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TURIN SCHOOL OF LOCAL REGULATION

Actors, incentives and information in regulation: a theoretical road-map

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TURIN SCHOOL OF LOCAL REGULATION
FONDAZIONE PER L'AMBIENTE

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OUTLINE

LECTURE OUTLINE

TURIN SCHOOL OF LOCAL REGULATION

PART I: THE BACKSTAGE
Institutions, organizations, individuals
Economic freedom, choices and institutions

PART II: INFORMATION AND GAMES
Information
Motivations and Choices
Strategic and not strategic contexts
Games
Mechanisms

PART III: INFORMATION AND REGULATION

THROWN INTO UNCHARTED TERRITORIES?

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- Road maps with sufficient granularity in all situations are not available
- Map of rationality
- Map of competition

INSTITUTIONS AND ORGANIZATIONS

- INST: systems of established and prevalent social rules that structure social interactions
- ORG: special institutions, islands, with
  (a) criteria for boundaries and membership
  (b) principles of sovereignity
  (c) chains of command

INSTITUTIONS AND ECONOMIC FREEDOM

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- $a_i \in A_i$).

- Extractive/inclusive

FORMAL AND INFORMAL INSTITUTIONS

- Gift culture in Africa
- Driving behaviour
- Market rigging and spoofing in finance

INSTITUTION's DESIGN

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- Careful design in calm times?
- Institutional and personal incentive to redesign rules or institutions in sunny days are so weak

PUBLIC HAND

- Polity
- Politics
- Policy

REGULATION: SEMANTIC

- Laws and rules
- Red tape
- Economic/industrial regulation
- Civic regulation /commons

INFORMAL REGULATION

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- Regulation not issued/enforced by public bodies
- Civil regulation stems out from social capital and is based on a network of collective control, reward and blame
- Self regulation: signals on expected behaviour

ENLIGHTENING QUOTE

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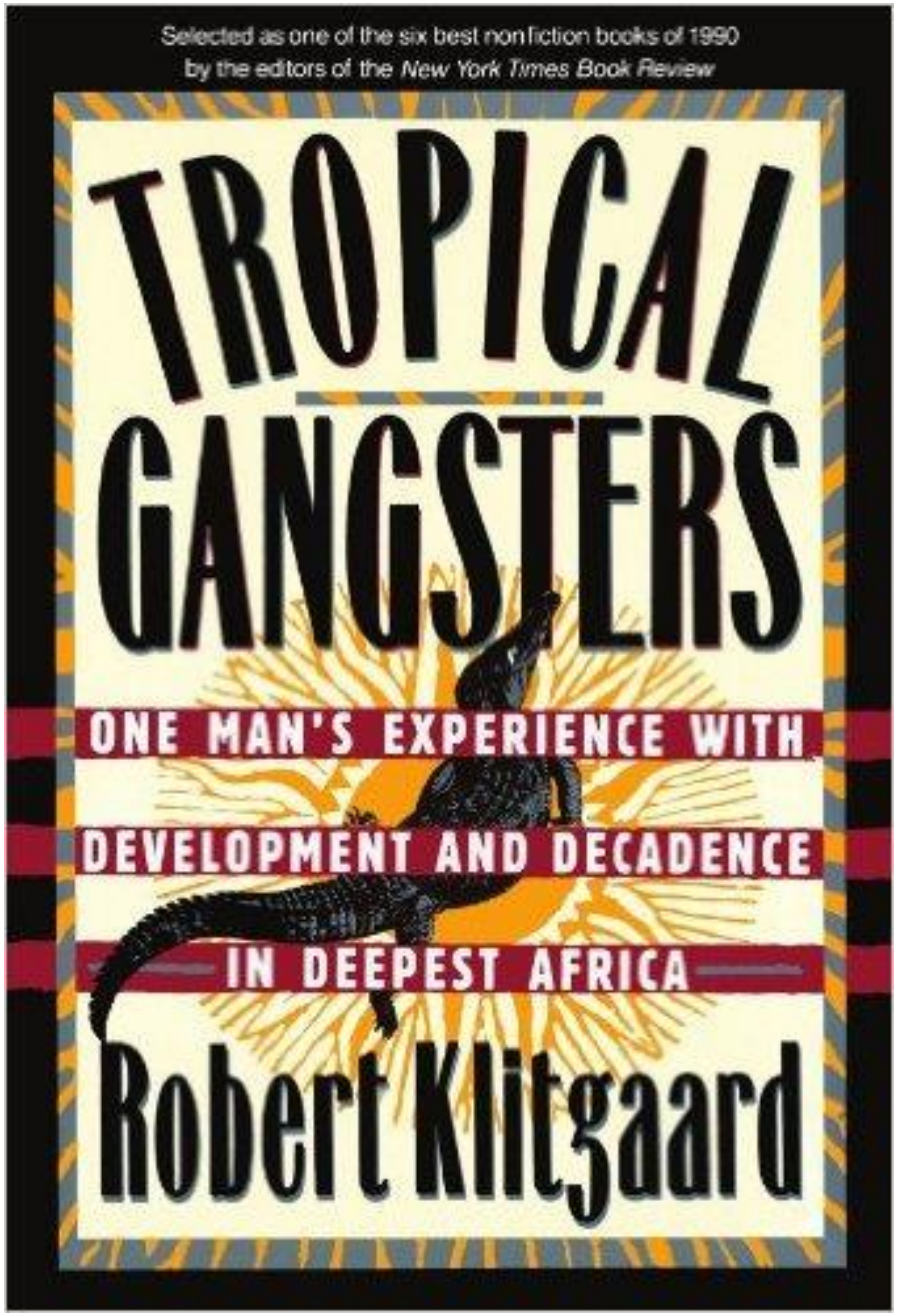
"overcame first the savage aspects of our aboriginal ethic, ill suited for breaking the isolation of the tribes and organizing them in large States or broader society ruled by common law. (….) Tribal customs, political organization, instead of developing toward a more open and universalistic human integration, has tended to consolidate personal power, identifying it with the leader's own horde, ethnic group clan or tribe"

Teodor Objang



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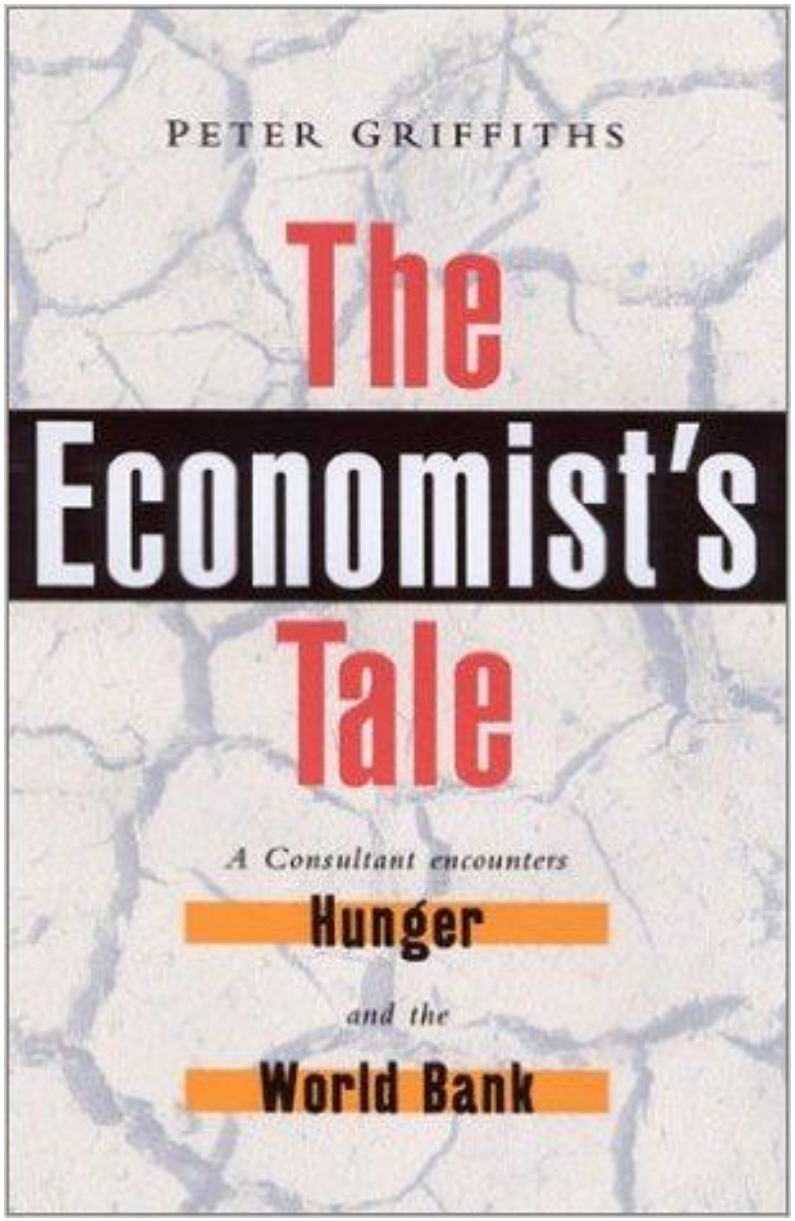

INSTITUTIONS AND REGULATION

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Three layers can help to approach the issue

- The institutional level
- The governance/regulatory level
- The service provision level

INFORMATION: A ROAD-MAP?

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THREE LEVELS AND MULTIDISCIPLINARY APROACH

- Information
- Knowledge
- Awareness

DISRUPTING INFORMATION

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- If you experience something — record it
- If you record something — upload it
- If you upload something — share it.

WHAT IS A PUBLIC INFORMATION?

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An information **k** is common knowledge if:

- Everyone knows k
- Everyone knows that everyone knows k
- Everyone knows that everyone knows that everyone knows k
- Everyone knows that….

This is Interactive epistemology!

INTERACTIVE ESPISTEMOLOGY AND THE ECONOMIC CLASSIC PARADIGM

Public information is the amniotic fluid in which choices are made in the model of perfect competition

INFORMATION

A CASE FROM INDUSTRIAL COSTS

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- The cost μ for extraordinary maintenance of a water infrastructure
- The regulated firm knows μ
- The regulator also knows μ
- The regulated firm knows that the regulator knows μ
- The regulator knows that the regulated firm knows that the regulator knows μ
- *Try to outline the consequences of just the first 3 steps changing the scenarios from knows to don't know*

PUBLIC INFORMATION AND THE PARADOX OF BACKWARD INDUCTION

- If I know that you know that I know ….Backward induction drives us to the traps of Nash equilibrium….
- … WITH SOME PARADOXES (see traveler's dilemma by Kaushik Basu)

BACKWARD INDUCTION: A CASE STUDY WITH COUNTERINTUITIVE OUTCOMES

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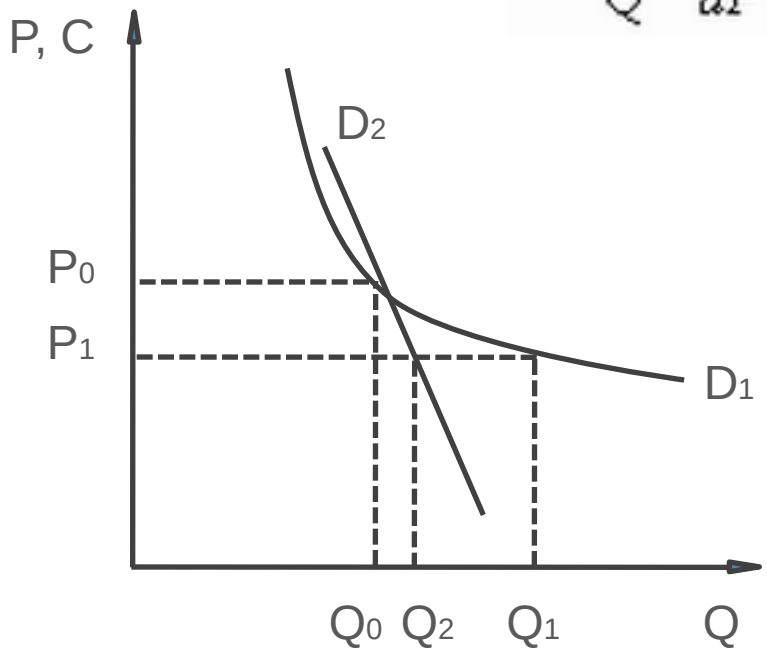
$$\varepsilon = \frac{P}{Q} \times \frac{dQ}{dP}$$



WHAT IS A PRIVATE INFORMATION?

- An information that is not shared
- Asymmetry
- Markets extract private information

and aggregate relevant private information

A goal of microeconomics: which design, institution, contract is best suited to minimize the economic losses generated by private information? (bid/ask spread)

INFORMATION

WHAT ARE YOU PROTECTING?

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CLEANING MESSAGES

The owner of the bin locks it in order to clean the message on his own individual demand of service

INFORMATION

TRYING TO HIDE INFORMATION: THE CASE OF MULTISERVICE UTILITY

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- $Ca = Ka + aQ\ (+\eta Cb)$
- $Cb = Kb + bQ$

TRYING TO HIDE INFORMATION: THE CASE OF DARK POOL

Dark pools as an interesting case of information hiding

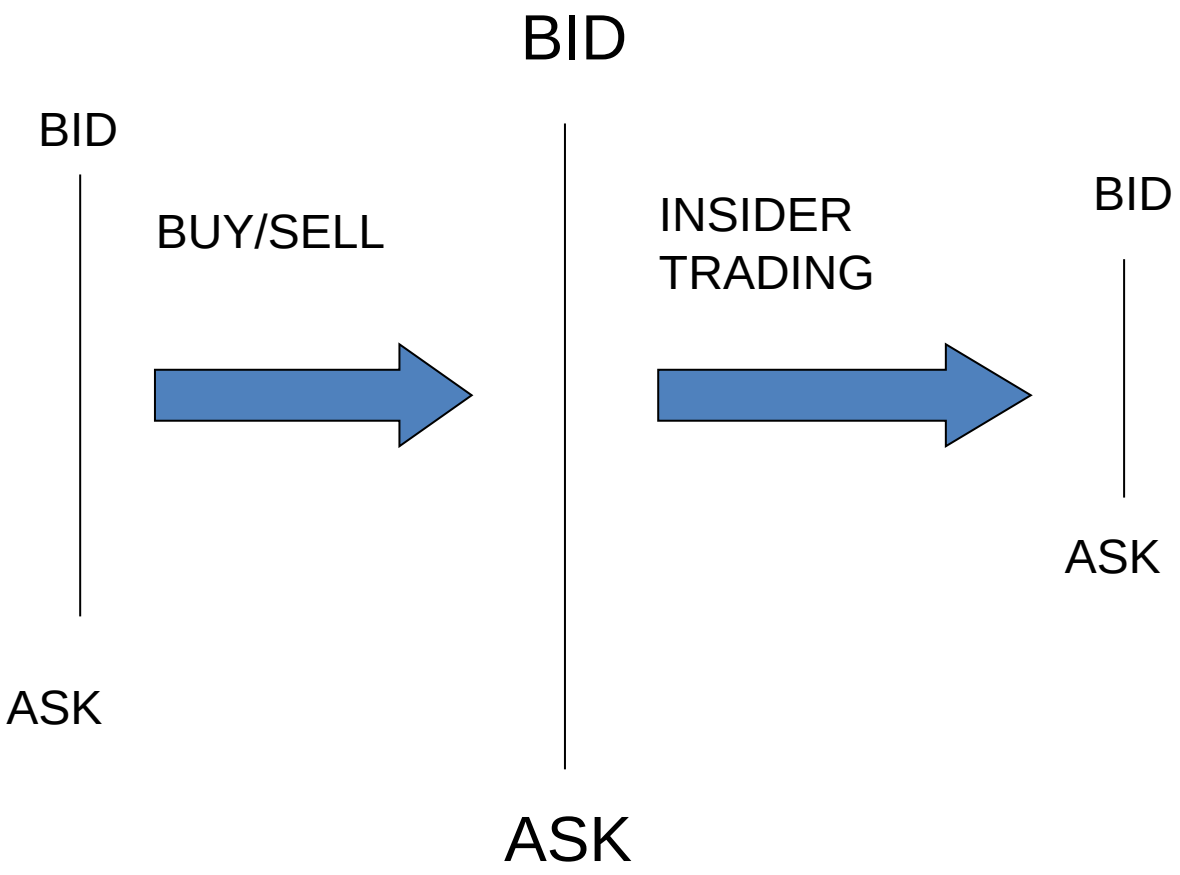
circa 8% of stock trades.

RECIPROCAL REVELATION AND INCENTIVE COMPATIBILITY

Is the context incentive compatible?

(I know that your best interest is to reveal information).

THE SOCIAL COST OF PRIVATE INFORMATION : BID - ASK SPREAD



ACTION AND REVELATION

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An action reveals information

The more general question is how one's behaviour affects other actors knowledge.

In the long run you cannot use information without revealing it and, consequently, destroying it.

TERRITORIES OF GAMES

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- GT: the biggest scientific effort to deal with strategic interaction
- Full of paradoxes (backward induction, dilemmas)
- Challenged by moral phylosophy (sociability, strain)

ONE-SHOT AND REPEATED GAMES

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Revenge, altruism, trust, self-destructive threats can be explained only in a context of repeated game.

COOPERATIVE AND NON COOPERATIVE GAMES

Everyone is in a corner thanks to NON-COOPERATION and absence of trust/information.

(only 50% follow rational Nash equilibrium in experiments)

FOLK THEOREM

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- Egoistic outcomes in repeated games correspond to cooperative outcomes in one-shot games.

- Non-cooperative strategic behaviour in the repeated game yields Cooperative behaviour.

RELEVANCE FOR REGULATION

- Common pool water resources uses
- Separate waste collection
- Green area uses
- Traffic jams

THE STUDENT'S WORK-GROUP GAME

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		You	You
		2 at me	8 to you
Me	2 at me	2 2	10 0
Me	8 to you	0 10	8 8

Nash equilibrium: non cooperation, mistrust?

Pareto optimum: trust, cartel

(Franco Becchis revistation of the President dilemma, see Sergiu Hart presentation of Bob Aumann)

THE DUOPOLIST GAME

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Q= 20-P C= 15 + 8Q

		Quantity (FIRM B)	
		4	3
Quantity (FIRM A)	4	1 1	5 0
	3	0 5	3 3

Nash equilibrium / Cournot

Pareto optimum / cartel

THE MAYOR AND THE UTILITY

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U dominant strategy

UTILITY

MAYOR

		Clean	Not to clean
	Clean	-1, 6	0, 0
	Non to clean	-2, 8	0, -4

Common knowledge

But in the case of a repeated game…

UTILITY

dominant strategy

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MAYOR

	Clean	Not to clean
Clean	-1   6	0   0
Non to clean	-2   8	0   -4

THE CHICKEN GAME

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	Leave	Stay
Leave	5 5	3 6
Stay	6 3	0 0

	L	S
L	1/3	1/3
S	1/3	0

A **(publicly) correlated equilibrium**

Another Nash equilibrium

A Nash equilibrium

Another **correlated equilibrium**:

- after signal L plays Leave
- after signal S plays Stay

(Franco Becchis revistation of the President dilemma, see Sergiu Hart presentation of Bob Aumann)

POLLUTER-POLLUTED GAME: THE FIRST ROUND

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The firm can decide to invest in pollution abatement technologies (A) or not (N), the consumers can decide to protect themselves from pollution (P ,double glasses, water filters..) or not (NP).

		Consumers	
		P	NP
Firm	A	5 12	5 10
	N	10 5	10 0

POLLUTER-POLLUTED GAME: THE PROTEST

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If we have a second round of the game protest can arise, and the firm pay off can be eroded (litigation, PR, bad press, pressures from politicians).

		Consumers			
		P		NP	
Firm	A	5	12	5	10
	N	8	5	8	0

POLLUTER-POLLUTED GAME: TAX

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In the third round government impose a tax on polluter.

		Consumers			
		P		NP	
Firm	A	5	12	5	10
	N	4	5	4	0

HELPING THE POOR: COMPLICATED GAMES?

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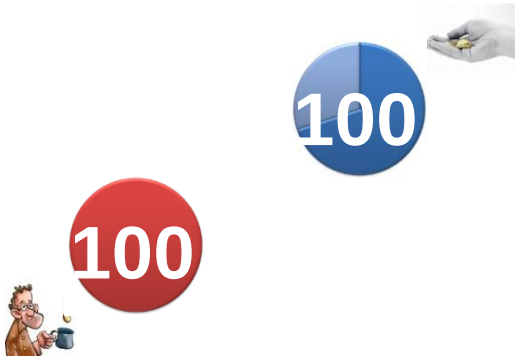
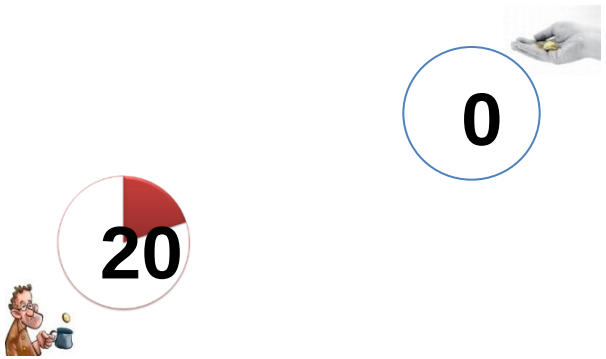
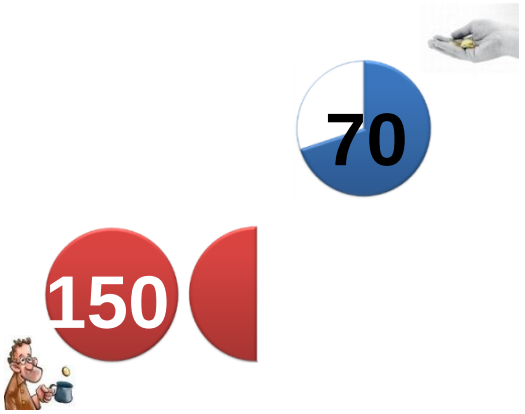
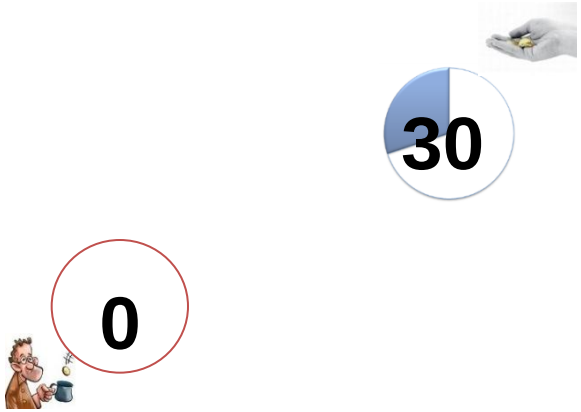
SCENARIO 1 – when for the donor mission and efficacy weight as follows:

- Mission (70)
- Effectiveness (30)

	GIVE	NOT TO GIVE
CHANGE		
NOT TO CHANGE		

HELPING THE POOR: COMPLICATED GAMES?

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SCENARIO 1 – when for the donor mission and effectiveness weight as follows:

- Mission (30)
- Effectiveness (70)

	GIVE	NOT TO GIVE
CHANGE	100 / 100	0 / 20
NOT TO CHANGE	30 / 150	70 / 0

MECHANISMS AND GAMES

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Mechanism design theory defines institutions as non-cooperative games

A mechanism can be described as a game: each part owns private info and send messages… rules assign outcomes

(Leonid Hurwicz,1960)

Equilibrium happens when all participants in the mechanism send a message that maximise their own expected payoff

THE ROLE OF MD

- Mechanism design has modernized and unified existing lines of research (industrial economics, contract theory, commons, finance, oligopoly, policy design…)…and is surprisingly present in every day life as the following picture shows…

(Buy 3 and pay the cheaper 1 €)

HIDDEN MATHEMATICS BUT…

- 1) Max R(x,p)
- 2) $j \in i$
- x1p1, x2p2, x3p3,
- con p3< p2 < p1
- U(x1p1 + x2p2 +x3g) >U(x1p1 e x2p2 e x3p3)
- Alternatives: (x1p1 + x2p2 + x3p3)/3 <(x1p1 + x2p2 + x3g)/ 3
- Incentive:
- Max (p3 - g) ;
- or
- Max (x1p1 + x2p2 + x3p3)/3 - (x1p1 + x2p2 + x3g)/ 3

…SIMPLE REALITY

aligning incentives!

INCENTIVE INCOMPATIBILITY (MISALIGNED INCENTIVES) IN PRIVATE EQUITY

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Fees paid to private equity managers depend on the “reported” asset value!

CONFLICTS AND INFORMATION

- Many conflicts are unresolved because of distrust caused by private information.
- Even if resolved, private information and distrust lenghten the process
- Expert opinion is the most common way to cancel the effect of private information (on costs, mainly)

FIRMS AND TRUST

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- Maximising shareholder value (MSV)…clashes with trust and long term commitment
- Cooperation and trust as an implicit contract
- The strategic information about MSV hinder agreement and cooperation that add value to the business and to the society

REVELATION AND PUBLIC GOODS

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Public goods could not be provided at an efficient level..

…because people would not reveal their true WTP

Are there possible mechanisms in which (a) truthful revelation of one's willingness to pay is a dominant strategy, and (b) the equilibrium level of the public good maximizes the social surplus?

YES (Edward Clarke,1971 and Theodore Groves,1973)

INFORMATION

PEOPLE, INFORMATION ENDOWNMENT AND EXCHANGE: THE "FIELD" PROJECT

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REGULATION AS A GAME

The regulatory process modeled as a game of incomplete information.

The regulator did not have direct access to information about the monopolist's true production costs.

Induce the regulated firm to employ its privileged information

In addition, the monopolist must be given sufficient incentive to participate (i.e. to stay in the market).

REGULATORY THEORY:5 PRINCIPLES

1) privileged information drives to rent
2) options induce the firm to employ its superior industry knowledge to realize Pareto gains.
3) outcomes differ from the outcomes the regulator would implement
4) Endow the regulator with a broader set of regulatory instruments and more extensive commitment powers.
5) Limited commitment power suggest to limit regulator's access to information

BACK TO REAL WORLD IN 5 STEPS

1) information asymmetries can be difficult to outline precisely
2) optimal regulatory policies cannot be outlined when info asymmetries are pronounced and multidimensional
3) it's impossible to specify completely firms and regulator's constraints
4) some instruments (transfers) optimal in theory are not available in practice
5) goals of the regulator difficult to specify.

REGULATION

PC-IRR COMPARISON

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Firm's flexibility over relative prices	Yes	No
Regulatory lag	Long	Short
Sensitivity of prices to realized costs	Low	High
Regulatory discretion	Substantial	Limited
Incentives for efficient cost reduction	Strong	Limited
Incentives for durable sunk investment	Limited	Strong

CONTACT

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END OF PART I AND II

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