

# Political Mechanism Design

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# Outline

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US Political Mechanism

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Estimation Results

Research Directions

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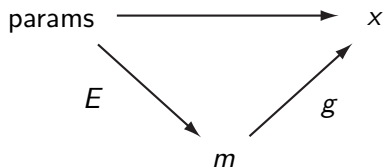
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- ▶ Specifically, we are interested in the effects of changes in institutional variables (e.g., veto, veto override, supermajoritarian voting rules, number of legislative chambers, staggered Senate elections).

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- ▶ We focus on US national politics.
- ▶ Specifically, we are interested in the effects of changes in institutional variables (e.g., veto, veto override, supermajoritarian voting rules, number of legislative chambers, staggered Senate elections).
- ▶ The approach accounts for policy dynamics, the existence of a mechanism currently in place, historical data, and the possibility of estimating environmental parameters.

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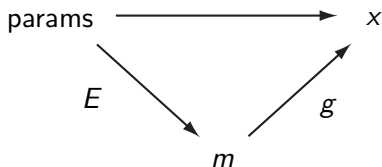
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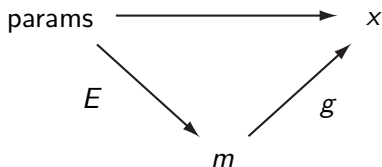
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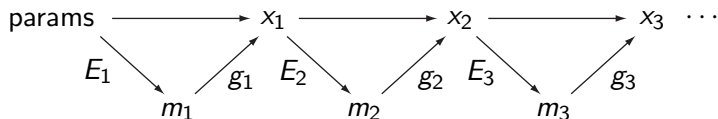
- ▶ The well-known Mount-Reiter schematic:



- ▶ In the standard framework, agents know the parameters (e.g., preferences), planner does not, and the mechanism is executed in “one shot.”
- ▶ Planner’s objective may be to maximize expected social welfare with respect to a prior on (or point estimate of) parameters.

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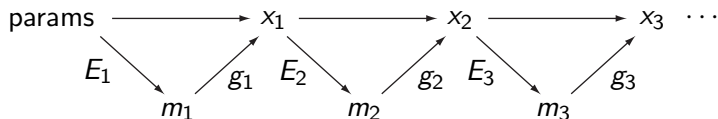
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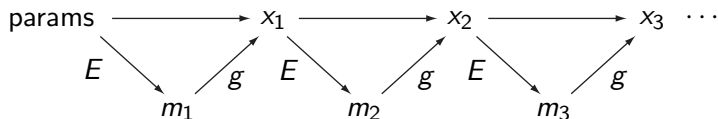
- ▶ The dynamic Mount-Reiter schematic:



- ▶ The mechanism is repeated over an infinite horizon.
- ▶ Given outcome  $x_{t-1}$ , agents choose  $m_t$ , which produces outcome  $g_t(x_{t-1}, m_t)$ .

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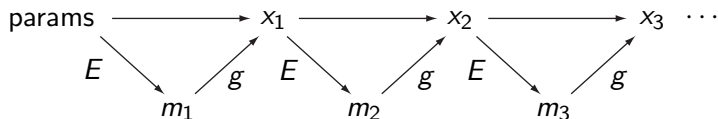
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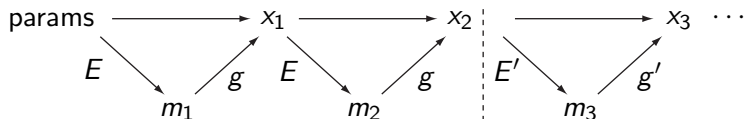
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- ▶ And tractability constraints impose strategic stationarity.

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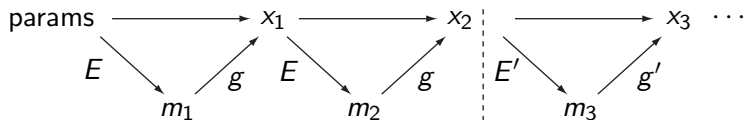
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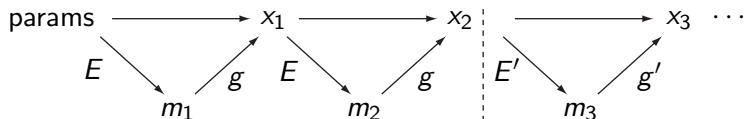


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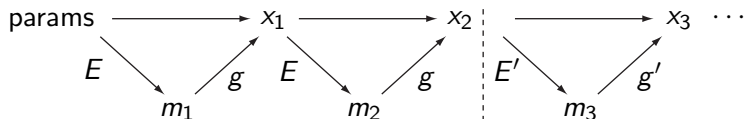
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- ▶ Choose  $g'$  to maximize estimated voter welfare.

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  - ▶ tractability constraints (stationary equilibrium)
- ▶ Similar to regulation of an industry?

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  - ▶ multiple (two) issue dimensions
  - ▶ endogenous elections
- ▶ We can consider modifying the veto rule, veto override, number of legislative chambers, timing of elections, term limits, office benefit, agenda control, etc.

# Model Fidelity

- ▶ We do not incorporate:
  - ▶ private information
  - ▶ enforceability
  - ▶ voting with feet, secession
  - ▶ endogenous parties, candidates
  - ▶ interest groups
  - ▶ economy



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- ▶ We endogenize elections by adding a “swing voter,” whose decisions determine national electoral outcome.
- ▶ Political interaction determines policy from a finite policy space over an infinite horizon.

# Timing, given $ps^0$ and $x^0$

## Electoral Stage:

- ▶ electoral state  $es$  is realized
- ▶ voter's action-specific shock  $\epsilon$  realized
- ▶ voter chooses action  $a$

▶ US Political Mechanism Details

## Policy Stage:

- ▶ political state  $ps$  is realized
- ▶ office holders realized
- ▶ status quo realized
- ▶ politicians' preference shocks  $\theta$  realized
- ▶ proposer  $\ell$  drawn
- ▶  $\ell$  proposes policy  $y$
- ▶ vote on policy proposal
- ▶ outcome  $x$  is determined.



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- ▶ Discount factor  $\delta \in [0, 1)$ .

# Strategies

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- ▶ Elected politician's approval strategy is

$$\alpha_{\tau} : PS \times X \times \Theta \times X \rightarrow \{0, 1\}.$$

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## Theorem

*Assume  $\epsilon$  and  $\theta$  have finite expectation. An equilibrium in pure strategies exists (by Brower's theorem).*

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  - ▶  $a_S^t = 0$  if the majority of Senators elected in that year belonged to the Republican party, and  $a_S^t = 1$  otherwise.

# Data

YEAR	$a_P$	$a_S$	$a_H$	President	Senate	House	PT
1952	0	0	0	R	R	R	1
1954	-	1	1	R	D	D	1
1956	0	1	1	R	D	D	2
1958	-	1	1	R	D	D	2
1960	1	1	1	D	D	D	1
1962	-	1	1	D	DS	D	1
1964	1	1	1	D	DS	DS	1
1966	-	1	1	D	D	D	1
1968	0	1	1	R	D	D	1
1970	-	1	1	R	D	D	1
1972	0	0	1	R	D	D	2
1974	-	1	1	R	D	DS	1
1976	1	1	1	D	D	DS	1
1978	-	0	1	D	D	D	1
1980	0	0	1	R	R	D	1
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1994	-	0	0	D	R	R	1
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1998	-	1	0	D	R	R	2
2000	0	1	0	R	R	R	1
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2006	-	1	1	R	D	D	2

- ▶ Data exhibit strong patterns:

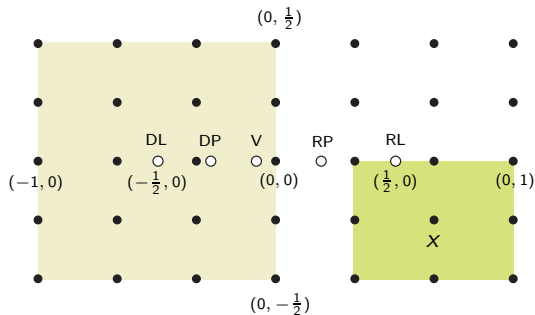
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- ▶ We compute equilibria to evaluate an aggregated likelihood in order to estimate model parameters.
- ▶ We (can) use model predictions at estimated parameter values to evaluate competing explanations for observed phenomena, evaluate role of different institutions, and perform constitutional experiments.

# Empirical Specification

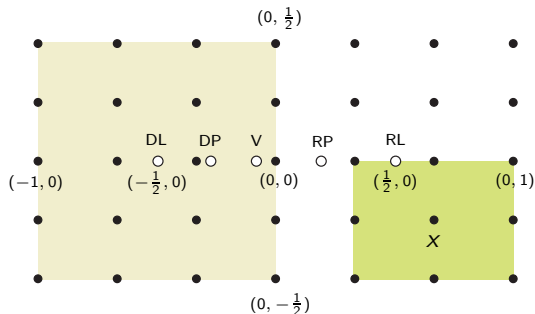
- ▶ Policy space is  $7 \times 5$  grid.





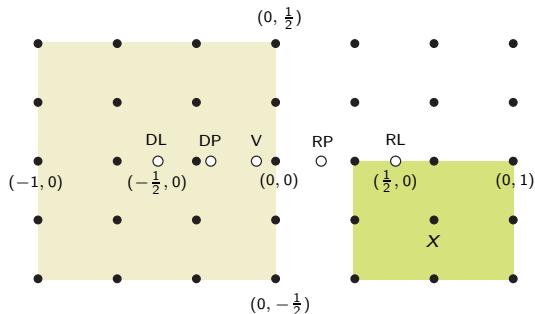
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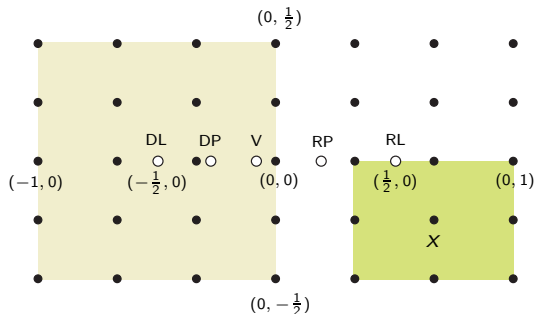
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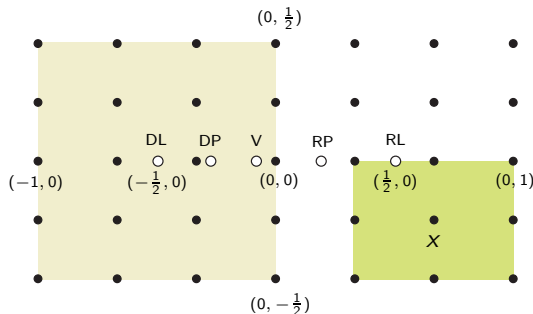
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- ▶ Noise on status quo and politician's utilities is uniform.
- ▶ Noise on voter's action-specific payoff is extreme value.



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- ▶ Since we don't observe the policies, we integrate them out.



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  - ▶ The value of office,  $b$
  - ▶ The degree majority party agenda control in each chamber,  $\mu$  ( $\mu = 0$  means all legislators have equal probability of proposing,  $\mu = 1$  only members of the majority party can)

# Parameters and Estimation

- ▶ One set of unknown parameters is transition probabilities, and continuation probabilities.
- ▶ We also wish to estimate:
  - ▶ The discount factor,  $\delta$
  - ▶ The location of the voter,  $\hat{x}_v$
  - ▶ The location of presidents relative to the voter,  $\lambda$
  - ▶ The value of office,  $b$
  - ▶ The degree majority party agenda control in each chamber,  $\mu$  ( $\mu = 0$  means all legislators have equal probability of proposing,  $\mu = 1$  only members of the majority party can)
  - ▶ A dispersion parameter for the voter's preference shock,  $\beta$ .

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  1. Estimate transition and continuation probabilities first (no need to compute equilibrium).
  2. Estimate  $(\delta, \hat{x}_v, \lambda, b, \mu, \beta)$  maximizing the likelihood over a *coarse grid* (current estimates are “rough”).

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## Stage II Estimation

Parameter	MLE	MLE ( $\delta = 0$ )
$\delta$	0.75	<b>0</b>
$b$	1.5	NA
$\lambda$	0	0
$\hat{x}_v$	-0.375	-0.5
$\beta$	30	30
$\mu$	0.5	0
LogLikelihood	-75.03	-78.73

- ▶ Pro-Democratic party bias.
- ▶ Presidents race to the 'median'.
- ▶ We can reject the hypothesis that  $\delta = 0$ .
- ▶ Majority control of the agenda.

▶ Stage I Estimation

# Invariant Distribution over Types of Government

Term half	1st half ( $M = 1$ )				2nd half ( $M = 2$ )			
	Republican		Democrat		Republican		Democrat	
Gov't	Unif.	Div.	Unif.	Div.	Unif.	Div.	Unif.	Div.
MLE	0.07	0.43	0.21	0.29	0.07	0.43	0.21	0.29
data	3	6	4	1	1	8	3	2

# Invariant Distribution over Voter Choices in Mid-Term Elections

Vote for Senate	R	R	D	D
Vote for House	R	D	R	D
MLE	0.15	0.25	0.18	0.42
data	2	1	1	10

# Invariant Distribution over Voter Choices in Presidential Elections

Pres. Vote	R	R	R	R	D	D	D	D
Senate Vote	R	R	D	D	R	R	D	D
House Vote	R	D	R	D	R	D	R	D
MLE	0.07	0.13	0.09	0.21	0.07	0.13	0.09	0.21
data	2	3	1	3	1	0	0	4

# Mid-Term Transitions

Term half	President	Gov't	2nd half (M = 2)			
			Republican		Democrat	
			Unif.	Div.	Unif.	Div.
1st half (M=1)	Rep	Unif.	0.27	0.73	–	–
	Rep	Div.	0.12	0.88	–	–
	Dem	Unif.	–	–	0.57	0.43
	Dem	Div.	–	–	0.31	0.69
1st half (M=1)	Rep	Unif.	1	2	–	–
	Rep	Div.	0	6	–	–
	Dem	Unif.	–	–	3	1
	Dem	Div.	–	–	0	1



# Transitions in Presidential Election Periods

Term half	President	Gov't	1st half (M = 1)			
			Republican		Democrat	
			Unif.	Div.	Unif.	Div.
2nd half (M=2)	Rep	Unif.	0.13	0.37	0.10	0.40
	Rep	Div.	0.06	0.44	0.23	0.27
	Dem	Unif.	0.03	0.47	0.28	0.22
	Dem	Div.	0.10	0.40	0.16	0.34
2nd half (M=2)	Rep	Unif.	1	0	0	0
	Rep	Div.	0	4	3	0
	Dem	Unif.	0	2	1	0
	Dem	Div.	1	0	0	1

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- ▶ Electorate pro-Democratic party: advantage in Congressional elections.
- ▶ Moderate presidents.
- ▶ Evidence of forward looking players.
- ▶ Some evidence of majority party control of the agenda.
- ▶ Farsighted electorate and politicians' choice of policy lead to serially correlated choices in the two chambers.

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- ▶ Investigate equilibrium strategies, dynamic incentives.
- ▶ Institutional experiments: veto rule, veto override, number of legislative chambers, timing of elections, term limits, office benefit, agenda control, etc.

- ▶ District-specific policies, pork barrel politics

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- ▶ Nature draws the voter's (action specific) preference shocks  $\epsilon$  from  $h(\epsilon)$ .
- ▶ The voter cast two ballots  $a_H \in \{0, 1\}$ ,  $a_S \in \{0, 1\}$  in midterm election periods, and an additional ballot  $a_P \in \{0, 1\}$  in presidential election periods.

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- ▶ The game moves to the next period, with a new electoral state being drawn.

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- ▶ For the House:

	level Democratic representation			
	3	4	5	6
$a_H = 0$	3/28	25/28	0	0
$a_H = 1$	0	0	25/28	3/28

# Stage I Estimation

- ▶ For the Senate:

		level Democratic representation				
		initial	3	4	5	6
$a'_S = 0$	3		1/2	1/2	0	0
	4		1/15	14/15	0	0
	5		0	6/11	5/11	0
	6		0	0	<b>1</b>	0
$a'_S = 1$	3		0	<b>1</b>	0	0
	4		0	5/11	6/11	0
	5		0	0	14/15	1/15
	6		0	0	1/2	1/2

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- ▶ Estimated probabilities:

$q_h$	0.855
$q_s$	0.920
$q_p^1$	0.929
$q_p^2$	0.727