

Faulty fighting

Misinterpretations of the gains from conflict

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Introduction

- ▶ How do groups become overambitious?
- ▶ Experiences of public policy:
 - ▶ gap between actual and perceived policies
- ▶ Aim of the paper:
 1. formalize the process of misperceiving
 2. study the interactions with affluence and inequality
- ▶ Main approach: discrimination in the labor market

Motivation

- ▶ Conflicts are often thought to occur due to imperfect information (e.g. Brito and Intriligator 1985, Esteban and Ray 2001, Bester and Wärneryd 2006)
 - ▶ Overambitious aspirations; underestimated achievements
- ▶ But how do these misperceptions form?
- ▶ Should be relevant for policy makers and empirical work

Preview results

We are able to formalize the process and get results:

- ▶ Revolts are more likely from large, patient, and prejudiced groups.
- ▶ Revolts are more likely where the regime was recently established, there are good alternatives and the population is large.
- ▶ Wealth and education decreases aggressiveness, whereas intragroup inequality increases it.
- ▶ Independent of intergroup inequality and the wage level.
- ▶ Transparency does not necessarily alleviate the problem in the short run.

Outline

- ▶ The basic model
- ▶ Solution and general results
- ▶ The effects of transparency
- ▶ The effects of affluence and inequality
- ▶ Concluding remarks

Motivation: the framework

- ▶ In many countries, typically two types of jobs
 - ▶ Government or modern sector jobs are 'good'
 - ▶ Rural or informal sector jobs are 'bad'
- ▶ Governments may influence access to good jobs
 - ▶ discrimination
- ▶ Citizens may not have an effective political voice
 - ▶ secession, revolt or rebellion instead of efficient voting

The basic model: general approach

- ▶ Several groups, each deriving utility collectively from total wages
- ▶ Regime may influence access to good jobs probabilistically
- ▶ Regime discriminates against (or for)
- ▶ Group leader observes the outcome of a subset from her group
- ▶ She may revolt, installing a new regime with a given probability
 - ▶ groups do *not* fight each other

The basic model: the equations

- ▶ Group i 's utility at time t depends on how many of their members have high wage, $N_i^{\bar{w}}$.

$$U_{it} = \frac{1}{N_i^\alpha} \sum_{j=1}^{N_i} w_{ijt} = \underline{w} + \frac{N_{it}^{\bar{w}}}{N_i^\alpha} (\bar{w} - \underline{w}), \quad \alpha \in (0, 1)$$

- ▶ Individual j from group i draws wage w_{ij} , given the group's labor market attractiveness γ_i and discrimination D_i .

$$w_{ij} = \begin{cases} \bar{w}, & \text{with probability } \psi_i = (1 - D_i)\gamma_i \\ \underline{w}, & \text{otherwise} \end{cases}$$

$$\bar{w} > \underline{w}, \quad D_i \in [0, 1]$$

The basic model: the information

- ▶ The structure of the model – i.e. γ_i and the effect of discrimination – is common knowledge.
- ▶ Discrimination, D_i , is not known.
- ▶ The group leader may verify the wage of a given number k_i of affiliates.
- ▶ Groups have an ex ante expectation about discrimination, independent of regime, δ_i , which may be different from their prior given regime, δ_{i0}

The stages

1. A regime is installed, giving actual discrimination levels D_i and priors δ_{i0} .
2. Group leaders update using Bayes' rule, and choose whether to oppose the regime or not. If some group opposes, return to stage 1. Else, go to stage 3.
3. Jobs and wages w_{ij} are drawn.
4. End of time period; Go to stage 2.

Group leader's problem

- ▶ Only two alternatives; revolt or not. Compare expected utilities.
- ▶ Expected utility if revolt successfully

$$\begin{aligned} E\left(\sum_{t=0}^{\infty} \beta^t U_{i,t} \middle| \delta_i\right) - C_i &= \frac{\bar{U}_i}{1 - \beta} - C_i \\ &= \frac{1}{1 - \beta} [\underline{w} + (\bar{w} - \underline{w}) N_i^{1-\alpha} \gamma_i (1 - \delta_i)] - C_i \end{aligned}$$

- ▶ Expected utility under current regime, given update

$$E\left(\sum_{t=0}^{\infty} \beta^t U_{i,t} \middle| \delta_{i,t-1}\right) = \frac{V_{it}}{1 - \beta} \quad (1)$$

$$= \frac{1}{1 - \beta} [\underline{w} + (\bar{w} - \underline{w}) N_i^{1-\alpha} \gamma_i (1 - \delta_{i,t-1})] \quad (2)$$

Revolt probabilities

The probability of revolt is just the probability of a high perceived level of discrimination.

$$Pr \left[\frac{(1 - \rho_i) V_{it} + \rho_i \bar{U}_i}{1 - \beta} - C_i > \frac{V_{it}}{1 - \beta} \right] \quad (3)$$

$$= Pr \left(\delta_{it} > \delta_i + \tilde{C}_i \right) \quad (4)$$

where the flow equivalent of the real revolt cost is

$$\tilde{C}_i = \frac{(1 - \beta) C_i}{\rho_i (\bar{w} - \underline{w}) N_i^{1-\alpha} \gamma_i} \quad (5)$$

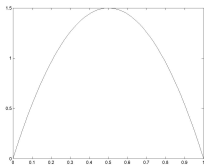
Learning about discrimination: The prior

- ▶ Updating is bayesian.
- ▶ The signal is the observed number of individuals with good jobs K_i
 - ▶ binomially distributed
- ▶ The only conjugate prior is the beta.

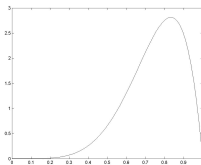
$$f(D_i) = \frac{\Gamma(a+b)}{\Gamma(a)\Gamma(b)} d^{a-1} (1-d)^{b-1} \quad (6)$$

$$\delta_{i0} = \frac{a}{a+b} \quad (7)$$

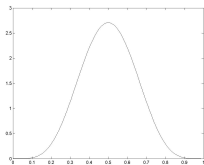
$$\text{var}(D_i) = \frac{ab}{(a+b)^2(a+b+1)} \quad (8)$$



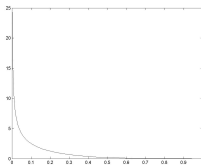
(a) $a = 2, b = 2$



(b) $a = 6, b = 2$



(c) $a = 6, b = 6$



(d) $a = 0.5, b = 4$

Figure: Beta distribution for different sets of parameters.

Learning about discrimination: The updating

- The updated parameters are:

$$a_t = a_{t-1} + K_{it} \quad (9)$$

$$b_t = b_{t-1} + k_i - K_{it} \quad (10)$$

$$\Rightarrow \psi_{it} = \frac{(a_{i,t-1} + b_{i,t-1})\psi_{i,t-1} + K_{it}}{a_{i,t-1} + b_{i,t-1} + k_i} \quad (11)$$

$$\delta_{it} = 1 - \frac{\psi_{it}}{Eh(\theta_i)} \quad (12)$$

The probability of revolt

- ▶ We can now rephrase the probability that a group revolts as the conditional probability of a 'sufficiently low' share of good jobs in the sample, given history.
- ▶ Can implement via binomial distribution

$$Pr(\delta_{i,t} > \delta_i + \tilde{C}_i) = Pr(K_{it} < \bar{K}_{it}) \equiv p_{it}$$

where

$$\bar{K}_{it} = \gamma_i \left[k_i(1 - \delta_i - \tilde{C}_i) - \frac{a_{i,t-1}}{\delta_{it}}(\delta_i + \tilde{C}_i - \delta_{i,t-1}) \right] \quad (13)$$

The probability of revolt: the group

For the group, this gives

$$p_{it} = \sum_{r=0}^{\bar{K}_{it}} \binom{k_i}{r} (1 - D_i)^r \gamma_i^r (1 - (1 - D_i)\gamma_i)^{k_i - r} \quad (14)$$

$$= \sum_{r=0}^{\bar{K}_{it}} \binom{k_i}{r} \psi_i^r (1 - \psi_i)^{k_i - r} \quad (15)$$

$$\equiv p_{\substack{(+)/- \quad (+)/- \quad - \quad - \quad + \quad + \quad +}}(k_i, \gamma_i, \tilde{C}_i, \delta_i, \delta_{it}, D_i, \delta_{i0}) \quad (16)$$

The probability of revolt: the country

For the country, we get

$$P_t = 1 - \Pr(\text{no revolt}) \quad (17)$$

$$= 1 - \Pr\left(\bigcap_{i=1}^m K_{it} > \bar{K}_{it}\right) \quad (18)$$

$$= 1 - \prod_{i=1}^m (1 - p_{it}) \quad (19)$$

$$\equiv P\left(\begin{smallmatrix} m \\ +/- \end{smallmatrix}, \begin{smallmatrix} \mathbf{k} \\ (+)/- \end{smallmatrix}, \begin{smallmatrix} \gamma \\ (+)/- \end{smallmatrix}, \begin{smallmatrix} \tilde{\mathbf{C}} \\ - \end{smallmatrix}, \begin{smallmatrix} \delta \\ - \end{smallmatrix}, \begin{smallmatrix} \delta_{\mathbf{t}} \\ + \end{smallmatrix}, \begin{smallmatrix} \mathbf{D} \\ + \end{smallmatrix}, \begin{smallmatrix} \delta_0 \\ + \end{smallmatrix}\right) \quad (20)$$

$$\mathbf{x} = \{x_i\}_{i=1,\dots,m} \quad (21)$$

Results: general

- ▶ Groups are more likely to revolt when
 - ▶ they are patient; β is large.
 - ▶ they have many members; n_i is large.
 - ▶ they are prejudiced against the regime; δ_{io} is large.
 - ▶ they believe the post-revolt regime would be favorable; δ_i is small.
 - ▶ they are severely discriminated against; D_i is large.
 - ▶ they are powerful such that a revolt is likely to succeed; ρ_i is large.
- ▶ and countries when
 - ▶ the regime is recently established; t is small.¹
 - ▶ there is a large population; $N = \sum_i N_i$ is large.

¹At least when groups have reasonably accurate priors. 

Numerical example: parameters

- ▶ Can illustrate with a numerical example:
 - ▶ $k = 10$, $\underline{w} = 1$, $\bar{w} = 10$, $\gamma = .5$,
 $\beta = .95$, $\alpha = 1$, $\delta = .1$ and $\rho = .5$
 - ▶ $a_0 = b_0 = 2 \Rightarrow \delta_0 = .5$ and $var = .05$
- ▶ Groups revolt if $\delta_t > \delta + \tilde{C} = \bar{D} = .7667$
- ▶ Simulate 10.000 regime histories, 100 periods long.

Numerical example: $D = .85 > \bar{D}$

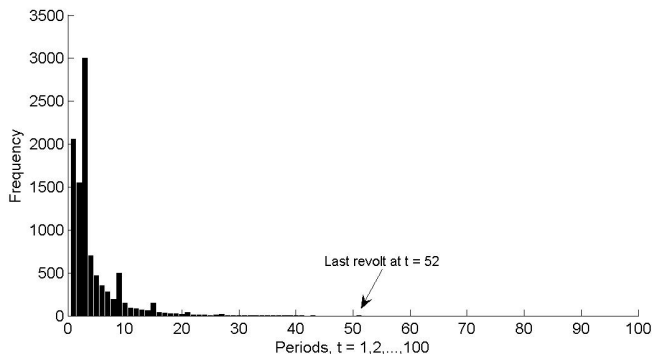


Figure: Simulated frequencies of revolts over regime history when informed groups would revolt. $D = .85 > \bar{D} = .7667$. Total revolts: 100%.

Numerical example: $D = .65 < \bar{D}$

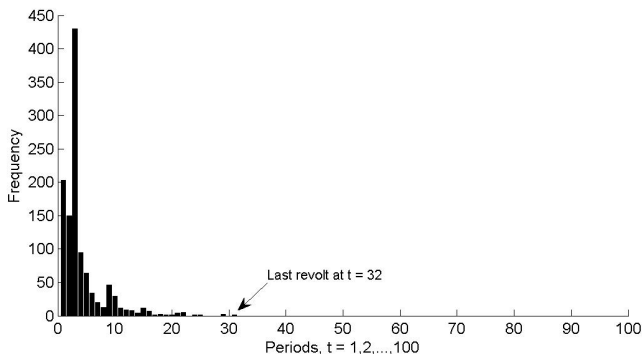


Figure: Simulated frequencies of revolts over regime history when informed groups would not revolt. $D = .65 < \bar{D}$. Total revolts: 11.55%.

Transparency

Proposition

Higher transparency k_i may increase the probability of revolt if discrimination is intense (D_i is high), and/or if the group is unattractive on the labor market (γ_i is low). This is true even when $D_i < \bar{D}$.

- ▶ aspirations effect: raises threshold $\Rightarrow p \uparrow$
- ▶ achievements effect:
 - ▶ if ψ_i small $\Rightarrow p \uparrow$
 - ▶ otherwise $\Rightarrow p \downarrow$

Transparency: Example

- ▶ From numerical example, $\bar{D} = .7667$.
- ▶ Say the prior is .5, $a_0 = b_0 = 2$. Let $\bar{\delta}(x) = \max\{\delta_1 | k = x\}$.

$$\bar{\delta}(x) = 1 - \max\{\psi_1 | k = x\} \quad (22)$$

$$\bar{\delta}(5) = 3/7 < \bar{D} \quad (23)$$

$$\bar{\delta}(20) = 5/6 > \bar{D} \quad (24)$$

- ▶ Increasing transparency from $k = 5$ to $k = 20$ clearly increases the probability of revolt in period 1 (from zero)

Transparency: Numerical example

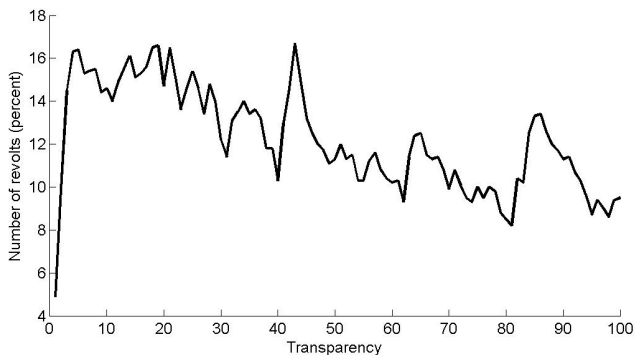


Figure: Simulated number of revolts (percent) over 100 regime periods.
 $\gamma = .1$, $D = .65 < \bar{D} = .7667$.

Transparency: Numerical example

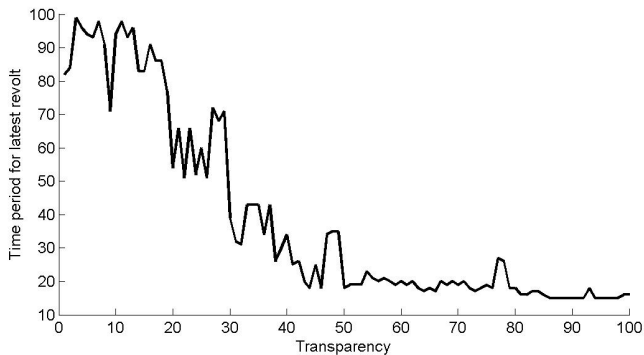


Figure: Latest period revolt is staged. $\gamma = .1$, $D = .65 < \bar{D} = .7667$.

Transparency: Numerical example (gamma low)

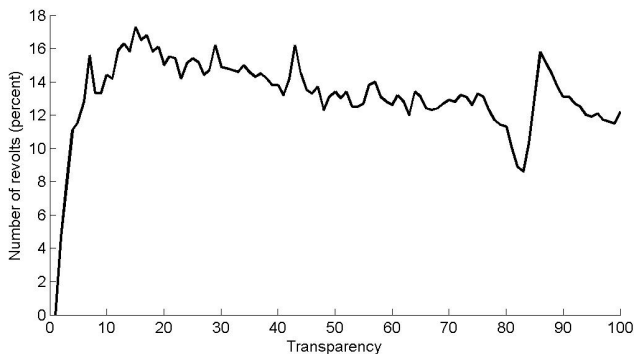


Figure: Simulated number of revolts (percent) over 100 regime periods.
 $\gamma = .05$, $D = .65 < \bar{D} = .7667$.

Transparency: Numerical example (gamma low)

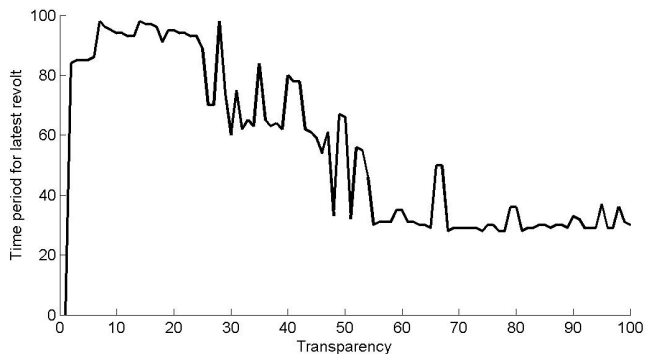


Figure: Latest period revolt is staged. $\gamma = .05$, $D = .65 < \bar{D} = .7667$.

Transparency: Proof

Define marginal probabilities

$p_{ir} = \text{bin}(r; k_i, \psi_i) = \binom{k_i}{r} \psi_i^r (1 - \psi_i)^{k_i - r}$. Now let the number of tries increase by Δ ; Define the new marginal probability as

$$p'_{ir} = \text{bin}(r; k_i + \Delta, \psi_i) = \frac{\binom{k_i + \Delta}{r}}{\binom{k_i}{r}} (1 - \psi_i)^\Delta p_{ir} \quad (25)$$

For the effect to be positive, we must have that

$$\frac{p'_{ir}}{p_{ir}} = \frac{\binom{k_i + \Delta}{r}}{\binom{k_i}{r}} (1 - \psi_i)^\Delta > 1 \quad (26)$$

in which case

$$\psi_i < 1 - \left[\frac{\binom{k_i}{r}}{\binom{k_i + \Delta}{r}} \right]^{\frac{1}{\Delta}} \equiv \tilde{\psi} \in (0, 1) \quad (27)$$

Income and wages: inequality

Proposition

Intergroup inequality has no effect on the probability of revolt.

- ▶ intergroup inequalities play no part (revolt against regime)

Proposition

Groups with high intragroup inequality in wages have a higher probability of revolt.

- ▶ intragroup inequality in wages increases the effect of discrimination, hence revolt gains

Income and wages: levels

Proposition

The wage level has no effect on the probability of revolt.

- ▶ the wage level shifts utility up, but equally for all regimes.

Proposition

Groups with lower average income, relative to the prevailing wage level, are more likely to revolt if $\bar{K}_{it} \in (\underline{K}, \bar{K})$.

- ▶ the average income level is a function of the share in high wage jobs, which (normally) decreases the probability of revolt
 - ▶ spurious relationship?

Education: remodel

- Let the attractiveness on the labor market be a function of education.

$$\gamma_{ij} = h(\theta_{ij}), \quad h' > 0, \quad h'' < 0 \quad (28)$$

$$\theta_{ij} \sim F_i(\theta) \quad (29)$$

$$\gamma_i = E\gamma_{ij} \quad (30)$$

Education: level inequality

Proposition

Groups with higher average education are less aggressive, if $\bar{K}_{it} \in (\underline{\kappa}_i, \bar{\kappa}_i)$

- higher education level implies higher γ_i

Education: level inequality

- ▶ higher inequality; consider a mean preserving spread
- ▶ F_i is 2OSD to $F'_i \Leftrightarrow \gamma_i = Eh(\theta_{ij}) > Eh'(\theta_{ij}) = \gamma'_i$

Proposition

Groups with higher intragroup inequality in education are more likely to revolt if returns to education are decreasing, while $\bar{K}_{it} \in (\underline{\kappa}_i, \bar{\kappa}_i)$.

Concluding remarks

- ▶ Misperceptions are an important determinant of conflict
- ▶ Observable group and country characteristics influence the exposure to such misperceptions
- ▶ Should be taken into account by empirical researchers and policy makers
- ▶ Work to do:
 - ▶ regime should be active
 - ▶ choose size of revolt
 - ▶ groups should interact (perhaps defend vs. attack regime, or fight for incumbency)
 - ▶ introduce risk aversion (particularly for patience. Solve numerically?)
 - ▶ test on data (particularly income vs. wage level)