Fiscal Policy in Monetary Unions: State Partisanship And Macroeconomic Policy

– preliminary – comments welcome –

Jerry Carlino [1] Thorsten Drautzburg [1] Bob Inman [2] Nick Zarra [3]

[1]FRB Philadelphia [2]Wharton [3]NYU Stern

AEA Annual Meeting
Atlanta, January 4 – 6, 2019

Big picture

1. Measured political polarization has risen in the U.S. since 1960s.
   (Andris et al., 2015, McCarty et al., 2016, Azzimonti, 2018)

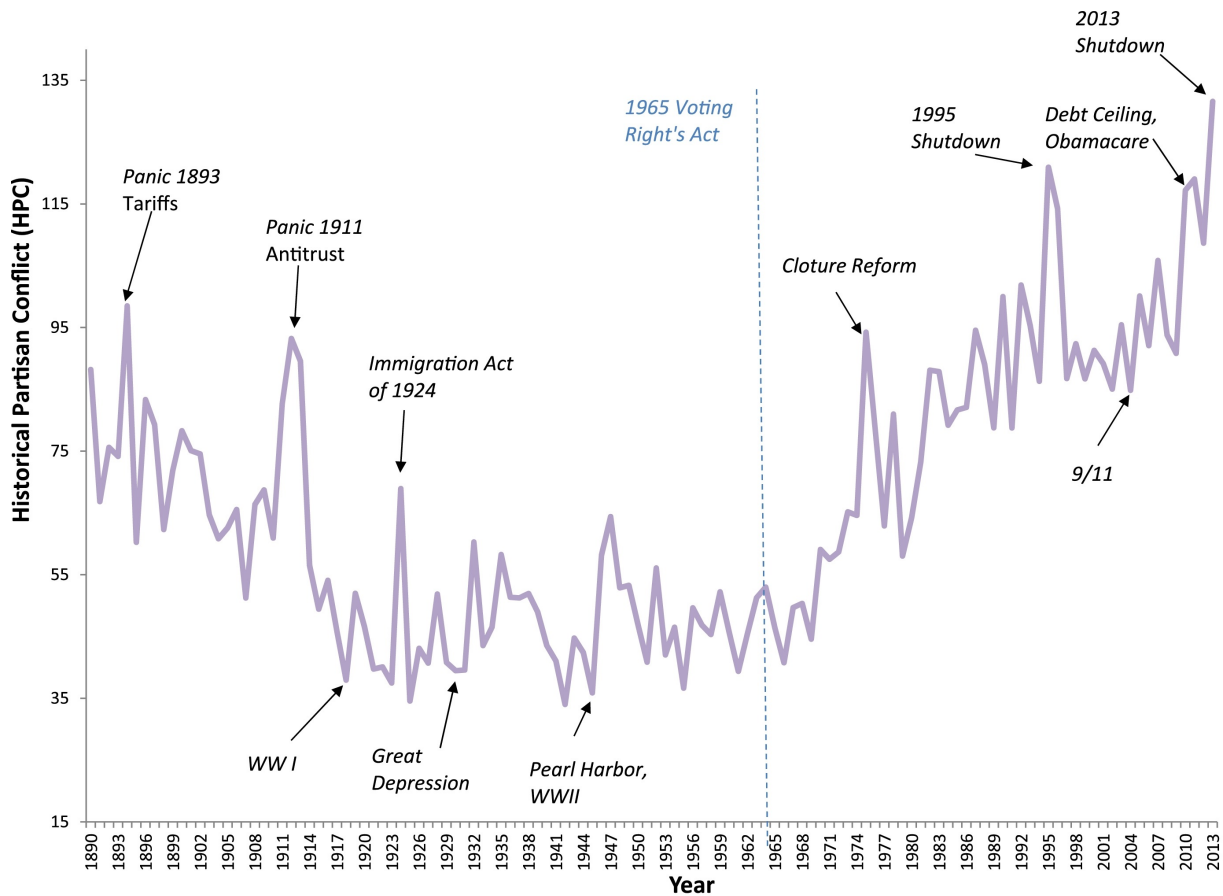
2. Unclear consequences:
   - Empirically: Gridlock or more partisan policies? (Binder, 1999)
   - Theoretically: Ideological polarization need not lead to more polarized fiscal policies. (Krasa & Polborn, 2014)

3. Are state governors partisan in their fiscal policies?
   (Anecdotally: Yes – see the Medicaid expansion.)

4. If so, are there macroeconomic effects?

Big picture

1. Measured political polarization has risen in the U.S. since 1960s. (Andris et al., 2015, McCarty et al., 2016, Azzimonti, 2018)



Big picture

1. Measured political polarization has risen in the U.S. since 1960s.
   (Andris et al., 2015, McCarty et al., 2016, Azzimonti, 2018)

2. Unclear consequences:
   - Empirically: Gridlock or more partisan policies? (Binder, 1999)
   - Theoretically: Ideological polarization need not lead to more polarized fiscal policies. (Krasa & Polborn, 2014)

3. Are state governors partisan in their fiscal policies?
   (Anecdotally: Yes – see the Medicaid expansion.)

4. If so, are there macroeconomic effects?

This paper

1. State-level panel of close elections: Estimate causal effects.
   - $\Rightarrow$ Unconditionally, few partisan differences in fiscal policies.
   - $\Rightarrow$ Significant differences in response to federal transfers: Democrats spend more, Republicans have lower taxes.

2. New-Keynesian model with "Republican" and "Democratic" states: Quantify aggregate effects.
   - $\Rightarrow$ GDP federal transfers multiplier lower in the presence of Republicans.
   - $\Rightarrow$ Effects of fiscal politics vary with the share of Republican governors.

3. Reduced-form time series model: Validate structural model.
   - $\Rightarrow$ Multipliers indeed vary with share of governors.

Literature

1. Public finance:
   - U.S. partisan differences: Besley & Case (2003), Lee et al. (2004), Ferreira and Gyourko (2009), Beland (2015).
   - Intergovernmental transfers: Gramlich (1969), Inman (1971, 2009), Hines & Thaler (1995), Leduc & Wilson (2017).
2. Political economy:
   - Polarization: Andris et al. (2015), McCarty et al. (2016), Azzimonti (2018); Binder (1999), Krasa & Polborn (2014).
   - Opportunistic business cycles: Nordhaus (1975), Alesina & Roubini (1992).
   - Opportunistic budget cycles: Keech & Pak (1989), Alesina et al. (1992), Alesina & Paradisi (2017).
   - Partisan political cycles: Hibbs (1977, 1994), Alesina (1987, 1988a,b), Alesina et al. (1997), Blinder & Watson (2016).
3. Fiscal policy:
   - Regional and national multipliers: Nakamura & Steinsson (2014), Chodorow-Reich (2017), Farhi & Werning (2017), Dupor et al. (2018)
   - Dissecting "G": Carlino & Inman (2013), Oh & Reis (2012), Drautzburg & Uhlig(2015), Bermperoglou et al. (2017)
   - Taxes: Blanchard and Perotti (2002), Mountford & Uhlig (2009), Mertens & Ravn (2013, 2014)
   - Time-varying multipliers: Auerbach & Gorodnichenko (2012a,b), Ramey & Zubairy (2018).

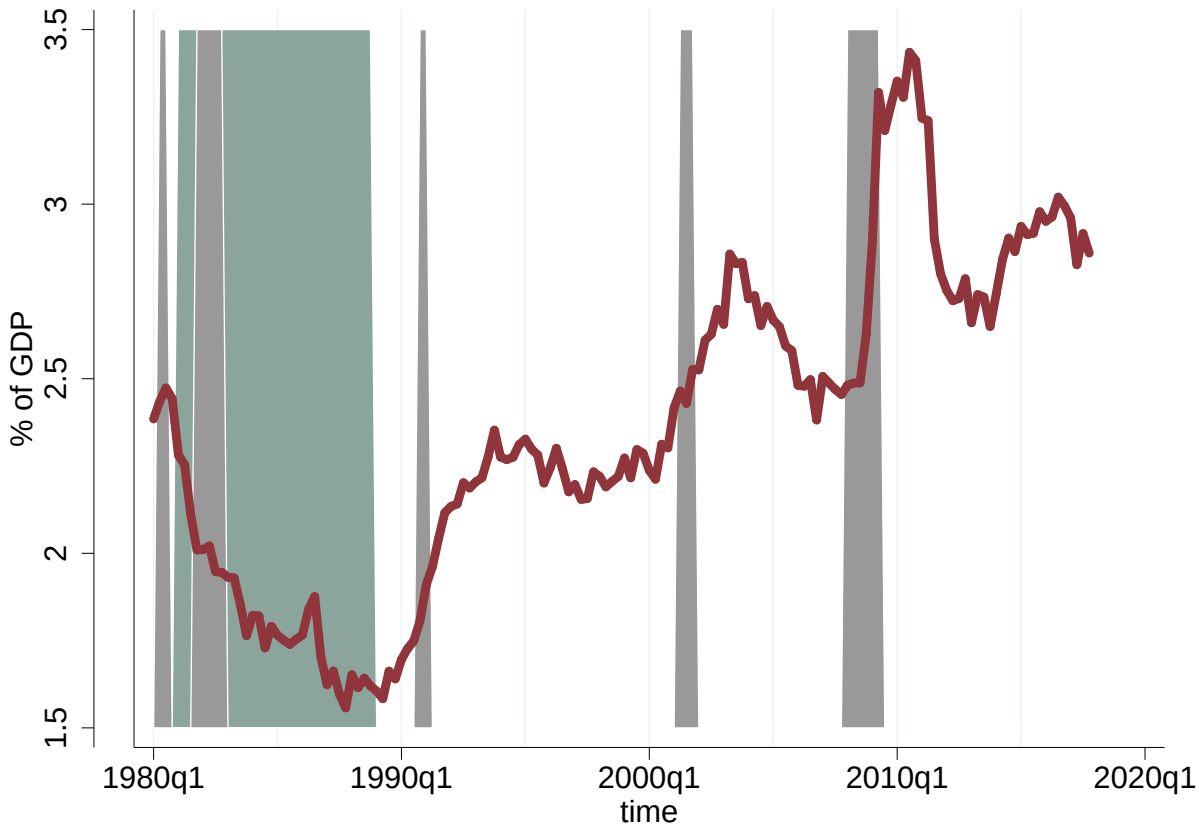
Why intergovernmental transfers?

- Anecdotally: Partisan take-up of Obama-era Medicaid expansion.
- At the state level, intergovernmental (IG) transfers account for 25% of revenue. ▸ budget share
- In NIPA, IG transfers have grown increasingly important:
  - ≈3% of GDP in 2017, less than 0.5% in 1947.
  - ≈13% of federal expenditures in 2017, less than 2.5% in 1947.
  - NIPA measure understates importance. ▸ precise annual measure

Intergovernmental transfers

- Systematic and discretionary components: ▸ precise annual measure
  - Discretion: Reagan cuts to revenue sharing.
  - Systematic: Countercylical increases in 1991 and ▸ 2009 recessions.

$$\Delta \log \frac{IG_t}{GDP_{t-1}} = \underset{[0.89]}{0.002} + \underset{[1.82]}{0.023} \times \mathbf{1}\{Recession\}_t - \underset{[2.53]}{0.020} \times \mathbf{1}\{Reagan\}_t, \quad N = 152.$$



Are intergovernmental transfers fungible?

- How many dollars of federal transfers pass through to spending?
- "The Flypaper Effect" (Hines & Thaler, 1995).

Some Estimates of the Flypaper Effect

Author	*Sample*	*Change in spending as grant changes*
Inman (1971)	Panel study of 41 city budgets	1.00
Weicher (1972)	State aid to 106 municipal governments	0.90
Weicher (1972)	State grants to independent school districts	0.40
Gramlich and Galper (1973)	Federal grants to local and state governments	0.43
Gramlich and Galper (1973)	Federal and state aid to 10 large urban governments	0.25
Bowman (1974)	Federal education grants to West Virginia school districts	1.06
Bowman (1974)	State grants to West Virginia school districts	0.50
Feldstein (1975)	State grants to Massachusetts towns	0.60
Olmsted, Denzau and Roberts (1993)	Missouri state aid to local school districts	0.58
Case, Hines and Rosen (1993)	Federal grants to 48 states, 1970–1985	0.65

0.25 to 1.06

- Leduc & Wilson (2017): 2.40 for state highway spending.

Data

Economic data

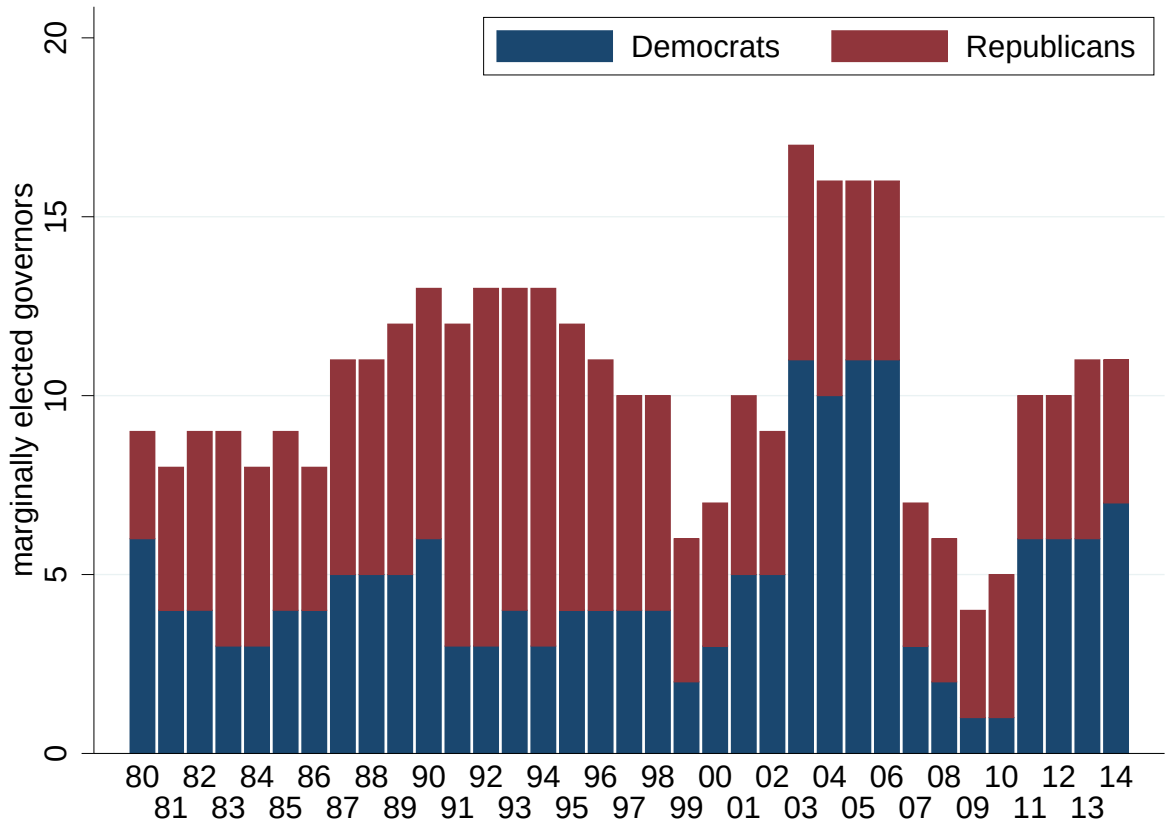
- Census State and Local Government Finance historical database (up to 2008) by fiscal year.
- Census Annual Surveys of State and Local Government Finances (2007 to 2014) by fiscal year.
- BEA: State GDP, GDP deflator, population data by calendar year.
- Merge fiscal years with the calendar years ending in the middle of the fiscal year.

Political data

- Council of State Governments' Book of States: Margin of victory, party affiliation.
- National Governors Association, Wikipedia: non-electoral gubernatorial changes; cross-check.
- Merged by first quarter of fiscal year.

Marginally elected governors

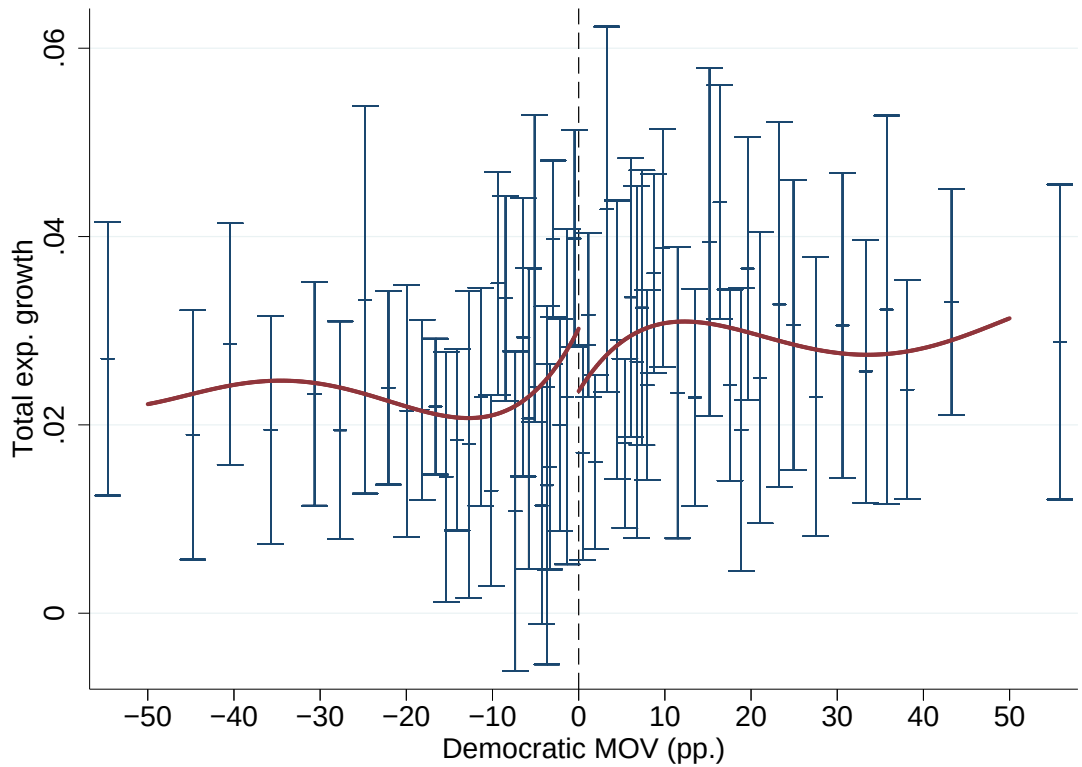
- Absolute margin of victory (MOV) $\leq$ 5pp.
  52.5% to 47.5% victory or closer.



▸ Overall Rep-Dem ▸ Rep-Dem state by state

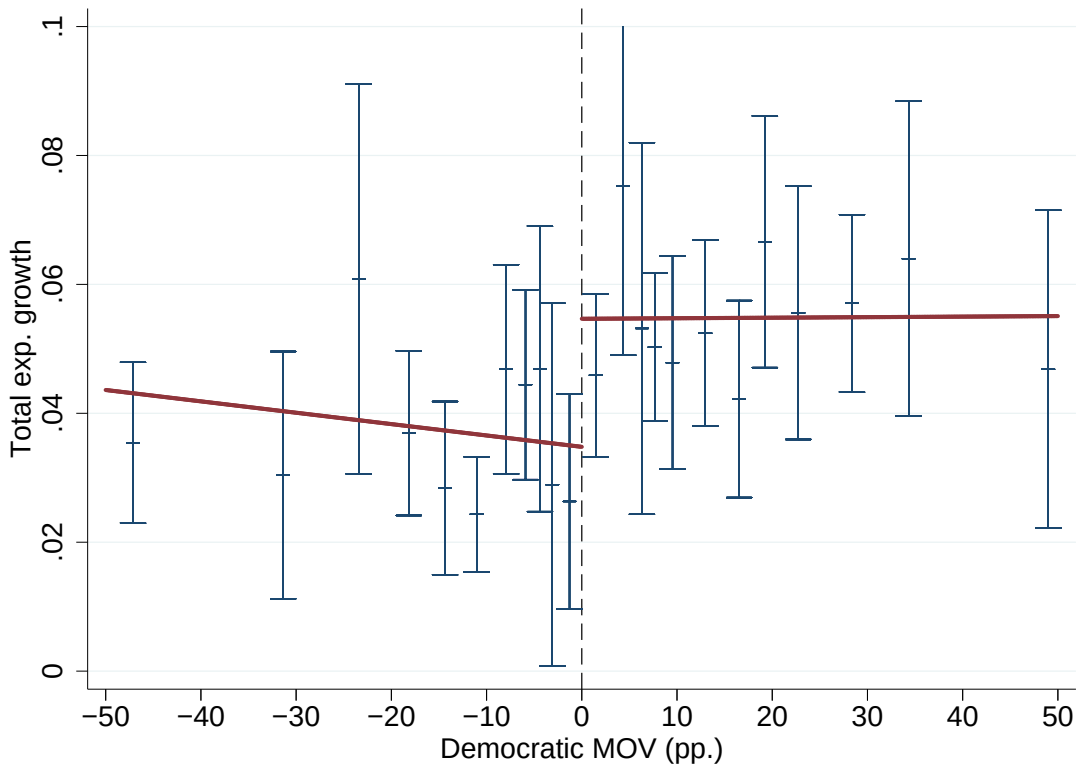
Expenditure growth and democratic margin of victory

- Unconditional relationship



Expenditure growth and democratic margin of victory

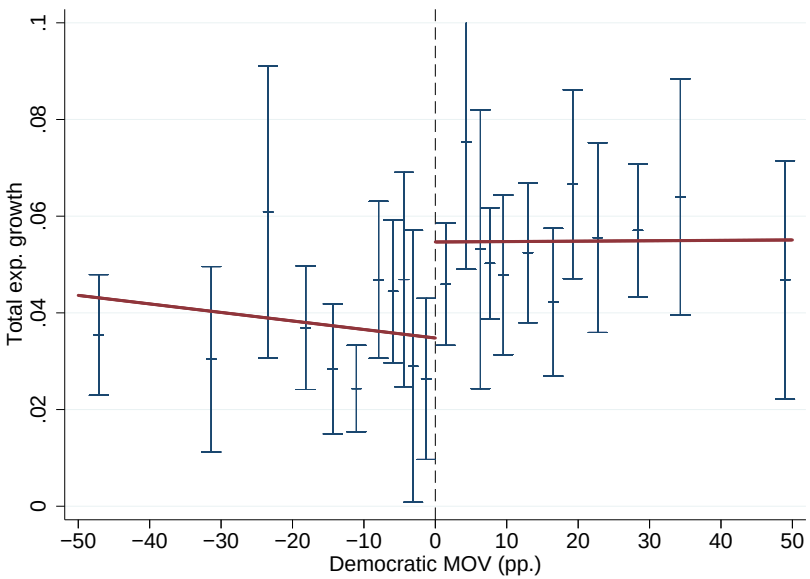
- Conditional on transfer growth in the top quartile



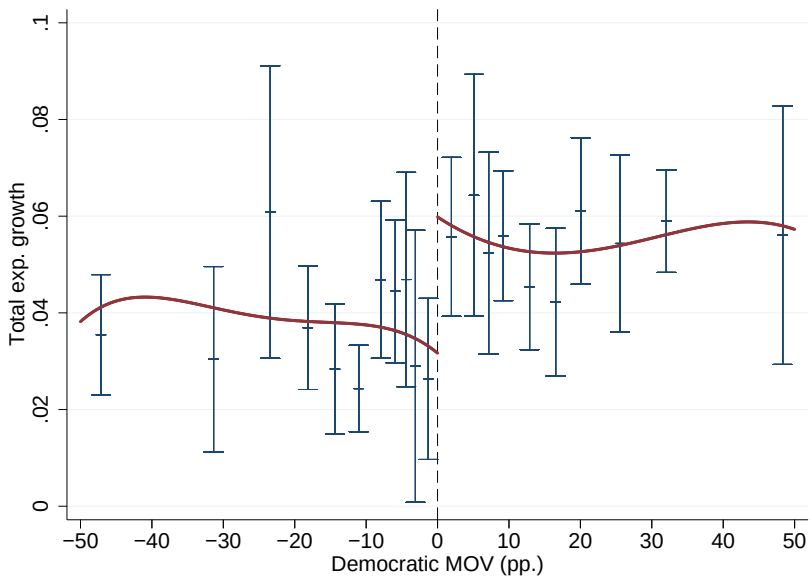
Expenditure growth and democratic margin of victory

- Conditional on transfer growth in the top quartile

Linear



4th order polynomial



Main empirical specification

- Begin in fiscal year 1983 (first FY planned with Reagan budget).
- Drop three states with wealth funds.
- Condition on the last gubernatorial election within ≤ 5pp.

$$\Delta Y_{s,t} = \mu_s + \nu_t + \epsilon_{s,t} + \alpha_r \mathbf{1}_{\{Gov_{s,t-\frac{1}{2}}=rep\}} + \beta_{sp}\frac{\Delta SP_{s,t-1}}{GDP_{t-1\frac{1}{2}}} + \beta_{gdp}\Delta \ln(GDP_{t-\frac{1}{2}})$$
$$+ (\gamma_{0,+} + \gamma_{r,+}\mathbf{1}_{\{Gov_{s,t-\frac{1}{2}}=rep\}})\Delta \ln IG^{+}_{s,t} + (\gamma_{0,-} + \gamma_{r,-}\mathbf{1}_{\{Gov_{s,t-\frac{1}{2}}=rep\}})\Delta \ln IG^{-}_{s,t}$$

- $Y_{s,t}$: (log) expenditures or (log) revenue.
- $\Delta \ln IG^{+}_{s,t} \equiv \max\{0, \Delta \ln IG_{s,t}\}$ (71% of observations).
- $\Delta \ln IG^{-}_{s,t} \equiv \min\{0, \Delta \ln IG_{s,t}\}$ (29% of observations).

- Assumption: $\mathbf{1}_{\{\circ\}} \perp\!\!\!\perp (X, \epsilon)$ for close elections.

Expenditure growth

Margin of victory cutoff	100pp.	6pp.	5pp.	4pp.	3pp.	2pp.
Pos IG Δ	0.291***	0.285***	0.369***	0.374***	0.356***	0.0395
	(8.53)	(4.25)	(5.94)	(5.49)	(3.32)	(0.26)
Neg IG Δ	0.0876**	0.0234	0.156	0.0929	-0.0128	0.0523
	(2.58)	(0.31)	(1.60)	(0.85)	(-0.10)	(0.29)
Surplus Δ.	0.0997**	0.182	0.284**	0.229	0.125	0.0748
	(2.06)	(1.55)	(2.05)	(1.51)	(0.70)	(0.56)
GDP Δ	0.170***	0.147	0.101	0.122	0.246	0.207
	(4.38)	(1.49)	(0.83)	(1.09)	(1.31)	(1.19)
GOP Dummy	0.00325	0.00825*	0.00926	0.0169	0.0229	-0.00583
	(1.08)	(1.68)	(1.34)	(1.68)	(1.27)	(-0.23)
GOP $\times$ Pos IG Δ	-0.104**	-0.165*	-0.246***	-0.416***	-0.467***	-0.270
	(-2.32)	(-2.00)	(-3.16)	(-4.27)	(-3.41)	(-1.22)
GOP $\times$ Neg IG Δ	0.166***	0.323***	0.283***	0.362***	0.403**	0.525
	(3.74)	(3.23)	(3.40)	(3.48)	(2.53)	(1.49)
Observations	1462	393	316	264	168	113
R^2	0.435	0.480	0.569	0.565	0.620	0.698

t statistics in parentheses. Standard errors clustered at the state level.

* p<0.10, ** p<0.05, *** p<.01

Expenditure growth

Margin of victory cutoff	100pp.	6pp.	5pp.	4pp.	3pp.	2pp.
Pos IG Δ	0.291***	0.285***	0.369***	0.374***	0.356***	0.0395
	(8.53)	(4.25)	(5.94)	(5.49)	(3.32)	(0.26)
Neg IG Δ	0.0876**	0.0234	0.156	0.0929	-0.0128	0.0523
	(2.58)	(0.31)	(1.60)	(0.85)	(-0.10)	(0.29)
Surplus Δ.	0.0997**	0.182	0.284**	0.229	0.125	0.0748
	(2.06)	(1.55)	(2.05)	(1.51)	(0.70)	(0.56)
GDP Δ	0.170***	0.147	0.101	0.122	0.246	0.207
	(4.38)	(1.49)	(0.83)	(1.09)	(1.31)	(1.19)
GOP Dummy	0.00325	0.00825*	0.00926	0.0169	0.0229	-0.00583
	(1.08)	(1.68)	(1.34)	(1.68)	(1.27)	(-0.23)
GOP $\times$ Pos IG Δ	-0.104**	-0.165*	-0.246***	-0.416***	-0.467***	-0.270
	(-2.32)	(-2.00)	(-3.16)	(-4.27)	(-3.41)	(-1.22)
GOP $\times$ Neg IG Δ	0.166***	0.323***	0.283***	0.362***	0.403**	0.525
	(3.74)	(3.23)	(3.40)	(3.48)	(2.53)	(1.49)
Observations	1462	393	316	264	168	113
R^2	0.435	0.480	0.569	0.565	0.620	0.698

t statistics in parentheses. Standard errors clustered at the state level.

* p<0.10, ** p<0.05, *** p<.01

Alternative specifications

1. Interact everything with governor dummy (Caetano et al., 2017).
2. Region × year fixed effects.
3. Drop controls.

	(1)	(2)	(3)	(4)	(5)	(6)
IG incr.	0.375***	0.345***	0.350***	0.355***	0.330***	0.348***
	(8.32)	(4.58)	(10.24)	(7.01)	(4.36)	(8.25)
IG decr.	0.165	0.156	0.225	0.159	0.116	0.209
	(1.70)	(1.32)	(1.64)	(1.66)	(0.90)	(1.53)
Republican Gov.	0.008		0.009	0.008		0.014**
	(1.24)		(1.41)	(1.17)		(2.07)
Rep x IG incr.	-0.258***	-0.231**	-0.196**	-0.235***	-0.220*	-0.200**
	(-4.70)	(-2.17)	(-2.37)	(-3.71)	(-1.99)	(-2.24)
Rep x IG decr.	0.285**	0.319*	0.274**	0.287**	0.365*	0.286**
	(2.54)	(1.85)	(2.08)	(2.53)	(1.99)	(2.26)
R-squared	0.63	0.71	0.75	0.63	0.71	0.76
R-sq, within	0.27	0.25	0.29	0.28	0.27	0.30
Observations	308	302	289	308	302	289
States	43	43	43	43	43	43
Years	31	31	30	31	31	30
StateFE	Yes	Dem, Rep	Yes	Yes	Dem, Rep	Yes
YearFE	Yes	Dem, Rep	Region	Yes	Dem, Rep	Region
Controls	No	No	No	Yes	Yes	Yes

t statistics in parentheses. Standard errors clustered at the state & year level.

* p<0.10, ** p<0.05, *** p<.01

Implied pass-through

- Transform elasticities into dollar-per-dollar pass-through.

	Response to IG increases		
Governor	Democratic	Republican	Difference
Estimate	1.30 (0.87, 1.74)	0.43 (-0.00, 0.87)	-0.87 (-1.42, -0.32)

Implied pass-through

- Transform elasticities into dollar-per-dollar pass-through.

	Response to IG increases		
Governor	Democratic	Republican	Difference
Estimate	1.30 (0.87, 1.74)	0.43 (-0.00, 0.87)	-0.87 (-1.42, -0.32)

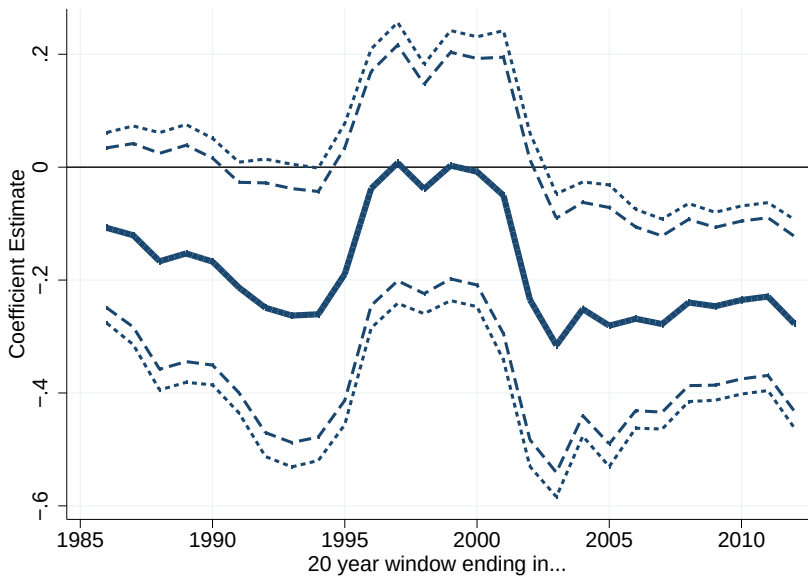
- Pass-throughs roughly flipped for negative IG growth.

	Response to IG decreases		
Governor	Democratic	Republican	Difference
Estimate	0.55 (-0.14, 1.24)	1.55 (0.91, 2.18)	1.00 (0.41, 1.58)

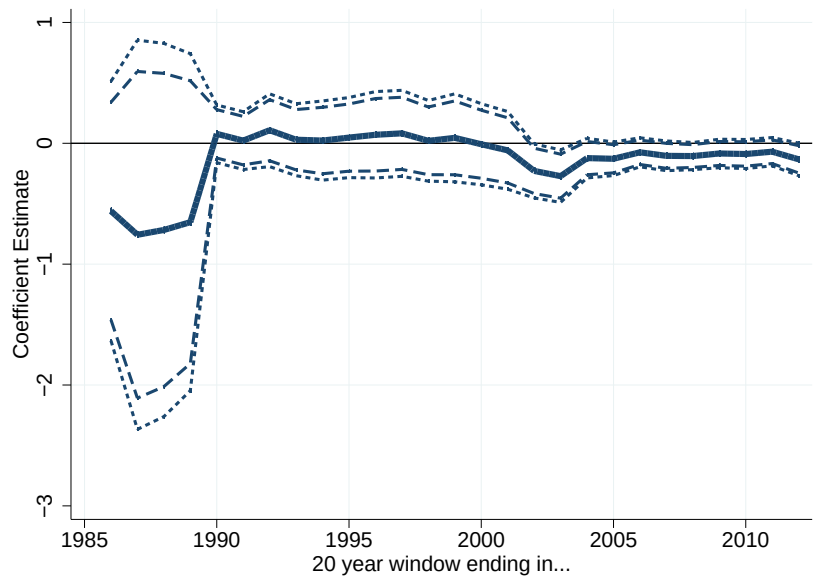
Expenditure vs. revenue side

- 20-year rolling window regression, otherwise same specification.
- Focus on coefficient for: Republican $\times \Delta \ln IG^{+}$

Total expenditure



net general revenue

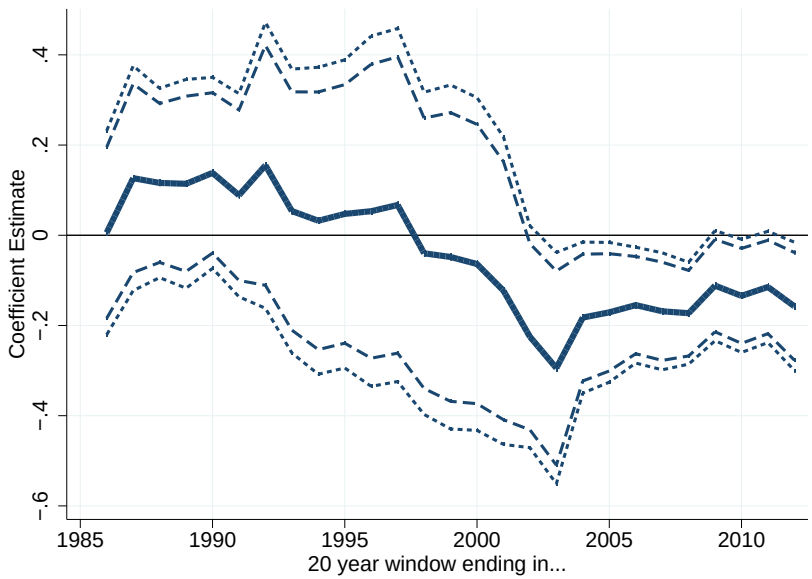


point estimate (± 1.645 and ± 1.96 standard errors)

Zooming in on the revenue side

- 20-year rolling window regression, otherwise same specification.
- Focus on coefficient for: Republican $\times \Delta \ln IG^{+}$

Total tax revenue



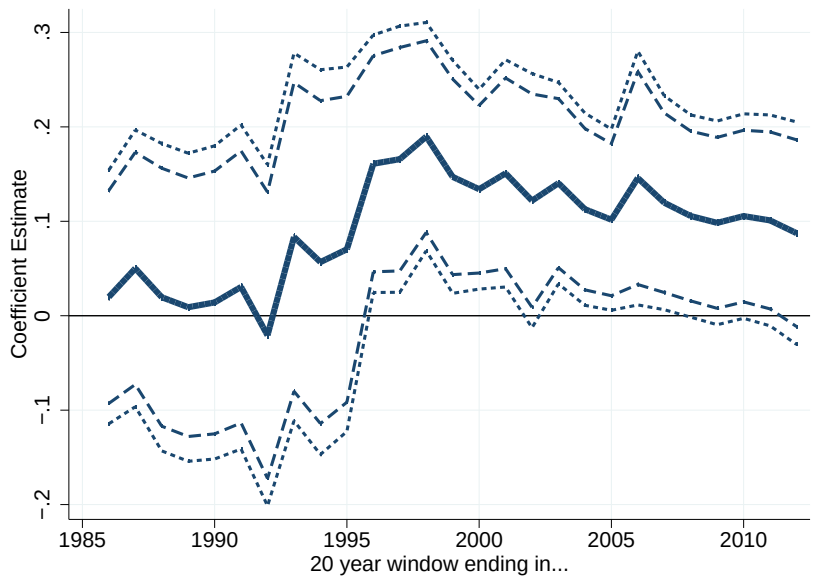
Income & sales tax revenue

point estimate (± 1.645 and ± 1.96 standard errors)

Effects on GDP

- 20-year rolling window regression, otherwise same specification.
- Focus on coefficient for: Republican $\times \Delta \ln IG^{+}$

Effects on current and future GDP



point estimate (± 1.645 and ± 1.96 standard errors)

Empirical summary

- Republican governors spend less of growth in federal transfers.
- Republican governors pass on more of federal transfer cuts.
- Republican governors adjust income and sales taxes.
- Some evidence for expansionary effects of Republican policies following transfer growth.

Model overview

- Extension of Nakamura & Steinsson (2014).
- Two heterogeneous regions inside a monetary union.
  - Perfect risk sharing across regions.
  - Federal government consumes, taxes.
  - Monetary policy follows a Taylor rule.
- Within each region
  - Representative household elastically supplies labor, consumes.
  - Home bias in consumption.
  - Perfect insurance against idiosyncratic shocks.
  - Home firms produce varieties using labor and capital with CRS.
  - Dollar prices of varieties are Calvo-sticky.
  - No mobility of capital or labor.

Model overview

- Extension of Nakamura & Steinsson (2014).
- Two heterogeneous regions inside a monetary union.
  - Perfect risk sharing across regions.
  - Federal government consumes, taxes, and transfers money to regions.
  - Monetary policy follows a Taylor rule.
- Within each region
  - Representative household elastically supplies labor, consumes.
  - Home bias in consumption.
  - Perfect insurance against idiosyncratic shocks.
  - Home firms produce varieties using labor and capital with CRS.
  - Dollar prices of varieties are Calvo-sticky.
  - No mobility of capital or labor.
  - State government consumes, taxes, provides services & infrastructure.
- Analyze above-trend increases in IG.

Environment: Home households

- Preferences:

$$V_t = \mathbb{E}_t \sum_{s=0}^{\infty} \beta^s U(C_{t+s}, G_{st,t+s}, N_{t+s})$$

$$C_t = \left(\phi_H^{\frac{1}{\eta}} C_{Ht}^{1-\frac{1}{\eta}} + (1-\phi_H)^{\frac{1}{\eta}} C_{Ft}^{1-\frac{1}{\eta}} \right)^{\frac{\eta}{\eta-1}}$$

$$C_{Jt} = \left(\int_0^1 c_{jt}^{1-\frac{1}{\theta}} dj \right)^{\frac{\theta}{\theta-1}}, \quad (J,j) \in \{(H,h),(F,f)\}$$

- Budget constraint:

$$P_t(C_t + I_t + \kappa(\nu_t)K_{t-1}^p) + \mathbb{E}_t[M_{t,t+1}B_{t+1}(\cdot)]$$

$$\leq B_t + (1-\tau_t^f - \tau_t^s)W_t L_t + R_t^k K_{t-1}^p \nu_t + \int_0^1 \Xi_{ht}(z)dz - T_t$$

- Capital accumulation subject to adjustment cost.

Environment: Home State Government

- Receives per capita transfers IG_t from federal government.
- Spending is partly endogenous:

$$
\begin{aligned}
G^e_{st,t} &= \psi_{IG} IG_t \\
G^x_{st,t} &= \mu_{G,st} + \rho_{st,g} G^x_{st,t-1} + \omega_{st,g} \epsilon^x_{st,t} \\
G_{st,t} &= G^e_{st,t} + G^x_{st,t}
\end{aligned}
$$

- Fraction ϕ spent on public infrastructure:

$$K_{st,t} = (1 - \delta_G) K_{st,t-1} + \phi G_{st,t}.$$

- Portion of budget financed via labor income taxes:

$$(1 - \gamma^s)(P_t G_{st,t} - IG_t - \psi_{G,SP} R^n_{t-1} SP_{t-1}) = \tau_{st,t} W_t N_t.$$

- Other state government: Analogous, but with $\psi^*_{IG} \neq \psi_{IG}$.

Other features of the environment

- Competitive firms producing. Productive public capital.
- Federal government partly finances IG with labor taxes.
- Interest rates follow a Taylor rule.

Competitive equilibrium, solution method

Equilibrium:

- Same initial financial wealth per capita.
- Households and firms take prices and government policies as given.
  - Producer reset prices: constant mark-up over current and expected future marginal costs.
  - Price indices follow from cost-minimization.
  - Labor supply to equate after-tax marginal utilities.
  - Risk-sharing across and within regions.

Solution method:

- First order approximation around symmetric steady state.

Calibration: Conceptual choices

- Pass-through parameters drawn from estimated distribution.
- Utility function:
  - Constant Frisch elasticity (Trabandt & Uhlig, 2011).
  - Public services provision optimal in steady state.
- Public capital maximizes production net of investment cost in steady state.

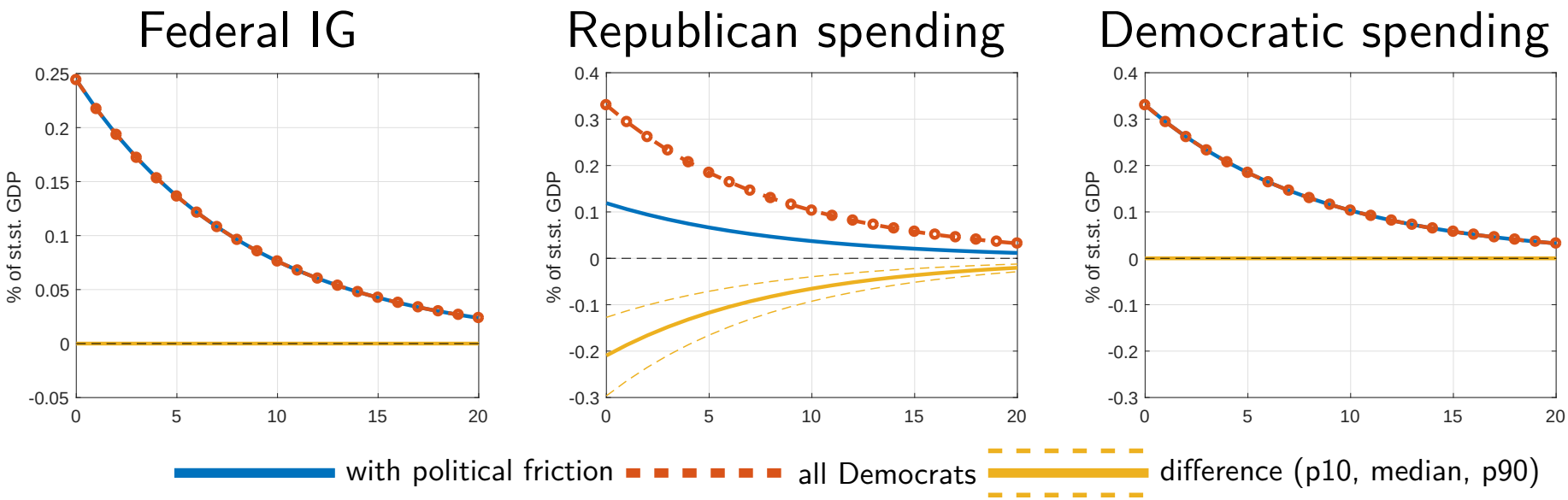
Calibration: Parameters

Parameter	Value	
Discount factor β	0.99	Nakamura & Steinsson (2014)
Frisch elasticity of labor supply ν	1	
Calvo stickiness α	0.75	
Private capital share in production α	0.33	
Within-region elasticity of demand θ	6	
Across-region elasticity of demand η	2	
Home demand for home goods ϕ_H	0.69	
Foreign demand for home goods ϕ_H^*	$\frac{n}{1-n}(1-\phi_H)$	
Investment adj. cost	0.7	
Utilization cost elasticity	1	
Taylor rule: inflation ϕ_π	1.5	
Taylor rule: output ϕ_y	0.5	
Taylor rule: smoothing ρ_r	0.8	
Size of home (Republican) region n	0.5 (equal size)	
Elasticity of substitution w.r.t state consumption λ	0.5 (complements)	
Speed of income tax adjustment $\gamma^f = \gamma^s$	0.3	
Federal government consumption $\bar{G}/\bar{Y}$	0.075 (data)	
Federal government IG $\overline{IG}/\bar{Y}$	0.025 (data)	
State government consumption $\bar{G}/\bar{Y}$	0.125 (data)	
Persistence of IG ρ_{IG}	0.89 (2009 ARRA stimulus)	
Standard deviation of IG σ_{IG}	0.10 (2009 ARRA stimulus)	
Republican transfer pass-through ψ_{IG}	drawn from estimates	
Democratic transfer pass-through ψ_{IG}^*	drawn from estimates	

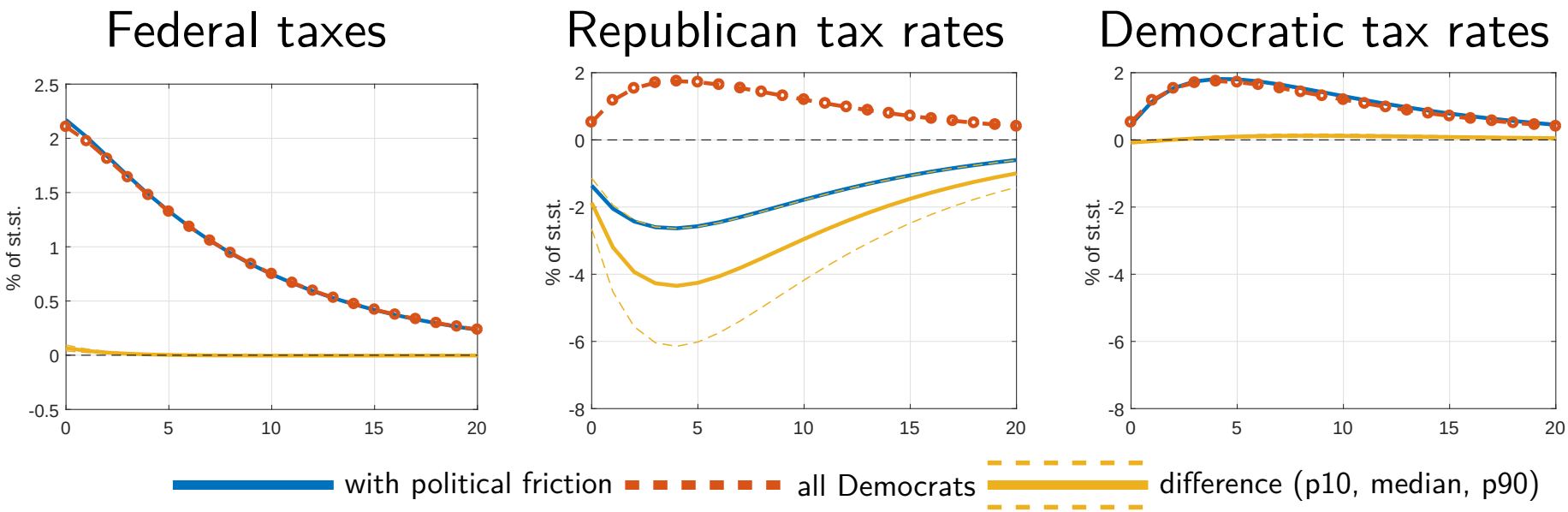
Calibration: Parameters

Parameter	Value
Size of home (Republican) region n	0.5 (equal size)
Elasticity of substitution w.r.t state consumption λ	0.5 (complements)
Speed of income tax adjustment $\gamma^f = \gamma^s$	0.3
Federal government consumption $\bar{G}/\bar{Y}$	0.075 (data)
Federal government IG $\overline{IG}/\bar{Y}$	0.025 (data)
State government consumption $\bar{G}/\bar{Y}$	0.125 (data)
Persistence of IG ρ_{IG}	0.89 (2009 ARRA stimulus)
Standard deviation of IG σ_{IG}	0.10 (2009 ARRA stimulus)
Republican transfer pass-through ψ_{IG}	drawn from estimates
Democratic transfer pass-through ψ^*_{IG}	drawn from estimates

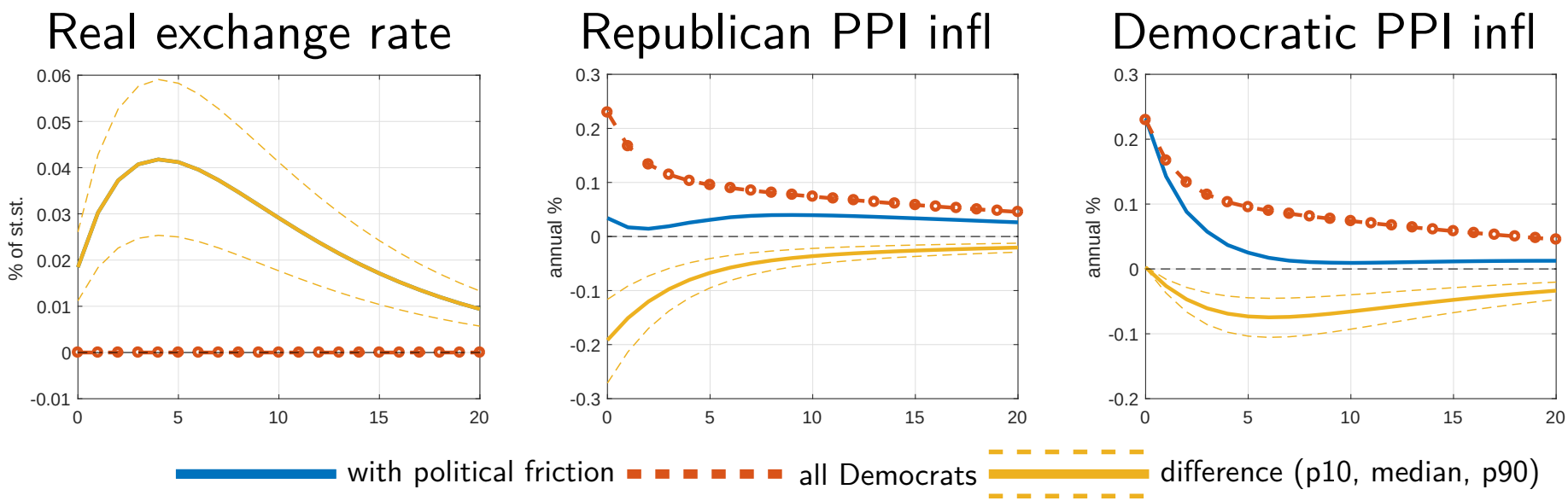
IG shock: Federal impulse, state pass-through



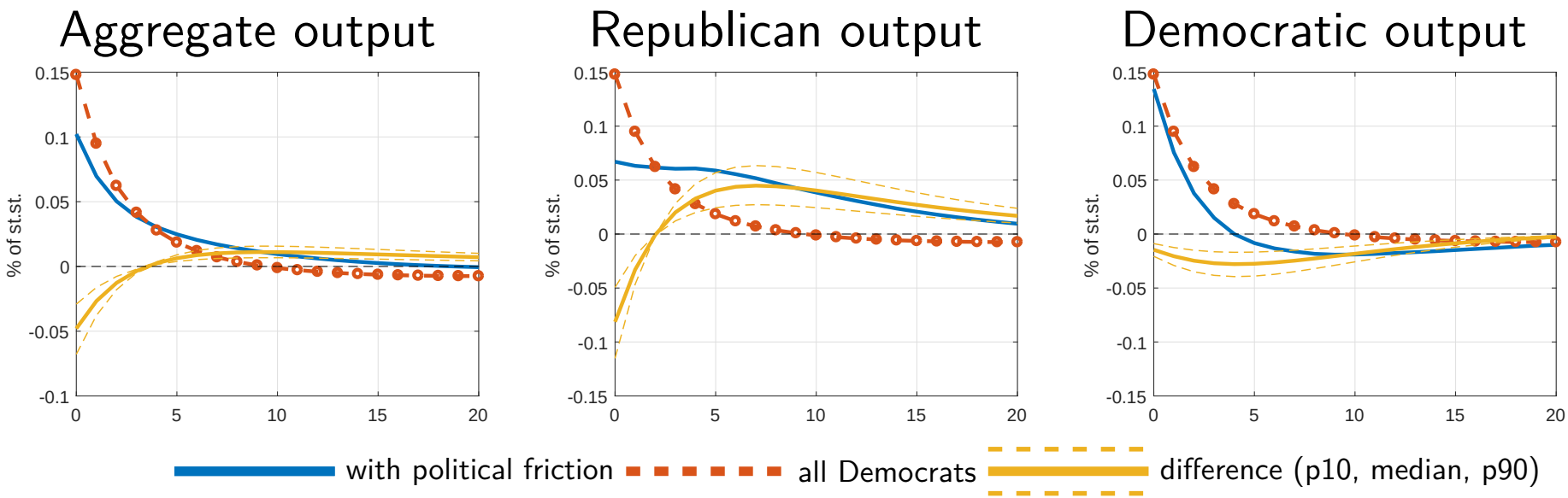
Labor income tax rates



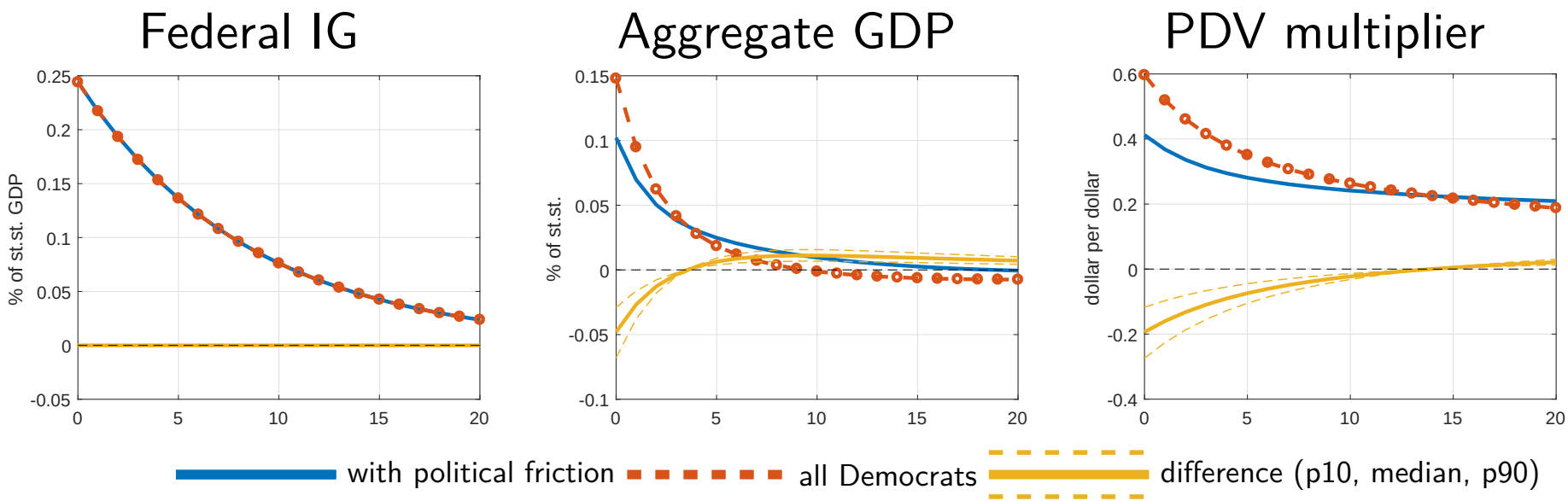
Exchange rate and inflation



GDP

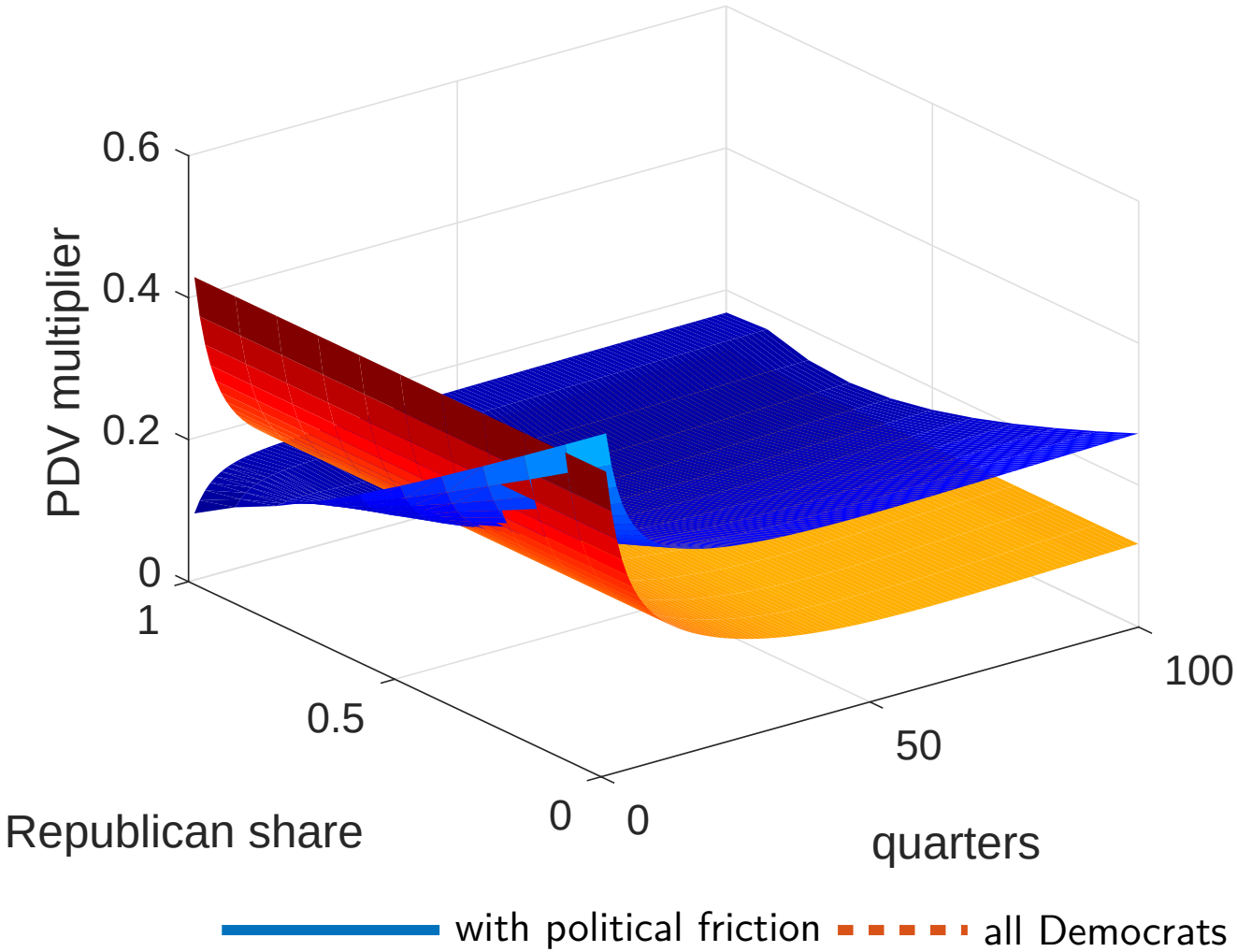

Aggregate output
Republican output
Democratic output
% of st.st.
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
0
5
10
15
20
with political friction
all Democrats
difference (p10, median, p90)

IG shock: summary



Varying the share of Republican governors

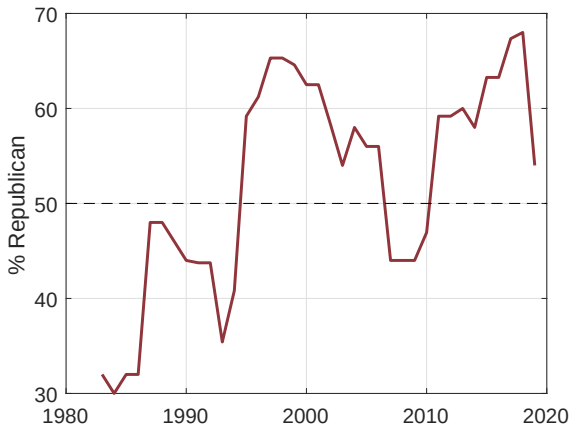
- PDV multiplier



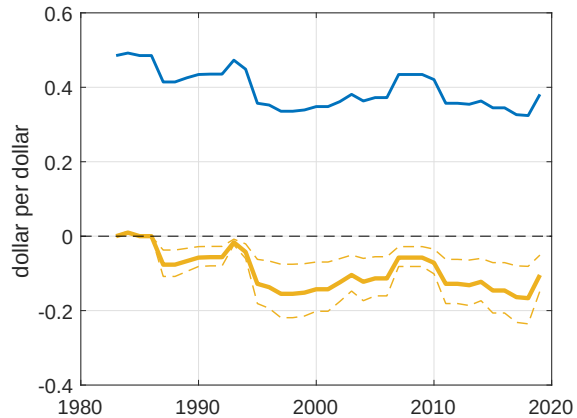
Political data in model: Time-varying fiscal multipliers

- Fix parameters at Reagan-era estimates, focus on variation due to changing partisan composition.

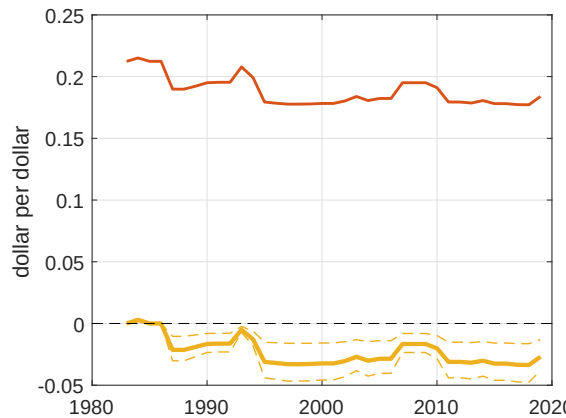
Share of Rep-Governors

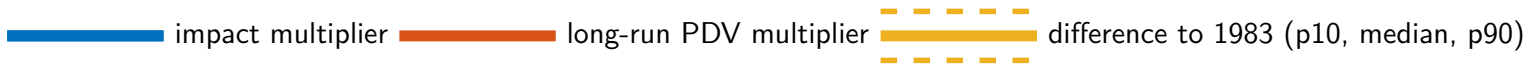


Impact multiplier



Long-run multiplier



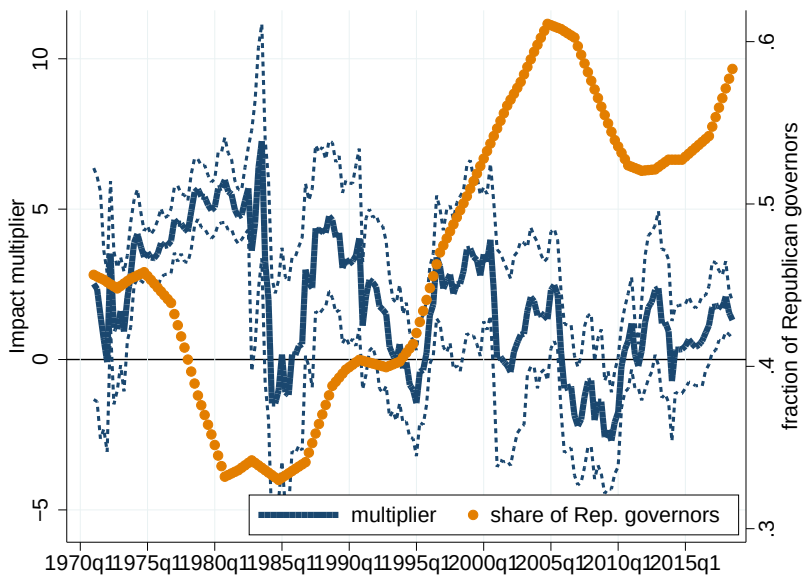


- Time-variation in degree of partisanship implies additional variation.

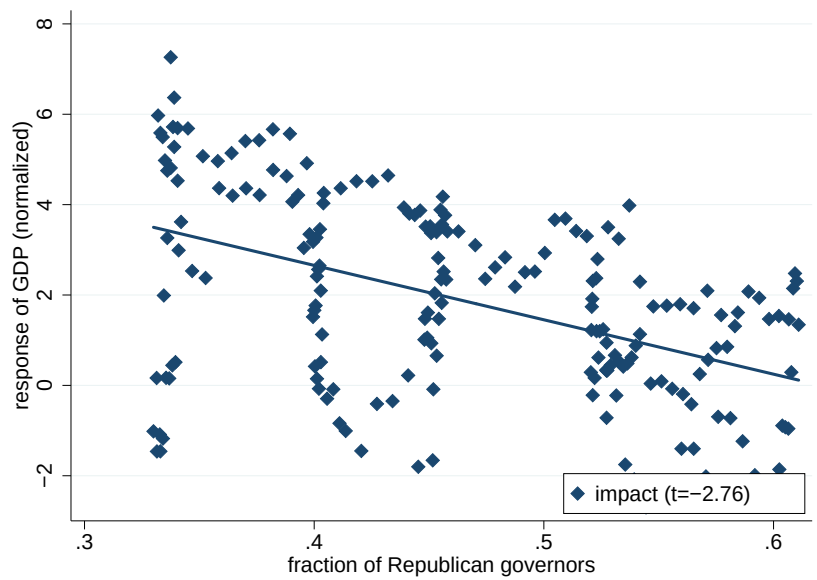
Time series: Do IG multipliers vary with state of politics?

- Estimate GDP response to IG innovations in 10-year rolling window local projections.
- Compute implied impact multiplier.
- corr(10-year multiplier, 10-year Republican share) = -0.48 (t=-2.76).

Time series



Scatter plot



Contributions

State panel data:

- Causal inference from close elections.
- Republican governors spend less.
- Republican governors cut income and sales taxes.

Model:

- (Short-run) transfer multiplier lower in presence of Republicans.
- Time-variation in transfer multiplier due to political composition and degree of partisanship.

Time series:

- Reduced-form multipliers vary with fraction of Republican governors.

Appendix

IG transfers as a recent policy tool

- Total 2009 ARRA stimulus bill: $796 bn.
- Of which: Intergovernmental transfers: $318 bn. (39.9%)
  - Medicaid funding: $101 bn.
  - Education spending: $93 bn.
  - Infrastructure spending: $70 bn.
  - Low-income assistance: $48 bn.
  - Public housing: $6 bn.

(Carlino & Inman, 2016)

back

General revenue growth

Margin of victory cutoff	100pp.	6pp.	5pp.	4pp.	3pp.	2pp.
Pos IG Δ	0.0910*	0.0641	0.179**	0.232***	0.188*	0.114
	(2.00)	(0.77)	(2.53)	(3.96)	(1.93)	(0.75)
Neg IG Δ	-0.0105	-0.0874	-0.153	-0.184	-0.299*	-0.256*
	(-0.27)	(-1.46)	(-1.19)	(-1.39)	(-1.92)	(-1.77)
Surplus Δ.	-0.124**	-0.369**	-0.362*	-0.331	-0.386	-0.132
	(-2.14)	(-2.31)	(-1.81)	(-1.57)	(-1.69)	(-0.72)
GDP Δ	0.329***	0.406***	0.355**	0.326**	0.0638	0.134
	(7.43)	(3.64)	(2.50)	(2.47)	(0.32)	(0.71)
GOP Dummy	0.00348	0.00215	0.00597	0.00266	0.00529	-0.0339
	(0.70)	(0.25)	(0.60)	(0.18)	(0.23)	(-1.58)
GOP $\times$ Pos IG Δ	-0.0413	-0.107	-0.180***	-0.255***	-0.270*	-0.173
	(-0.62)	(-1.19)	(-2.70)	(-2.81)	(-1.87)	(-0.78)
GOP $\times$ Neg IG Δ	-0.0104	0.163	0.251	0.207	0.150	-0.0181
	(-0.15)	(1.46)	(1.57)	(1.08)	(0.75)	(-0.14)
Observations	1462	393	316	264	168	113
R^2	0.381	0.404	0.427	0.475	0.454	0.659

t statistics in parentheses. Standard errors clustered at the state level.

* p<0.10, ** p<0.05, *** p<.01

Tax revenue growth

Margin of victory cutoff	100pp.	6pp.	5pp.	4pp.	3pp.	2pp.
Pos IG Δ	0.0679	0.0746	0.199**	0.253***	0.203*	0.213
	(1.61)	(0.81)	(2.61)	(3.56)	(1.79)	(1.32)
Neg IG Δ	-0.0650	-0.219***	-0.276**	-0.317**	-0.367**	-0.288*
	(-1.26)	(-3.52)	(-2.05)	(-2.11)	(-2.15)	(-1.94)
Surplus Δ.	-0.0978*	-0.289	-0.385	-0.330	-0.335	-0.286
	(-1.69)	(-1.66)	(-1.63)	(-1.62)	(-1.46)	(-1.47)
GDP Δ	0.472***	0.457***	0.487**	0.380**	0.0941	0.268
	(8.57)	(2.91)	(2.57)	(2.33)	(0.41)	(1.04)
GOP Dummy	0.000249	0.0101	0.0143	0.00937	0.0253	-0.0192
	(0.03)	(1.10)	(1.18)	(0.54)	(1.04)	(-0.79)
GOP $\times$ Pos IG Δ	0.0407	-0.153	-0.225***	-0.264**	-0.307*	-0.223
	(0.44)	(-1.60)	(-3.17)	(-2.37)	(-1.94)	(-0.90)
GOP $\times$ Neg IG Δ	0.0183	0.311**	0.378**	0.370	0.384	0.146
	(0.17)	(2.49)	(2.11)	(1.65)	(1.68)	(0.91)
Observations	1462	393	316	264	168	113
R^2	0.398	0.416	0.439	0.510	0.502	0.674

t statistics in parentheses. Standard errors clustered at the state level.

* p<0.10, ** p<0.05, *** p<.01

Which taxes adjust?

Income and sales taxes

Margin of victory cutoff	100pp.	5pp.
Pos IG Δ	0.0697	0.193**
	(1.64)	(2.25)
Neg IG Δ	-0.0891	-0.296**
	(-1.67)	(-2.20)
Surplus Δ.	-0.0958*	-0.479*
	(-1.75)	(-1.97)
GDP Δ	0.362***	0.432**
	(7.13)	(2.40)
GOP Dummy	-0.00177	0.0190
	(-0.23)	(1.58)
GOP $\times$ Pos IG Δ	0.0699	-0.222***
	(0.66)	(-2.73)
GOP $\times$ Neg IG Δ	0.0462	0.493**
	(0.41)	(2.64)
Observations	1462	316
R^2	0.415	0.457

Other taxes

Margin of victory cutoff	100pp.	5pp.
Pos IG Δ	0.0595	0.103
	(1.31)	(1.08)
Neg IG Δ	-0.00997	-0.0421
	(-0.18)	(-0.25)
Surplus Δ.	-0.112*	-0.372**
	(-1.83)	(-2.27)
GDP Δ	0.360***	0.461**
	(7.14)	(2.11)
GOP Dummy	-0.00329	0.00892
	(-0.34)	(0.67)
GOP $\times$ Pos IG Δ	0.121	-0.119
	(0.92)	(-1.30)
GOP $\times$ Neg IG Δ	-0.0617	0.104
	(-0.50)	(0.60)
Observations	1462	316
R^2	0.214	0.274

t statistics in parentheses. Standard errors clustered at the state level.

* p<0.10, ** p<0.05, *** p<.01

Are there effects on economic activity?

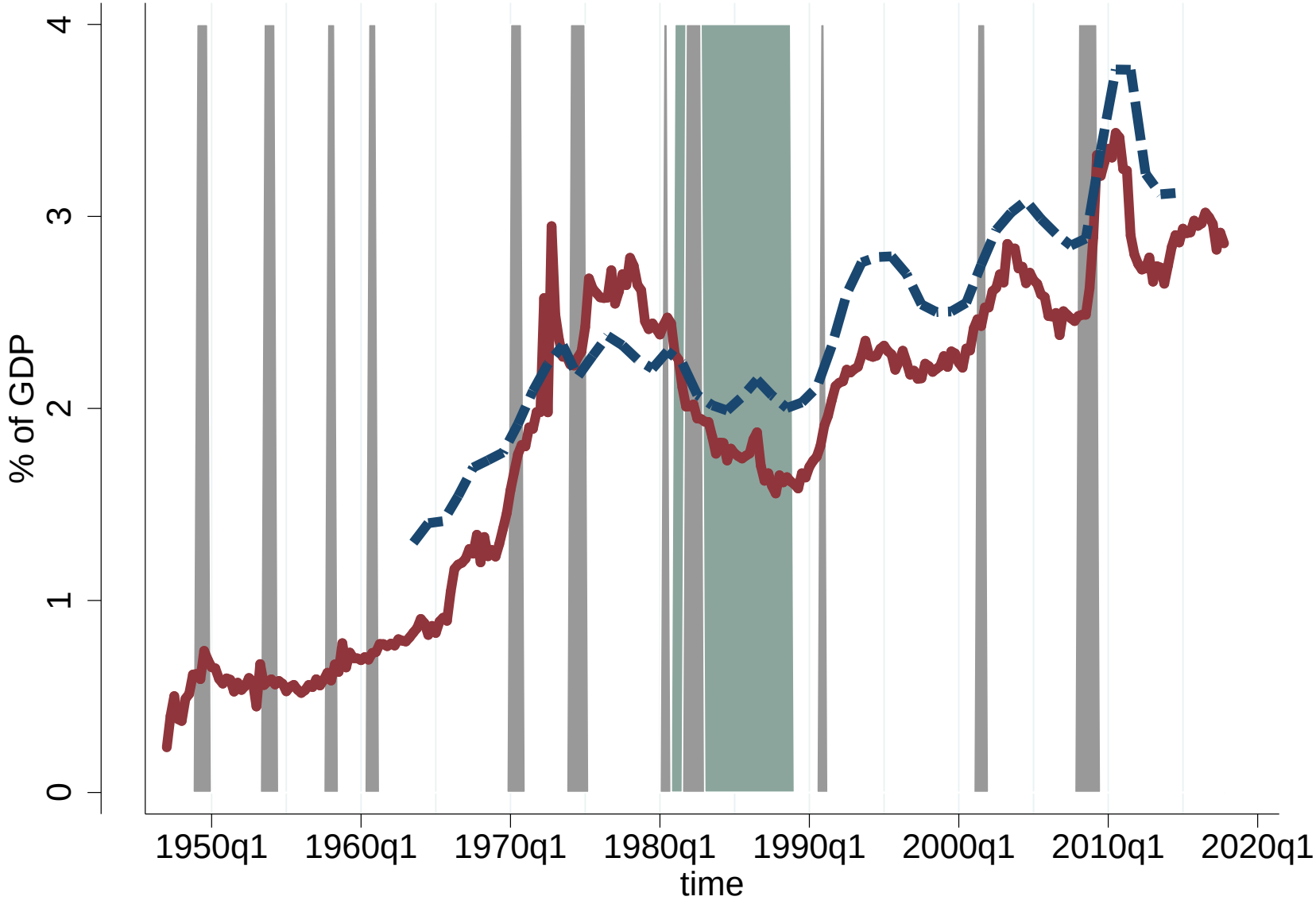
- Future $(t + \frac{1}{2})$ GDP growth

Margin of victory cutoff	100pp.	6pp.	5pp.	4pp.	3pp.	2pp.
Pos IG Δ	-0.000276	-0.0245	-0.0827**	-0.0813*	-0.0439	0.0284
	(-0.02)	(-0.60)	(-2.16)	(-1.93)	(-0.69)	(0.21)
Neg IG Δ	-0.0192	-0.0669*	0.0267	0.0843**	0.114**	0.0355
	(-0.95)	(-1.70)	(0.63)	(2.17)	(2.29)	(0.45)
Surplus Δ.	-0.0125	-0.0267	0.0460	-0.00156	-0.0615	-0.113
	(-0.47)	(-0.34)	(0.53)	(-0.02)	(-0.55)	(-0.77)
GDP Δ	0.157***	0.214***	0.143**	0.0767	0.0569	0.160
	(4.19)	(3.68)	(2.04)	(1.45)	(0.61)	(1.14)
GOP Dummy	0.000401	-0.00157	-0.00695	-0.0141**	-0.0228**	-0.00606
	(0.24)	(-0.41)	(-1.46)	(-2.07)	(-2.30)	(-0.52)
GOP Pos IG Δ	0.0143	0.0224	0.0764*	0.112**	0.112	0.191
	(0.67)	(0.60)	(1.95)	(2.17)	(1.68)	(1.64)
GOP Neg IG Δ	0.00605	0.0454	-0.0305	-0.0954	-0.124	-0.0707
	(0.23)	(0.92)	(-0.58)	(-1.55)	(-1.67)	(-0.93)
Observations	1462	393	316	264	168	113
R^2	0.405	0.478	0.529	0.524	0.560	0.665

t statistics in parentheses. Standard errors clustered at the state level.

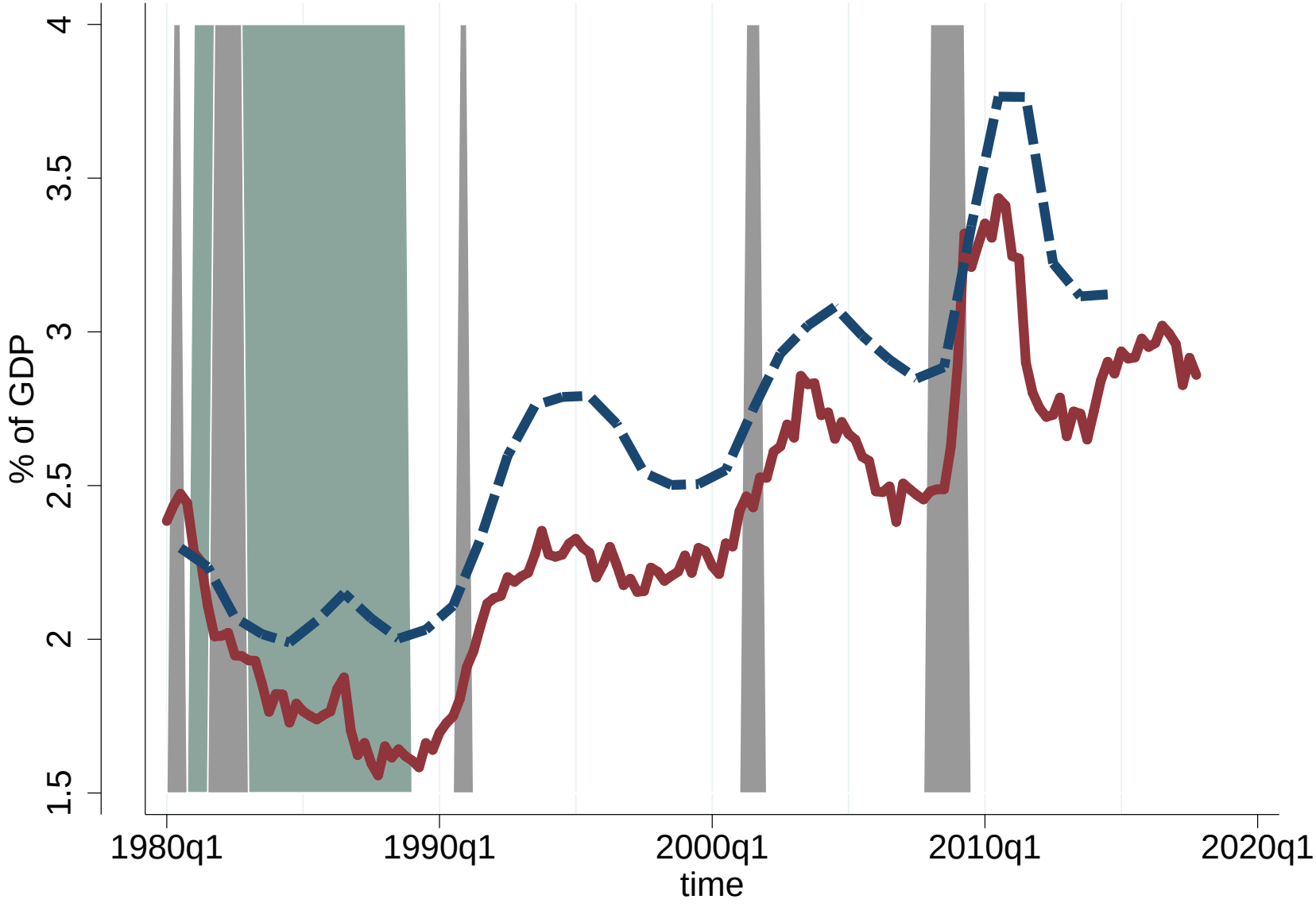
* p<0.10, ** p<0.05, *** p<.01

Intergovernmental transfers



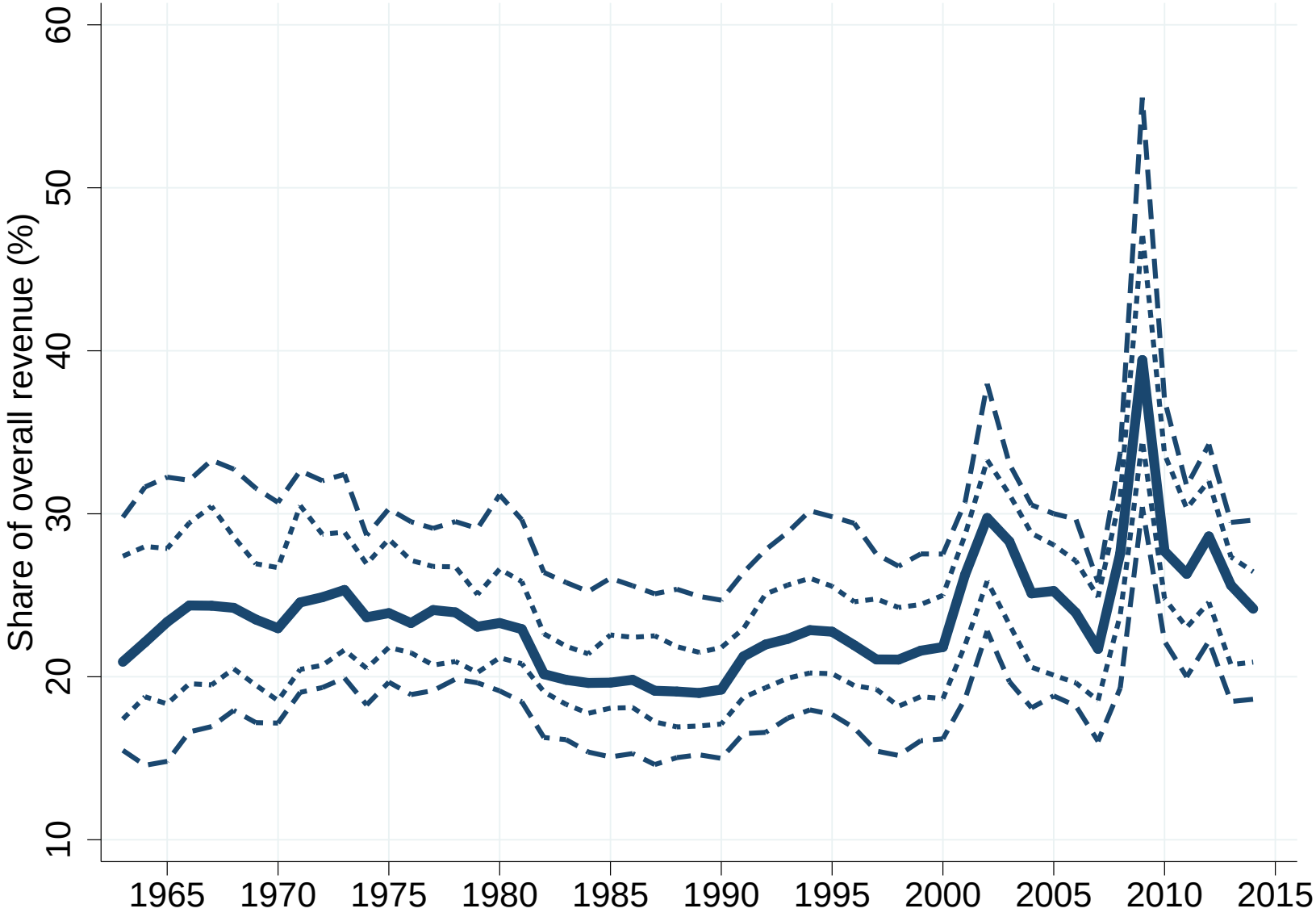
back

Intergovernmental transfers



back

Intergovernmental transfers



back

Environment: Home firms

- Production technology

$$y_{ht}(\ell) = \left(\frac{K_{st,t-1}}{\bar{y}_{H,t}} \right)^{\frac{\zeta}{1-\zeta}} K_t(\ell)^{\alpha} N_t(\ell)^{1-\alpha}.$$

- Public infrastructure with congestion externality. Equilibrium share ζ.
- Firms stuck with price $p_{h,t+s}(\ell) = p_{ht}(\ell)$ with iid Calvo probability $\xi \in (0,1)$.
- Objective

$$\mathbb{E}_t \sum_{s=0}^{\infty} M_{t,t+s} \left(p_{h,t+s}(\ell) y_{h,t+s}(\ell) - W_{t+s} N_{t+s} - R^k_{t+s} K_{t+s} \right)$$

Environment: Federal Government

- Fraction γ^f of expenditures financed via lump-sum taxes.
- Transfers equal (nominal) per capita amounts IG_t to each region.
- Transfers exogenous (today):

$$IG_t = \rho_{IG} IG_{t-1} + \sigma_{IG} \epsilon_{IG,t}.$$

- Purchases equal real per capita amounts $G^f_{Ht} = G^f_{Ft} = G^f_t$ per region (exogenous).
- Portion of budget financed via labor income taxes:

$$(1-\gamma^f)(nP_{Ht}G_{Ht} + (1-n)P_{Ft}G_{Ft} + IG_t) = \tau^f_t \int_0^1 W_t(x)L_t(x)dx.$$

n is the relative size of home region.

Environment: Monetary authority

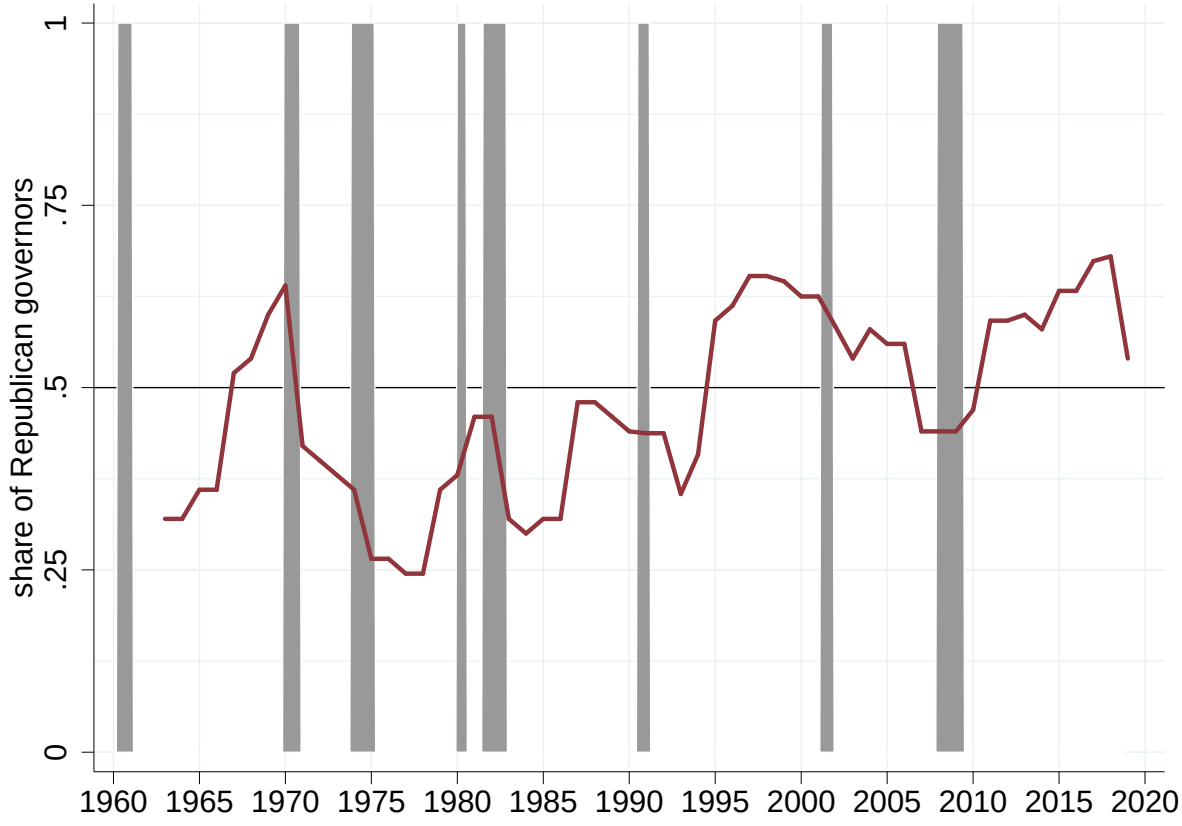
- Interest rate rule:

$$\ln R_t^n = \rho_r \ln R_{t-1}^n + (1-\rho_r)\left(-\ln\beta + \phi_\pi \ln \Pi_t^{agg} + \phi_y \ln \frac{Y_t^{agg}}{\bar{Y}}\right)$$

$$\Pi_t^{agg} = n\Pi_t + (1-n)\Pi_t^*$$

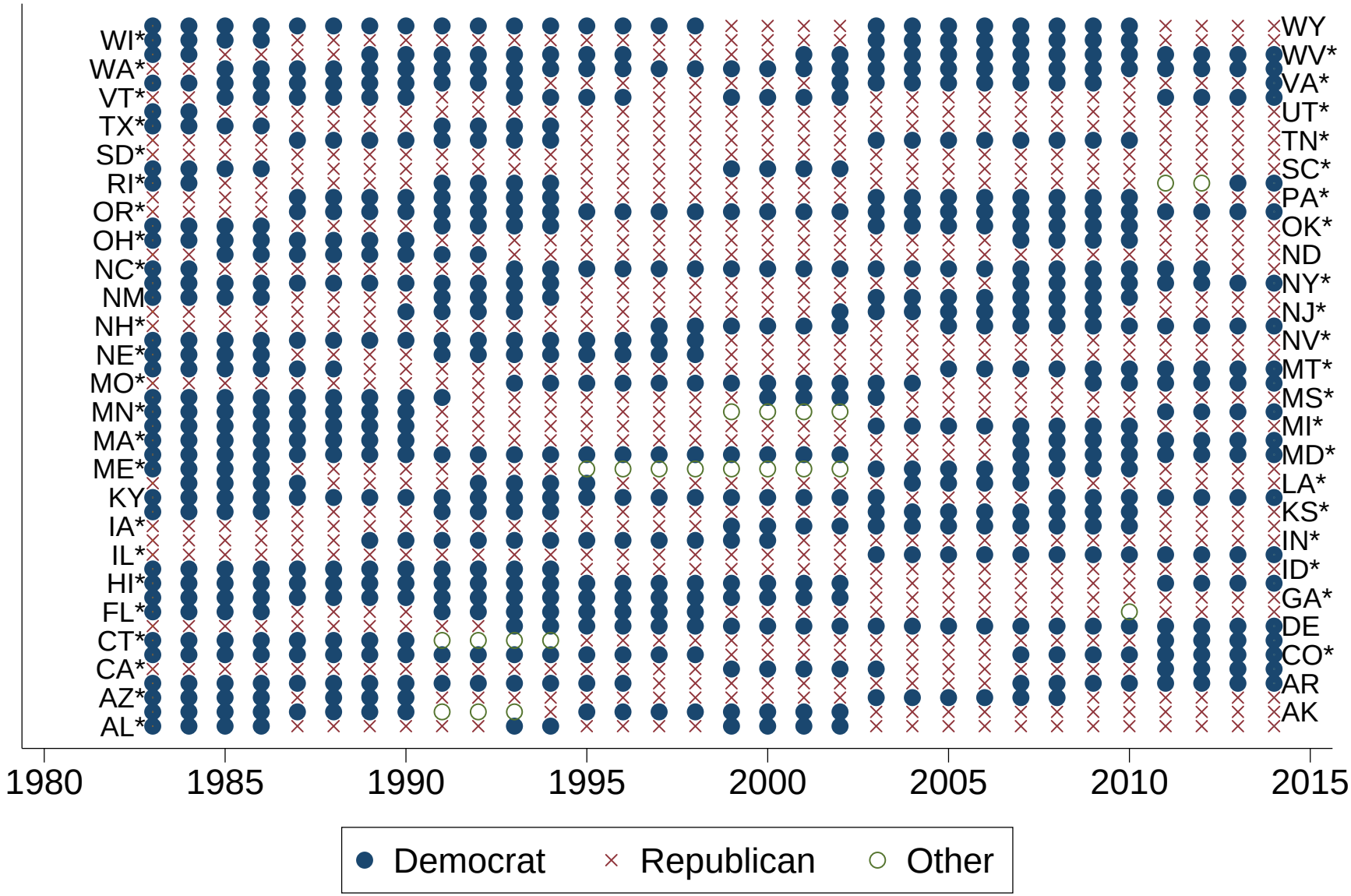
$$Y_t^{agg} = nY_t + (1-n)Y_t^*$$

Fraction of Republican governors



◂ Marginal governors

Governors by state and year



***** ever in 5pp MOV sample

◂ Marginal governors