Persistent Protests

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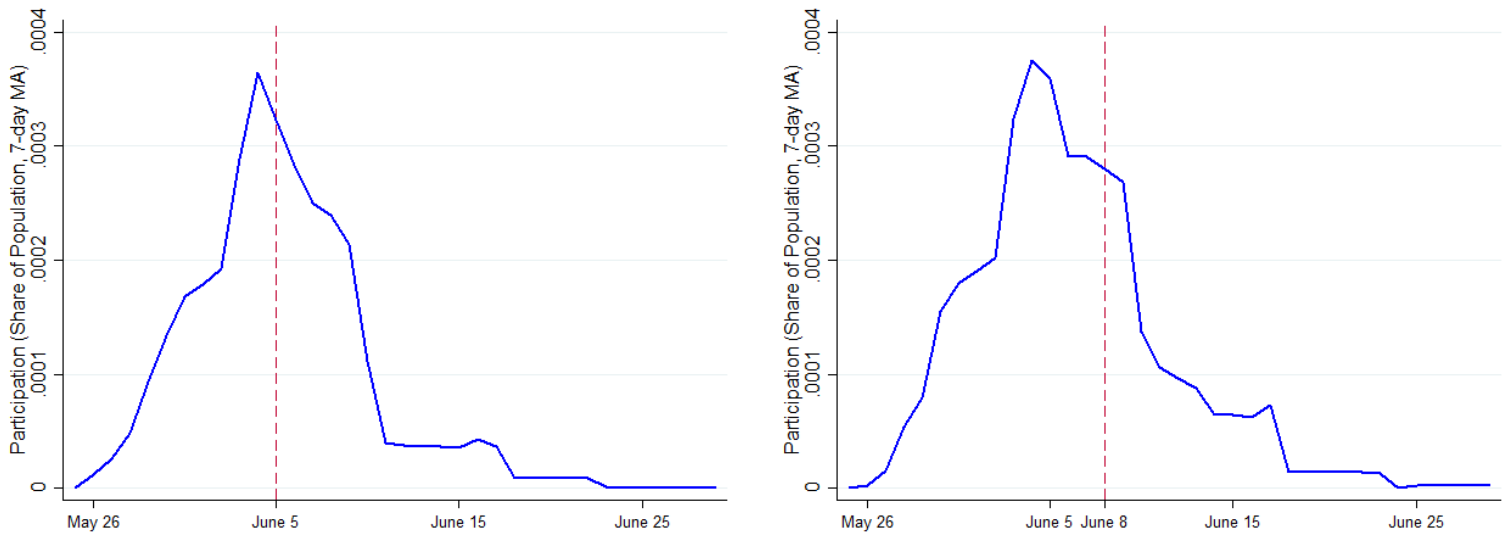
Motivation

- Public protests are relevant for democracies
- Some protests are persistent, and their intensity varies over time
- Participation evolves as people might join and then leave
- It takes time to build-up a movement and get government's attention
- Recent protests: France 2018, Chile 2019, US 2020

Motivation: Black Lives Matter Protests

Daily Participation and First Concession



(a) California

(b) New York

Note: Vertical red line corresponds to the time of the first concession by State Governor's (news reports, Lexis-Nexis).

Motivation

- Static theories capture the essential coordination problem
  - Allows us to characterize successful protests in an aggregate form
- Dynamics of protests carry relevant information
- How does participation evolves over time?
- With heterogeneous agents, how do protesters' characteristics evolve?

Motivation

- This paper focuses on these dynamics:
  - The trajectory of aggregate participation
  - Government reactions over time
- How heterogeneity in opportunity costs of participating shapes persistent protests

This paper: A Dynamic Model of Protests

- A government and a continuum of citizens asking for a public good
- Protesting is costly
  - Opportunity cost of protesting: occupations, income, etc
- Government faces a cost from staring down the protest
  - Increasing in participation: direct cost from having people in the streets
  - Increasing in duration: indirect cost from media attention, political reputation

This paper: A Dynamic Model of Protests

- Public good is non-excludable
- Citizens' intrinsic motive: Veteran Reward
  - Value from merit in the victory against the government
  - Citizens who are in the protest when the government concedes, get a prize increasing in their contribution

Preview of Results I: The Dynamics of Protests

- All equilibria with protests share the same qualitative features
- There is always delay in government concession.
- Every equilibrium with protests is characterized by three stages:
  - Build-up stage: participation increases, and the government waits;
  - Peak: maximum participation, first (probabilistic) concession; and, possibly,
  - Decay stage: the government concedes, and people continuously drop out
- Decay stage: war of attrition between the citizens and the government

Preview of Results II: A Continuum of Equilibria

- The set of equilibria is fully described by the protest peak time
  - Set possible peaks is a bounded interval
  - For each peak time within this interval the equilibrium is unique

Preview of Results III: Empirical Predictions

- Citizens' strategies are monotone in opportunity costs
  - Entry times increase with opportunity costs, and exit times are decreasing
  - LIFO dynamics
- Test empirical prediction using Black Lives Matter
- County-level daily participation data
  - Mapping model to data: Individuals $\rightarrow$ County

Empirical Predictions: Black Lives Matter

- Hypothesis
  - Counties with higher opportunity costs enter later, and exit earlier
- Opportunity costs
  - Time flexibility induced by COVID-19 through stay-at-home behavior
- Result
  - Stay at home behavior is consistent with earlier entry, and later exit

Contribution to the Literature

- Coordination and protests: Dynamics
  - Bueno de Mesquita and Shadmehr (2020), Edmond (2013), Bueno de Mesquita (2010, 2014)
- War of Attrition: Continuum of agents against a large player
  - Hendricks et al (1998), Bulow and Klemperer (1997)
- Social Psychology of Participation: Paradox of persistent participation
  - Feather and Newton (1982), Klandermans(1984), Passarelli and Tabellini (2017)
- Opportunity costs, conflict and protests
  - Chassang and Padro i Miquel (2009), Dal Bo and Dal Bo (2011), Dube and Vargas (2013), Bazzi and Blattman (2014), Mitra and Ray (2014)

Outline for Today

- Motivation
- A Dynamic Model of Protests
- The Dynamics of Protests
  - Equilibrium Characterization
  - A Continuum of Equilibria
- Black Lives Matter: An Empirical Exploration
- Extensions and Concluding Remarks

A Dynamic Model of Protests

Model

- Continuous time $t \in [0, \infty)$
- $t = 0$: time at which the protest begins
- Continuum of citizens $i \in [0, 1]$ and a government
- At any time t, citizens can protest to ask for a non-excludable public good
- At any time t, government can either concede or wait
- Protest ends when either the government concedes, or all citizens drop out.

Government's Payoffs

- q: flow cost of providing the public good
- π_t: participation at time t
- $c(\pi, t)$: cost of the protest to the government
  - Strictly increasing in π
  - Strictly increasing in t if $\pi > 0$
  - $c(0, t) = 0$ and $c(1, t) > q$ for all t
- Government's total payoff if concedes at τ:

$$-\int_0^\tau e^{-rs} c(\pi_s, s) ds - e^{-r\tau} \frac{q}{r}$$

Citizens' Payoffs

- θ_i: (flow) opportunity cost of protesting.
  - $\theta \sim F$ with full support $[\underline{\theta}, \overline{\theta}]$, bounded away from zero
  - Income, type of occupation, etc

- Everyone gets the same value from the public good, $x = 1$

- Motivation to participate $\rightarrow$ Veteran Reward
  - If government concedes at τ, a citizen protesting since t_0 gets $v(\tau - t_0)$
  - $v : [0, \infty] \rightarrow \mathbb{R}_+$ is increasing, concave and it satisfies $v(0) = 0$
  - Intrinsic + instrumental motive.

Strategies

- Citizens: decision to participate in the protest.
  - Strategy σ: history $\pi^t \mapsto \{\textit{participate}, \textit{not participate}\}$.
  - π_t^σ: size of the protest at time t
- Government's strategy: a time τ to concede
- Government's mixed strategy
  - $G(t)$: Probability distribution over concession times
  - Increasing and right-continuous in t, with support: $\mathcal{T}$
  - $\tau_0 = \inf \mathcal{T}$: Time of the first probabilistic concession
  - Hazard rate λ_t: instantaneous probability of government concession.

Alternative interpretation: Partial Concessions

- Government can to concede only a fraction of the demands
- Partial concessions are irreversible
- Government strategy: fraction of the public good to provide at time t.
- "Purify" Government's strategy

Equilibrium. *Distribution of government concessions $G(t)$, and a profile of citizens' strategies σ, such that given the outcome path $\{\pi_t^\sigma\}_{t\geq 0}$,*

(i) *The strategy for the government maximizes its expected total payoff.*

(ii) *Citizens' strategies maximize their expected total utility given government's distribution of concession G.*

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- I focus on the set of equilibria in which a protest occurs.

The Dynamics of Protests

Equilibrium Characterization

Theorem 1. *Let $G : [0, \infty] \to [0, 1]$, $(\pi_t^\sigma)_{t \geq 0}$ be an equilibrium with protests. Then:*

(i) *There is always delay before concession, i.e. $\tau_0 > 0$*

(ii) *Participation is continuous, increasing for $t \leq \tau_0$, and if $G(\tau_0) < 1$, decreasing afterwards*

(iii) *The distribution of concessions has at most one discrete jump at τ_0*

(iv) *If $G(\tau_0) < 1$, then $G(t)$ strictly increasing, continuous for $t > \tau_0$, and concession continues forever*

Government's Optimal Strategy

Lemma 1. *Either the government concedes w.p.* 1 *at* τ_0*, or it randomizes over an interval* $[\tau_0, \infty)$*.*

- $\tilde{\pi}_t$: Indifference participation level, $c(\tilde{\pi}_t, t) = q$ for all t

Citizens' Optimal Strategies

Lemma 2. *For citizens is optimal to enter and exit at most once: enter before concession starts, and exit afterwards.*

- Citizens choose an entry time t_0, and exit time t_1 to maximize:

$$E\left[-\theta\int_{t_0}^{t_1\wedge\tau} e^{-rs}ds + e^{-r\tau}\left(\mathbb{1}_{\tau<t_1}v(\tau-t_0)+\frac{x}{r}\right)\right]$$

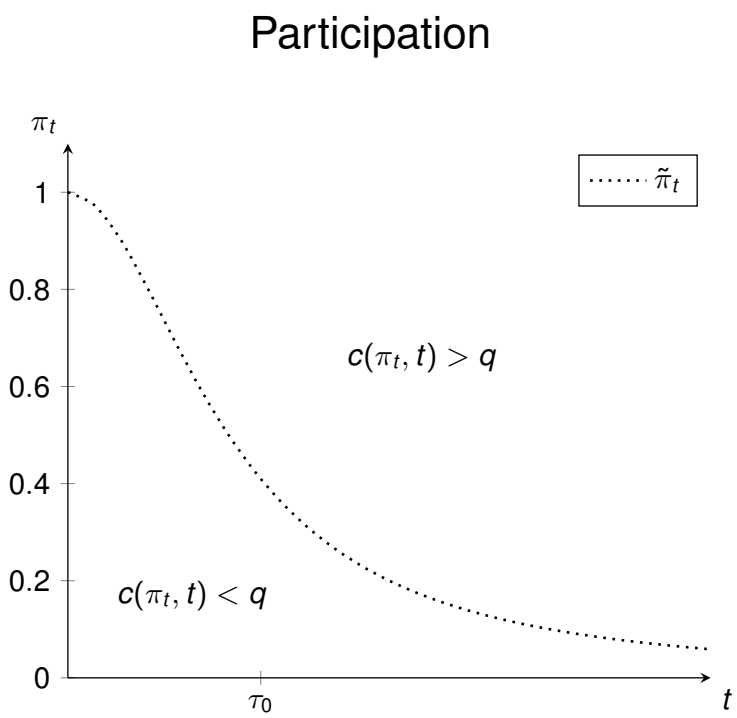
- Exit if $\theta \geq \lambda_{t_1} v(t_1 - t_0)$
- Enter if $\theta \leq E\left[e^{-r(\tau-t_0)}\mathbb{1}_{\tau<t_1}v'(\tau-t_0)\right]$

Equilibrium

- Government $G(t) \rightarrow$ Expected gains from protesting
- Citizens' strategies monotone in opportunity costs $\rightarrow$ Thresholds
- Increasing Entry threshold $\tilde{\theta}_0(t)$
- At any $t < \tau_0$, protest if $\theta \leq \tilde{\theta}_0(t) \Rightarrow \pi_t^\sigma = F(\tilde{\theta}_0(t))$
- Decreasing Exit threshold $\tilde{\theta}_1(t)$
- At any $t \geq \tau_0$, protest if $\theta \leq \tilde{\theta}_1(t) \Rightarrow \pi_t^\sigma = F(\tilde{\theta}_1(t))$

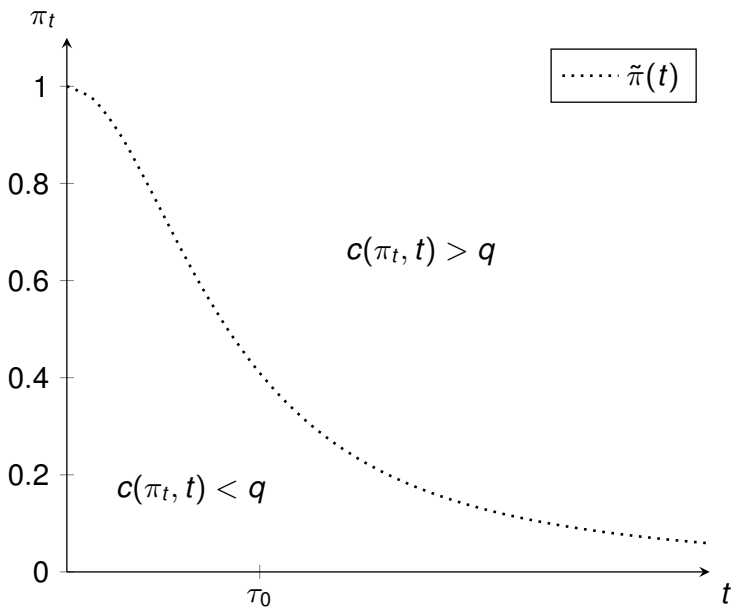
Equilibrium Illustration

- $\tilde{\pi}_t$: Indifference participation level, $c(\tilde{\pi}_t, t) = q$ for all t

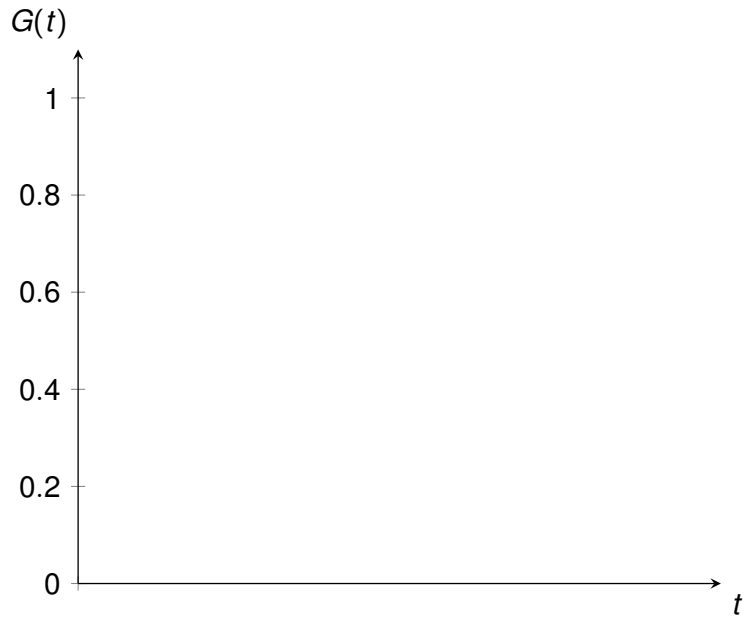


Equilibrium Illustration

Participation

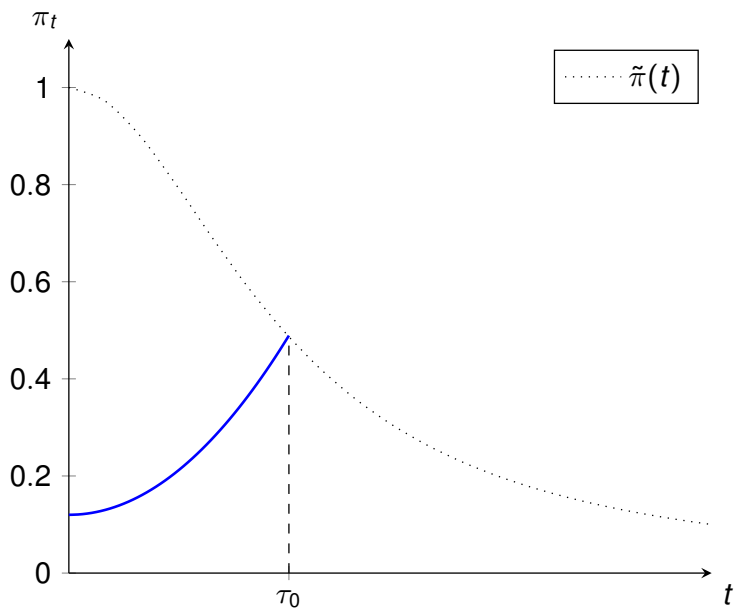


Government Concession



Equilibrium: Build-up

Participation



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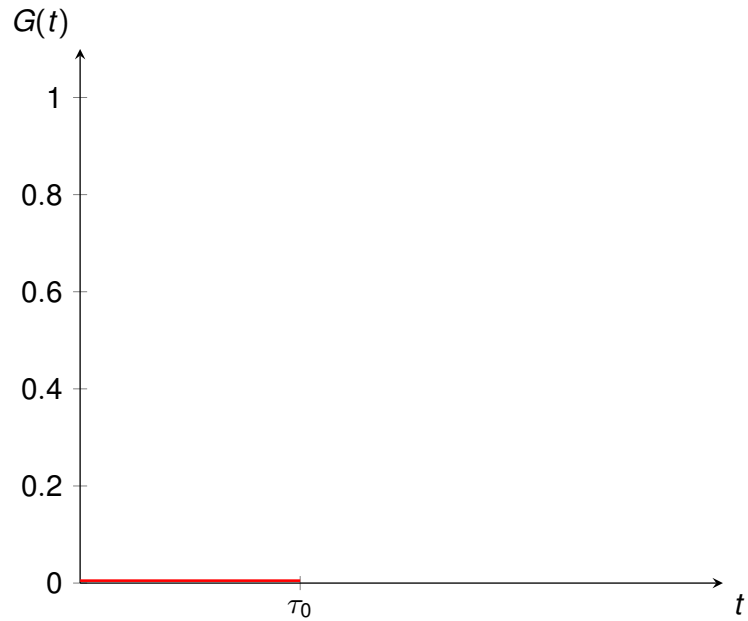
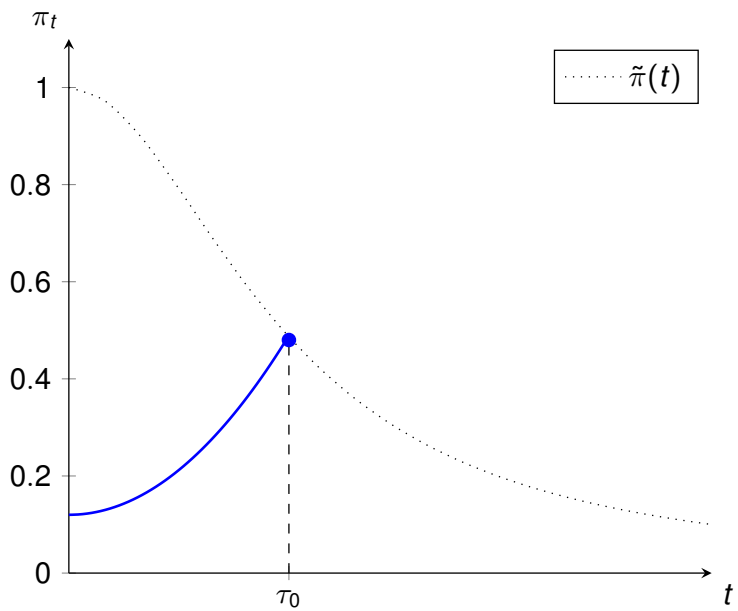
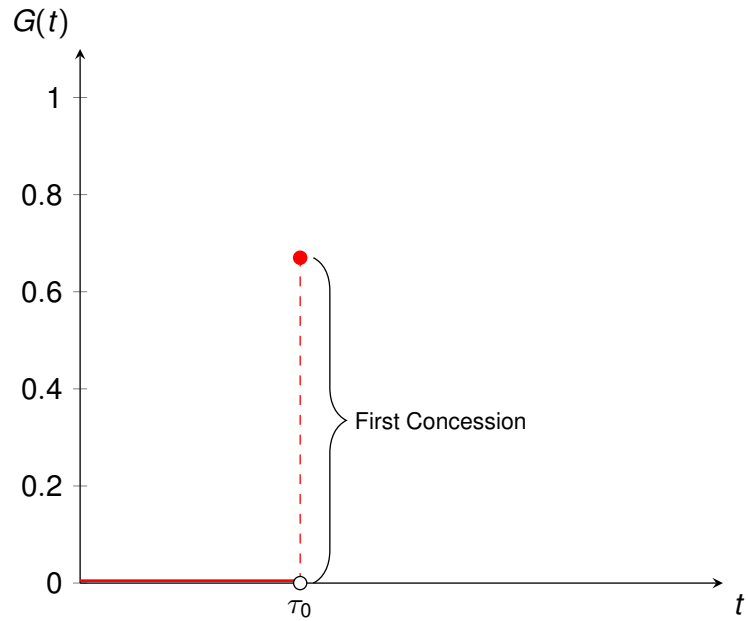


Equilibrium: Peak

Participation

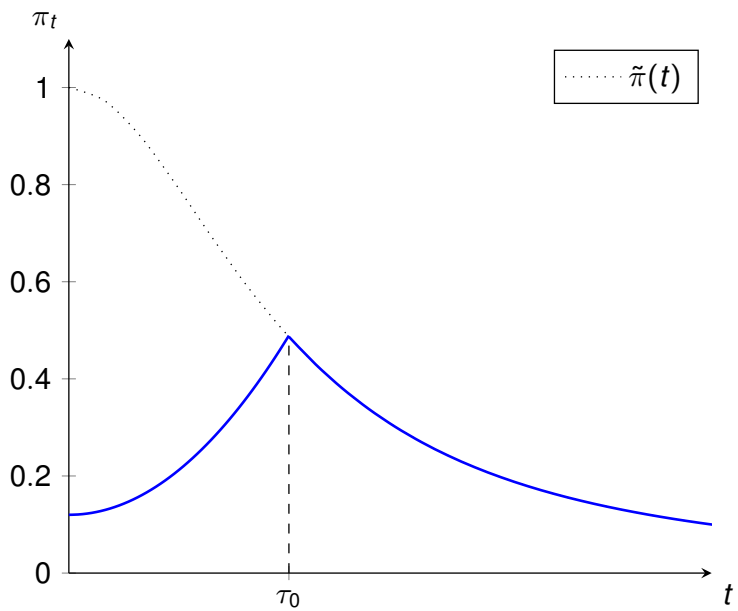


Government Concession

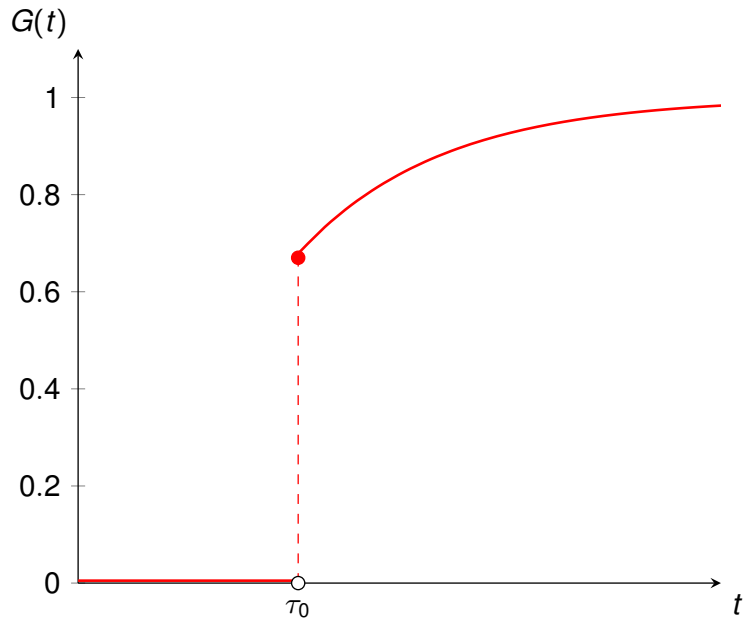


Equilibrium: Decay

Participation



Government Concession



A Continuum of Equilibria

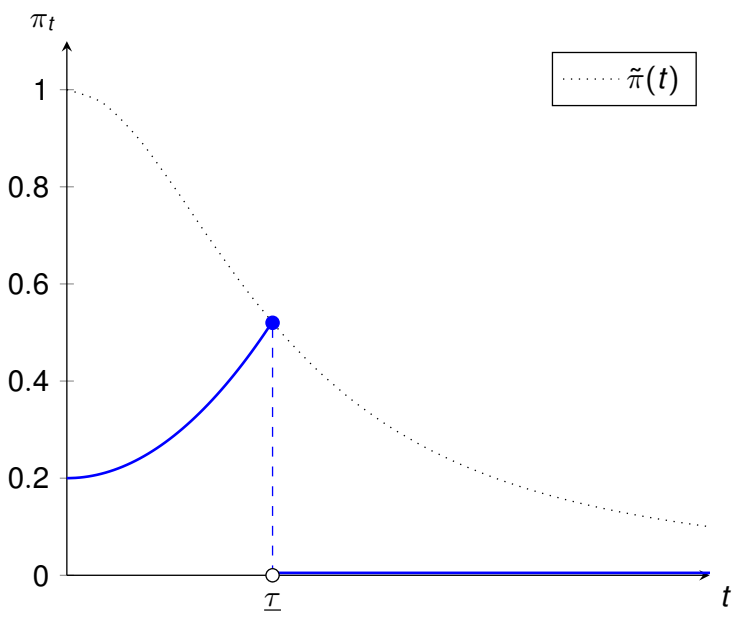
The Set of Possible τ_0 is Bounded

- Lower bound $\underline{\tau} > 0$: concession cannot start too soon
  - Government concedes w.p. 1, i.e. $G(\underline{\tau}) = 1$
- Upper bound $\overline{\tau} < \infty$
  - Lowest opportunity cost citizen is indifferent at $t = 0$

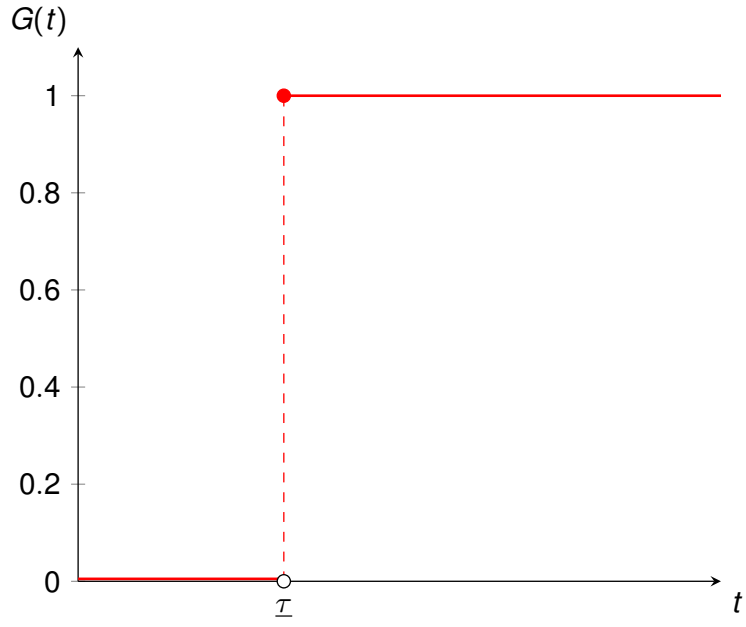
A Continuum of Equilibria

Theorem 2. *For each time $\tau_0 \in [\underline{\tau}, \overline{\tau}]$, there is a unique equilibrium in which the government starts conceding at τ_0.*

Continuum of Equilibria: Lower bound $\underline{\tau}$

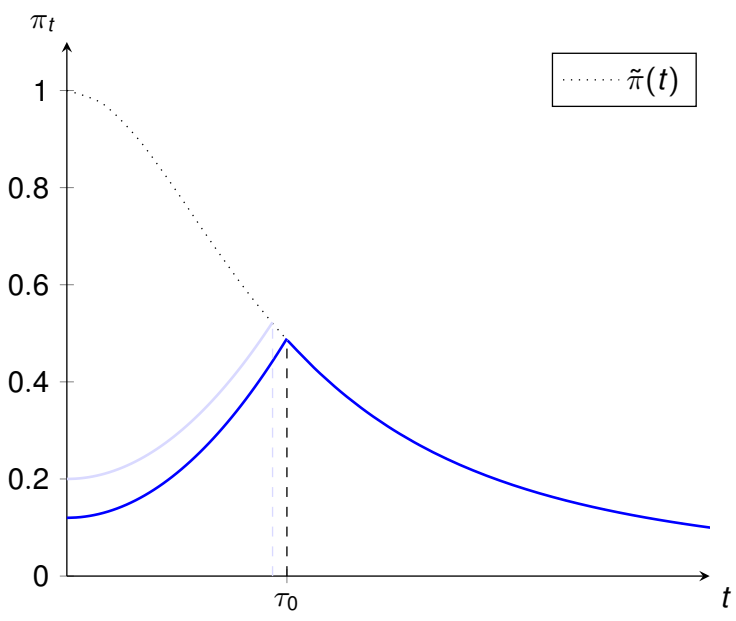


Participation

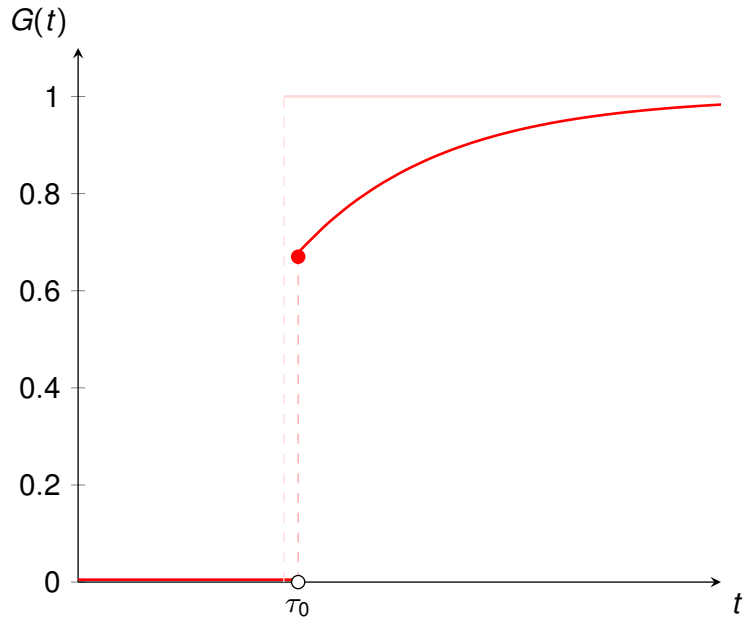


Government Concession

Continuum of Equilibria: $\tau_0 \in (\underline{\tau}, \overline{\tau})$

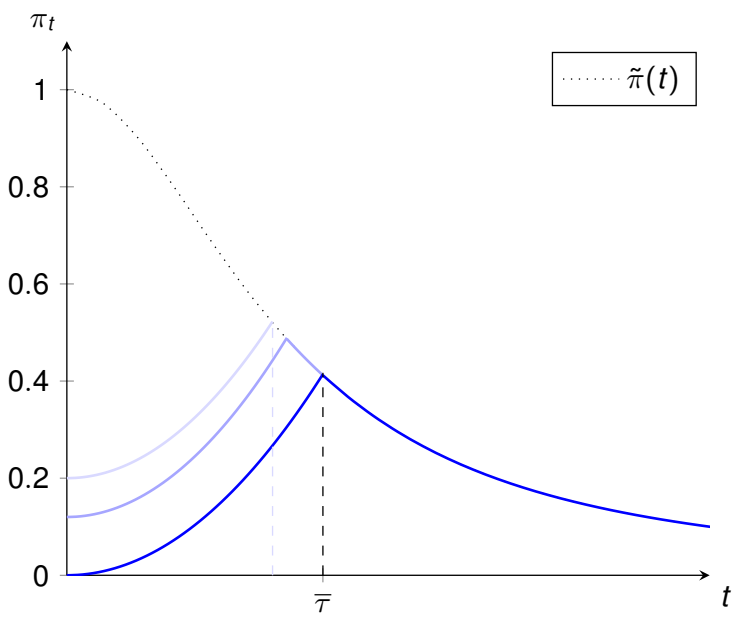


Participation

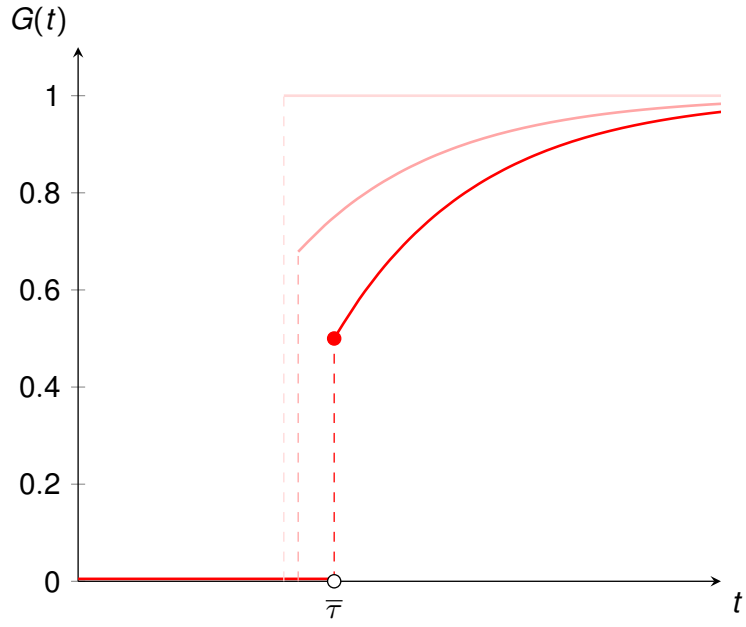


Government Concession

Continuum of Equilibria: Upper bound $\overline{\tau}$

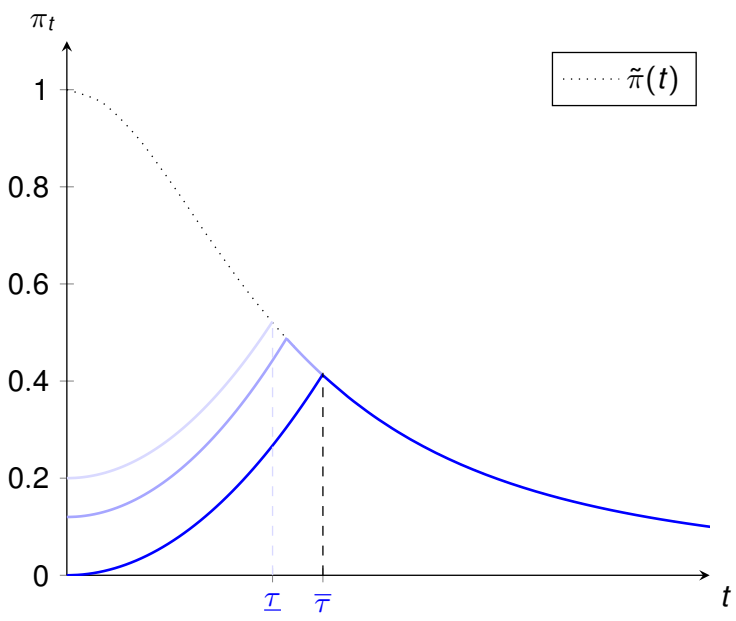


Participation

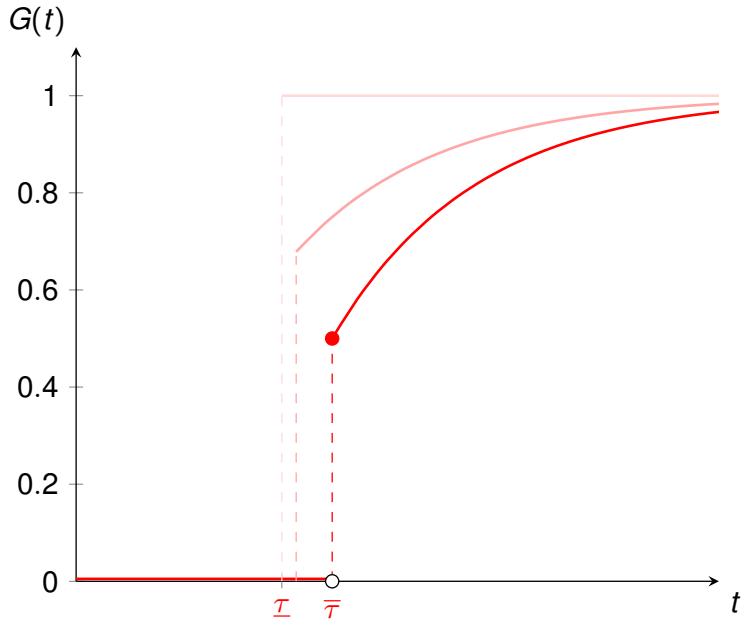


Government Concession

Continuum of Equilibria



Participation



Government Concession

Expected Duration is Decreasing in Initial Participation

Corollary 1. *Fix an initial participation, π_0. There exits a unique equilibrium trajectory of participation $(\pi_t^\sigma)_{t\geq 0}$ with initial participation $\pi_0^\sigma = \pi_0$.*

Corollary 2. *The expected duration of protests increases with the time of the peak, τ_0, and decreases with initial participation, π_0.*

Discussion

- Multiplicity: Structure is the same across equilibria
  - Conditional on π_0, the equilibrium is unique.
  - Multiplicity in protests: Schelling (1960), Hudin (1995), Bueno de Mesquita (2014).
- Delay: not captured by static models of collective action
  - Trade-off *participation* - *persistence*
- Empirical Predictions:
  - Participation is single-peaked
  - Concessions happen after the peak, and the probability of concession decreases over time
  - LIFO: entry times are increasing in opportunity costs, and exit times are decreasing.

Black Lives Matter:

A Preliminary Exploration

Motivation

- Test empirical prediction of the model
  - Entry times increase with opportunity cost, and exit times decrease
- Approach: Heterogeneity across counties
  - Participation: county-level daily participation in *Black Lives Matter* protests
  - Opportunity costs: Cross-county variation in time flexibility
- Each state is a protest
- Demands: police system reforms, allowing for partial concessions.

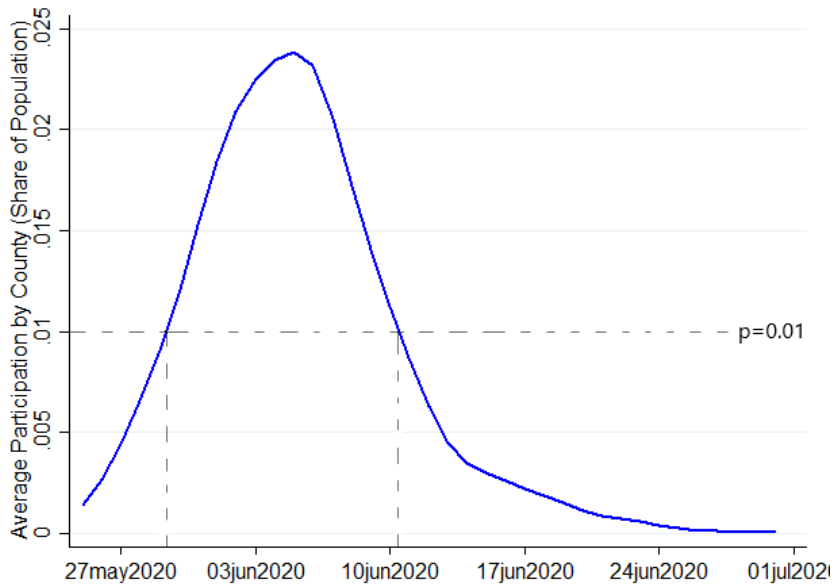
Empirical Strategy: Mapping the Model to the Data

- Individual decisions $\rightarrow$ county-level participation
  - Opportunity cost: Citizen i at county j: $\theta_i = \theta_j + \epsilon_i$
  - θ_j: county-level component, ϵ_i iid
  - $\pi_{j,t}$: participation as a fraction of the population.
  - $\pi_{j,t} = P(\theta_j + \epsilon_i \leq \tilde{\theta}(t))$, for $\tilde{\theta}(t) = \min\{\tilde{\theta}_0(t), \tilde{\theta}_1(t)\}$
- County-level hypotheses:
  - Counties with higher opportunity costs take longer to reach a given participation level
  - Counties with higher opportunity costs fall below a given participation level quicker

Empirical Strategy: Dependent Variable

- Entry: First time the county reaches a given participation level
- $\text{ENTRY}_j(p)$: time it takes for county j's participation to reach p%

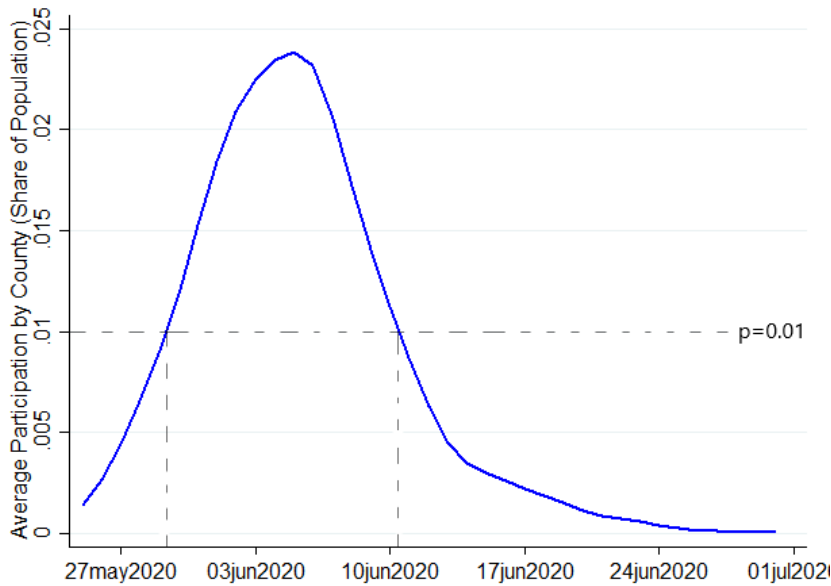
Average Participation by County (Fraction of the Population, US)



Empirical Strategy: Dependent Variable

- Exit: Last time the county reaches a given participation level.
- $\text{EXIT}_j(p)$: time it takes for county j's participation to fall below p%

Average Participation by County (Fraction of the Population, US)



Empirical Strategy: Opportunity Costs

- Time flexibility induced by COVID-19 through stay-at-home behavior
- More time at home $\rightarrow$ time flexibility $\rightarrow$ lower opportunity cost
- Stay-at-home: number of people at their residences (mobile device data)
  - STAY AT HOME: $\Delta\%$ number of people staying at home the month prior to the protests, with respect to 2019

Empirical Strategy: Opportunity Costs

- Structural Equations (for $p \in \{0.001, 0.005, 0.01, 0.02\}$):

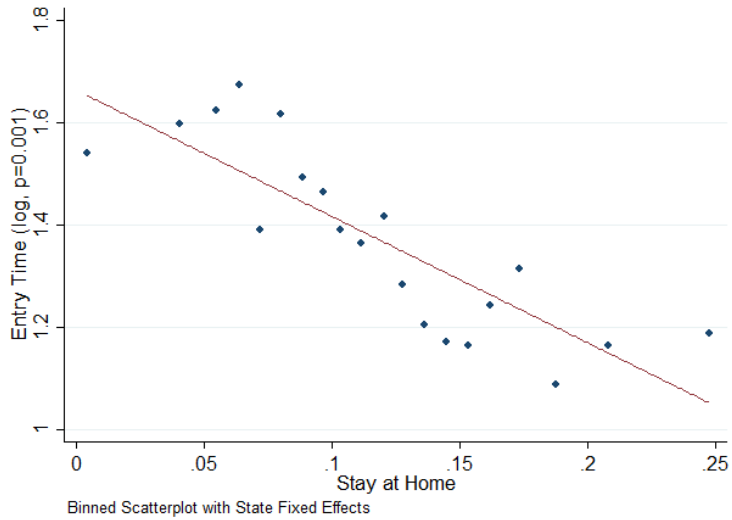
(1) $\text{ENTRY}_{j,s}(p) = \alpha_0 + \alpha_1 \text{STAY-AT-HOME}_{j,s} + \gamma_s + \epsilon_j$

(2) $\text{EXIT}_{j,s}(p) = \beta_0 + \beta_1 \text{STAY-AT-HOME}_{j,s} + \gamma_s + \epsilon_j$.

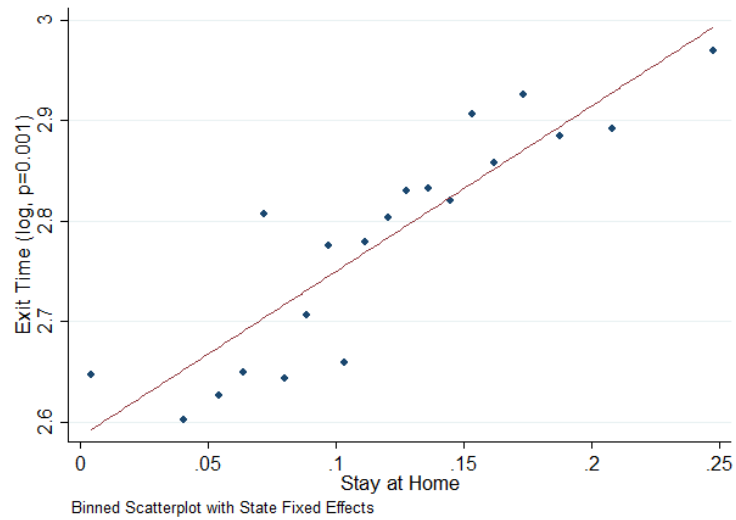
- Hypothesis: Higher STAY AT HOME implies earlier entry, and later exit
  - $\alpha_1 < 0$ and $\beta_1 > 0$

More People Staying Home: Earlier Entry and Later Exit

Figure: Entry, Exit and People Staying Home ($p = 0.01$)



(a) Entry



(b) Exit

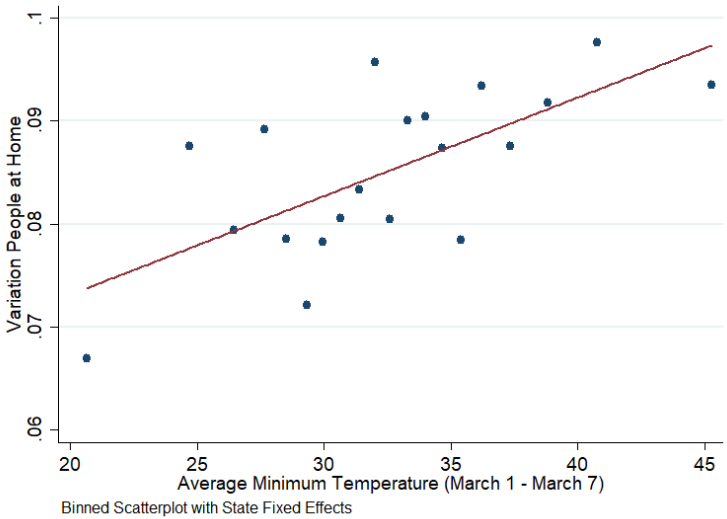
Note: Binned Scatterplot. Residuals after controlling for State Fixed Effects.

Empirical Strategy: Identification

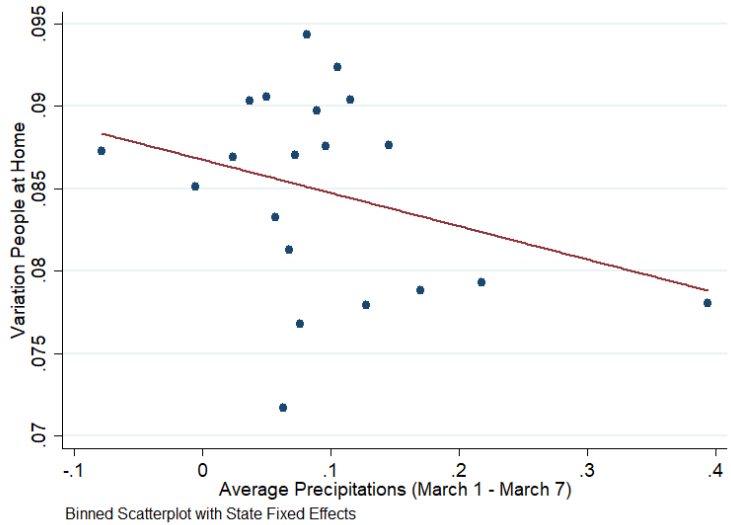
- Stay-at-home behavior might capture other variables affecting participation
- Identification: Exogenous variation in COVID-19 induced by weather
  - Kapoor et al (2020): rainfall affects social-distancing, and hence COVID-19
- Incidence of COVID-19 $\rightarrow$ stay at home behavior
- Instruments:
  - MIN TEMP$_j$: Average minimum temperature, first week of March
  - PRECIPITATIONS$_j$: Average precipitations, first week of March.

Empirical Strategy: First Stage

Stay at Home (May, 2020) and Weather (March, 2020)



(a) Temperature



(b) Precipitation

Data and Main Variables

- Protests: *Crowd Counting Consortium* (May 26 - June 30, 2020)
  - Event data: date, location (county), participation (approximated, media sources)
- People at home: *Bureau of Transportation Statistics.*
  - Travel statistics are produced from an anonymized national panel of mobile device data from multiple sources.
- Weather: Daily Summaries from the National Oceanic and Atmospheric Administration
- Demographics and previous election results: *MIT Election and Data Lab*.

Counties with More People at Home Enter Earlier and Exit Later

Entry and People Staying Home

Dependent Variable:	ENTRY(p)		EXIT(p)	
	(1)	(2)	(3)	(4)
Threshold p:	0.001%	0.005%	0.001%	0.005%
	Panel (a) OLS			
STAY AT HOME	-2.468***	-1.933***	1.647***	1.208***
	(0.363)	(0.352)	(0.172)	(0.171)
	Panel (b) IV			
STAY AT HOME	-6.940***	-4.569**	3.446***	3.632***
	(2.344)	(2.205)	(1.178)	(1.192)
State FE	X	X	X	X
Observations	1029	999	1029	999
First-Stage F	14.01	13.35	14.01	13.35

SE in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Comments and Additional Results

- Results are consistent with predictions
- Further analysis on dynamics of participation is needed.
- Other sources of participation (cell phone data)
- Robustness.
- Income and education.
  - Higher income $\rightarrow$ Higher opportunity cost
  - Lower education $\rightarrow$ Higher opportunity cost.

Concluding remarks

- I characterize the dynamics of participation and concessions
- Persistent participation is motivated by a psychological payoff
- There is a continuum of equilibria sharing the same qualitative features
  - Delay in government concession
  - A building up stage, a peak, and possibly, a decay stage
- Evidence from *Black Lives Matter* protests supports some empirical predictions
- Further empirical analysis on the timing of participation is needed.

Some Extensions

- Income to opportunity costs
  - How does the distribution of income affects protests duration?
- Heterogeneous stakes in the protest
  - Relation between opportunity costs and value from protests
  - What types of policies may get implemented earlier?

Thanks!