

## Titre cours

Course title - Intitulé du cours	Microeconomics 2
Level / Semester - Niveau /semestre	Master 2 / S2
School – Composante	École d'Économie de Toulouse
Teacher - Enseignant responsable	David Martimort & Patrick Rey
Other teacher(s) - Autre(s) enseignant(s)	
Other teacher(s) - Autre(s) enseignant(s)	
Other teacher(s) - Autre(s) enseignant(s)	
Other teacher(s) - Autre(s) enseignant(s)	
Other teacher(s) - Autre(s) enseignant(s)	
Lecture Hours - Volume Horaire CM	36
TA Hours - Volume horaire TD	15
TP Hours - Volume horaire TP	0
Course Language - Langue du cours	English
TA and/or TP Language - Langue des TD et/ou TP	English

### **Teaching staff contacts - Coordonnées de l'équipe pédagogique :**

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### **Course's Objectives - Objectifs du cours :**

This course focuses on the economics of information and incentives. It covers key notions and principles in situations of adverse selection and moral hazard, including mechanism design and its applications to auction theory.

### **Prerequisites - Pré requis :**

Microeconomics 1 ; Game theory

### **Practical information about the sessions - Modalités pratiques de gestion du cours :**

Two 1.5h lectures per week for 12 weeks; One tutorial per week for 10 weeks.

Lecture notes are available.

### **Grading system – Modalités d'évaluation :**

Mid-term exam and Final exam. The final grade is given by  $0.30 \times \max \{\text{Mid-term}, \text{Final}\} + 0.70 \times \text{Final}$ .

## **Outline – Plan :**

### **PART I (Patrick Rey)**

#### ***Textbooks:***

- . Bolton, P., and M. Dewatripont (2005), *Contract Theory*, MIT Press.
- . Laffont, J.J. (1991), *The Economics of Uncertainty and Information*, MIT Press, Cambridge.
- . Laffont, J.J., and D. Martimort (2002), *The Theory of Incentives: The Principal Agent Model*, Princeton University Press.
- . Mas-Colell, A., M.D. Whinston and J. Green (1995), *Microeconomic Theory*, Oxford University Press, New York and Oxford.

#### ***Chapter 1: Information economics***

- I. Introduction*
- II. Asymmetric information and market failures*
  - 1. Lemons problem
  - 2. Screening
  - 3. Screening versus signaling
  - 4. Market disequilibrium
- III. Roadmap*

#### ***Chapter 2: Adverse selection***

- I. Introduction*
- II. Simple example*
  - 1. Price discrimination
  - 2. Complete information
  - 3. Incomplete information
- III. A more general analysis*
  - 1. Framework
  - 2. Implementation
  - 3. Optimization
  - 4. Examples
- IV. Variations*
  - 1. Multiple agents
  - 2. Noisy observation
  - 3. Interim renegotiation
  - 4. Countervailing incentives
  - 5. Stochastic contracts
  - 6. Dynamics

#### ***Chapter 3: Moral hazard***

- I. Introduction*

- 1. Efficiency versus risk-sharing
- 2. Efficiency versus informational rent
- II. *The role of statistical inference*
  - 1. The inference problem
  - 2. Full inference
  - 3. Limited inference
  - 4. Valuable signals
- III. *Effort levels*
  - 1. A simple example
  - 2. Risk-sharing, incentives and participation constraint
  - 3. Multi-tasking
- IV. *Applications*
  - 1. Partial insurance
  - 2. Efficiency wage
  - 3. Credit rationing
  - 4. Group lending
  - 5. Moral hazard in teams
  - 6. Career concerns
  - 7. Commitment

## **PART II (David Martimort)**

**Textbook:** Laffont, J.J., and D. Martimort (2002), *The Theory of Incentives: The Principal Agent Model*, Princeton University Press.

### **1. Mechanism Design: Basics**

- 1.1 A Brief History of Economic Thought on the Theory of Incentives
- 1.2 Collective decision making. Arrow's and Gibbard-Satterwaite's Theorems
- 1.3 A bare-bone model. Preferences, information structures
- 1.4 The Revelation Principle
  - 1.4.1 Dominant strategy implementation, Bayesian-Nash implementation, Nash implementation
  - 1.4.2 Full versus partial implementation

### **2. Non-Market Institution: The Public Good Problem**

- 2.1 Dominant implementation
  - A fundamental Lemma. Vickrey-Clarke-Groves mechanisms, characterization and examples. A first impossibility theorem.
- 2.2 Bayesian implementation
  - A fundamental Lemma (again). D'Aspremont-Gerard-Varet mechanisms,

characterization. A first possibility theorem and a second impossibility theorem

### 2.3 Second-best analysis

The fundamental incentive-feasibility condition. The free-riding problem in large economies. The second-best solution.

### 2.4 Interim efficiency

### 2.5 Applications

Climate agreements. The formation of interest groups.

## **3. Market institutions 1: The Coase Theorem under Asymmetric Information**

### 3.1 The Coase Theorem under complete information: A reminder

### 3.2 The Myerson-Satterthwaite impossibility theorem

Second-best solution. Implementation. Broker-mediated trade

### 3.3 Dominant strategy trading mechanisms

### 3.4 Dissolving a partnership. A possibility theorem

### 3.5 The relationship between Clarke mechanisms and efficiency

### 3.6 Bargaining and non-verifiable information

## **4. Market institutions 2: Auctions**

### 4.1 Preferences. Information structures

### 4.2 Various auction formats

First-price, second price, all-pay auctions, multi-unit auctions, supply functions.

### 4.3 The Revenue Equivalence. Dominant and Bayesian implementation

### 4.4 Auctions with externalities

### 4.5 Collusion rings

### 4.6 Correlated information / Interdependent values

Efficiency or inefficiency?

### 4.7 Robust mechanism design

## **5. Hierarchies**

### 5.1 Set-up. Information structures

### 5.2 Loss of control

### 5.3 Vertical collusion

### 5.4 Horizontal collusion

## **Bibliography/references - Bibliographie/références :**

### **Part I**

#### **Chapter 1: Information economics**

*Textbook:* Mas-Colell, Whinston and Green, Chap. 13.

*Articles:*

. Akerlof, G. (1970), "The market for Lemons: Quality uncertainty and the market mechanism," *Quarterly Journal of Economics*, 89:488-500.

. Attar, A., Th. Mariotti and F. Salanié (2011), "Nonexclusive Competition in the Market for Lemons," *Econometrica*, 79(6):1869-1918.

. Attar, A., Th. Mariotti and F. Salanié (2014), "Nonexclusive Competition under Adverse Selection," *Theoretical Economics*, 9(1):1-40.

. Diasakos, Th. M., and K. Koufopoulos (2013), "Efficient Nash Equilibrium under Adverse Selection," Department of Economics Discussion Paper 1313, University of St. Andrews, available at <http://www.carloalberto.org/assets/working-papers/no.215.pdf>

. Hirshleifer, J. (1971), "The Private and Social Value of Information and the Reward to Inventive Activity," *American Economic Review*, 61:561-574.

. Miyazaki, H. (1977), "The rat race and internal labor markets," *Bell Journal of Economics*, 8:394-418.

. Picard, P. (2014), "Participating insurance contracts and the Rothschild-Stiglitz equilibrium puzzle," *The Geneva Risk and Insurance Review*, 39:153-175.

. Rothschild, M., and J. E. Stiglitz (1976), "Equilibrium in Competitive Insurance Markets," *Quarterly Journal of Economics*, 90:629-649.

. Spence, M. (1973), "Job Market Signalling," *Quarterly Journal of Economics*, 87:355-374.

. Wilson, C. (1977), "A Model of Insurance Markets with Incomplete Information," *Journal of Economic Theory*, 16:167-207.

. Wilson, C. (1980), "The Nature of Equilibrium in Markets with Adverse Selection," *Bell Journal of Economics*, 11:108-130.

#### **Chapter 2: Adverse selection**

*Textbooks:* Laffont 1991, Chap. 10; Laffont and Martimort Chap. 2-3; Bolton and Dewatripont, Chap. 2; Mas-Colell, Whinston and Green, Chap. 13-14.

*General References:*

- . Baron, D. (1989), "Design of Regulatory Mechanisms and Institutions," Chapter 24, Handbook of Industrial Organization, R. Schmalensee and R. Willig eds, North Holland.
- . Caillaud, B., R. Guesnerie, P. Rey, and J. Tirole (1988), "Government Intervention in Production and Incentives Theory: A Review of Recent Contributions," Rand Journal of Economics, Spring 19: 1-26.
- . Hart, O., and B. Holmstrom (1987), "The Theory of Contracts," in Advances in Economic Theory, Fifth World Congress, T. Bewley ed., Cambridge University Press.
- . Laffont, J.J., and J. Tirole (1993), A Theory of Incentives in Procurement and Incentives, MIT Press.

*Articles:*

- . Baron, D., and R. Myerson (1982), "Regulating a Monopolist with Unknown Costs," Econometrica, 50: 911-930.
- . Bester, H., and R. Strausz (2001), "Contracting with Imperfect Commitment and the Revelation Principle: The Single Agent Case," Econometrica, 69: 1077–1098.
- . Chiappori, P.-A., I. Macho, P. Rey and B. Salanié (1994), "Repeated moral hazard: The role of memory, commitment, and the access to credit markets," European Economic Review, 38(8): 1527-1553.
- . Guesnerie, G., and J.-J. Laffont (1984), "A Complete Solution of Principal-Agent Problems with an Application to the Control of a Self-Managed Firm," Journal of Public Economics, 25: 329-369.
- . Maskin, E., and J. Riley (1984), "Monopoly with Incomplete Information," Rand Journal of Economics, 15: 171-196.
- . Mussa, M., and S. Rosen (1978), "Monopoly and Product Quality," Journal of Economic Theory, 18: 301-317.

**Chapter 3: Moral hazard**

*Textbooks:* Laffont 1991, Chapter 11; Laffont and Martimort, Chapters 4-5; Bolton and Dewatripont, Ch. 4; Mas-Colell, Whinston and Green, Ch. 14.

*General References:*

- . Baron, D. (1989), "Design of Regulatory Mechanisms and Institutions," Chapter 24, Handbook of Industrial Organization, R. Schmalensee and R. Willig eds., North Holland.
- . Hart, O., and B. Holmstrom (1987), "The Theory of Contracts," in Advances in Economic Theory, Fifth World Congress, T. Bewley ed., Cambridge University Press.

*Articles:*

- . Grossman, S., and O. Hart (1983), "An Analysis of the Principal-Agent Problem," Econometrica, 51: 7-45.

- . Holmstrom, B. (1979), "Moral Hazard and Observability," *Bell Journal of Economics*, 10: 74-91.
- . Rogerson, W. (1985), "The First-Order Approach to Principal-Agent Problems" *Econometrica*, 53: 1357-1368.
- . Shavell, S. (1979), "Risk-Sharing and Incentives in the Principal and Agent Relationship," *Bell Journal of Economics*, 10: 55-73.
- . Jewitt, I. (1988), "Justifying the First-Order Approach to Principal-Agent Problems," *Econometrica*, 56(5): 1177-1190.
- . Poblete, J., and D. Spulber (2012), "The form of incentive contracts: Agency with moral hazard, risk neutrality and limited liability," *Rand Journal of Economics*, 43:215-234.
- . Sappington, D. (1983), "Limited Liability Contracts between Principal and Agent," *Journal of Economic Theory*, 29: 1-21.
- . Holmstrom, B., and P. Milgrom (1987), "Aggregation and Linearity in the Provision of Intertemporal Incentives," *Econometrica*, 55: 303-328.
- . Holmstrom, B., and P. Milgrom (1991), "Multi-Task Principal-Agent Analyses: Incentives Contracts, Asset Ownership and Job Design," *Journal of Law, Economics and Organization*, 7: 26-52.

## **Part II**

### **1. Mechanism Design: Basics**

#### 1.1 A Brief History of Economic Thought on the Theory of Incentives

Arrow, K. (1951). *Social Choice and Individual Values*, Wiley and Sons.

Bowen, H (1943). The Interpretation of Voting in the Allocations of Economic Resources. *The Quarterly Journal of Economics*, 58: 27-48.

Dreze, J. and D. de la Vallée Poussin. (1971). A Tâtonnement Process for Public Goods. *The Review of Economic Studies*, 38: 133-150.

Gibbard, A. (1973). Manipulation of Voting Schemes: A General Result. *Econometrica*, 41: 587-602.

Hurwicz, L.(1972). On Informationally Decentralized Systems, in R. Radner and C. McGuire eds. *Decision and Organization*, North-Holland.

Green, J. and J.J. Laffont (1979). *Incentives in Public-Decision Making*, North- Holland.

Samuelson, P. (1954). The Pure Theory of Public Expenditure, *The Review of Economics and Statistics*, 36: 387-389.

Satterthwaite, M. (1975). Strategy-Proofness and Arrow's Conditions: Existence and Correspondence Theorems for Voting Procedures and Social Welfare Functions. *Journal of Economic Theory*, 10: 187-217.

Tiebout, C. (1956). A Pure Theory of Local Expenditures. *The Journal of Political Economy*, 64; 416-424.

Vickrey, W. (1961). Counterspeculation, Auctions, and Competitive Sealed Tenders. *The Journal of Finance*, 16: 8-37.

1.2 A bare-bone model. Preferences, information structures

1.3 The Revelation Principle

1.3.1 Dominant strategy implementation, Bayesian-Nash implementation, Nash implementation

Dasgupta, P., P. Hammond, P. and E. Maskin (1979). The Implementation of Social Choice Rules: Some General Results on Incentive Compatibility. *The Review of Economic Studies*, 46: 185-216.

Myerson, R. (1979). Incentive Compatibility and the Bargaining Problem. *Econometrica*, 47: 61-73.

Myerson, R. (1982). Optimal Coordination Mechanisms in Generalized Principal-Agent Problems. *Journal of Mathematical Economics*, 10: 67-81.

1.3.2 Full versus partial implementation

Demski, J. and D. Sappington (1984). Optimal Incentive Contracts with Multiple Agents. *Journal of Economic Theory*, 33: 152-171.

Jackson, M. (1991). Bayesian Implementation, *Econometrica*, 59: 461-477.

Maskin, E. (1999). Nash Equilibrium and Welfare Optimality. *The Review of Economic Studies*, 66: 23-38.

Moore, J. and R. Repullo (1988). Subgame-Perfect Implementation. *Econometrica*, 56: 1191-1220.

Moore, J. and R. Repullo (1990). Nash Implementation: A Full Characterization. *Econometrica*, 58: 1083-1099.

Mookherjee, D. and S. Reichelstein (1990). Implementation via Augmented Revelation Mechanisms. *The Review of Economic Studies*, 57: 453-475.

## **2. Non-Market Institution: The Public Good Problem**

2.1 Dominant implementation

Clarke, E. (1971). Multipart Pricing of Public Goods. *Public Choice*, 2: 19-33.

Green, J. and J.J. Laffont. (1977). Characterization of Satisfactory Mechanisms for the Revelation of Preferences for Public Goods, *Econometrica*, 45: 427-438.

Groves, T. (1973). Incentives in Teams. *Econometrica*, 41: 617-631.

Kuzmics, C. and J. Steg (2017). On Public Good Provision Mechanisms with Dominant Strategies and Balanced Budget, *Journal of Economic Theory*, 170: 56-69.

Laffont, J. J. and E. Maskin (1980). A Differential Approach to Dominant Strategy Mechanisms,



*Econometrica*, 48: 1507-1520.

## 2.2 Bayesian implementation

d'Aspremont, C. and L.-A. Gérard-Varet (1979). Incentives and Incomplete Information, *Journal of Public Economics*, 11: 25-45.

Laffont, J.J. and E. Maskin (1979). A Differential Approach to Expected Utility Maximizing Mechanisms, in *Aggregation and Revelation of Preferences*, ed. J.J. Laffont, 289-308. North-Holland.

## 2.3 Second-best analysis

Güth, W. and M. Hellwig (1986). The Private Supply of a Public Good, *Journal of Economics*, 5: 121-159.

Hellwig, M. (2003). Public-Good Provision With Many Participants, *The Review of Economic Studies*, 70: 589-614.

Mailath, G. and A. Postlewaite (1990). Asymmetric Information Bargaining Problems with Many Agents. *The Review of Economic Studies*, 57: 351-367.

## 2.4 Interim efficiency

Holmström, Bengt, and Roger Myerson (1983). "Efficient and Durable Decision Rules with Incomplete Information," *Econometrica*, 51: 1799-1819.

Ledyard, J. and T. Palfrey (1999). A Characterization of Interim Efficiency with Public Goods, *Econometrica*, 67: 435-448.

## 2.5 Applications

Lefévre, P and D. Martimort (2020), "When Olson Meets Dahl..." From Inefficient Group Formation to Inefficient Political Process, *The Journal of Politics*, 82, 1026-1043.

Martimort, D. and W. Sand-Zantman (2016). A Mechanism Design Approach to Climate-Change Agreements, *Journal of European Economic Association*, 14: 669-718.

Rob, R. (1989). Pollution Claim Settlements under Private Information, *Journal of Economic Theory*, 47: 307-333.

# **3. Market institutions 1: The Coase Theorem under Asymmetric Information**

## 3.1 The Coase Theorem under complete information: A reminder

## 3.2 The Myerson-Satterthwaite impossibility theorem

Chatterjee, K. and W. Samuelson (1983). Bargaining under Incomplete Information, *Operations Research* 31: 835-851.

McKelvey, R. and T. Page, T. (2002). Status Quo Bias in Bargaining: An Extension of the Myerson-Satterthwaite Theorem with An application to the Coase Theorem. *Journal of Economic Theory*, 107: 336-355.

- Myerson, R. and M. Satterthwaite (1983). Efficient Mechanisms for Bilateral Trading. *Journal of Economic Theory*, 29: 265-281.
- Segal, I. and M. Whinston (2011). A Simple Status Quo that Ensures Participation (with Application to Efficient Bargaining). *Theoretical Economics*, 6: 109-125.
- Wolitzky, A. (2016). Mechanism Design with Maxmin Agents: Theory and an Application to Bilateral Trade, *Theoretical Economics*, 11: 971-1004.

### 3.3 Dominant strategy trading mechanisms

- Hagerty, K. and W. Rogerson (1987). Robust trading mechanisms. *Journal of Economic Theory*, 42(1), 94-107.
- Rochet, J. C. (1985). Bilateral monopoly with imperfect information. *Journal of Economic Theory*, 36(2), 214-236.

### 3.4 Dissolving a partnership. A possibility theorem

- Cramton, P., R. Gibbons and P. Klemperer (1987). Dissolving a Partnership Efficiently, *Econometrica*, 55: 615-632.
- Fieseler, K., T. Kittsteiner, and B. Moldovanu, (2003). Partnerships, Lemons, and Efficient Trade, *Journal of Economic Theory*, 113, 223-234.
- Jehiel, P., and A. Paudyal (2006). Partnership dissolution with interdependent values. *The RAND Journal of Economics*, 37, 1-22.

### 3.1 The relationship between Clarke mechanisms and efficiency

- Makowski, L., and C. Mezzetti (1994). Bayesian and Weakly Robust First Best Mechanisms: Characterizations, *Journal of Economic Theory*, 64: 500-519
- Williams, S. (1999). A Characterization of Efficient, Bayesian Incentive Compatible Mechanisms. *Economic Theory*, 14: 155-180.

### 3.1 Bargaining and non-verifiable information

- Aghion, P., M. Dewatripont and P. Rey (1994). Renegotiation Design with Unverifiable Information. *Econometrica*, 62: 257-282.
- Che, Y. K. and T. Chung (1999). Contract Damages and Cooperative Investments. *The RAND Journal of Economics*, 30: 84-105.
- Edlin, A. and S. Reichelstein (1996). Holdups, Standard Breach Remedies, and Optimal Investment, *The American Economic Review*, 86: 478-501.
- Hart, O. and J. Moore (1988). Incomplete Contracts and Renegotiation, *Econometrica*, 56: 755-785.
- Green, J. and J.J. Laffont, J. J. (1992). Renegotiation and the Form of Efficient Contracts, *Annales d'Economie et de Statistique*, 123-150.
- Maskin, E. and J. Moore (1999). Implementation and Renegotiation, *The Review of Economic Studies*, 66: 39-56.
- Maskin, E. and J. Tirole (1999). Unforeseen Contingencies and Incomplete Contracts, *The Review of Economic Studies*, 66: 83-114.
- Maskin, E. and J. Tirole (1999). Two Remarks on the Property-Rights Literature. *The Review of Economic Studies*, 66: 139-149.

Nöldeke, G., and K. Schmidt (1995). Option Contracts and Renegotiation: A Solution to the Hold-Up Problem, *The RAND Journal of Economics*, 26: 163-179.

Segal, I. and M. Whinston (2002). The Mirrlees Approach to Mechanism Design with Renegotiation (with Applications to Hold-Up and Risk Sharing), *Econometrica*, 70: 1-45.

#### **4. Market institutions 2: Auctions**

4.1 Preferences. Information structures

4.2 Various auction formats

Bernheim, B. and M. Whinston, (1986). Menu Auctions, Resource Allocation, and Economic Influence,' *The Quarterly Journal of Economics*, 101: 1-31.

Bulow, J. and P. Klemperer (2009). Why Do Sellers (Usually) Prefer Auctions?. *The American Economic Review*, 99: 1544-75.

Klemperer, P. (1999). Auction Theory: A Guide to the Literature, *Journal of Economic Surveys*, 13: 227-286.

Klemperer, P. and M. Meyer (1989). Supply Function Equilibria in Oligopoly under Uncertainty, *Econometrica*, 57: 1243-1277.

Krishna, V. (2009). *Auction Theory*, Academic Press.

Krishna, V. and J. Morgan (1997). An Analysis of the War of Attrition and the All-Pay Auction, *Journal of Economic Theory*, 72: 343-362.

McAfee, P. and J. McMillan, J. (1986). Bidding for Contracts: A Principal-Agent Analysis. *The RAND Journal of Economics*, 17: 326-338.

McAfee, P. and J. McMillan (1987). Auctions and Bidding, *Journal of Economic Literature*, 25: 699-738.

Maskin, E. and J. Riley (1989). Optimal Multi-Unit Auctions, in *The Economics of Missing Markets, Information, and Games*, ed. F. Han.

Milgrom, P. and R. Weber (1982). A Theory of Auctions and Competitive Bidding, *Econometrica*, 50: 1089-1122.

Milgrom, P. (1989). Auctions and Bidding: A Primer, *Journal of Economic Perspectives*, 3: 3-22.

Myerson, R. (1981). Optimal Auction Design, *Mathematics of Operations Research*, 6: 58-73.

Riley, J. and W. Samuelson (1981). Optimal Auctions, *The American Economic Review*, 71: 381-392.

Wilson, R. (1979). Auctions of Shares, *The Quarterly Journal of Economics*, 93: 675-689.

4.3 The Revenue Equivalence. Dominant and Bayesian implementation

Mookherjee, D. and S. Reichelstein(1992). Dominant Strategy Implementation of Bayesian Incentive Compatible Allocation Rules. *Journal of Economic Theory*, 56:

378-399.

#### 4.4 Auctions with externalities

Jehiel, P. and B. Moldovanu (2000). Auctions with Downstream Interaction Among Buyers, *The RAND Journal of Economics*, 31: 768-791.

Jehiel, P., B. Moldovanu and E. Stacchetti (1996). How (Not) to Sell Nuclear Weapons, *The American Economic Review*, 86: 814-829.

#### 4.5 Collusion rings

Che, Y. K. and J. Kim (2009). Optimal Collusion-Proof Auctions, *Journal of Economic Theory*, 144; 565-603.

Dequiedt, V. (2007). Efficient Collusion in Optimal Auctions, *Journal of Economic Theory*, 136: 302-323.

Mailath, G. and P. Zemsky (1991). Collusion in Second-Price Auctions with Heterogeneous Bidders, *Games and Economic Behavior*, 3: 467-486.

McAfee, P and J. McMillan (1992). Bidding Rings, *The American Economic Review*, 82: 579-599.

Pavlov, G. (2008). Auction Design in the Presence of Collusion, *Theoretical Economics*, 3: 383-429.

#### 4.6 Correlated information / Interdependent values

Cr mer, J., and R. McLean (1988). Full Extraction of the Surplus in Bayesian and Dominant Strategy Auctions. *Econometrica* 56: 1247-1257.

Dequiedt, V. and D. Martimort (2015). Vertical Contracting with Informational Opportunism, *The American Economic Review*, 105: 2141-82.

Jehiel, P. and B. Moldovanu (2001). Efficient Design with Interdependent Valuations. *Econometrica*, 69: 1237-1259.

Laffont, J. J. and D. Martimort (2000). Mechanism Design with Collusion and Correlation, *Econometrica*, 68: 309-342.

McAfee, R. and P. Reny (1992). Correlated Information and Mechanism Design, *Econometrica*; 60: 395-421.

#### 4.7 Robust mechanism design

Bergemann, D. and S Morris (2005). Robust Mechanism Design. *Econometrica*, 73: 1771-1813.

Chung, K. and J. Ely (2007). Foundations of Dominant-Strategy Mechanisms. *The Review of Economic Studies*, 74: 447-476.

Jehiel, P., M. Meyer-ter-Vehn, B. Moldovanu, B., and W. Zame, (2006). The Limits of Ex Post Implementation. *Econometrica*, 74: 585-610.

Neeman, Z. (2004). The Relevance of Private Information in Mechanism Design. *Journal of Economic Theory*, 117: 55-77.

Wilson, R. (1987). Game-Theoretic Analyses of Trading Processes. *Advances in Economic*

*Theory: Fifth World Congress*, ed. by T. Bewley. Cambridge University Press, Chap. 2, 33-70.

## **5. Hierarchies**

### 5.1 Set-up. Information structures

### 5.2 Loss of control

Martimort, D. (2007). Multi-Contracting Mechanism Design, *Advances in Economic Theory Proceedings of the World Congress of the Econometric Society*, eds. R. Blundell, A. Newey and T. Persson, Cambridge University Press.

McAfee, R. and J. McMillan (1995). Organizational Diseconomies of Scale, *Journal of Economics and Management Strategy*, 4: 399-426.

Melumad, N., D., Mookherjee and S. Reichelstein (1995). Hierarchical Decentralization of Incentive Contracts, *The RAND Journal of Economics*, 26: 654-672.

Mookherjee, D. and M. Tsumagari (2004). The Organization of Supplier Networks: Effects of Delegation and Intermediation, *Econometrica*, 72: 1179-1219.

### 5.3 Vertical collusion

Baliga, S. and T. Sjöström (1998). Decentralization and Collusion. *Journal of Economic Theory*, 83: 196-232.

Baron, D. and D. Besanko (1992). Information, Control, and Organizational Structure. *Journal of Economics, and Management Strategy*, 1: 237-275.

Faure-Grimaud, A., J.J. Laffont and D. Martimort (2003). Collusion, Delegation and Supervision with Soft Information, *The Review of Economic Studies*, 70: 253-279.

Kofman, F. and J. Lawarree (1993). Collusion in Hierarchical Agency. *Econometrica*, 61: 629-656.

Laffont, J. J. and D. Martimort (1998). Collusion and Delegation. *The RAND Journal of Economics*, 29: 280-305.

Laffont, J. J., and D. Martimort (1999). Separation of Regulators Against Collusive Behavior. *The RAND Journal of Economics*, 232-262.

Laffont, J. J. and J. Tirole (1991). The Politics of Government Decision-Making: A Theory of Regulatory Capture. *The Quarterly Journal of Economics*, 106: 1089-1127.

Tirole, J., (1986). Hierarchies and Bureaucracies: On the Role of Collusion in Organizations, *Journal of Law, Economics and Organization*, 2: 181-214.

Tirole, J., (1992). Collusion and the Theory of Organizations, in *Advances in Economic Theory: Proceedings of the Sixth World Congress of the Econometric Society*, ed. J.-J. Laffont, Cambridge: Cambridge University Press.

### 5.4 Horizontal collusion

Bergemann, D. and S Morris (2005). Robust Mechanism Design. *Econometrica*, 73: 1771-1813.

- Che, Y. K. and J. Kim (2006). Robustly Collusion-Proof Implementation, *Econometrica*, 74: 1063-1107.
- Laffont, J. J. and D. Martimort (1997). Collusion under Asymmetric Information, *Econometrica*, 65: 875-911.