Toulouse School of Economics

TSE M1 – Semester 1

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# Understanding Real World Organizations
# Week 7:

# Bandits, armies and insurgent groups

# Outline of presentation

- An unusual type of market the protection market
- Producing versus plundering in the history of development
- A prehistoric paradox – technological advances can make societies worse off, by giving them more to steal
- What are the kinds of business model that insurgent groups can use?
- Conclusion: how do armies resemble firms, and how are they different?

# A Model

Protector $i$ offers
probability $p_i$ of security if you accept
risk $r_i$ of expropriation if you refuse
tax rate $t_i$ for the package

A monopoly protector offers $t_M$ and $p_i = 1$
If you accept you get $(1 - t_M)C$
If you refuse you get $(1 - r_M)C$
So monopoly protector chooses $t_M = r_M$

# Duopoly

Duopoly protectors offer $t_1, t_2$

If you accept both you get $(1 - t_1 - t_2)C$

If you accept just $i$ you get $p_i(1 - t_i)C + (1 - p_i)(1 - r_j)C$

If you refuse you get $(1 - r_i)(1 - r_j)C$

Each duopolist $i$ takes $t_j$ as given

and chooses $t_j$ to maximize $t_i C - (1 - p_j)r_i C$

s.t. $(1 - t_i)[1 - r_j(1 - p_i)]C$

$\leq (1 - t_j)[1 - r_i(1 - p_j)]C$

# Bertrand competition in taxes (I)

Under Bertrand competition in tax rates each taxer $i$ will not wish to charge less than its marginal cost $c_i$. This is its *opportunity cost* $c_i = r_i(1 - p_j)$ which is what it could get for plundering instead

So competition will drive down tax rates until the first gangster reaches $t_i = c_i$
But the rate offered by the second gangster at which you are indifferent between them is $t_j$ s.t. $(1 - t_i)(1 - c_j) = (1 - t_j)(1 - c_i) = (1 - t_j)(1 - t_i)$

# Bertrand competition in taxes (II)

Thus $t_j = c_j$ - the gangsters reach marginal cost at the same time!
Note that tax rates differ
because protection levels differ

Compare duopoly to monopoly:
Under monopoly your welfare is $(1 - r_i)$
Under duopoly it is $(1 - r_j(1 - p_i))(1 - r_i(1 - p_j))$
So the arrival of gangster $j$ improves welfare
if $p_j$ is large and $r_j$ is small

# Questions we can use the model to answer:

- What is the effect of competition on tax rates?
- How do tax rates respond to a) protection probabilities and b) predation probabilities?
- When are citizens better off under monopoly and when are they better off under competition?

# Simulations, various parameter values

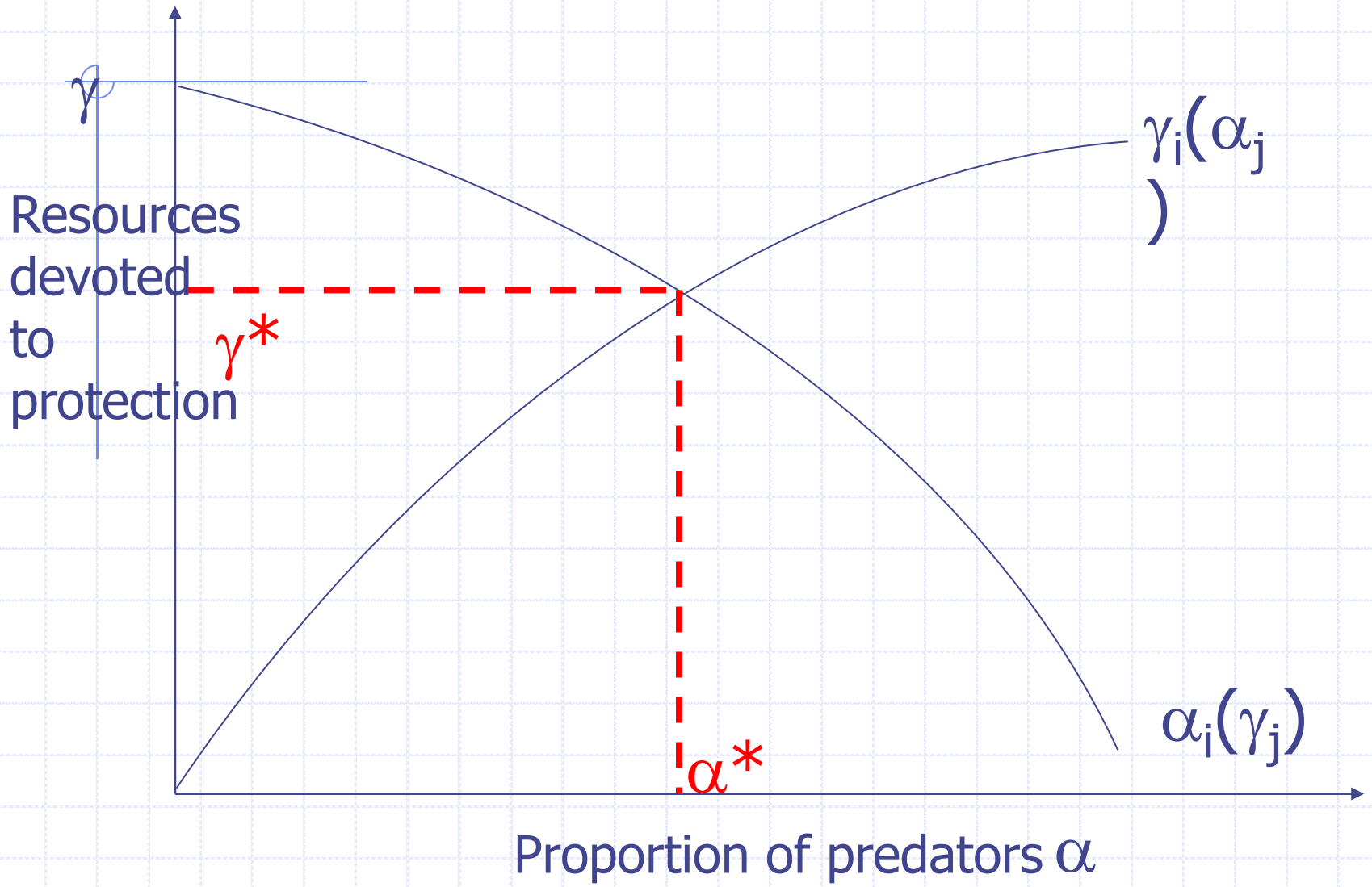
| *p1* | *p2* | *r1* | *r2* | *t1* | *t2* | *W1* | *W2* | *W12* | *Wm* |
|---|---|---|---|---|---|---|---|---|---|
| 0.9 | 0.8 | 0.7 | 0.7 | 0.140 | 0.070 | 0.800 | 0.800 | 0.790 | 0.3 |
| 0.9 | 0.9 | 0.4 | 0.4 | 0.040 | 0.040 | 0.922 | 0.922 | 0.920 | 0.6 |
| 0.4 | 0.4 | 0.5 | 0.5 | 0.300 | 0.300 | 0.490 | 0.490 | 0.400 | 0.5 |
| 0.6 | 0.4 | 0.4 | 0.2 | 0.240 | 0.080 | 0.699 | 0.699 | 0.680 | 0.6 |
| 0.6 | 0.2 | 0.4 | 0.5 | 0.320 | 0.200 | 0.544 | 0.544 | 0.480 | 0.6 |
| 0.3 | 0.3 | 0.4 | 0.4 | 0.280 | 0.280 | 0.518 | 0.518 | 0.440 | 0.6 |
| 0.3 | 0.3 | 0.7 | 0.7 | 0.490 | 0.490 | 0.260 | 0.260 | 0.020 | 0.3 |
| 0.9 | 0.2 | 0.3 | 0.8 | 0.240 | 0.080 | 0.699 | 0.699 | 0.680 | 0.7 |
| 0.5 | 0.5 | 0.5 | 0.5 | 0.250 | 0.250 | 0.563 | 0.563 | 0.500 | 0.5 |

# Producing vs. plundering in the history of development

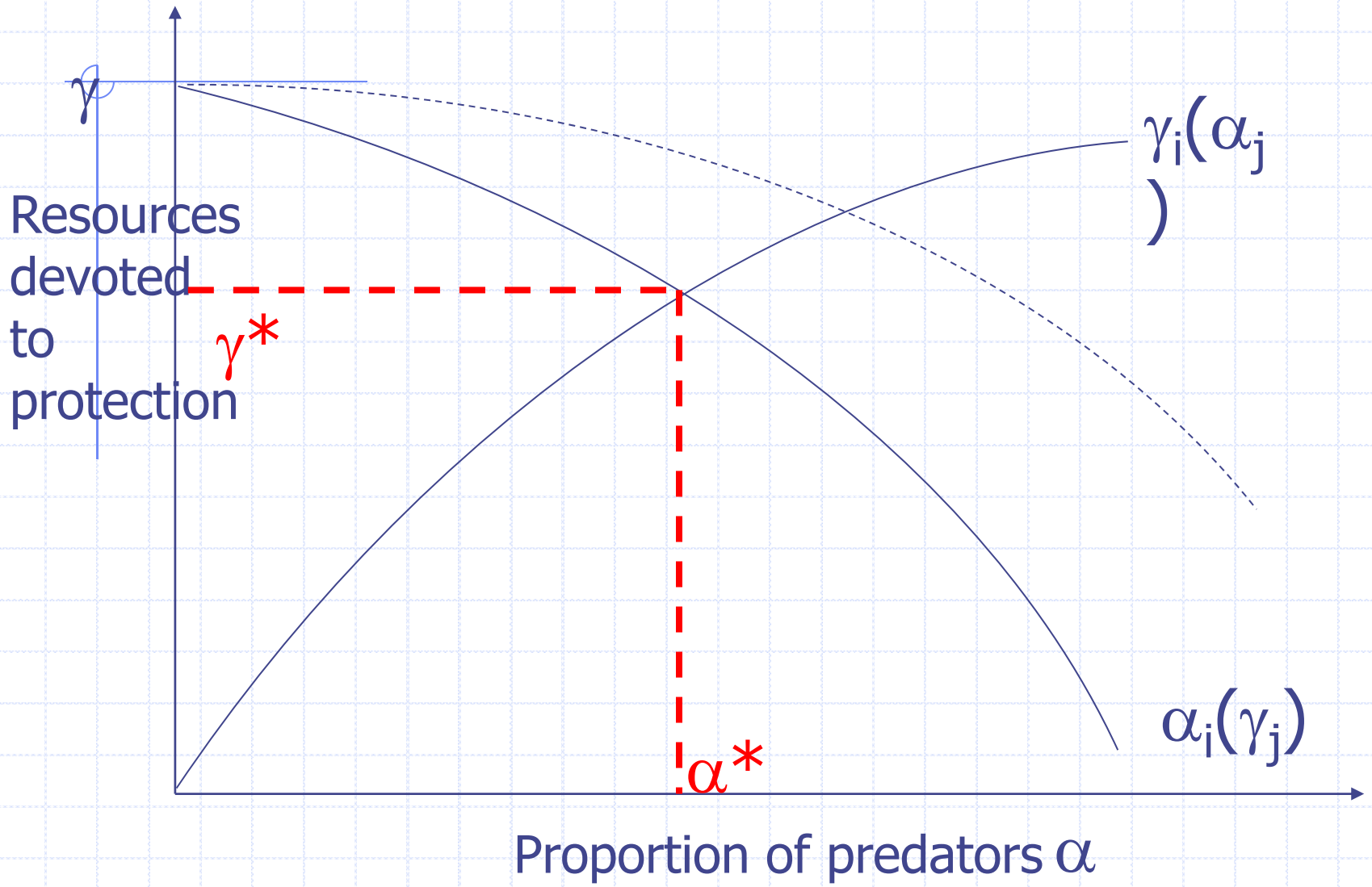
- For any group it is better that all produce than that some produce & others plunder
- For individuals plunder may dominate production $\Rightarrow$ possibility of arms races
- Changes in the technology of plundering & defence affect optimal group size:
  - hunter-gatherer bands
  - medieval mounted armies
  - crossbow and city-states
- Is the state just the "optimal bandit"?

# Grossman (NBER wp 6499; adapted)

- Citizens decide to be producers or predators; proportion $\alpha$ are predators
- Producers decide what fraction $\gamma$ of resources to devote to defence.
- Each takes others' decisions as given.
- $\alpha_i(\gamma_j)$ is decreasing in $\gamma_j$
- $\gamma_i(\alpha_j)$ is increasing in $\alpha_j$
- Collective choice of $\gamma$ may increase efficiency


γ
Resources devoted to protection
γ*
γi(αj)
αi(γj)
α*
Proportion of predators α

Now consider an "improvement" in the technology of predation…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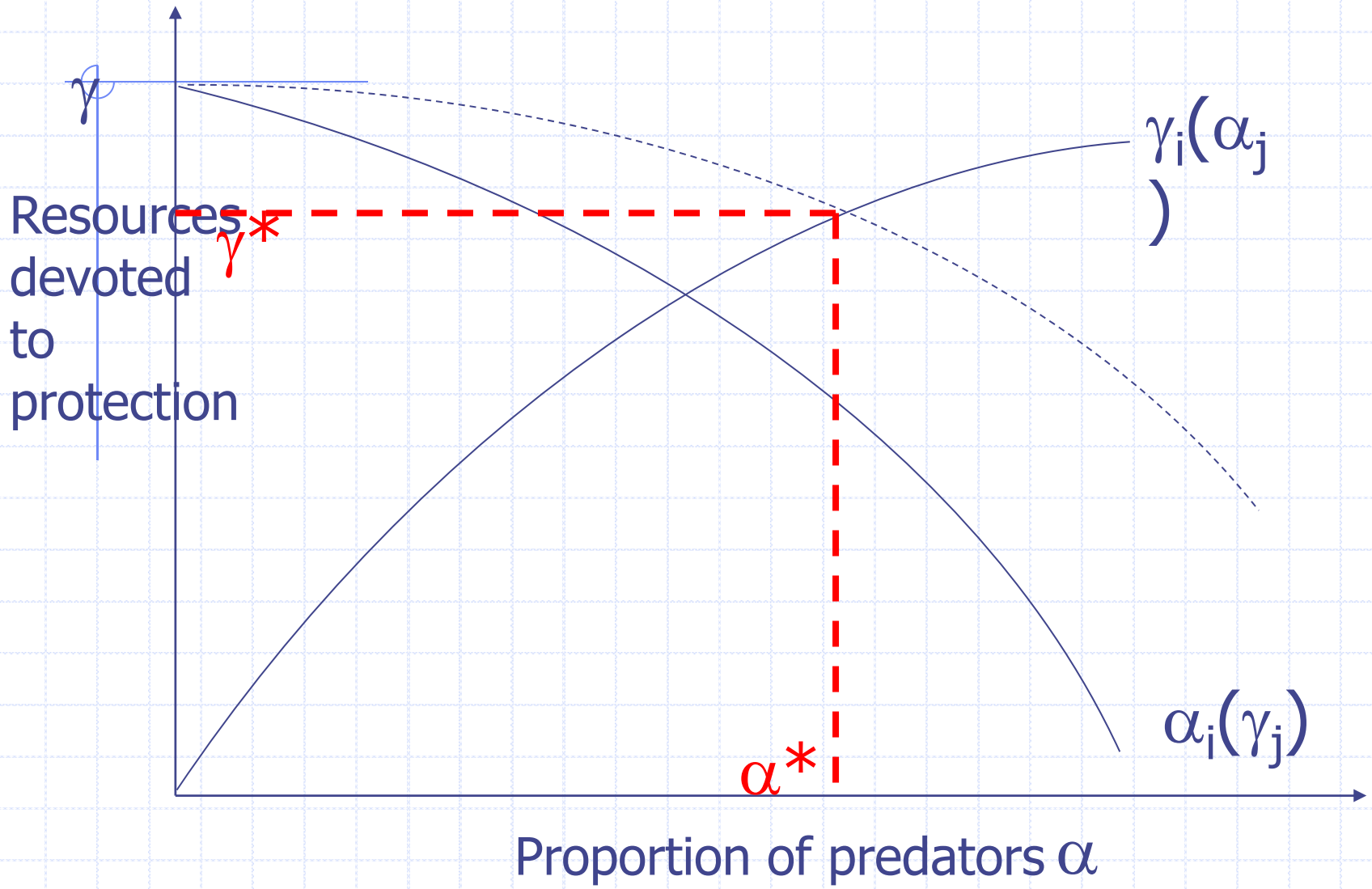

γ
Resources devoted to protection
γ*
γi(αj)
αi(γj)
α*
Proportion of predators α

# Monopoly & competition

- In Grossman framework, the fewer predators the better
- Monopoly is bad in the production of goods, but good in the production of bads.
- Is the state an optimal monopoly predator?
- Yes, but….

# A prehistoric paradox:

- Agriculture was adopted beginning around 10K years ago independently in several different parts of the world
- But evidence from skeletons suggests that first farmers may have been less well nourished than their hunter gatherer predecessors
- So why did they adopt?
- Perhaps they didn't foresee the outcome?

# Or perhaps they did…..

- Although hunter gatherers were poor they were not particularly vulnerable:
  - They were mobile
  - They had nothing to steal
- Farmers, in contrast:
  - Are sedentary (comparatively) so cannot easily hide
  - Store food between harvests
- This means farmers need to devote more to defence
- Their resources devoted to defence also make them a greater danger to their neighbours (the resources can also be devoted to attack)
- Agricultural adoption can be in each group's interest even if it makes all groups worse off

# A little model of hunting, farming and fighting…

- Hunting: $H(l_i^H) = \frac{(l_i^H)^{1-\eta}}{1-\eta}$ for $0 \leq \eta < 1$
- Farming: $F(l_i^F) = \frac{(l_i^F)^{1-\eta} f}{1-\eta}$
- Fighting: $\gamma_{ij} = \frac{2\gamma}{1+e^{-\alpha l}}$ and $\phi_{ij} = \frac{2\phi}{1+e^{-\beta l}}$
- Labor constraints: $l = l_j^W - l_i^W$

$$l_i^H + l_i^F + l_i^W = 1$$

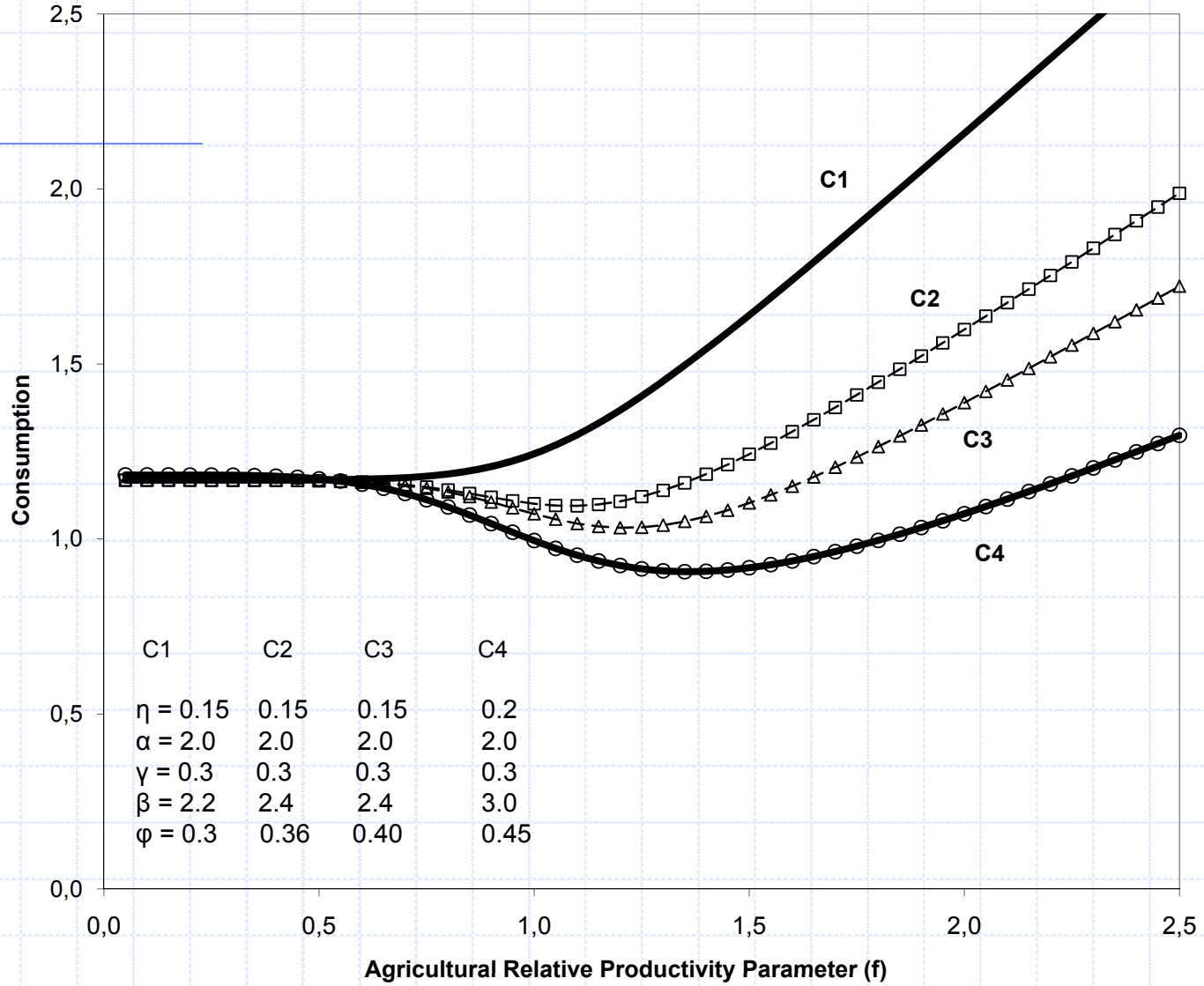
# What does the model show?

- Consumption is:

$$C_i = (1-\gamma_{ij})H(l_i^H) + (1-\phi_{ij})F(l_i^F) + \gamma_{ji}H(l_j^H) + \phi_{ji}F(l_j^F)$$

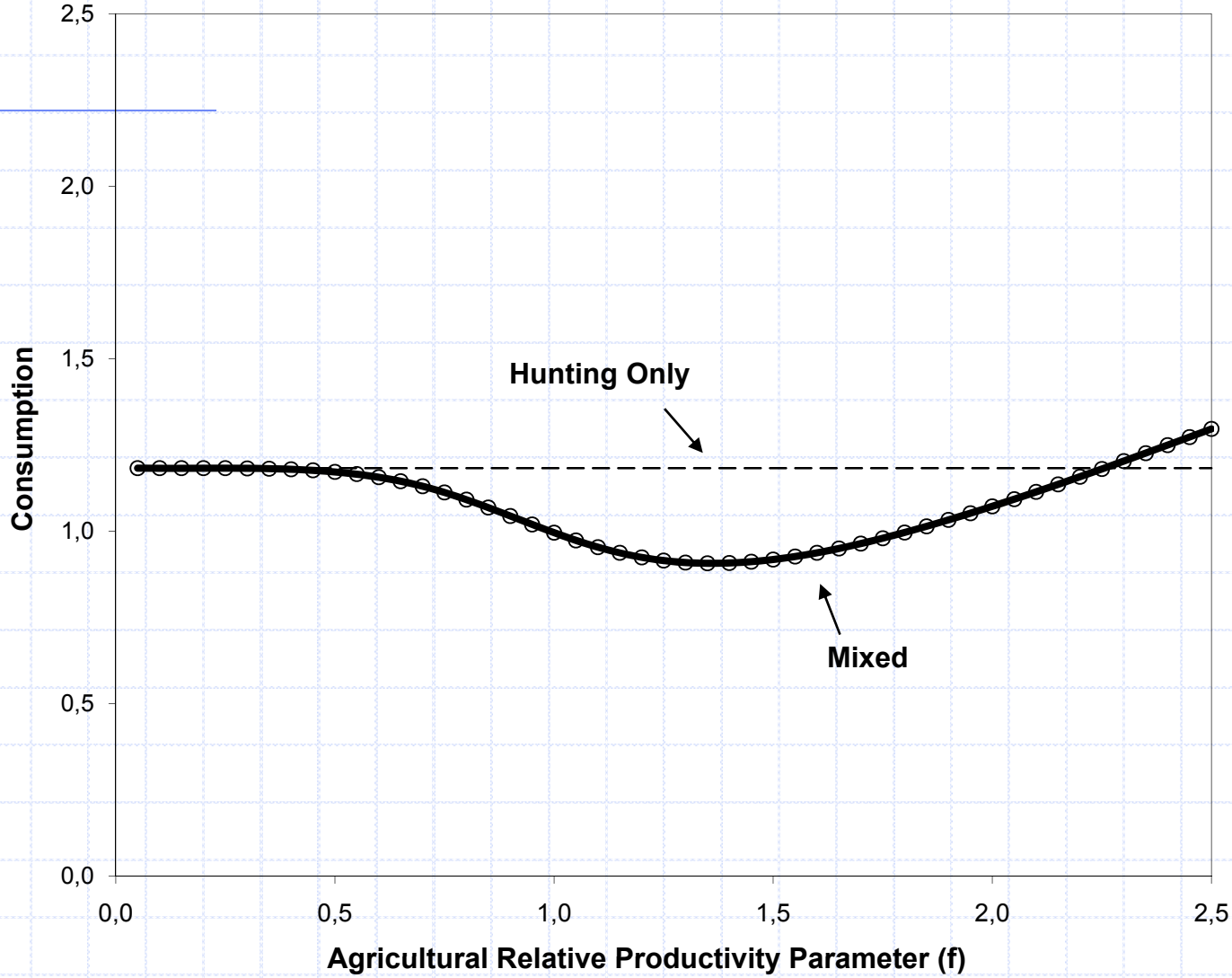
- Surprise finding: consumption can be decreasing in the productivity of agriculture over a certain range; because farming gives people more to fight about!

## Figure 1. Agricultural Productivity and Consumption: Mixed Farming and Hunting




| | C1 | C2 | C3 | C4 |
|---|---|---|---|---|
| η = 0.15 | 0.15 | 0.15 | 0.2 | |
| α = 2.0 | 2.0 | 2.0 | 2.0 | |
| γ = 0.3 | 0.3 | 0.3 | 0.3 | |
| β = 2.2 | 2.4 | 2.4 | 3.0 | |
| φ = 0.3 | 0.36 | 0.40 | 0.45 | |

**Figure 2 . Comparison of Mixed Farming & Hunting with Specialized Hunting (Parameters as in Curve C4 of Figure 1)**



# A problem of commitment

- Resources devoted to defence may equally be used for attack
- Gellner (*Conditions of Liberty*) takes this to be central problem of modern societies
- If state cannot commit against predation, is competition among predators desirable?
- Alternatively, are there commitment mechanisms?
  - Constitutions
  - Tax systems

# Stationary versus roving bandits

- Mancur Olson (APSR 1993) developed a theory of states as "stationary bandits" who implement a monopoly of violence in order to tax revenue
- There are costs of imposing that monopoly but it encourages productive labor and investment by the population
- This outcome is more likely if the output and/or labor of the population can be taxed (ie not hidden)
- The theory is tested by Raul de la Sierra (1993) on data from Eastern Congo

# De la Sierra results:

- In year 2000 there was dramatic increase in world demand for coltan (columbite-tantalum) for use in video-games industry; price rose from $90 to $590 at start-2000 and collapsed at end 2000
- There was an increase in attacks and conquest attempts on villages mining coltan
- No equivalent increase in villages mining gold in spite of increase in gold price
- The difference: coltan is bulky and hard to conceal; gold is easy to conceal
- Evidence that village control increased output: withdrawal by RCD from some villages in 2003 as part of peace agreement saw fall in output there

Figure 7: Effect of the coltan shock on attacks on mining camps

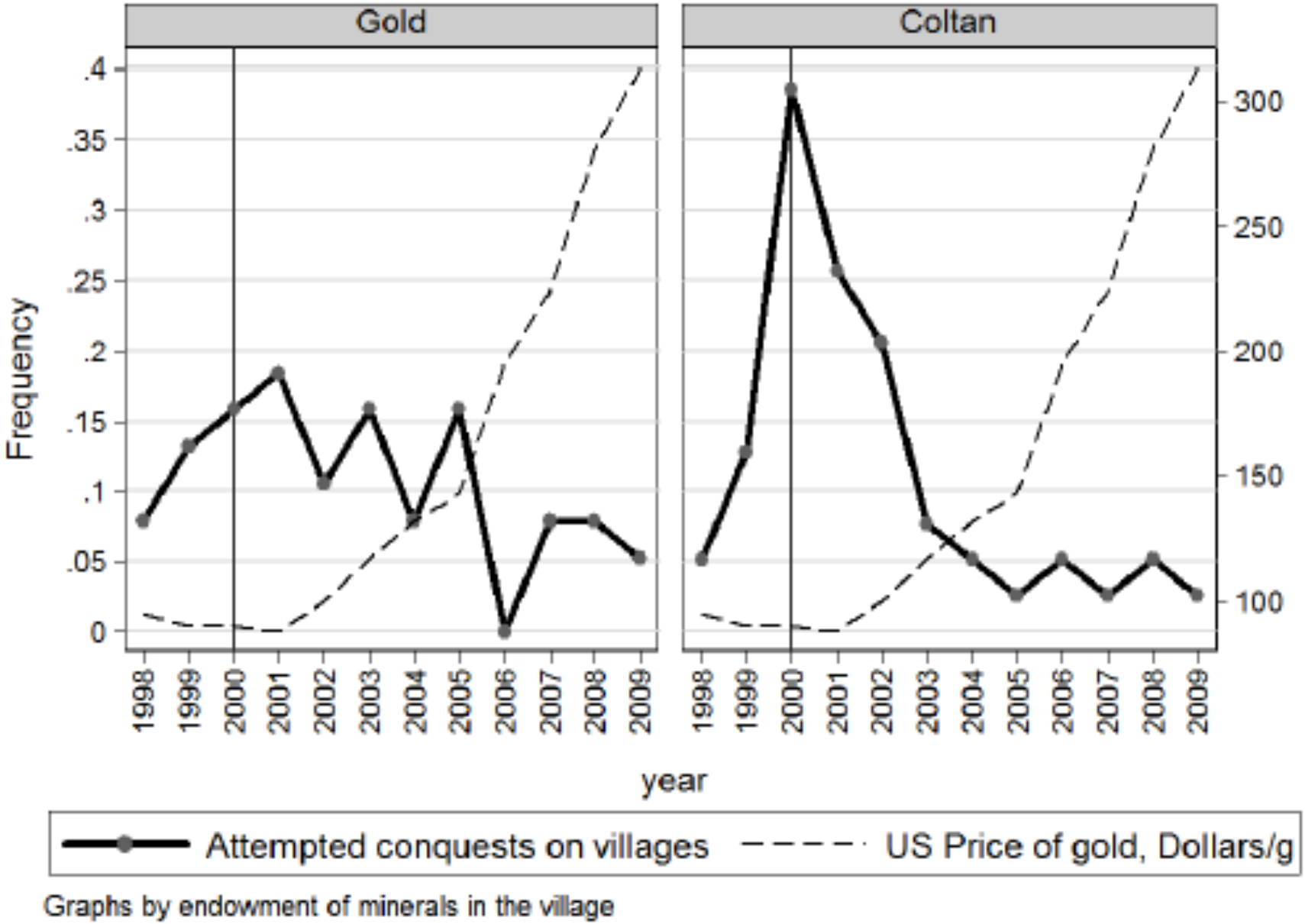


Figure 8: Effect of the coltan shock on Conquest attempts on villages

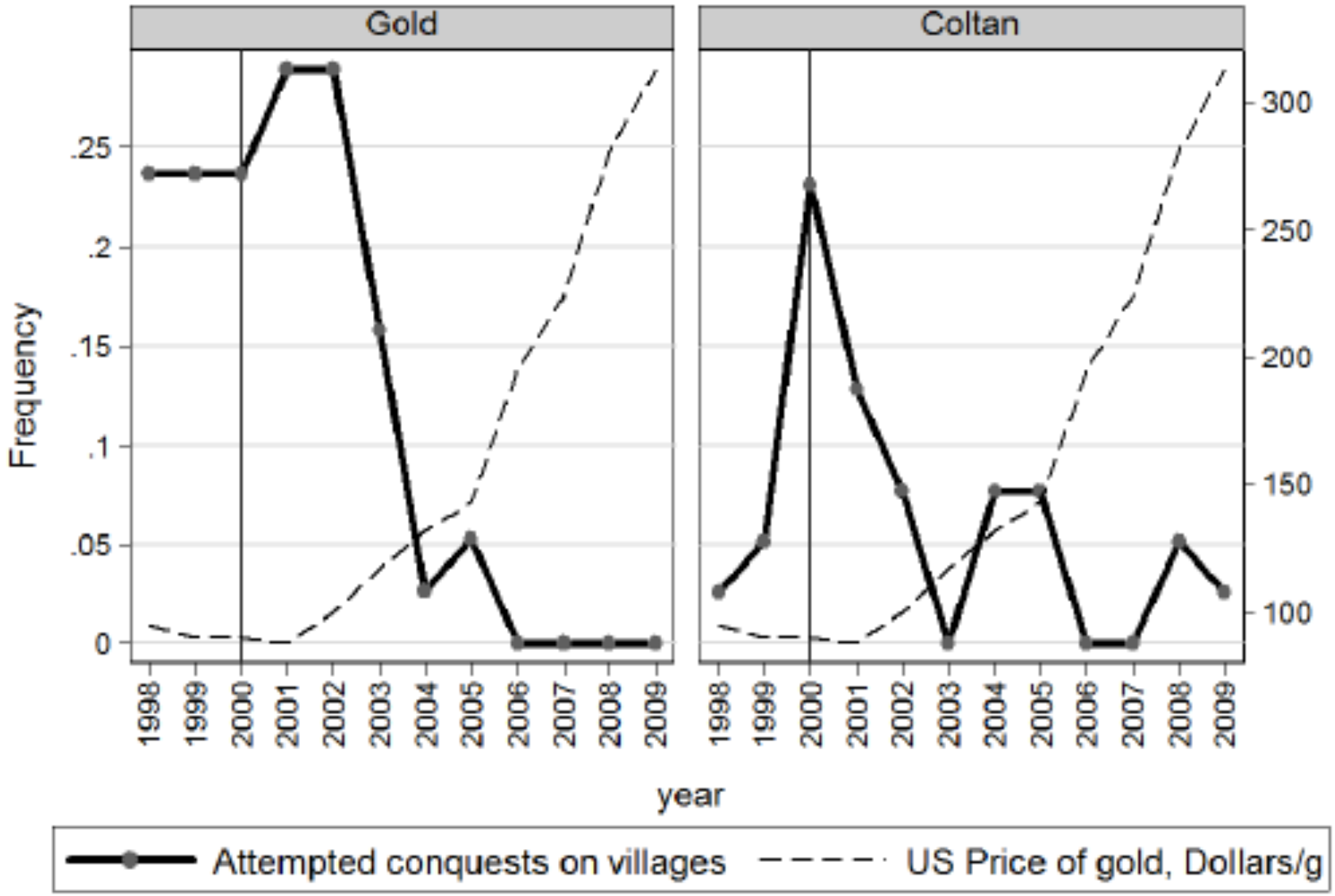
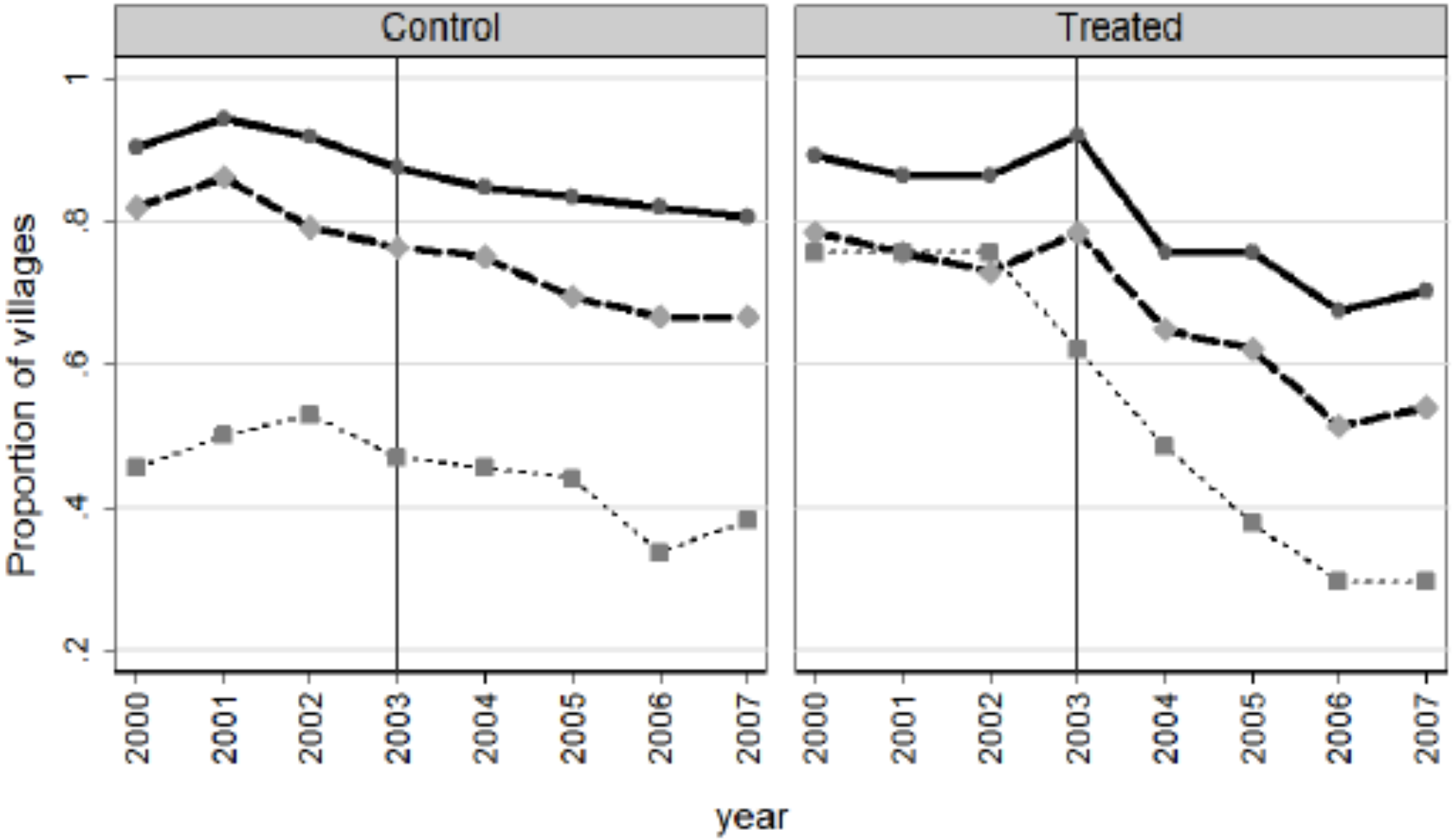


Figure 16: Economic effects of control by the RCD

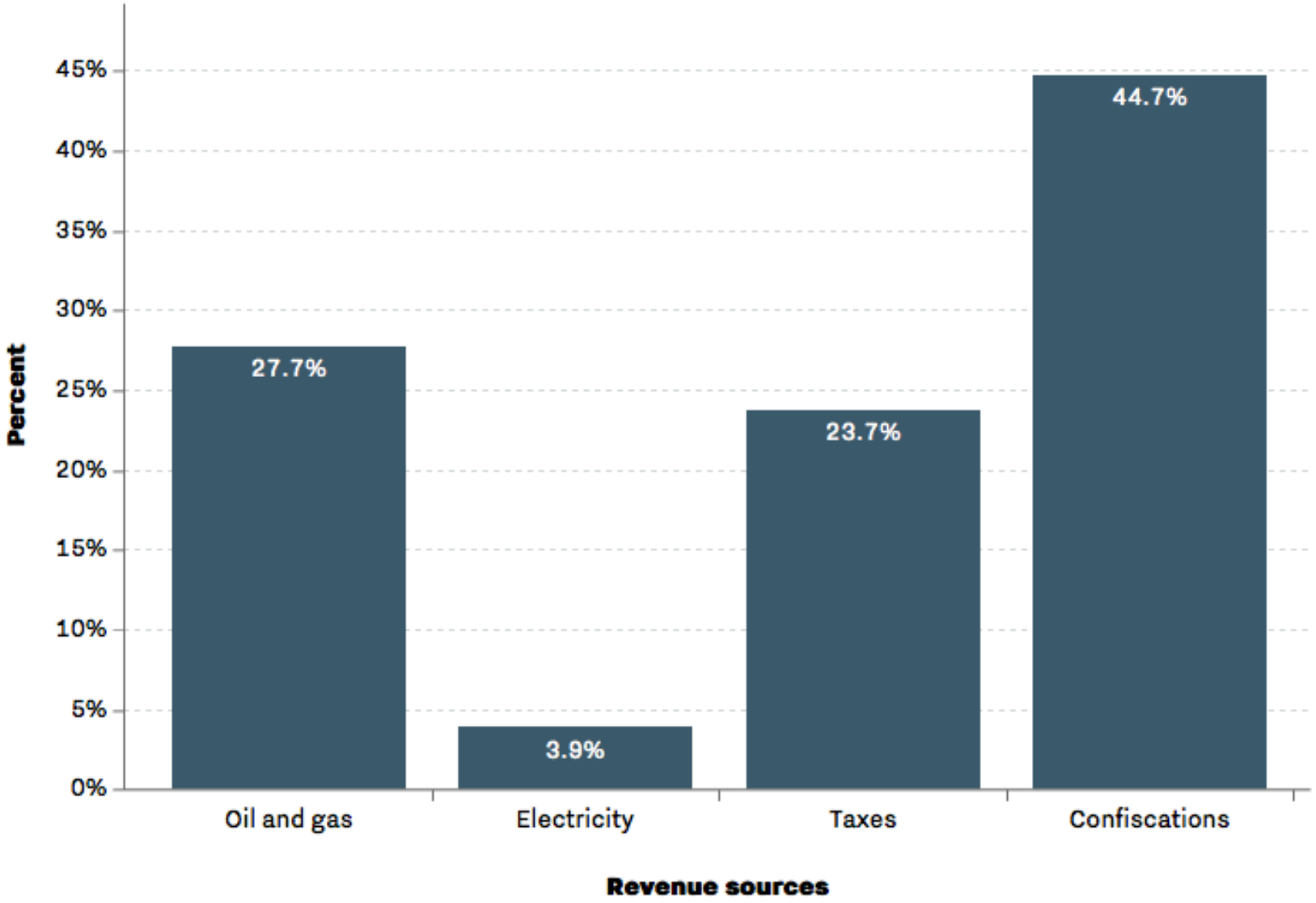



Graphs by Targeting of Peace agreements

# Can we say anything about the business model of ISIS?

- Leaked revenue and expenditure data suggest that the bulk of ISIS revenues come not from oil but from extortion (see http://www.vox.com/2015/10/7/9466633/isis-financial-records)
- This suggests the group is not very vulnerable to aerial bombing, but it may have difficulty sustaining legitimacy
- Especially since its revenues include very little spent on development (unlike, say, Hamas or Hizbollah)

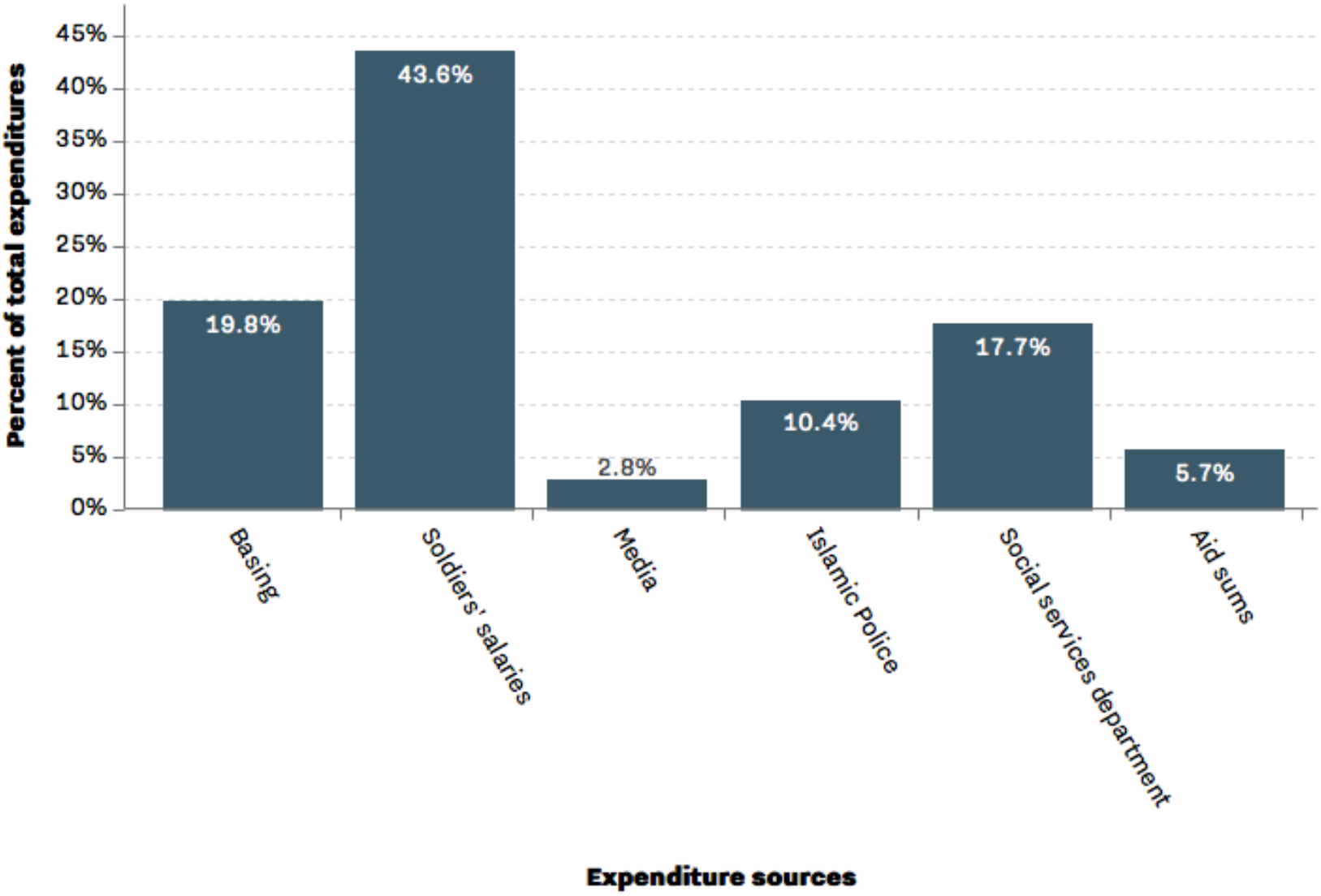
# Where ISIS's money comes from




Source: Jihadology

Vox

# Where ISIS spends its money

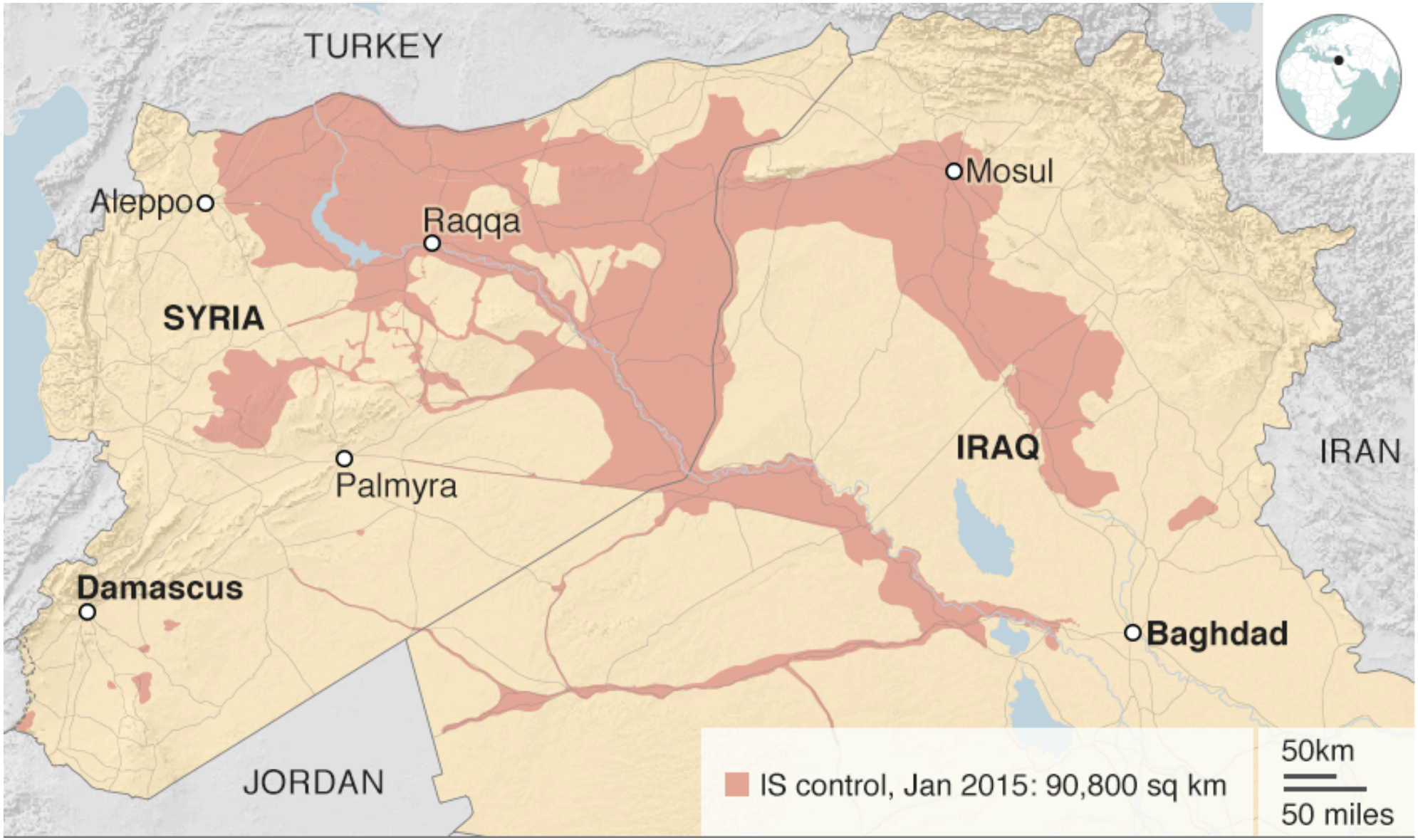


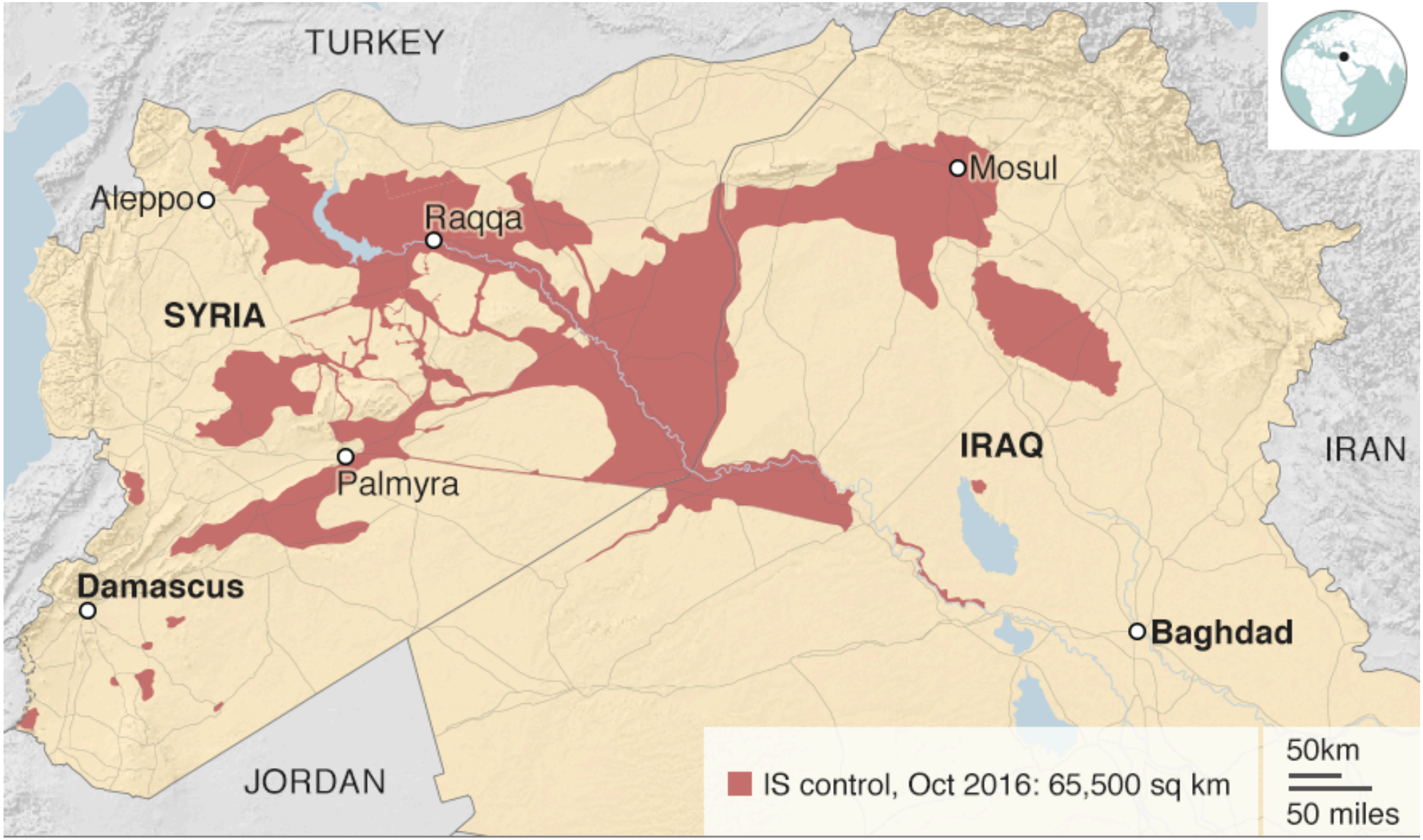

Source: JIhadology

Vox

# Alternative business models – compare ISIS and Al-Qaeda

- Both organizations rely on recruitment – but they attract recruits in subtly different ways
- They are platforms – their appeal depends on their activities on the other side
- Recruitment to ISIS surged after it declared itself a "caliphate" on June 29th 2014
- The last caliphate was abolished by Ataturk in 1924 after the end of the Ottoman empire
- What does this mean for ISIS now that its territory is shrinking?


TURKEY
Aleppo
Raqqa
Mosul
SYRIA
IRAQ
IRAN
Palmyra
Damascus
Baghdad
JORDAN
IS control, Jan 2015: 90,800 sq km
50km
50 miles




Source: IHS Conflict Monitor

BBC