Regime Switching in Fiscal Debt Targets and Policy Functions in the United States

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Describe fiscal policy dynamics

Government expenditures
Income tax rate
Net transfer payments
Deficits
Debt

Describe debt service

1. How do these fiscal policy variables respond to *debt / GDP*?
2. What is the implied target for *debt / GDP*?
3. Is there switching in these fiscal policy responses?
4. Is there switching in the long-run debt target?

Describe stabilizing behavior

1. How do fiscal policy variables respond to *output gap*?
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Purpose

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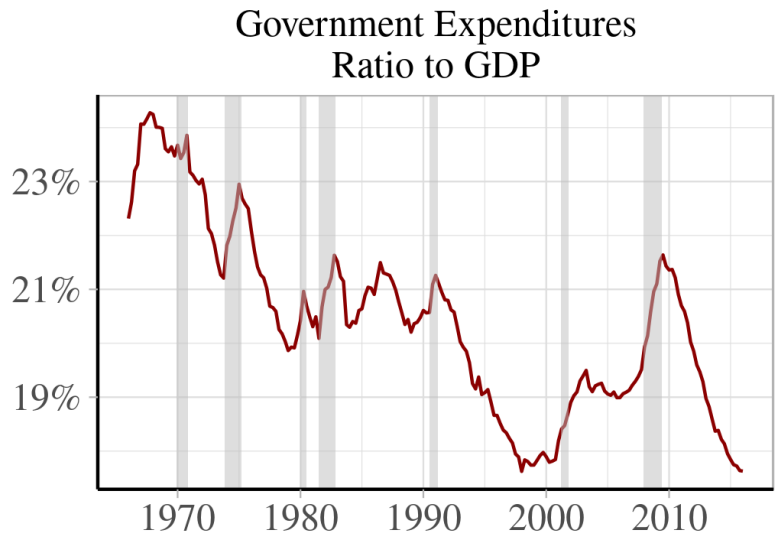
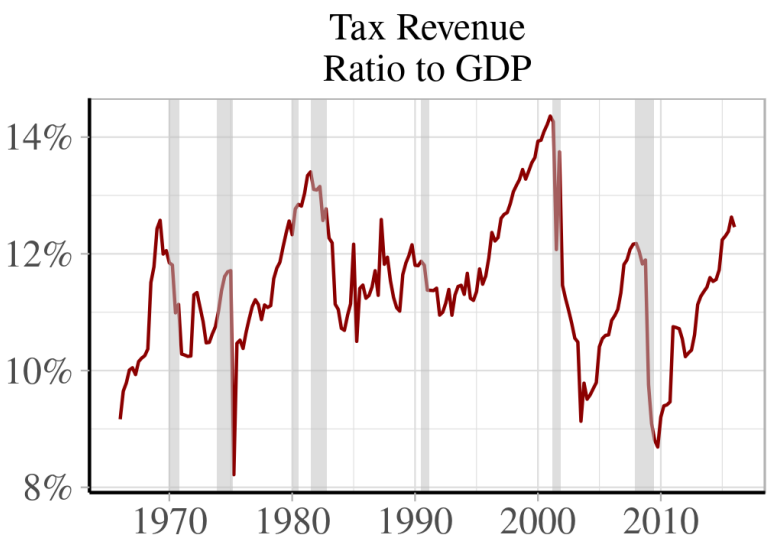
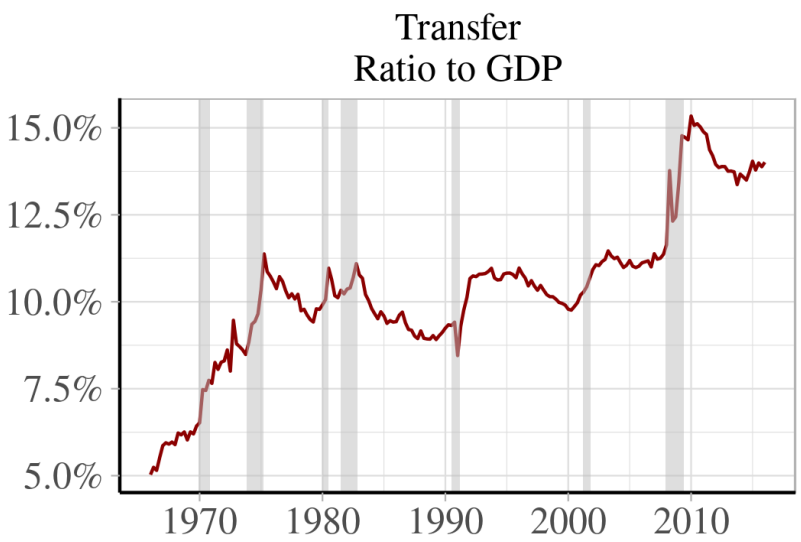
Fiscal Variables







Target Policy Behavior

- Use government expenditures to stabilize business cycle
  $\rightarrow$ **Decrease gov exp** in response to output gap
- **Decrease government expenditures** in response to rising debt

Structure

$$g_t^* = \bar{g}(s_t) + \psi_g(s_t)x_t + \gamma_g(s_t)\left[b_{t-1} - \bar{b}(s_t)\right] + u_{g,t},$$

- $s_t \in \{1, .., M\}$: Fiscal regime... more later
- $\bar{g}(s_t)$: Long-run government expenditures / GDP goal
- b_{t-1}: Lagged government debt / GDP ratio
- $\bar{b}(s_t)$ Long-run goal debt / GDP ratio
- $\psi_g(s_t) < 0$: Response to increase in output gap
- $\gamma_g(s_t) < 0$: Response to increase in government debt
- $u_{g,t}$: Shock to government expenditures

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Target Policy Behavior

- Use taxes to stabilize business cycle
  $\rightarrow$ **Increase taxes** in response to output gap
- **Increase taxes** in response to rising debt

Target Tax Policy

$$\tau_t^* = \bar{\tau}(s_t) + \psi_\tau(s_t)x_t + \gamma_\tau(s_t)\left[b_{t-1} - \bar{b}(s_t)\right] + u_{\tau,t}$$

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Target Policy Behavior

- Use transfers to stabilize business cycle
  $\rightarrow$ **Decrease transfers** in response to output gap
- **Decrease transfers** in response to rising debt

Target Transfers Policy

$$n_t^* = \bar{n}(s_t) + \psi_n(s_t)x_t + \gamma_n(s_t)\left[b_{t-1} - \bar{b}(s_t)\right] + u_{n,t}$$

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Primary Budget Deficit

$$d_t = \tau_t - g_t - n_t + \tilde{d}_t$$

$\tilde{d}_t$: Deficit residual
(Other expenditure or revenue items I did not include)

Deficit Residual Behavior

$$d_t^* = \bar{\tilde{d}}(s_t) + \psi_d(s_t)x_t + \gamma_d(s_t)\left[b_{t-1} - \bar{b}(s_t)\right] + u_{d,t}$$

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Regime-dependent variances for fiscal shocks

$\sigma_g^2(s_t)$: Var(shock to gov exp)
$\sigma_n^2(s_t)$: Var(shock to transfers)
$\sigma_\tau(s_t)$: Var(shock to taxes)
$\sigma_d^2(s_t)$: Var(shock to deficits)

Correlations of fiscal shocks

- Fiscal policy decisions are dependent on one another.
- Consider all possible correlations:

$$\varrho_{g,\tau},\ \varrho_{\tau,n},\ \varrho_{g,n},\ \varrho_{\tau,d},\ \varrho_{g,d},\ \varrho_{n,d}$$

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Long-run Debt Target Regimes

Regime L: *Low* long-run target for debt/GDP (low value for $\bar{b}(s_t)$)

Regime H: *High* long-run target for debt/GDP (high value for $\bar{b}(s_t)$)

Fiscal Financing

- Targets for fiscal components: $\bar{g}(s_t)$, $\bar{\tau}(s_t)$, $\bar{n}(s_t)$, $\bar{d}(s_t)$
- Behavior toward output gap and debt: $\psi_f(s_t)$ and $\gamma_f(s_t)$, for $f \in \{g, \tau, n, \tilde{d}\}$

Regime A: Fiscal behavior A

Regime B: Fiscal behavior B

Fiscal Volatility

Two regimes to determine variances, $\sigma_g^2(s_t)$, $\sigma_\tau^2(s_t)$, $\sigma_n^2(s_t)$, and $\sigma_d^2(s_t)$:

Regime S: *Stable*, relatively smaller variances

Regime V: *Volatile*, relatively larger variances

Three Sources for Regime Switching

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Markov regime switching

Regime switches randomly, each source **independently** of other sources

- $p_L = P(s_t = L|s_{t-1} = L)$ be prob policy remains in reg L
- $p_H = P(s_t = H|s_{t-1} = H)$ be prob policy remains in reg H
- $p_A = P(s_t = A|s_{t-1} = A)$ be prob policy remains in reg A
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- $p_A = P(s_t = V|s_{t-1} = V)$ be prob policy remains in reg V

Rich Set of Regime-Switching Possibilities

- Changes in priorities for taxes, transfers, spending, *without adjusting long-run targets for debt/GDP*
- Changes in debt-targets, *without adjusting purposes and priorities for fiscal components*
- Changes in volatility of fiscal outcomes, *without changing goals or purposes*

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Fiscal policy variables

1. Nominal government expenditures: NIPA Table 1.1.5, Line 22
2. Tax revenue: NIPA Table 3.2, Line 3
3. Net transfers: Federal current transfer pmts - receipts
   - NIPA Table 3.2, (Line 25 - Line 18)
4. Primary budget deficit:
   - (-) net federal government saving - federal interest payments
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5. Government debt: Federal debt held by the public (U.S. Dept of Treasury)

Remaining variables

6. Nominal GDP: NIPA Table 1.1.5, Line 1
7. Output gap: Difference between NGDP and potential GDP
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Posterior Parameter Distributions Under Regimes A & B

Param.	Description	Fiscal Regime A Median	Fiscal Regime A 90% Bounds	Fiscal Regime B Median	Fiscal Regime B 90% Bounds
$\bar{g}$	Long-run gov target	0.19	(0.18, 0.20)	0.31	(0.29, 0.32)
ψ_g	Resp to output gap	-0.32	(-0.38, -0.28)	-0.43	(-0.45, -0.39)
γ_g	Resp to debt	-0.55	(-0.61, -0.49)	-0.44	(-0.50, -0.40)

Description

- Fiscal Regime A has **lower long-run** government expenditures
- Fiscal regime A has gov exp **less responsive to output gap**
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$\bar{\tau}$	Long-run tax target	0.14	(0.13, 0.14)	0.28	(0.25, 0.29)
ψ_τ	Resp to output gap	0.69	(0.68, 0.72)	0.47	(0.44, 0.55)
γ_τ	Resp to debt	0.25	(0.23, 0.29)	0.34	(0.26, 0.44)

Description

- Fiscal Regime A has **lower long-run** tax target
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$\bar{n}$	Long-run transfers	0.11	(0.10, 0.13)	0.18	(0.17, 0.20)
ψ_n	Resp to output gap	-0.46	(-0.49, -0.41)	-0.50	(-0.54, -0.43)
γ_n	Resp to debt	-0.33	(-0.37, -0.26)	-0.51	(-0.55, -0.47)

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- Fiscal Regime A has **lower long-run** transfers
- Regimes are **not different on responsiveness to output gap**
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Posterior Parameter Distributions Under Low & High Debt Regimes

Param.	Description	Low Debt Regime Median	Low Debt Regime 90% Bounds	High Debt Regime Median	High Debt Regime 90% Bounds
$\bar{b}$	Debt/GDP target	0.37	(0.34, 0.39)	0.60	(0.55, 0.64)

Debt Regimes

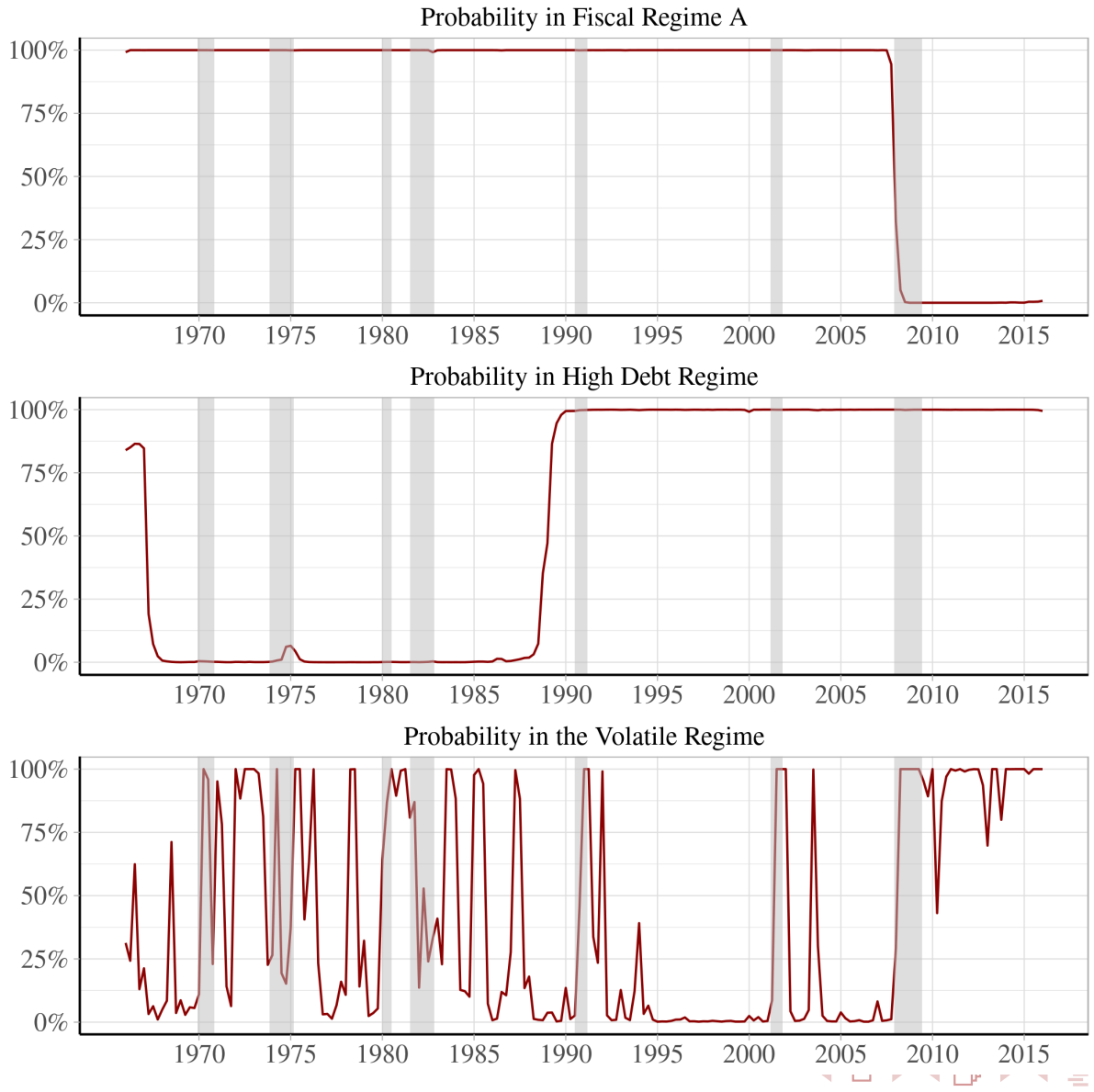
Low debt regime $\approx$ 37% of GDP
High debt regime $\approx$ 60% of GDP

Posterior Parameter Distributions Under Stable and Volatile Regimes

		Stable Regime		Volatile Regime	
Param.	Description	Median	90% Bounds	Median	90% Bounds
σ_g	Gov stdev	0.10	(0.09, 0.11)	0.19	(0.17, 0.22)
σ_τ	Tax stdev	0.10	(0.10, 0.11)	0.29	(0.28, 0.30)
σ_n	Transfers stdev	0.06	(0.06, 0.08)	0.22	(0.19, 0.26)
σ_d	Deficit stdev	0.08	(0.08, 0.10)	0.20	(0.19, 0.22)

All standard deviations are larger in volatile regime,
most more than double.

Timing of Fiscal Regimes



- Evidence of switching in all three dimensions.
- Switch from low-debt to high-debt regime in 1989.
- Single, permanent, switch in fiscal policy behavior in 2008.
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