

Introduction to the Principal-Agent Model

(Econ4350/6350)

A non-exhaustive coverage of the theory of incentives

A special topics course in Economics at UNSW

Course overview, Semester 2, 2010

Logistics

- Instructor: Dr Guillaume Roger, Quad 3120 (g.roger@unsw.edu.au)
- Lectures: 3 hours/week, including some student presentations
- Assessment: 3 assignments (30%), student presentations (25%) and a final exam (45%)

Introduction to the topic

This course is a non-exhaustive introduction to the theory of mechanism design. Work in this area has been rewarded by the Nobel prize in 2007 (Hurwicz, Maskin and Myerson), but also earlier: 2001 (Akerlof, Spence and Stiglitz) under the heading of information economics, 1996 (Mirrlees and Vickrey) and 1992 (Becker). So this is an important field. To use a broad brush, mechanism design starts where markets stop. If an efficient market exists, the first welfare theorem tells us the efficient allocation is necessarily implemented. Since efficiency is already achieved, whether an alternative implementation method exists is a moot point. But of course markets are rarely efficient, for a variety of reasons. In particular, they fail under *asymmetric* information (that is, then the information is *private*). This is exactly where mechanism design starts off.

Under asymmetric information, price formation is challenging and it is difficult to speak of efficiency; this is the world of *second-best*. In this introductory course to mechanism design we confine ourselves to standard models of *adverse selection* (or hidden *information*) and *moral hazard* (or hidden *action*) involving private parties. Under adverse selection, one or more agent(s) holds some information relevant to the trade that others have not. Applications of this theory include the regulation of natural monopolies, auctions, non-linear pricing, corporate finance or even some aspects of the theory of the firm. Under moral hazard, one party to the transaction may take an action that the other one does not observe (for example, working hard or not). Applications may include labour contracts, theories of organisation of the firm, optimal insurance, and again corporate finance.

The course begins with a basic model of adverse selection involving one principal and one agent whose private information can take one of two types. With this we introduce the notion of information rents and incentive compatibility, as well as the very essential *rent extraction-efficiency trade-off*. Then we show the *Revelation Principle*, which allows us to write down simple mechanisms in the first place. We then allow for more convoluted constraints and investigate their impact on the optimal mechanism. This model is then generalised to allow for continuous private information. Next we move to a problem where the principal deals with several agents. In this case, information he learns from one agent may be used to deal with the other ones. Time permitting (and tastes allowing) we also explore more advanced topics, some of which are the subject of recent research. Along the way we study some applications such as auctions and non-linear pricing.

The moral hazard problem is to be studied a little more swiftly. We introduce the notion of moral hazard constraint and moral hazard rent in the simplest model possible and quickly extend it to a richer, continuous model. This also presents some technical difficulties we discuss. Applications include insurance problems, labour contracts and corporate finance.

Content

This is indicative only and does not correspond to the weekly schedule.

Adverse selection

- 1 A basic model of Adverse Selection
- 2 The Revelation Principle
- 3 Type-dependent participation constraints
- 4 The continuous-type case
- 5 The Spence-Mirrlees Condition
- 6 Multiple dimensions
- 7 Multiple agents
- 8 Advanced topics 1: multi-period contracting
- 9 Advanced topics 2: non-verifiability
- 10 Advanced topics 3: collusion

Moral hazard

- 11 Two outcomes
- 12 Continuous outcome space
- 13 Concavity conditions
- 14 Applications

Student presentations

Students will be asked to pick a *recent* research paper, read it thoroughly and present its main contributions in class. Depending on class size, this may take 2 or 3 weeks. I will suggest a list, but you can pick any other one you may prefer.