Government Debt and Interest Rates

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Overview

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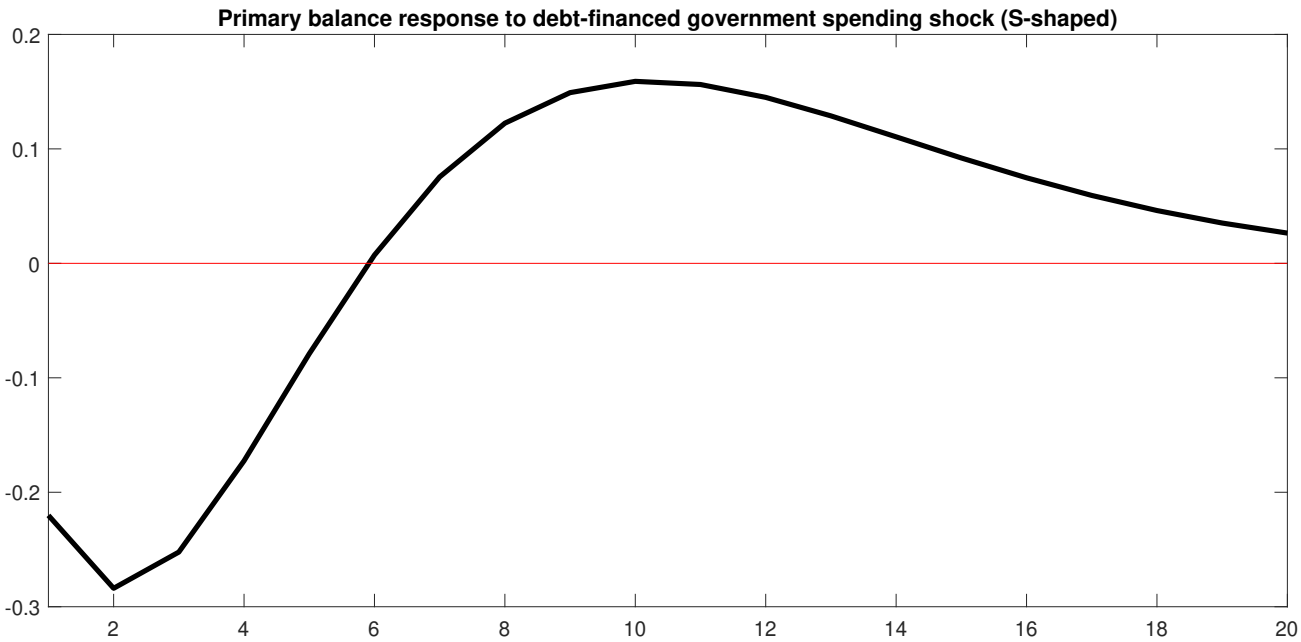
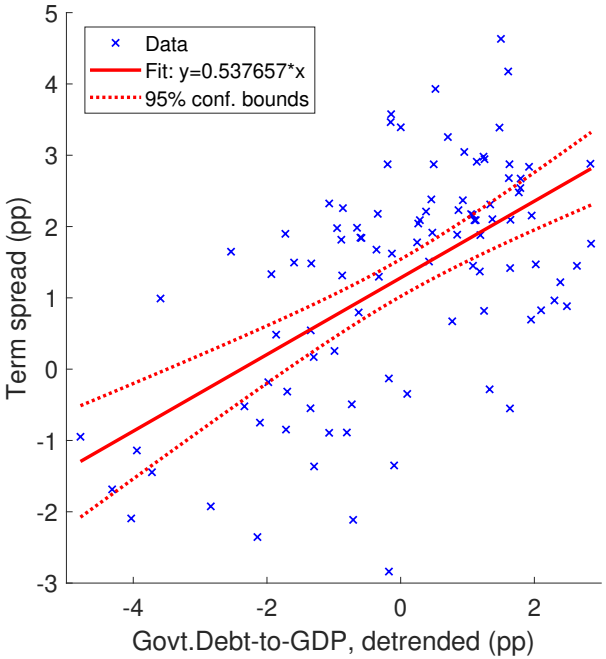
Motivation: fiscal sustainability and sovereign debt risk

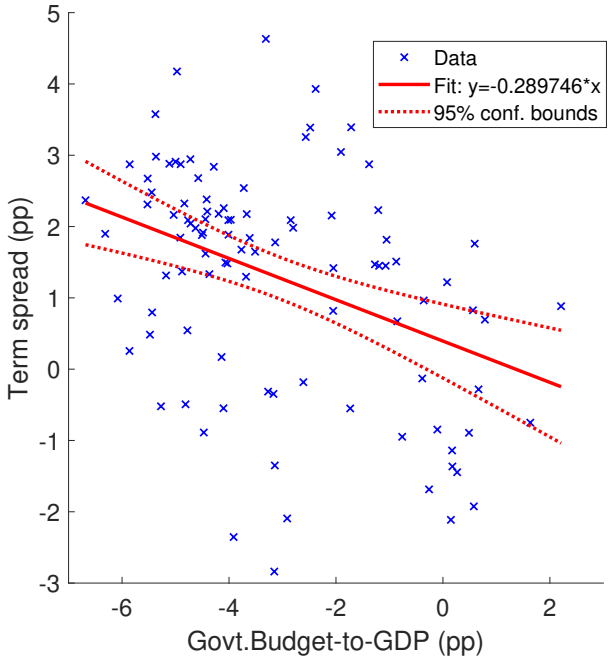


In search of the "right [s-shaped] surplus" response . . .

- academia: Calitz et al. (2014); Burger and Calitz (2019); Calitz (2020)
- markets: 5-11% probability of default within next 5 years (CDS spreads, 2020)
- policymakers: sovereign debt crisis by 2024 (Mboweni, 2020)

Motivation: government debt and interest rates





The effect of debt-financed fiscal stimulus (DFFS) on interest rates

- reduced-form measures estimate the average effect of changes in debt or deficits—a proxy for DFFS.
- expenditure or tax revenue?
- a key transmission mechanism for fiscal multipliers (Ganelli and Rankin, 2020) and fiscal sustainability (Fourie and Burger, 2003; Calitz et al., 2013)

Motivation: government debt and interest rates

Theoretically, DFFS programs directly stimulate aggregate demand through government expenditure or tax cuts, but their effectiveness is highly dependent on:

- direct crowding-out of private sector expenditure (Afonso and Sousa, 2012; Traum and Yang, 2015; Kemp, 2020; Kemp and Hollander, 2020),
- spillover effects to the private sector through higher interest rates (risk premium) (Peter and Grandes, 2005; De Bruyckere et al., 2013; Augustin et al., 2018), and
- the interaction between fiscal policy and monetary policy (Ascari and Rankin, 2013; Ramey, 2019; Ganelli and Rankin, 2020).

Aims for the study

1. What is the effect of disaggregated debt-financed revenue and expenditure shocks on interest rates?
2. How important are the transmission mechanisms: crowding in/out, risk premium, and fiscal-monetary policy interaction?
3. What is the effect of interest rate shocks on government debt: monetary policy (domestic and foreign), risk premium, and credit ratings?

Contribution to the literature

I. The effect of DFFS on interest rates in a DSGE model

- Difficulty in identifying fiscal policy shocks is well-documented in the literature (Engen and Hubbard, 2004; Ramey, 2019; Gamber and Seliski, 2019; Kemp, 2020)
- Empirical evidence on the effect of government debt on interest rates in South Africa is very limited (Fedderke, 2020)
- SA literature predominantly focused on:
  - the effect of government debt on growth,
  - the effect of interest rates on the macroeconomy, and
  - the spillover effects of credit ratings or sovereign risk.

  (e.g., Peter and Grandes, 2005; Fedderke, 2020; Mothibi, 2019; Mhlaba and Phiri, 2019; Soobyah and Steenkamp, 2020b,a)

The model economy

The new-Keynesian open-economy fiscal DSGE model based on Kemp and Hollander (2020) is well-suited to answer the above questions:

- Includes a non-trivial role for fiscal policy: consumption, investment, transfers, labour income tax, capital tax, consumption tax.
- Sticky prices for all goods: domestic, foreign, imports, exports
- Sticky wages for Ricardian and non-Ricardian households
- Rational, forward-looking, and optimizing households and firms
- Households have access to domestic and foreign bonds

Estimate with SA data and run counterfactual simulations:

- 18 observable variables; 21 exogenous shocks
- The six fiscal policy variables are estimated by six fiscal reaction functions that respond to output and debt.

Main findings I

I. The effect of debt-financed fiscal stimulus on interest rates in a DSGE Model

- Reduced-form estimates provide quantitatively similar results to the net effect of DFFS on real yields
- But for fiscal policy analysis, there are non-negligible differences in the responses of households, firms, and the monetary authority (and the risk premium) to each disaggregated fiscal policy shock.
- Notably, an investment-driven DFFS, as opposed to government consumption, produces far more favourable fiscal sustainability outcomes.
- Fiscal "revenue cuts" are contractionary.[1]

[1] To ensure a stable and predictable stream of tax revenue over the business cycle, the accuracy and credibility of official projections is crucial (e.g., Calitz et al., 2016).

Main findings II

- The endogenous responses of the risk premium (long rate) and monetary policy (short rate) have sizeable influences on the dynamic effects of DFFS.
- Crowding out can be important for government consumption spending, but not a significant channel.

II.The effect of interest rates on debt

- Monetary policy shocks contribute 13% of the variance of government debt-to-GDP
- Risk premium shocks in the long-term rate contribute 10%
- Credit rating shocks are $\approx$ 50% larger than non-ratings-related risk premium shocks

Results: debt-financed fiscal expenditure

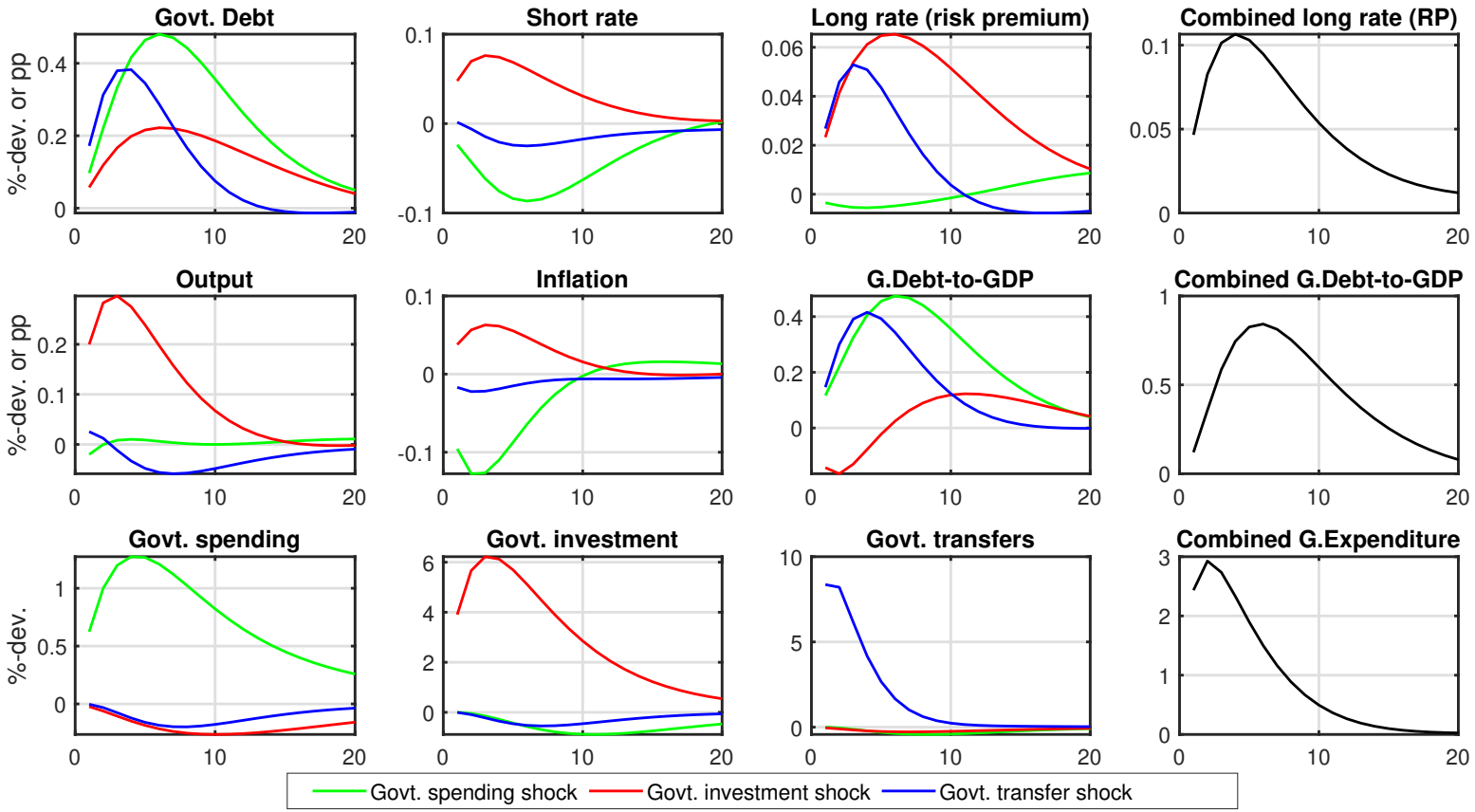


Figure: IRFs for government expenditure shocks.

Sensitivity of interest rates to government debt-to-GDP

Table: Sensitivity of interest rates to government debt-to-GDP (SIGD)

	Combined basis points	G.Spending basis points	G.Investment basis points	G.Transfers basis points
$SIGD_0$				
$i^{(10y)}$	88	7	-46	36
$i^{(3m)}$	21	2	-53	1
$r^{(10y)}$	155	105	-25	51
RP	120	70	-15	49
$SIGD_{max}$				
$i^{(10y)}$	13	2	53	13
$i^{(3m)}$	3	0.4	62	0.4
$r^{(10y)}$	22	26	29	18
RP	17	17	17	17

Note: $i^{(10y)}$ is the implied long rate based on the short-term interest rate response and the endogenous response of the risk premium to the debt-to-GDP ratio. $r^{(10y)}$ is the inflation-adjusted long rate. RP is the risk premium.

Results: debt-financed fiscal revenue shortfalls

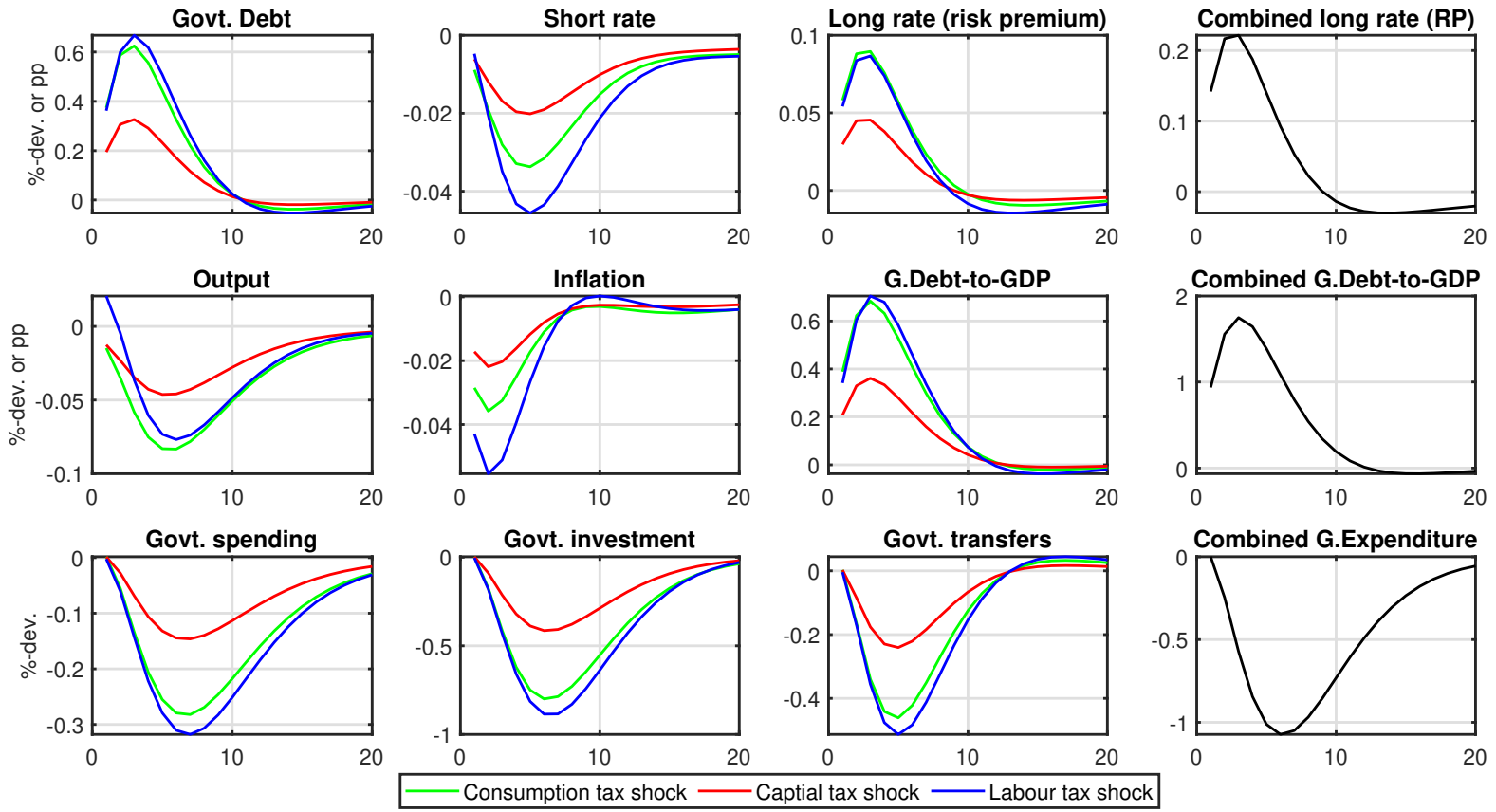


Figure: IRFs for government tax revenue shocks.

Sensitivity of interest rates to government debt-to-GDP

Table: Sensitivity of interest rates to government debt-to-GDP (SIGD)

	Combined basis points	VAT basis points	CIT basis points	PIT basis points
$SIGD_0$				
$i^{(10y)}$	24	23	22	25
$i^{(3m)}$	-1	-1	-2	-1
$r^{(10y)}$	35	32	32	41
RP	32	30	30	36
$SIGD_{max}$				
$i^{(10y)}$	13	13	13	12
$i^{(3m)}$	-1	-1	-1	-1
$r^{(10y)}$	19	18	19	20
RP	17	17	17	17

Note: $i^{(10y)}$ is the implied long rate based on the short-term interest rate response and the endogenous response of the risk premium to the debt-to-GDP ratio. $r^{(10y)}$ is the inflation-adjusted long rate. RP is the risk premium.

The transmission mechanisms: risk premium

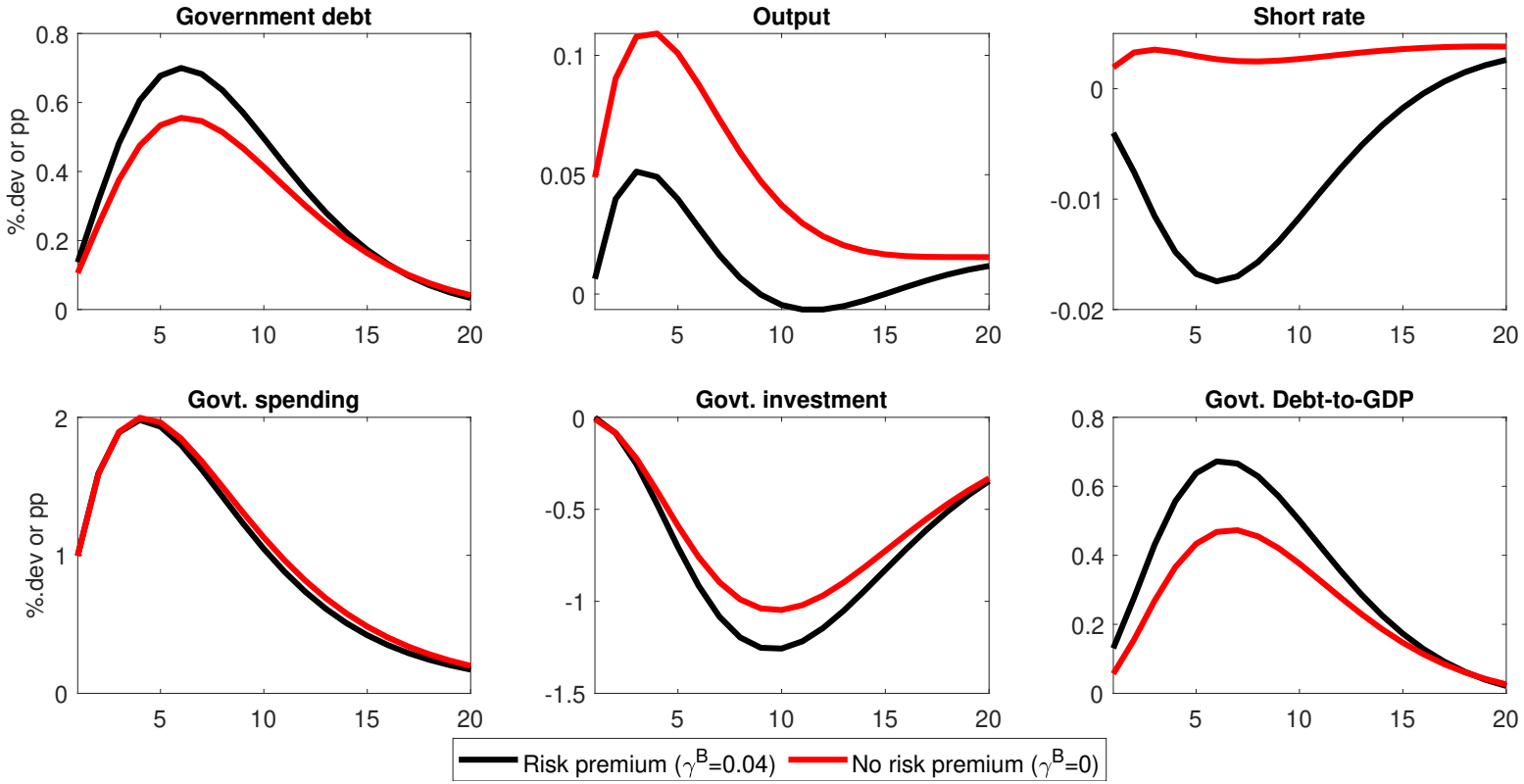


Figure: Government spending with and without risk premium response

The transmission mechanisms: risk premium

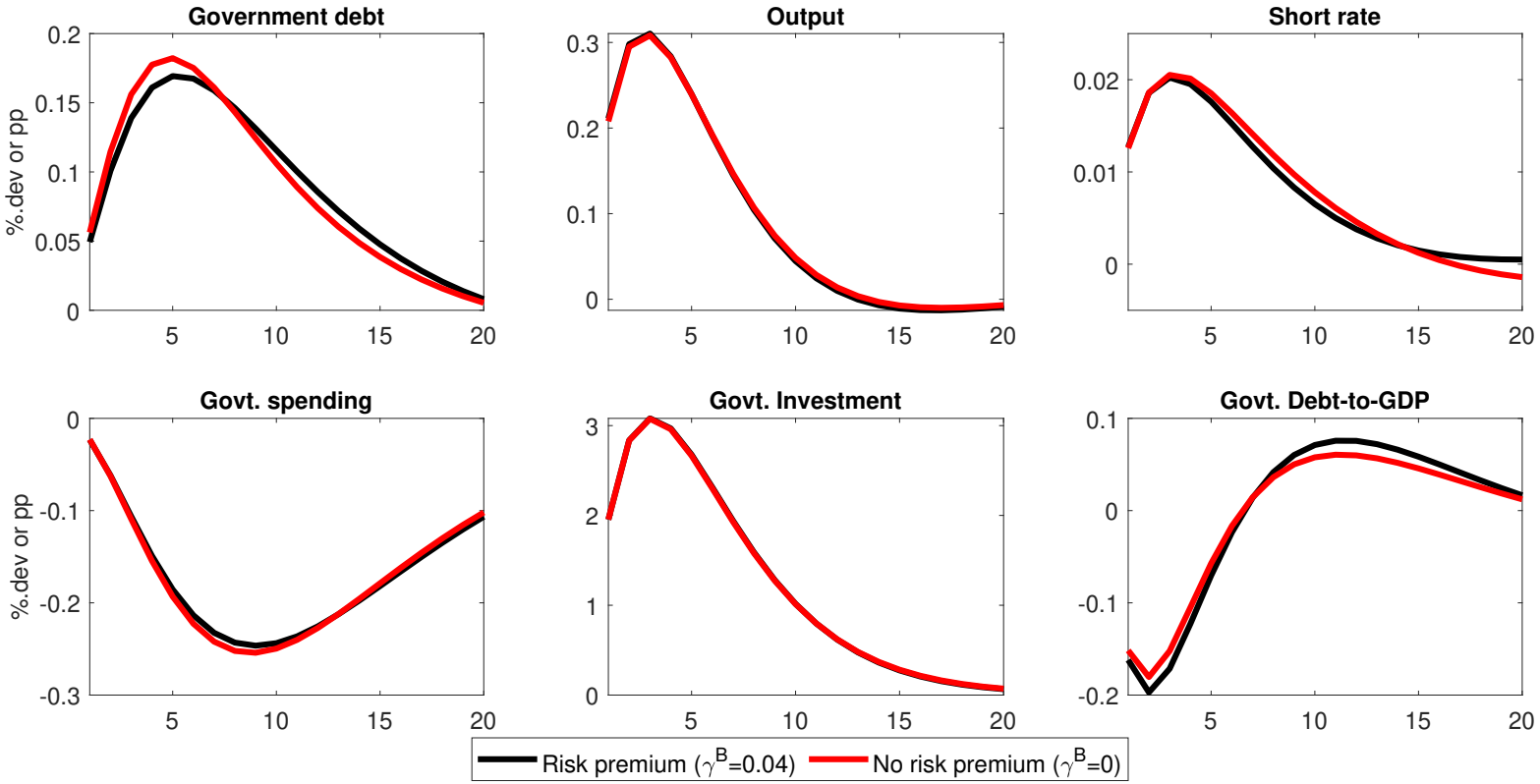


Figure: Government investment with and without risk premium response

The transmission mechanisms: monetary policy

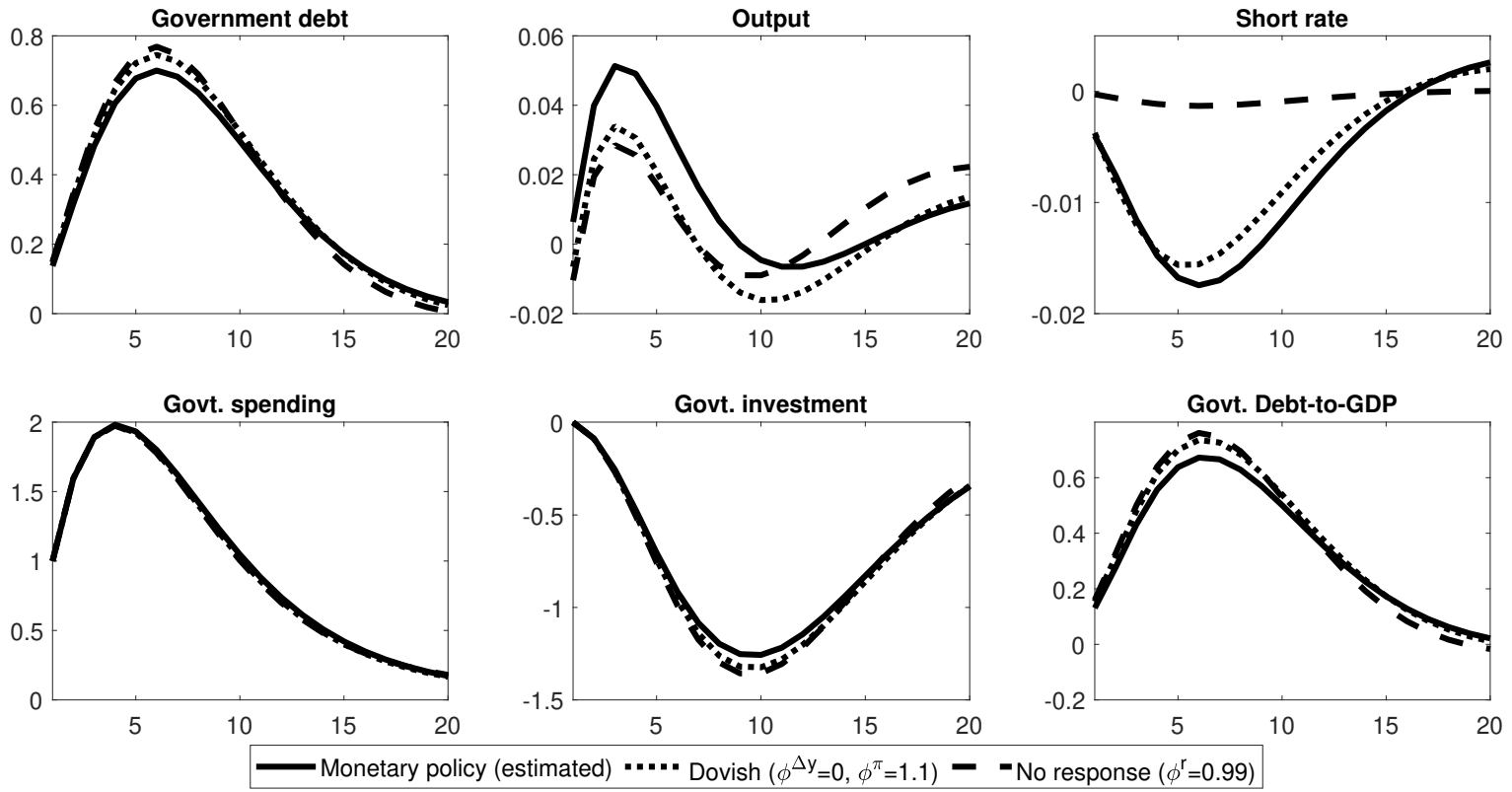


Figure: Government consumption spending with degrees of monetary policy responses

The transmission mechanisms: monetary policy

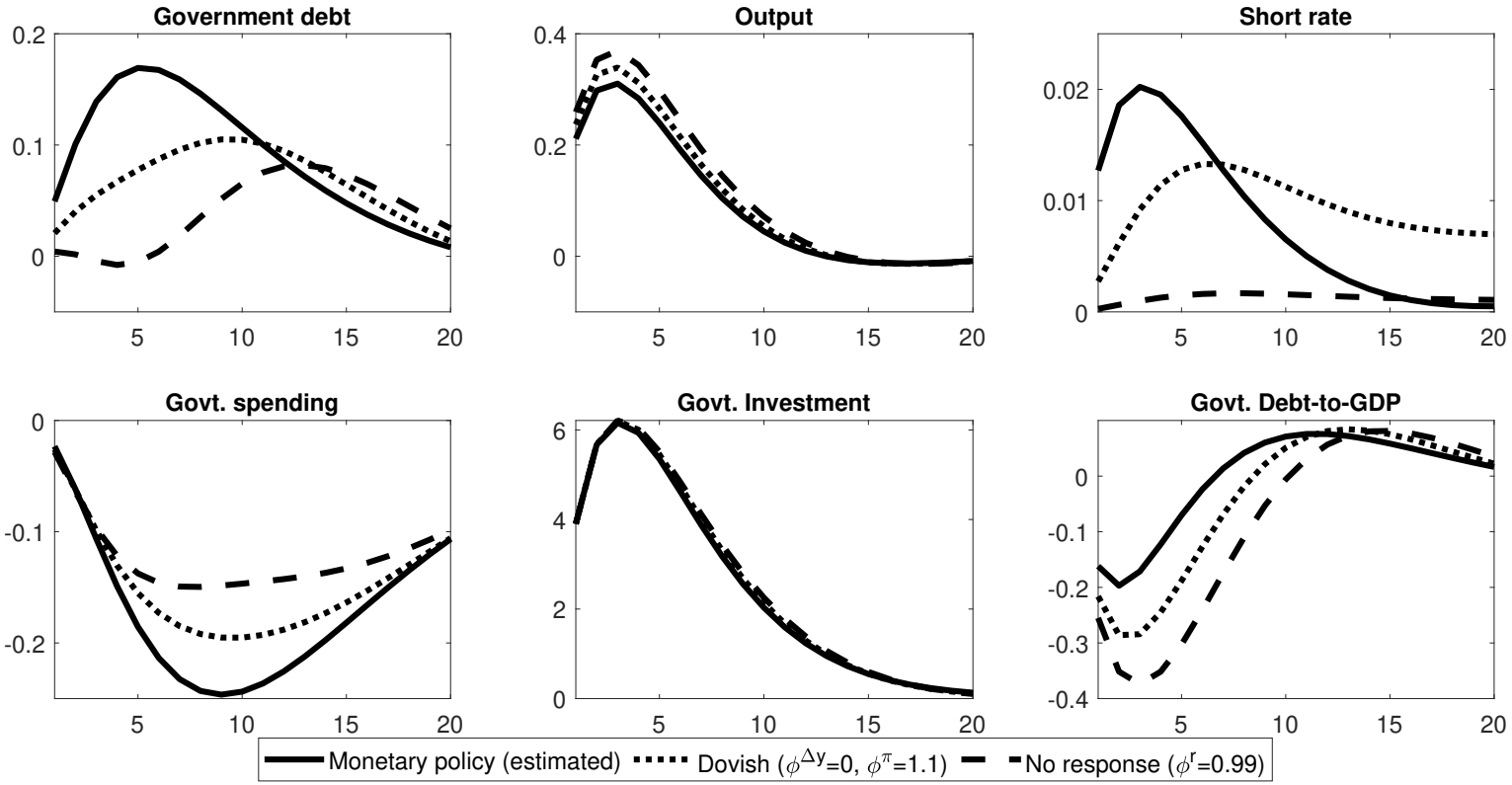


Figure: Government investment with degrees of monetary policy responses

The transmission mechanisms: crowding-in/-out

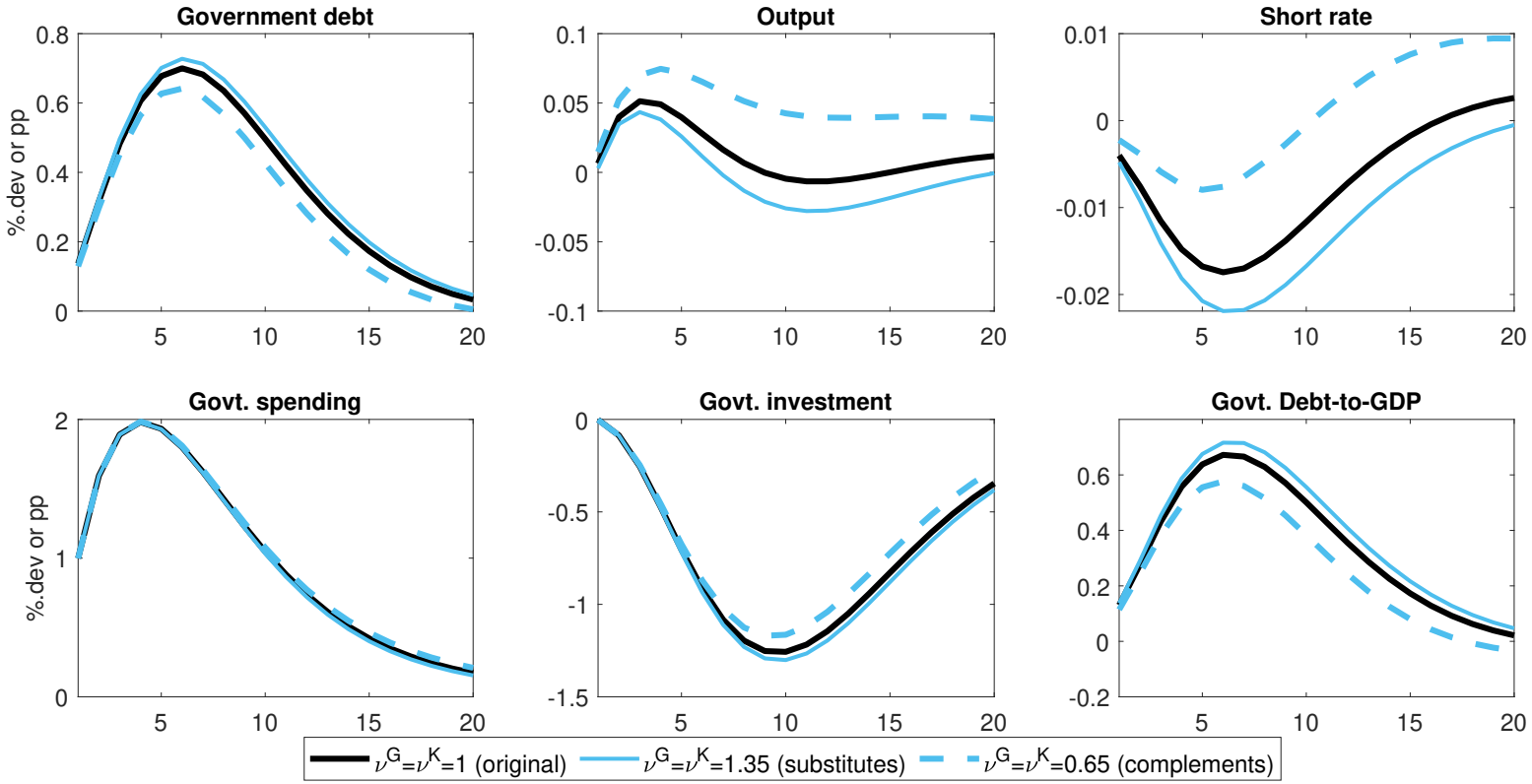


Figure: Government spending with crowding-in and crowding-out

The transmission mechanisms: crowding-in/-out

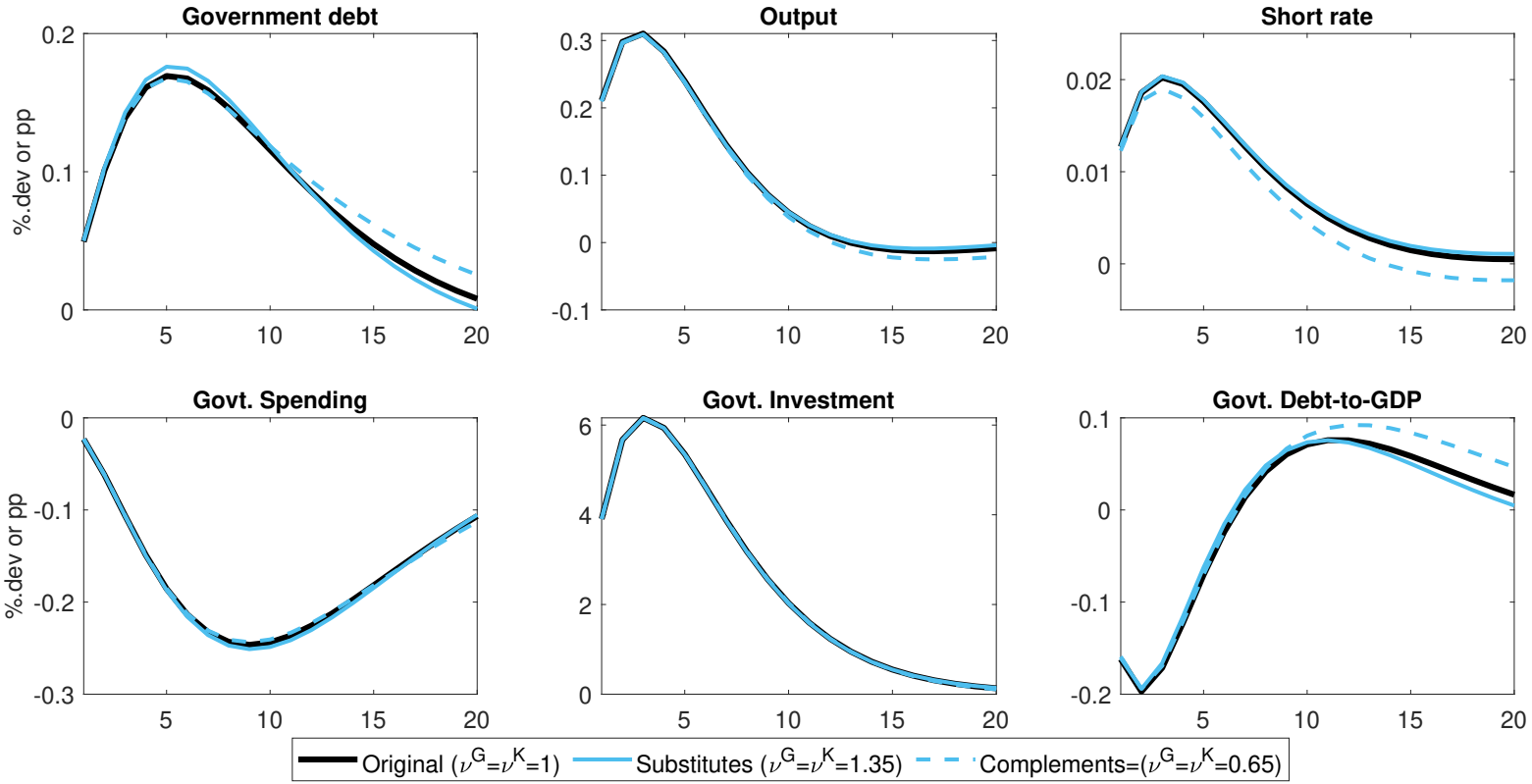
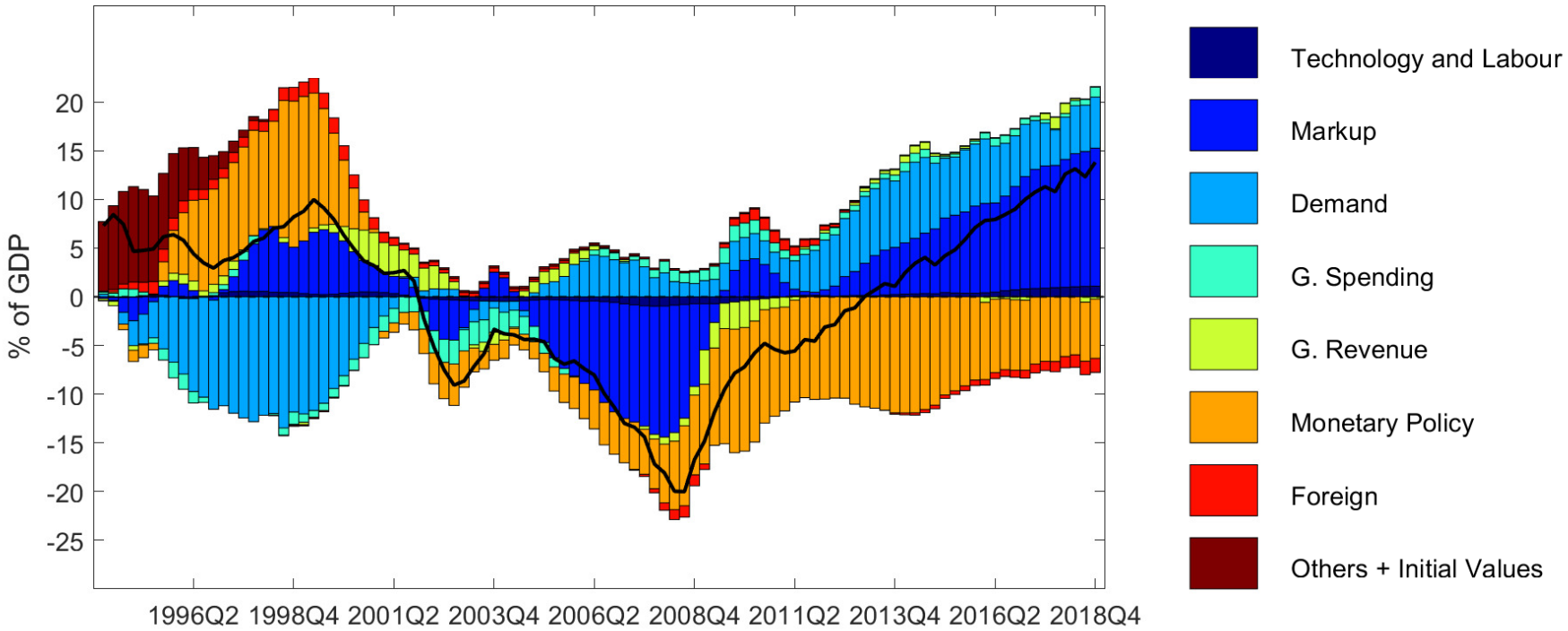


Figure: Government investment with crowding-in and crowding-out

Government debt, monetary policy, and the risk premium



FEVD:

- Monetary policy shocks contribute 13%
- Risk premium shocks contribute 10%

The effect of interest rates

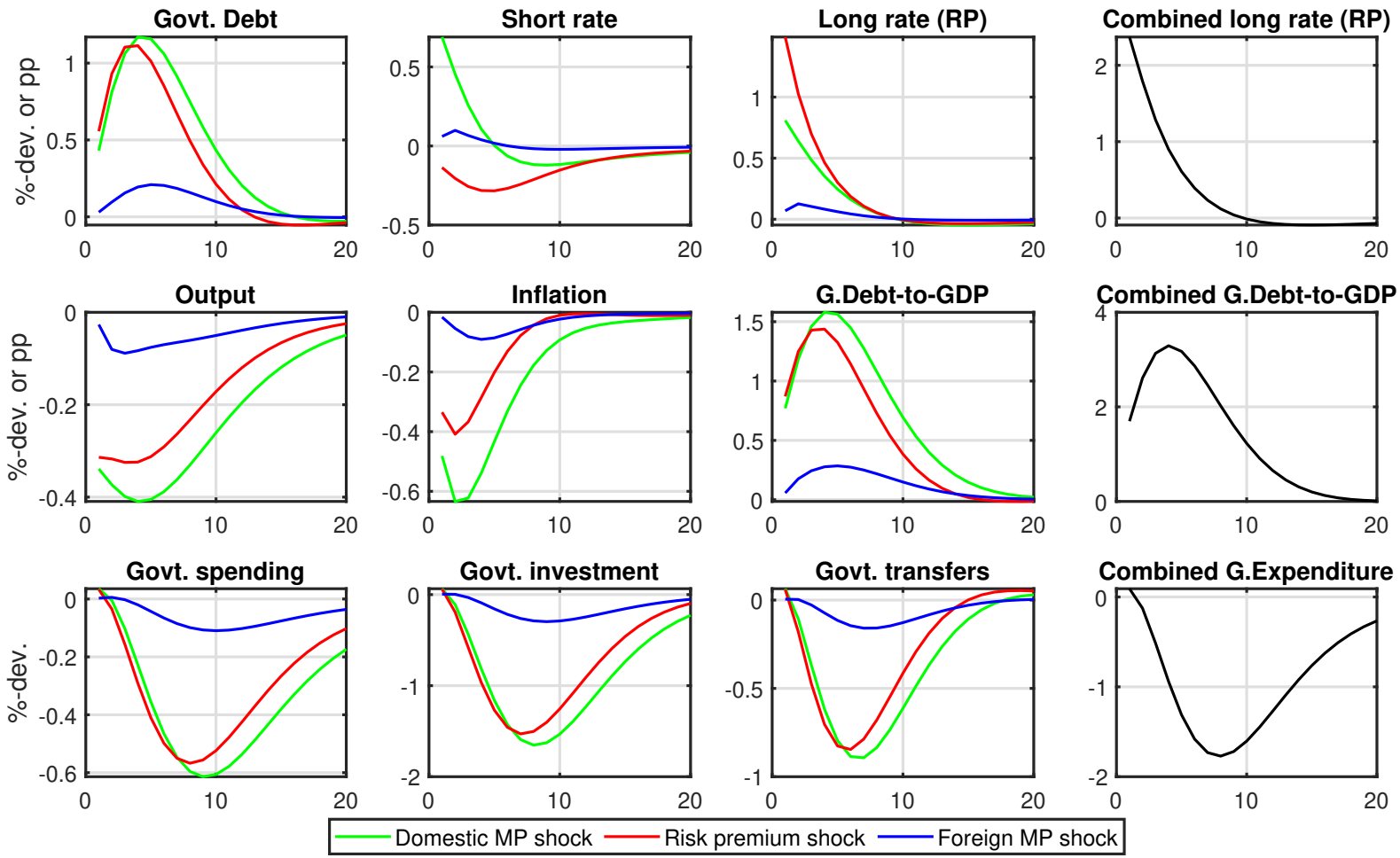


Figure: IRFs for interest rate shocks

Credit Rating Changes (Fitch)

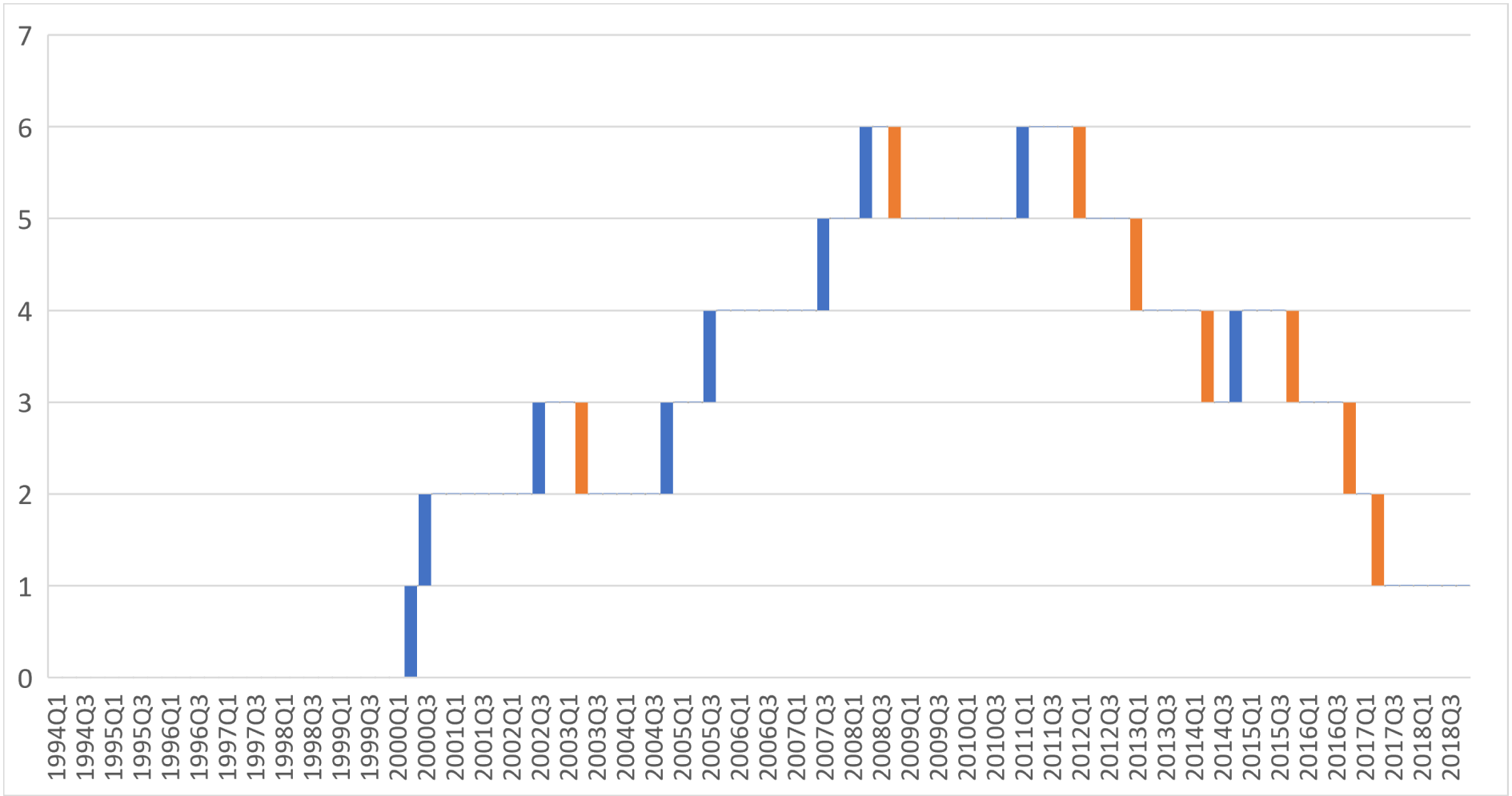


Figure: Credit Rating Changes (Fitch)

The effect of credit ratings

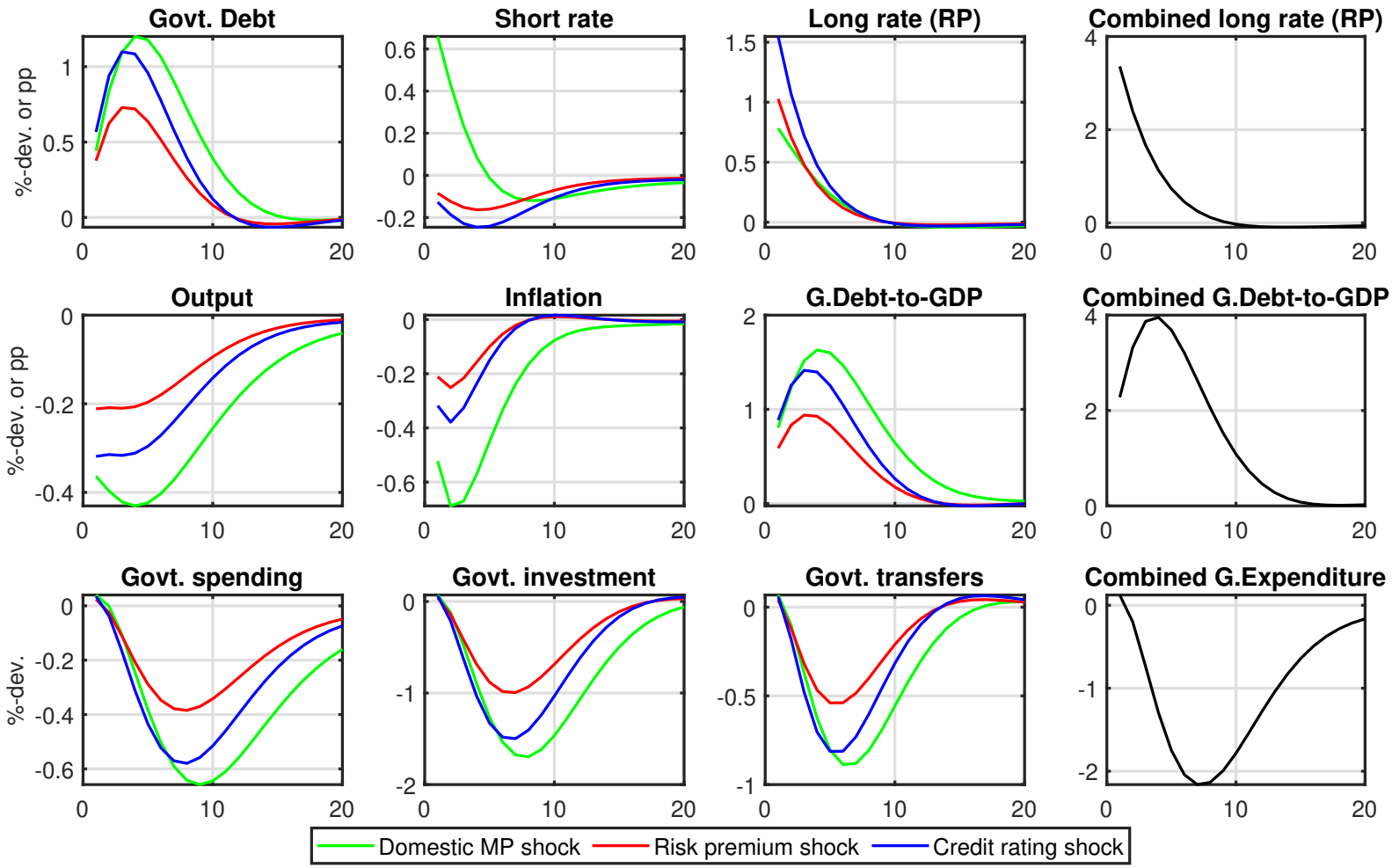


Figure: IRFs for interest rate and credit rating shocks

Implications?

- As in the current environment, an investment-driven DFFS could reduce the government debt-to-GDP ratio in periods of economic slack, when monetary policy would typically be more accommodative.
- The extent of forecast (e.g., "fiscal projection") errors and the "assumed" long-run steady-state are crucially important for policy decision-making and credibility. (Applies to monetary policy as well)
- The response of debt and interest rates to credit rating changes suggest that further downgrades could offset any gains from the current stance of monetary policy.
- If fiscal policy remains unsustainable a negative feedback loop between increasing debt servicing costs (through a higher risk premium) and rapid debt accumulation may push the country into a sovereign debt crisis and economic distress.

Modelling issues

- Identification sensitivity: data, shocks, and model specification
- Identification of foreign shocks and monetary policy shocks
- Measurement errors in the model and bringing the data to the model
- Fit-for-purpose: forecasting vs. policy analysis

Appendix: observable variables

Observable variables used for Bayesian estimation of the model

- Domestic: output, employment, inflation, real wages, short-term interest rate, import inflation, export inflation, government debt-to-GDP, and the inflation target.
- Foreign: output, inflation, and the short-term interest rate. All are weighted-average series from South Africa's main trading partners.

Appendix: implied long rate

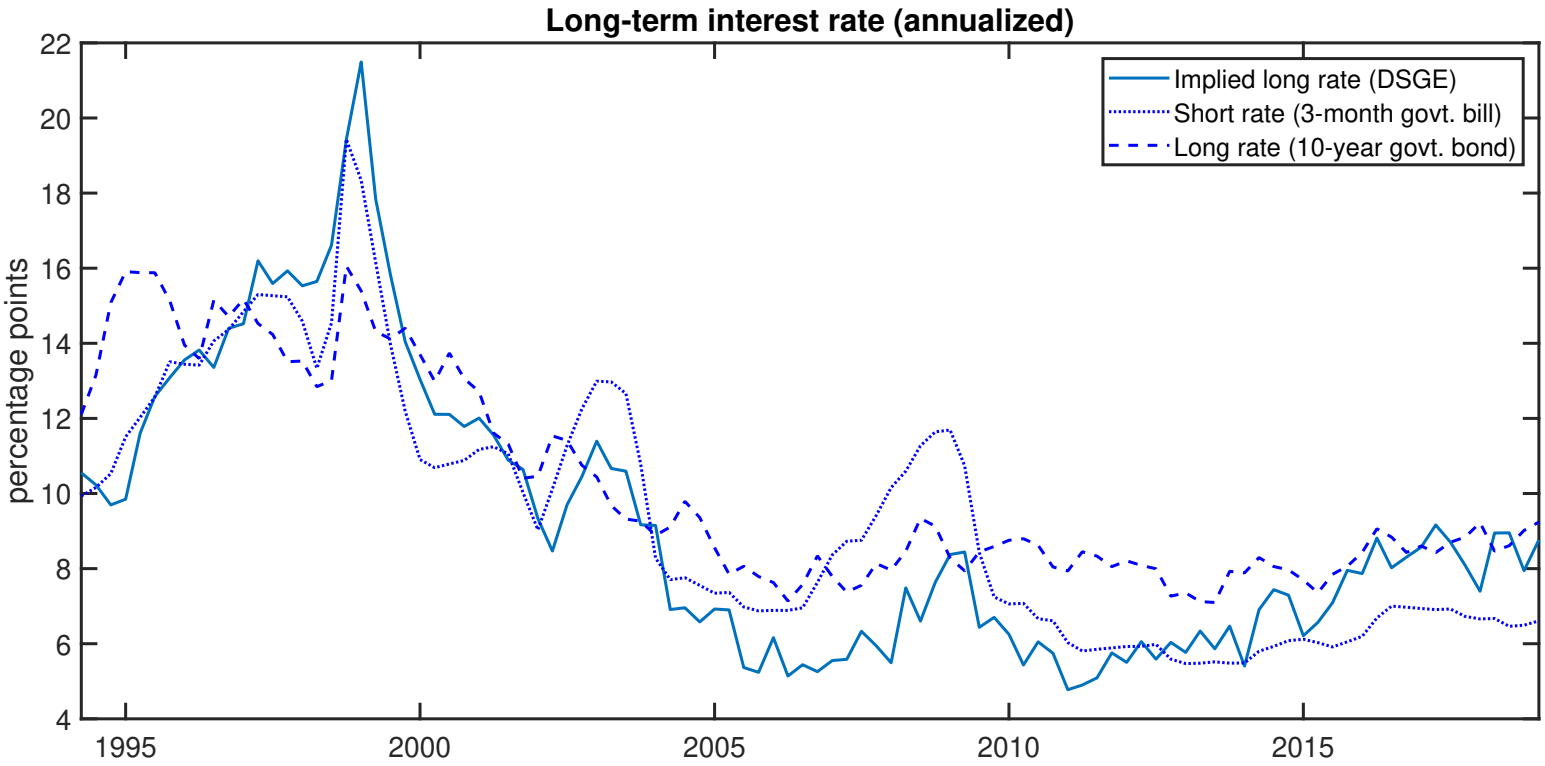


Figure: Long rate: Implied vs Actual

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