Markets and Organizations

TSE M1 – Session 5

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Outline of presentation

- An unusual type of market – the protection market
- Producing versus plundering in the history of development
- A prehistoric paradox
- Commitment and corruption

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

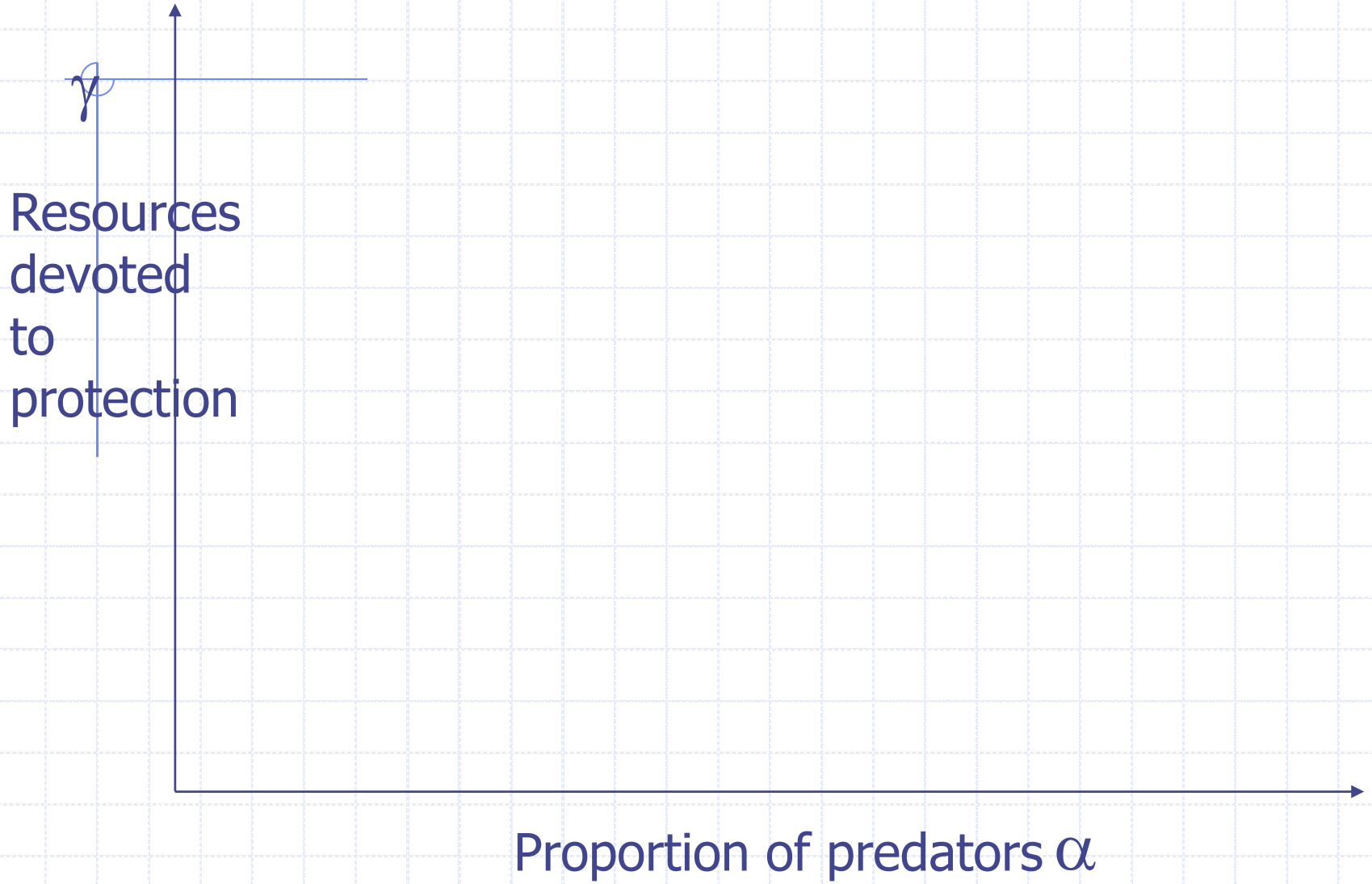
p1	*p2*	*r1*	*r2*	*t1*	*t2*	*W1*	*W2*	*W12*	*Wm*
0.9	0.8	0.7	0.7	0.140	0.070	0.800	0.800	0.790	0.3
0.9	0.9	0.4	0.4	0.040	0.040	0.922	0.922	0.920	0.6
0.4	0.4	0.5	0.5	0.300	0.300	0.490	0.490	0.400	0.5
0.6	0.4	0.4	0.2	0.240	0.080	0.699	0.699	0.680	0.6
0.6	0.2	0.4	0.5	0.320	0.200	0.544	0.544	0.480	0.6
0.3	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

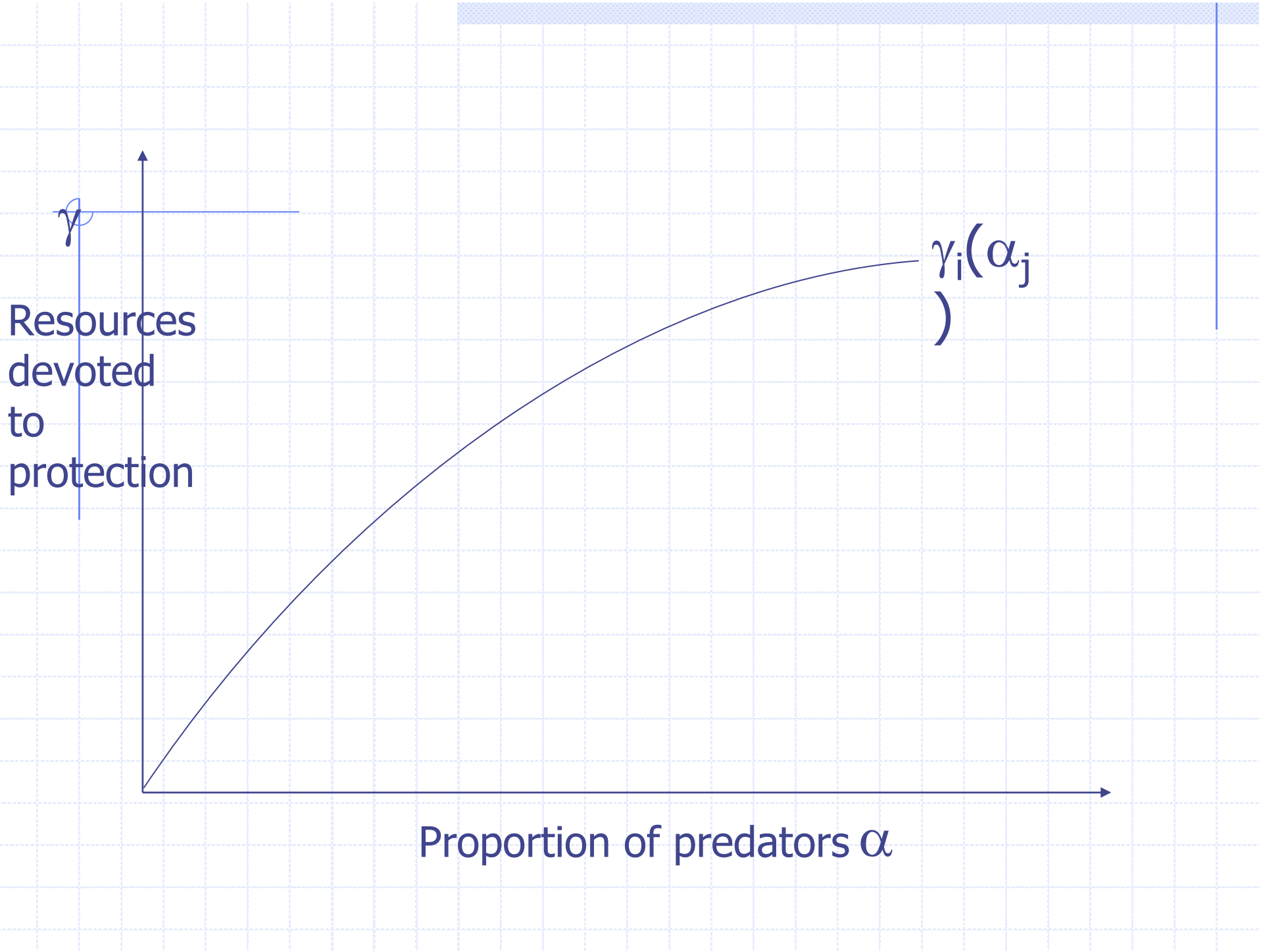
Producing vs. plundering in the history of development

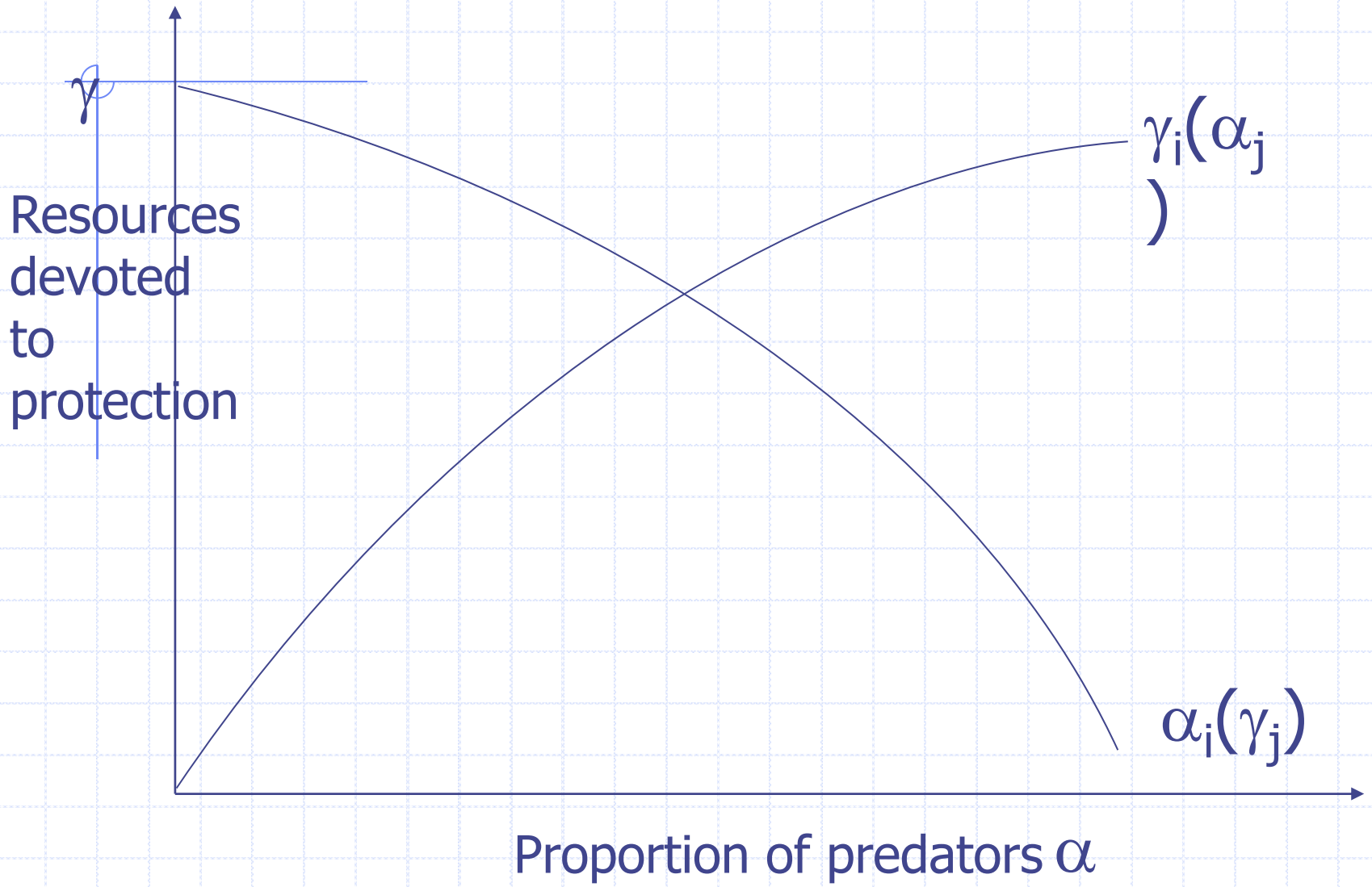
- For any group it is better that all produce than that some produce & others plunder
- For individuals plunder may dominate production $\Rightarrow$ possibility of arms races
- Changes in the technology of plundering & defence affect optimal group size:
  - hunter-gatherer bands
  - medieval mounted 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 α are predators
- Producers decide what fraction γ of resources to devote to defence.
- Each takes others' decisions as given.
- $\alpha_i(\gamma_j)$ is decreasing in γ_j
- $\gamma_i(\alpha_j)$ is increasing in α_j
- Collective choice of γ may increase efficiency


γ
Resources devoted to protection
Proportion of predators α


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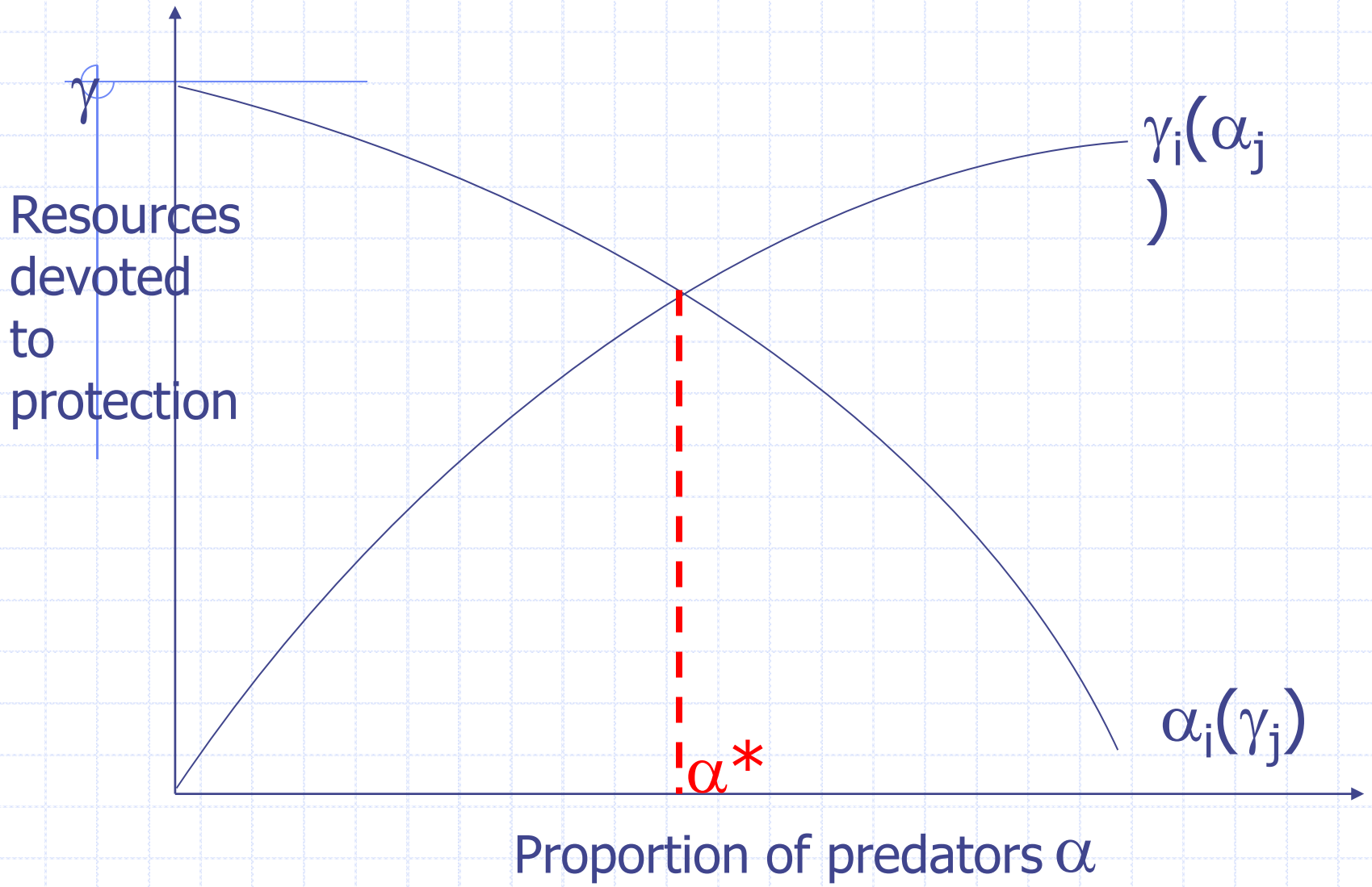
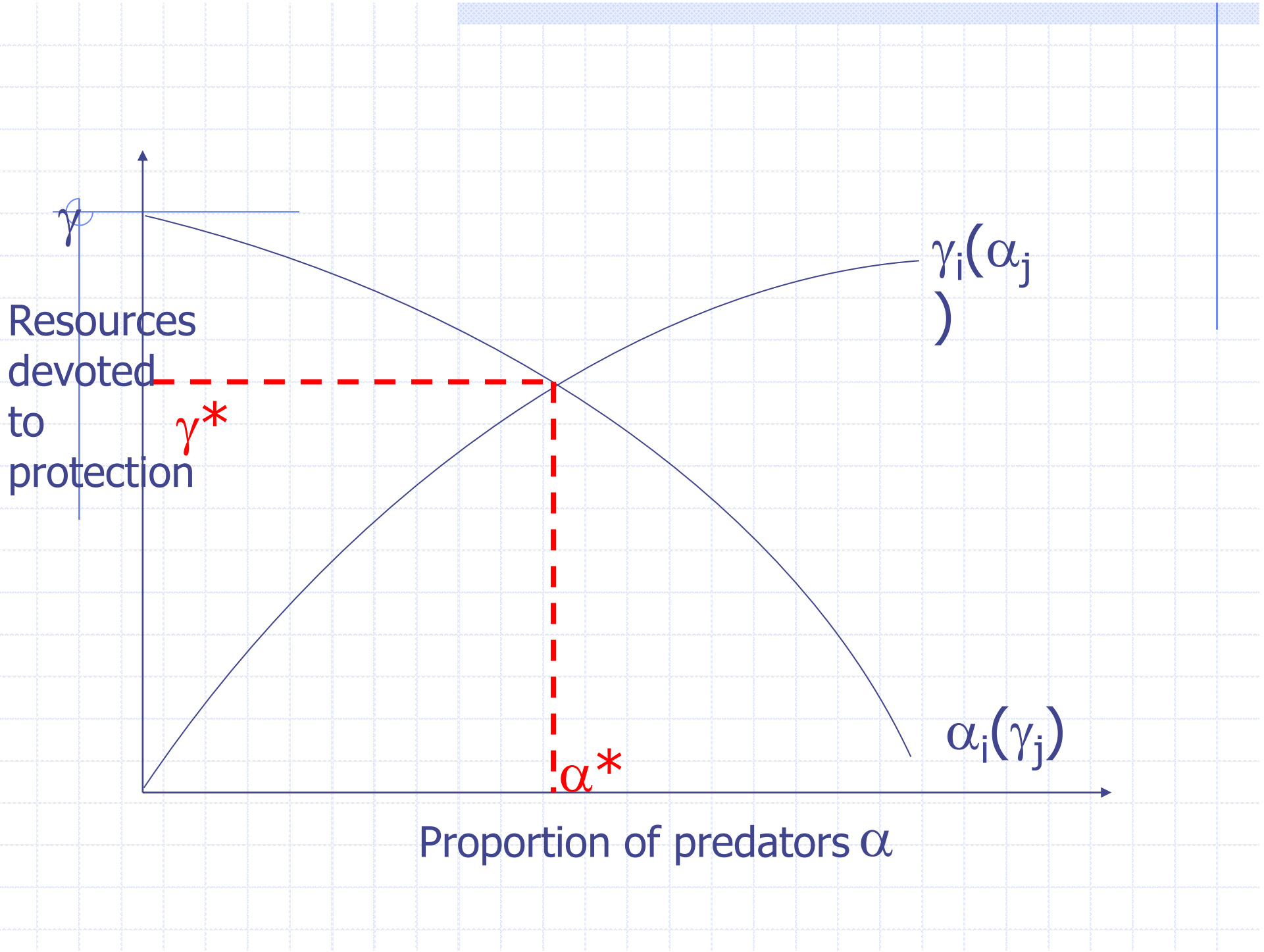
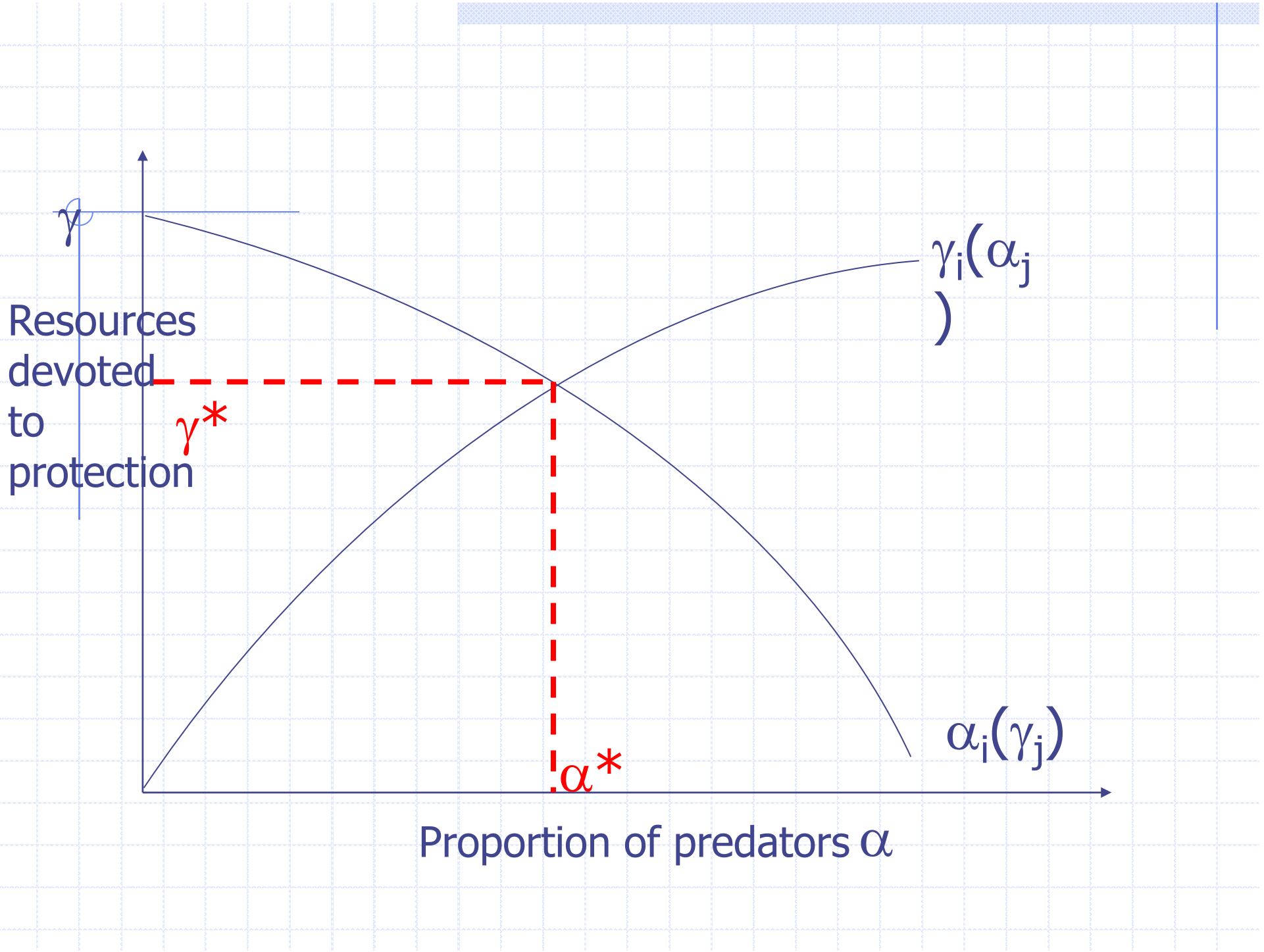

γ
Resources devoted to protection
γi(αj)
αi(γj)
α*
Proportion of predators α


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

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


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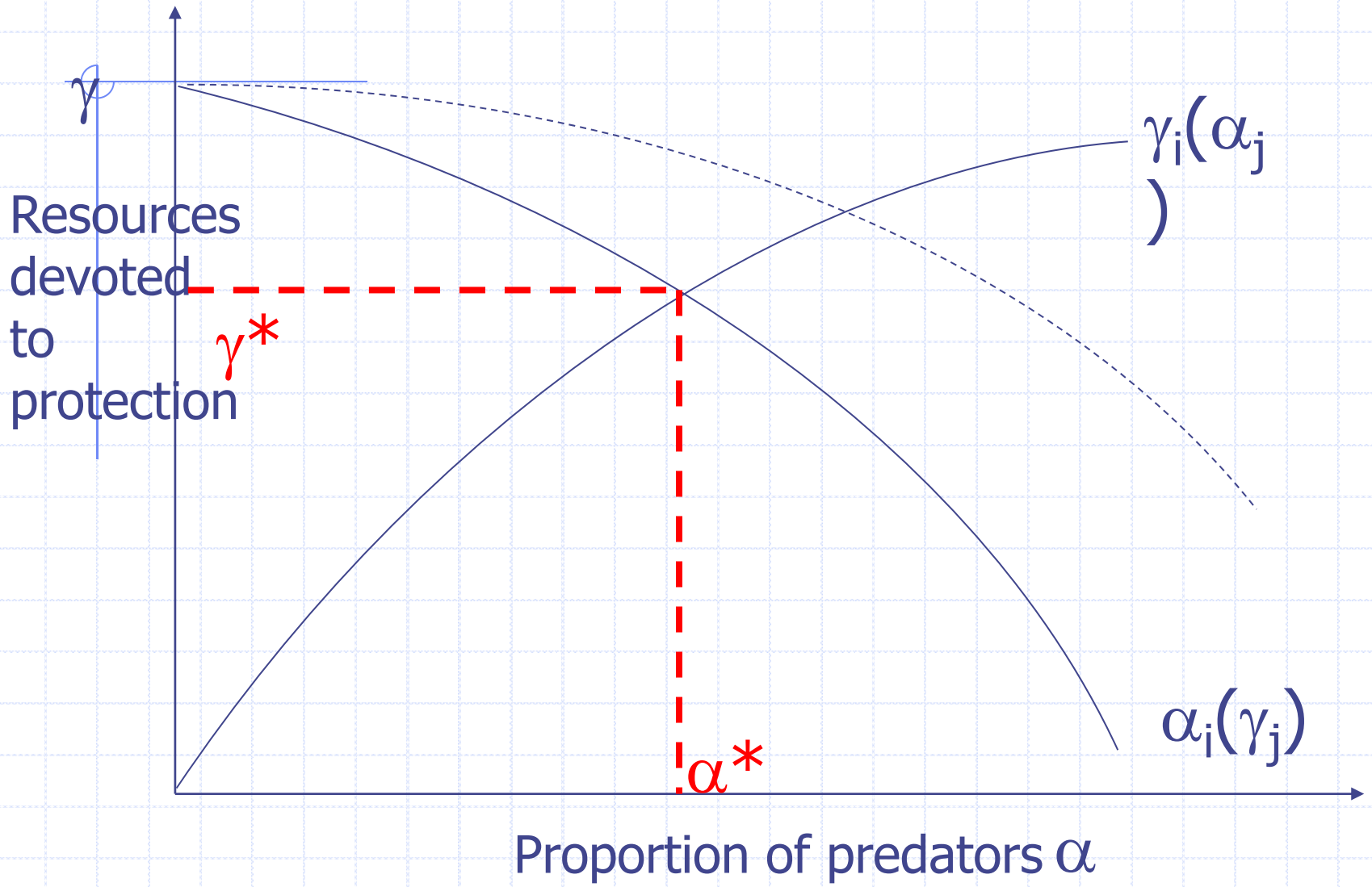
α*
Proportion of predators α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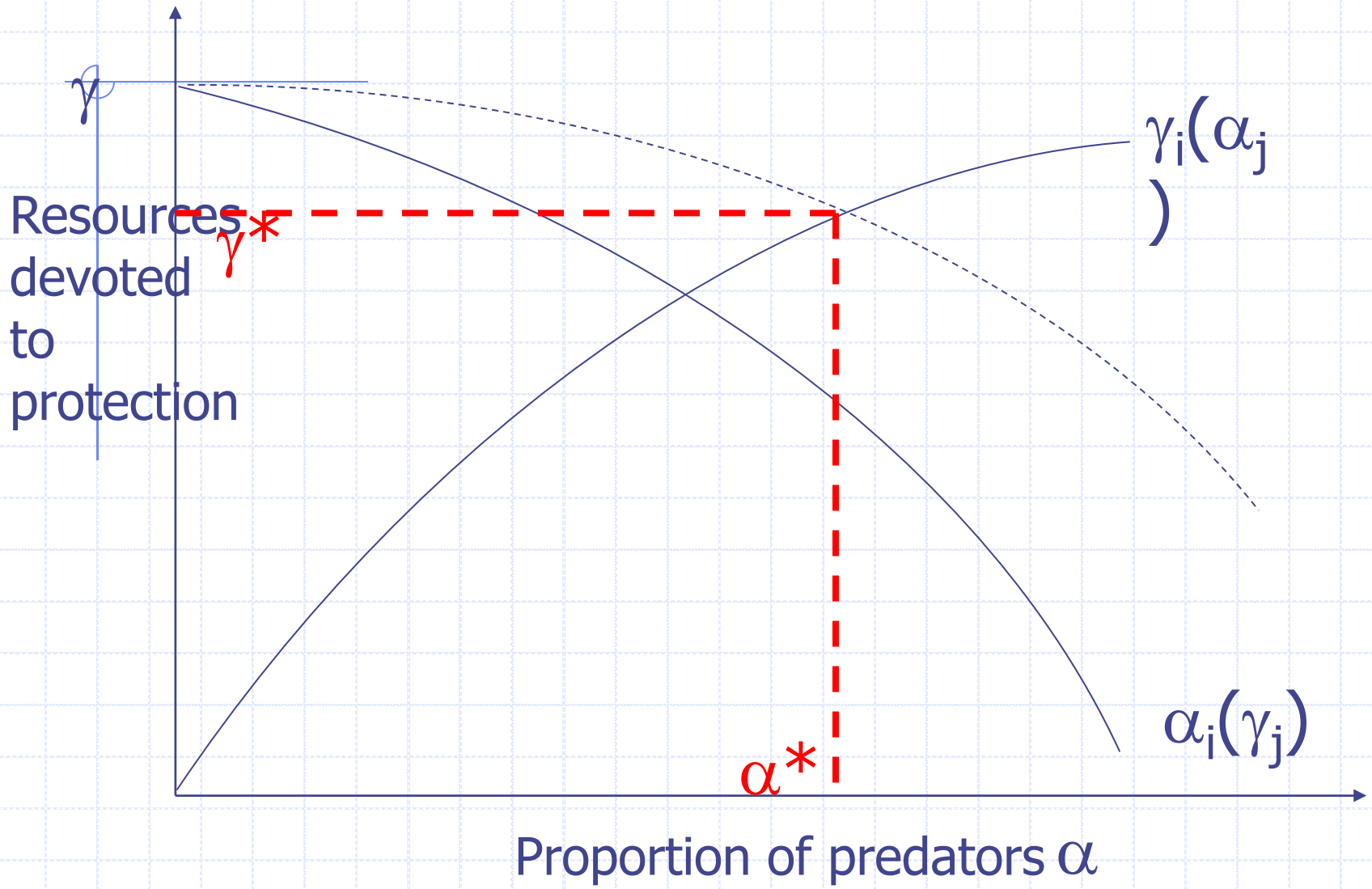
Resources devoted to protection
γ*
γi(αj)
αi(γj)
α*
Proportion of predators α


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…

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: $l = l_j^W - l_i^W$

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

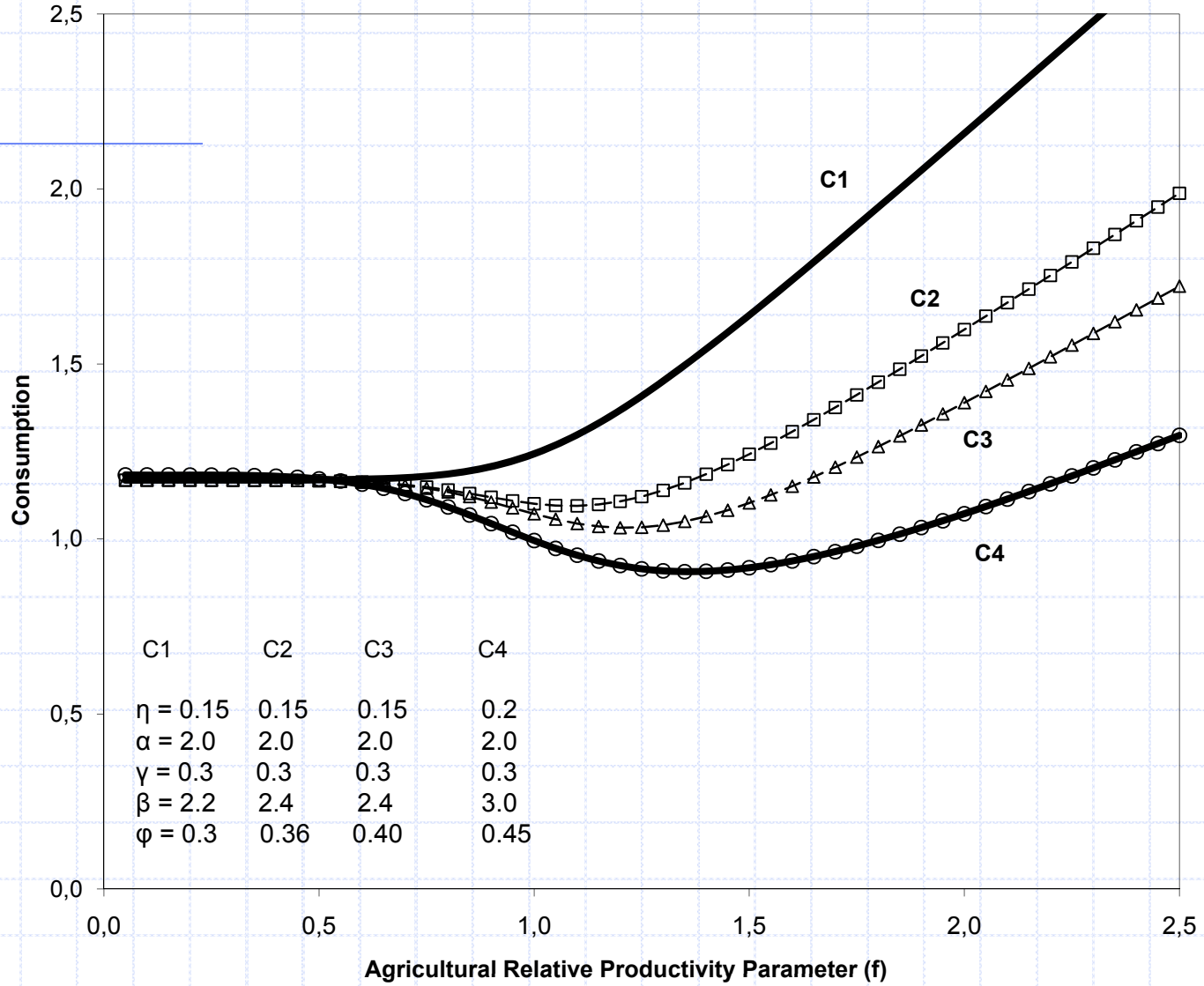
What does the model show?

- Consumption is:

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

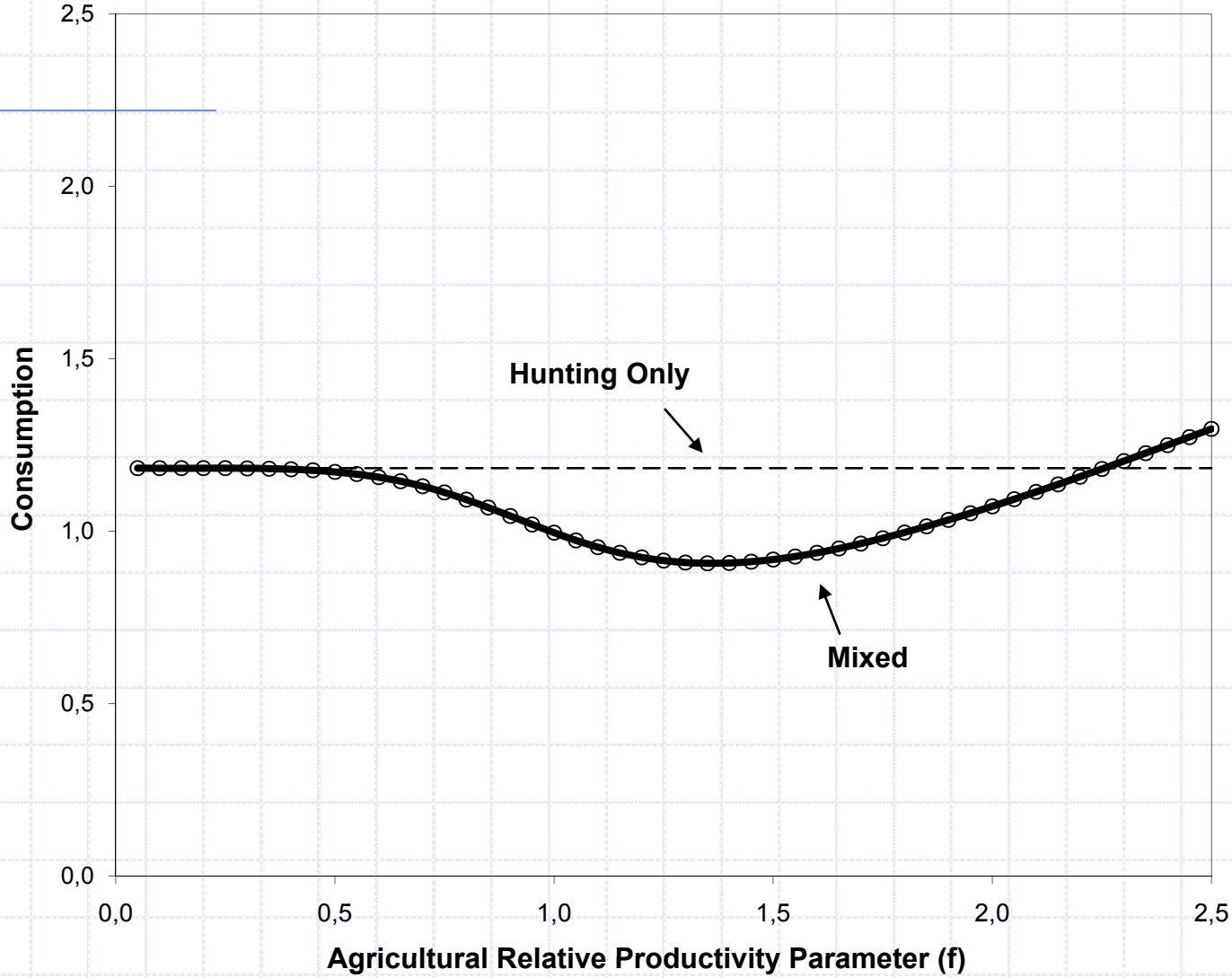
- Surprise finding: consumption can be decreasing in the productivity of agriculture over a certain range; because farming gives people more to fight about!

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

Corruption

- Can be seen as mid-point between anarchy and the state
- Imperfect commitment power of the state's agents
- Under what circumstances does competition worsen the cost of corruption?

Shleifer & Vishny (QJE 93)

- Multiple corrupt agents
- Each offers no protection, only predation
- Complementarity between agents only increases the social cost (analogy w. double marginalization)
- Analogies with river tolls
  - In 1400 there were 60 independent tolls along the Rhine
  - England had no such tolls

Is there persistence of corruption?

- Tirole (RES 1996) shows that if
  - Current generations inherit the reputation of their predecessors
  - Corrupt behaviour is more costly for those with good reputations
- There may be multiple equilibria
- Low-corruption equilibria may Pareto-dominate high-corruption equilibria

Treisman (J.Pub.Ec. 2000) finds corruption lower if:

- Long history of democracy
  - current democratic status insignificant
- High percentage of Protestants
- British heritage (esp. common law)
- Unitary not federal states
- GDP is high
- GDP & democr. explain apparent effect of
  - Ethnolinguistic fragmentation
  - Dependence on raw materials

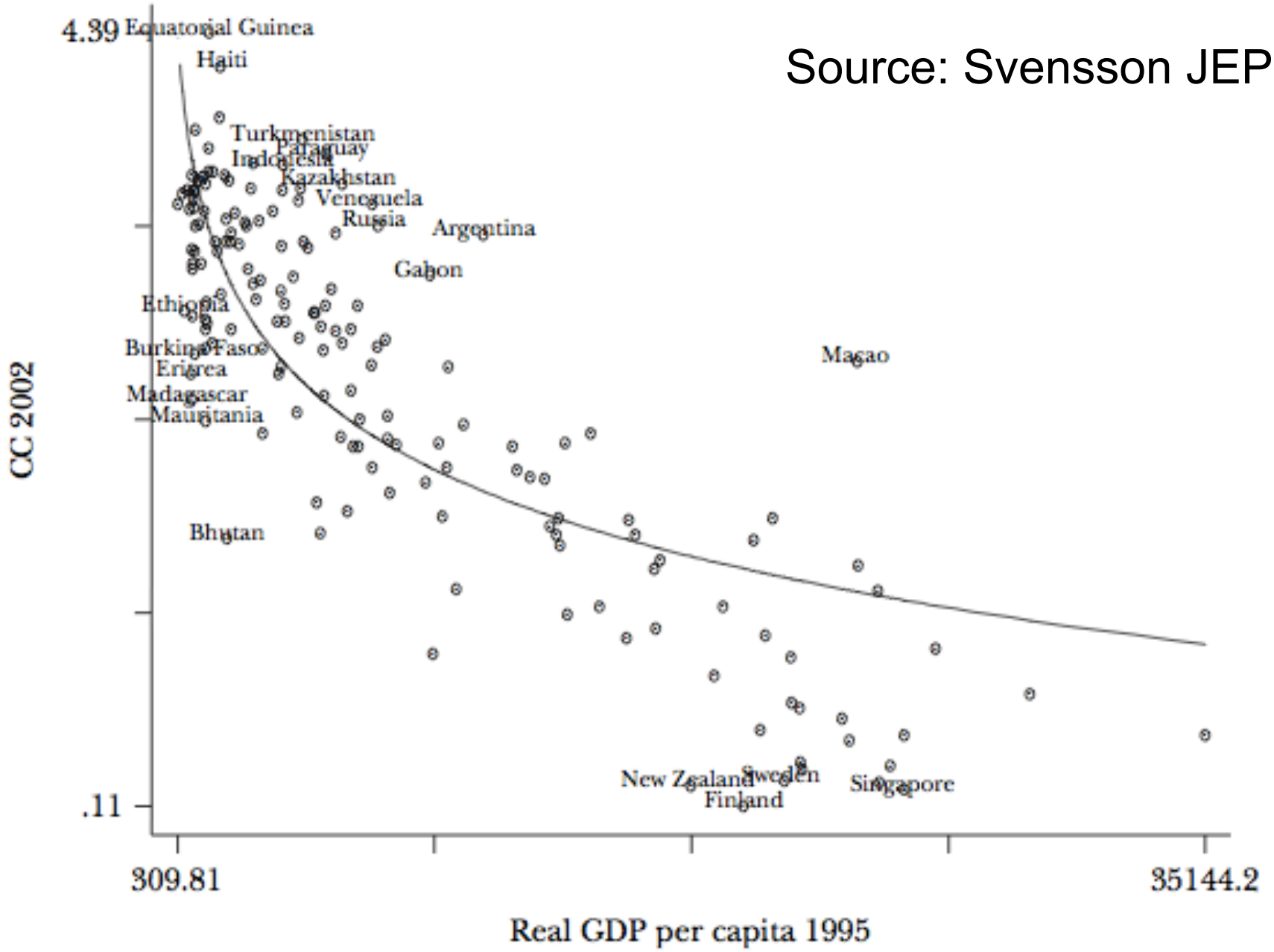
Private enforcement as a check against corruption

- Gambetta (1988) and Varese (1994) argue that mafias should be seen as offering a service (protection)
- Inefficiency of private provision means it will only be demanded when state provision is particularly inadequate
- But supply conditions also make a difference (Sicily in the 1860s; Russia in the 1990s)

Johnson et.al. (ibid.):

% of firms reporting	Poland	Slovakia	Romania	Russia	Ukraine
Bribes for licences	19.3%	42.2%	17.0%	91.7%	87.5%
Bribes for govt. services	20.0%	38.0%	20.0%	91.0%	87.0%
Mafia protection	8.0%	14.9%	0.6%	92.9%	88.8%
Courts can enforce contracts	72.9%	67.9%	86.9%	58.4%	54.7%

Corruption and Income



Source: Svensson JEP 2005

Note: The graph depicts the regression line of corruption (CC 2002) on real GDP per capita (in logarithms) 1995.

Table 6

Growth and Corruption

Dep. variable	*Growth (1980–2000) Ordinary least squares*	*Growth (1980–2000) Fixed effects*
Real GDP per capita (log)	−0.82*	−6.50***
	(.47)	(1.03)
Years of schooling (log)	1.86***	6.63***
	(.66)	(1.36)
Corruption	−0.33	0.11
	(.24)	(.24)
Countries	85	86
Observations	85	335

Notes: For details on sources of data, see Table 2. Growth is growth in real GDP per capita over the period 1980–2000 in specification (1) and growth in real GDP per capita over the periods 1981–1985, 1986–1990, 1991–1995, 1996–2000 in specification (2). Real GDP per capita and years of schooling are measured at the start of the sample period (in 1980 for specification (1) and in 1980, 85, 90, 95 for specification (2)). Corruption is the International Country Risk Guide's corruption indicator, average for 1982–2000 in specification (1) and average over 1982–1985, 1986–1990, 1991–1995, 1996–2000 in specification (2).