MCM
more than
50 years of
experience

Macroeconomic and Fiscal Consequences of Quantitative Easing

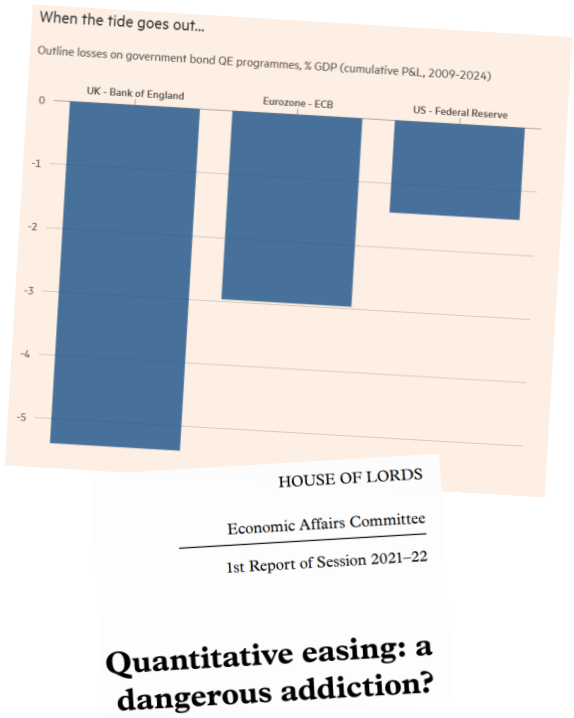
NBER MACROECONOMICS ANNUAL CONFERENCE
APRIL 16, 2026

Tobias Adrian, Christopher Erceg, Marcin Kolasa, Jesper Lindé, and Pawel Zabczyk

The views expressed here are those of the authors and do not necessarily represent the views of the IMF, its Executive Board, or IMF management

Motivation

- Following the GFC & EA debt crisis and during the COVID pandemic, central banks ventured into unprecedented territory and undertook large scale asset purchases (QE) at the ELB.
- But QE subsequently resulted in substantial central bank losses, with their impact on inflation and output questioned. QE has also been critiqued for contributing to overheating and late liftoff (Orphanides, 2023; Eggertsson and Kohn, 2023)
- Important to **reconsider the conditions when QE likely to be warranted.**



What We Do

- Develop framework that can be used to weigh the macroeconomic benefits of QE against the consolidated fiscal costs.
  - The consolidated fiscal position includes the Treasury balance plus CB profits/losses.
- Build New Keynesian DSGE model with:
  - Bond market segmentation (Chen et al, 2013) => QE affects real activity.
  - Behavioral discounting (Gabaix, 2020) and nonlinear Phillips Curve (HLT, 2023) => mute potency of FG and make inflation sticky at the ELB (Del Negro et al., 2023)
- Explore effects of QE on macroeconomy, fiscal position, and CB profits under different scenarios (severity of liquidity trap, use of FG, etc).
- Compare QE to fiscal expansion.

Key Findings

- Substantial macro stimulus from QE in “deep” liquidity traps:
  - Consolidated fiscal position improves significantly even if CB makes losses.
  - QE contrast sharply with fiscal expansion which boosts debt.
  - QE benefits tend to be sizeable even if economy recovers faster than expected.
- More reason for caution in “shallow” liquidity traps:
  - Macro benefits smaller under modal outlook.
  - More risk of overheating and CB losses (in faster recovery scenarios).
  - Even so, the fiscal position shows strong likelihood of improving, and policymakers can mitigate some risks from overheating (e.g., through escape clauses).
- Complement previous literature with our focus on joint macro-fiscal effects and direct comparison with fiscal stimulus.

Remainder of Talk

1. Model and Calibration
2. QE in Deep Liquidity Traps
   - ➢ Comp. with conv. fiscal stimulus
3. QE in Shallow Liquidity Traps
   - ➢ Impact of shock uncertainty
   - ➢ Impact of forward guidance
4. Concluding Remarks

Model and Calibration

Model Overview

- Build on model with standard NK features: sticky prices, sticky wages, and habit persistence in consumption.
  - *K* given, so no investment channel as in Gertler and Karadi (2011, 2013).

- **Incorporate bond market segmentation** to allow QE to have real effects (Andres et al., 2004; Chen et al., 2013):
  - "Financially Restricted" households: trade only in long-term bonds, which are perpetuities with geometrically decaying coupons (Woodford, 2001).
  - "Financially Unrestricted" households HHs: trade in both short- and long-term bonds, but are subject to portfolio friction in long-bonds.

- **Behavioral discounting** (Gabaix, 2020) and **nonlinear Phillips Curve** (Harding et al., 2023) to address FG puzzle (Del Negro et al., 2023) and capture risks of overheating.

- Fiscal authority issues mix of short- and long-term debt with constant maturity.

Portfolio Frictions

- All households maximize a utility functional given by:

$$U_t^j = \mathbb{E}_t^j \sum_{s=0}^{\infty} \beta_j^s \exp\{\varepsilon_{t+s}^d\} \left[\exp\{\varepsilon_{t+s}^c\} \log(c_{t+s}^j - \varkappa \bar{c}_{t-1+s}^j) - \frac{(n_{t+s}^j)^{1+\varphi}}{1+\varphi} \right]$$

- Unrestricted households face the nominal budget constraint:

$$P_t (1+\tau_t^c) c_t^u + B_t^u + (1+\zeta_t) P_{L,t} B_{L,t}^u + T_t^u$$
$$= R_{t-1} B_{t-1}^u + (1+\kappa P_{L,t}) B_{L,t-1}^u + W_t (1-\tau_t^n) \bar{n}_t^u + D_t^u + \Xi_t^u$$

- The portfolio friction ("tax" on long-term bonds) facing unrestricted agents is given by:

$$\frac{1+\zeta_t}{1+\zeta} = \left(\frac{b_{L,t}^u}{b_L^u} \right)^{\xi}$$

- Restricted households face the same budget constraint except they face no portfolio frictions on long-term bonds and can't hold short-term bonds.

How QE Lowers the Term Premium and Stimulate Demand

- When linearized, transaction costs (ζ_t) create a wedge between returns on short and long-term bonds and lowers the term-premium:

$$\mathbb{E}_t\left\{\hat{P}_{L,t+1} - \hat{P}_{L,t} + \hat{R}_{L,t+1}\right\} = \hat{R}_t + \zeta_t \qquad TP_t = R_{L,t} - R_{L,t}^{EH} \approx D^{-1}\sum_{s=0}^{\infty}\left(\frac{D-1}{D}\right)^s E_t\zeta_{t+s}$$

where *D* is long term bond duration (40 quarters in our case).

- Simplified FOCs for consumption of unrestricted and restricted households:

$$1 = \beta_u E_t \frac{c_t^u}{c_{t+1}^u}\left\{\frac{P_{L,t+1}R_{L,t+1}}{P_{Lt}\Pi_{t+1}}\right\}\frac{1}{1+\zeta_t} \qquad 1 = \beta_r E_t \frac{c_t^r}{c_{t+1}^r}\left\{\frac{P_{L,t+1}R_{L,t+1}}{P_{Lt}\Pi_{t+1}}\right\}$$

- **All told: Transmission of QE**: Supply of long bonds ↓ => Expected rate of return on long bonds ↓ => Spending by "Restr" agents ↑, Spending by "Unrestr" agents ↔

Policy Rules

- Taylor-type simple instrument rule for short-term rate subject to an effective lower bound (here normalized to 0):

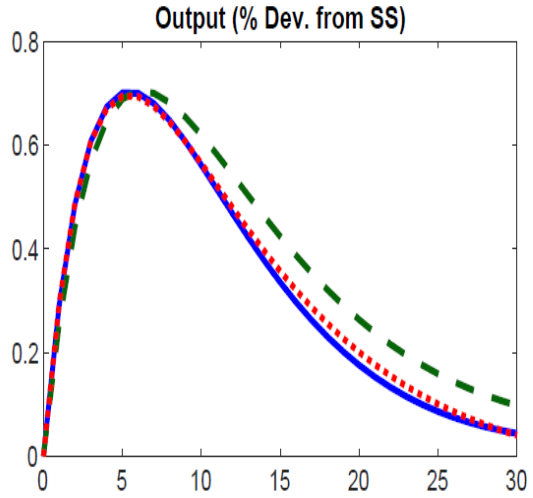
$$R_t = \max\left\{1, \tilde{R}_t\right\}, \qquad \frac{\tilde{R}_t}{R_t^*} = \left(\frac{\tilde{R}_{t-1}}{R_{t-1}^*}\right)^{\gamma} \left[\left(\frac{\pi_t^{yoy}}{\pi}\right)^{\gamma_\pi} \left(\frac{y_t}{y_{t-1}}\right)^{\gamma_y}\right]^{1-\gamma} \exp\{\varepsilon_t^r\}$$

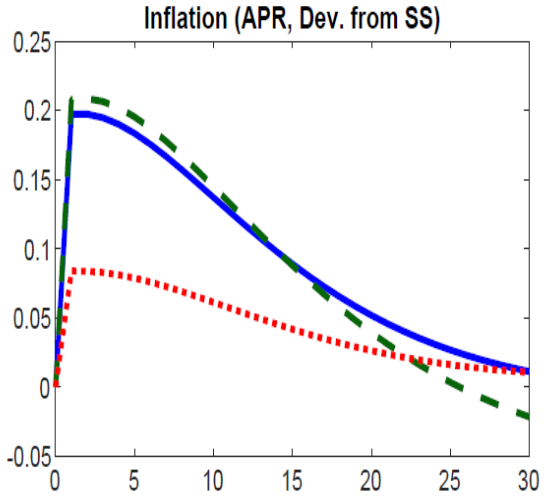
- **QE discretionary and follows an autoregressive process** with an exogenous shock.
- QE: Bond market segmentation calibrated so that 10 percent of GDP CB purchase reduces TP about 50 basis points. SS Term premium 1 percent APR.
  - QE -> Term-premium elasticity lower end of Gagnon (2016) survey for EA and US, and more recent EA evidence by Vaccaro-Grande (2025).
  - Achieve this by setting portfolio cost (ξ) elasticity to .02.
- Distortionary taxes on labor income and consumption with gradual dynamic adjustment of the labor tax in response to government debt.

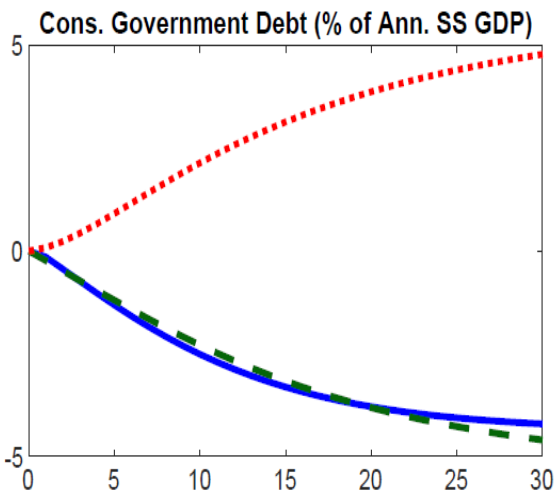
Model Parameterization & Solution

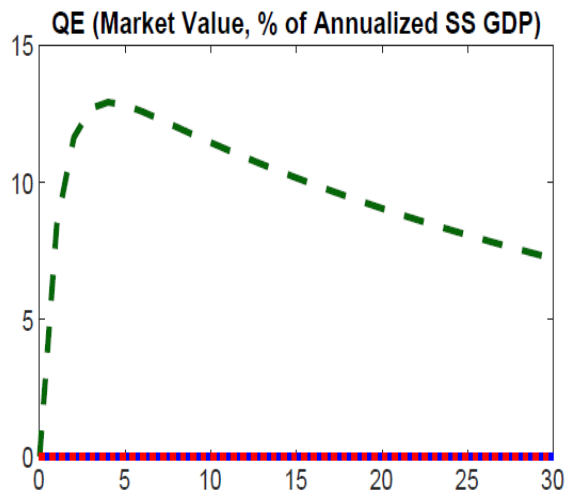
- Nominal and real rigidities to match IRFs to short-term interest rate and government spending shocks as estimated in VAR and DSGE models US.
  - Nonlinearities in price setting (Kimball quasi-kinked demand) calibrated in line with Harding et al. (2023).
  - Small (0.95) degree of behavioral discounting (myopia) a la Gabaix (2020).
- Share of restricted households (0.2) calibrated so that macroeconomic stimulus of QE slightly below median estimates by academics surveyed in Fabo et al. (2021).
  - Predominantly US and EA studies covered by the Fabo meta study.
- Steady state tax rates, debt/GDP, debt dur. based on averages for US and EA.
- Solve nonlinear model with extended path method in Dynare (Fair-Taylor, 1983) to exploit pricing nonlinearities.

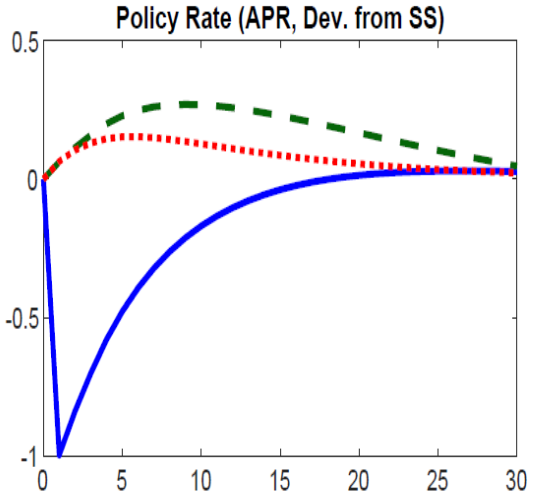
Transmission of Policy Tools in Model (No ELB)

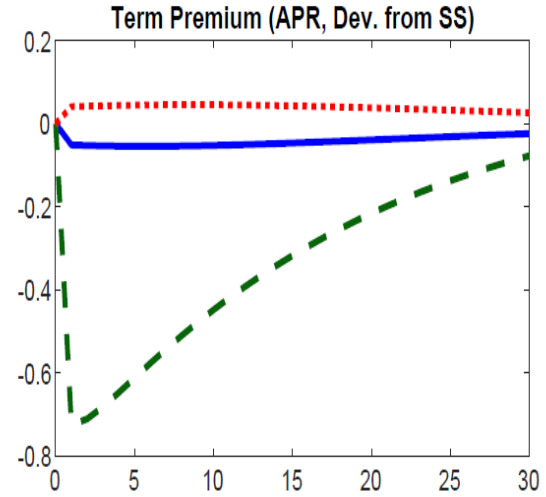


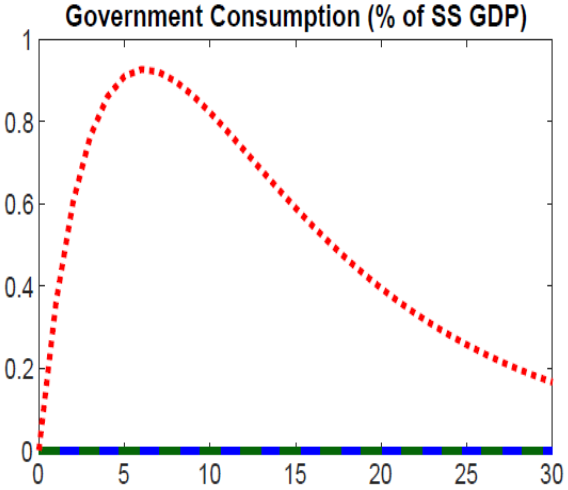


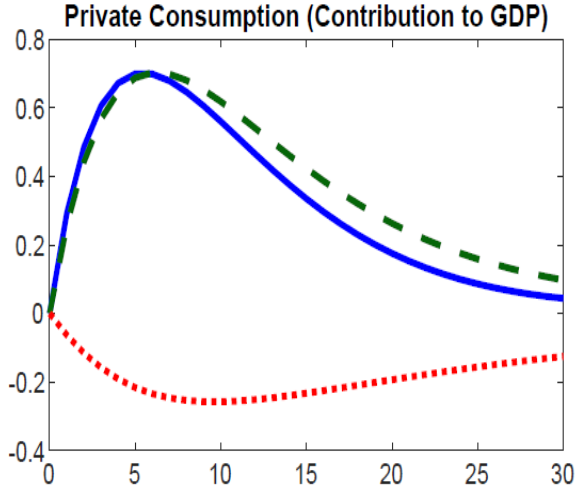








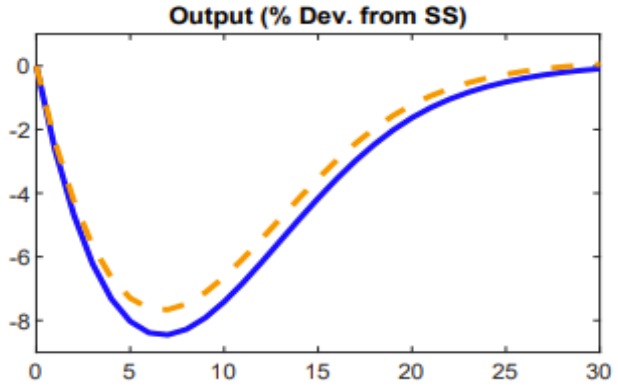


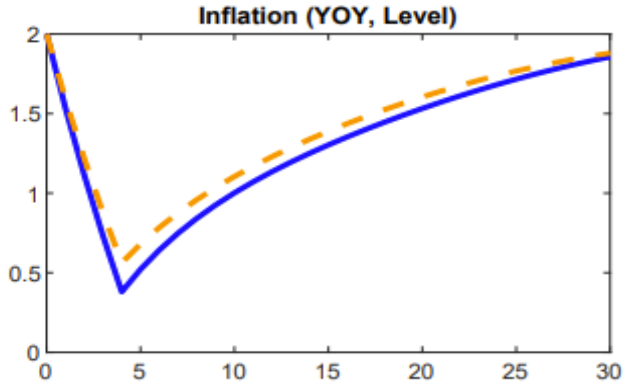


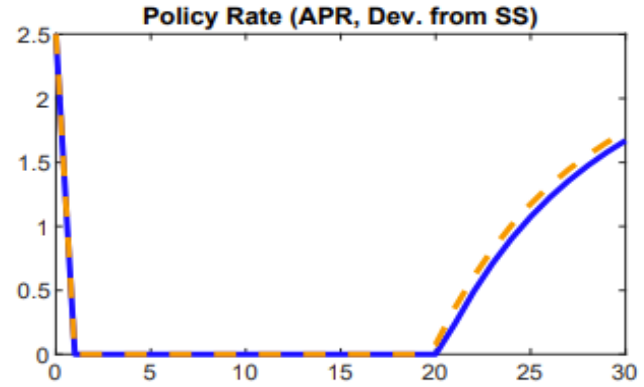
Policy Rate — QE — Government Consumption

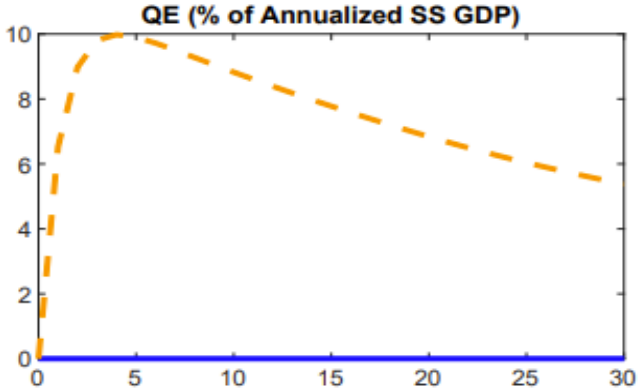
QE in a Deep Liquidity Trap

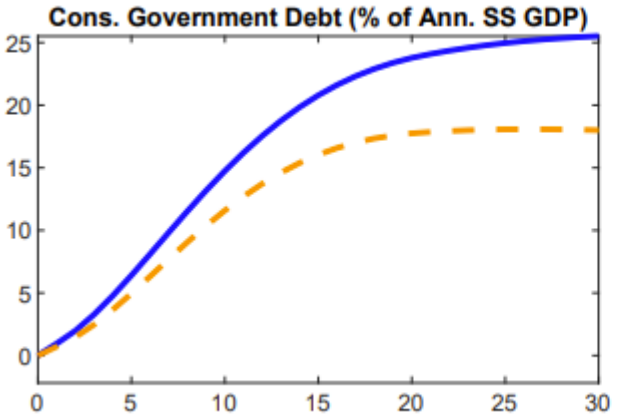
QE in a Deep Liquidity Trap

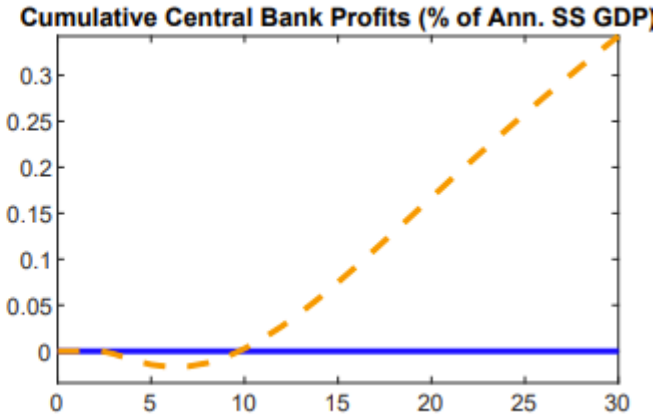










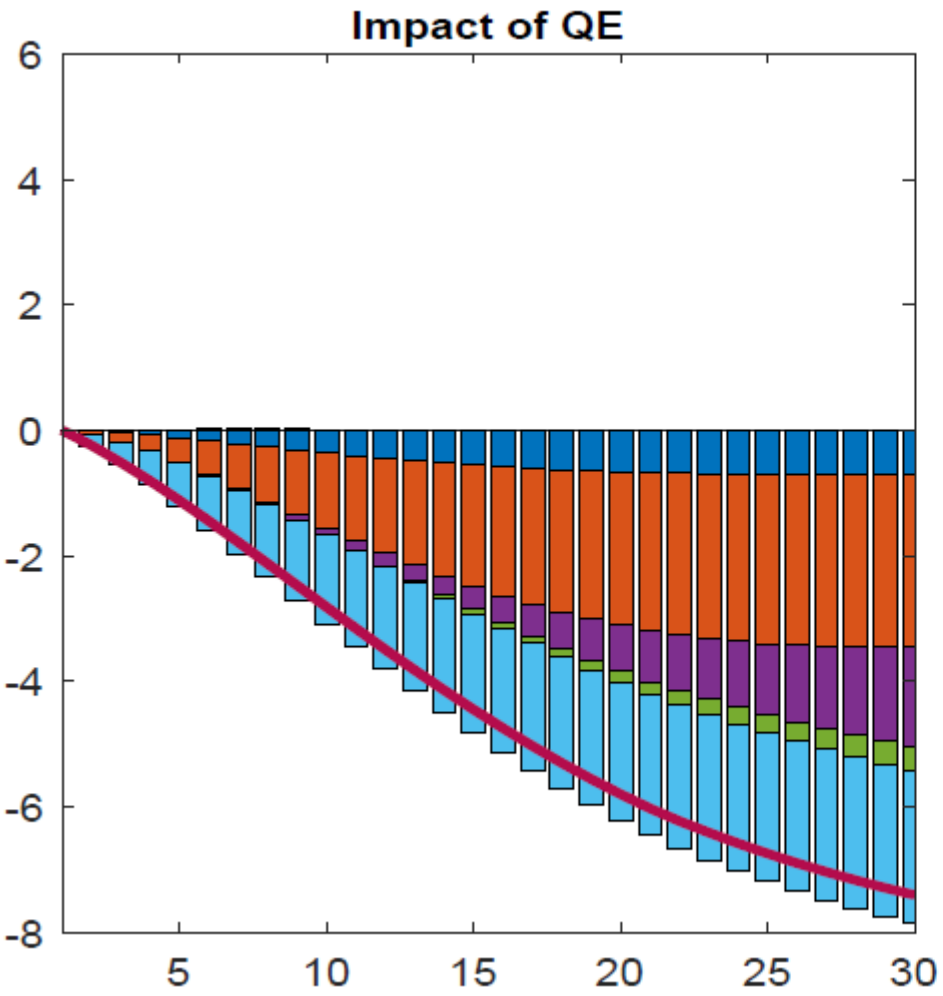


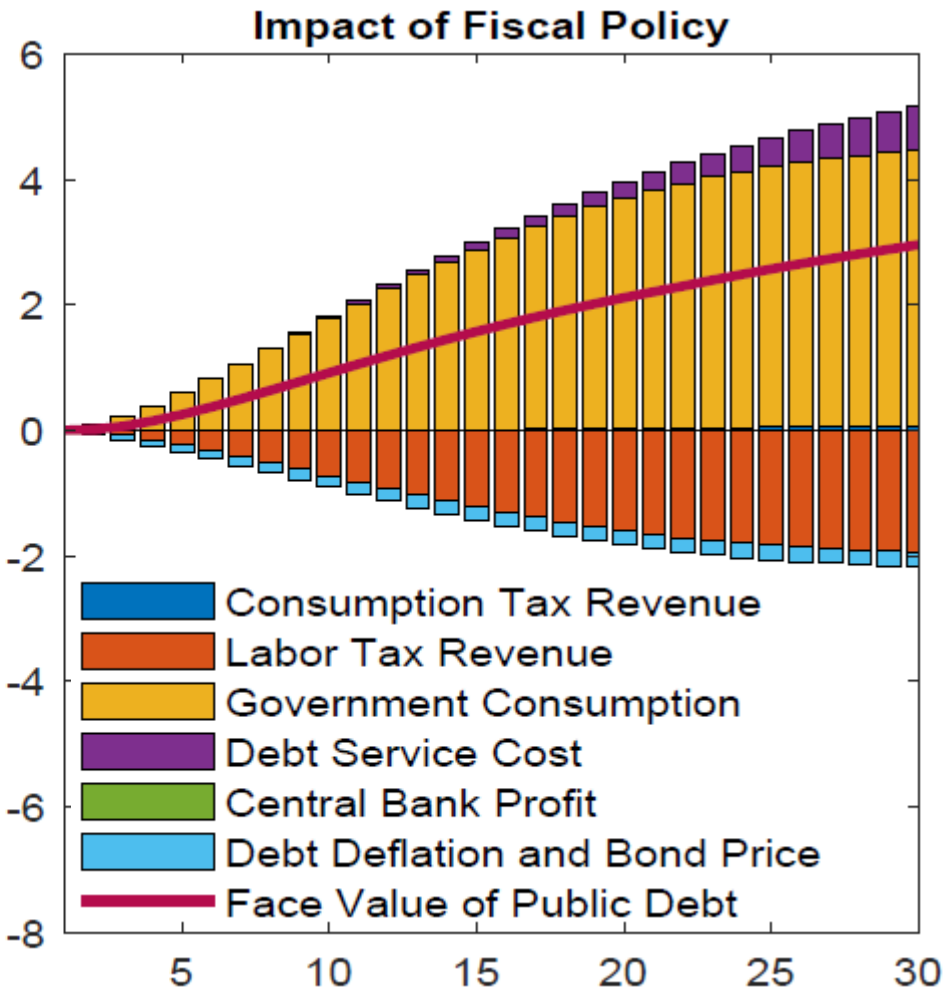
- Negative and persistent discount factor shock
  => liquidity trap
- Under the modal outlook, QE scaled to 10 percent of GDP boosts output about 3/4 percent.
- Stabilization gains material, QE reduces dual mandate quadratic loss function with 20 percent.
- Reduces consolidated govt debt significantly with CB profits rising.

Baseline Baseline with QE

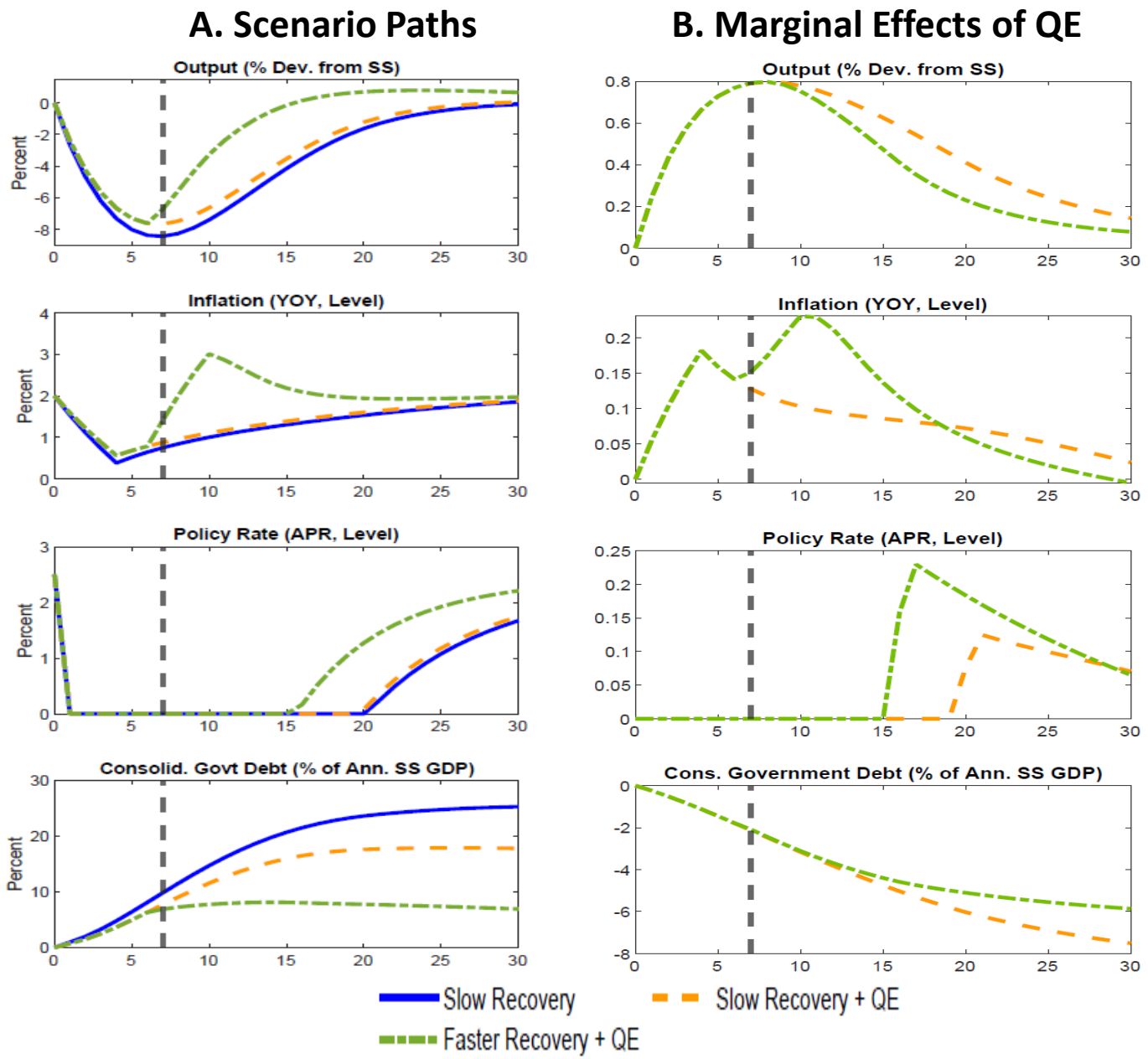
QE vs. Fiscal Expansion

- Compare the effect on government debt of QE and fiscal stimulus (same output boost).





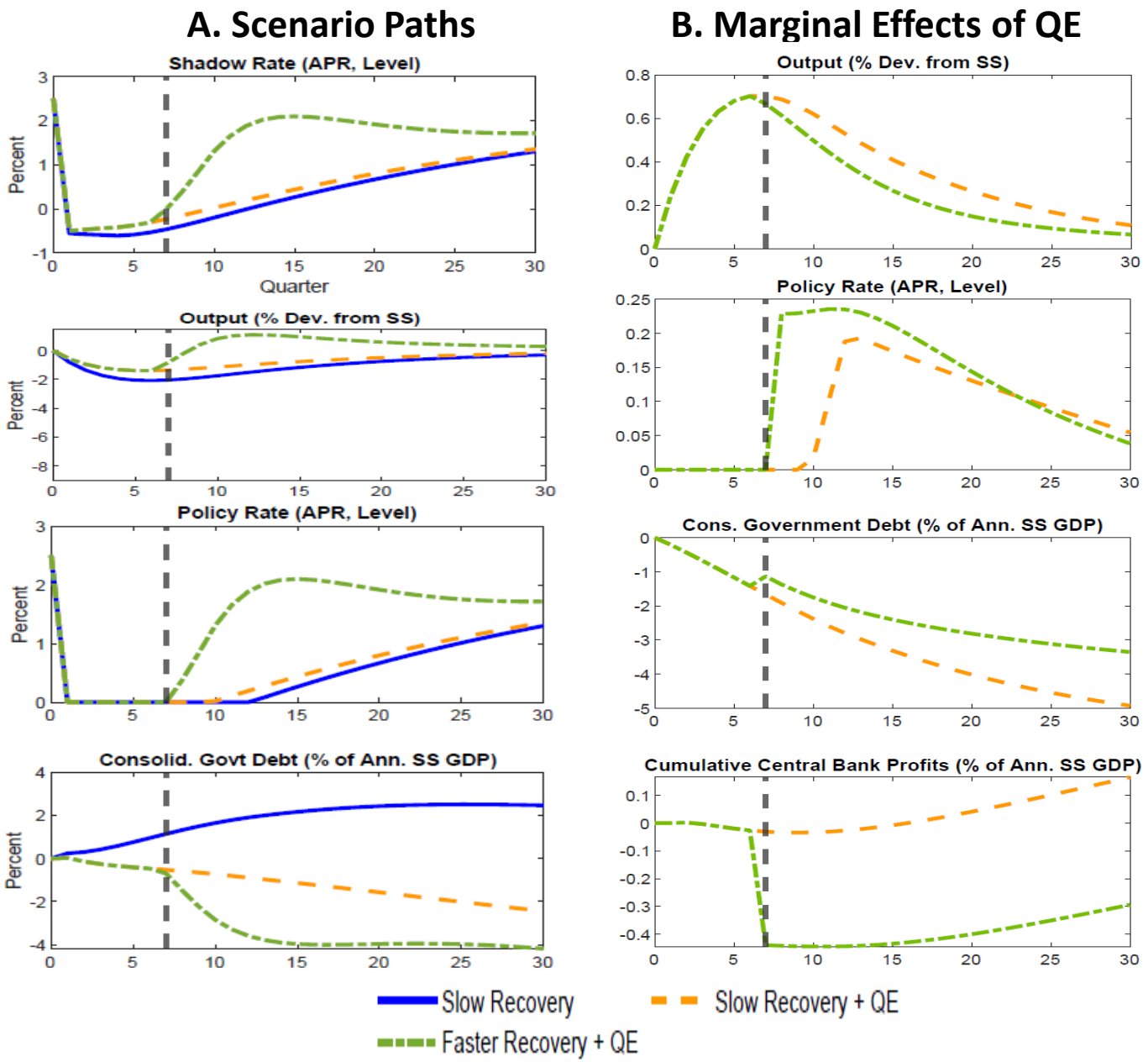
QE in Deep Liquidity Trap with Faster Recovery



- Faster-than-expected recovery: positive demand and cost-push shocks hit 6 quarters after the initial recessionary shock.
- Ex post macroeconomic benefits of QE reduced:
  - Earlier liftoff implies less stimulus to output.
  - Some minor uptilt in sensitivity of inflation to QE.
- Gov't debt still falls notably despite minor CB losses (latter not shown).

QE in a Shallow Liquidity Trap

QE in Shallow Liquidity Trap with Faster Recovery



- Consider baseline of a "shallow" liquidity trap where notional rate only slightly below ELB.
- If recession baseline unfolds as expected when QE launched, stimulus only modestly smaller than in deep liquidity trap.
- But in faster recovery scenario, get almost immediate liftoff, smaller output effects, and some overheating.
- Sizeable CB losses, though consol. govt position still improves (n.b. losses bigger if smaller initial term premium).

Stochastic Simulations Setup

- So far, we have undertaken deterministic simulations, no future shock uncertainty.
- We now examine the consequences of QE under shock uncertainty, i.e. allow for shocks to hit the economy t=1,2,…,T. Shocks can lead to more favorable and less favorable outcomes around the modal (no-uncertainty) outlook.
  - Nonlinear solution approach implies asymmetries.
- Calibrate shock uncertainty by matching a set of moments in US data with consumption demand, technology, and price and wage cost-push shocks.
  - US quarterly data 1960Q2-2019Q4.

Shocks used in model:

$$\varepsilon_t^z = 0.90\varepsilon_{t-1}^z + u_t^z,\ u_t^z \backsim i.i.d.N(0, 0.01)$$

$$\varepsilon_t^c = 0.90\varepsilon_{t-1}^c + u_t^c,\ u_t^c \backsim i.i.d.N(0, 0.035)$$

$$\varepsilon_t^p = 0.85\varepsilon_{t-1}^p + u_t^p,\ u_t^p \backsim i.i.d.N(0, 0.04)$$

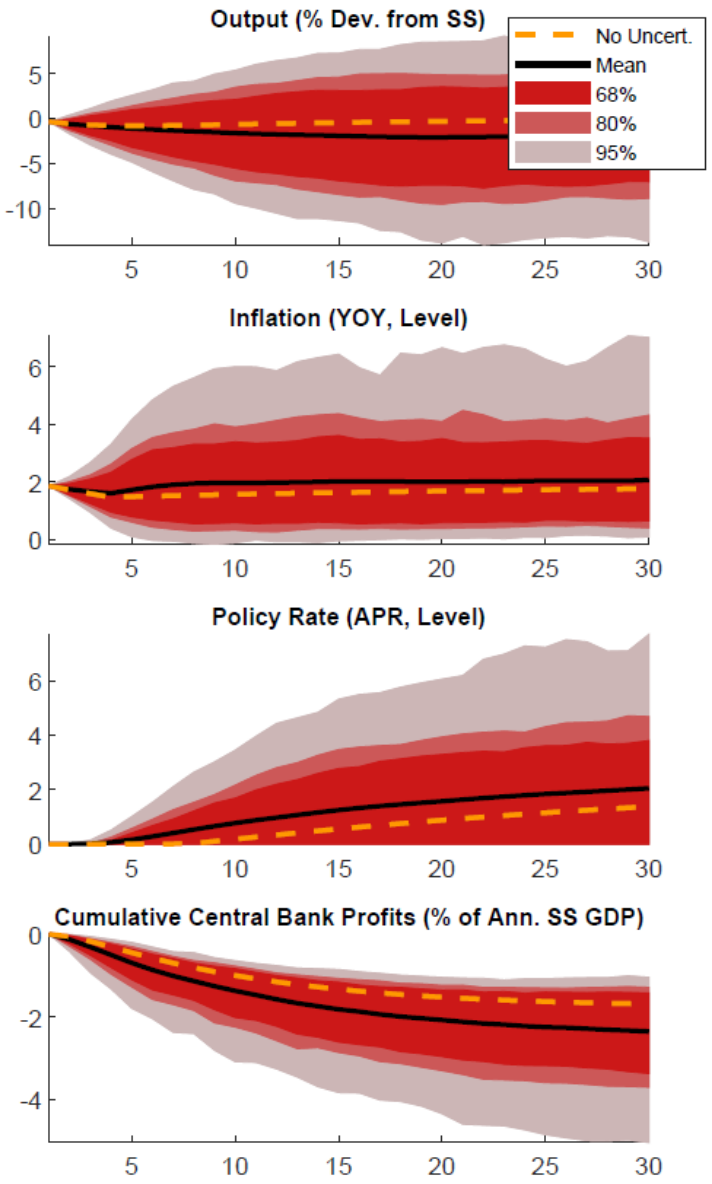
$$\varepsilon_t^w = 0.85\varepsilon_{t-1}^w + u_t^w,\ u_t^w \backsim i.i.d.N(0, 0.26)$$

Table 3: Targeted Stochastic Moments.

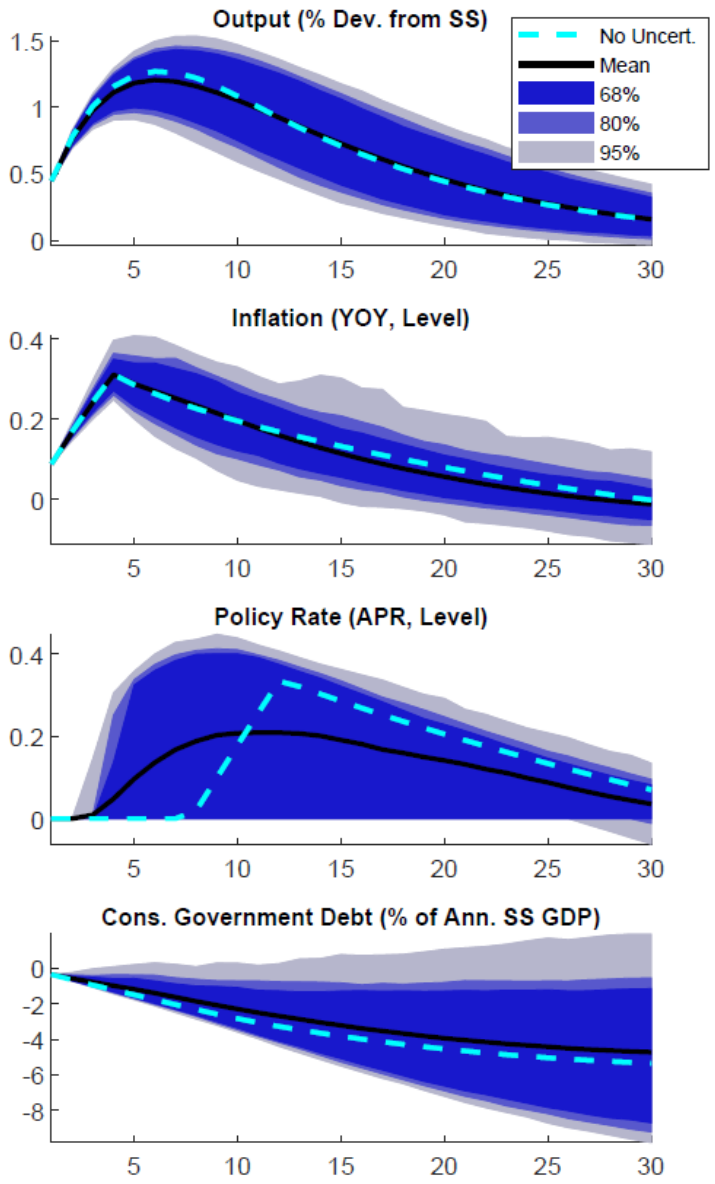
Moment	US Data	Model
$\text{Std}(\Delta \ln y_t)$	0.81	0.85
$\text{Std}(\pi_t^{ann})$	2.17	2.19
$\text{Std}(\pi_t^{w,ann})$	3.45	3.71
$\text{Std}(\hat{n}_t)$	4.99	4.83
$\text{Std}(R_t^{ann})$	3.65	3.12
$\text{Corr}(\Delta \ln y_t, \pi_t^{ann})$	-0.18	-0.23
$\text{Corr}(\Delta \ln y_t, \pi_t^{w,ann})$	-0.12	-0.10
$\text{Corr}(\Delta \ln y_t, \hat{n}_t)$	0.07	0.00

QE in Shallow Liquidity Trap: Risk Evaluation

A. QE in a Shallow Liquidity Trap

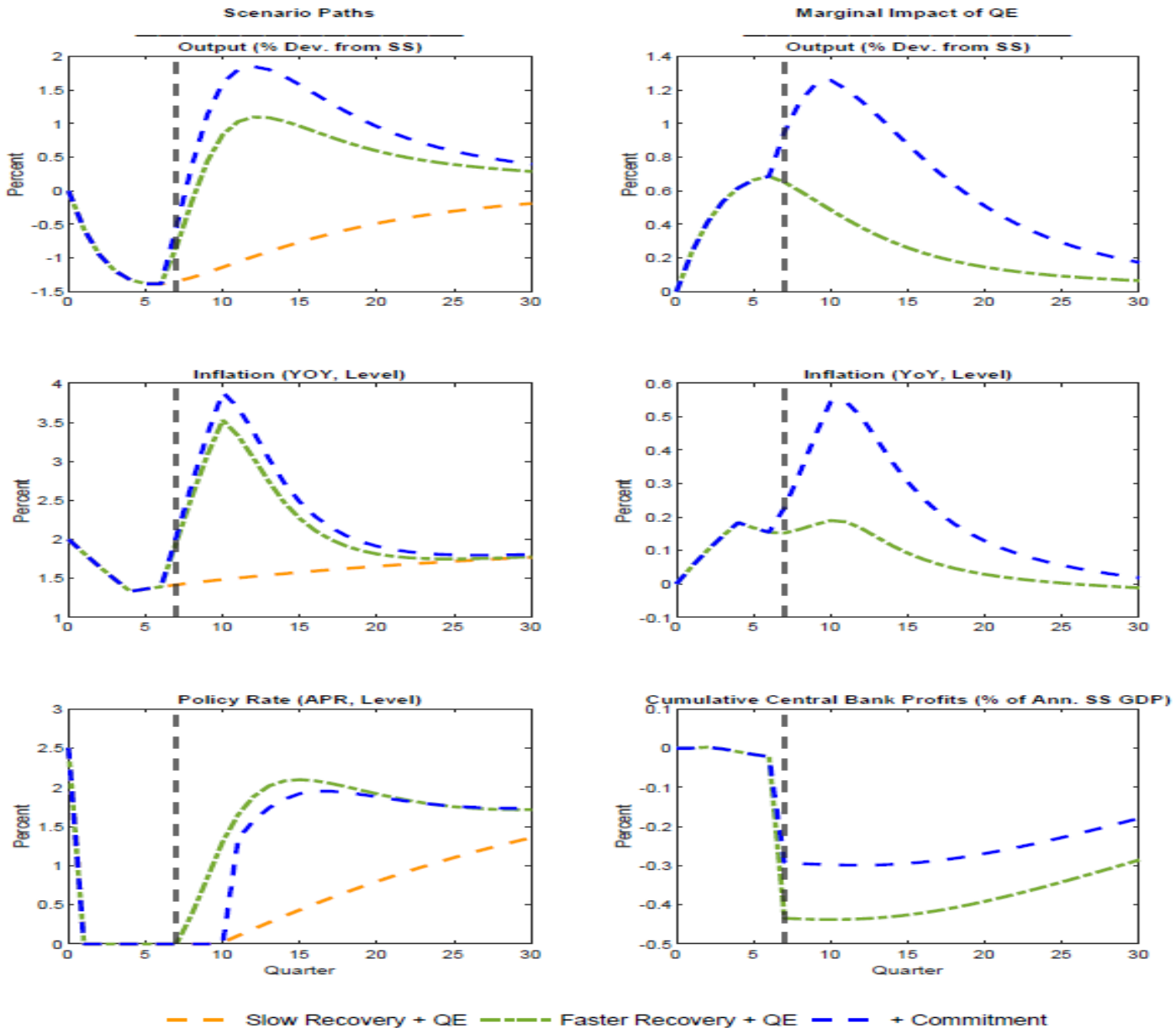


B. Marginal Effect of QE



- Assume more risky conditions:
  - TP initially low (0 instead of 1% APR),
  - QE larger (20% instead of 10% of baseline GDP).
- Upside inflation risk makes earlier and sharp liftoff likely.
- Large downside risk for CB profits.
- Even so, QE likely to benefit consolidated fiscal position.

FG Commitment can Exacerbate QE Overheating Risks



- QE is often accompanied by forward guidance indicating that rates will be unlikely to rise for some time.
- If CB feels “locked into” keeping policy rates low even when it would otherwise raise them, this can trigger more overheating.
- This is shown in the figure, where QE “with commitment” exacerbates output overheating.

4. Concluding Remarks

Conclusions

- Strong rationale for QE in “deep” liquidity traps.
  - Sizeable stimulus, even when economy recovers more quickly than expected.
  - Depresses public debt in contrast to fiscal which boosts debt – which is especially desirable in an environment with limited fiscal space.
- More reason for caution in “shallow” liquidity traps, especially when term premiums are already compressed.
  - Smaller macro benefits, and more risk of overheating and CB losses.
  - Even so, can be worth considering in some circumstances.
- QE likely more effective to boost output and inflation than fiscal stimulus at lower budgetary cost for the government.

Extra Slides

Exchange Rate Channel of QE

- Although we are considering a closed economy variant of the model, QE can propagate via the exchange rate rate in an open economy setup.

- To see this, the model implies that the UIP for long-term bonds is given by

$$\mathbb{E}_t\left\{\hat{P}_{L,t+1} - \hat{P}_{L,t} + \hat{R}_{L,t+1}\right\} = \mathbb{E}_t\left\{\hat{P}^*_{L,t+1} - \hat{P}^*_{L,t} + \hat{R}^*_{L,t+1} + \Delta\hat{S}_{t+1}\right\}$$

- And transaction costs generate a wedge from complete markets UIP:

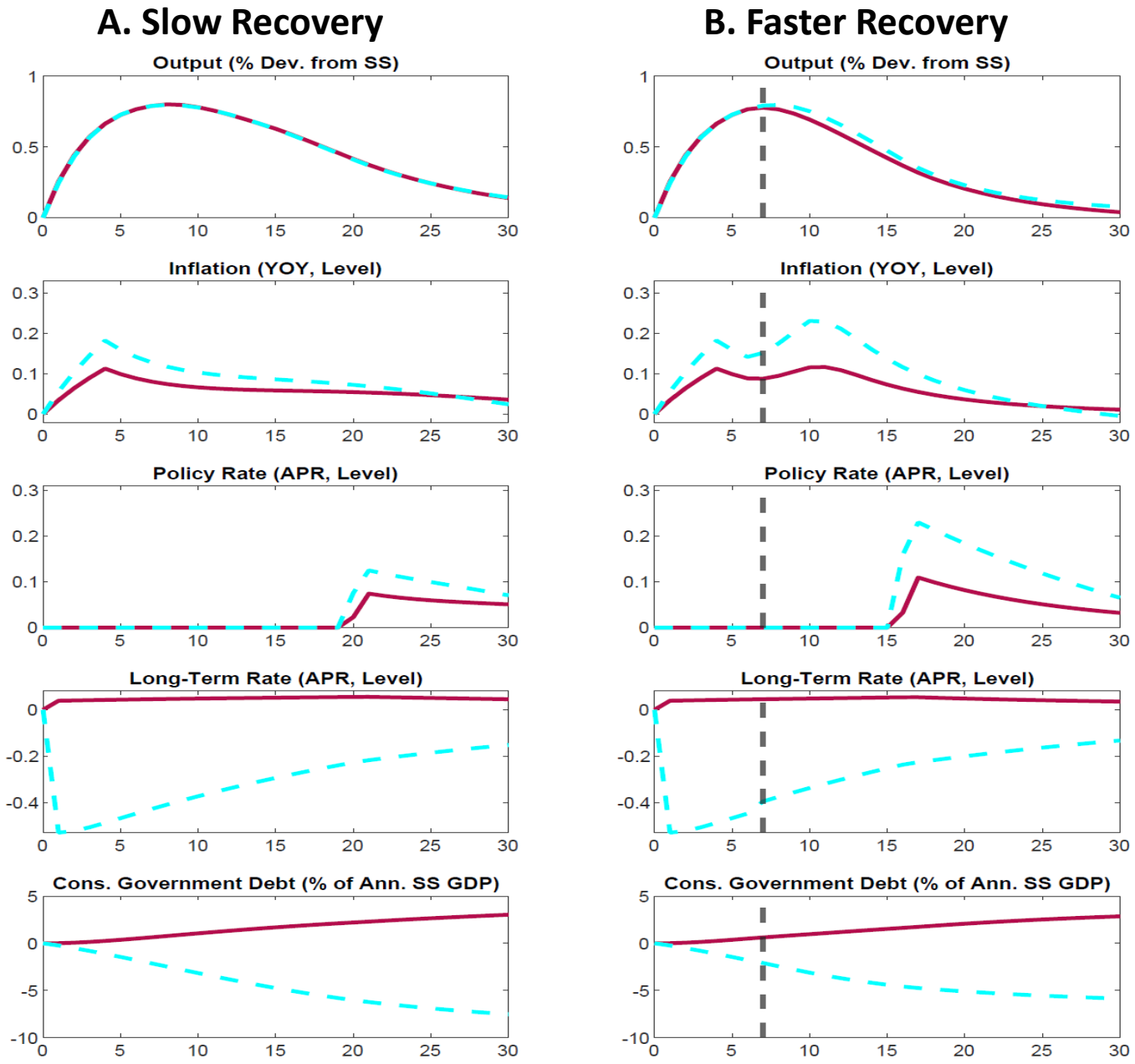
$$\hat{R}_t = \hat{R}^*_t + \mathbb{E}_t\left\{\Delta\hat{S}_{t+1}\right\} + \zeta^*_t - \zeta_t$$

- So that during an episode with QE in the home economy

$$\zeta^*_t - \zeta_t > 0, \qquad \hat{R}_t > \hat{R}^*_t + \mathrm{E}\left\{\Delta\hat{S}_{t+1}\right\}$$

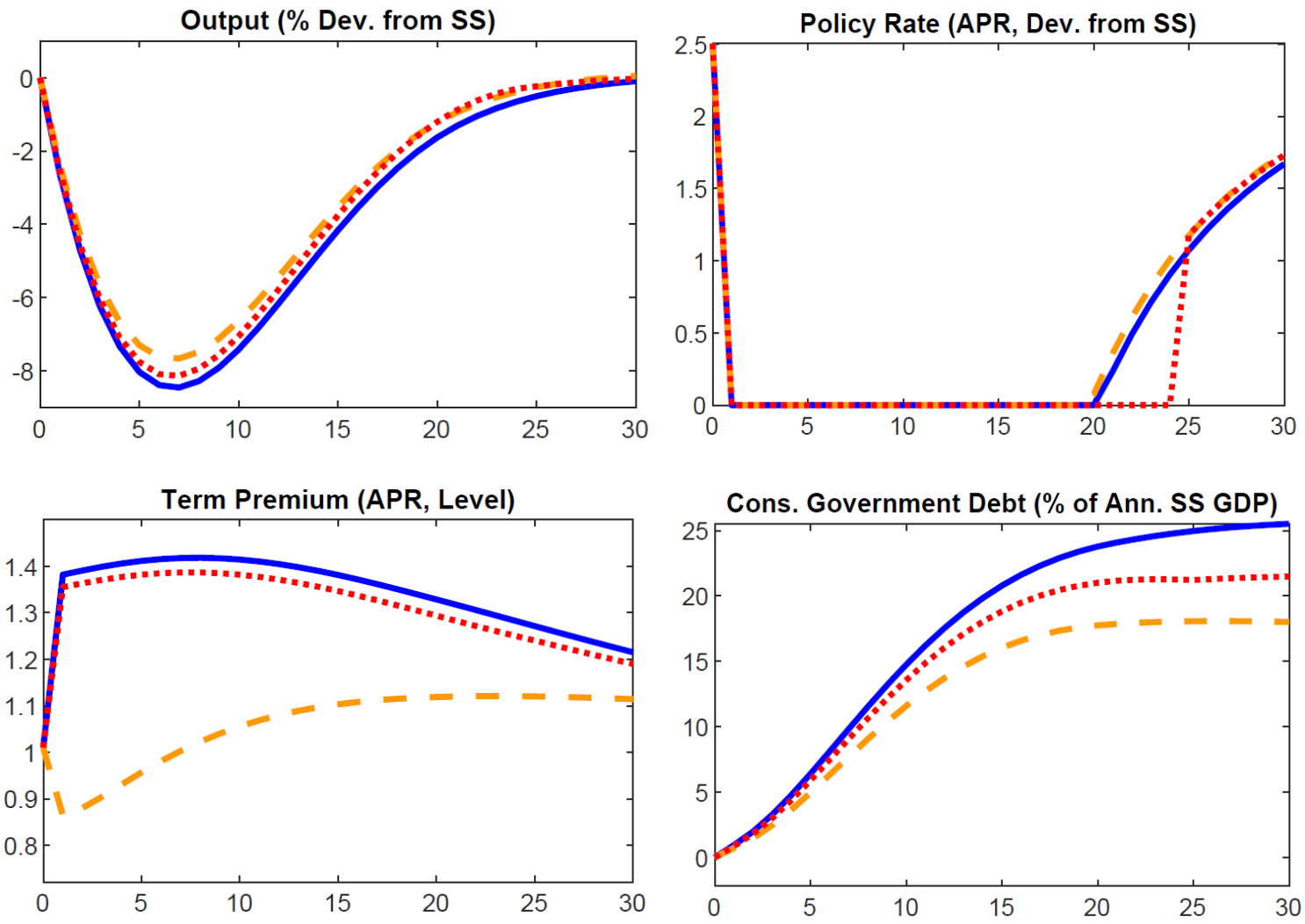
- Implication: QE can be potent in small open economies even if domestic demand channel small (see Kolasa, Laseen and Linde, 2025).

QE vs. Conventional Fiscal Stimulus in Deep Liquidity Trap



- Compare QE with conventional fiscal stimulus (higher G).
- Fiscal stimulus sized to give same output boost as QE.
- Macroeconomic benefits reduced under fiscal stimulus.
  - Smaller boost to inflation.
  - Higher fiscal costs that require higher taxes down the road.
- Future work: Study other fiscal instruments and impact on inequality.

Less Stimulus from Forward Guidance



- Examine if central bank can use forward guidance instead of QE to stimulate the economy.
- Cognitive discounting and kinked demand (flat Phillips curve when inflation is below CBs target) mute effectiveness of forward guidance.
- FG – even if fully credible – provides notably smaller stimulus than QE, and even smaller than here if more gradual liftoff from ELB in baseline.

Related Workstream

1, “Central Bank Exit Strategies: Domestic Transmission and International Spillovers,” Christopher Erceg, Marcin Kolasa, Jesper Lindé, Haroon Mumtaz and Pawel Zabczyk, IMF WP 2024-73

2. “New Perspectives on Quantitative Easing and Central Bank Capital Policies,” Tobias Adrian, Christopher Erceg, Marcin Kolasa, Jesper Lindé, Roger McLeod, Romain Veyrune, and Pawel Zabczyk, IMF WP 2024-103

3. “Monetary Policy and Inflation Scares,” Christopher Erceg, Jesper Lindé, and Mathias Trabandt, IMF WP 2024-260

4. “Unconventional Monetary Policies in Small Open Economies,” Marcin Kolasa, Stefan Laséen, and Jesper Lindé, IMF WP 2025-66