Stabilization versus Sustainability: Macroeconomic Tradeoffs

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Fortuitous Reporting

- If I could have planted an article to appear in the press the day before this conference, this is it:

  "Trichet hints at ECB bond rethink"
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- This paper posits monetary policy behavior of this kind, together with fiscal behavior, to study the effects of macroeconomic policies when the economy is near its *fiscal limit*

Stabilization vs. Sustainability

- A palpable tradeoff to policymakers. . . typically absent from models
- Greece, Ireland, Portugal & Spain: large fiscal contractions in the midst of serious recession
- United Kingdom: announced large spending cuts despite weak recovery
- United States: talk about consolidation in face of tepid growth
- Sweden: government resisted additional fiscal expansion on sustainability grounds
- Japan: long history of fiscal flip-flops even during lost decade

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- Do routine monetary & fiscal policy actions taken to achieve stabilization goals. . .
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- This is an interim report on progress toward answering this increasingly relevant question

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- Three key departures

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- Three key departures
  1. we integrate monetary policy explicitly
  2. we allow the possibility of sovereign debt default & risk premia
  3. we use a model within class of DSGE models used at policy institutions

Paper's Findings

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2. Risky sovereign debt can alter usual stability conditions

3. If sustainability an issue, monetary policy may lose control of inflation *even if it always obeys Taylor principle*

4. Expansionary fiscal consolidations are hard to produce in explicit DSGE models

Simple Analytics

- Endowment, exogenous default fraction $\delta_t \in [0, 1]$
- Active monetary policy & passive fiscal policy
- Two Fisher relations

$$\text{Risky rate } \frac{1}{R_t} = \beta E_t \left[\frac{1 - \delta_{t+1}}{\pi_{t+1}} \right]$$

$$\text{Risk-free rate } \frac{1}{R_t^f} = \beta E_t \left[\frac{1}{\pi_{t+1}} \right]$$

- Fiscal behavior

$$s_t - s^* = \gamma \left[(1 - \delta_t) \frac{B_{t-1}}{P_{t-1}} - b^* \right]$$

$$\text{Passive requires } \gamma > \frac{\beta^{-1} - 1}{1 - E_t \delta_{t+1}}$$

Simple Analytics: Risk-Free Instrument

- Monetary instrument risk-free rate

$$\frac{1}{R_t^f} = \frac{1}{R^*} + \alpha\left(\frac{1}{\pi_t} - \frac{1}{\pi^*}\right) \qquad \alpha/\beta > 1$$

- Yields dynamic equation for inflation

$$\frac{1}{\pi_t} - \frac{1}{\pi^*} = \frac{\beta}{\alpha} E_t\left(\frac{1}{\pi_{t+1}} - \frac{1}{\pi^*}\right)$$

- Unique bounded solution: inflation always on target

$$\pi_t = \pi^*$$

- With passive fiscal policy, default causes no problems for monetary policy's control of inflation

Simple Analytics: Risky Instrument

- Monetary instrument risky rate

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- Yields dynamic equation for inflation

$$\frac{1}{\pi_t} - \frac{1}{\pi^*} = \frac{\beta}{\alpha} E_t\left(\frac{1-\delta_{t+1}}{\pi_{t+1}} - \frac{1}{\pi^*}\right)$$

- Unique bounded solution: inflation always away from target

$$\frac{1}{\pi_t} = \frac{1}{\pi^*}\left(1 - \frac{\beta}{\alpha}\right)\left\{1 + E_t \sum_{i=1}^{\infty}\left(\frac{\beta}{\alpha}\right)^i \prod_{j=1}^{i}(1-\delta_{t+j})\right\}$$

- With passive fiscal policy, inflation rises with expected default

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- Repo contracts use government bonds as collateral
  - policy rate inherits some of the risk
  - even if overnight rate has tiny risk, rolling over repos makes effective rate of borrowing from CB reflect default risk over rollover period
  - CBs do not seem to reduce rates in face of default risk
  - effective cost of borrowing from CB has fallen
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- Risky rate rule implies (with fixed default rate)

$$\frac{1}{R_t^f} = \frac{1}{R^*} + \frac{\alpha}{1-\delta}\left[\frac{1}{\pi_t} - \left(\frac{1}{\pi^*} - \frac{\delta}{\alpha R^*}\right)\right]$$

- Higher δ: bonds lose value, raises aggregate demand & inflation
- New channel by which default risk raises inflation

Numerical Model

- Off-the-shelf new Keynesian model
  - elastic labor, fixed capital, costly price adjustment
  - tax on labor income, nominal debt, exogenous spending & transfers
  - interest rate rule for monetary policy
  - tax rule for fiscal policy
  - model-based “fiscal limit”
  - default rule
- Solve full non-linear model
  - find fixed point in decision rules over discretized state space
  - calibrate—loosely—to Greek fiscal data

The Fiscal Limit

- Peak of Laffer curve a natural fiscal limit, given spending
- Peak a function of exogenous state & model parameters

$$\tau_t^{\max} = \tau^{\max}(A_t, g_t)$$
$$T_t^{\max} = T^{\max}(A_t, g_t)$$

- Fiscal limit $\equiv$ maximum expected PV surpluses (inflation & transfers at steady state)

$$\mathcal{B}^* = E\sum_{t=0}^{\infty}\beta^t \underbrace{\beta_t^p}_{\text{political factor}} \frac{u_c^{\max}(A_t, g_t)}{u_c^{\max}(A_0, g_0)}\left(T^{\max}(A_t, g_t) - g_t - z\right)$$

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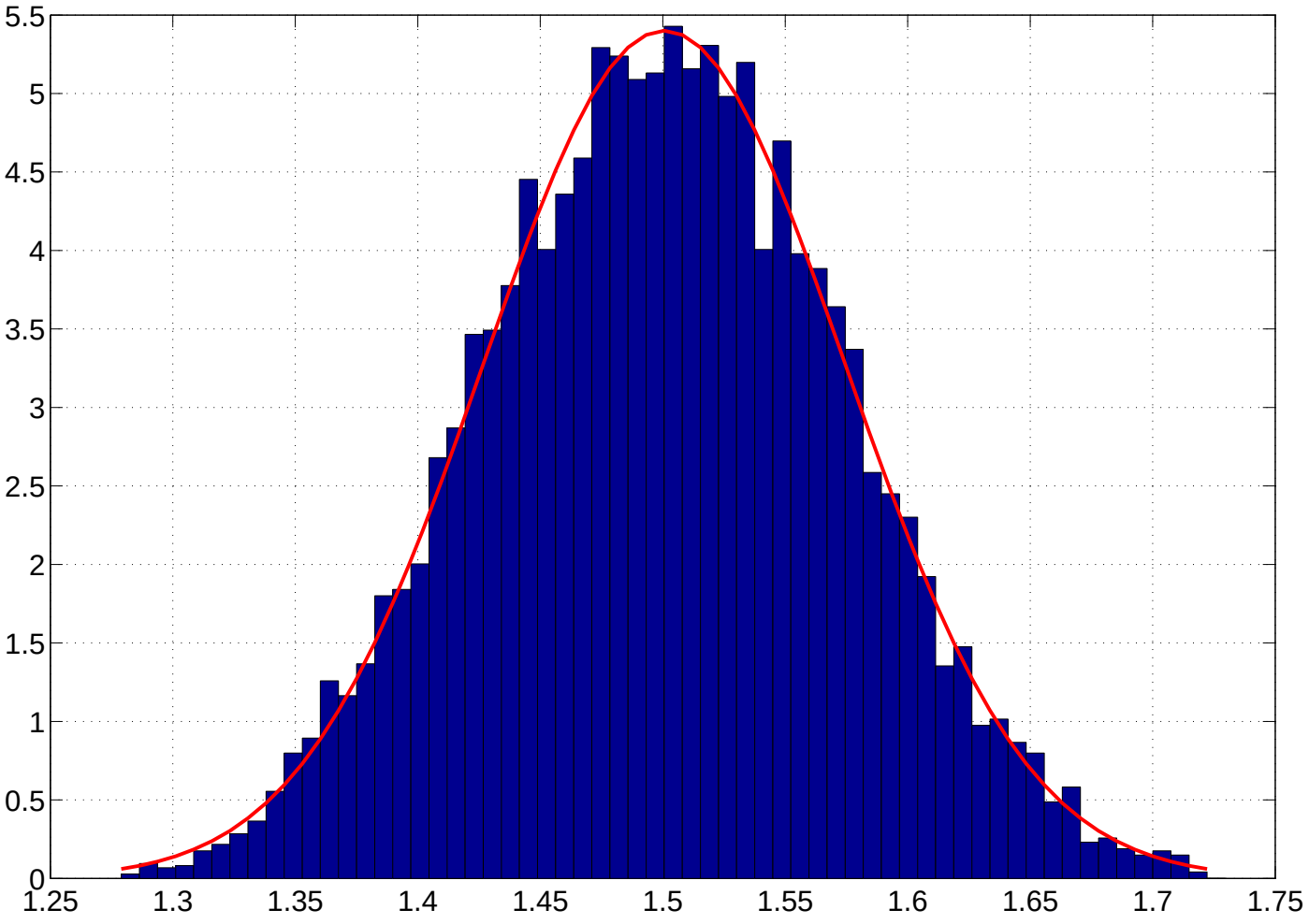
- Political risk: $\beta_t^p \in \{\beta_L^p, \beta_H^p\} \sim$ Markov chain
  - policymakers have higher discount factors than private agents
  - uncertainty about whether maximum surpluses will be forthcoming
  - $\beta^p < 1$ necessary to generate risk premia at plausible debt-GDP levels
- Compute model-based unconditional distribution of fiscal limit, $f(\mathcal{B}^*)$

Distribution of Fiscal Limit



$f(\mathcal{B}^*)$: Debt to Steady-State GDP Ratio

Default Rule

- Optimal, strategic default generates default at implausibly low debt levels
- *Effective fiscal limit* is $\mathcal{B}_t$ drawn from $\mathcal{N}(\bar{\mathcal{B}}^*, \sigma^2_{\mathcal{B}})$
  - choice of effective fiscal limit is random
  - determined by political considerations: *willingness* to meet obligations
  - fiscal limit, $f(\mathcal{B}^*)$, *ability* to meet obligations

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- Fixed default:

$$\delta_t = \begin{cases} \delta & \text{if } b_{t-1} > \mathcal{B}_t \text{ (Above Effective Fiscal Limit)} \\ 0 & \text{if } b_{t-1} \leq \mathcal{B}_t \text{ (Below Effective Fiscal Limit)} \end{cases}$$

- With partial default, debt outstanding at beginning of period t is

$$b^d_t = (1 - \delta_t) b_{t-1}$$

Decision Rules

- Important non-linearities
- Over the range of the fiscal limit—130%-170% debt-GDP
  - default probability rises rapidly
  - risk premia $\mathcal{S}$-shaped
  - interest rates and inflation inherit $\mathcal{S}$ shape
  - output non-monotonic

Policy Disturbances

- Exogenous monetary contraction or fiscal expansion when
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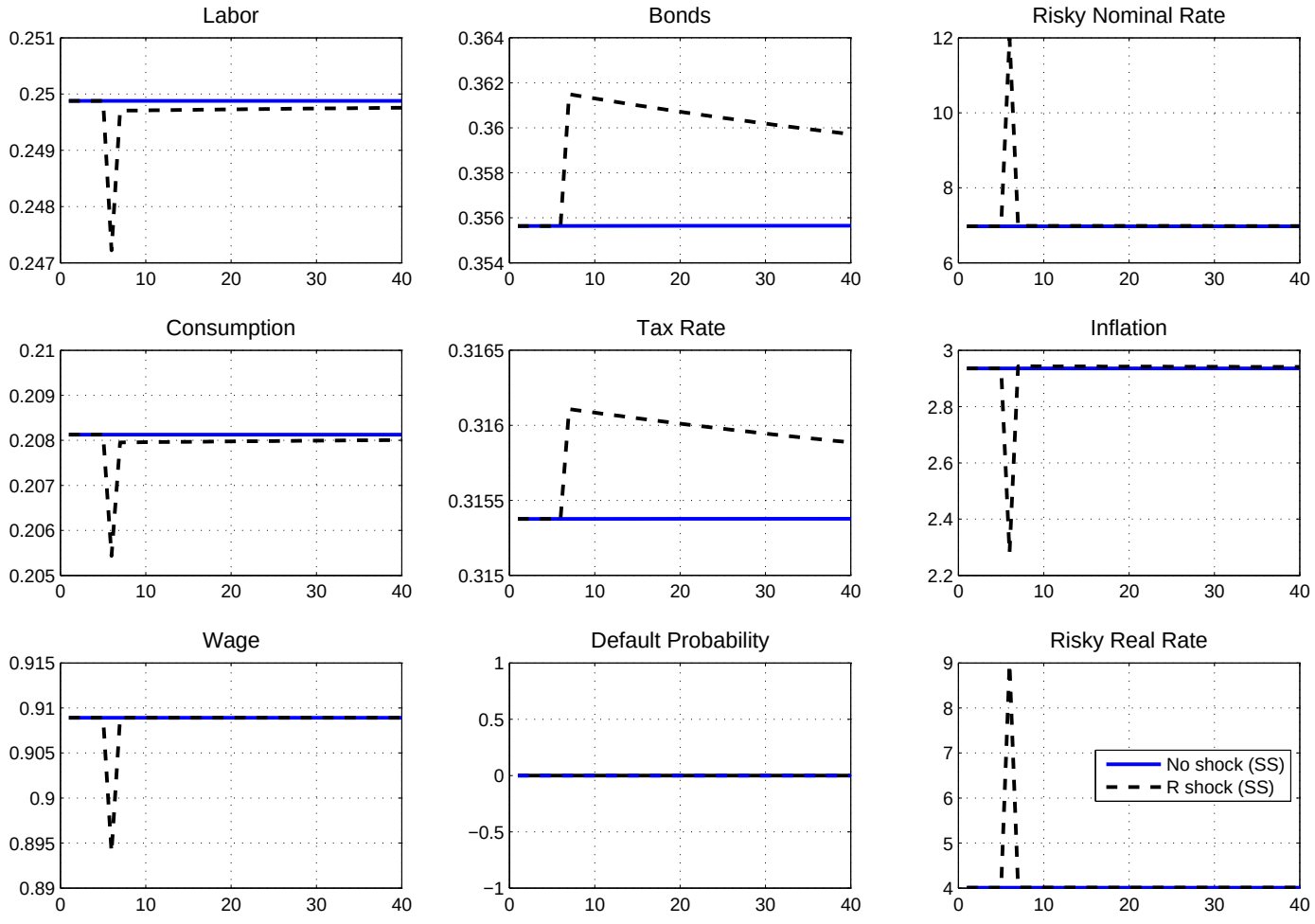
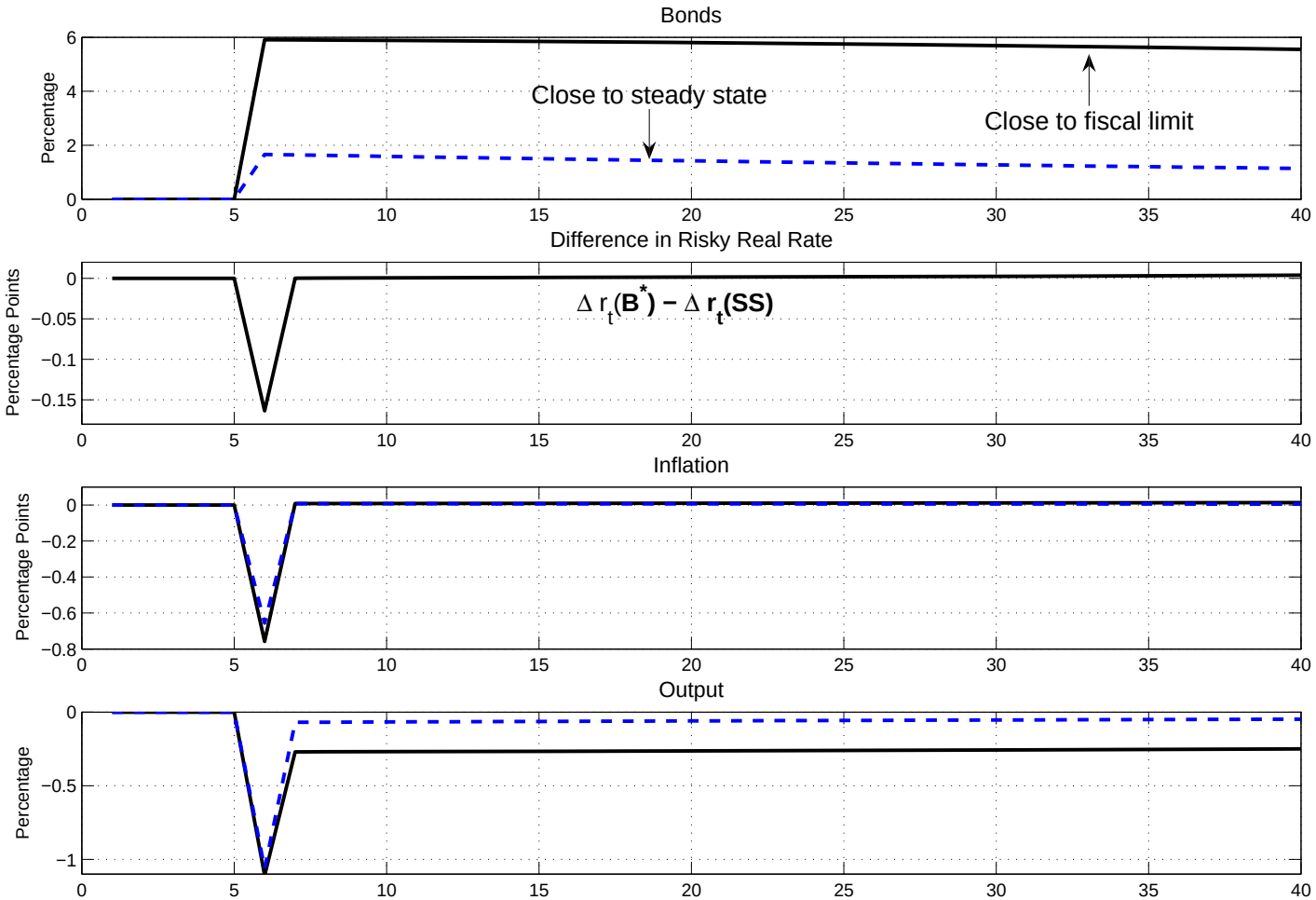
- Exogenous monetary contraction or fiscal expansion when
  - debt-GDP at steady state
  - debt-GDP near fiscal limit
- Four distinct sources of dynamics
  1. initial policy disturbance
  2. intrinsic dynamics when debt away from steady state
  3. dynamics stemming from possibility of default & risk premia
  4. specification of monetary policy instrument
- Report differences in time paths with and without policy shock, contrasting when debt is away from and near to the fiscal limit

Monetary Contraction: Away from Fiscal Limit



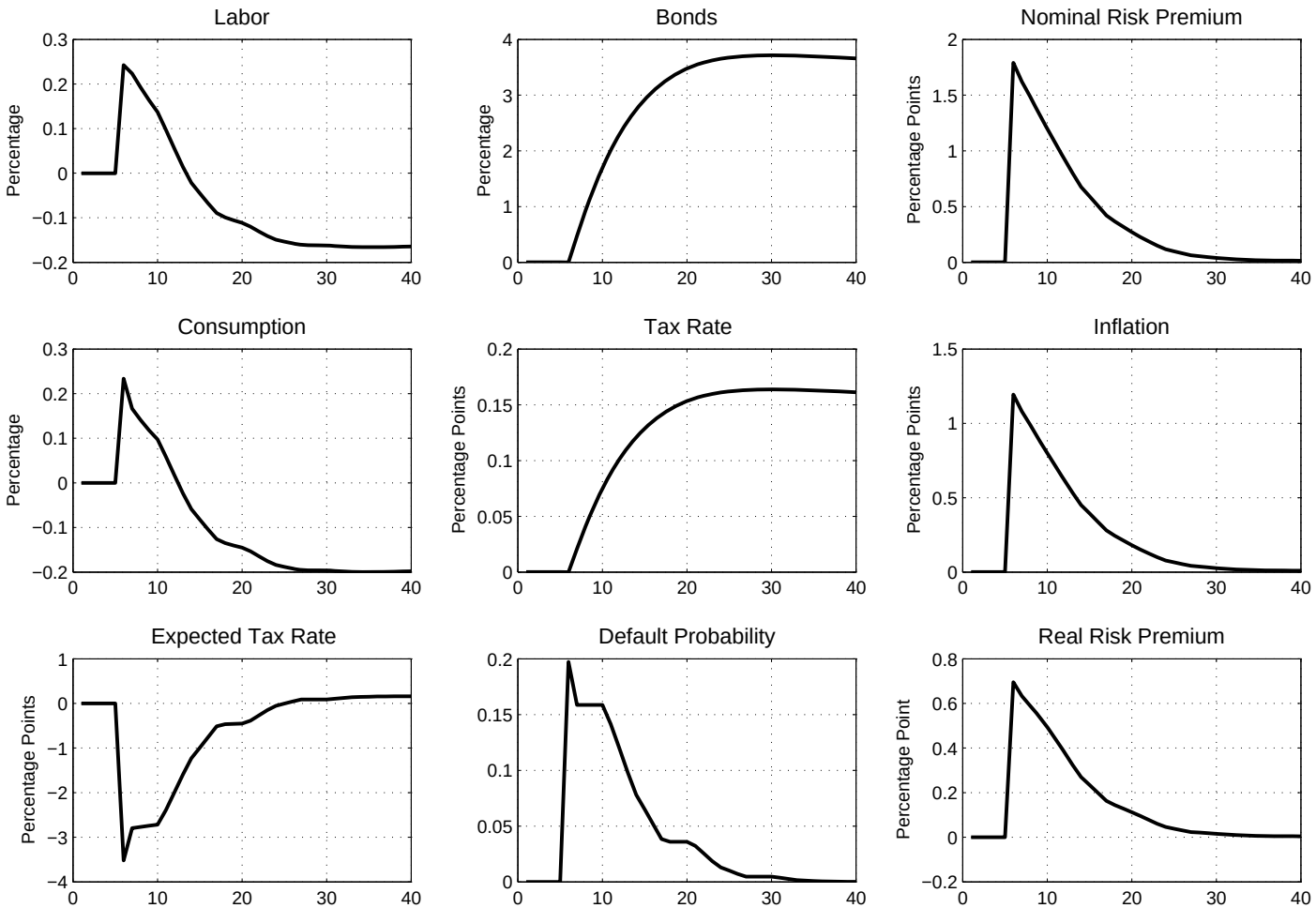
Conventional effects of i.i.d. monetary contraction

Monetary Contraction: No Default



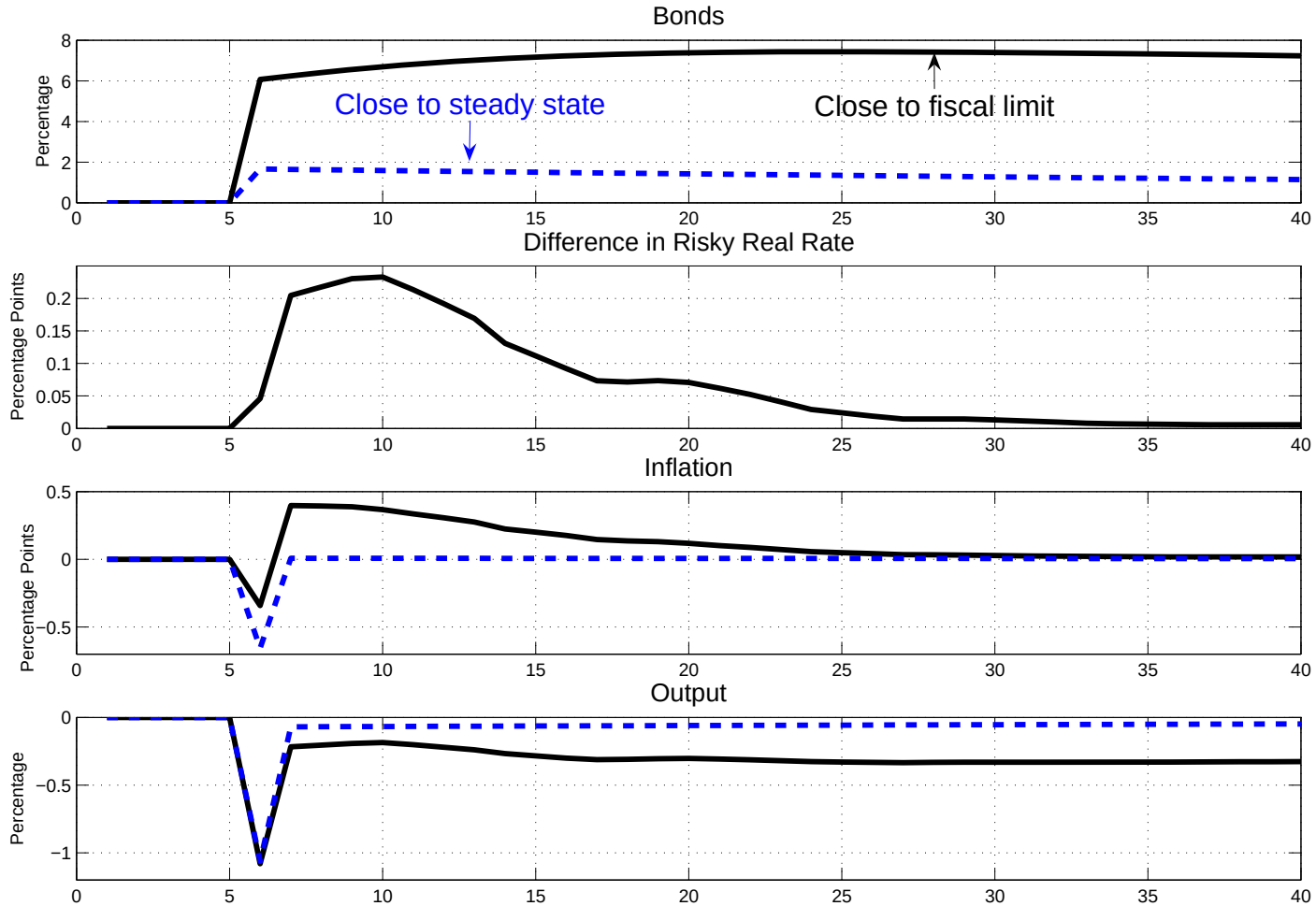
Difference in paths with an i.i.d. monetary contraction and without in model that rules out default

Monetary Contraction: Effect of Default



Difference in paths from solving with default rule and with $\delta_t \equiv 0$, conditional on debt being near the fiscal limit

Monetary Contraction: Effect of Default



Difference in paths with an i.i.d. monetary contraction and without in model where default is possible

Monetary Contraction: Synopsis

- Monetary contraction in economy close to fiscal limit
  - raises debt service through
    - more debt in hands of public
    - higher real interest rates
  - lower output reduces revenues, reinforcing rise in debt
  - higher debt raises $\Pr(b_{t-1} > \mathcal{B}_t)$, raising risk premia
  - monetary policy accommodates, lowering risk-free rate (relatively)
  - inflation falls initially, then rises
  - tax policy passively raises tax rates with debt
- Output decline larger
- Inflation higher, despite active monetary/passive fiscal policies

Fiscal Expansion: No Default

- Usual effects
  - negative wealth effect raises employment & output
  - higher demand for goods raises inflation & interest rates
  - output multiplier < 1; consumption multiplier < 0
  - longer run: labor taxes rise, employment & output fall

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- Complications at high debt
  - larger fiscal impacts from surprise inflation & interest rates
  - effect of tax rates on revenues different near peak of Laffer curve
  - differences at high debt include
    - smaller rise in inflation, debt, and taxes
    - monetary policy raises real rates by less

Fiscal Expansion: Effect of Default

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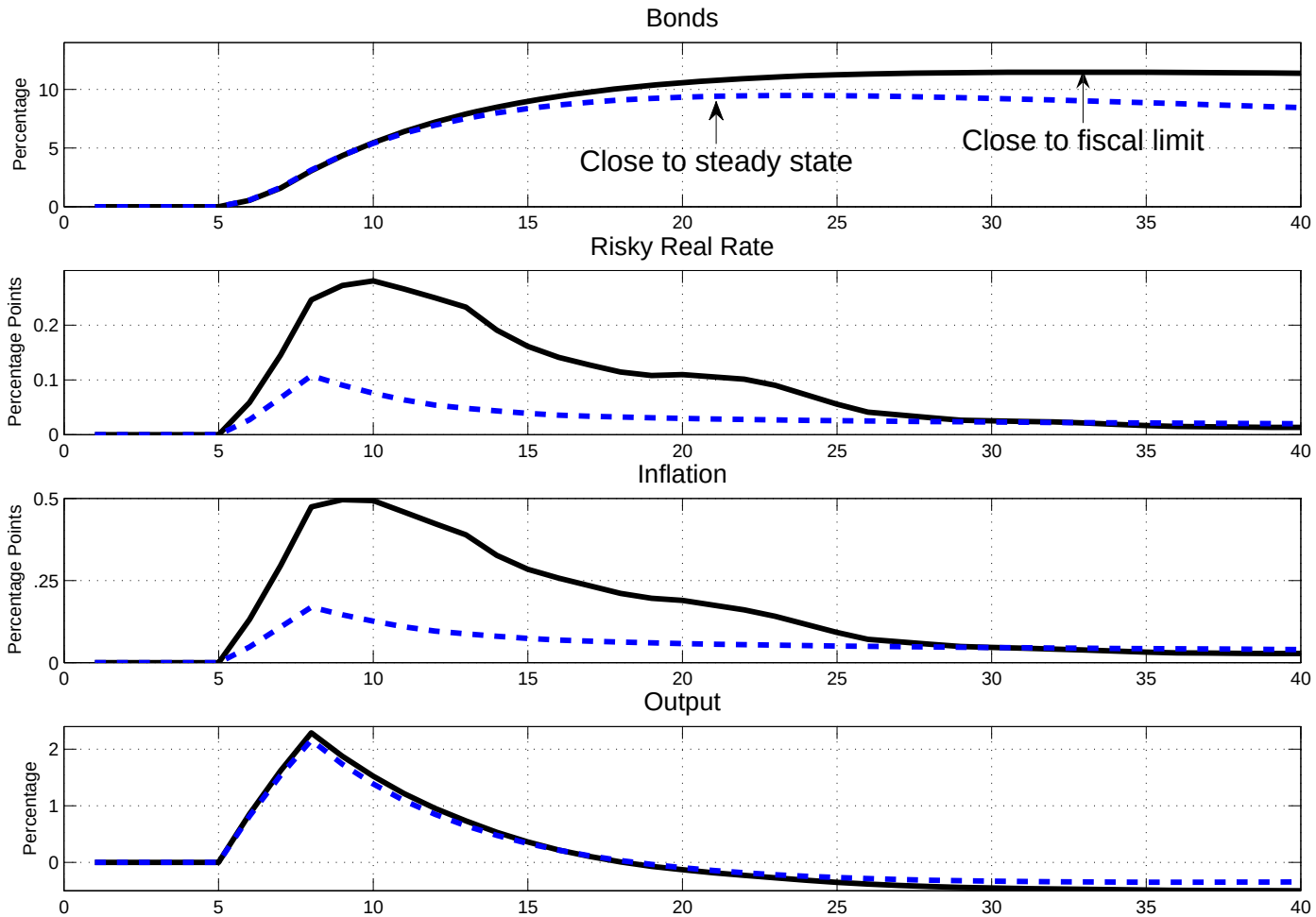
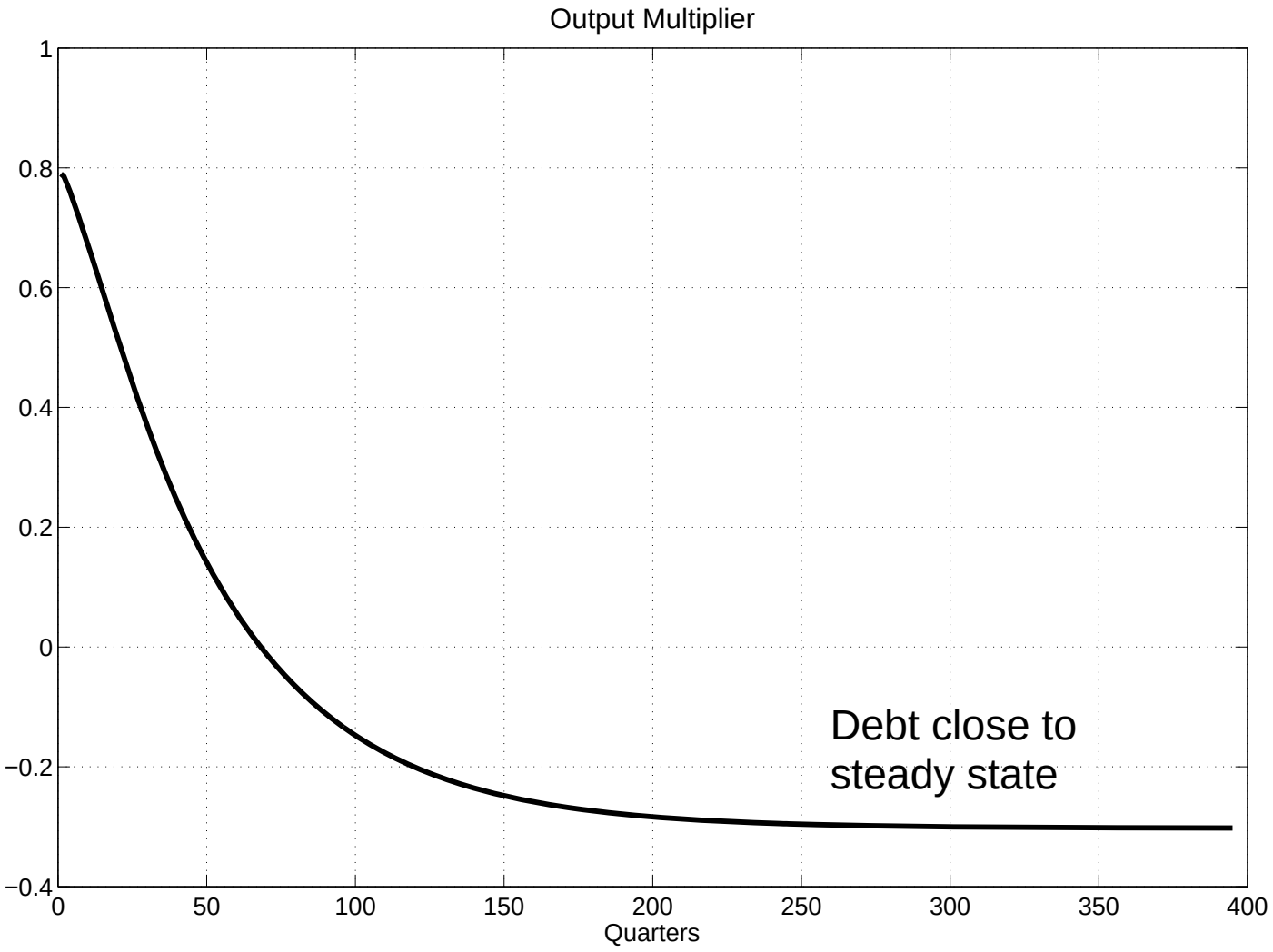
- Some observations
  - this is a model that produces only modest spending multipliers
  - unlike a monetary contraction, a fiscal expansion generates countervailing effects on the fiscal state
  - fiscal effects symmetric, even near fiscal limit
- Important long-run differences emerge near the limit

Fiscal Expansion: Effect of Default



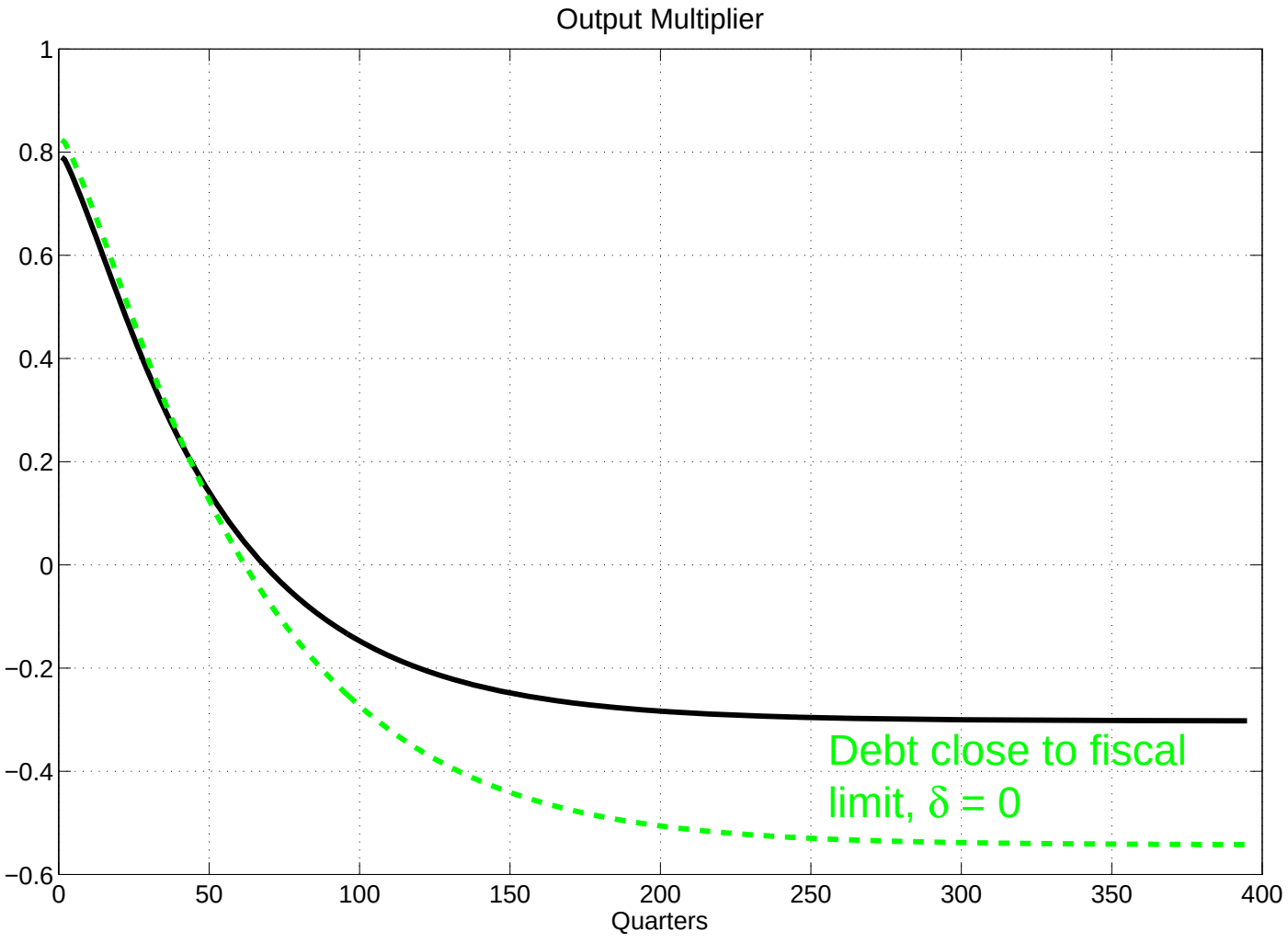
Difference in paths with a serially correlated government spending expansion and without the expansion in model where default is possible

Fiscal Expansion: Long-Run Output Effects



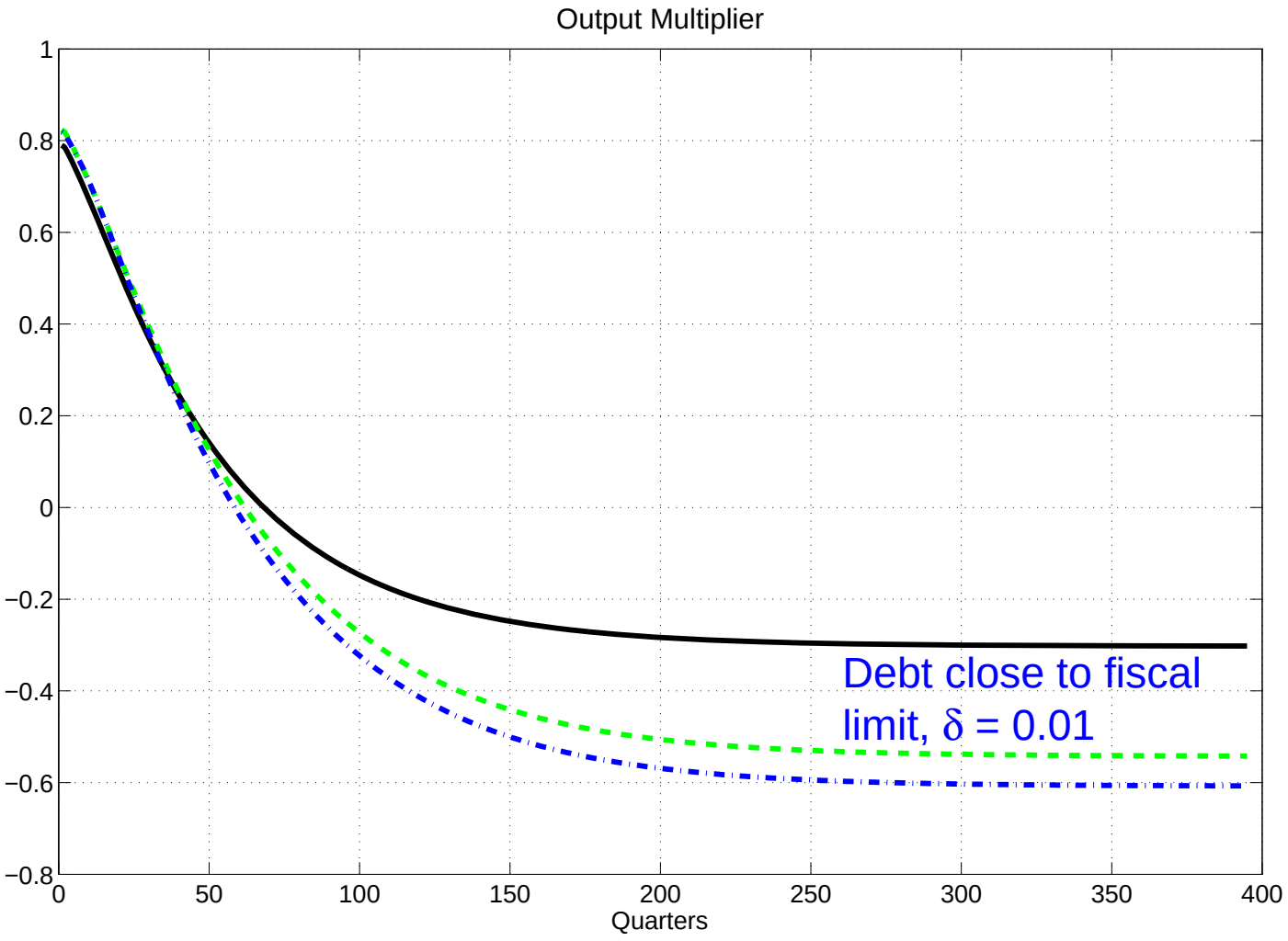
At steady state

Fiscal Expansion: Long-Run Output Effects



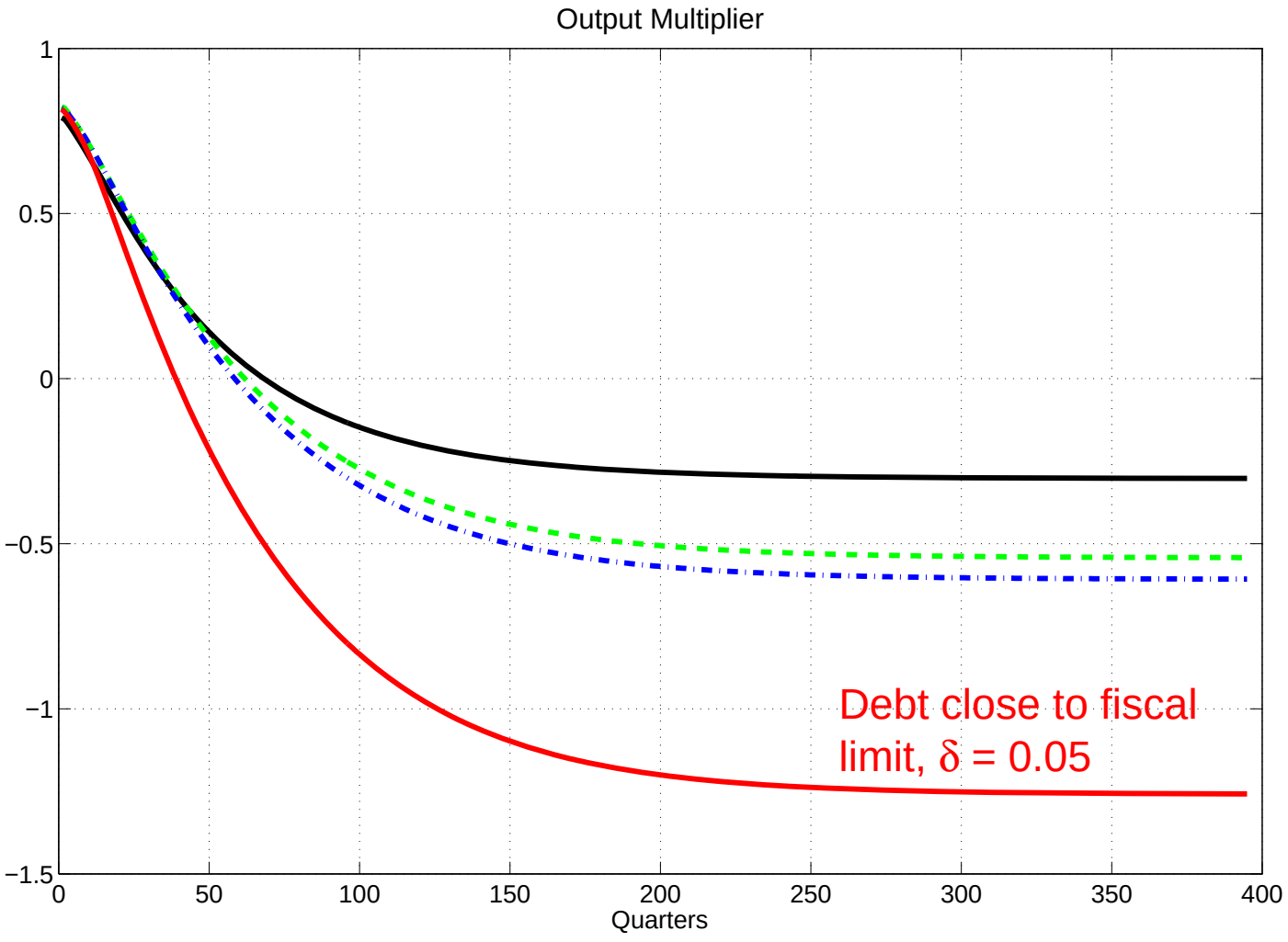
Near fiscal limit: No default

Fiscal Expansion: Long-Run Output Effects



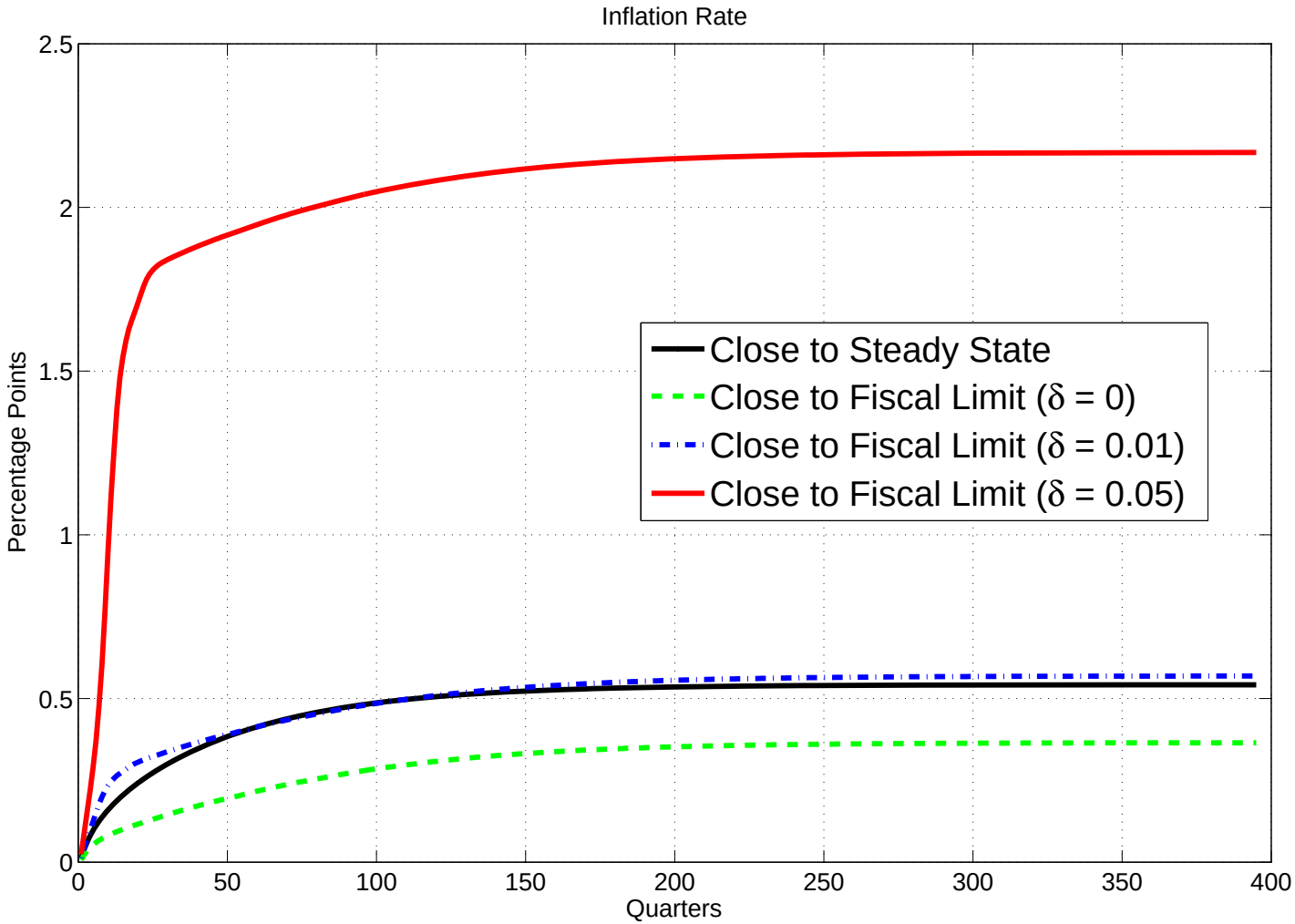
Near fiscal limit: Small default rate

Fiscal Expansion: Long-Run Output Effects



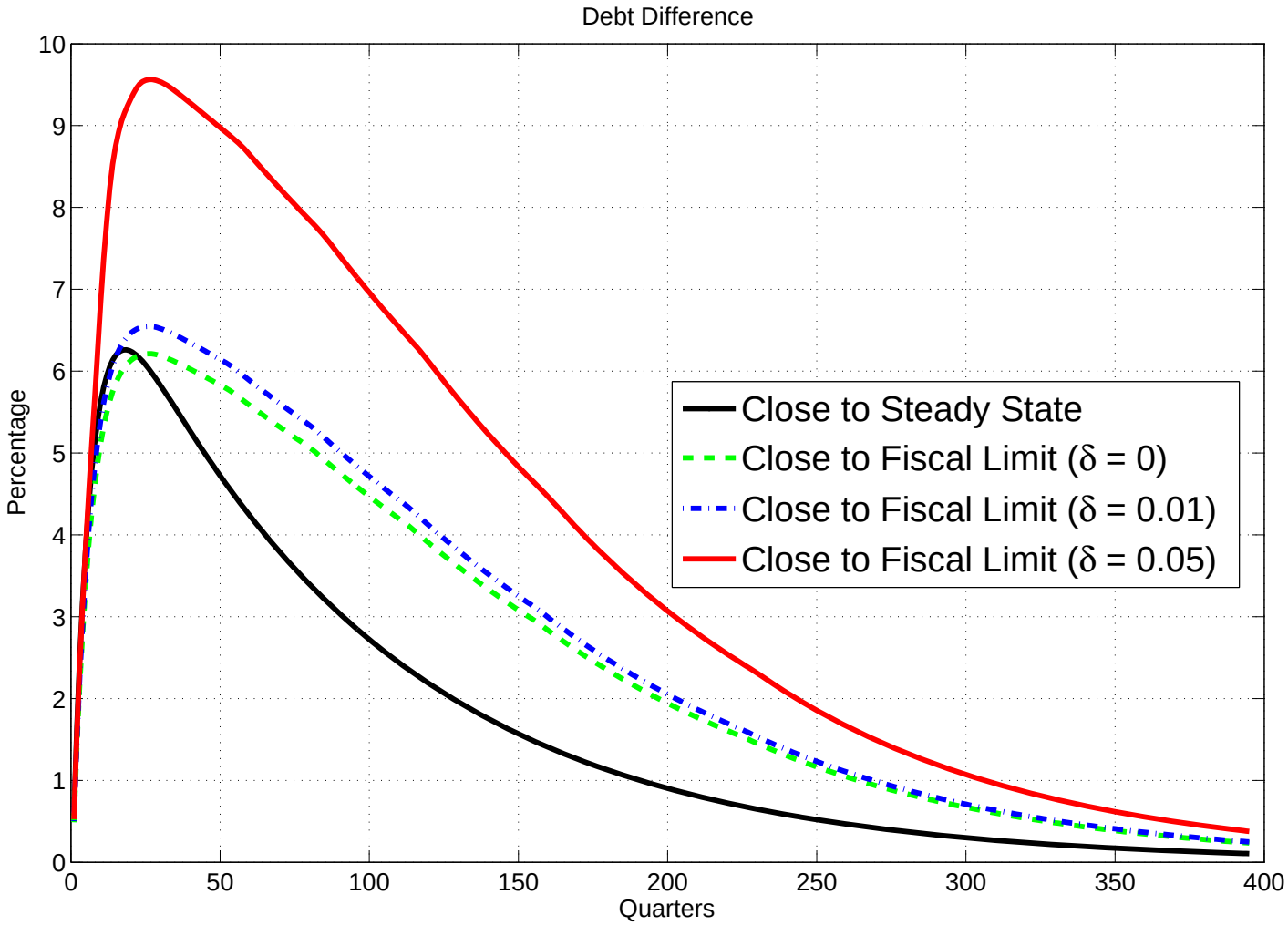
Near fiscal limit: Higher default rate

Fiscal Expansion: Long-Run Inflation Effects



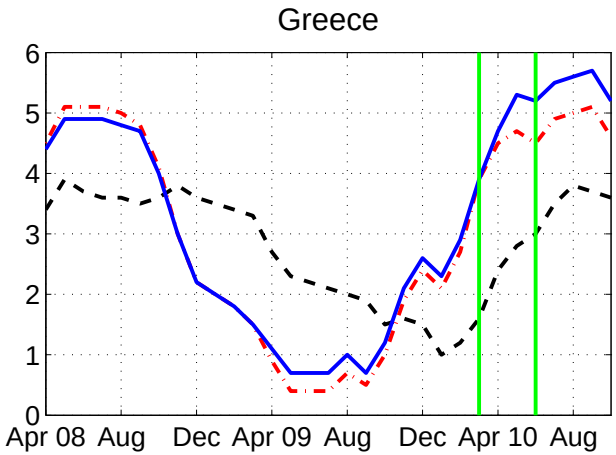
Inflation away from and near to fiscal limit: Various default rates

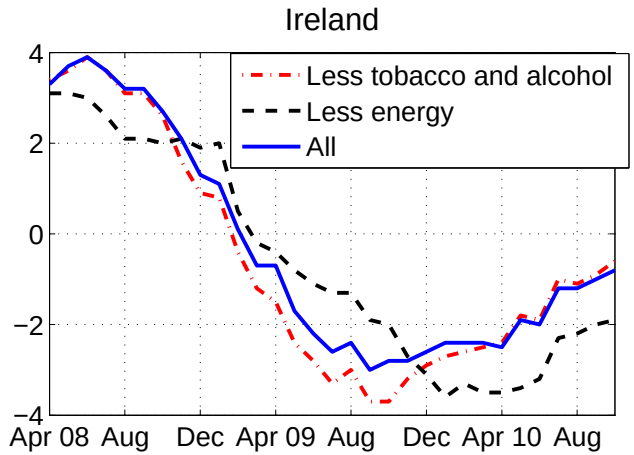
Fiscal Expansion: Long-Run Debt Dynamics

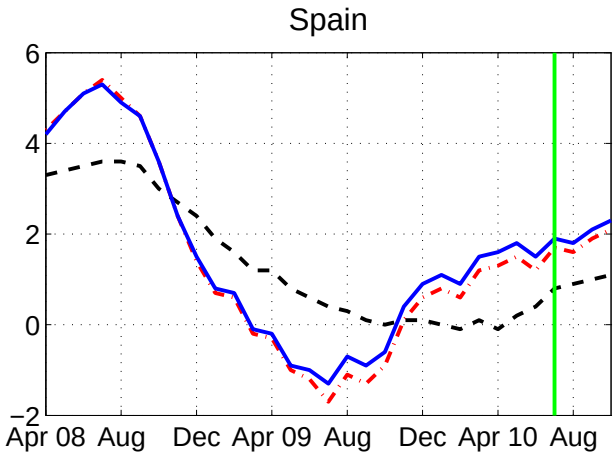


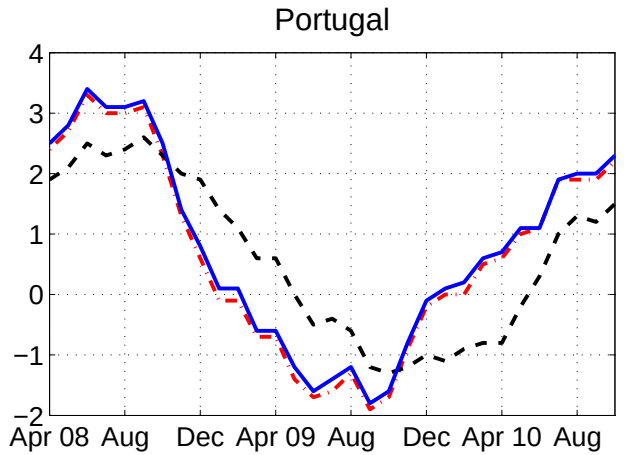
Debt away from and near to fiscal limit: Various default rates

Suggestive Pictures: Inflation









Green vertical lines are dates of VAT increases

Suggestive Pictures: Inflation & Risk Premia