The Political Economy of Indirect Control

Gerard Padró i Miquel and Pierre Yared

LSE and Columbia

December 2009

Motivation

- Many governments use indirect control of local agents
  - e.g., law and order, prevention of riots and protests, taxation, terrorism
  - e.g., Roman Empire, British Empire, Ottoman Empire, others today
- Use occasional favors and occasional military intervention
  - Useful for alligning incentive of agent with own
- This paper: How should governments use rewards and interventions?

Three Key Political Economy Frictions

- Government cannot commit to rewards or interventions
- Local agent cannot commit to fulfilling delegated task
- Local agent's actions are imperfectly observed by government

What We Do

- Develop principal-agent model where agent prevents a disturbance
  - e.g., riots, protests, terrorism, crime, tax evasion
- Two departures from standard setting
  - Principal can intervene with endogenous intensity of force
  - Principal suffers from limited commitment
- Focus: Optimal likelihood, intensity, and duration of intervention
  - Achieve explicit characterization of contract using APS (1990)

Results

- Repeated and costly interventions are a feature of optimal policy
  - Operate as a form of punishment to induce agent into cooperation
  - Phases of punishment and cooperation sustain each other
- Fundamental tradeoff between duration and intensity of intervention
  - Driven by the principal's inability to commit
- Sharp predictions on impact of various factors on type of intervention
  - Cost of force to principal (e.g., less international rebuke)
  - Cost of disturbance to principal (e.g., more at stake)
  - Cost of effort to agent (e.g., less legitimacy, radicalization)

Related Literature

- Optimal dynamic contracting
  - Atkeson-Lucas (1992), Thomas and Worrall (1990), Phelan (1995), Golosov-Kocherlakota-Tysvinski (2003)
  - **This paper:** Punishment which is costly to principal and agent
    - Analogous to Green-Porter (1984) but for efficient equilibrium
- Costly political conflict
  - Acemoglu-Robinson (2006), Baliga-Sjostrom (2004), Chassang-Padro i Miquel (2009), Powell (1999), Yared (2009)
  - **This paper:** Repeated conflict and below Nash payoffs
- Static punishments
  - Becker (1968), Polinski-Shavell (1984), DalBó-DiTella (2003), Acemoglu-Wolitsky (2009)
  - **This paper**: Dynamics and no commitment by government

Outline

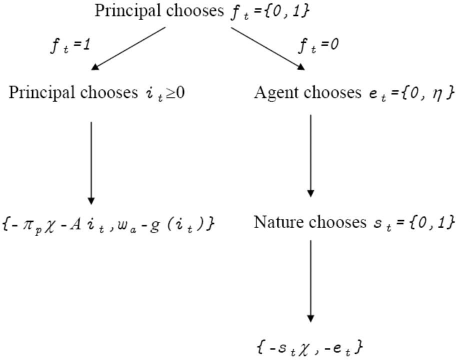
- Model
- Equilibrium Definition
- Analysis
- Extensions and Discussion

Model
Setup

- Principal seeks fewer disturbances
  - e.g., riots, protests, terrorism, crime, tax evasion
- Principal can intervene with force and choose intensity of force
  - Higher intensity hurts both the principal and the agent
  - Principal suffers from limited commitment
- Principal can allow agent to reduce disturbances on his own
  - Agent's effort towards reducing disturbances is unobserved
  - NOTE: Ignore payments to agent for now
    - Reduces notation and does not affect results since focus is interventions
    - Yields unique LR equilibrium

Model

Environment



Notes:

$g'(\cdot), -g''(\cdot) > 0$

$\pi_a(e_t) = \Pr\{s_t = 1 | e_t\}$

$\pi_a(0) > \pi_a(\eta)$

Assumptions:

A1. (inefficiency of intervention) $-\pi_a(\eta) > -\pi_p$ and $-\eta > w_a$

A2. (desirability of intervention) $-\pi_p > -\pi_a(0)$

Model

Understanding the Assumptions

- Intervention is inefficient. Both players would prefer cooperation
- Low effort by agent not acceptable to principal
  - Agent cannot commit to high effort. Static Nash is intervention
  - Repeated game strategies could induce high effort
- Political economy frictions
  - Principal cannot commit
    - Cannot commit to abstaining from intervention
    - Cannot commit to more than minimal force
  - Agent cannot commit to high effort
  - Principal cannot observe e_t and only observes s_t
    - Always a positive probability of disturbance even under high effort
    - Problem: Agent can choose low effort and lie about it

Equilibrium Definition

Efficient Sequential Equilibrium

- Efficient sequential equilibrium
  - Continuation strategies as a function of public history
  - Maximize principal's welfare subject to providing the agent at least U_0
  - Randomization potentially needed. Public randomization device z
- From Abreu (1988): Public deviations lead to worst punishment:

$$\underline{J} = -\frac{\pi_p \chi}{1-\beta} \text{ (min-max for principal)}$$

$$\underline{U} \leq \frac{w_a}{1-\beta} \text{ (min-max for agent)}$$

- From APS (1990): Public history embedded in continuation values
  - Problem can be characterized recursively with

$$\delta = \left\{ f_z, i_z, e_z, U_z^F, U_z^H, U_z^L \right\}_{z \in Z}$$

  - Focus on solution which satisfies *Bang-Bang* property

Equilibrium Definition

Recursive Representation

$$J(U) = \max_{\delta} \int_z \left[\begin{array}{c} f_z \left(-\pi_p \chi - A i_z + \beta J \left(U_z^F \right) \right) + \\ (1 - f_z) \left(-\pi_a(e_z) \chi + \beta \left(\begin{array}{c} (1 - \pi_a(e_z)) J \left(U_z^H \right) \\ + \pi_a(e_z) J \left(U_z^L \right) \end{array} \right) \right) \end{array} \right]$$

s.t.

$$U = \int_z \left[\begin{array}{c} f_z \left(w_a - g(i_z) + \beta U_z^F \right) + \\ (1 - f_z) \left(-e_z + \beta \left((1 - \pi_a(e_z)) U_z^H + \pi_a(e_z) U_z^L \right) \right) \end{array} \right]$$

$$J\left(U_z^F\right), J\left(U_z^H\right), J\left(U_z^L\right) \geq \underline{J}$$

$$U_z^F, U_z^H, U_z^L \geq \underline{U}$$

$$-\pi_p \chi - A i_z + \beta J\left(U_z^F\right) \geq \underline{J}$$

$$\beta\left(U_z^H - U_z^L\right)(\pi_a(0) - \pi_a(e_z)) \geq e_z$$

- Likelihood of intervention: $\Pr\left\{f_{t+1} = 1 | f_t = 0, s_t = 1\right\}$
- Intensity of intervention: $E\left\{i_t | f_t = 1\right\}$
- Duration of intervention: $\Pr\left\{f_{t+1} = 1 | f_t = 1\right\}$

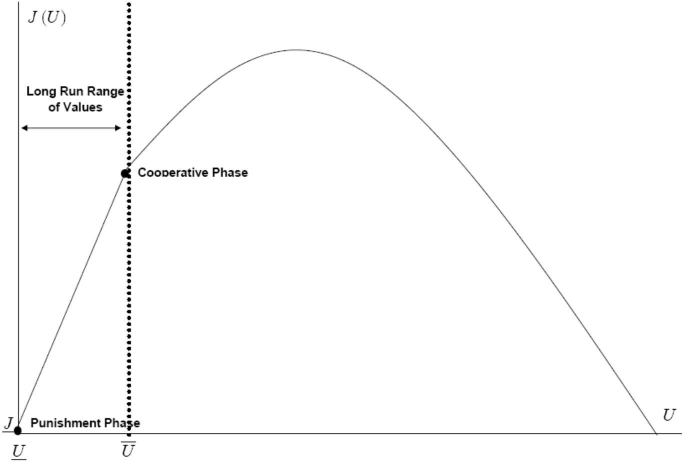
Proposition

$\exists \overline{U}, \underline{U}$, *and* i^* *s.t.*

1. $\lim_{t\to\infty} \Pr\left\{U_t \leq \overline{U}\right\} = 1 \ \forall U_0$, *and*
2. *If* $U \leq \overline{U}$, *then* $\mathbf{E} f_z^*(U) = \left(\overline{U} - U\right) / \left(\overline{U} - \underline{U}\right)$ *and* $\forall z$

$$
\begin{aligned}
i_z^*(U) &= i^*, \\
e_z^*(U) &= \eta, \\
U_z^{F*}(U) &= \left(\underline{U} - w_a + g(i^*)\right)/\beta, \\
U_z^{H*}(U) &= \overline{U}, \text{ and} \\
U_z^{L*}(U) &= \overline{U} - \eta / \left(\beta\left(\pi_a(0) - \pi_a(\eta)\right)\right)
\end{aligned}
$$

Figure 2


$J(U)$
Long Run Range
of Values
Cooperative Phase
J
Punishment Phase
$\underline{U}$
$\overline{U}$
U

- In long run, efficient contract features two phases: C and P
- Cooperative phase (C)
  - Principal abstains from intervention. Agent exerts high effort
  - No disturbance $\rightarrow$ Transition to C with prob 1
  - Disturbance $\rightarrow$ Transition to C with prob $1 - l^*$ and P with prob l^*
- Punishment phase (P)
  - Principal intervenes and chooses intensity i^*
  - Transition to P with prob d^* and C with prob $1 - d^*$

- If $U \geq \overline{U}$, then $f_z^*(U) = 0 \; \forall z$. Intervention is never used
  - If intervention never used along path then agent never exerts high effort
  - Implies continuation values must decline below $\overline{U}$
  - NOTE: May require enough disturbances in model with payments
- If $U \leq \overline{U}$, then continuation values trapped below $\overline{U}$
  - If values rise above $\overline{U}$ then effort is low going forward
  - Implies U delivered to agent with higher likelihood of intervention
  - Inefficient for principal to use intervention versus requesting high effort
- Implication: Values between $\underline{U}$ and $\overline{U}$ are self-generating
  - Full characterization of long run in closed form is possible

Analysis

Intuition: Second Part of Proposition

- Current cooperation is sustained by future punishment
  - High effort chosen to avoid disturbance and punishment
  - $\downarrow$ Agent's punishment value $\rightarrow$ $\downarrow$ Likelihood of punishment
  - Possible to forgive agent without weakening incentives
  - Increases principal cooperation value since punishment costly
- Current punishment is sustained by future cooperation
  - High intensity chosen to avoid low effort and permanent intervention
  - $\uparrow$ Principal's cooperation value $\rightarrow$ $\uparrow$ Duration of punishment
  - Possible to induce principal to increase duration of punishment
  - Decreases agent's punishment value since punishment longer
- Optimal contract maximizes principal's value of cooperation
  - Also minimizes agent's value of punishment
  - Requires a single level of intensity which minimizes value
  - Optimal intensity determines intervention likelihood and duration

Analysis

- Construct equilibrium with same structure as optimum for intensity i
- Principal receives $\underline{J}$ in P and agent receives $\overline{U}$ in C
  - Both are independent of i
- Implies likelihood $l\,(i)$ and duration $d\,(i)$ of intervention

Given i, $\left\{ I(i), d(i), \underline{U}(i), \overline{J}(i) \right\}$ are defined by:

$$
\begin{aligned}
\overline{U} &= -\eta + \beta \left(\left(1 - \pi_a(\eta) I(i) \right) \overline{U} + \pi_a(\eta) I(i) \underline{U}(i) \right) \\
\underline{U}(i) &= w_a - g(i) + \beta \left(\left(1 - d(i) \right) \overline{U} + d(i) \underline{U}(i) \right) \\
\overline{J}(i) &= -\pi_a(\eta) \chi + \beta \left(\left(1 - \pi_a(\eta) I(i) \right) \overline{J}(i) + \pi_a(\eta) I(i) \underline{J} \right) \\
\underline{J} &= -\pi_p \chi - Ai + \beta \left(\left(1 - d(i) \right) \overline{J}(i) + d(i) \underline{J} \right)
\end{aligned}
$$

Proposition

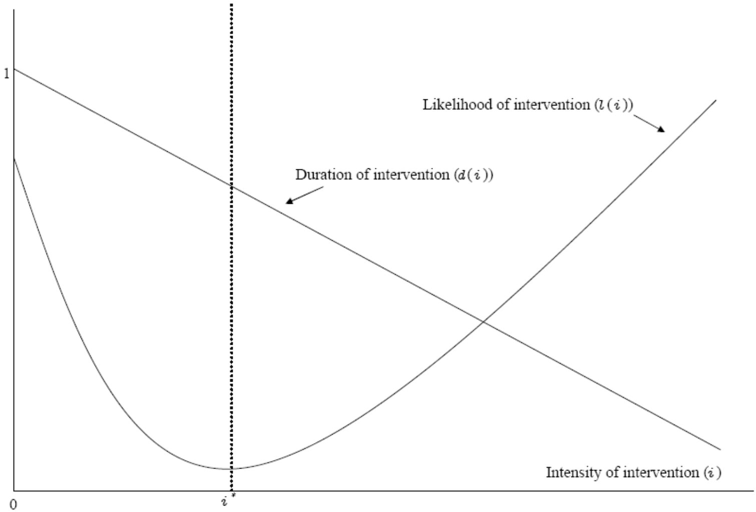
$\exists$The optimal levels of I^*, i^*, and d^* satisfy $I^* = I(i^*)$ and $d^* = d(i^*)$ for i^* defined in

$$1 = \frac{g'(i^*)}{A} \frac{(\pi_p - \pi_a(\eta))\chi + Ai^*}{-\eta - w_a + g(i^*)}$$

where $I(\cdot)$ and $d(\cdot)$ are continuously differentiable functions with $I'(i) < (>) \, 0$ if $i < (>) \, i^*$ and $d'(i) < 0$

Analysis

Tradeoff between Intensity and Duration of Intervention



Analysis

Tradeoff between Intensity and Duration of Intervention

- Principal's incentives $\rightarrow d'(i) < 0$
  - Principal can only intervene intensively if cooperation resumes soon
- Agent's incentives $\rightarrow I'(i) < (>) \, 0$ if $i < (>) \, i^*$
  - Agent's incentives strengthen and then weaken in intensity
  - Reason: Agent's welfare under punishment initially declines then rises
    - Rise in intensity initially reduces welfare under punishment
    - Effect eventually outweighed by decline in punishment duration
    - Relies on diminishing returns to intensity
- Optimal contract minimizes likelihood of intervention
  - Unique level of intensity minimizes agent's welfare under punishment
  - $i^* > 0$ requires $g'(0)$ to be sufficiently high

- $\downarrow$ Cost of force to principal (e.g., less international rebuke)
- $\uparrow$ Cost of disturbance to principal (e.g., more at stake)
- $\uparrow$ Cost of effort to agent (e.g., less legitimacy, radicalization)

Proposition

If $\downarrow A$ *or* $\uparrow \chi \longrightarrow \downarrow I^{*}$, $\uparrow i^{*}$, *and* $\downarrow d^{*}$

Proposition

If $\downarrow A$ or $\uparrow \chi \longrightarrow \downarrow I^*$, $\uparrow i^*$, and $\downarrow d^*$

- Intuition
  - Principal has higher return to intensity
  - Increase in intensity reduces intervention duration
  - Stronger agent's incentives reduces intervention likelihood
- Mechanism: Effect of $\downarrow A$ or $\uparrow \chi$ independent of change in i^*
  - $\downarrow I^*$ and $\uparrow d^*$
  - Strengthening of principal's incentives raise phase duration
- Mechanism: Effect of $\downarrow A$ or $\uparrow \chi$ taking into account $\uparrow i^*$
  - $\downarrow I^*$ by more and $\downarrow d^*$
  - Intensity increase reinforces decrease in intervention likelihood
  - Implies duration also decreases. Requires $g(i) = i^{\theta}$

Proposition

If $\uparrow \eta \longrightarrow \uparrow l^*, \uparrow i^*,$ *and* $\downarrow d^*$

Proposition

If $\uparrow \eta \longrightarrow \uparrow l^*, \uparrow i^*$*, and* $\downarrow d^*$

- Intuition
  - Principal has higher return to intensity
  - Increase in intensity reduces intervention duration
  - Weaker agent's incentives increases intervention likelihood
- Mechanism: Effect of $\uparrow \eta$ independent of change in i^*
  - $\uparrow l^*$ and $\downarrow d^*$
  - Weakening of agent's incentives reduces phase duration
- Mechanism: Effect of $\uparrow \eta$ taking into account $\uparrow i^*$
  - $\uparrow l^*$ by less and $\downarrow d^*$ by more
  - Intensity increase mitigates decrease in cooperation duration

- Three forces
  - $\downarrow$ Cost of intervention to principal
  - $\uparrow$ Cost of disturbance to principal
  - $\uparrow$ Cost of effort to agent
- All cause intensity to rise and duration to fall
- Only last force causes likelihood to rise

Extensions

Four Extensions

- Temporary payments to agent
- Permanent concession which ends disturbances
- Political turnover by agents
- Endogenous effort cost by agent

- Principal pays agent either before or after realization of state
- One LR equilibrium: Exact same equilibrium as here
  - Intuition: Many disturbances $\rightarrow$ Intervention with zero payment
  - Because of limited liability, withholding of payments alone is inefficient
  - Equilibrium must occur if intervention is ever used
- Another (potential) LR equilibrium: No intervention and payments
  - Intuition: Few disturbances $\rightarrow$ No need to ever intervene
  - Classical pay for performance from PA literature
    - Caveat: Agent cannot retire because of principal's incentives

Extensions

Permanent Concessions

- Two long run equilibria
  - Few disturbances $\longrightarrow$ Permanent concession
  - Many disturbances $\longrightarrow$ Same two phases as in benchmark
- Intuition: Concession used as reward
  - Do not use concessions after sufficient disturbances
- Quantitative difference: More difficult to provide principal incentives
  - Principal's min-max is to make a concession
  - $\uparrow$ likelihood of intervention and $\downarrow$ duration of intervention

- Benchmark model applies for incumbent agents
  - Intuition: Unnecessary to punish new agents
  - Can be combined with extension with concession
  - Implication: Some agent will receive the concession eventually
- Quantitative difference: Discount factor of agent is lower
  - $\uparrow$ likelihood of intervention and $\downarrow$ duration of intervention
- Benchmark model can also applies with endogenous turnover
  - Only one type of punishment used: Intervention or removal
  - Inefficient to remove agent if not painful enough
    - Otherwise like Ferejohn (1986) but with history-dependence

- $\eta_0 = \eta^L$ and

$$\eta_t = \begin{cases} \eta^H & \text{if } f_k = 1 \text{ and } i_k > \widetilde{i} \text{ for any } k < t \\ \eta^L & \text{otherwise} \end{cases}.$$

- LR characterization applies for equilibrium associated with η^H
  - $\uparrow$ likelihood of intervention and $\downarrow$ duration of intervention
- Intuition
  - Allowing for cost of effort to rise is ex-ante efficient
  - Provides additional punishment to agent. Prolongs ex-ante cooperation
  - Relies on η^H being feasible. Otherwise hit corner

Discusssion

Application: Counterinsurgency

The use of costly interventions in counterinsurgency:

> *"The simple starting point is that insurgents are not the only ones who can intimidate or terrorize civilians. For instance, whenever insurgents are believed to be present in a village, small town, or distinct city district...the local notables can be compelled to surrender them to the authorities, under the threat of escalating punishments...Occupiers can thus be successful without need of any specialized counterinsurgency methods or tactics if they are willing to out-terrorize the insurgents, so that the fear of reprisals outweighs the desire to help the insurgents or their threats..."*

Discusssion

"...The Turks were simply too few to hunt down hidden rebels, but they did not have to: they went to the village chiefs and town notables instead, to demand their surrender, or else. A massacre once in a while remained an effective warning for decades. So it was mostly by social pressure rather than brute force that the Ottomans preserved their rule: it was the leaders of each ethnic or religious group inclined to rebellion that did their best to keep things quiet, and if they failed, they were quite likely to tell the Turks where to find the rebels before more harm was done." (Edward Luttwak, Harper's, 2007)

- Model provides conditions under which costly intervention optimal
  - Requires indirect control to dominate direct control (i.e., $\pi_p > \pi_a(\eta)$)
  - Requires marginal cost of intervention to be low ($g'(0)$ high)
  - Requires many disturbances. Otherwise make concessions
- Model identifies basic principals for intervention
  - Maximal force is inefficient
  - Principal must be compelled to use this force
  - Should occur as seldomly as possible while still providing incentives
- Model sheds light on role of international pressure ($\uparrow A$)
  - Government may respond by intervening more often and for longer
  - More attractive concessions would avoid interventions

Conclusion

- Characterization of optimal interventions under indirect control
- Results
  - Repeated intervention are feature of optimal policy
  - Tradeoff between intensity and duration of intervention
  - Implications of factors for optimal likelihood, intensity, and duration
- Future directions
  - Static features of optimal intervention (i.e., endogenous π_p)
  - Persistent hidden information
    - e.g., hidden cost of effort, hidden cost of intervention