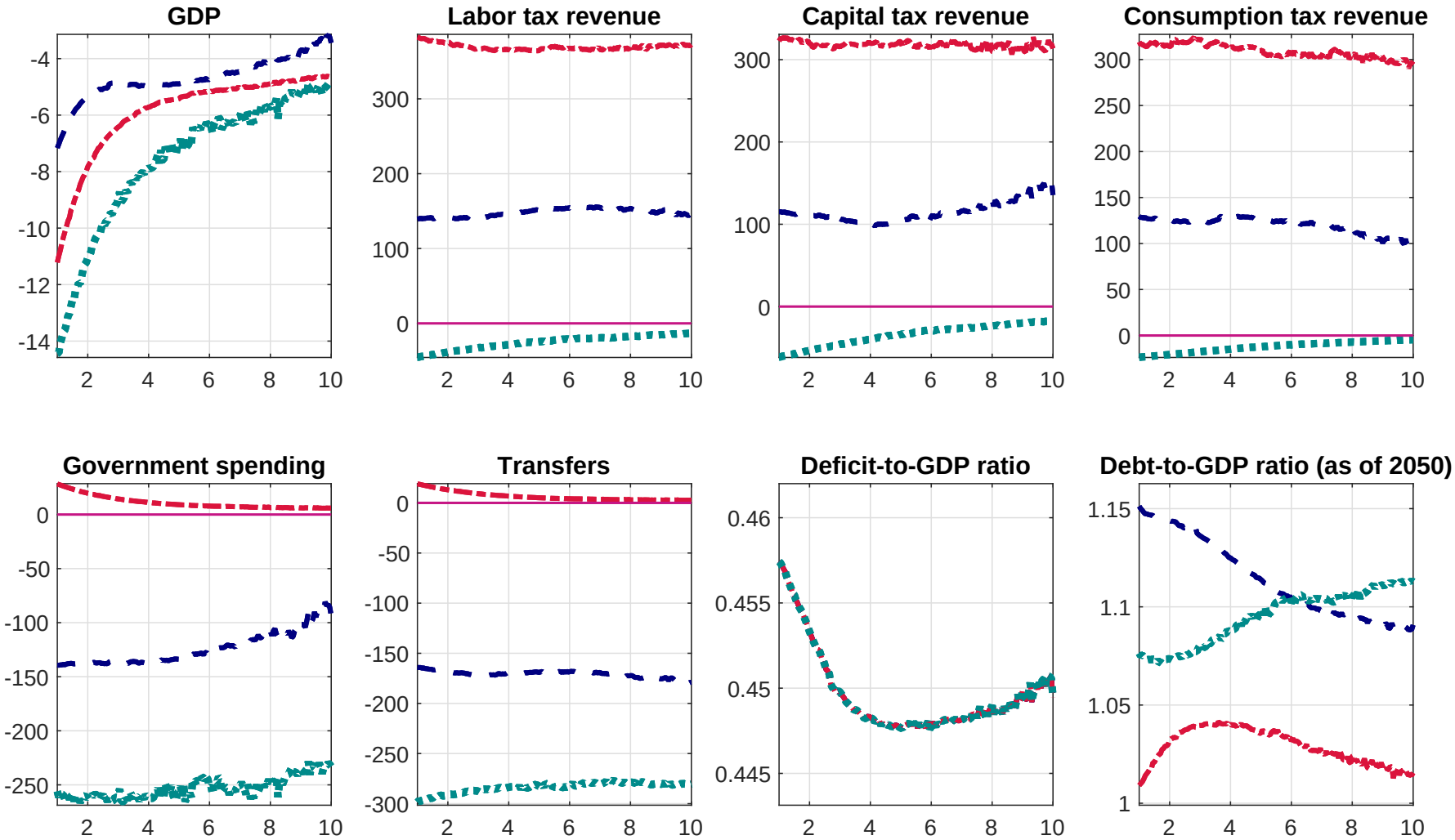




Solid: $\mu = 1$ (S1, S2, S3); Dashed: $\bar{\mu} > 1$ (S1, S2, S3)

BENEFITS OF HIGHER μ'S

Cumulative sum of percentage changes 2027-2050 w.r.t. $\mu \in [1, 10]$



Dashed: All adjust (S1); Dash-dot: Only taxes adjust (S2)

Dotted: Only outlays adjust (S3)

POTENTIAL COSTS OF HIGHER μ'S

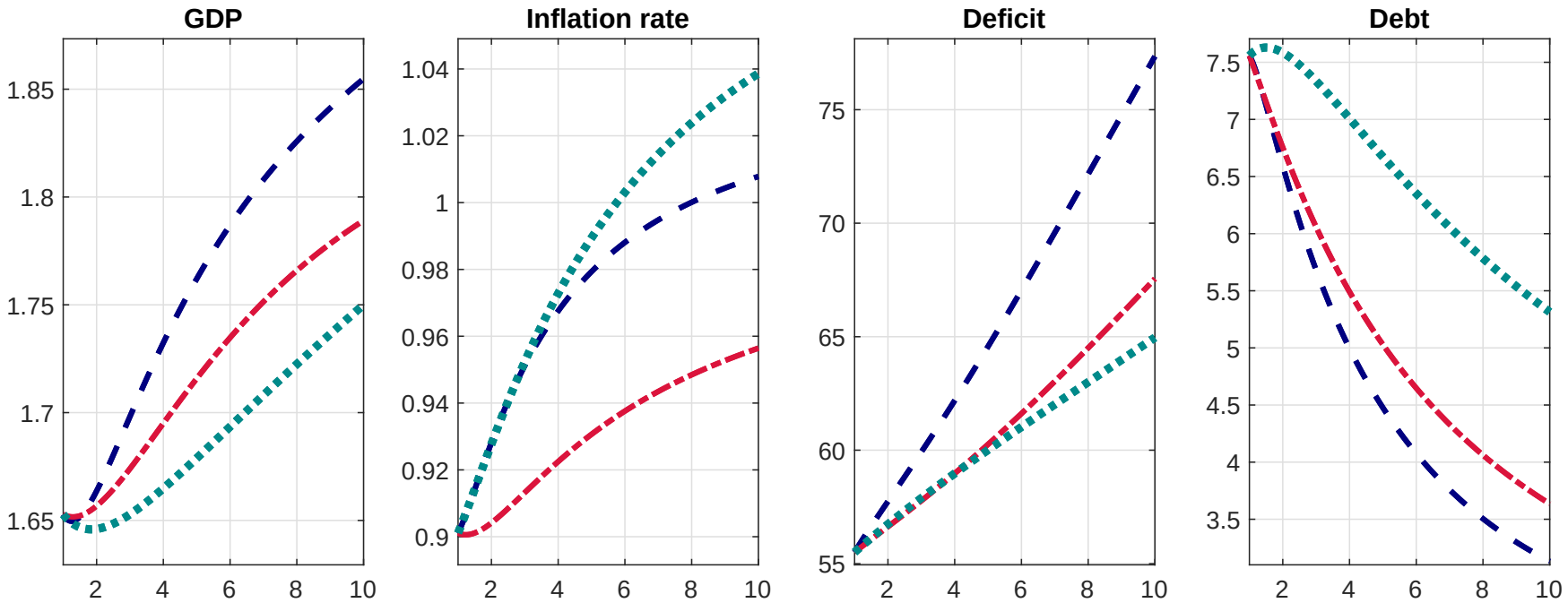
- In (1) through (5), the terms associated with φ's and γ's have opposite implications for business cycle volatility
  - the automatic stabilizers are designed to be countercyclical as they reduce macroeconomic volatility
  - fiscal instruments' reaction to the debt-GDP ratio makes FP more procyclical, increasing macroeconomic instability
    - because the debt-GDP ratio tends to be countercyclical
- This feature of FP may suggest its potential cost
  - as $\mu \uparrow$, a relatively more weight is given to the procyclical component of FP, which is likely to raise economic instability
- Consistent with the view that FP itself can be a source of macroeconomic volatility
  - e.g., Levinson (1998); Fatás and Mihov (2003, 2006)

POTENTIAL COSTS OF HIGHER μ'S

- Perform a simulation that demonstrates how the second moments of the key macro variables change as μ rises
  - calculate model-implied standard deviations by simulating random shocks for the model's 13 structural disturbances
- Assess welfare consequences of higher μ's
  - focus on the second moments of GDP and the inflation rate

Potential Costs of Higher μ's

Unconditional standard deviation w.r.t. $\mu \in [1, 10]$



Dashed: All adjust (S1); Dash-dot: Only taxes adjust (S2)

Dotted: Only outlays adjust (S3)