

## **Contract theory (Fall term)**

**Instructor's name: Anton Suvorov (lectures)**

Class Times and Locations: TBA

Lectures: TBA

Classes: by groups

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Office Location: Shabolovka 26, 3225

Office Hours: TBA

Course type: elective

### **Section 1. General information about the course**

How do managers create incentives for their employees? How, in turn, stockholders create incentives for the managers themselves? What is the difference between complete and incomplete contracts? How do relational contracts work? Why top managers get impressive compensation packages – is it efficient or is there abuse? During the course we will address these and other questions. The course is relatively short, so we will not have time to cover all topics comprehensively. However, we will try to explore the core topics thoroughly, and briefly survey extensions, applications, and new directions in this fascinating subject.

**Duration:** 10 weeks, 2 classes per week.

### **Section 2. Course goals, learning objectives, expected learning outcomes**

The objectives of the course are:

- to provide students with the knowledge of core concepts, methods and models in the contract theory;
- to develop students' ability to apply the knowledge acquired in the analysis of specific methods and models to economic phenomena.

By the end of the course students are expected:

1. To be able to solve basic contract-theoretic models and their extensions
2. Given the problem, to properly categorise its contract-theoretic features (adverse selection\moral hazard, how to model types in a particular situation, describe information structure, IC IR constraints)

Prerequisites: microeconomics, game theory, mathematics for economists.

**Section 3. Course Outline**

№	Topic	Week	Course format			Readings
			lectures	classes	self-study	
1	Introduction. Moral hazard and adverse selection in principal-agent framework.	1-2	4		16	Salanie [1-5] Laffont, Tirole [1-7]
2	Dynamic aspects of contracting, renegotiation.	2-4	4		16	Salanie [6] Laffont, Tirole [8] Bolton [9-10] Aghion, Dewatripont, Rey (1994)
3	Multitasking, team productions.	5-6	4		16	Bolton [7-8] Baker, Gibbons, Murphy (1994) Holmstrom, Milgrom (1991) Holmstrom (1982)
4	Implicit contracts (career concerns).	7	2		8	Bolton [10] Gibbons, R. (1997)

5	Relational contracts.	8	2		8	Bolton [10] Abreu, Pearce, Stacchetti (1986) Levin (2003)
6	Incomplete contracts and property rights.	9	2		8	Bolton[11-12], Salanie[6]
7	Delegation.	10	2		8	Bolton[12] Aghion Tirole 1997 Baker Gibbons Murphy 1999

### **Description of course methodology and forms of assessment to be used**

While teaching the course the following teaching methods and forms of study and control are used:

- ⇒ lectures (4 hours a week);
- ⇒ written home assignments;
- ⇒ presentation by students;
- ⇒ self-study;
- ⇒ teachers' consultations;
- ⇒ written test

Assessment and grade determination (see section 5 for more details):

- Two problem sets [20% each (40% total)]
- Presentation of a research article [20%]
- Final test [40%]

### **Section 4. Texts, readings and other informational resources**

Required readings

1. Bolton and Dewatripont. Contract Theory. MIT Press, 2005.
2. Laffont and Martimort. The Theory of Incentives. Princeton University Press.2002.
3. Salanie. The Economics of Contracts: A Primer. MIT Press 2005.
4. Hart. Firms, Contracts and Financial Structure. Oxford University Press, 1995.

*Additional readings:*

B.Holmstrom and P.Milgrom (1991) Multitask principal-agent analysis: Incentive contracts, asset ownership and job design. *Journal of Law, Economics and Organization* 7: 24-51.

B.Holmstrom (1982) *Moral hazard in teams. Bell Journal of Economics, Autumn 1982.*

George Baker, Robert Gibbons, and Kevin J. Murphy (1994). Subjective Performance Measures in Optimal Incentive Contracts. *Quarterly Journal of Economics* 109:1125-56.

P.Aghion, M.Dewatripont, P.Rey (1994) Renegotiation design with unverifiable information. *Econometrica* 62: 257-282.

P.Aghion and J. Tirole (1997) Formal and real authority in organizations. *Journal of Political Economy*, 105(1): 1-29.

O.Hart and J.Moore (2005) On the Design of Hierarchies: Coordination vs Specialization, *Journal of Political Economy* 113(4) (2005) 675-702.

B.Bernheim and M.Whinston (1986), Common Agency. *Econometrica*, 54(4): 923-942.

Gibbons, R. (1997), «Incentives and Careers in Organizations,» in *Advances in Economic Theory and Econometrics*, D.M. Kreps and K.F. Wallis eds., 7th World Congress, vol II, chap. 1, p. 1-37.

Abreu, D., Pearce, D. and Stacchetti, E., (1986). Optimal cartel equilibria with imperfect monitoring. *Journal of Economic Theory*, 39(1), pp.251-269.

Levin, J., (2003). Relational incentive contracts. *The American Economic Review*, 93(3), pp.835-857.

Aghion, Philippe and Jean Tirole. (1997). “Formal and Real Authority in Organizations.” *Journal of Political Economy* 105:1-29.

Baker, George, Robert Gibbons, and Kevin J. Murphy. (1999). “Informal Authority in Organizations.” *Journal of Law, Economics, and Organization* 15: 56-73.

## **Section 5. Examination/Evaluation**

### **Sample test questions**

(from Golovan Guriev Makrushin, question 11) Consider the case where values of the good  $\theta_a$  and  $\theta_b$  by two risk-neutral agents (A and B) are uniformly distributed on  $[0,1]$  random variables. Each agent is endowed with 1 unit of the good. Agents decide to strike a deal when they meet: one agent can leave with 0, 1 or 2 unit of good (second leaves with the remainder of the total goods endowment).

a) Find the ex-post optimal trading rule

b) Consider the following mechanism: each agent submit a bid, the agent who submits higher bid pays this bid to the other agent and receives the unit. Find symmetric (meaning the same  $a$  and  $b$ ) Bayes-Nash equilibrium with bids linear in values:  $\text{bid} = a + b \cdot \theta_i$  (where  $i = a$  or  $b$ ). Deduce FOC for each agent.

c) What allocation of goods is achieved by this mechanism? Is it Bayes incentive compatible? Is it ex-post efficient? Is it individually rational? (optional: How these results correspond to Myerson-Satterthwaite

theorem?)

(based on Problem Set by Bremzen) Consider Aghion Tirole 1997 setting with both principal and agent risk-neutral. There are three potential projects: project  $k$  give benefit  $K$  to the principal and  $k$  to the agent.  $K_1=20$ ,  $K_2=10$ ,  $K_3=-200$ ,  $k_1=4$ ,  $k_2=12$ ,  $k_3=-200$ . There is also outside option (“project” with both  $K$  and  $k$  equal 0). Both principal and agent do not know which project is of which type. Principal can learn the type of the project at a cost  $g(E)=40E^2$ , where  $E$  – effort from  $[0,1]$  (given effort  $E$ , probability of discovering the type is  $E$ ). Agent can learn the type of the project under similar cost function  $g(e)=10e^2$ .

- a) Principal has the formal authority. What are principal's and agent's reaction functions? What is the equilibrium level of efforts,  $E^*$  and  $e^*$ ? What is the expected social value of the adventure?
- b) Now principal delegates. What are the reaction functions now? Equilibrium efforts? Social value? Compare to a)

### **Grading system and how both the course and final test will be graded**

Presentation should be scheduled in advance.

Test and problem sets are graded out of 100 points. The results for the written test and problem sets are used to calculate the final mark using the weights specified in section 3 and the resulting mark is converted into 10-points scale.

### **Make-up policies and form of the make-up**

If the final course mark is below 4 out of 10 then the student can sit one written make-up test in the end of January/beginning of February set in accordance with the HSE's [Internal Regulations](#). This test covers all the material studied in the course.

### **Policies on late work**

Late home assignments are marked but are not counted for the average mark for home assignments.

### **Section 6. Academic Integrity**

The Higher School of Economics strictly adheres to the principle of academic integrity and honesty. Accordingly, in this course there will be a zero-tolerance policy toward academic dishonesty. This includes, but is not limited to, cheating, plagiarism (including failure to properly cite sources), fabricating citations or information, tampering with other students' work, and presenting a part of or the entirety of another person's work as your own. HSE uses an automated plagiarism-detection system to ensure the originality of students' work. Students who violate university rules on academic honesty will face disciplinary consequences, which, depending on the severity of the offense, may include having points deducted on a specific assignment, receiving a failing grade for the course, being expelled from the university, or other measures specified in HSE's [Internal Regulations](#).