ISS 2012

TURIN SCHOOL OF LOCAL REGULATION

Information, incentives and mechanism design in regulation: a theoretical road-map

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TURIN SCHOOL OF LOCAL REGULATION
FONDAZIONE PER L'AMBIENTE
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Turin, September 2012

OUTLINE

LECTURE OUTLINE

TURIN SCHOOL OF LOCAL REGULATION

- PART I: INFORMATION
- Maps and reality
- Economic freedom and Institutions
- Information
- Mechanisms
- Games
- Strategic and not strategic contexts
- Revelation and public goods
- Short/long period, repeated not repeated games, human/political/cultural cycles (investments, trust, networks)
- PART II: INFORMATION AND REGULATION

A TRIP

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The journey between…

A) individuals

B) institutions

C) markets

DETAILED MAPS?

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

ECONOMIC CHOICES AND UNCERTAINTIES

$$VA_a = f(\Theta_1, \Theta_2, \Theta_1 \ldots \Theta_n)$$

INSTITUTIONS AND ECONOMIC FREEDOM

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- $a_i \in A_i$).
- $VA_a = f(\Theta_1 p_1, \Theta_2 p_2, \Theta_3 p_3 \ldots \Theta_n p_n)$
- Extractive/inclusive

TRANSACTIONS, MARKETS, INSTITUTIONS

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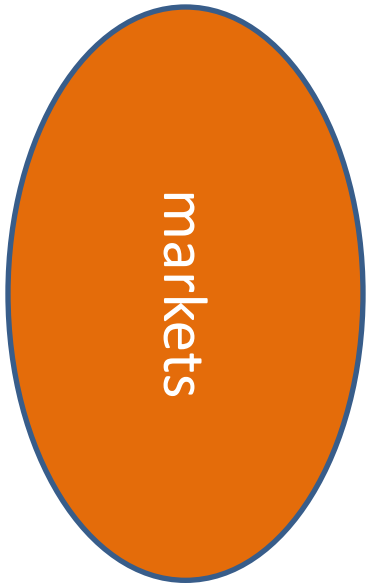
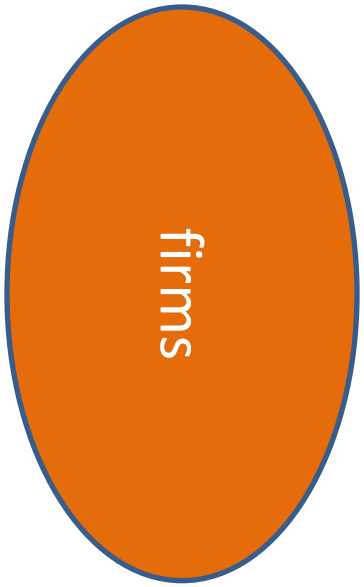
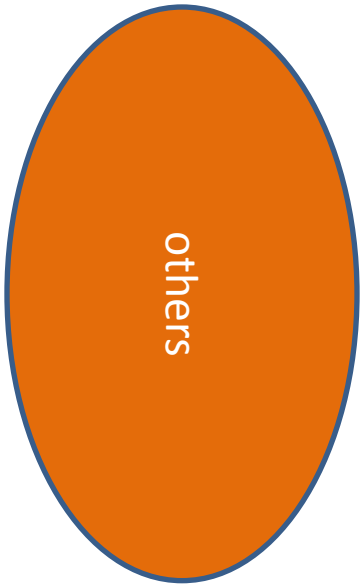
A- in markets

B- within firms

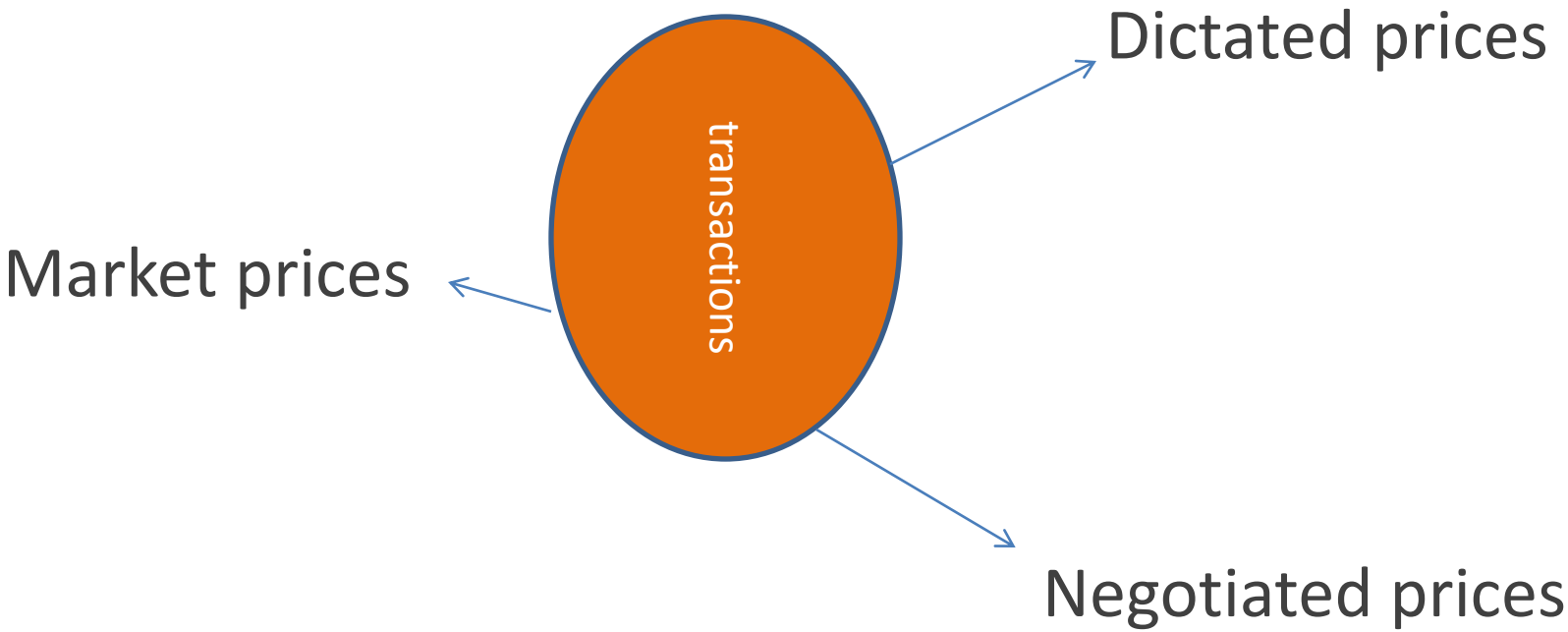
C- with other institutional arrangements







TRANSACTIONS, MARKETS, INSTITUTIONS



The role of transaction costs and incomplete contracts

JUDICIAL SYSTEM, CONTRACTS, UNCERTAINTY

- Judicial activism
- Risk aversion
- Incomplete contract
- Options for freedom

PUBLIC HAND

- Politics
- Policy
- Polity

INFORMATION: A ROAD-MAP?

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Instead of maps...

... INFORMATION

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 epistemiology!

INFORMATION

INTERACTIVE ESPISTEMIOLOGY AND THE ECONOMIC CLASSIC PARADIGM

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Public information is the amniotic fluid in wich choices are made in the CP model.

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 regulatore knows μ
- *Try to outline the consequences of just the first 3 steps changing the scenarios from knows to don't knows*

INFORMATION

PUBLIC INFORMATION AND THE PARADOX OF BACK INDUCTION

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

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?

INFORMATION

WHAT ARE YOU PROTECTING?

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INFORMATION

CLEANING MESSAGES

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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).

INFORMATION

BID - ASK SPREAD

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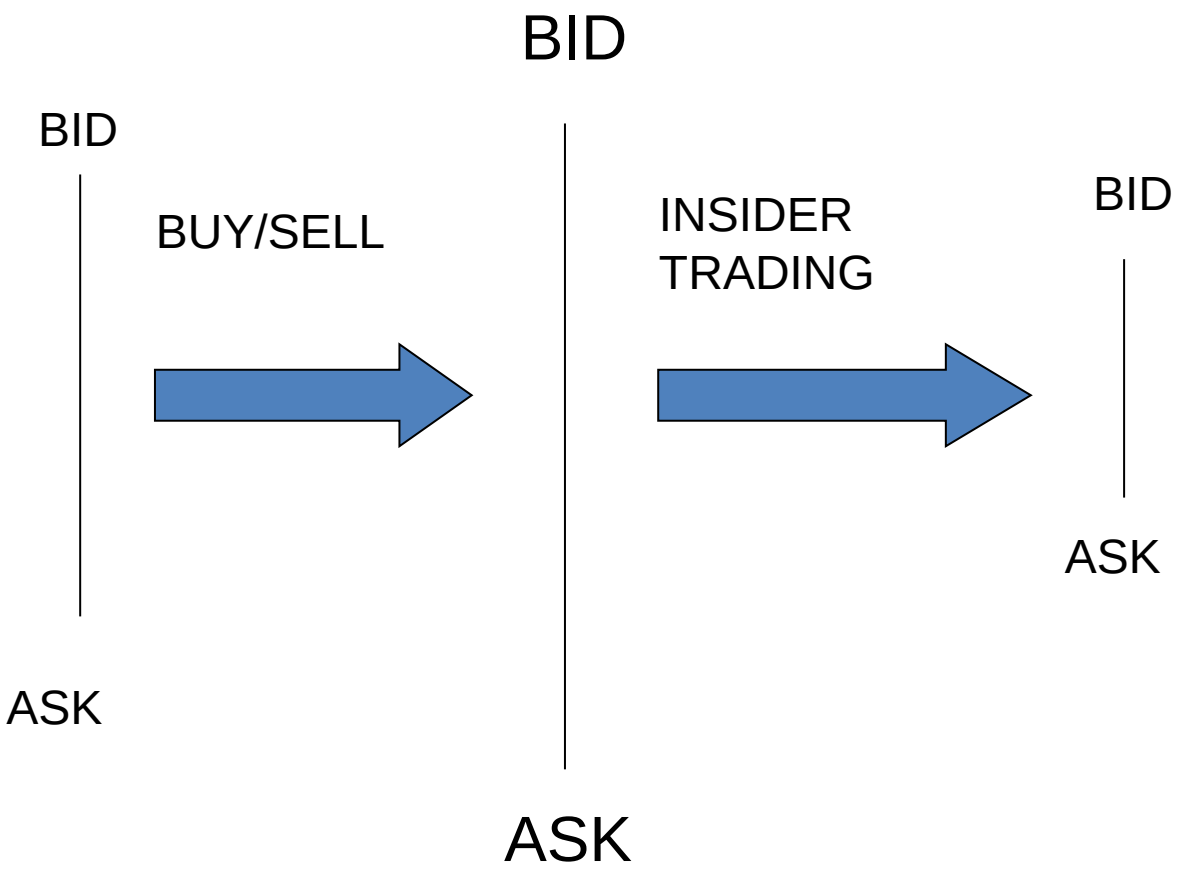

MECHANISMS AND GAMES

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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 (DISALIGNED INCENTIVES) IN PRIVATE EQUITY

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

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.

RECIPROCAL REVELATION AND INCENTIVE COMPATIBILITY

The question: is the context incentive compatible?

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

CONFLICTS AND INFORMATION

- Many environmental 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)

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)

ONE-SHOT AND REPEATED GAMES

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.

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.

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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		Utility		Utility	
		Clean		Not to clean	
Mayor	Clean	**5**	**5**	**0**	**8**
Mayor	Not to clean	**8**	**0**	**1**	**1**

Pareto optimum: trust, cartel

Dominant strategy

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 POORS: COMPLICATED GAMES?

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		Welfare			
		Help		Not to help	
Needy	Lie	100	20	0	15
	Truth	50	50	0	0

		Welfare			
		Help		Not to help	
Needy	Change	100	100	20	0
	Not to change	150	50	0	30

CONTACT

THANK YOU FOR YOUR ATTENTION!

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